

- 1 Q. (Liberty December 17, 2014 Report to Board on *Supply Issues and Power Outages*
2 *Review Island Interconnected System* addressing Newfoundland and Labrador
3 Hydro) Recommendation 2.13 states (Appendix A, page A-3) that given the
4 vulnerabilities likely to be present on December 1, 2014, Hydro must prepare an
5 emergency contingency plan to identify all generation resources for a potential
6 supply emergency while the new CT remains unavailable. Hydro's *Supply and*
7 *Demand Status Report* filed with the Board on Friday, January 9, 2015 indicates that
8 the new CT is not yet in service, and 25 MW of the Stephenville Gas Turbine
9 remains unavailable (since December 15, 2014). Has Hydro filed an emergency
10 contingency plan with the Board, and what generation resources has Hydro
11 identified that are not already accounted for in the *Demand and Supply Status*
12 *Report*?
- 13
14
- 15 A. Hydro's contingency plan for addressing supply related emergency situations is
16 outlined in a letter from Hydro to the Board on December 23, 2014, a copy of which
17 is attached as CA-NLH-085 Attachment 1. All generation resources and load
18 reduction strategies are included in the *Demand and Supply Status Report* provided
19 to the Board. As customer conservation is not specifically quantifiable, it is not
20 included in the daily status report.



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December 23, 2014

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, Newfoundland & Labrador
A1A 5B2

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

**Re: The Board's Investigation and Hearing into Supply Issues and Power Outages
on the Island Interconnected System**

On December 18, 2014, Newfoundland and Labrador Hydro (Hydro) received the Board of Commissioners of Public Utilities (the Board) commissioned report "Supply Issues and Power Outages Review Island Interconnected System" (the Report) authored by The Liberty Consulting Group. In response to *Recommendations* section E, item 2.13 (page 35) of the Report and a discussion with Board staff on December 22, 2014, Hydro submits the following actions in response to item 2.13, parts a) through e).

- a) *"Prepare an emergency contingency plan to identify all generation resources for a potential supply emergency while the new CT remains unavailable."*

Hydro utilizes Standard Operating Instruction T-001 "Generation Reserves" (see December 19, 2014 version attached as Attachment 1). This instruction details the methodical steps Hydro takes to manage the generation reserves on the Island System through placing generation onto the system and through reducing load. These steps constitute the plan for all current generation sources and for when the new CT is a part of Hydro's generating capacity. This recommendation is already in place.

To illustrate the plan above, consider the current MW value associated with T-001 "Generation Reserves" utilizing data on the Daily Supply and Demand Report for December 21, 2014.

- i. The Available Island System Supply is presented as 1,855 MW. This is comprised of Hydro's generation capacity for the day, plus generation that can be provided from Newfoundland Power, Corner Brook Pulp and Paper, and Vale. It should be noted that this level of system supply fluctuates for reasons such as generating units out of service or water availability for hydroelectric generation.

- ii. Hydro then estimates the demand on the system that can be reduced. There are three primary methods to reduce load. The first is through interrupting Corner Brook Pulp and Paper to a current maximum of 60 MW. The second is through reducing demand on the system by reducing system voltage within CSA standards (prorated based upon what load is on the system compared to season peak, and this amount is expected to be approximately a maximum of 20 MW). The third primary method is to further interrupt Corner Brook Pulp and Paper load by a maximum of 30 MW. The potential total of reducing the system demand is approximately 110 MW.
- iii. In addition to the Operating Instruction T-001, Hydro will also work with Newfoundland Power in communicating to customers, requesting customers to conserve energy through various media methods. The quantity of load reduction that can be achieved through customer conservation is not quantifiable in advance but when implemented in the past, provides visible load reduction.

b) "Report to the Board all steps being taken to expedite completion of the new CT".

In the final two weeks of December, Hydro will be commissioning, testing and synchronizing the new CT with the system at a load at or below 40 MW. Synchronization is expected on or before December 31.

Hydro has developed a deliberate and careful commissioning process to ensure safety and reliability. The process works through each stage of testing to ensure the new CT operates as required for reliable service. The commissioning process and loading protocol utilizes 40 MW as the load for which testing will occur. This load is selected such that the Island System will likely not see an impact of testing the CT when synchronized with the system. As a prudent and cautionary approach to mitigate under-frequency load shedding events, Hydro will increase the load on the CT in roughly 10 MW increments. Hydro has completed a formal risk review to identify risks when the new CT is placed on line at various loads. This risk review identifies measures to implement thereby minimizing the risk of underfrequency events and keep customers informed as necessary.

Hydro has revised and attached the Holyrood CT Bi-Weekly update (Attachment 2) to provide additional detail on specific tasks.

c) "Be prepared to trigger emergency plans when and if extreme weather sufficient to reach or exceed expected peaks is forecast."

