REFERENCE: General

QUESTION:

Please provide a copy of the following:

December 7, 1992 Report to the Commissioner in Executive Council by the Yukon Utilities Board concerning the Review of the Capital Resource Plans of Yukon Energy and Yukon Electrical;

ANSWER:

Please see attached as follows:

- UCG-YEC-2-1 Attachment 1: The YUB 1992 Report
- UCG-YEC-2-1 Attachment 2: YEC and YECL response to matters raised in the YUB's 1992 Report, from the 1993/94 YEC/YECL General Rate Application.

REVIEW OF

THE CAPITAL RESOURCE PLANS

OF

YUKON ENERGY CORPORATION
and
THE YUKON ELECTRICAL COMPANY LIMITED

REPORT TO

COMMISSIONER IN EXECUTIVE COUNCIL

BY

YUKON UTILITIES BOARD

DECEMBER 7, 1992

Yukon
Yukon Utilities Board
Box 2703, Whitehorse, Yukon Y1A 2C6
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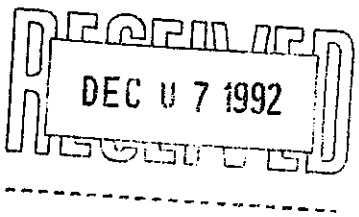
Our File:
Your File: 3620-16-5-18



December 7, 1992

MEMORANDUM

TO: All Intervenors & Interested Parties

FROM: Colleen Geddes
Executive Secretary

RE: Review of Capital Resource Plan YEC and YECL

Please find enclosed a copy of the Yukon Utilities Board review of YEC and YECL's Capital Resource Plan.

The review has been forwarded to the Minister and general public as outlined in section 4 of O.I.C. 1992-92.

C Geddes

Colleen Geddes
Executive Secretary

CG:klk

Enclosure

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EXECUTIVE SUMMARY

Pursuant to Order-in-Council 1992/92 the Board conducted a review of Yukon Energy Corporation's and The Yukon Electrical Company Limited's (**"the Companies"**) capital resource plan. A public hearing was held in the City of Whitehorse from October 26 to 31, 1992.

Those participating in the hearing were the Companies, the City of Whitehorse, NEW ERA Electric Corporation, Friends of Aishihik & Associates, Richie Outfitters Ltd., Yukon Conservation Society, Yukon Chamber of Mines, Department of Fisheries and Oceans (Canada), and Mr. Ross Kelly on behalf of Dr. and Mrs. Craig.

The Board acknowledges the valuable contribution made by each of the participants during the review, and would like to express its appreciation to each of the participants.

This Report provides a preliminary framework within which the Companies should proceed with their capital resource plan. The Companies' capital resource plan will be reviewed on an ongoing basis as part of the general rate applications or as directed by the Board. Before the Companies proceed with a specific project a full regulatory review must be undertaken, including an assessment of the prudence of the timing and the costs of each project.

To assess the Companies' capital resource plan, it is necessary first to consider the need for additional sources of electricity. The first step in assessing this need is the preparation of load forecasts. The Companies provided Low, Base and High Case load forecasts. The principal difference between these forecasts was the assumption made with respect to closure of the Faro Mine. The three scenarios show that closure of the mine creates significant uncertainty in the Companies' forecast.

The Board recognizes that it is not possible for the Companies to forecast with any reasonable degree of precision the timing and likelihood of closure of the Faro Mine. Thus, the Board recommends that the probable closure time of the Faro Mine be continuously assessed by the Companies in determining the need for new facilities.

The likelihood of closure of the Faro Mine in the near future indicates the need to consider the Low and Base Case load forecasts in assessing the Companies' capital resource plan.

The Board further considers that it is necessary for the Companies to prepare as accurate load forecasts as practical to avoid the building of unnecessary supply sources of electricity or a shortage of supply. The Board makes several recommendations with respect to improving the forecasting procedures used by the Companies.

To avoid the construction of unnecessary supply facilities of electricity, it is important that the existing resources be managed as efficiently as possible. The Board makes several recommendations that should result in more efficient use of the Companies' existing hydro resources.

The primary recommendation made by the Board with respect to management of the existing hydro resources is that the Companies perform the necessary studies and tests to determine the potential to use load factoring to increase the capacity relied on at the Whitehorse Rapids Plant.

The Board considers that the significant market risks associated with closure of the Faro Mine and the potential capacity available at the Whitehorse Rapids Plant due to load factoring requires that the Companies proceed on a cautious basis before pursuing expensive supply options. The Board recommends that the Companies aggressively pursue Demand-Side Management ("DSM") activities to the extent it can be demonstrated that the activities will result in lower cost to consumers than alternative supply options.

To assess the economic feasibility of DSM programs, the Companies adopted the use of the Rate Payers Impact Test under which customer rates will not increase due to expenditures even if they do not participate in the DSM programs. Several Intervenors recommended the use of the Total Resource Cost Test. The Board is cognizant of the high rates charged to Yukon customers and the considerable risks in implementing DSM programs and recommends, for the present, the use of the Rate Payers Impact Test to assess the economic feasibility of the DSM programs. The Board considers it appropriate that the Total Resource Cost Test be considered for future use.

The City of Whitehorse made several recommendations with respect to the Companies' proposed DSM programs, and the Board recommends that the Companies consider concerns and suggestions made by Intervenors with respect to the DSM programs.

It was demonstrated during the review that significant savings in energy and demand could be realized through reduction of the installation of electric heat in new construction. The Board recommends that the Companies develop a mechanism that will strongly discourage the installation of electric heat in new construction.

The Board also recognizes that the introduction of Government Energy Efficiency Standards would be a cost effective method of reducing energy consumption. The Board recommends that the Government develop energy efficiency standards for electrical appliances as soon as possible.

The Board recommends that before the Companies commit to the construction of a supply option they should critically assess the knowledge they have gained with respect to potential load factoring at the Whitehorse Rapids Plant, the savings in demand and energy to be realized from DSM programs, the potential for closure of the Faro Mine, improvements in forecasting techniques and the necessity for diesel retirements.

The Companies identified a short list of supply options on which they requested Board review and comment.

The following is a brief summary of the Board's recommendations on the supply options:

(1) The Companies pursue Yukon Territory Water Board approval for the construction of Aishihik #3, assess the environmental costs after giving due consideration to the findings of the environmental reviews, and report back to the Board before commencing construction.

(2) The McIntyre Creek project should be pursued if it remains economically feasible after the resolution of the land claim issues and after the Companies have considered the need for the capacity.

(3) The Companies develop a long-term hydrological base for Drury Creek, Morley River, Lapie River and Orchay River, and that the Companies not pursue any other feasibility studies for the above-noted projects at this time.

(4) Funds expended to study coal-fired generation should be limited to a review of coal technology, particularly with respect to plants having capacity under 20 MW.

(5) The Government take steps to encourage Independent Power Producers (**"IPP's"**) to provide proposals on the feasibility of small scale hydro development at North Fork to replace diesel generation at Dawson, and that no further studies be performed on the Mayo-Dawson transmission projects unless demand changes sufficiently to warrant further review of the project.

The Board recommends that research and development with respect to wind generation continue to be pursued.

The Board recommends that the Companies pursue changing their transformer purchasing policy to reduce future line losses.

The Board recommends that the development of independent power production be encouraged in Yukon. However, it recognizes that a significant number of issues require resolution before IPP's are introduced. The Board considers that mediation will be required to resolve the issues between the Companies and IPP's, and recommends that the Board be directed by the Minister to hold a hearing to develop a firm IPP policy for Yukon.

1. INTRODUCTION

This Report is submitted to the Commissioner in Executive Council pursuant to Section 1 of Order-in-Council 1992/92 ("OIC"). Section 1 of the OIC states:

> "1. The Yukon Utilities Board (the 'Board') be assigned the duty of reviewing, at a public hearing, Yukon Energy Corporation's and The Yukon Electrical Company Limited's proposals in respect of major capital projects and contract commitments required for non-diesel fuel generation, transmission and demand-side management during the period 1992 to 2001, with emphasis on those projects and commitments required by the year 1997. This review shall include consideration of the following:
>
> (a) significant utility spending commitments that would affect long term utility costs and rates related to the generation and transmission of power in the Yukon, including demand-side management and independent power commitments, new hydro or other capital-intensive long term generation projects excepting new diesel fuel generation projects and major new transmission connections;
>
> (b) the effect of the proposed spending commitments on electricity rates to be charged to Yukon consumers and the methods proposed to phase in the changes required in electricity rates;
>
> (c) the necessity for the proposed spending commitments, their physical and engineering characteristics and their economic consequences with emphasis on:
>
> (i) effects relating to load forecasts and the need for the spending commitments to meet the load forecasts;

(ii) the process to be used by Yukon Energy Corporation and The Yukon Electrical Company Limited in the development and implementation of its demand-side management programs;

(iii) evidence that all reasonable alternative options have been considered and that the proposed spending commitments have been selected on reasonable grounds, i.e. technical feasibility, cost efficiency, and reliability; and

(iv) the analysis by Yukon Energy Corporation and The Yukon Electrical Company Limited of potential risks from all causes, including but not limited to economic and financial risks. By reason of the fact that the proposed projects may be the subject of environmental review, the risk analysis should include possible modification to the projects resulting from the environmental review."

