YUKON ENERGY CORPORATION
ENERGY PROJECT CERTIFICATE AND ENERGY OPERATION CERTIFICATE APPLICATION FOR THE PROPOSED MAYO HYDRO ENHANCEMENT PROJECT (MAYO B)

YUKON UTILITIES BOARD INFORMATION REQUEST (YUB) ROUND 1 TO YUKON ENERGY CORPORATION (YEC)

YUB-YEC-1

Reference: **YEC Application, page 1**

Quote: "The timing for Mayo B also reflects the opportunity to displace diesel generation energy requirements associated with growing power loads on both grids."

Preamble: The Board would like to obtain further information about the displaced diesel generation.

Request:

(a) Please provide a table listing separately, all diesel generation units and the amount of diesel displaced per unit (in MW.hs), for each year starting when Mayo B is commissioned and then continuing for each of the next 20 years. Please provide all assumptions.

(b) Where the displacement in part (a) above is for new load, please show the net generation to service the load, and the assumed line losses for that load from the generation source from the commissioning date and for each of the next 20 years.

YUB-YEC-2

Reference: **YEC Application, page 1**

Issue/Sub-Issue: **YESAB Review**

Request:

(a) What is the status of the YESAB review to March 1, 2010?

(b) Based on the answer to part (a), when does YEC expect to have all approvals from YESAB and other regulatory bodies. Please list the approvals required, the authority providing those approvals, and when each of those approvals are expected. Only list outstanding approvals, not the approvals already received by YEC.

YUB-YEC-3
Reference: **YEC Application, page 1.**

Issue/Sub-Issue: **Changes to Mayo Lake operating regime**

Request:
(a) Without any changes to the Mayo Lake operating regime, is the effective capacity of Mayo less than 15 MW? Please explain.

YUB-YEC-4
Reference: **YEC Application, page 2**

Issue/Sub-Issue: **YESAB Review**

Quote: "After the YESAB review of the Mayo B Project Proposal is concluded, and the additional information requested by YESAB is available regarding an additional one metre drawdown at Mayo Lake, Yukon Energy intends to file a new project proposal with YESAB relating specifically to an additional one metre drawdown of Mayo Lake."

Request:
(a) Please provide YEC's estimate for the timing of that process. That is, how long does YEC estimate it will take from the day the application is presented to YESAB, to the date a final decision is rendered?

YUB-YEC-5
Reference: **Application, page 2 and Application, page 3.**

Issue/Sub-Issue: **Timing of application**

Quote: "A Project Proposal Submission to the YESAB Executive Committee was filed February 27, 2009."

"On April 13, 2009 Yukon Energy applied for federal funding for the Yukon Green Energy Legacy Project: Mayo B enhancement/CSTP under the Federal Green Infrastructure Fund (GIF) … with $53.35 million in funding committed to Mayo B through the Federal Contribution Agreement executed on August 31, 2009."

Request:
Given that a YESAB application was filed in February, 2009 and the GIF agreement was executed on August 31, 2009, why did YEC wait until December 11, 2009 to file its application for energy project and energy operation certificates with the Minister of Justice?

YUB-YEC-6

Reference: **A letter from the Minister of Justice dated December 18, 2009 with accompanying Terms of Reference.**

Issue/Sub-Issue: **Generation Planning/Criteria**

Preamble: The Minister of Justice has requested that, amongst other matters, the YUB report on the capability of existing and currently committed transmission and generation facilities to meet the forecast load requirements, taking into account the new planning criteria as proposed by the YEC and recommended by the YUB.

Request: Provide a statement of the YEC's current generation planning criteria that addresses each criterion, LOLE and N-1.

YUB-YEC-7

Reference: **A letter from the Minister of Justice dated December 18, 2009 with accompanying Terms of Reference.**

Issue/Sub-Issue: **Generation Planning/Diesel Generation Use**

Preamble: The Minister of Justice has requested that, amongst other matters, the YUB report on the effect the completion of Mayo B is expected to have on the ongoing use of diesel generation at various locations under reasonable electric load forecasts.

Request:

(a) On page 29 of the Application, Figure 2: Mayo B Net Contribution to IS energy supply 2012-2046 appears. Supply this information in tabular form broken out by existing hydro, Mayo B, and diesel energy supplied.

(b) Figure 2 omits the contribution of renewable energy while Figure D-2 includes its contribution. Supply the values for renewable energy that would apply to Figure 2 had they been included originally.

(c) On page 30 of the Application, Figure 3: Mayo B Annual Costs and Diesel Savings ($000s) 2012 to 2046 appears. Supply this information in tabular form.

(d) Both Figure 2 and Figure 3 assume a Mayo B project configuration with additional drawdown of Mayo Lake. Provide in tabular form the same information for the configuration without the additional drawdown.

(e) On page 39, Figure 4: Mayo B Annual Costs and Diesel Savings 2012 to 2046 – No Carmacks Copper appears. Supply this information in tabular form.

(f) On page D-5 of Attachment D of the Application, Figure D-2: Energy Supply on Yukon Integrated System without Mayo B, 2012 - 2046 appears. Supply this information in tabular form broken out by existing hydro, renewable, and diesel energy supplies.

(g) On page D-6 of Attachment D of the Application, Figure D-3: Diesel Generation Cost without Mayo B, 2012 - 2031 appears. Supply this information in tabular form.

(h) With respect to the diesel energy displaced by Mayo B provide in tabular form a comparison of diesel plant use for the period 2009 to 2019 as follows:

i. by location,

ii. by annual capacity factor,

iii. by total number of hours operated each year and,

iv. by energy produced each year.