When extreme weather sufficient to reach or exceed expected peaks is forecast, Hydro is prepared and the plan is twofold: first, Hydro will implement its Standard Operating

Instruction T-001 "Generation Reserves" to manage the peak as much as is possible (discussed above in section a); and second, Hydro will implement the "Joint Storm/Outage Communication Plan" (the Plan) (see PUB-NLH-304, Attachment 1, Rev 1, December 3-14).

In the Plan, Hydro and Newfoundland Power detail the Customer and Stakeholder Advance Notification Plan. Per the notification plan, Hydro has committed to notify customers and stakeholders at various levels of generation reserves. Among other actions, Hydro and Newfoundland Power communicate with customers on actions they can take (e.g. conservation) to mitigate the peak, or actions that will be taken by the utilities (rotating outages in unlikely, extreme situations). Details of the notification plan are provided on page 94 of the attachment noted above. This recommendation is in place at present.

d) "Report to the Board daily whenever forecasted reserves for the day are less than 10 percent."

Hydro provides a daily Supply and Demand Status Report to the Board. This report contains the Available Island System Supply for the current day in Section 2. Section 3 contains the Forecast Island Peak Demand. The difference in these two numbers is the base generation reserve. If the system forecast requires further reserves than the base generation reserves, the demand management steps (discussed above in part a) can be implemented to further add to the reserves. This daily report informs the Board of forecasted reserves on a daily basis, therefore, this recommendation is effectively in place at present.

e) "Report to the Board immediately whenever forecast reserves fall under 10 percent during any day."

The "Joint Storm/Outage Communication Plan" (the Plan) provides for notifications to the Board in the event generation reserves reach pre-determined notification levels. Hydro's Energy Control Centre monitors system demand and load forecast and if the demand trends in a fashion such that generation reserves reach pre-determined notification levels through any day, the Board will be notified per the Plan details (discussed in part c). Through the utilization of this notification protocol, this recommendation is effectively in place at present.

We trust the foregoing is satisfactory. If you have any questions or comments, please contact the undersigned.

Ms. C. Blundon
Public Utilities Board

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Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO


Wayne D. Chamberlain, Q.C.
General Counsel & Corporate Secretary

WDC/jc

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
ecc: Roberta Frampton Benefiel – Grand Riverkeeper Labrador

Thomas Johnson – Consumer Advocate
Danny Dumaresque

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	Inst. No.	T-001
TITLE:	GENERATION RESERVES *, **	Page	1 of 5

INTRODUCTION

In order to ensure that customer service is maintained, the Energy Control Centre (ECC) shall exercise its authority to reduce risks to the generation supply and maintain sufficient generation reserves to meet current and anticipated customer demands. The ECC shall be prepared to deal with generation shortages and take appropriate actions in order to maintain the reliability of the Island Interconnected System.

*Generation reserve*¹ is required to replace generation capacity lost due to an equipment forced outage, to cover performance uncertainties in generating units or to cover unanticipated increases in demand. Sufficient generation reserve is required to meet current and forecasted demands under a contingency of the largest generating unit.

PROCEDURE

A. Calculation of *Available Generation Reserve*²

Available generation reserve shall be calculated for the current day and the following six days in the manner as indicated below:

Available Generation Reserve for each day =
 Available Generation of NLH (Hydro + Thermal + *Standby*³ + *Purchases*⁴); *plus*
 Available Generation of NP (Hydro + Standby); *plus*
 Available Generation of DLP (60 Hz Hydro); *plus*
 Capacity Assistance of Vale (*Standby*)⁵; *less*
 Forecasted Island Peak Load (adjusted for CBPP Capacity Assistance⁶ and Voltage Reduction⁷)

¹ *Generation Reserve* is defined as the quantity of available generation supply that is in excess of demand, and includes spinning reserve⁸. It is equal to Available Generation Supply less Current / Forecasted Demand.

² *Available Generation Reserve* is associated with generation that is in service or standby generation that can be placed in service within 20 minutes. NP's mobile generation may take up to 2 hours to place in service.

³ *Standby* generation includes combustion turbine / diesel generation.

⁴ *NLH Purchases* includes wind for the current day based on actual wind output, but assumes no wind generation for the following six days.

⁵ *Capacity Assistance* (when available) from Vale through operation of standby diesel units with a combined capacity of 10.8 MW.

⁶ *Capacity Assistance* (when available) from CBPP through load interruption in 20, 40 or 60 MW blocks.

⁷ Up to 20 MW of load reduction (on peak) is expected to be achieved through the *Voltage Reduction* strategy.

⁸ *Spinning reserve* is defined as unloaded generation that is synchronized to the power system and ready to serve additional demand.

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	Inst. No.	T-001
TITLE:	GENERATION RESERVES *, **	Page	2 of 5

PROCEDURE (cont'd.)

B. Assessment and Notification of Available Generation Reserve

The available generation reserve will be calculated for the current day and the following six days and an assessment will be made against the criteria in the table below and a notification will be issued to stakeholders when available generation reserve is below the stated thresholds.