2. PROCEDURES FOLLOWED BY THE BOARD

The procedures followed by Yukon Utilities Board ("**Board**") in the conduct of its review pursuant to the OIC were as follows:

(1) Yukon Energy Corporation ("**YEC**") and The Yukon Electrical Company Limited ("**YECL**") ("**the Companies**") filed a joint submission to the Board, "Major Capital Project Proposals: 1992 - 2001", on June 30, 1992. The Companies sent copies of their submission to interested parties and public libraries.

(2) On July 17 and 22, 1992 the Board published in The Whitehorse Star and Yukon News a Notice of Public Hearing indicating that a Pre-Hearing Conference would take place in the City of Whitehorse on August 11, 1992 to determine the schedule of events leading up to and including the Public Hearing.

(3) All Intervenors were provided with the opportunity to make written interrogatories to the Companies respecting their procedures and recommendations. The Companies provided written responses to these interrogatories.

(4) On September 25, 1992 a second Pre-Hearing Conference was held in the City of Whitehorse to hear two Notices of Motion. The first Notice of Motion was on behalf of Richie Outfitters Ltd. for an adjournment of the hearing. The Board denied the motion for adjournment.

The second Notice of Motion heard dealt with the relevance of certain interrogatories to the Companies from the Friends of Aishihik & Associates. The Board issued a written decision outlining the interrogatories that it determined to be irrelevant to the review and to which responses were not required from the Companies.

(5) All Intervenors were provided with the opportunity to file evidence respecting the matters to be reviewed. Intervenor evidence was filed by Mr. William B. Marcus on behalf of the City of Whitehorse, Mr. Randy Clarkson on behalf of the NEW ERA Electric Corporation, Mr. Gary McRobb on behalf of the Friends of Aishihik & Associates, and Mr. Bob Vandijken and Ms. Lisa Sumi on behalf of the Yukon Conservation Society. A written submission was also provided by the Yukon Chamber of Mines. The Companies made written interrogatories to the Intervenors who provided written responses.

(6) The Board engaged a hydrology expert, Mr. Donald J. Druce representing B.C. Hydro International, to assist the Board in its review of the Companies' major capital projects and water management practices. Mr. Druce filed evidence in the review and provided responses to the Companies' written interrogatories.

(7) A Public Hearing was held in the City of Whitehorse from October 26th to 31, 1992. Those participating in the hearing were YEC, YECL, the City of Whitehorse, NEW ERA Electric Corporation, Friends of Aishihik & Associates, Richie Outfitters Ltd., Yukon Conservation Society and Yukon Chamber of Mines.

The Board provided an opportunity to the public to make presentations to the Board at the end of each day of the scheduled sittings. Presentations were made by Mr. Al Von Finster from the Department of Fisheries and Oceans (Canada), and Mr. Ross Kelly on behalf of Dr. and Mrs. Craig.

(8) At the conclusion of the Hearing, the Companies and Intervenors were provided with an opportunity to make final written submissions to the Board.

3. THE COMPANIES' SUBMISSION

The Companies requested that the Board review their submission in order to provide a report on the need and rationale for the major capital projects and commitments being considered by the Companies.

As explained in the Companies' submission, in order to assess the need and rationale for major capital project proposals the following must be examined:

(1) The load forecasts by customer class and supply region.

(2) The capability of existing facilities and resources to supply the forecast loads.

(3) The technical and economic feasibility of major capital options, including demand-side management programs and supply options.

(4) The effects on Yukon electric customers, including impacts on the level and stability of future electric rates and the quality of service provided to customers.

(5) The effects on public related strategic objectives of the Companies, including environmental and socio-economic impacts.

3.1 The Load Forecasts by Customer Class and Supply Region

The Companies prepared Low, Base and High Case generation load forecasts for each of the Whitehorse/Aishihik/Faro (**"WAF"**) System, the Mayo System, Dawson, Watson Lake and the Isolated Systems.

The first step in developing the forecasts was to determine an industrial profile. Relationships between industrial, government and other employment were used to develop a forecast of overall employment which in turn was used to forecast total population. The population forecast was used to determine the forecast number of residential and general service customers.

Average use rates were applied to the forecast number of customers to determine forecast energy consumption. Load factors were applied to the forecast energy consumption to determine the forecast demand at the time of system peak.

3.1.1 WAF System Load Forecasts

The primary difference between the Low, Base and High Case generation forecast for the WAF system is the industrial profile assumed. The following Table provides a summary of the industrial profile for each case:

TABLE 1

Industrial Load Assumptions
WAF System Load Forecasts

Industrial Loads	Employ-ment	Capacity Required (MW)	Start-up Date			Shut-down Date		
			High	Base	Low	High	Base	Low
WAF SYSTEM								
Curragh (Faro)	485	22.0	exis[3]	exis	exis	>2011	2008[1]	1995[1]
Wheaton River	100	1.7	1993	1993	1993	2001	2001	2001
Williams Creek	75	3.0[2]	1995	1995	1995	2005	2005	2005

1. Base Case assumes shut-down of Faro Mine in 2008 with reclamation operations continuing until 2023 (reclamation involves 15 MW load for six month summer operation and only 1 MW load at the time of system peak in winter). The Low Case assumes shut-down in 1995 and no subsequent reclamation.

2. Williams Creek assumed to be a six month (summer) 3 MW leaching operation with a winter coincident peak of 200 kW.

3. Mine currently in operation.

Based on current trends, the Companies forecast residential use rates to increase very slightly between 1991 and 1997. Between 1997 and 2011 they are expected to decline very slightly on the premise that increased end-use efficiency will become more prevalent.

The general service use rates were forecast to increase very slightly between 1991 and 1997, and to decrease very slightly thereafter.

3.1.2 Other System Load Forecasts

As with the forecasts for the WAF System, the primary difference between the Low, Base and High Case generation forecasts is the industrial profile. The following Table provides a summary of the industrial profile for each case:

TABLE 2

Industrial Load Assumptions
Other Systems

Industrial Loads	Employ-ment	Capacity Required (MW)	Start-up Date			Shut-down Date		
			High	Base	Low	High	Base	Low
DAWSON SYSTEM								
Brewery Creek	100	3.0[1]	1994	-	-	2014	-	-
MAYO SYSTEM								
UKHM	120	2.0	1997	-	-	>2014	-	-
Elsa Area	300	10.0	2005	-	-	>2014	-	-
WATSON LAKE AREA								
Sa Dena Hes	100	0	1991	1991	1991	2010	2000	2000
ISOLATED SYSTEMS								
No Industrial Load	-	-	-	-	-	-	-	-

1. Brewery Creek assumed to be a six month (summer) 3 MW leaching operation with a winter coincident peak of 200 kW.

The Companies forecast the residential and general use rates to remain constant on the basis that the use rates of the various customer classes would not impact on decisions regarding resource options.

3.2 Capability of Existing Facilities and Resources to Supply the Forecast Loads

In determining the capability of the existing facilities to supply the forecast loads, it is necessary to assess the ability of the facilities to meet the energy requirements as well as the ability of the facilities to meet the demand at system peak (generally referred to as capacity). Typically energy is measured in gigawatt hours ("**GWh**") and demand (capacity) is measured in megawatts ("**MW**").

3.2.1 Capability of the WAF System to Supply the Forecast Loads

The WAF System consists of both hydro and diesel generation. The Companies determined that the need for new facilities on the WAF System should be determined solely on the basis of firm capacity needs as diesel generation capability will be sufficient to meet energy requirements not met by hydro generation.

The WAF System's firm capacity in 1992 was 78.5 MW based on 97.8 MW of dependable capacity less 19.3 MW of required reserve. The required reserve was determined to be the capacity required to cover the loss at the time of system peak of the largest hydro unit (currently 15 MW at Aishihik) plus 10% of the installed diesel capacity. It should be noted that this calculation was based on the lowest recorded water flow conditions and, consequently, only 19 MW was attributed to the

Whitehorse generating units which have a nominal capacity of 40.0 MW.

The firm capacity of 78.5 MW consists of 35 MW of hydro capacity, 38.5 MW of diesel capacity and 5 MW of "Other" capacity. The 5 MW of "Other" capacity represents capacity which is assumed to be available from the Whitehorse units for 80% or more of the years, plus the ability to import 5 MW of diesel capacity on a short term rental basis.