The comparison should address the Mayo B project both with and without additional drawdown of Mayo Lake versus the base load diesel generation operation case. Assume that major industrial loads such as Minto, Alexco, and Carmacks Copper are included in the load forecast.

YUB-YEC-8

Reference: **A letter from the Minister of Justice dated December 18, 2009 with accompanying Terms of Reference.**

Issue/Sub-Issue: **Generation Planning/Alternatives to the Mayo B Project**

Preamble: The Minister of Justice has requested that, amongst other matters, the YUB report on what, if any, alternatives to Mayo B might be advisable given reasonable load assumptions and risk assessments.

Request:

(a) What alternatives exist to the development of Mayo B that would address the additional energy requirements of the Interconnected System (IS) to 2019 with the major industrial loads included?

(b) Without the Mayo B development, what would be the Aishihik plant's ability to produce more energy annually during the 2012 to 2019 period to reduce any additional diesel use given that the Aishihik 3 unit is to be installed by the end of 2010 and given that Aishihik has multi-year storage capability with daily peaking capacity? Explain the reasons for your answer.

(c) Are there any operating constraints or other conditions that would prevent the Aishihik plant from providing additional hydro energy to offset diesel use during this period?

(d) If there are constraints or conditions what are they, how do they impact the plant's ability to produce more energy annually, what actions would need to be taken to remove those constraints or conditions, and what would be the time frame involved?

(e) How much additional energy could the Aishihik plant produce annually to offset diesel use during this period both with and without any constraints or conditions?

(f) What additional cost, if any, would be associated with achieving greater annual energy production from the Aishihik plant both with and without any constraints or conditions?

(g) What would be the annual capacity factor for this plant if no additional energy were to be produced annually during the 2012 to 2019 time period?

(h) What would be the annual capacity factor for this plant if additional energy were able to be produced annually during the 2012 to 2019 time period? Provide the capacity factor for each situation, i.e. both with and without any constraints or conditions.

YUB-YEC-9

Reference: **A letter from the Minister of Justice dated December 18, 2009 with accompanying Terms of Reference.**

Issue/Sub-Issue: **Generation Planning/Alternatives to the Mayo B Project**

Preamble: The Minister of Justice has requested that, amongst other matters, the YUB report on what, if any, alternatives to Mayo B might be advisable given reasonable load assumptions and risk assessments.

Request:

(a) What role would the 6.4 MW of installed diesel plant at the Minto mine site play during the 2012 to 2019 time period in terms of system supply?

(b) Would those resources be available to the system during this time period if the Mayo B project were not to proceed and if additional generation were required in this time frame?

(c) Were those additional diesel resources included in the evaluation of the capability of the existing and committed transmission and generation facilities to supply the forecast load requirements through to 2019?

(d) If they were not, what effect might their inclusion have on the capability of the existing system to supply the forecast load and the cost to supply that load through to 2019, if the Mayo B project were not to proceed.

YUB-YEC-10

Reference: **A letter from the Minister of Justice, dated December 18, 2009, with accompanying Terms of Reference.**

Issue/Sub-Issue: **Generation Planning/Transmission Matters**

Quote: On page 18 of the Application, in footnote 20, the following statement is made:

"Delay in completion of CSTP Stage 2 beyond spring/early summer of 2011 would require that costly diesel generation rather than available WAF surplus hydro be used when the existing Mayo plant is required to be shut down briefly during the summer to complete the connection of the new Mayo B powerhouse. Delay in the in-service of CSTP Stage 2 beyond 2011 would mean that Mayo B generation would not be available to be utilized to displace diesel generation on the WAF grid. CSTP Stage 2 is currently planned to be in-service by the end of 2010."

Preamble: The Minister of Justice has requested that, amongst other matters, the YUB report on the relationship between Mayo B and CSTP Stage 2 completion.

Request:

(a) Confirm the currently expected completion date for CSTP Stage 2.

(b) What is the currently expected Mayo B powerhouse completion date, in terms of requiring an outage to the existing Mayo plant in order to connect Mayo B to the system?

(c) How long might such an outage take?

(d) If the completion and commissioning of CSTP Stage 2 were delayed say to the fall of 2011 beyond the point in time when Mayo B was ready to be connected to the system, what would be the additional cost of that delay in terms of the cost of additional diesel generation required when the Mayo plant is shut down for a short period of time?

(e) What would be the cost in terms of additional diesel generation required to supply the electric system load as a whole if the Mayo B plant were to be completed on schedule and the CSTP Stage 2 completion were to be delayed to the fall of 2011?

YUB-YEC-11

Reference: **The Application**

Issue/Sub-Issue: **Generation Planning/LOLE Analysis**

Request: Provide an analysis of the current system and the Mayo B project that addresses the need for the Mayo B project in terms of the current generation planning criteria including both LOLE and N-1 for the period 2009 to 2019 and that omits major industrial loads such as Minto, Alexco, and Carmacks Copper. The analysis should specifically address each criterion individually both LOLE and N-1 and should be provided in tabular form and should address the following cases:

(a) The system without Mayo B with additional diesel resources added as needed.

(b) The system with Mayo B both with and without additional Mayo Lake drawdown (enhanced storage).

