Wesley Hawe

From: Paul Wilson <plwilson@mhi.ca>
Sent: Wednesday, August 31, 2011 4:59 PM
To: Fred Martin
Subject: Biweekly report revised
Attachments: 20110826 Biweekly Report 3 Rev 4.docx

Hi Fred, here is the revised Biweekly report we were discussing.

Paul Wilson

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August 30, 2011

File: NFLD
Status: Draft Revision 4

Newfoundland and Labrador
Board of Commissioners of Public Utilities
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Attention: Maureen Greene, Legal Counsel

Nalcor Submission Two Option Study Project – Biweekly Report 3

Manitoba Hydro International Ltd is pleased to present the biweekly report for the period August 14 to August 27. This report is divided into six sections: activities completed to date, activities planned for the next two weeks, legal compliance update, significant issues and findings, schedule, and cost and expenses. A spreadsheet on MHI's assessment of the RFIs filed to date is also appended.

1. Activities Completed To Date

During this period, activities on the project involved technical and financial reviews of the material submitted by Nalcor.

Technical and Financial reviews under way in this period include:

- AC Power System and HVDC Integration Studies
- Options Reliability Study
- Nalcor System Load Forecast
- HVDC Feasibility Study

Personnel involved at site this period:

- Paul Wilson, MHI Project Director
- Craig Kellas, Load Forecasting Specialist
- Enrico Colombo (CESI), Marine Crossing Assessment

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- Bob Dandenault, Thermal Review Operations and Maintenance
- Paul Durkin (Gryphon Engineering), Thermal Engineering

This represents the last of the technical assessment visits as all other technical teams have now been to site.

A total of 95 Information Requests (RFIs) have been filed to date by MHI, in addition to the twenty two information requests filed by the PUB. MHI has also prepared another 23 RFIs and forwarded them to Fred Martin for review and submission to Nalcor. The RFIs are increasingly more detailed and we anticipate that Nalcor will take another two to three weeks to prepare answers for this latest set of questions.

2. Activities Planned for the Next Two Weeks

The visit schedule has been revised for next week recognizing a new deadline for the final report.

The travel itinerary details are as follows:

Week of August 28 – September 3

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Rick Horocholyn		28-Aug	12:07am AC1196	02-Sep	5:15 AC259	CPW analysis and report		
Mack Kast		28-Aug	12:07am AC1196	02-Sep	5:15 AC259	CPW analysis and report		

Week of September 4 – September 10 (Labour Day Sept 5th)

MHI will not be at site this week. Project staff will use the time in Winnipeg to prepare the framework for the final report, and the respective draft reports now available into one consolidated report. Staff will also continue with their Technical Reviews as documents are made available.

3. Legal Compliance Update

All of the legal compliance issues have been resolved.

Eight PEGNL professional engineering registrations have been received, or receipt is imminent. All engineering team members have been requested to provide a copy of their registration letter. One additional engineering registration has been applied for - Paul Durkin.

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The Permit to Practice notification letter has been received for MHI, Permit No. N0474.

4. Significant Issues and Findings

Cumulative Present Worth (CPW) Analysis Status Report

Activities this period for the CPW team have been focused on monitoring and reviewing the RFIs published this past period.

The CPW team has been actively involved in coordination of material with the technical teams this period.

Mack Kast has also reviewed and commented on the load forecast report, and subsequently prompted some clarification to the sensitivity analysis options. The work is now embodied in MHI-Nalcor-41 and resulting in Exhibit 43.

More activity is anticipated in the next two weeks as the finance team will be on site focused on preparing the CPW report.

Technical Reviews Status Report

Technical review activities this period centered on the Thermal, SOBI Marine Crossing, and Load Forecast areas with reviewers on site. A number of new RFIs were drafted based on input from the Technical team. Preliminary draft reports have been filed and are in various states of completion as MHI is waiting on Nalcor's responses to a number of RFIs. As the deadline approaches, decisions will have to be made on qualifying areas of investigation if responses are not published effecting the overall quality of the investigation. Reports have been filed in the following areas with some key findings noted.

Peter Rae (Muskrat Falls GS) - A draft report has been filed and revised based on feedback from the CPW team. Peter is waiting on information requested from Nalcor to complete his report.