The future capacity requirements differ between the Low, Base and High Case load forecasts. The following Table summarizes the Companies' forecast need for new capacity under the Low, Base and High Cases:

TABLE 3

WAF System
Capacity Requirements

LOW CASE

YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		76.00	2.50
1993	78.50		82.40	-3.90
1994	78.50		83.20	-4.70
1995	73.50	5.00	58.30	15.20
1996	73.50		58.40	15.10
1997	73.50		58.80	14.70
1998	64.40	9.10	59.50	4.90
1999	61.40	3.00	60.30	1.10
2000	48.30	13.10	61.10	-12.80
2001	48.30		59.00	-10.70
2002	48.30		59.70	-11.40
2003	48.30		60.50	-12.20
2004	48.30		61.20	-12.90
2005	48.30		61.00	-12.70
2006	48.30		61.80	-13.50
2007	48.30		62.60	-14.30
2008	48.30		63.40	-15.10
2009	47.30	1.00	64.30	-17.00
2010	44.70	2.60	65.10	-20.40
2011	40.00	4.70	65.30	-25.30

BASE CASE

YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		76.00	2.50
1993	78.50		82.40	-3.90
1994	78.50		83.20	-4.70
1995	73.50	5.00	85.10	-11.60
1996	73.50		86.00	-12.50
1997	73.50		86.90	-13.40
1998	64.40	9.10	87.70	-23.30
1999	61.40	3.00	88.50	-27.10
2000	48.30	13.10	89.30	-41.00
2001	48.30		87.20	-38.90
2002	48.30		88.00	-39.70
2003	48.30		88.80	-40.50
2004	48.30		89.50	-41.20
2005	48.30		89.40	-41.10
2006	48.30		90.20	-41.90
2007	48.30		91.00	-42.70
2008	48.30		65.60	-17.30
2009	47.30	1.00	65.50	-18.20
2010	44.70	2.60	66.10	-21.40
2011	40.00	4.70	66.10	-26.10

HIGH CASE

YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		76.00	2.50
1993	78.50		82.40	-3.90
1994	78.50		83.20	-4.70
1995	73.50	5.00	85.10	-11.60
1996	73.50		86.00	-12.50
1997	73.50		86.90	-13.40
1998	64.40	9.10	87.70	-23.30
1999	61.40	3.00	88.50	-27.10
2000	48.30	13.10	89.30	-41.00
2001	48.30		87.20	-38.90
2002	48.30		88.00	-39.70
2003	48.30		88.80	-40.50
2004	48.30		89.50	-41.20
2005	48.30		89.40	-41.10
2006	48.30		89.20	-40.90
2007	48.30		91.00	-42.70
2008	48.30		91.80	-43.50
2009	47.30	1.00	92.70	-45.40
2010	44.70	2.60	93.50	-48.80
2011	40.00	4.70	93.70	-53.70

For all three cases, approximately 5 MW of new capacity will be required to meet load growth from 1992 to 1994.

Under the Low Case forecast, no further capacity will be required until the year 2000 when approximately 13 MW will be required due to diesel retirements.

Under the Base Case forecast, a further 38 MW of capacity is required between the years 1994 and 2008 at which time the Faro Mine is forecast to close. The new capacity will be required to replace retired diesel equipment. After the closure of the Faro mine, the WAF System is expected to have surplus capacity for at least 10 years if the diesel retirements are replaced.

Under the High Case forecast, a further 35 MW of capacity will be required by the year 2001, primarily due to the replacement of retired diesel equipment. New capacity continues to be required subsequent to 2001.

3.3 Supply Options and Demand-Side Management Programs

The Companies examined two sources of new capacity: supply options and demand-side management programs. The economic feasibility of the options and programs examined by the Companies was determined by a comparison of the particular option or program with the cost of providing the same capacity with diesel generation.

3.3.1 Supply Options

The Companies perform three levels of feasibility studies for hydro supply options. Level 1 studies involve the identification of possible sites, Level 2 studies involve preliminary hydrological studies and preliminary estimates of power available and the capital costs. Level 3 studies include environmental and socio-economic studies, detailed studies to determine structure sizing and location, power availability and project capital cost. The Companies indicated that Level 3 studies would be substantially completed prior to making an informed decision to proceed with a project. They expect that the capital cost determined in a Level 3 study is likely to be within 20% of the final forecast capital cost.

The Companies used a discounted cash-flow model to assess the economic feasibility of the supply options.

3.3.1.1 Supply Options - WAF System

The following Table summarizes the supply options examined by the Companies for the WAF System:

TABLE 4

Potential Supply Options for WAF System

Project Option	Potential Inservice Date	Economic Life (years)	Dependable Capacity (MW)	Deliverable Annual Energy (GWh)	Estimated Costs ($1992)	
					Capital ($000)	Annual O&M ($000)
Over 30 GWh/yr						
Surprise Lake hydro	1996	50	6.7	48.0	32,990	1,800
Moon Lake hydro	1996	50	7.4	44.9	36,130	1,800
Wolf River hydro	1998	50	4.3	37.6	29,060	390
Coal Plant	1996	30	17.0	133.6	37,390	2,200
20 to 30 GWh/yr						
Drury Creek Hydro	1996	50	2.8	24.8	17,070	270
Orchay River hydro	1997	50	3.0	26.6	18,490	285
Mayo-Carmacks Trans.Line	1994	50	2.8	24.5	26,700	200
10 to 20 GWh/yr						
Morley River hydro	1996	50	1.6	16.0	11,240	210
Lapie River hydro	1996	50	0.3	10.5	5,740	155
Squanga Creek hydro	1996	50	0.6	10.7	8,000	180
5 to 10 GWh/yr						
McIntyre Creek #3 hydro	1995	50	0.62	5.5	4,040	30
5 GWh/yr or less						
Aishihik 3rd Turbine hydro	1994	50	5.0	2.8	3,100	30

Level 2 feasibility studies have been completed for all of the potential hydro supply options. The studies indicate that:

(1) None of the supply options examined by the Companies are economically feasible under the Low Case forecast.

(2) Under the Base Case forecast, the Surprise Lake, Mayo-Carmacks and Moon Lake projects are uneconomic.

(3) Under the High Case forecast, all of the supply options, with the exception of Moon Lake, are economic.

The Companies determined that supply side options for non-diesel generation and transmission development should be implemented only in the event that the projects are expected, over their life, to yield reduced utility costs relative to diesel generation and that any initial adverse impacts on overall rate levels are not expected to continue for longer than approximately five years.

The Companies also recognized the significant market risks related to the possible loss of major loads, primarily the Faro Mine load, and determined that it was appropriate to develop supply options costing in excess of $5 million only in the event that the market risks could be reduced.

One mechanism identified by the Companies to reduce the market risk to the utilities and their customers would be a flexible debt financing arrangement with the Yukon Government whereby principal and interest payments could be reduced or eliminated whenever loss of loads would impose significant adverse rate impacts on customers.

The Companies identified a short list of supply options on which they requested Board review and comment. The following is a brief summary of the supply options proposed by the Companies:

(1) Aishihik 3rd Turbine

The proposed work plan calls for the Aishihik #3 turbine hydro project to be installed by August 1994, subject to resolution of environmental concerns related to the Aishihik Lake operation. The August 1994 date is, therefore, subject to receipt of all necessary approvals from the Yukon Territory Water Board.

In comparison to the installation of new diesel, rates will be higher under the Low Case scenario and lower under the Base and High Case scenarios if Aishihik #3 is installed.

(2) McIntyre Creek

The McIntyre Creek project is a proposed extension of the existing YECL development of the Fish Lake and McIntyre Creek watersheds. The project would make further use of controlled water flows to provide additional generation during the winter period.

Spawning salmon utilize the lower reach of McIntyre Creek. YECL suggests that the tail race could be developed in such a manner so as to provide necessary spawning beds. The project is not anticipated to have any other significant environmental impacts. However, the Companies have indicated that the McIntyre Creek project cannot be developed until land ownership problems are resolved.

Under the Low Case scenario, rates would be higher if McIntyre Creek was developed than if diesel was installed. Under the Base Case and High Case scenarios, rates would be higher until the year 2001 after which time they would be lower.

(3) Feasibility Studies

The Companies propose to complete Level 3 feasibility studies for hydro projects at Drury Creek, Morley River, Lapie River and Orchay River. Each of these projects is subject to considerable market risks as their capital costs are in excess of $5 million (Table 4). The Companies forecast costs of $175,000 to $300,000 for completion of the Level 3 assessments for each of the projects.

Under the Base and High Case scenarios, each of these projects would result in higher rates to customers in the early years of operation (1 to 7 years) than if diesel were installed. Under the Low Case scenario, rates would be higher in all years.

(4) Coal-Fired Generation

The Companies also propose to continue to examine available technologies for small scale (10 to 20 MW) coal-fired plants and to work with interested parties to examine specific practical proposals.

The Companies estimated the cost of a 20 MW coal plant to be $37 million. The Companies considered that, on the basis of this cost, the utilities and their customers would be exposed to significant market risks.

Under the Base and High Case scenarios, rates would be lower over the life of the plant if coal-fired capacity was developed rather than diesel. Under the Low Case scenario, rates would be higher if coal-fired capacity is installed.

Environmental considerations relating to coal-fired generation include emissions of sulphur oxides, nitrogen oxides and carbon dioxide, impacts on wildlife aquatic habitats from mining operations and impacts on water resources from generation.

Socio-economic impacts of coal generation are positive compared to diesel due to the creation of jobs and, in the appropriate circumstances, use of waste heat.