YUB-YEC-12

Reference: **The Application**

Issue/Sub-Issue: **Generation Planning/LOLE Analysis**

Request: Provide an analysis of the current system and the Mayo B project that addresses the need for the Mayo B project in terms of the current generation planning criteria including both LOLE and N-1 for the period 2009 to 2019 and that includes major industrial loads such as Minto, Alexco, and Carmacks Copper. The analysis should specifically address each criterion both LOLE and N-1 and should be provided in tabular form and should address the following cases:

(a) The system without Mayo B with additional diesel resources added as needed.

(b) The system with Mayo B both with and without additional Mayo Lake drawdown (enhanced storage).

YUB-YEC-13

Reference: **The Application**

Issue/Sub-Issue: **Generation Planning/Mayo B Project Energy Output**

Request: Please provide or confirm the following numbers:

(a) What is the annual energy output in the near term for the Mayo B project with the additional drawdown of Mayo Lake?

(b) What is the annual energy output in the near term for the Mayo B project without the additional drawdown of Mayo Lake?

(c) What is the annual energy output in the long term for the Mayo B project for each of the two situations cited above respecting Mayo Lake?

(d) How does the annual energy output of Mayo B for the long term with additional drawdown cited as 38.4 GW.h in various parts of the Application, such as in footnote 12 on page 10,

relate to the value of 41.4 GW.h cited also for the long term in various other places such as on page 10 of the Application?

What value would replace the 41.4 GW.h value cited if the additional drawdown of Mayo Lake were not to proceed?

YUB-YEC-14

Reference: **The YUB Report to Commissioner in Executive Council re YEC-20 Year Resource Plan – Jan 15/07**

Issue/Sub-Issue: **Generation Planning/LOLE Criterion**

Quote: On page 10 of the YUB Report to Commissioner in Executive Council re YEC-20 Year Resource Plan – Jan 15/07, the Board states:

"However the definition of the LOLE criterion does not mention exclusion of major industrial loads explicitly and it appears YEC included the major industrial loads in the calculations under certain load forecast scenarios. If this is the case, the Board considers it to be an inconsistent approach, as inclusion of major industrial loads in the LOLE calculation will produce higher LOLE values, possibly above 2 hours per year that would signal a need for new capacity. Therefore, the Board recommends that, in order to ensure that no new generating capacity is added for the purpose of ensuring reliable supply to major industrial customers and to ensure consistency with the N-1 criterion, major industrial loads should not be included in the LOLE calculation."

On page 11 of that same report, the Board states:

"The Board also notes that major industrial loads are to be excluded when the N-1 criterion is to be used. This is specified in the definition of the N-1 criterion, which states: Each system (WAF and MD) should be able to carry the forecast peak winter loads (excluding major industrial loads) under the largest single contingency. This is consistent with YEC's testimony that new generating capacity will not be planned, or added to the system, for the purpose of ensuring reliable supply to major industrial loads. The Board expects that the same consistency would be applied under the LOLE criterion, as addressed above."

Request:

(a) In the LOLE criterion and calculations does YEC include major industrial loads such as Minto, Alexco, and Carmacks Copper? If not explain the reasons for your answer.

(b) If yes explain why they are not omitted as per the Board's recommendation.

YUB-YEC-15

Reference: **The YUB Report to Commissioner in Executive Council re YEC-20 Year Resource Plan – Jan 15/07**

Issue/Sub-Issue: **Generation Planning/Capacity Planning**

Quote: On page 11 of the same report, in footnote 11 at the bottom of that page the following statement appears:

"Exhibit B-1, page 3-12 states that no capacity is planned to supply secondary energy sales. At Transcript, pages 86-87, YEC testified that, for capacity planning, industrial customers are treated as if they were secondary sales customers."

Request:

(a) Is that quote an accurate statement of YEC's position on capacity planning for industrial customers such as Minto, Alexco and Carmacks Copper? If it is not, explain why it is not an accurate statement.

(b) Provide a statement of YEC's position on capacity planning for industrial customers including such customers as Minto, Alexco and Carmacks Copper.

YUB-YEC-16

Reference: **Application, page 3.**

Issue/Sub-Issue: **Project Financing**

Quote: "The Yukon Government is providing funding assistance to Yukon Development Corporation (YDC) for the Mayo B and CSTP Stage 2 projects through an annual contribution for the principal and interest payments related to $52.5 million of YDC's required borrowing for these legacy projects (see letter from the Minister responsible for YDC as provided in Attachment F). Up to $31.15 million of this no cost funding assistance will be provided to borrowing costs for the Mayo B Project."

Request:

(a) Will any of the borrowing costs or load assumptions with this project have any impact on any existing borrowing agreements with YEC such as the flexible term note? If so please explain in detail.

(b) Will the costs of the Mayo B Project and the concomitant borrowings have any affect on YEC's cost of debt? If so, what effect will it have?

(c) Based on the YEC response to part (b) above, if there is any impact on the cost of debt, has that effect been included in any cost benefit analysis undertaken by YEC?

YUB-YEC-17

Reference: **Application, page 3.**

Quote: "This funding assists Yukon Energy to advance the enhancement of Yukon's renewable energy capability and the reduction of future Yukon diesel generation requirements."

Request:

(a) What does YEC mean by "reduction of future Yukon diesel energy requirements? What timeframe does this refer to?

(b) Does the statement above preclude other hydro opportunities identified in YEC's 20 Year Resource Plan such as the Marsh lake Fall/Winter Storage?

YUB-YEC-18

Reference: **Application, page 6.**

Issue/Sub-Issue: **Reduction of Generation at Mayo A**

Quote: "The minimum flow level requires only one of the existing powerhouse's two turbines to operate at any given time, and typical generation at the existing powerhouse will be reduced in most instances to approximately 1 to 2 MW."

