Wesley Hawe

From: Paul Wilson <plwilson@mhi.ca>
Sent: Friday, August 26, 2011 9:21 PM
To: Fred Martin; Fred Martin (f.martin@[redacted]
Subject: Biweekly report, RFI assessments
Attachments: 20110826 Biweekly Report 3.docx; RFI Log Aug 25-11.xlsx

Hello Fred, I hear you have a big storm coming so I hope you can weather it no problem. Mack and Rick are flying in a day early (tomorrow) just so they can get it before the storm hits St. John's. They plan to see you first thing on Monday to coordinate their agenda for the week.

Attached is the Biweekly report in draft for your review before I issue it to Maureen. Mack and Al may send in some revisions this weekend which I may factor in on Monday.

The excel spreadsheet is our MHI RFI analysis and the contents of the COMMENTS and STATUS column would be of most interest. STATUS can include:

Accepted : the answer is satisfactory.

Unsatisfactory : Nalcor may have not answered the question, or there is insufficient detail, or the question was ambiguous and the answer was not what we were looking for.

Other : for example the "CPW Team to review". Some of the responses are very detailed, and the CPW team's task this week is to very that all the inputs are correct and traceable from the responses. Mack can speak to this on Monday.

I am pleased to see that most reports have been filed and Mack, Al, and I will be going through them over the next two weeks to consolidate and expand as required.

Have a safe weekend.

Regards,
Paul Wilson

	Newfoundland Options Review Project - Request For Information Log (Revised August 26/11)							
	Includes to Batch 15							
RFI No.	Request/Question	Addressed to	Requested by	Date of Request	Return Doc	Date of Return	Comments	Status
1)	What are the components that make up composite costs related to the CPW's related to each the options? Please provide a step-matrix back to the source documents.	Nalcor	CPW	18-Jul-11	Batch 8	10-Aug-11	Rev 1 (Exhibit 14, MHI-Nalcor-49.3)	Response is fairly detailed and appears ok. CPW team will assess during week of Aug 28.
2)	What is the sensitivity of the CPW if the time frame was reduced from 2067 to 2041?	Nalcor	CPW	18-Jul-11				
3)	What consideration has been given to the excess power capacity that will become available associated with the termination of the Upper Churchill Falls Agreement in 2041?	Nalcor	MHI	18-Jul-11				
4)	To what extent have the Isolated Island Option cost estimates been updated as related to Island Pond (2006), Portland Creek (2007), and Round Pond (1989)?	Nalcor	AG	18-Jul-11	Batch 4	5-Aug-11	Portland Creek is common to both, and most recent. Escalation is acceptable. Other two plants do not have a large capital expenditure.	Accepted
5)	Does the costing of all project estimates include AFUDC and Escalation? Has this been incorporated in the CPW analysis and available for review?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11		Accepted
6)	Recognizing that all projects related to each of the Options have not been estimated at the same level of detail, what adjustments have/should be done in order to be able to evaluate them on the same basis?	Nalcor	CPW	18-Jul-11	Batch 4	5-Aug-11		CPW team to review week of Aug 28
7)	What is the composition of the capital cost definition for the HVDC Capital Cost Exhibit 5 (e)?	Nalcor	CPW	18-Jul-11	Batch 2	27-Jul-11	Refer to the table in Batch 2 - Page 2 and Exhibit 5e	Accepted
8)	Have the exchange rates in the CPW analysis been revised from those initially used in the base year of the input document. For example Table 4.1a of Exhibit #5 (h) (Holyrood) indicated $1.50 CAD = $1.00 USD	Nalcor	CPW	18-Jul-11	Batch 3	August 4 ,2011		Accepted
9)	Please provide a report and related documentation to support the option to allow Holyrood to continue to operate in the Isolated Island alternative? Please include all related legal, technical, environmental and economic considerations for the operation or continued operation of Holyrood. For example, this will include the potential additions for precipitators, scrubbers, NOx burners, and grade of fuel to be used throughout its planned life of the alternative and the legal and environmental drivers that guide this alternative. What constraints does Newfoundland Hydro have on Holyrood operations today?	Nalcor	Thermal	18-Jul-11	Batch 4	5-Aug-11	Nalcor did not do a good job answering this question. To many unanswered questions.	Unsatisfactory
10)	Does Nalcor have a requirement to continue purchasing energy from the Wind farm NUGs for the foreseeable future or are the plants retired after 20 years of service?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11		CPW team to review week of Aug 28
11)	Provide a document that clearly outlines the retirement costs to take Holyrood out of service 2017 (or beyond)? What is the cost to convert unit(s) to synchronous condenser operation? Are these costs factored into the CPW analysis?	Nalcor	CPW	18-Jul-11	Batch 4	5-Aug-11		Accepted
12)	Explain the composition of the operating costs for Labrador Island Link in Exhibit 8? What is the source document for the cable inspection costs?	Nalcor	CPW	18-Jul-11	Batch 15	24-Aug-11	Refers to CE-44 Rev 1 section 7. Does not appear to line up with Exh 8.	CPW team to review week of Aug 28
13)	With respect to Exhibit 10 (a), please provide the load balance estimate annually from 2014 to 2067 in a format similar to that provided for years 2010 to 2014.	Nalcor	CPW	18-Jul-11	Batch 10	11-Aug-11	See RFI 13a and RFI 13b (Pages 3-4 of Batch 10)	CPW team to review week of Aug 28
14)	Please identify the additional costs to provide the extended overload capacity of the HVDC system and describe the financial impact it will have on the CPW analysis.	Nalcor	HVDC	18-Jul-11	Batch 2	27-Jul-11	Question was ambiguous. Costs of OL capacity have been factored into the CPW	Accepted
15)	With respect to Exhibit 11 and the plant maintenance requirements, please describe the HVDC plant performance criteria that are incorporated into the design requirements.	Nalcor	HVDC	18-Jul-11	Batch 7	10-Aug-11	Also see Exhibit 29 Revision 1, exhibit 29 is 30 years old to reference reliability. No reliability criteria defined in the answer. RFI 61 may supply the required information.	Unsatisfactory
16)	With respect to Exhibit 16, figure 7-3, please provide the justification and details supporting the addition of two 50 MW CTs and the 170 MW CCCT in the generation mix (years 2022, 2024 to 2027)?	Nalcor	Thermal	18-Jul-11	Batch 11	12-Aug-11	Did not deal with any capacity issues, only energy. Also refer to the Energy Balance and LOLH Results sheet in RFI 13	Accepted
17)	As one unit at Holyrood is already capable of synchronous condenser operation; when are the other two units converted? Please provide a document that outlines the plan and timing for the synchronous condenser conversion at Holyrood.	Nalcor	Thermal	18-Jul-11	Batch 7	10-Aug-11	No studies to support the conversion, cost estimates are not detailed or supportable. $$ may not be material to the overall Ref Question.	Unsatisfactory