3.3.1.2 Supply Options - Other Systems

The following Table summarizes the supply options examined by the Companies for the Other Systems:

TABLE 5

Supply Options for Other Systems

Project Option	Potential Inservice Date	Economic Life (years)	Dependable Capacity (MW)	Deliverable Annual Energy (GWh)	Estimated Costs ($1992)	
					Capital ($000)	Annual O&M ($000)
20 to 30 GWh/yr						
Dawson: North Fork hydro	1995	50	3.7	21.0	18,230	325
Dawson: Mayo-Dawson Trans. Line #1 (UKHM closed)	1993	50	2.5	21.9	20,900	200
10 to 20 GWh/yr						
Dawson: Mayo-Dawson Trans. Line #2 (UKHM reopens)	1993	50	2.5	16.0	20,900	200

The North Fork project involves the rehabilitation of the North Fork Hydro System. This project is only economic under the High Case scenario and YEC recommends that no major work proceed unless it appears that sufficient load will develop.

YEC examined the potential of constructing a transmission line in order to utilize the current surplus at Mayo to service Dawson. This interconnection is only technically feasible under the High Case scenario provided the United Keno Hills Mine remains closed. The Companies propose that no further work be performed on this option unless it appears that market conditions warrant such work.

3.3.1.3 Wind Generation

During the last few years, monitoring work has been performed and preliminary results indicate that the wind regime is sufficiently strong to provide for efficient wind generation.

The technical feasibility of wind in Yukon must be assessed. The monitoring program highlighted some uncertainties as to whether the wind regime can be harnessed, and there is concern that icing of generators could occur.

The Companies' preliminary analysis indicates that a 10 MW farm would not be economic at current diesel fuel prices. However, with the expectation that fuel costs will increase YEC recommends that development work continue to allow Yukon to take advantage of wind generation if economically feasible. YEC is proposing to install a demonstration unit at Haeckel Hill in the summer of 1993, provided it receives adequate funding assistance.

3.3.1.4 Independent Power Producers

YEC has adopted an interim policy for the purchase of power from Independent Power Producers ("**IPP's**"). This policy specifies that pricing will be based on the current avoided cost to YEC of providing electricity. YEC proposes that the purchase price could be levelized over the life of the contract to provide financial security to the IPP provided YEC is satisfied that the power can be delivered by the IPP. YEC also proposes that it be authorized to negotiate take-or-pay contracts with IPP's.

YEC indicated that one potential limitation to the development of IPP's in Yukon is the Public Utilities Act which deems an independent producer to be a public utility. YEC proposes that it would enter into contracts with IPP's and that the Board could regulate IPP's through approval of contracts.

YEC has had discussions with the Carcross/Tagish First Nation with respect to an IPP at Carcross. The Companies have also examined participation in a large IPP project at Surprise Lake.

3.3.2 Demand-Side Management

Demand-Side Management ("**DSM**") programs are designed to influence customer use of electricity, with the intent of changing consumption in order to minimize system costs and future rate increases.

The Companies based their proposed DSM programs primarily on a study prepared for YEC by the British Columbia Hydro and Power Authority through Power Smart Incorporated.

The economic feasibility of DSM programs has been determined by the Companies using the Rate Payers Impact ("**RIM**") test. The RIM test assesses the impact on customer rates of changes in utility revenues and operating costs resulting from DSM projects. In order to pass the RIM test the Companies' DSM program costs, plus the decreased sales revenues, must be equal to or less than the avoided supply cost. The RIM test ensures that customers who do not participate in a particular DSM program are economically no worse off than if the program was not implemented.

One of the key inputs into determining the viability of a DSM program is the estimated savings in energy and demand. The Companies estimated the savings in demand and energy from engineering models, results from their pilot projects, information from other utilities, survey results and judgment.

In recognition of the risk involved in the determination of savings in energy and demand, the Companies performed a sensitivity analysis to determine the percentage decrease to demand and energy savings that could occur and have the DSM program still break even. The Companies also performed a sensitivity analysis to determine the percentage reduction in fuel prices at which each program would fail the RIM test.

3.3.2.1 Demand-Side Management Programs

The Companies proposed that DSM programs be introduced in three phases. The Companies estimate that the proposed DSM programs will result in 7 to 10 MW of savings in demand and 21 to 30 GWh of annual savings in energy. The total estimated cost to the Companies for the proposed DSM programs is $6 million to $7.5 million.

(1) Phase 1

Phase 1 consisted of:

(a) the launch of a DSM information program, including the opening of the Power Smart Idea Shop Information Centre;

(b) the launch of a DSM planning study carried out by B.C. Hydro;

(c) the implementation of a Hot Water Saver Program to reduce electricity use of residential water heaters and the Power Saver Cord Program to reduce electricity use by vehicle block heaters;

(d) an evaluation of the Hot Water Saver Program and the Power Saver Cord program, which included an independent market survey; and

(e) a DSM audit and other initiatives undertaken with Curragh Resources Inc.

The Companies requested that the Board approve the inclusion of all 1991 and 1992 DSM program expenditures in YEC's rate base at the next General Rate Application, with continued provision for the normal Allowance for Funds Used During Construction on these expenditures until such time as they are placed in rate base.

(2) Phase 2

Phase 2 DSM programs will be introduced in 1992 and 1993, and will include the following:

(a) water heater blankets;

(b) energy efficient hot water heaters;

(c) energy efficient refrigerators;

(d) vehicle timers for block heaters;

(e) compact florescent fixtures for residential customers;

(f) compact florescent tubes for residential customers;

(g) commercial lighting program for general service customers; and

(h) commercial buy-back program offering subsidies on a range of products and technologies.

(3) Phase 3

Phase 3 is to be implemented over the period 1994 to 2000. It is designed to expand on the Phase 2 initiatives and to implement fuel switching DSM programs for electrically heated residential customers.

The Phase 3 initiatives include other Smart Home Programs which have not been specifically identified by the Companies at this time. However, the Companies estimated savings of 0.13 MW and 0.70 GWh by the year 2000 through other potential programs.

The fuel switching program will be designed to displace the use of electricity for space heating, and in some applications for water heating, with propane or fuel oil. The Companies estimate that diesel generated electricity for space heat takes two and one-half times as much fuel as direct heating in a furnace. They state that electric heating is not a cost effective or efficient use of electricity for either the customer or the utility. The reduction of electric space heating offers the greatest potential for load reduction for the utility. The Companies estimate that the utilities may need to spend up to $5,000 per household combined with a $2,000 customer cost in order to accomplish the fuel switching program. The Companies indicated that a fuel switching program must be carried out in coordination with the Yukon Government.

The Companies recognize that YEC will have surplus power if the Faro Mine is closed and that the reduction or elimination of electric space heating will close a future market for electricity which YEC may wish to access in the event of a closure. YEC is examining the use of dual fuel technology to resolve this dilemma.

(4) Electric Heating in New Home Construction

The Companies recognized that a separate opportunity for significant DSM, but excluded from the proposed DSM programs, is reduced use of electric heating in new home construction. Recent YECL experience suggests that about one-half of new homes currently being built have electricity as the primary space heating source and about one-quarter have electricity as the backup heating source. If this trend is allowed to continue, the utilities will experience significant increases in winter peak and energy loads.

The capital costs of new heating systems have led to the extensive use of electric heating. The Companies estimate that capital savings to the customers of $3,000 to $5,000 can be achieved by installing electric space heating rather than heating systems which use alternative fuels.

The Companies indicate that unless the installation of electric heating systems in new construction can be reduced it will be difficult to implement the fuel switching program. The Companies have suggested three options for discouraging the installation of electric heating in new construction:

(a) forbid or discourage installation through the Electric Service Regulations;

(b) institute a connection fee for electric heating; and

(c) institute higher rates so that those who use electric heating will pay the full cost of supplying these loads.

The focus of the Companies' work to date to discourage the installation of electric heating in new homes has been public eduction and information. Discussions with the Yukon Housing Corporation have resulted in the discontinuation of the installation of electric heating in social and government housing. Discussions with building contractors in Whitehorse have also reduced the current installation rate of electric heating.

3.3.3 Water Management

Pursuant to Board Directives included in Decision 1992-1 YEC requested:

> "c. confirmation that YEC's current water management practices are appropriate (subject to any ongoing review of environmental or licensing matters), and that any changes to the operation of the Aishihik Lake reservoir and power plant could have a significant adverse impact on Yukon power customers, ...
>
> d. confirmation that YEC should not be proceeding with further studies to assess, or to develop, top storage license options at either Aishihik Lake or Marsh Lake"
>
> (Submission Overview, Page 58)

To support its request YEC provided the following studies:

(1) "Effects of Potential Lake Level Increases, Aishihik Lake" by Acres International Limited.

(2) "Marsh Lake Dam - Ramifications of Higher FSL" by Monenco Inc.

(3) "Proposed Aishihik Lake Top Storage Scheme Effect on Sekulmun Lake" by Acres International Limited.

(4) "Preliminary Evaluation of the Effect on Energy Generation of Changing the License Levels on Aishihik Lake" by Acres International Limited.

(5) "Preliminary Evaluation of the Energy and Capacity Value of Mobilizing Top Storage on Marsh Lake" by Acres International Limited.

The findings of the studies indicated that the costs associated with developing top storage at Aishihik Lake are substantial and would include:

(1) $1.6 - $2.3 million for studies required by the Yukon Territory Water Board (**"YTWB"**) and the Environmental Assessment Review Process Guidelines Order S.O.R./84-467 (**"EARP"**).