<u>Available Reserve</u>	<u>Expected Action</u>	<u>Level</u>
> Largest Generating Unit + min. spinning reserve	none	0
< Largest Generating Unit + min. spinning reserve	Prepare for Potential Load Reduction	1
< Largest Generating Unit	Load Reduction	2
< ½ Largest Generating Unit	Conservation	3
Zero/deficit; hold f=59.8 Hz	Rotating Outages	4

Based on the assessment above, perform the following:

- Level 0 - If the available reserve is anticipated to be greater than the largest available generating unit capacity plus minimum spinning reserve, the ECC are not expected to perform any further actions, other than to advise the on-call Executive member (Exec On-call) of NLH's Corporate Emergency Response Plan (CERP), Corporate Relations and Newfoundland Power that available reserve has returned to normal following a prior Level 1, 2, 3 or 4 notice.
- Level 1 - If the available reserve is anticipated to be less than the largest available generating unit capacity plus the minimum spinning reserve, the ECC will notify Newfoundland Power's Control Centre, advising of possible requirements for load reduction to maintain sufficient spinning reserve, if the available generation reserve should decrease.
- Level 2 - If the available reserve is anticipated to be less than the largest available generating unit capacity, the ECC will notify Exec On-call (CERP)⁹, Corporate Relations¹⁰ and Newfoundland Power, advising of load reduction strategies to maintain sufficient spinning reserve, if the generation shortfall is not corrected.

⁹ As part of the CERP, the Exec On-Call makes the decision to activate the Corporate Emergency Operations Centre (CEOC) and issues alert notifications.

¹⁰ Corporate Relations is responsible for activating the joint communication plan between NLH and Newfoundland Power.

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TITLE:	GENERATION RESERVES *, **	Page	3 of 5

PROCEDURE (cont'd.)

- Level 3 - If the available reserve is anticipated to be less than half of the largest available generating unit capacity, the ECC will notify Exec On-call (CERP), Corporate Relations and Newfoundland Power, advising of customer conservation strategies to help maintain sufficient spinning reserve, if the generation shortfall is not corrected.
- Level 4 - If the available reserve is anticipated to approach zero or fall into a deficit, the ECC will notify Exec On-call (CERP), Corporate Relations and Newfoundland Power, advising of rotating outages to help maintain frequency near the 60 Hertz standard, if the generation shortfall is not corrected.

The following is the standard message that will be communicated if it is anticipated that a notification is to be made under Level 1, 2, 3 or 4; or a return to Level 0:

"System Operations is advising that the available Island generation reserve is at a notification level [0-4] for [insert date here]. The available generation reserve is expected to be [insert reserve amount in MW], calculated from an available generation capacity of [insert available capacity in MW] and a peak load forecast of [insert peak forecast in MW]."

C. Maintaining Spinning Reserve

The ECC shall maintain sufficient spinning reserve to cover performance uncertainties in generating units, especially wind and other variable generation, and unanticipated increases in demand. The ECC will take appropriate action to maintain a minimum spinning reserve level equal to 70 MW. Such actions include the following: placing in service all available generating capacity, cancelling outages to generating units that have a short recall, deploying all available standby resources, including CBPP and Vale Capacity Assistance, cancelling industrial interruptible load and reducing system load, through procedures such as public conservation notices, voltage reductions, curtailing interruptible loads and non-essential firm loads.

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	Inst. No.	T-001
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PROCEDURE (cont'd.)

The following guideline shall be followed in the sequence outlined in order to maintain sufficient spinning reserve, maintain the reliability of the Island Interconnected System and minimize service impacts to customers:

Normal Sequence

1. Place in service all of Hydro's available hydroelectric generation.
2. Request Newfoundland Power to maximize their hydroelectric generation.
3. Make a Capacity Request of Deer Lake Power to maximize their hydroelectric generation.
4. Request Non-Utility Generators to maximize their hydroelectric and wind generation.
5. Maximize Holyrood thermal generation.
6. Start and load standby generators, both Hydro and Newfoundland Power units, in order of increasing average energy production cost with due consideration for unit start-up time, while holding the least efficient NLH standby combustion turbine unit in reserve. (At this point in time it is important to notify customers taking non-firm power and energy that if they continue to take non-firm power, the energy will be charged at higher standby generation rates.)
7. Request Newfoundland Power to curtail its interruptible loads (typically up to 10 MW and can take up to 2 hours to implement).
8. Request Corner Brook Pulp and Paper for Capacity Assistance (20, 40 or 60 MW).
9. Request Vale for Capacity Assistance (11 MW).
10. Start and load the remaining NLH standby combustion turbine unit.

Load Reduction

11. Cancel all non-firm power delivery to customers and ensure all industrial customers are within contract limits.
12. Inform Newfoundland Power of Hydro's need to reduce supply voltage at Hardwoods and Oxen Pond and other delivery points to minimum levels to facilitate load reduction. Implement voltage reduction.
13. Request Newfoundland Power to implement voltage reduction on their system.