18)	With respect to Exhibit 15, please explain how the numbers tie to the CPW results? Why were the 75/25 D/E ratio and respective costs not incorporated in the calculation?	Nalcor	CPW	18-Jul-11	Batch 3	4-Aug-11	Also refer to Exhibit 15 and the response to RFI 35	Accepted
19)	With respect to Exhibit 18 (HVDC), have the cost estimates and system configuration been upgraded to the current project definition? The original report had the converters at Gull Island and the transmission line was a different voltage. Please provide definitive design report(s) on the final configurations and costs for the HVDC Labrador Island Transmission System.	Nalcor	CPW	18-Jul-11	Batch 3	4-Aug-11	Refer to response to RFI 7 and CE 32 (Exhibit 23)	CPW team to review week of Aug 28
20)	With respect to Exhibit 19 (Muskrat Falls), has there been any detailed analysis carried out relating to the clay spur and the effectiveness of the sump pump system under impounded conditions (tests, simulations, experience of other dam operators)? Please provide supporting documentation.	Nalcor	AS	18-Jul-11	Batch 3, Ex38, Ex39, Ex40, Ex41	4-Aug-11	Appendix C of Exhibit 19; the Technical Note in Batch 3 (Pages 6-15) aka Exhibit 38; and consultant reports (Exhibit 39-41). No discussion on the effectiveness of the sump pumps under impounded conditions. To much material provided in the exhibits.	Unsatisfactory
21)	With respect to DC1010, what is the current HVDC operating voltage to be used in the Option 1 configuration? How has the capital cost been adjusted in the CPW for this configuration? Is there any provision for future capacity improvements included? Please provide supporting documentation.	Nalcor	CPW	18-Jul-11	Batch 3	4-Aug-11	See responses to RFI 7; RFI 24 and CE-32 (Exhibit 23)	CPW team to review week of Aug 28, appears satisfactory
22)	With respect to MF1320, this report indicates firm generation of 515 MWc, not 824 MWc at Muskrat Falls. Why?	Nalcor	PW	18-Jul-11	Batch 1	26-Jul-11		Accepted
23)	The +/- 320 kV was noted as the minimum operating voltage for the HVDC. Please explain the rationale for this decision; have conductor optimization studies been revised to support this; and revised cost estimates transmission lines, cables, and converter station equipment.	Nalcor	HVDC	18-Jul-11	Batch 2	27-Jul-11	See document HVdc System - Historical Summary - 2011-07-14, Exhibit 23 and responses to RFI 7 & RFI 24	Unsatisfactory, RFI-62 filed
24)	What assurances exist and what are the cost implications for mainland power sources to supply firm power in the event of a loss of the HVDC system?	Nalcor	AS	18-Jul-11	Batch 1	26-Jul-11	Nalcor has not confirmed that the reliability is adequate in terms of HVDC system. Maritime link is not to be considered in the Ref Question.	Questions to be reworded for other power sources, not just mainland. Another RFI may be required.
25)	With respect to document DC1010 " Voltage and Conductor Optimization" a. How do the costs for the various voltage options at the top of page 3-20 get factored into the CPW? b. In para 3.2.4 it is stated, "The costs estimates exclude the costs for operating and maintaining the transmission system, and also exclude the costs for laying and protecting the submarine cables, which will have a significant impact on the total project costs." Please explain the rational and elaborate.	Nalcor	CPW	18-Jul-11	Batch 2	27-Jul-11	a) See document HVdc System - Historical Summary - 2011-07-14, Exhibit 23 and responses to RFI 7 & RFI 24 b) These costs are beyond the scope of DC1010; applicable estimates were prepared by Nalcor and included in the CPW.	Ref to RFI is OK - Tech Team to check ref to RFI 24; Technical Team needs to review part (b)
26)	What costs have been factored in for public consultations on either option?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11		Accepted
27)	What costs have been factored in for environmental assessments?	Nalcor	CPW	18-Jul-11	Batch 2 / Batch 6 / Batch 7	July 27 / Aug 10	Rev 1	Accepted
28)	What costs have been factored in for land owner easements, expropriations, and purchases?	Nalcor	CPW	18-Jul-11	Batch 5	8-Aug-11		Accepted but CPW team to confirm week of Aug 28
29)	With respect to Document 1500 "Electrode Review – Confirmation of Type and Site Selection" a. Where is the cost estimate of $8.2 million set out in section 6.6 on page 86 included in the CPW numbers? b. At the bottom of page 88, several recommendations have been suggested to improve the confidence level associated with the assumptions. Have these recommendations been carried out and if not/so, what are the cost implications?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11		Not responsive to where cost est is. Tech Team should review part (b)
30)	With respect to Document MF 1010 "Pre-Feed Engineering Study – Muskrat Falls – Study of Variants" a. It is indicated the unit prices were updated to the 2007 base year from the 1999 report. Please identify where the revised numbers shown in Appendix D have been included in the CPW output?	Nalcor	CPW	18-Jul-11	Batch 2	27-Jul-11		Tech Team should provide overview
31)	Has Nalcor received an updated report from Global Insights relating to the estimates used in the Studies? Please provide a copy of the base Global Insights report, and any revised reports?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11	CE36, DN076-079	Accepted - subject to check, the revised reports have not been provided
32)	What is the basis for using 10 % rate of return on equity used in the studies?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11	Exhibit 5e	Accepted
33)	Have any guarantee fees, water rentals, land grants or dividend payments been factored into the cost of the options?	Nalcor	CPW	18-Jul-11	Batch 1	26-Jul-11		Accepted
34)	With respect to Exhibit 5(b), Section 5.2, please provide details relating to the owner's costs (8.7% of Total Direct Costs) as set out in the cost estimates of Island Pond?	Nalcor	CPW	18-Jul-11	Batch 2	27-Jul-11		Accepted