(2) $3.4 million for shoreline clearing.

(3) $4.3 - $5.8 million for shoreline protection.

(4) $0.85 million for flood protection for Aishihik village.

YEC noted that other significant mitigation costs may be identified after the required studies are performed.

The advantages of utilizing top storage at Aishihik Lake identified by YEC are an increased storage range to take advantage of unusual economic or meteorological occurrences. The increase in storage may also allow YEC to manage the storage range in such a manner as to offset any whitefish recruitment problems.

YEC concluded that the substantial costs and risks associated with top storage at Aishihik Lake far outweigh the benefits, which would be uncertain and would occur only occasionally when unusual events occur.

Studies with respect to utilizing top storage at Marsh Lake indicated that such a project appeared to be technically feasible and that firm capacity could be increased by up to 7.7 MW. YEC noted that raising the storage level on Marsh Lake would have a significant effect on shoreline properties and houses on the lower end of the lake, and that any increases in the upper level of the lake would cause considerable flooding of trees.

The studies indicated that the costs associated with shoreline stabilization and remediation are difficult to quantify but that $25 million in capital costs would not be an unrealistic estimate.

YEC also noted that the Yukon Government has requested that the Yukon Council for the Economy and Environment ("**YCEE**") conduct a review of the hydrological management of Aishihik Lake in order to address environmental concerns raised by the public.

3.3.4 Other

3.3.4.1 Mayo-Elsa Transmission Line Improvements

It was determined that it was essential that work be performed to ensure the safety of the Mayo-Elsa transmission line. The line was identified as a severe safety hazard for Company employees and the general public.

YEC estimated that a rebuild of the transmission line would cost between $1.5 and $2.0 million. YEC determined that, because the United Keno Hills Mine ("**UKHM**") was closed, an expenditure of this magnitude could not be justified.

YEC stated that, on the basis that UKHM made it clear that the Northern Canada Power Commission had been derelict in its duty to maintain the line, it decided to proceed with the minimum amount of work without customer contributions. The cost of the improvements was $333,000.

3.3.4.2 Contribution Policy

In response to Board Decision 1992-1, YEC provided a description of its contribution policy. The maximum investment to be made by YEC is summarized below:

(1) Residential Service

- $900 per single family dwelling
- $450 per multiple dwelling

(2) Small General Service

- $180 per kilowatt of estimated billing demand, which shall not be less than 5 kilowatts provided that the estimated service life is twenty-five years
- if load characteristics of a new service are expected to vary significantly, then the company's investment will be determined on an individual basis

(3) Large General Service or Industrial Service

- the maximum company investment will vary depending on the level of risk in the new extension
- an Electric Service Agreement between the company and the customer will be established for this purpose

In response to a Board interrogatory, YEC prepared a comparison of its contribution policy with other Canadian utilities.

4. INTERVENOR EVIDENCE

4.1 City of Whitehorse

The City of Whitehorse called William B. Marcus to present evidence regarding the Companies' major capital project proposals. The primary purpose of his testimony was the promotion of more effective planning through the reduction of uncertainty in the electricity demand forecast and identification of DSM and transmission opportunities that will reduce costs, provide environmental benefits and reduce the market risk to the utilities.

4.1.1 Forecasting

Mr. Marcus recommended that the utilities should improve their load forecasting through the development of end-use capability in the residential sector. He described an end-use forecast as one which is developed by determining how electricity is used by the customers and how much electricity is consumed for each use.

Mr. Marcus expressed the concern that the Companies may be understating the effect of the drop in the population and consumption of electricity that would be caused by the closure of the Faro Mine. He indicated that there would be a loss of 485 jobs if the Faro Mine closed. From the Companies' forecast it appeared that virtually all of these persons would remain in Yukon and there would be no significant loss in the number of customers.

4.1.2 Supply Options and Demand-Side Management Programs

Mr. Marcus expressed the concern that the diesel fuel price forecast by the utilities assumes that there will be no escalation in fuel oil prices in excess of inflation, and that this assumption could lead to too few non-oil resource options being undertaken. This could expose Yukon ratepayers to fuel price shocks. Mr. Marcus recommended that the Board use a real escalation rate of 1.5% for diesel fuel prices in evaluating resource options.

4.1.2.1 Supply Options

Mr. Marcus made several recommendations with respect to supply options. The following is a brief summary of his recommendations:

(1) Transformer Purchasing Policy

Mr. Marcus recognized that the Companies have an extremely high rate of line losses even though they have some of the highest marginal costs in North America. The Companies purchase their line transformers based on criteria used by Alberta Power Limited. Mr. Marcus suggested that the benefits realized through bulk purchases of line transformers through Alberta Power Limited are likely to be outweighed by the cost of high line losses. He therefore recommended that the Companies should be directed to change their purchasing policy and, specifically, that they should investigate the use of amorphous distribution transformers.

(2) Aishihik #3

Mr. Marcus recommended that the potential environmental risks of Aishihik #3 that could increase its costs or reduce its output should be taken into consideration before Aishihik #3 commitments are made on the project.

(3) Wind Generation

Research and development of wind generation should be encouraged. If a 1.5% real escalation rate is included in the fuel price forecast, the economics of wind generation are more favourable than the Companies suggest.

(4) The Companies' Other Supply Options

Mr. Marcus recommended that no new hydro-electric generation beyond Aishihik #3 or commercial scale wind generation should be committed to without further examination of costs and risks in a later hearing.

(5) Other Recommendations

Mr. Marcus recommended that the Companies should be required to integrate the economics of line loss reduction in transmission and distribution planning in order to develop a more reliable load forecast.

4.1.2.2 Demand-Side Management Programs

Mr. Marcus recommended that DSM programs and efficiency standards that will minimize the need for new generation should be aggressively and comprehensively pursued. He recommended that the Board should indicate that its goal is to approve as few new diesel projects as possible, and that supply options should be entered into only when it can be demonstrated that DSM options are not sufficient.

With respect to testing the economic viability of proposed DSM programs, Mr. Marcus recommended the use of the Total Resource Cost ("TRC") test. The TRC test compares the total cost of the DSM program with the costs of alternative supply resources.

Mr. Marcus stated that the RIM test used by the Companies is extremely restrictive and economically inefficient. He also stated that the perspective of the RIM test with respect to non-participants is inherently fragmented. When a wide variety of programs are offered to a large number of customers in all customer classes, it becomes less necessary to worry about non-participants.

With respect to specific DSM programs, Mr. Marcus made the following recommendations:

(1) New Electric Heating

Electric heating in new construction should be eliminated through an Electric Service Regulation similar to that contained in Alberta Power Limited's Rider A-2, after providing sufficient lead time for adjustment. It was also recommended that the Government should work to reduce the cost of alternate fuels which compete with electricity, and to reduce the cost of installing diesel and propane heating systems by promoting increased competition among suppliers.

(2) Energy Efficiency Standards

The Government should establish energy efficiency standards for refrigerators, freezers, furnaces, florescent lamp ballasts and electric motors. Establishing standards will reduce future demand while minimizing the costs of DSM programs to ratepayers.

In response to an interrogatory Mr. Marcus provided a Discussion Paper on Standards issued by the Federal Ministry of Energy, Mines and Resources. He suggested that it would be appropriate for the Yukon to adopt the Ontario standards, except for refrigerators where it may be appropriate to set a standard 10% above that of B.C. Hydro on the basis that the Companies have indicated that a number of refrigerators in Yukon already meet this standard.

Mr. Marcus recommended that in the longer term the very high level of costs facing Yukon consumers would justify more stringent standards than exist in other parts of Canada.

Mr. Marcus made the following comments with respect to efficiency standards for certain appliances:

> "Freezers A number of manufacturers already beat the U.S. standard. In the long run, a standard equal to 10-20% less energy use than the U.S. standard is likely to be cost-effective.
>
> Furnaces Minimum standards in Ontario are 78% Annual Fuel Use Efficiency. An initial standard equivalent to Ontario's would be appropriate. Further study may well indicate that a standard of 85% or more (condensing) is cost effective for the Yukon's severe climate. However, standards should not be brought in at this high a level until new electric heat is banned; otherwise the perverse incentive of causing more builders to install electric heat would arise.

> Water heaters In the interim, the 'Silver' water heater should be the standard. Ultimately, once the 'Yukon Gold' water heater has come into significant use, a standard should be set at that level. Utility rebates to popularize it may need to be higher in the short-term to draw more than a single manufacturer into the market so that the standard can be raised to that level.
>
> Fluorescent lamp ballasts Only electronic ballasts should be permitted. The savings in most applications outweigh the extra costs. Costs will also come down if more are sold. Standards should be set so that magnetic ballasts of any type will not pass.
>
> Building efficiency On an interim basis, the R-2000 standards in Canada are appropriate (with the exception that electric heat would not be allowed). More stringent standards may be cost-effective in the Yukon climate, but further investigation is needed."
>
> (Information Response BD/COW-3)

With respect to the Companies' proposed DSM programs, Mr. Marcus made the following recommendations:

(1) Water Saver Program

A direct installation program for an electric domestic hot water program which consists of the following:

(a) R-11 Water Heater Tank Wrap;

(b) up to 20 feet of R-3 Hot Water Pipe Wrap;

(c) high efficiency showerheads;

(d) faucet aerators; and

(e) water heater set point adjustment.