SYSTEM OPERATING INSTRUCTION

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PROCEDURE (cont'd.)

Load Reduction (cont'd)

14. Request industrial customers to shed non-essential loads, informing them of system conditions.
15. Request Corner Brook Pulp and Paper for Supplemental Capacity Assistance (to a maximum of 30 MW). Note that this is above the Capacity Assistance request and a request for the full 30 MW will likely reduce CBPP Mill load to that required for essential services. Upon request for Supplemental Capacity Assistance, arrangements should be made with TRO-Central to close the load break bus tie switch B2B4-1 at Massey Drive.

Rotating Outages

If the spinning reserve continues to decrease below the minimum level, the system frequency should be watched closely. In order to minimize outages to customers, utilize the reserve as much as possible and maintain the system frequency at 59.8 Hz.

16. Request Newfoundland Power to shed load by rotating feeder interruptions. At the same time, shed load by rotating feeder interruptions in Hydro's rural distribution areas. Follow instruction for rotating outages, T-042.

* Part of the Environmental Plan

** Part of the Emergency Response Plan

REVISION HISTORY

<u>Version Number</u>	<u>Date</u>	<u>Description of Change</u>
0	1992-07-16	Original Issue

11	2014-12-19	Added Supplemental Capacity Assistance for CBPP
PREPARED: J. Tobin		APPROVED:

Supply and Installation of a 100 MW Combustion Turbine Generator

Status Update Briefing– Dec 19, 2014

Revision 1

Boundless Energy



Contents

- Project Dashboard
- Progress & Schedule Summary
- Cost Summary (S-Curve)
- Risk Analysis
- Project Photos

(Includes only material updated since Dec 5, 2014)

Project Dashboard

The project is progressing according to plan and in compliance with Safety, Quality and Cost, with concerns with Schedule.



Progress & Schedule Summary

1. Civil work is complete.
2. CTG unit is mechanically complete.
3. CTG control system is powered up and function testing is ongoing.
4. Mechanical BOP placement progress has advanced significantly since last report and is nearing substantial completion
5. Fuel storage tank is complete and fuel deliveries are ongoing.
6. Fuel pipeline is complete and tested

Progress & Schedule Summary (cont'd)

7. Electrical switchgear terminations and testing are ongoing.
8. Mechanical and electrical trades continue working double shifts to advance schedule.
9. Cost S-Curve reflects tracking in compliance with original plan.
10. Overall schedule is consistent with previous report and reflects slippage on several work fronts, and that said function testing and initial commissioning of CTG unit is still planned for the month of December 2014.

Weekly Schedule – Weeks 3 & 4 Dec. 2014

Dec. 21st – 27th

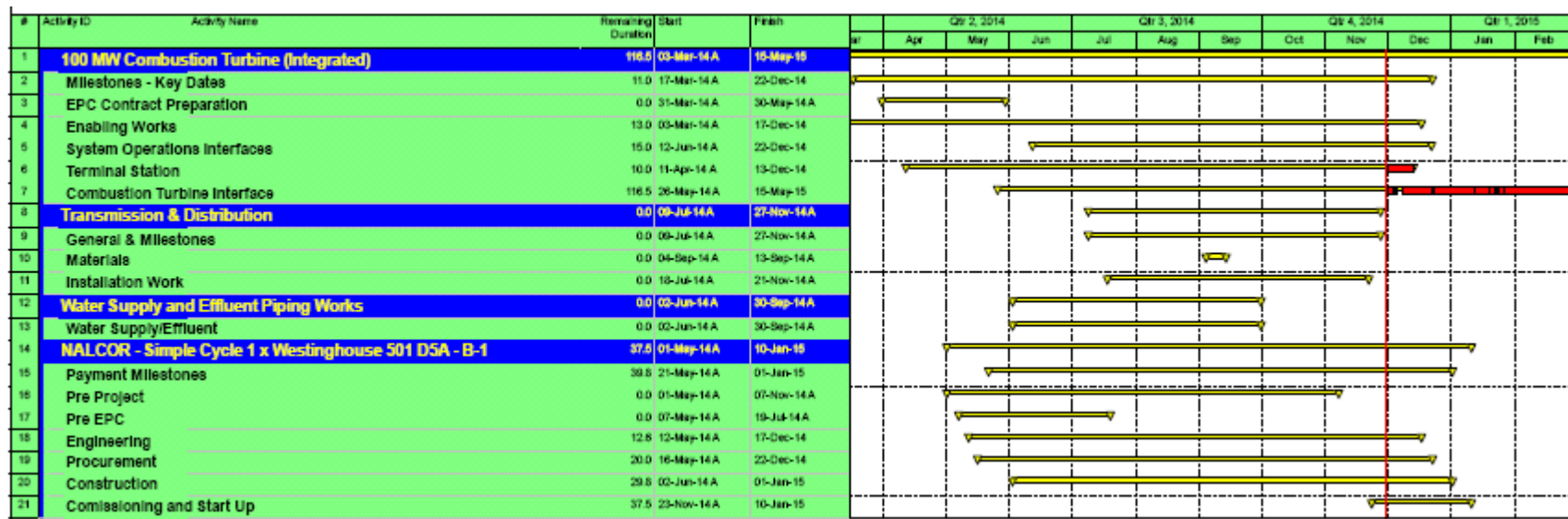
1. Protection termination, testing, and validation
2. Continuity testing and commissioning of sub systems
3. Independent testing and verification (Orbis, Acuren)
4. Formal risk review of energization plan
5. Formal approval of energization plan