35)	Have the costs of the Muskrat Falls Option been included using a PPA approach as opposed to actual capital expenditure cash flow in the CPW? If so, please explain the rationale for doing so.	Nalcor	CPW	18-Jul-11	Batch 3	4-Aug-11	The costs of Muskrat Falls energy have been included as a PPA; also see responses to Request #4 from the Board's July 12, 2011 letter to Nalcor and RFI 18	Accepted
36)	Please provide unredacted cost estimates for each component of the Isolated Island Options, SOBI and all other reports.	Nalcor	MHI	24-Jul-11	Batch 12	16-Aug-11	SOBI in CE44, Island Pond in CE48, and Portland Creek in CE49	Accepted
37)	Please provide a document that describes the Newfoundland Hydro and Nalcor power system planning criteria	Nalcor	AC	24-Jul-11	Batch 5, Ex42	8-Aug-11	Also see Exhibit 42	Under review pending Alan Silks report
38)	Please provide specifications for the HVDC converter stations related to the current configuration.	Nalcor	HVDC	24-Jul-11	Batch 8	10-Aug-11	Refer to Section 6 in Exhibit 30 (LCP Design Progression, 1998-2011)	Unsatisfactory
39)	Please provide the updated AC integrations studies for the 2011 HVDC configuration. This should include the AC system operational performance criteria, and any operational issues that need to be factored into the system design.	Nalcor	AC	24-Jul-11	Batch 7	10-Aug-11		Under review pending Alan Silks report
40)	Please provide the AC Power System Integration Studies for the Isolated Island option.	Nalcor	AC	24-Jul-11	Batch 5	8-Aug-11	Also see Exhibit 24	Under review pending Alan Silks report
41)	Documentation is requested on which modules of Ventyx Strategist Software were used to derive the CPW? Please identify the 'objective functions' used as input and what are the parameters and weights given to each of the objective functions. If more than one module was used, please elaborate on how these objectives are tied together. What sensitivities were run relative to the base case and what were the results of the sensitivity runs? Please explain on how the transmission capabilities, transfer limits and any system operating constraints were factored into the model.	Nalcor	CPW	24-Jul-11	Batch 9, Ex24	11-Aug-11	Also see CE-50 and Exhibit 43	Acceptable, subject to point that page 12 does not specify sulphur content. Will follow up on-site.
42)	Please provide the detailed data inputs used in the Strategist runs for both option cases, with all associated source documentation describing each generation component as given to Strategist, and how all these relevant input data and parameters were derived. Provide all relevant run parameters, targets, schedules, system load characteristics, reliability and reserve criteria, generation capabilities, and constraints factored as input into Strategist for both options under consideration.	Nalcor	CPW	24-Jul-11	Batch 9	11-Aug-11	See Exhibits: 1-5(a-l), 6 (a-b), 7-10 (a-b), 11-13 (a-b), 15-16, 25, 26, & 42; Board Letter July 12 Q5; RFI 10, 37, 41, 50, & 55	Appears reasonable, but more time is required to check the many references.
43)	Please provide the Strait of Belle Isle Feasibility Studies, appendices, and all related reference reports.	Nalcor	CESI	24-Jul-11	Batch 8	10-Aug-11	Refer to CE-40-44 and Exhibits 33-35	Satisfactory
44)	Please provide the detailed Newfoundland power system reliability study for Nalcor and Newfoundland Hydro for the Muskrat Falls and Labrador Island Link HVDC system.	Nalcor	BB	24-Jul-11	Batch 8	10-Aug-11	Reponse not filed as no reliability study is performed annually as required NERC Standard TPL-005-0. Nalcor is not interconnected.	Insuffient response
45)	Please provide a detailed Newfoundland power system reliability study for the Isolated Islanded option.	Nalcor	BB	24-Jul-11	Batch 11	12-Aug-11	Refer to RFI 44	Insuffient response
46)	Please provide all Wind farm feasibility and integration studies, associated cost estimates, additions, and replacement or refurbishment plans, including cost estimates. The documents "Exhibit 5(a), 5(i), 5(j), and 5(k)" have no information. Some documentary evidence is necessary to provide a direct linkage between costs estimated, and that embedded into the CPW model.	Nalcor	MCW	24-Jul-11	Batch 7	10-Aug-11	Refer to Exhibit 25	Satisfactory, RFI 87 and 88 in response
47)	Please provide all CT and CCCT feasibility and integration studies, and associated cost estimates for additions, replacements, or refurbishments. "Exhibit 5(g) - Capital Cost Estimates - 50MW CT (Greenfield)", and "Exhibit 5L(ii) - Capital Cost Estimates - HTGS Environmental Improvements - Low NOX Burners" were not available in report form. Some documentary evidence is necessary to provide a direct linkage between costs estimated, and costs embedded into the CPW model.	Nalcor	Thermal	24-Jul-11	Batch 8	10-Aug-11	Refer to Board Letter July 12 Q4 and attachments for CT and CCCT cost estimates justification. Cost of the CT is in CE-47, Nalcor did not provide an update for 5L(ii) as this item is ten years and has been escalated.	Accepted
48)	MF1330 Report 5_filed.pdf appears to be missing from the material provided (Lower Churchill Project). Please provide this document.	Nalcor	MHI	24-Jul-11	Batch 4	5-Aug-11	Document is not relevant as it relates to Gull Island	Accepted
49)	Please provide a detailed schedule by year for Fuel Costs, O&M Costs, and a further breakdown of Fixed Charges for each capital project identified on pages 1 and 2 of Exhibit 14. The breakdown of Fixed Charges should identify AFUDC and escalation as separate line items. Where escalation is being applied, please identify the year for which the base dollar cost estimates were derived. Identify the specific debt/equity ratio and interest rates used in determining AFUDC. Please demonstrate in an Excel workbook how provided cost values in Exhibit 14 result in the individual PCW line-item totals in the left-most column for Fixed Charges, Fuel Costs, and O&M Costs, for both options.	Nalcor	CPW	24-Jul-11	Batch 6	9-Aug-11	See attachments in Batch 6; Exhibit 5; and RFI 1	Appears reasonalble, but not unlike IR 42, many references. More time is required to confirm.