Request:

(a) Has this reduced generation from Mayo A been factored into YEC's cost-benefit analysis of the Mayo B project?

(b) Please provide all models (in electronic format) showing how this reduced generation has been factored into the total costs of the project.

YUB-YEC-19

Reference: **Application, page 6.**

Issue/Sub-Issue: **Generating Capacity**

Quote: "A new powerhouse of approximately 10 to 12 MW of nameplate generating capacity …"

Request:

(a) What capacity did YEC utilize in its economic evaluations?

YUB-YEC-20
Reference: **The Application**

Issue/Sub-Issue: **Generation Planning/Transmission Matters**

Request:
(a) Confirm that the bulk of the diesel energy displaced by the Mayo B project (located in the MD area) will come from diesel units located in the WAF area during the 2012 to 2019 period.

(b) If the transmission line(s) linking the Mayo B project and the MD area to the WAF area is forced out of service how will the energy needs of the three major loads, Minto, Alexco, and Carmacks Copper be served during the line(s) outage?

(c) What constraints might be imposed on these customers during such outages?

(d) What would be the expected frequency of such outages?

(e) In the analysis of diesel cost savings, have the economic costs of the transmission losses that would be incurred in transmitting the displacement energy between the Mayo B project and loads in the WAF area been factored into the economic analysis presented? If not, then explain why not.

(f) If yes, explain how the losses and their costs were calculated and how they were factored in.

(g) Provide the costs of those losses for each applicable year of the 2009 to 2019 period.

YUB-YEC-21
Reference: **The Application**

Issue/Sub-Issue: **Generation Planning/Mayo A Plant**

Preamble: On pages 5 and 6 of the Application, YEC addresses the operation of the existing power plant at Mayo subsequent to the commissioning of the Mayo B project.

Request:
(a) Without the Mayo B project, what would be the annual energy production expected from the existing Mayo A units for each year of the period 2009 to 2019?

(b) What would be the plant's capacity factor in each year of that period?

(c) With the Mayo B project, both with and without the additional Mayo Lake drawdown, what would be the annual energy production expected from the existing Mayo A units for each year of that same period?

(d) What would be the plant's capacity factor in each year of that period?

(e) For the Mayo B project, both with and without the additional Mayo Lake drawdown what would be the annual energy production expected from the Mayo B units for each year of that same period?

(f) What would be the Mayo B plant's capacity factor in each year of that period?

(g) What sorts of maintenance outages would require the Mayo B plant to be entirely or partially taken out of service?

(h) How frequently would such outages be required? For instance footnote 44 on page 30, dealing with operating and maintenance costs appears to suggest once in 10 years for a major overhaul.

(i) Except for maintenance outages, doesn't the Mayo B project render the Mayo A plant virtually redundant given the reduction in energy output at Mayo A with the commissioning of the Mayo B plant? Explain the reasons for your answer.

(j) If the Mayo A plant is not redundant, what reduction in its economic value occurs once the Mayo B project is commissioned because the full amount of annual energy it is currently capable of producing is not likely to be produced in the future?

YUB-YEC-22

Reference: **Application, page 8**

Issue/Sub-Issue: **Decommissioning costs**

Request:

(a) What are the forecast reclamation costs for the work camp and lay down area(s)? How are these costs being accounted for?

(b) Does the Mayo B project affect the expected service life of Mayo A?

YUB-YEC-23

Reference: **Application, page 9**

Quote: "Until the Mayo lake licence (sic) change is approved, Mayo B's long term average annual net generation potential will be reduced by about 4 GW.h/yr."

Request:

(a) Does this generation potential include the reduction in Mayo A generation?

YUB-YEC-24

Reference: **Application, page 9**

Issue/Sub-Issue: **Potential Target Price Contract/Turbine – Generator Supplier**

Request:

(a) How do the MOU contract and the early competitive selection process conform with the recommendations of the Auditor General from the M-D transmission project?

(b) Please enter on the record the winning bid for the T-G supplier.

YUB-YEC-25

Reference: **Application - Section 3.1.2, Project Costs, Financing and Economics**

Quote: Table 1 summarizes the overall in-service estimated capital cost estimate and financing for Mayo B. Levelized costs of energy (LCOE) for projected Mayo B "net generation" (generation forecast to displace diesel generation on the WAF/MD grids) are also provided, both with and without the Mayo Lake enhanced storage, assuming YEC's approved 2009 GRA cost of capital (average 6.56%), a 65 year economic life for the Project, a base case grid generation load forecast (as reviewed later in this Application) with the Carmacks Copper mine connected by 2012, and the other currently existing or committed grid generation and transmission assets.

Preamble: The YUB wishes to glean information in respect of "currently existing or committed grid generation and transmission assets" that underpin YEC's forecast.

Request:

(a) Please provide the analysis that supports YEC's LCOE (levelized cost of energy) forecast 6.69 c/kW.h (assuming 1 m added Mayo Lake storage) and 7.59 c/kW.h (assuming no change in Mayo Lake licence)

(b) Please explain fully how the "Flexible debt financing with YDC will cap annual net generation costs at 10 to 11 cents/kW.h (2012$)" for electricity customers in the Yukon.

(c) Please provide the underlying spreadsheet analysis complete with formula and linkages that supports the Mayo B annual costs and diesel savings portrayed in Figure 1, page 14 of the application.

(d) With respect to the analysis portrayed in Figure 1, please provide the base case grid load forecast and forecast assumptions. Please explain whether this base load forecast could be categorized as a low, mid/average or high range forecast.