Dec. 27th – 31st

1. Energization and backfeed
2. Remaining commissioning tests
3. Generation and synchronization
4. Ramping protocols with incremental load increases
 - Load testing from zero to 40MW, then 40MW to base load.

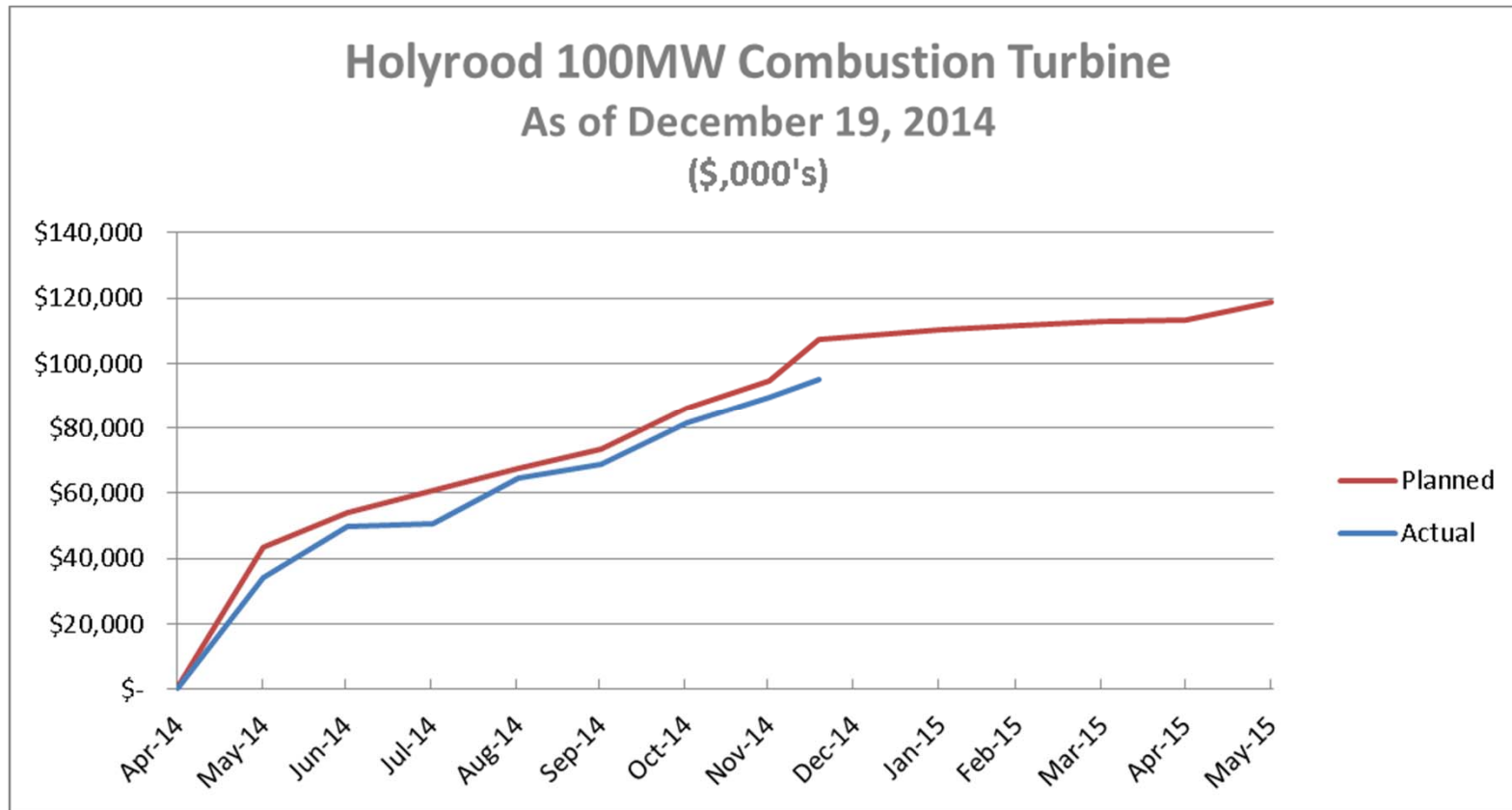
Level 2 – Summary Schedule

- Summary level schedule provided below.