50)	Please document and describe the complete set of escalators and their values that are shown as being used in Exhibit 3.	Nalcor	CPW	24-Jul-11	Batch 7	10-Aug-11	Also see PPI info request #2 as requested by the Board dated July 12, 2011; CE-45; (Batch 7 attachments)	Accepted
51)	Please provide the projected GWh/yr and $CAD(2010)/yr by fuel type that was generated by Strategist in the runs for each of the two options.	Nalcor	CPW	24-Jul-11	Batch 8	10-Aug-11	See attachment in Batch 8 (Pages 9-10)	Appears reasonable.
52)	Please provide any environmental assessment reports outlining the costs of environmental mitigation related to the Muskrat Falls and Labrador Island Link HVDC System.	Nalcor	CPW	24-Jul-11	Batch 13	17-Aug-11		CPW Team to confirm week of Aug 28.
53)	What was the HVDC design voltage related to the capital costs used in the CPW calculation?	Nalcor	CPW	24-Jul-11	Batch 4	5-Aug-11	The HVdc design voltage used in the current capital cost estimate is 320kV. Refer to the response to RFI 19, 21 & Exhibit CE-32	Appears ok
54)	Please clarify what percentage of the total capital costs for each of the major cost elements in the MF/HVDC Project are being allocated to the calculation of the CPW in Exhibit 14, and what is the basis for determining those percentages? If the allocation is over an extended period, please elaborate.	Nalcor	CPW	24-Jul-11	Batch 4	5-Aug-11	100% of the capital costs for each of the major cost elements in the MF/HVdc Project have been allocated for the calculation of the CPW in Exhibit 14.	Appears ok.
55)	Please provide the document "Summary of Newfoundland and Labrador Hydro 2010 Long Term Planning Forecast" dated July 2011. Also please provide the excel spreadsheets showing the coefficients and statistical outputs from the following six regression models used to prepare the load forecast: 1. Residential - Average Use per Customer 2. Residential - Total Number of Customers 3. Residential - Percentage of New Customers Installing Electric Space Heat 4. Residential - Number of Existing Customers Converting from Non-Electric to Electric Space Heat 5. General Service - Annual Electric Energy Demand (GW.h) 6. System Peak - Winter Peak (MW)	Nalcor	LF	24-Jul-11	Batch 8	10-Aug-11	Refer to Exhibits 27, 45 and 46	Accepted
56)	Please provide excel files related the load forecast that contain all the historical sales and generation data from 1969 to present, as well as a file that contains historical and forecasted values for all forecast inputs that are driving the forecast models, including information on energy rates (electric, oil), demographics (population, housing), economic (GDP, disposable income, business investment, etc.) that are used as input or explanatory variables in the load forecasting equations.	Nalcor	LF	24-Jul-11	Batch 8	10-Aug-11	Refer to exhibits files in response to RFI 55. Note: historical data back to 1969 is not available.	Accepted
57)	The AMEC report on Thermal Generation life extensions at Holyrood.	Nalcor	Thermal	24-Jul-11	Batch 8	10-Aug-11	Refer to Exhibit 43	Accepted
58)	Regarding the information provided in 'Exhibit 15 PWC S245. Subsheet Summary 2010PLF PUB Review', please provide the original Excel workbook printed out as Exhibit 15, plus the following information: a) Derivation of the chosen discount rate of 7.30% for Muskrat Falls b) Understanding that the PWC analysis assumes 100% equity, why does the total equity invested in the Muskrat Falls project ($2,852.91 MM) not match the stated "Direct capex (escalated nominal $MM)" of $2,869? c) Footnote 1 indicates that $2,869 MM "Includes interest during construction, financing fees, and debt service reserve". Why would these be included for an analysis based on 100% equity? If they are not actually zero, please provide the amounts associated with these three costs elements. d) Please breakout the 'Nominal Equity Return (Post-Innu), line on pp. 4-8, into all revenue and cost components, including PPA revenues, Innu payments, etc., demonstrating that they add to the 'Nominal Equity Return' line in the Exhibit. e) How are Innu payments determined? f) Please confirm that the PPA tariff charged to NL Hydro in the CPW analysis is $75.82/MWh at MF busbar (2010 CAD), escalated annually 2%. Within the PPA itself, what is the date within the year that the escalation formula will be applied, or will the escalation be applied monthly commencing on a specific date in 2010? If this has not yet been confirmed in a PPA document, please explain how this escalation has been modeled. g) Please provide the annual energy delivered to the busbar (in GWh) underlying the 'Nominal Equity Return' line on pp. 4-8; what classes of energy were used in the total (e.g. firm, average, etc.); their proportions; and the source documents or specific calculations used in determining the volumes of each class of energy, How were the proportions used for each class of energy in the total determined?	Nalcor	CPW	2-Aug-11	Batch 14	19-Aug-11	Very detailed answer, Mack is this what your looking for?	Appears reasonable but given the complexity of the response, more time is required to confirm.