(e) Further, with respect to Figure 1, please provide details into the underlying water conditions that were incorporated into the study, i.e. Extreme Low Water, Median Water and Extreme High Water Conditions, in the areas of Aishihik, Whitehorse and Mayo.

(f) Other than the "Minto, and Alexco, and Carmacks Copper mines) assumed to be connected in 2012 and shut down (at varying dates) by 2019, please confirm and provide supporting for any additional proxy mine loads that may or may not be included in the assumptions underlying the "Mayo B Annual Costs and Diesel Savings" illustrated in Figure 1.

(g) Please provide support for the assertion that a GW.h of hydro generation, when it replaces a GW.h of diesel generation, displaces "700 tonnes of greenhouse gas (GHG) emissions.

(h) YEC states that it seeks to "increase hydro generation capacity installed on the Mayo River from approximately 5 MW to approximately 15 MW."[1] Considering seasonal river flows and

[1] Application, page 1

the biophysical effects described on page 19 of the Application, please explain in detail what can be expected regarding the seasonal average output of Mayo B, i.e. summer and winter.

YUB-YEC-26

Reference: **Application, page 10.**

Issue/Sub-Issue: **Project Costs**

Quote: During Yukon Energy's 2008/2009 GRA, the cost of the Project was estimated at $120 million (including escalation, interest during construction, and contingencies of 15% to 25% depending on the Project Component).

Request:

(a) Do the estimates provided take into account the economic downturn and therefore reflects lower construction rates for the various trades utilized during the construction?

(b) In Board Order 2009-8 Appendix A (Reasons for Decision) at paragraph 196 (page 37) the Board states:

> To alleviate existing concerns regarding YEC's ability to estimate, the Board directs YEC, in future, to file any Part 3 applications before this Board only when preliminary engineering estimates are available and included as part of the application.

(c) In this application, are the estimates provided based on preliminary engineering estimates?

(d) Please provide a copy of the Constructions Contractor MOU between YEC and PKS.

(e) Please explain what is meant by "resolution of ongoing ES&G treatment for this specific project." Will this project attract the same ES&G rate as all other YEC capital projects?

(f) For all regulatory aspects of this project which have been reviewed by this Board or are to be reviewed by this Board, including development costs – have those costs been recorded to the project according to the Board scale of costs?

(g) Please provide the business case for this project, including the electronic models, and state all assumptions used in the economic analysis of the business case. Have the business case provide the economic analysis based on the current approved water levels, and

(h) Please provide the details of your levelized cost of energy calculations as noted in footnote 12 of page 10 of the application.

YUB-YEC-27

Reference: **Application, pages 11 & 12.**

Issue/Sub-Issue: **Levelized Cost of Energy**

Request:

(a) Are the B.C. green market power purchase costs, the highest costs for energy in B.C?

(b) Please provide, in tabular form, a comparison of the LCOE of existing Yukon hydro generation including the Aishihik 3rd Turbine and other alternatives such as Marsh Lake Fall/Winter Storage, Atlin Winter Storage, Gladstone Diversion and the Aishihik Rewind.

(c) Please explain how the target range of 8 to 10 cents per kWh was established. Using the same output assumptions, same forecast operating costs, and financing assumptions what does this range represent in capital expenditures?

(d) What would be the LCOE if it was calculated over 35 and 50 years? Please provide the calculations for the LCOE over 35 and 50 years.

YUB-YEC-28

Reference: **Application, page 12.**

Issue/Sub-Issue: **Mayo B Refinements**

Quote: "In finalizing Project design, Yukon Energy will continue to pursue refinements and/or options (e.g., turbine/generator and/or penstock design, powerhouse location within the defined area) that can increase Mayo B energy output at an incremental levelized cost (for the added capital cost) that does not exceed the minimum target cost of 8 c/kW.h."

Request:

(a) What kind of potential increased energy output can YEC expect?

(b) Is there a current firm need for the increased output? If not, when does YEC forecast a firm need for the increased output?

(c) What is the current rate for secondary sales?

(d) For YEC's base assumptions on the Mayo B project, in tabular form, please provide the expected quantity of secondary sales for each of the next 10 years than can be met through the availability of Mayo B's energy output.

YUB-YEC-29

Reference: **Application, page 13.**

Issue/Sub-Issue: **Net Generation**

Quote: The forecast "net generation" impact of Mayo B to displace diesel generation on YEC's overall WAF/Mayo Dawson integrated system (assuming completion of CSTP Stage 2) recognizes that, in order to assess diesel displacement benefits due to Mayo B, the increased generation at the Mayo plant ("gross generation") must be reduced to the extent that Mayo B operation results in reduced generation at the Whitehorse and/or Aishihik hydro generation facilities (due, for example, to impacts on seasonal generation at these other hydro plants).

Preamble: The Board wishes to better understand this statement.

Request:

(a) Does the above statement imply that for Mayo B to displace diesel, it must first displace other hydro plants which displace diesel? Please explain.

YUB-YEC-30

Reference: **Mayo Hydro Enhancement Project (Mayo B) Application; page 13**

Issue/Sub-Issue: **D**isplaced diesel/hydro generation

Quote: The forecast "net generation" impact of Mayo B to displace diesel generation on YEC's overall WAF/Mayo Dawson integrated system (assuming completion of CSTP Stage 2) recognizes that, in order to assess diesel displacement benefits due to Mayo B, **the increased generation at the Mayo plant** ("gross generation") **must be reduced to the extent that Mayo B operation results in reduced generation at the Whitehorse and/or Aishihik hydro generation facilities** (due, for example, to impacts on seasonal generation at these other hydro plants **[Emphasis added]**

Preamble: The YUB wishes to understand the above quote.