A company installation program would overcome the problem of customers not installing the item or installing it incorrectly. It was suggested that the use of electric water heater time clocks would prevent the upper element from operating during peak utility periods and, therefore, would reduce system peak demands.

(2) Weatherization

Reducing the use of electric heat through improved weatherization of homes should be a major focus of utility programs. Weatherization programs will help customers who cannot participate in fuel switching to control their bills.

(3) Efficient Refrigerators

The Companies' commission to salespersons for the sale of an energy efficient refrigerator will not be effective. The program would be more effective if a rebate was provided directly to the individuals purchasing refrigerators.

(4) Commercial Lighting

The full rebate proposed by B.C. Hydro should be offered to encourage customers to install energy efficient lighting rather than the lower rebate proposed by the Companies. The Companies' program must provide both commercial and industrial customers with the information and technical assistance needed to evaluate the costs and benefits of retrofits or new lighting.

(5) Low Income Programs

Low income groups are not active participants in DSM programs that require customer investment.

4.2 NEW ERA Electric Corporation

Mr. Randy Clarkson presented evidence on the appropriateness of the Companies' interim policy for Independent Power Producers and the benefits of IPP's in Yukon. Mr. Clarkson's evidence primarily addressed the Companies' method of calculating long-term avoided costs for purposes of establishing the price to be paid to IPP's.

He submitted that small scale IPP hydro-electric and wind-electric production are the most environmentally compatible methods to reduce non-renewable diesel generation on the WAF System and to replace diesel generation at remote communities which are located near development potential. The integration of IPP generation systems would result in increased efficiency and reliability for Yukon electrical systems.

Mr. Clarkson recognized that long-term avoided costs should be used in establishing the price to be paid to IPP's. His calculation of long-term avoided costs was based on the embedded costs derived from the Companies' cost of service study.

Mr. Clarkson's specific recommendations are as follows.

4.2.1 Interim IPP Policy

(1) Price

The interim policy should include set prices for the three major rate zones based on full avoided costs and transmission benefits, rather than the "vague" language used by the Companies to describe the appropriate prices.

The following is a summary of the prices recommended by Mr. Clarkson:

TABLE 6

Recommended Prices for IPP Contracts

Rate Zone	Price $/kWh
Hydro	.1736
Large Diesel	.1768
Small Diesel	.1902

(2) Levelized Prices

Levelized prices throughout the IPP contract should be available to all reliable local IPP's. The levelized prices should reflect historic inflation and discount rates.

(3) Take-or-Pay Contracts

The Companies should be required to negotiate take-or-pay contracts with reliable local IPP's. IPP's require take-or-pay contracts to provide them with sufficient security to acquire funds from investors to construct the IPP project.

(4) Requirement to Purchase from IPP's

As utilities are reluctant to purchase power from IPP's, they should be required to purchase power from any reliable local IPP subject only to the approval of the Board.

(5) Utilities Have Competitive Advantage

Mr. Clarkson recognized that utilities have a competitive advantage due to their access to information and their ability to recover their costs through their approved rates. With respect to these advantages, Mr. Clarkson recommended that:

(a) the Companies should be instructed to release accurate cost information that will be beneficial to the IPP's;

(b) the amount of money requested by the Companies for feasibility studies should be reduced;

(c) the IPP's costs incurred to intervene in regulatory proceedings should be guaranteed or the Companies should not be allowed to include their regulatory costs in their rates; and

(d) income taxes and licensing fees for all hydro-electric production should be eliminated.

(6) Regulation of IPP's

Based on a report prepared for YEC on purchasing policy options, Mr. Clarkson indicated that regulation of IPP's in the United States constituted a major deterrent to IPP's entering the market. He recommended that the Yukon Public Utilities Act be amended to remove IPP's from regulation.

4.3 Friends of Aishihik & Associates

Mr. Gary McRobb presented evidence on behalf of the Friends of Aishihik & Associates ("**FAA**"). Mr. McRobb's evidence centered around the water management of Aishihik Lake. The primary concern of the FAA was the impact that drawing down the lake to the low levels the Companies propose will have on the aquatic life, wildlife and native subsistence activities.

FAA is concerned that the Companies' operations at Aishihik are going to result in significant costs to them, and that these costs should be considered in assessing the Companies' management of Aishihik Lake.

4.4 Yukon Conservation Society

Mr. Bob Vandijken and Ms. Lisa Sumi presented evidence on behalf of the Yukon Conservation Society ("YCS"). Their evidence primarily addressed broad principles relating to the management of energy resources.

YCS indicated that it is vital that the need for electricity not be overestimated. Overestimating the need for capacity will result in oversupply and will unnecessarily waste or harm resources.

YCS supported Mr. Marcus's evidence with respect to DSM. YCS believes that the Companies should proceed with DSM programs more quickly and on a broader scale. YCS stated that the Board should send a "strong positive signal" to the Companies with respect to DSM initiatives.

YCS takes the position that wind power, solar power, energy from biomass, waste heat, cogeneration, hybrid systems such as wind and diesel, geothermal energy and alternative means of harnessing hydro power should be investigated to a greater extent than has occurred in the past.

YCS recognized that the cost of natural resources are not properly reflected in the rates paid by customers. They suggested that an environmental premium or adder should be included in the cost of the supply options in order to reflect the true impact of the options.

YCS supported the use of the TRC test, supplemented with an environmental premium, for testing the economic viability of DSM programs. YCS also recommended that the use of the "societal test" for assessing DSM programs should be examined. Environmental externalities are considered in the "societal test".

YCS outlined ten energy management principles which should be considered in the capital planning process:

(1) Pursue demand reduction before increasing supply.

(2) Delay large investments in infrastructure.

(3) Give a preference to small plants over large plants by investing in increments, promoting carefully managed independent power production and operating at a moderate level.

(4) Give a preference to local supply over central supply.

(5) Choose renewable over non-renewable sources of energy.

(6) Focus on energy, not just electricity.

(7) Maximize efficiency gains of infrastructure already in place.

(8) Use waste heat and district heating systems.

(9) Increase the use of alternate energy by first introducing hybrid systems.

(10) Include environmental factors in costing energy alternatives.

5. EVIDENCE OF MR. DONALD DRUCE OF B.C. HYDRO INTERNATIONAL LIMITED

At the Board's request, Mr. Druce presented evidence on the Companies' water management practices. The following is a summary of Mr. Druce's comments and recommendations:

(1) Capacity at the Whitehorse Rapids Plant

Mr. Druce recognized that new plant has generally been added to the WAF System to provide the capacity to meet forecasted peak loads. The timing of plant additions is affected by the capacity of existing plant and the capacity reliability criteria. Mr. Druce concluded that the capacity of the existing Whitehorse Rapids Plant may be understated. He suggested that the Whitehorse Rapids Plant could be "load factored" to provide perhaps less energy but more capacity than is presently planned for under low water conditions. Load factoring is defined as:

> "Operating a generating plant by varying the output above and below the average energy capability during a daily, weekly or seasonal period to more nearly fit a load shape and still maintain the average during the period." (Northwest Power Pool, Glossary of Terms)

He concluded that it was possible to increase the capacity to be relied on at the Whitehorse Rapids Plant by 3.0 to 17.5 MW.

Mr. Druce recognized that the Companies have concerns with respect to the impact that load factoring would have on ice cover and potential flooding, and that these concerns will have to be resolved before the Whitehorse Rapids Plant can be relied on to provide additional capacity.

(2) Peak Demand Forecast

Mr. Druce expressed concern about the methods used by the Companies to forecast peak demand. He observed that the Companies' load factors used to forecast demand are not based on Yukon specific data but rather are based on data collected in Alberta.

On the basis that Yukon electric systems are primarily capacity constrained, Mr. Druce recommended that the Companies should address the issue of peak demand forecasting. Further, he suggested that temperature effects should be modeled explicitly in determining peak demand forecasts.

(3) Hydrological Data Bases

(i) Hydro Supply Options

Mr. Druce's review of the Companies' evidence with respect to their hydrological data bases indicated that they were adequate for Aishihik #3, McIntyre Creek and Klondike North Fork. However, he expressed concern about the adequacy of the hydrological data bases for the other supply options, and recommended that the Companies install stream gauging stations at proposed sites as soon as possible.

(ii) Existing Hydro Projects

Mr. Druce concluded that the Whitehorse Rapids project has a reasonably good long-term hydrologic record. He expressed concerns about the daily hydrologic data base for the Aishihik project. He noted that although the Aishihik project has the ability to regulate inflows throughout the year, YEC does not make a practice of calculating inflows on a daily basis.

Without reliable inflow data, it is not possible to calibrate a conceptual hydrologic model. A conceptual hydrologic model can be used for both short-term and seasonal inflow forecasting, in the design of discharge facilities and to evaluate the adequacy of existing facilities in a dam safety review.

Mr. Druce recommended that improvements should be made to measuring inflow data through measuring water level data at a second site and installing data collection platforms at all gauging stations.

(4) Decision Support

Mr. Druce suggested that a higher level of decision support is feasible for the WAF System.