	h) Please describe the underlying basis, approach, assumed energy volumes, and financial objectives used in selecting a PPA tariff strategy to reflect Muskrat Falls' costs to Newfoundland Hydro, and determining the appropriate PPA tariff that was incorporated in the CPW summary. i) Regarding the document provided, identified as 'CE 27 Summary of Studies on Firm and Average Energy Production', please explain any differences in assumed energy volumes between those used per I).h. above and those indicated in 'CE 27'. j) Please provide the annual energy delivered to Soldier's Pond station from Muskrat Falls. k) Besides the PPA energy tariff determined by the PWC analysis, what other revenues or costs accrue to the Province, as the ultimate equity owner, resulting from the operations of Muskrat Falls (e.g. water rentals, etc.), and are they part of the 'Nominal Equity Return' figures?							
59)	Regarding 'CE 38 MHI-Nalcor-1 CPW Details', insurance expenses for each fixed asset are shown to be constant over the remaining life of the asset. Please describe the insurance Newfoundland Hydro actually arranges for these fixed assets, including the basis for estimating the insurance expense per annum, and whether Newfoundland Hydro self-insures fixed assets or purchases such from an external insurer. Please also illustrate an example using all relevant Expense and Balance Sheet T-accounts affected by the entire annual insurance transaction.	Nalcor	CPW	2-Aug-11	Batch 12	16-Aug-11		Response has been provided but difference between two options is substantial. May require follow up RFI, (not material from high-level perspective).
60)	With respect to the PIRA forecast used in Exhibit 4 "Nalcor Energy/NLH Thermal Fuel Oil Price Forecast" as of January 2010: a) Please provide an update of Exhibit 4 based on the most recent and readily available 20U PIRA fuel price forecast; and b) Please estimate what impact the revised and updated fuel price forecast has on the CPW for the Isolated Island option. Please describe the determination of the revised estimated CPW.	Nalcor	CPW	2-Aug-11	Batch 9	11-Aug-11	Refer to Fuel Price sensitivities files in RFI 41	Accepted
	HVDC Converter Stations and System							
61)	MHI is aware that a comprehensive reliability report for the entire project has been requested from Nalcor by the Board in a letter July 12, and this document is yet to be filed. As an additional related information request, is there an operational reliability report considering the forced outage rate and scheduled outage rate? Has all equipment and systems been looked from an operations and maintenance perspective at using an N-1 criteria or considering the Criteria required? Some detailed areas of concern are listed below but the response should include all areas considered. a) Are there two or three auxiliary supply feeds (station service) for the Bipole? Considering an extensive Forced Outage to one feed (Station Service) there is now an entire Bipole feed from one station service transformer for one year or more. Is this acceptable? Is there a spare Station service or other alterative feed? The same question is applied to the battery banks and chargers. b) How many relay buildings are being considered in the AC switchyard of the converter station? What is the physical separation between the buildings? Are there duplicate control and protections from different suppliers? c) Has separation of equipment and controls supplies been considered to limit the amount of power lost for any event? d) What is the Forced Outage Rate (FOR) and scheduled outage rate target? e) Has a design report been issued detailing all these requirements? If so please provide. f) Is there a contingency plan in place or being considered, if the reliability criteria cannot be met? ie Documents have indicated that there is one synchronous condenser (SC) provisioned as a spare. If one SC is out of service for maintenance, and a second one trips off, what is Nalcor's operating plans?	Naclor	HVDC	18-Aug-11				
62)	Please provide a copy of the analysis that was carried out in June and July of 2010 which confirmed that the 900 MW HVDC link would require a minimum operating voltage of 320 kV as referenced in Exhibit 30, Section 4, paragraph 4.	Nalcor	HVDC	18-Aug-11				
63)	In discussions with Nalcor, it was stated that the AC collector system at Muskrat Falls and associated transmission lines to Upper Churchill, was optimized at 345 kV. Please provide a document of that analysis.document of that analysis.	Nalcor	HVDC	18-Aug-11				
64)	Exhibit #30, page 24 shows a simplified single line diagram of the Muskrat Falls converter station. Please provide a complete single line diagram and major equipment data of the Muskrat Falls converter station.	Nalcor	HVDC	18-Aug-11				