Request:

(a) Please provide the study and accompanying analysis that led to the base case forecast, wherein "Mayo B net generation contribution the system … approximates 26.4 GW.h in 2012, and ranges from 14.9 to 41.4 GW.h/yr over the Project's assumed 65 year economic life."

(b) Please provide a comparative study and analysis, using the same components that underpin the above study, wherein Mayo B is operated "absent [the] 1 meter drawdown."

(c) Please confirm that operationally, Mayo B output may be curtailed as a) it may displace hydro output elsewhere on the IS and b) to minimize line losses?

(d) In consideration of the answer to part (c) and using Attachment C-1 as a template, please provide a table with the expected average MW output of Mayo B. For clarity please provide average out put using the following table:

	Firm Load Level (GW.h/year)		
Water Conditions	417 GW.h	468 GW.h	575 Gwh
Extreme Low Water			
Median Water			
Extreme High Water			

(e) Please explain why in 2012, Mayo B net generation approximates 26.4 GW.h, and then ranges from 14.9 to 41.4 GW.h/yr over the Projects economic life?

Mayo Hydro Enhancement Project (Mayo B) Application; page 13

Issue/Sub-Issue: Displaced diesel/hydro generation

Quote: "Net generation" impacts of Mayo B are sensitive to assumed overall loads on the WAF/MD systems, and changes to annual grid generation load are forecast to change long term average net generation from Mayo B; for example, under the base case forecast, Mayo B net generation contribution to the system (**with Mayo Lake enhanced storage**) approximates 26.4 GW.h in 2012, and ranges from 14.9 to 41.4 GW.h/yr over the Project's assumed 65 year economic life, **reflecting the impact of changes during this period in overall forecast WAF/MD annual dispatchable generation loads.** By comparison, gross generation at Mayo B during this same period would be expected to fluctuate considerably less under the same forecast load conditions. **[Emphasis added]**

Preamble: The YUB wishes to understand the above.

Request:

(a) Please provide the study, assumption and accompanying analysis that led to the base case forecast, wherein

> "Mayo B net generation contribution to the system … approximates 26.4 GW.h in 2012, and ranges from 14.9 to 41.4 GW.h/yr over the Project's assumed 65 year economic life."

(b) Please provide the base case forecast, i.e. the approximate GW.h in 2012 and the range of output (GW.h) over the Project's assumed 65 year economic life, without Mayo Lake enhanced storage

(c) Please explain what is meant by the statement, "By comparison, gross generation at Mayo B during this same period would be expected to fluctuate considerably less under the same forecast load condition." Please provide an example.

(d) YUB notes the statement that

> "Net Generation" impacts of **Mayo B are sensitive to assumed overall loads on the WAF/MD systems**, and changes to annual grid generation load are forecast to change long-term average net generation from Mayo B" **[Emphasis added}**

a. Please provide sensitivity analyses wherein the changes to annual grid generation load are within +/- 10% and +/- 5% of the base case generation load forecast.

(e) Provide a detailed explanation regarding the water conditions that were used, i.e. extreme low, median water and extreme high water conditions, over the Project's assumed 65-year economic life.

YUB-YEC-31

Reference: **Section 3.2, Anticipated Timeline**

Preamble: The YUB wishes to understand the current status of Project planning and design

Request:

(a) Please provide a detailed explanation as to what remains to be done with respect to project planning and design.

(b) YEC states "In order to meet the target in-service date, long lead equipment (i.e., the Turbine/Generator [T/G] must be contracted in early 2010 from a supplier selected and committed before the end of 2009." Please confirm that a T/G contractor has been committed to and selected.

(c) If the answer to part (b) is yes, please provide "a more definitive target schedule for in-service of Mayo B facilities" and updated "expected costs and requirements."

(d) Considering that "Mayo B in service is currently planned to occur on, or before, December 31, 2011" and the updated costs estimate provided in part (c), can YEC confirm the accuracy range of the estimate to be within plus 20% minus 10% of final costs?

(e) If YEC cannot confirm part (d) please provide a detailed explanation.

YUB-YEC-32

Reference: **Application, page 14 – Figure 1**

Issue/Sub-Issue: **Cost of Diesel Generation Saved by Mayo B**

Quote: Cost of Diesel Generation Saved by Mayo B: diesel generation annual costs (the upward sloping "Costs of Diesel Generation Saved by Mayo B" line) if the equivalent net generation forecast for Mayo B was to be provided from diesel plants at the assumed diesel price fuel costs (incremental diesel generation fuel and incremental O&M costs at approximately c/kW.h in 2010, increasing by inflation thereafter).

Request:

(i) Does the above illustration imply no new hydro generation projects over the 35 year period?

(j) Is that a reasonable assumption?

YUB-YEC-33

Reference: **Application, page 15**

Issue/Sub-Issue: **YESAB Review Process**

Quote: The YESAB review process and any related permitting requirements are the key critical path elements currently affecting the required start of construction for Mayo B in May of 2010. Under the MOU, a construction contract is targeted with PKS by the end of 2009. If a PKS contract cannot be successfully concluded, a competitive tender process and award is to be concluded by April 2010.

Request:

(a) Is there now a construction contract with PKS in place? If not, has a competitive tender process commenced?