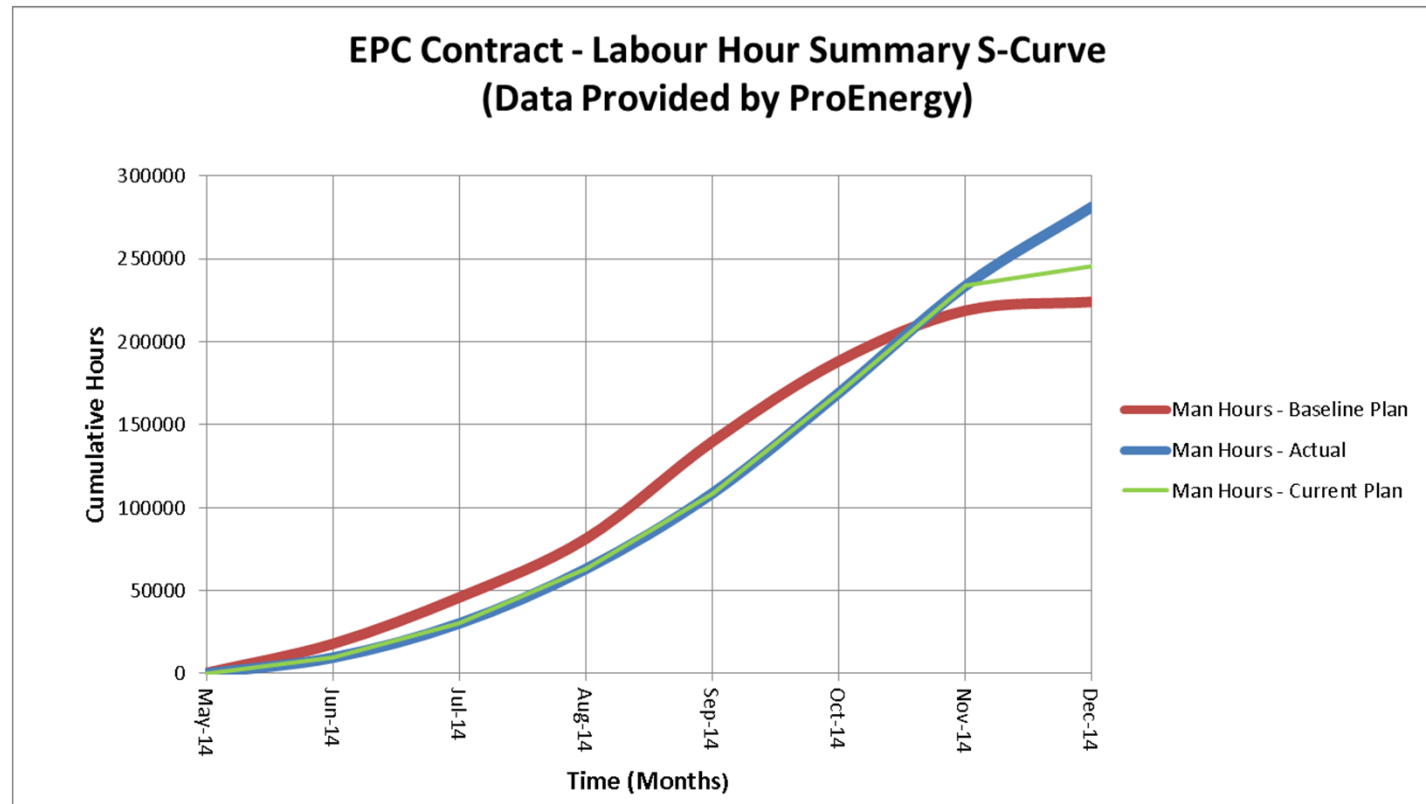


- 'Combustion turbine interface' task adjusted as the redundant black start line is not required and can not be connected until the temporary black start diesels are removed from service, which is being planned for 2015.

Cost Summary – S-Curve



EPC Labour Hour Summary



Notes:

Planned hours to Dec 15 (%Baseline Plan): 100%

Actual Progress to Dec 15 from Schedule: 90.09 %

Actual hours expended to Date (%Current Plan): 125.54%

Schedule Performance Index = 0.90 - **Indicates tracking behind plan**

Cost/Hrs Performance Index = 0.72 - **Indicates slippage in labour efficiency**

Total Hours to Date: 280,000 with 1 LTI

Risk Analysis

A 3rd party facilitated risk workshop was held on June 26th.

Risk Register was produced during the workshop. 50+ risks identified.

Risk mitigation plan in place and being used to manage risk during execution of the project.

Key Risks & Mitigation (cont'd)

Risk: Construction activities lead to contact with energized lines leading to safety incident.

Mitigation: Relocate lines, power line hazard training for operators, use permit system, prepare lift plans, de-energize lines where possible.

(Dec 19 update – Line energized this period as lifting activities in this area are complete, signage posted, spotters being used as required, status covered in tailboard talks)

Key Risks & Mitigation (cont'd)

Risk: Unfamiliarity with new equipment leads to delay in commissioning.