65)	Please provide a complete single line diagram and major equipment data for the Solders Pond converter station.	Nalcor	HVDC	18-Aug-11				
66)	Please provide a copy of the study used to determine the requirements for the 3 – 300 MVar Synchronous Condensers.	Nalcor	HVDC	18-Aug-11				
67)	In discussions with Nalcor, it was stated that the Voltage Source Converter (VSC) Option was discarded and the Line Commutated Converter (LCC) chosen. One reason the VSC option was discarded was because studies showed that the recovery from a DC fault was too slow at about 900 milliseconds, and also that the system still required an Effective Short Circuit Ratio (ESCR) of 1.5. Please provide copies of the studies performed by Siemens on the HVDC Plus fault recovery rate and the ABB PSS/E ESCR study.	Nalcor	HVDC	18-Aug-11				
68)	The inverter system for a LCC requires 2 – 300 MVar (plus one spare) Toshiba Synchronous Condenser with and inertia of 7.2 to achieve an ESCR of 2.5 under worst case conditions. Please provide the study done to confirm this finding as referred to in Exhibit 30, Section 6.7, page 21, System Upgrades for Island Link.	Nalcor	HVDC	18-Aug-11				
69)	Based on discussions with Nalcor and documents received to date, only $ 2.5 M has been allocated for HVDC equipment replacement / refurbishment over the 50 year life of the project. Please describe the components of this figure, and the rationale for its determination.	Nalcor	HVDC	18-Aug-11	Batch 15	24-Aug-11	Answer shows that Nalcor has not factored all HVDC converter station equipment replacement costs, eg. Converter Tranformers ($5M) every 25 years, Controls every 15 to 20 years.	See comment
70)	From discussions with Nalcor, it is understood that some recent algorithms and custom indices have been developed to escalate the converter and other equipment costs. Please provide information on the methodologies that were used to derive these.	Nalcor	HVDC	18-Aug-11				
	HVDC Transmission Line							
71)	Based on meetings with Nalcor, the transmission line sections have been designed to different requirements due to varying conditions. Please provide a copy of this design. Provide any transmission line design concept documents, detailed design reports, drawings, tower designs, cost estimates, line route selection details, transmission line reliability design criteria, risk analysis, for the HVDC overhead transmission line, and associated AC transmission lines from the Converter stations.	Nalcor	MHI	18-Aug-11				
72)	From discussions with Nalcor, a mechanical fuse concept has been adopted for the HVDC transmission line. The conductor design will drop the conductor to save the tower due to high icing and wind loading over ratings. Have sufficient investigations been done to prove the concept of the mechanical fuse to save the tower during a catastrophic event? Please provide supporting information why this technology was chosen. What is the risk of a mechanical fuse failure and how would this be prevented/mitigated.	Nalcor	MHI	18-Aug-11				
	From discussions with Nalcor, a mechanical fuse concept has been adopted for the HVDC transmission line. The conductor design will drop the conductor to save the tower due to high icing and wind loading over ratings. Have sufficient investigations been done to prove the concept of the mechanical fuse to save the tower during a catastrophic event? Please provide supporting information why this technology was chosen. What is the risk of a mechanical fuse failure and how would this be prevented/mitigated.	Nalcor	MHI	18-Aug-11				
72)	Please provide the report containing the preparation of the detailed cost estimate that is presented in the "Gate 2 Capital Cost Estimate Report – Muskrat Falls Generation Facilities and LIL HVDC System". Your response should include the sources of information for labour, equipment and materials costs, methods used to estimate labour rates, computation of construction equipment operating costs, assumptions made for construction productivity, computation of indirect costs, and derivation of the cost for the main generating equipment.	Nalcor	MHI	18-Aug-11				
	Muskrat Falls							
73)	Describe the methods and details to benchmark and validate the cost estimates prepared by Nalcor for the entire Project to confirm their validity for the conditions at the site and regional construction markets?	Nalcor	MF	18-Aug-11	Batch 15	24-Aug-11	CE-51 referenced	Refered to Peter Rae
74)	Please describe whether the optimization of the installed capacity will differ with the Muskrat Falls project when developed in isolation from the Gull Island, Quebec river diversions, and Churchill Falls 2 plant in the 1999 report.	Nalcor	MF	18-Aug-11				