Charly Cadou (Hydrology) – A draft report has been filed and the conclusions are not a surprise considering how well the Muskrat Falls GS and Churchill River system has been studied. Further RFIs have been requested but the conclusions to date are:

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- The studies were conducted in a professional, comprehensive, and detailed manner where no apparent weaknesses were identified;
- Unless the final layout of Muskrat Falls changes significantly, especially the spillway, which may affect routing of the PMF, the PMF studies can be considered final. However, since the spillway has to be finalized, the post-project routing component with HEC-RAS (Hydrologic Engineering Center- River Analysis System, a simulation tool of the US Army Corps of Engineers) should be re-run to test the new spillway variants;
- It may be necessary to increase the proposed diversion capacity of Muskrat Falls since the flood peak has increased by some 500 m^3/s above the value estimated in the feasibility study. This would require the prior completion of the following activities:
    - A flood forecasting analysis to predict local flood flows;
    - Establishment of a minimum acceptable turbine flow at Churchill Falls during construction, in agreement with CF(L)Co.; and
    - Application of the river hydraulic model to determine the necessary timing of turbine flow reduction;
- Complete the ice studies to determine the potential effect of ice breakup on construction activities;
- Modify the layout in accordance with the findings of the numerical modeling of structures and test the modifications with the model;
- Update the spillway design in accordance with the latest PMF results;
- Before implementing the Emergency Preparedness Plan (EPP), an activity likely to take place once the project is built or near completion, update the dam break analysis with the final layout, and
- Re-run the power and energy generation model once the relevant parameters have been finalized.

Alex Gerrard (Isolated Island Option Hydro) – MHI is still waiting on responses for RFIs to allow Alex to complete his study. The projects are all relatively small and straight forward from a technical perspective. It is debatable whether or not the Island Pond and Portland Creek reports are truly at the feasibility level since the scope of work for the feasibility studies were reduced after contract award and the extent of some of the field investigations

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are very limited. The level of environmental work done is also limited, especially in the case of Round Pond.

In general, MHI would anticipate that the impact of the uncertainties would, if anything, increase the cost of the projects although nothing has been noted that would appear to have a major impact on capital costs.

As the capital investment of the three hydro's in the Isolated Island Option amounts to less than 5% of the total CPW of the Isolated Island Option, and that Portland Creek is included in both options, further refinement of the costs for the three hydro projects would have minimal impact on the difference between the CPW of the Isolated Island and Labrador Infeed options. Some work is still required to ensure that the costs provided are in the CPW analysis.

Dr. Bagen Bagen (System Reliability) – A draft reliability report has been prepared and Dr. Bagen is waiting on RFI responses to complete his report.

System probabilistic reliability studies including quantification of the impact of the LIL HVdc system on overall system reliability, and the comparison of the two alternatives in terms of reliability and reliability cost implications are major gaps in Nalcor's assessment.

MHI expected that the following probabilistic reliability analysis documents would be available at a minimum; however, these documents have not been supplied from Nalcor, nor are they available:

1. Complete investigations on the impact of the proposed LIL HVdc system on the overall system probabilistic reliability performance in terms of LOLE and/or EUE.
2. Comparisons of the reliability of the two alternatives in terms of LOLE and/or EUE.

In addition to above minimum documentation expected, the following assessments were also not available from Nalcor:

1. Revise detailed probability models (originally developed by PTI) for the proposed LIL HVdc system as input into the reliability studies.
2. Complete a comprehensive value based reliability analysis for the two alternatives to determine the relative worth of the two options in terms of risk costs.
3. Perform a thorough investigation on potential high impact low

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probability events and develop appropriate procedures to ensure the load on the Island of Newfoundland's Interconnected Electrical System can be substantively be met if a catastrophic event occurs.

4. Perform reserve margin studies for the two alternatives considering transmission restrictions.

The lack of documentation severely hampers MHI's ability to assess the overall reliability of the Island System, or review the relative performance of both options.

Based on Nalcor's response to RFI MHI-Nalcor-44, the NERC TPL-005-0 Standard referenced is silent on how reliability assessments are performed which leaves the option for Nalcor to use deterministic methods. However, Dr. Bagen has notes that industry as a whole is moving towards adoption of probabilistic methods which provide superior results. These recommendations are embodied in NERC's Resource and Transmission Adequacy Recommendations published in 1994. These methods are currently employed by NPCC member utilities, Ontario Hydro, BC Hydro, Manitoba Hydro and SaskPower, along with a number of organizations worldwide.

Craig Kellas (Load Forecast) – A draft report is in process and Craig is waiting on a number of responses to RFIs to complete his report. As indicated above, this report has been reviewed by the CPW team which prompted further clarifications on the sensitivity analysis.