Mitigation: Training included in EPC contract; engage operations and commissioning personnel early in the process.

(Dec 19 update – Startup and Commissioning teams established)

Key Risks & Mitigation (cont'd)

Risk: Lack of coordination of work with all of the work crews on site leads to safety incident.

Mitigation: HSE Plans; Site Orientations; Contractor coordination meetings; toolbox meetings.

(Dec 19 update – Continue to have daily coordination meetings with relevant parties. Several specific safety meetings held to discuss working in congested work areas.)

Key Risks & Mitigation (cont'd)

Risk: Aggressive project schedule does not allow for any delay or rework in design – leads to schedule delay.

Mitigation: Close coordination between fast-track design and construction teams; regular coordination meetings; field engineering engaged with design team, increase shifts as required to pick up any delays.

Mitigation action ongoing requires day by day measurement and management.

(Dec 19 update – Additional schedule review and issues and solves sessions held to mitigate schedule impacts. Additional technical resources engaged at job site to mitigate any technical issues as they may arise.)

Key Risks & Mitigation (cont'd)

Risk: Delay in delivery of equipment and/or materials leads to schedule delay.

Mitigation: expediting; order materials as early as possible; identify long lead items early in project; choose appropriate shipping method; identify work around contingency plans.

(Dec 19 Update - Late materials delivery continues to be an exposure. Shipments are being expedited daily. Late deliveries on electrical equipment and materials have pushed function testing and commissioning later into December)

Key Risks & Mitigation (cont'd)

Risk: Adverse weather conditions could negatively impact construction progress.

Mitigation: Use of temporary enclosures to protect equipment and enable work to proceed during adverse weather conditions.

(Dec 19 – Temporary enclosures have been constructed as required. Permanent Building envelope construction is now underway)