Operations planning provides information to the system operators that will allow them to meet the demand for electricity reliably and at minimum cost. Typically, utilities use a form of economic dispatch to minimize the cost of meeting the demand for electricity. YEC uses rule curves and a prearranged resource stack. Mr. Druce recommended the use of economic dispatch which considers the marginal cost of hydro-electric resources. The marginal cost of hydro-electric resources may reflect the value of displacing thermal generation, the probability of spill, possible damage costs and the discount rate.

(5) Reserve Criteria

Mr. Druce suggested that it may be possible for YEC to revise its reserve capacity if in the future it is possible to rely on more than 20 MW of capacity at the Whitehorse Rapids Plant. He noted that the Yukon system is not interconnected with other systems and, thus, reliability criteria that recognize Yukon specific conditions should be used to establish the required reserve.

6. OTHER SUBMISSIONS PRESENTED TO THE BOARD

6.1 Department of Fisheries and Oceans (Canada)

Mr. Al Von Finster made a presentation on behalf of the Department of Fisheries and Oceans (Canada) ("**DFO**") on concerns raised by the Companies' resource plan.

6.1.1 Determining the Viability of a Supply Option

Mr. Von Finster expressed the view that addressing environmental concerns late in the planning process will likely result in a change in the economic viability of a project, thus requiring it to be abandoned after considerable funds have been expended in engineering and other studies. DFO is concerned that the investment of large sums in projects before environmental issues and costs have been identified will, as a practical matter, result in projects being implemented irrespective of their environmental impacts and ultimate costs.

6.1.2 Management of Aishihik Lake

DFO is concerned with the Companies' requests for confirmation:

(1) that YEC's water management practices are appropriate and that any changes may have a significant adverse impact on Yukon consumers; and

(2) that YEC should not be proceeding with further studies to assess or develop top storage license options at Aishihik Lake.

Mr. Von Finster indicated that there are currently three reviews in process that are concerned with the management of Aishihik Lake. On this basis, DFO requested that the Board defer comment on the Companies' requests with respect to water management at Aishihik Lake.

6.1.3 Environmental Impacts of Proposed Supply Options

Mr. Von Finster provided a brief assessment of the necessary fisheries-related studies and potential mitigation costs. A summary of Mr. Von Finster's comments respecting the supply options included in the Companies' short list is as follows:

(1) Aishihik #3

The additional turbine potential to draw the lake down faster than the existing facilities is of concern.

(2) Drury Creek

Compensation will be required for lost chinook salmon spawning and rearing habitat.

(3) Morley River

The extent of chinook salmon spawning and rearing habitat needs to be determined. Compensation and mitigation for lost chinook salmon spawning and rearing habitat may require winter maintenance flows.

(4) Lapie River

The extent of utilization of chinook salmon will need to be determined and the possible need for summer and winter maintenance flows.

(5) Orchay River

This is a complex project with potentially significant long-term effects to a number of freshwater species and to chinook salmon.

(6) McIntyre Creek

DFO and YECL have been working together to develop compensatory habitat for the chinook salmon spawning and rearing habitat which will be lost when the project proceeds.

(7) Klondike North Fork

Compensation will be required for lost chinook salmon spawning and rearing habitat or maintenance flows required to ensure chinook salmon are not negatively impacted.

Mr. Von Finster expressed the concern that the Companies' submission identified an inconsistent level of fisheries-related information for the projects.

6.2 Yukon Chamber of Mines

The Yukon Chamber of Mines ("**Chamber**") submitted a written submission to the Board which it had made to the Government of Yukon Department of Economic Development on the Yukon Energy Strategy.

The Chamber supports the identified goals of the energy strategy. However, it expressed the concern that the strategy does little to identify energy sources. The Chamber recommends that money would be more wisely spent on technical evaluation and development of resources, such as Yukon's extensive coal reserves or potential for geothermal power. The Chamber supports the incorporation of environmental concerns in any development project.

The Chamber expressed the concern that the paper entitled "Electricity Development" is preoccupied with the managing of market risks in Yukon and there is no recognition of opportunities or strategy for growth for electrical energy.

The Chamber supports the development of an IPP policy which will provide incentive for a locally responsive energy development strategy.

The Chamber made the following recommendations which are relevant in assessing the Companies' resource plan:

(1) Encourage oil and gas exploration in Yukon with a view to reducing Yukon's dependence on imported petroleum products.

(2) Yukon Government should investigate new coal plant technology and invest in research to develop down-sized versions of these plants suitable for the significantly smaller energy demands of Yukon communities.

(3) Choose the five hydro-electric projects most likely to proceed (from an engineering standpoint) in various regions of Yukon, and begin conducting baseline environmental project impact studies on these sites now. This will identify those areas that will, in the end, prove to be unsuitable for development and will provide a sound information base for any future legislated environmental assessments. In making this recommendation, the Chamber was concerned about the extensive amount of time needed to assess the hydro-electric projects.

(4) Research potential small scale hydro development sites, particularly those near communities which presently use diesel generators to supply all or much of their electrical needs.

(5) Continue to support small local energy development projects through direct contracting for services and through programs such as the Yukon Energy Alternatives Program. It is also recommended that some co-ordinated and focused research and development projects be initiated. Such a research and development role could be filled by YEC.

(6) Government and YEC can play an important role in public education on improved energy efficiency in the mining industry.

The Chamber noted that, if power is being generated entirely by a renewable energy resource, the use of electrical heating systems should be encouraged.

The Chamber recognized that new mining projects require new electrical infrastructure development, and that there should be harmonized planning between the power producers and the mining companies.

6.3 Dr. and Mrs. Craig

Mr. Ross Kelly presented a letter to the Board on behalf of Dr. and Mrs. Craig who were at a conference on wind energy in Sweden. Dr. and Mrs. Craig noted that alternatives to fossil fuels, including wind energy, for generating electricity are being evaluated and increasingly applied due to the effects of the use of fossil fuels on the environment.

Dr. and Mrs. Craig acknowledged that icing posed a problem for wind generation in Yukon. They supported YEC's plans to install a demonstration wind unit.

Dr. and Mrs. Craig indicated that the Atlantic Wind Test Site and Nor'Wester Energy Services are developing a specification for wind turbines for northern applications for the Canadian Electrical Association. They also noted that the Alaska Energy Authority has recently signed an agreement with Energy, Mines and Resources Canada to collaborate on developing technology for northern applications. Dr. and Mrs. Craig encouraged Yukon to participate in these efforts.

7. DISCUSSION OF MAJOR ISSUES

7.1 Providing a Framework for Capital Programs to be Pursued

In their submission the Companies stated:

> "The Companies intend to proceed with only those projects and commitments that the Board finds to be in the best interests of the customers served by the utilities, on the understanding that reasonable costs incurred for such undertakings will be added in future to the approved rate bases and revenue requirements of the Companies in order that these costs can be recovered through rates charged to the customers." (Submission Overview, Page 51)

The City of Whitehorse ("**Whitehorse**") expressed the concern that the Companies may be shifting responsibility for their future management decisions to the Board. Whitehorse submitted that the decision of the Board in this capital hearing cannot be taken as approval of those items to be included in rate base. Prudent management will require appropriate decisions to be made by the Companies as circumstances change in the future. The Board's responsibility in this proceeding is to set a framework within which the Companies can proceed with their capital programs.

The Companies proposed that after the capital hearing the Board review the status of the resource plan in conjunction with its review of periodic general rate applications. The Companies submitted that this procedure will enable the Board to review the extent to which changing economic conditions, load forecasts and the results of investigations and reviews by other regulatory bodies may require a change to the resource plan. The Companies also recognize that the Board will assess the prudency of the actual costs of the capital projects when the Companies apply to include these costs in rate base.

The Companies acknowledged in their final Argument that if they are going to proceed with a specific project then a full regulatory review must be undertaken, including the Board's assessment of the prudence of the timing and costs of each project.

The Board recognizes that changing circumstances may require a change in the resource plan, and for that reason this Report cannot be construed as approval of the inclusion of expenditures in rate base. With respect to the construction of facilities, the Yukon Public Utilities Act states:

"Energy operation certificate

38. No person shall operate a regulated project except in accordance with an energy operation certificate.

Applications for certificates

39. An application for an energy project certificate or energy operation certificate shall be made to the Executive Council Member and shall contain the prescribed information.

Review of applications

40. On receipt of an application, the Executive Council Member shall refer the application to the board for a review.

Report and recommendations of the board

41.(1) Upon receipt of an application from the Executive Council Member under section 40, the board may, subject to subsection (2) and section 50, hold a public hearing in accordance with such terms of reference as may be specified by the Executive Council Member, and on conclusion of the review the Board shall submit a report and recommendations to the Executive Council Member. ...

Grant or refusal of applications

42.(1) On receipt of the report and recommendations of the Board, the Executive Council Member, may

(a) refuse the application, or

(b) grant the application subject to such terms or conditions he considers to be in the public interest."

Section 32 of the Yukon Public Utilities Act states:

"Rate base of public utilities

32.(1) The board, by order, shall determine a rate base for the property of a public utility used or required to be used to provide service to the public, and may include a rate base for property under construction, or constructed or acquired, and intended to be used in the future to provide service to the public. ...