75)	Does the change of the ac transmission interconnection to Churchill Falls used in the 1999 optimization report affect the optimal installed capacity needed to dispatch the energy available at Muskrat Falls under the current arrangement?	Nalcor	MF	18-Aug-11				
76)	From discussions with Nalcor on the Muskrat Falls pumpwell system, it was suggested that it will be required only for the next ten years. Why would that be the limit since the system will be in operation for 30 or more years? When the MF project is commissioned, what is the expected life of the current system? Is there a backup supply system in place to provide power in case of a future catastrophic failure of the pumpwell system?system will be in operation for 30 or more years. When the MF project is commissioned, what is the expected life of the current system? Is there a backup supply system in place to provide power in case of a future catastrophic failure of the pumpwell system?	Nalcor	MF	18-Aug-11				
77)	The following documents of the Muskrat Falls study have not been made available but are needed to fully understand the analyses that have been performed since documents provided reference these missing documents: a) Acres International Ltd, (1998), Churchill River Complex, PMF Review and Development, volumes 1 and 2, This document is required in order to fully understand the PMP development procedure, especially with respect to Probable Maximum Snow Pack. b) Hatch Ltd. GI1141 – Upper Churchill PMF and Flood Handling Procedures Update. Prepared for Nalcor Energy – Lower Churchill Project, August 2009.	Naclor	CC, MF	18-Aug-11	Batch 15	24-Aug-11	CE-54 filed	Refered to Charly
	Isolated Island Option							
78)	The report "Studies for Island Pond Hydroelectric Project", (2006) by SNC-Lavalin presents no new data or analysis with respect to hydrology but relies on results from previous studies. The hydrological analysis would be contained in the Prefeasibility Study (1986), the re-optimization of Round Pond (1987), the Feasibility Study (1988) and possibly Island Pond and Granite Canal Final Feasibility Studies (1988), all studies executed by Shawmont Newfoundland. The relevant documents from these three studies are required in order to evaluate the completeness of the hydrological analysis.	Nalcor	MHI	18-Aug-11				
79)	Please provide "Appendix A Capital Cost Estimates - Backup" for Exhibit 5b - Studies for Island Pond Hydroelectric Project	Nalcor	MHI	18-Aug-11				
80)	Please provide "Appendix F Geotechnical site Investigations - Proposed Island Pond Hydro Electric Development (as prepared by AMEC)" for Exhibit 5b - Studies for Island Pond Hydroelectric Project.	Nalcor	MHI	18-Aug-11				
81)	Please provide "Appendix A Capital Cost Estimates – Backup" for Exhibit 5c - Feasibility Study for Portland Creek Hydroelectric Development.	Nalcor	MHI	18-Aug-11				
82)	Please provide backup for the summary capital cost estimate in Table 9.1 of Exhibit 5d - Round Pond Hydroelectric Development Feasibility Study	Nalcor	MHI	18-Aug-11				
	AC Power System Performance							
83)	Please provide a project description and schedule for the systems improvements outlined in Section 2.4.3 of document DC1210_filed.pdf "HVDC Sensitivity Studies", July 2010 required to mitigate the 3 phase fault at Bay d'Espoir. The system improvements noted are a cross tripping/over frequency protection system, a new 230 kV circuit between Bay d'Espoir and Western Avalon, plus two new 230 kV circuits between Bay d'Espoir and Sunnyside.	Nalcor	AC	18-Aug-11				
84)	Please provide project scoping documents, cost estimates, and relevant technical details of these system reinforcements referred to in MHI-NALCOR-86.	Nalcor	AC	18-Aug-11				
85)	Are there any load/generation patterns on the Island where the system survives a 3 phase fault at d'Espoir, and will implementing the system reinforcements listed in DC 1220, section 2.4.3 change this result?	Nalcor	AC	18-Aug-11				

86)	Are any further system reinforcements planned or required to mitigate a 3 phase fault at Bay d'Espoir?	Nalcor	AC	18-Aug-11				
			Wind Farms					
87)	The assumption of annual capacity factor of 40% for the 25 MW wind farm is based on the average of the two existing wind farms at St. Lawrence (44.3%), and Fermeuse (35.7%) capacity factors. Has any wind survey data been collected to validate the assumption of a 40% capacity factor at the proposed site of the 2014 3rd 25 MW wind farm? If so, please provide documentation to support the anticipated capacity factor,	Nalcor	MCW	18-Aug-11				
88)	Has a system study been performed that examines the issues with wind integration into the Newfoundland Island power system? If so, please provide this document. What is the maximum wind capacity sustainable on the Island under both options (Muskrat Falls LIL HVDC and the Isolated Island)?	Nalcor	MHI	18-Aug-11				
89)	What is the maximum wind capacity sustainable on the Island under both options (Muskrat Falls LIL HVDC and the Isolated Island)?	Nalcor	MHI	18-Aug-11				
			Load Forecast					
90)	Please provide all historical sales, generation and peak demand information for the period 1969-2010 for all sectors that are part of the Load Forecast. This would include the number of customers and energy (GW.h) for the following sectors: rural residential, NP residential, total residential, rural GS, small GS, large GS, electric heat GS, total GS, street & area lighting, industrial and total island sales.	Nalcor	LF	18-Aug-11				
91)	Please provide historical energy (GW.h) information for distribution & transmission losses, total utility requirements, total island requirements. NLH energy deliveries and NLH net generation.	Nalcor	LF	18-Aug-11				
92)	Please provide historical demand (MW) information for the non-coincident utility peak demand, non-coincident industrial peak demand, coincident island peak demand, NLH transmission losses peak demand and coincident NLH peak demand.	Nalcor	LF	18-Aug-11				
93)	Please provide the historical and forecast information for all variables used, but not provided (as yet), in the winter peak demand equation specified in Exhibit 45. This would include information on the following variables: WINDCHILL, NPTOTGSWA, NST and DECPEAK. The requested information should cover the 1967 – 2029 period similar to the information provided on page 7 of Exhibit 45.	Nalcor	LF	18-Aug-11				
			Reliability Analysis					
94)	Please provide a copy of the report "Reliability of the Straits of Belle Isle HVDC Cable System" - PTI, Sept. 1988.	Nalcor	BB	18-Aug-11	Batch 15	24-Aug-11	Exhibit 57 filed	Refer to BB for assessment
			SOBI					
95)	Please provide a copy of the SOBI Technical Request for Proposal document for "Submarine Cable Design, Supply and Install".	Nalcor	CESI	18-Aug-11				