Les Recksiedler (HVDC) – A draft report has been filed and MHI is still waiting on a number of responses to RFIs to complete this report. A number of cost implications have been raised and are under examination as it appears that Nalcor has not factored in any life cycle costs for asset management (ie: replacement of HVDC components) in their analysis. A number of technical issues on the Effective Short Circuit Current ratings, the Synchronous Condensers, and converter station and system reliability are also being examined.

Bob Dandenault and Paul Durkin (Thermal team) have just completed their visit and are now drafting their report. A number of RFIs were prepared this period to be submitted to Nalcor next week.

Allan Silk (AC Power Systems) – A draft set of comments was received which

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will be used to formulate the AC power system studies, integration studies, and system planning guidelines report. Some key comments are:

- The documentation provided so far is related to the Gull Island and LIL 3 terminal system. A number of issues that were raised in the supporting documentation that appears to be unresolved. For example, power system stabilizers on the Island and the collector system had to be studied, the status of the refinery at Pipers Hole needed to be addressed, and grid reinforcements to improve the thermal limits of the transmission lines were identified.

- There is a consistent reference throughout the documentation of a 200% overload on the HVDC system for 10 minutes without describing what type of mitigation is required to occur during that time frame. A ten minute mitigation period is very aggressive and the mitigation would have to be automatically deployed, e.g. operator initiated through a SCADA interface. However the continuous overload capability of 150% will be helpful in mitigating a significant number of single contingency ac disturbances involving loss of generation or DC system contingency. It would be beneficial to quantify a 30-minute overload capability as this is a defacto standard mitigation period in North America.

- Documents state that Nalcor has made a decision to ignore the impacts of a three phase fault at Bay d`Espoir. If this decision was based on technical reasons, further documentation is required to support this decision. If the reasons for ignoring this condition are business related, Nalcor may be assuming additional risk depending on the legal framework this decision was made, the existing and future agreements with stakeholders, and governing law.

  Industry standards used to define Good Utility Practices (GUP) are generally set in North America by NERC and these Standards are developed in an open forum with stakeholder input and approval. Standard TPL001-2 requires that planning studies should demonstrate that the system must be able to survive a 3 phase fault on any transmission circuit, generator, shunt device, or transformer without the interruption of firm transmission service, which would include generator to load service, or the loss of any load. Clearly, the reports

submitted demonstrate that this industry standard is not met. A review of the EMERA Terms Sheet is silent on the issue of GUP, NERC and the application of reserves.

Report

A draft report outline has been prepared and provided to the PUB Project Manager for comment.

A graphics designer has developed a template, graphic designs, and art work for this public report. The draft template is now available but has not yet to be forwarded to the PUB Project Manager for review and comment.

Issues

There was discussion between MHI, the Project Manager, and the Project Director regarding the implications of a Maritime Link on various areas under review particularly reliability. It was decided that there was uncertainty as to whether or not this could be explored under the Government's Terms of Reference. Also, there are a number of legal, technical, and business issues evident which would be barriers for successful and timely completion of this potential task, for example, access to EMERA technical information on the Maritime link.

MHI's assessment of the responses to the RFIs are appended in the spreadsheet "RFI Log Aug 25-11.xlsx".

5. Schedule

MHI this period requested an extension since many responses to the RFIs are still pending. We are dependent on receiving that information in order to perform a comprehensive and quality study. The new schedule discussed is as follows:

October 3rd, Preliminary Draft Report
October 10th, Comments returned by PUB project staff
October 17th, Final Draft report issued
October 24th, Presentation to of final draft report
October 31st, Final Report issued.

This schedule is still tentative pending ratification by the Board.

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MHI has logged approximately 53% of the budgeted person hours as at the end of August 13th. Update of the MS Project schedule in the next Biweekly report.

6. Costs and Expenses

Costs to date to August 13th together with the related budget estimates are detailed in the attached spreadsheet PDF file. Labour hours to date are 556.75 + 418.75 = 975.50 hours.

The costs estimated to August 13, 2011 are as follows:

Labour:	$159,139
Expenses:	$ 33,730
Total	$192,869

Note: The expenses may not be up to date as some expenses (notably from credit cards) take about 4 weeks to show on our account reporting system due to a processing lag.

The next biweekly report is due September 9th.

Regards,

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Paul Wilson
Managing Director Subsidiary Operations

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