(b) If the YESAB review process and any related permitting requirements are affecting the required start of construction, why is a deadline for a report recommendation of March 31, 2010 so urgent versus a May 31, 2020 deadline?

YUB-YEC-34

Reference: **Application, page 16**

Issue/Sub-Issue: **NND Project Agreement**

Request:

(a) What is the current status of the NND Project Agreement?

YUB-YEC-35

Reference: **Application, Section 4.1.1 Need Based on Opportunity**

Request:

(a) What is the primary driver for this project? Is it the available funding or does forecast load increased drive the project?

(b) For the load component, is there currently enough surplus generation from Mayo A (M-D system) to meet the anticipated load requirements for the mine (Alexco) at Keno?

(c) Would the addition of the Aishihik 3rd Turbine satisfy the incremental load requirements for the anticipated mine load at Carmacks?

(d) Would the Marsh Lake Fall/Winter Storage and the Aishihik Rewind options enable enough hydro generation to meet load growth (outside of new industrial loads) on the WAF system?

YUB-YEC-36

Reference: **Application, page 22**.

Issue/Sub-Issue: **Generation Planning/Project Need**

Quote: On page 22 of the Application, in the first full paragraph on that page, YEC makes the following statement:

> "At its core, the "need" for the Project reflects an opportunity available today to reduce diesel generation in a cost effective and timely manner. Without the Project, existing and committed Yukon Energy generation and transmission facilities (as reviewed in Attachment C) will still be able to supply forecast WAF/MD grid generation energy load forecasts for many years to come by relying on existing diesel generation facilities. If and when needed, additional diesel plant can be added in a timely way to augment winter peak capacity as need to satisfy YEC's capacity planning criteria. …".

Request:

(a) What time period is being addressed in this statement?

(b) Does the load forecast referred to in that statement include major industrial loads such as Minto, Alexco, and Carmacks Copper or does the load forecast omit major industrial loads?

(c) Does the statement regarding the capabilities of the existing system include the Minto, Alexco and Carmacks Copper industrial loads?

(d) Without the Mayo B project, when might additional diesel generation be needed and how much additional capacity would be needed to meet this forecast?

YUB-YEC-37

Reference: **Section 4.1, Need for the Project**

Issue/Sub-Issue: **Project Costs**

Quote: The technical, economic and financial feasibility of proceeding with the Project at this time is confirmed by review of forecast WAF/MD grid **baseload diesel generation requirements** that will be displaced by Mayo B, by the engineering and other studies conducted to establish the Project's components and estimated costs and expected timelines, and by the material federal and YDC no cost funding contributions now committed to the Project. Review of alternative means to carry out the Project, as well as alternatives to the Project, confirm that Mayo B, as proposed, is also the optimum development for Yukon Energy to proceed with at this time. Development of Mayo B will provide near term and long term economic development benefits for Yukon, through the near term construction, as well as the long term augmentation of cost-effective renewable hydro electric generation supplying all customers on the Yukon grid.

Preamble: The Yukon Utilities Board (YUB) seeks clarification of the assertion contained in the above quote.

Request:

(a) Please provide a table that outlines and describes the associated costs with Mayo B, i.e. substation costs, refurbishing of existing Distribution and Transmission lines to carry power to the Mayo Dawson 69 kV line, etc that are included in the Project estimate at this time.

(b) Please provide the review(s) of alternative means to carry out the Project as well as alternatives to the Project that lead to the affirmation that "Mayo B, as proposed, is … the optimum development for Yukon Energy to proceed with at this time.

(c) Does YEC consider industrial customers such as Minto, and Alexco, and Carmacks Copper mines as being part of the baseload diesel generation requirements that will be displaced by Mayo? Please describe in detail.

(d) If the answer to part (c) is no please provide a cost benefit analysis wherein industrial customers such as Minto, and Alexco, and Carmacks Copper mines elect to generate their own on-site power with fossil fuel generation rather than connect to the grid.

(e) If material federal and YDC "no-cost" funding were not in place, please affirm and provide a detailed explanation that supports the notion that the Project provides "cost effective renewable hydro electric generation supplying all customers on the Yukon grid."

(f) The capacity of Mayo B is approximately 15 MW. What is the expected capacity or output availability seasonally?

(g) Please provide seasonal loadflow snapshots of the IS using 2009 summer and winter peak loading scenarios that includes the following amendments to the current system:

   a. Aishihik 3rd turbine in operation without Mayo B;

b. Mayo B in operation without Aishihik 3rd turbine; and

c. Both Mayo B and Aishihik 3rd turbine operational.

Please provide a detailed analysis of each loadflow in part (g).

YUB-YEC-38

Reference: **Application, page 24**

Issue/Sub-Issue: **Electricity Loads**

Quote: Mayo B will come into service at a time when electricity loads are now forecast over the near term to require grid service and energy materially beyond available surplus hydro, driving new diesel generation requirements in Yukon over both the near term and the long term unless new renewable power resource options are developed.

Request:
(a) Does the above quote include production from the Aishihik 3rd Turbine in the analysis?

YUB-YEC-39

Reference: **Application, page 30 – Figure 3.**

Issue/Sub-Issue: **Project Economics**

Quote: Figure 3 indicates the cost of supplying the same load with diesel as it varies during the period with anticipated mine loads (2012 to 2018) versus the sharp reduction that may occur if indeed these mine loads drop as presently forecast and no further industrial loads arise at that time.

Request:
(a) Could YEC provide an analysis similar to Figure 3 where other hydro generation options (Marsh Lake Fall/Winter Storage, Aishihik Rewind, Gladstone Diversion, or Atlin are implemented?