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August 26, 2011

File: NFLD

Status: Draft

Newfoundland and Labrador
Board of Commissioners of Public Utilities
PO Box 21040
120 Torbay Road
St. John's, NL
A1A 5B2

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

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- Enrico Colombo (CESI), Marine Crossing Assessment
- 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

Week of Aug 28 - Sept 3							
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 frame work 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 - 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. This RFI material has been factored as preparation for the CPW analysis.

The CPW team has been actively involved in coordination of material with 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 RFI 41 and resulting in Exhibit 43.

More activity is anticipated in the next two weeks as the team on site focused on producing their final report on the CPW analysis.

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 area with some key findings noted.

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

Charly Cadou (Hydrology) – draft report has been filed and the conclusions are not a surprise considering how well the Muskrat Falls GS and Churchill river system have 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 should be rerun to test the new spillway variants ;
- It may be necessary to increase the proposed diversion capacity of Muskrat Falls since the flood peak has increase 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.;
    - Application of river hydraulic model to determine necessary timing of turbine 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 EPP, an activity likely to take place once the project is built or near completion, is to update the dam break analysis with the final layout, and
- Rerun the power and energy generation model once the relevant parameters have been finalized.

Alex Gerrard (Isolated Island Option Hydro) – MHI is still waiting on RFIs to allow Alex to complete his study. The projects are all relatively small and straightforward 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 are very limited. The level of environmental work done is also limited, especially in the case of Round Pond.

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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 three hydros in the Isolated Island Option level of the capital investment amounts to less than 5% of the total CPW of the 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) has filed a draft reliability report and is now waiting on RFIs to complete. The following points highlight the major findings of the review of the reliability studies to date:

- The source documents for developing reliability models for the Strait of Belle Isle (SOBI) cable system and the LIL HVdc system overhead line are comprehensive and adequate.

- The methodologies and procedures for the development of LIL HVdc system reliability models proposed by Power Technologies Inc (PTI) are still valid and can be used with minor updates and modifications.

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

- Investigations are needed together with documentation on whether the LIL HVdc system is vulnerable to any natural and man-made hazards for example forest fire, ice storm, tornadoes and terrorism that could result in catastrophic outages.

Discussion ensued with Fred Martins on whether MHI should perform a reliability assessment of the Nalcor power system with the GE MARs software, the reliability tool commonly used for these assessments. Pricing was obtained by GE to obtain a license grant to perform this study as MHI does not currently have this tool (prices range from $8,000 for this one study to $30,000 per year), over and above the Manitoba Hydro license of $30,000 per year. Dr. Bagen Bagen indicated that a quick study could be done in 5 to 6 weeks if he is fully dedicated, but this type of study normally takes 6 months or more.

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MHI, in consultation with Fred Martin, decided not to pursue this study since MHI would not be able to produce a fully defendable study in the time allowed.

Craig Kellas (Load Forecast) – a draft report is in process and is waiting on a number of RFIs to complete. 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 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.

Allen Silk (AC Power Systems) – a draft set of comments was received which 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 does support the addition of the Labrador – Island HVdc System additions. However issues that were raised in the supporting documentation appear to be unresolved. Also there are assumptions which appear not to be fully supported by the documentation.
    - There is a consistent reference throughout the documentation of a 200% overload for 10 minutes without describing what type of mitigation is expected 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 application. However the continuous overload capability of 150% will be helpful in mitigating a significant number of single contingency ac disturbances. It

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would be beneficial to quantify a 30-minute overload capability as this is a standard mitigation period.

- More supporting studies are required to support the decision to ignore the impacts of a three phase fault at Bay d`Espoir. Industry standards are generally set in North America by NERC. These Standards are developed in an open forum with stakeholder input and approval. 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.

Report

A 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. This draft template is now available but has not yet to be forwarded to the PUB Project Manager for review and comment.

Issues

The Maritime link scope expansion request to assess the system reliability impacts on the Nalcor system has been withdrawn by MHI as this would be difficult to realize. AMERA is currently not involved in our review and a number of legal, technical, and business issues are evident at this particular juncture which are barriers for successful and timely completion of this task.

MHI assessment on 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 of the RFIs are still pending and we are dependent on receiving that information in order to perform a comprehensive and quality study. The new schedule discussed is as follows:

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October 3rd, Preliminary draft report
October 10th, comments returned by PUB project staff
October 17th, Final Draft report issued
October 24th, Presentation to the Board of Commissioners
October 31st, Final report issued.

Note: October 17th could be the date for issue of the final report if the Board does not require a draft. This schedule is still tentative pending ratification by the Board.

MHI has logged approximately 53% of the budgeted person hours as at the end of August 13th. The MS Project schedule has not been updated at this time and will be updated early next week with a finalized 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,

Paul Wilson
Managing Director Subsidiary Operations

plw / 20110826 Biweekly Report 3.docx