Project Photos

Photo 1 – Building Construction



Photo 2 – Fuel Delivery



Photo 3 – Exhaust Stack Complete



Photo 4 – Fuel Line Heat Tracing



Photo 5 – Foam Fire Protection System

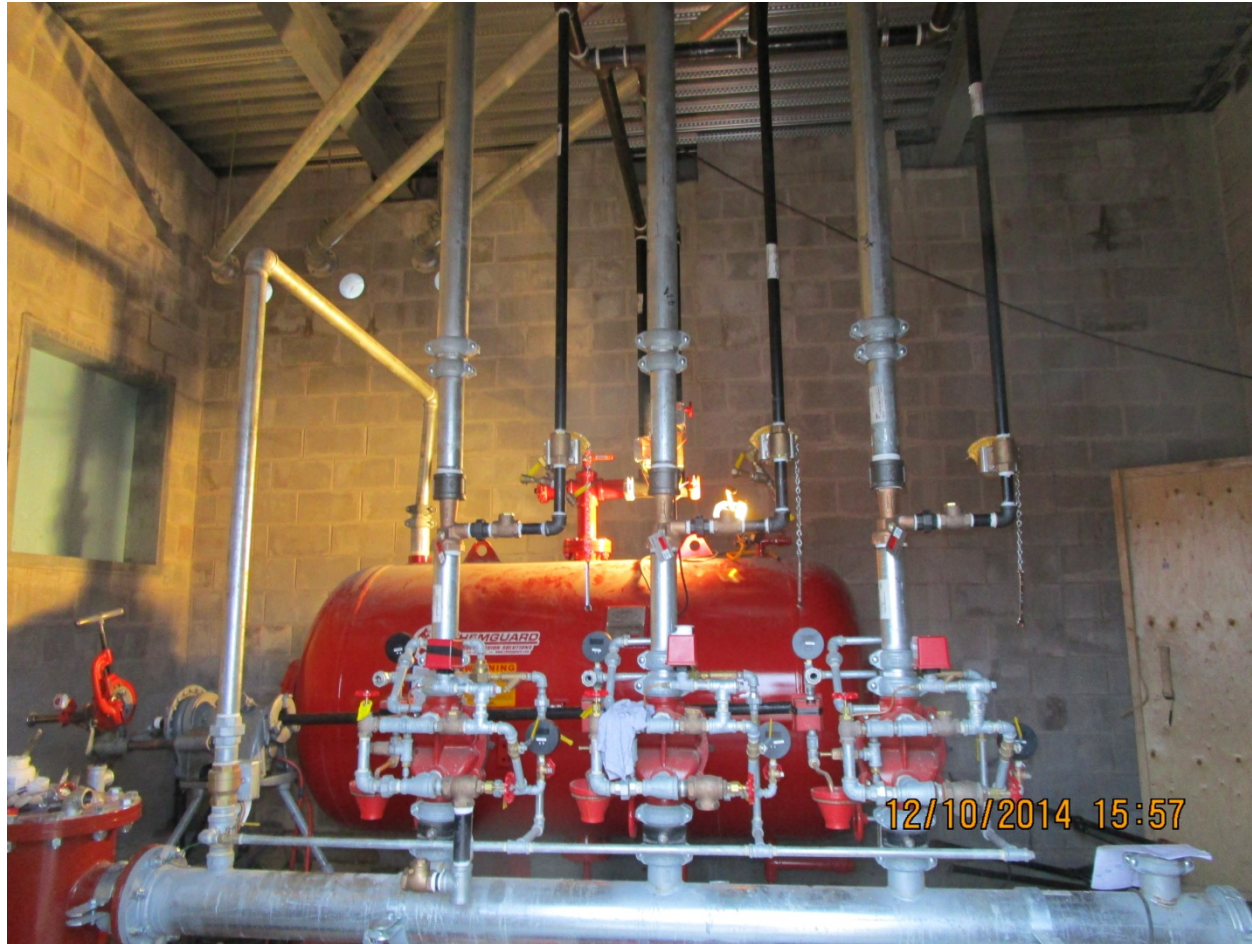


Photo 6 – Black Start Diesel Generator

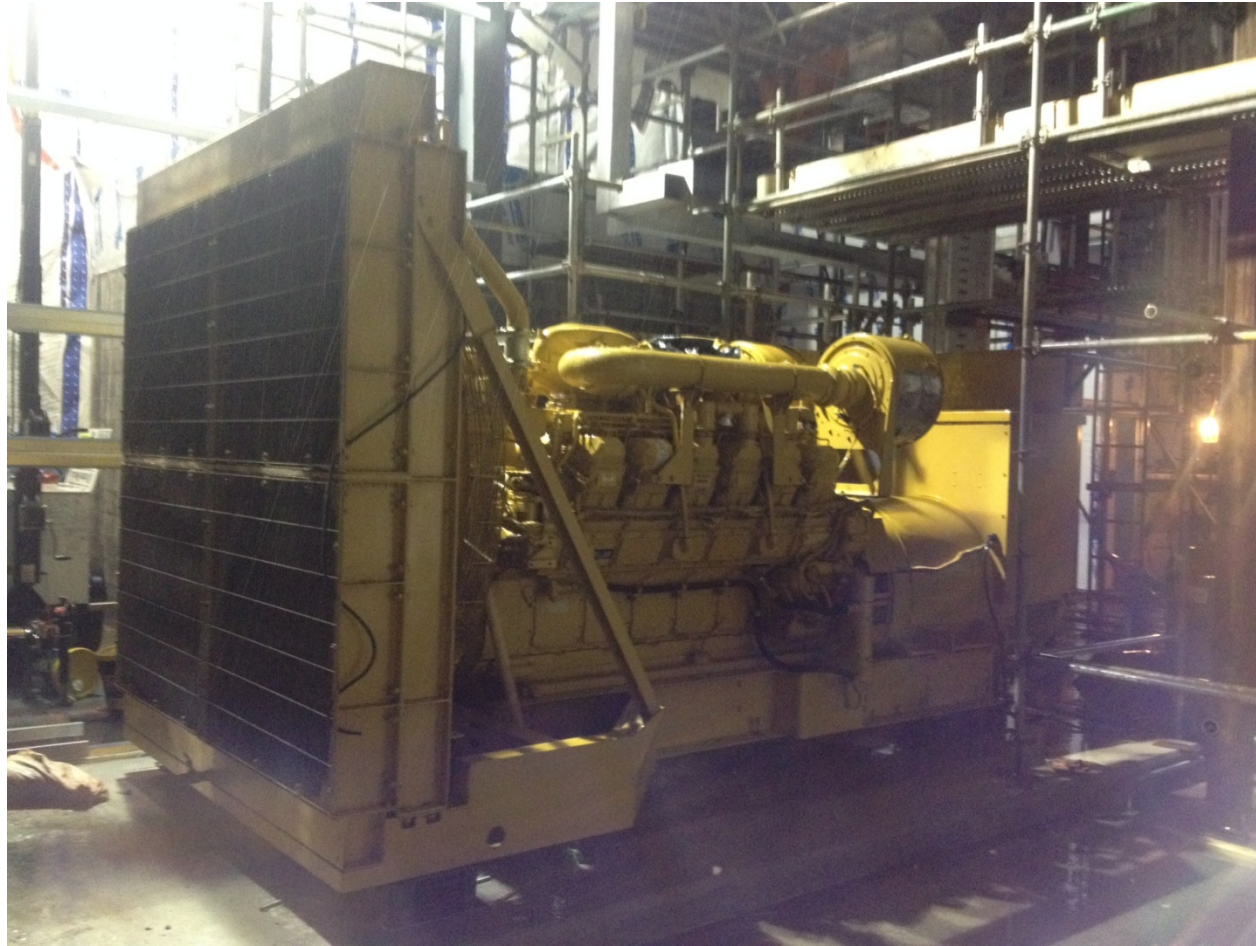


Photo 7 – Aerial View of Site



Photo 8 – Site View Looking North