YUB-YEC-40

Reference: **Application, page 31**

Quote: In short, even absent any flexible note financing, the annual costs in each year of Mayo B under the above load forecast will be lower than they would have been absent the Project to supply the same load with diesel generation.

Request:

(a) Does the above statement imply that by proceeding with this project the economic justifications for other hydro projects changes since diesel displacement cannot be a factor for those projects?

YUB-YEC-41

Reference: **Application, page 31**.

Issue/Sub-Issue: **Generation Planning/Project Need**

Quote:

On page 31 of the Application, in footnote 50 on that page, YEC makes the following statement:

"While the focus of the Resource Plan review in 2006 was Chapter 4 (near term resource options to be developed prior to 2009 in order to address capacity planning related concerns, or take advantage of short term opportunities to advance system enhancements), Chapter 5 (and Appendix B) of the 20-Year Resource Plan established the framework for addressing resource planning over the second stage of this orderly process for additional projects that might be committed between 2006 and 2016 to address additional new industrial energy requirements that may commence before 2016."

Again on page 31 of the Application, in the third paragraph of Section 4.1.3, YEC makes the following statement:

"Following the resolution of the capacity-related issues to be addressed prior to 2009, Yukon Energy embarked upon a new stage of planning and regulatory review focused on addressing energy-related issues raised in Chapter 5 of Yukon Energy's 20-Year Resource Plan."

Request:

(c) Given both those statements, does YEC believe that the existing and currently committed new transmission and generation facilities provide adequate capacity in the reliability sense and in addition could supply the electric energy necessary to supply the forecast load to 2019 including major industrial loads such as Minto, Alexco, and Carmacks Copper albeit by increasing use of diesel generated energy? Explain the reasons for your answer.

(d) If major industrial loads were factored out of the requirement to meet the load forecast both in terms of capacity and energy would the existing and currently committed new transmission and generation facilities be adequate in terms of capacity and energy to meet the load forecast to 2019? Explain the reasons for your answer.

(e) What is the main purpose or need for the Mayo B project through to 2019 - is it to provide additional generating capacity for reliability purposes or is it to provide a source of economical renewable energy to supplant diesel energy required for major industrial customers through to 2019?

YUB-YEC-42

Reference: **Application, page 26**

Issue/Sub-Issue: **Mayo B is second in dispatchable resource stacking order**

Quote: As a result, the typical approach that would be used to stacking these three plants on a weekly basis is to maximize the reasonable output of Whitehorse as a first priority, then dispatch Mayo B, with use of Aishihik being driven by loads in excess of the amounts that can be supplied by Whitehorse and Mayo.

Request:
(a) Do the dispatch criteria factor in the economics of line losses?

(b) Based on the stacking order cited above, is there a reduced need for the refurbishment of the Mirrlees units to satisfy the N-1 criteria (that is, due to reduced output, a lower N-1 contingency is required)?

YUB-YEC-43

Reference: **Application, page 26 – footnote 36**

Issue/Sub-Issue: **Plant Configuration**

Quote: Depending on the turbine design selected, there appears to be a possibility of additional energy available from this plant due to selecting higher efficiency in unit performance; penstock design as well powerhouse location may also affect effective net head available for generation; however, the selection of such refinements needs to consider both cost and benefit aspects, and analysis of such final design options remains underway.

Request:
(a) Has that analysis concluded? If so, what are the results of that analysis?

YUB-YEC-44

Reference: **Application, page 29 – footnote 38**

Issue/Sub-Issue: **Secondary Sales**

Request:
(a) When evaluating generation projects, how much weight should be given to secondary sales considerations?

YUB-YEC-45

Reference: **Application, page 40**

Issue/Sub-Issue: **Minto Mine Load**

Quote: … the Minto mine has been connected to the grid with ongoing expansion of its reserves and expected power requirements.

Preamble: <insert>

Request:
(a) What was the forecast Minto mine load in the YEC's PPA proceeding?

(b) What is the current forecast for the Minto mine load?

YUB-YEC-46

Reference: **Application, Section 6.2.2**

Quote: A decision to **not** proceed with the project or any other renewable generation enhancement project in Yukon, would be expected to result in the following:
…
the utility will be required to utilize non-renewable generation to service the loads, almost certainly diesel generation.
…
Long-term power costs in Yukon will not benefit from the enhanced stability associated with capital intensive renewable power generation such as increased hydro (and that accordingly would occur with Mayo B). This would likely lead to materially higher power rates over time than would be the case with the Project, and separately may lead to more industrial customers electing to generate their own on-site power with fossil fuel generation rather than connect to the grid.

Request:
(a) Provide the results of studies that may have been undertaken wherein consideration was given to delaying Mayo B in-service dates by 5 and 10 years.

(b) If such studies were not undertaken, please provide a detailed explanation as to why delay of the Project was not considered, esp. in consideration that the Aishihik 3rd turbine is expected to be operational in the very near term.

YUB-YEC-47

Reference: **Attachment C**

Request:

(a) Please provide the annual Firm Load Levels (GW.h/year) for the period from 1989 to 2009. For each of these years, please provide a) the annual Hydro generation and Diesel generation (GW.h/year) that was required to serve the Firm Load Levels and b) a description of the water conditions.

(b) With respect to) provide a net present value analysis that incorporates but is not limited to cost of diesel displaced, a line loss comparison, and the recouping of initial investment of monies, for each of the three Firm Load Levels; i.e. minimum, average and maximum baseload diesel generation displacement.