(3) In determining a rate base the board shall give due consideration to the cost of the property when first devoted to public utility use, to prudent acquisition cost less depreciation, amortization or depletion, and to necessary working capital."

Recommendation #1:

The Board recommends that this Report provide a preliminary framework within which the Companies should proceed with their capital program.

Recommendation #2:

The Board recommends that the Companies' capital resource plan be reviewed on an ongoing basis as part of the general rate applications or as directed by the Board. The Board notes that before the Companies proceed with a specific project a full regulatory review must be undertaken, including an assessment of the prudence of the timing and costs of each project. The Yukon Public Utilities Act provides the Board with the ability to assess the prudency of constructing a facility and the prudency of the actual costs when added to rate base.

7.2 Load Forecasts by Customer Class and Supply Regions

7.2.1 Market Risks

The key input into the load forecast prepared by the Companies is the industrial profile. It is generally recognized that the uncertainty associated with industrial customers in Yukon causes the Companies significant forecast risk. The uncertainty associated with the closure of the Faro Mine creates the largest uncertainty in the Companies' forecast. The Companies noted that the Faro Mine accounts for in excess of 40% of the system's energy load, and that very significant risks remain regardless of the procedures used to monitor the activities of the mine and the timing of any possible closure.

The Companies submitted that protection mechanisms are required to deal with market risk. The Companies used a scenario forecast where they prepared Low, Base and High Case scenarios which provide the forecast load assuming different industrial profiles. The primary difference between the Low, Base and High Case scenarios is the different assumptions as to the closure of the Faro Mine. As can be seen from Table 3 at Pages 11 and 12 of this Report, the timing of the Faro Mine closure will have a significant impact on the Companies' load forecast. It should also be noted that the forecast start-up of new mines in Yukon also adds to the Companies' forecast risk.

In the Companies' three scenarios, they assumed a start-up date for the Wheaton River Mine of 1993 and for the Williams Creek Mine of 1995. It was established during the course of the hearing that the Wheaton River Mine will not open in 1993, and that the Companies do not have any knowledge as to when the mine will open.

During the course of the proceedings, discussions took place with the Companies with respect to their ability to assess the likelihood of a mine closure. The following exchange took place between a witness for the Companies and the Board's consultants:

> "Q So in summary, you are saying that it is not really possible for you, as an outsider, to assess the future or future closure of Curragh Mine (a) because you are not receiving useful information from the company to assist you in that prediction; and (b) that there are so many other factors involved, such as other operations by that same company, which preclude you from making any rational estimates. Is that what you are saying?
>
> A MR. OSLER: I thought that we were saying all of those things in terms of factors that prevent us from being able to predict. I'm not even sure Curragh, frankly, knows what is going to happen.
>
> But I was saying I thought something else; that even if Curragh was open as anything to us and gave us everything they could, I wouldn't recommend that that's the way to make a capital decision, where the events are putting in place a facility that has to have a life to be useful of much more than 10 or 15 years.

Q It would be better than knowing nothing, though, wouldn't it, Mr. Osler?
A MR. OSLER: Every piece of information is useful, but I really think that those types of decisions should not be made without a protection for the down side risk, which will be there no matter what forecast you have."
(Tr.877-878)

The Board recognizes that it is impossible for the Companies to forecast with any reasonable degree of precision the timing and likelihood of closure of the Faro Mine. Thus, there is significant risk associated with the load forecast in Yukon that must be considered in assessing the Companies' resource plan.

Recommendation #3:

The Board recommends that the significant market risks associated with the closure of the Faro Mine should be considered in assessing the Companies' resource plan and in determining the need for new facilities.

7.2.1.1 Impact of a Closure of the Faro Mine

Whitehorse expressed the concern that the Companies have understated the effect of the drop in the population and the consumption of electricity that would be caused by the closure of the Faro Mine.

The Board notes that between the years 1981 and 1983 there was an approximate drop in the population in Yukon of 2,000, a significant portion of which can be attributed to the closure of the Faro Mine during that period.

Company witnesses acknowledged that a population drop of that magnitude had not been considered in their load forecasts. The load forecasts reflected a higher level of unemployment rather than a reduction in the population in Yukon. Company witnesses indicated that this understatement of the impact of a closure of the Faro Mine would not have a significant impact on the Companies' capital planning.

The Board considers that an understatement of the impact of the Faro Mine will result in an understatement of any surplus capacity available after closure of the Faro Mine.

Recommendation #4:
The Board recommends that in assessing the Companies' capital plan the full impact of the Faro Mine closure, including the impact on demands by all customer classes, should be considered.

7.2.2 Most Likely Forecast

As explained, the Companies utilized a scenario planning approach in preparing their load forecasts. Company witnesses described scenario forecasting as follows:

> "This process, which is commonly called scenario planning, involves the preparation of a number of forecasts, each of which include a specific event or a set of events that would significantly impact the forecast loads.
>
> Since the emphasis has shifted for more precise forecasting to forecasting major changes, the need for greater and greater forecast detail is no longer required; rather the forecaster expends his efforts in looking forward to see those events that will most significantly impact on future loads."
>
> (Tr.87-88)

While the Board recognizes that scenario planning may be a useful tool in the assessment of market risk in Yukon, the Board considers it necessary to assess the probability of each of the scenarios in order to determine an appropriate capital plan. During cross-examination, Company witnesses indicated that the Base Case is the most likely forecast but that the Board should keep in mind the Low Case in making its recommendations. The Companies attributed less significance to the High Case scenario.

The Board notes that, since the public hearing was held, the decline in zinc prices may have significantly increased the likelihood of a closure of the Faro Mine in the near future.

A recent article in The Whitehorse Star stated:

> " Faro produces three times the quantities of concentrates as Sa Dena Hes and employs well over 400 people. It will close for 16 days this Christmas, and a further 32 days next year - likely in the spring.
>
> Curragh said the shutdowns are in response to low zinc and lead prices and a world glut of concentrates and metal.
>
> In the last month, zinc has fallen from 60 cents US per pound to 47 cents on Wednesday. Lead is now trading at 21 cents US per pound from a year-long high of 26 cents."
>
> (The Whitehorse Star,
> Thursday, November 26, 1992)

A further article in The Whitehorse Star stated:

> " Those who were prepared to comment said this week's announcement of the Sa Dena Hes mine's pending five-week shutdown suggests the company will have difficulty continuing to strip the Grum orebody at the Faro mine.
>
> Grum must come on stream by March 31, 1993 to keep the Faro mine in ore.
>
> Bruce Reid of Research Capital Corp. in Toronto said the combination of low metal prices and high costs will affect Curragh's cash flow, which may in turn affect the Grum stripping program."
>
> (The Whitehorse Star,
> Friday, November 27, 1992)

The Board considers that, with the significant risk of closure associated with the Faro Mine, it is necessary to consider the Low and Base Case scenarios in assessing the Companies' resource plan.

Recommendation #5:

The Board recommends that the Low and Base Case scenarios should be considered in assessing the need and rationale of the supply and DSM options.

7.2.3 Accuracy of Load Forecasts

7.2.3.1 Wheaton River Mine

As explained in Section 7.2.1 of this Report, it was acknowledged during the course of the proceedings that the Wheaton River Mine is not likely to open in 1993 and the Companies cannot predict when it will open. Company witnesses indicated that the peak demand in the Base Case forecast for the WAF System would be reduced by 1.7 MW if the Wheaton River project is removed.

Recommendation #6:

The Board recommends that the peak demand in the Low and Base Case forecasts be reduced by 1.7 MW for each of the years 1993 through 2001 to reflect the probability that the Wheaton River Mine will not open during that period.

7.2.3.2 Impact of a Closure of the Faro Mine

As discussed in Section 7.2.1.1 of this Report, the Companies' forecast impact of a closure of the Faro Mine on the demands of all customer classes is understated.

7.2.4 Method of Forecasting

7.2.4.1 Use per Customer

Whitehorse in its Argument expressed the concern that the use of electricity per customer was based entirely on judgment with no specific calculation. Company witnesses could not identify any specific facts, patterns or trends which led them to their conclusions regarding the residential forecasts. Whitehorse noted that the patterns in electric heat use in both the past and the projected future are entirely different from the use per customer forecast submitted by the Companies.

The Board notes that the use per customer forecast provides the energy forecast and is used in the determination of the peak demand. On the basis that there is significant market risk in Yukon and that the WAF System is capacity constrained, it is important that the forecast be as accurate as possible. An overstatement in the average use per customer could result in excess capacity and, thus, wasted resources.

YCS submitted that it is vital that the need for electricity is not overestimated. Overestimating the need for capacity will result in oversupply and will unnecessarily waste or harm resources.

The Board is also cognizant of the fact that if the need for electricity is underestimated, then a shortage of capacity could result.

Recommendation #7:
The Board agrees with the position of the City of Whitehorse, and recommends that a more rigorous approach to forecasting use per customer be taken by the Companies. In future general rate applications or reviews of capital plans, the Companies should be able to provide detailed support for such forecasts.

7.2.4.2 End-Use Capability

Whitehorse recommended that the utilities should improve their load forecasting through the development of end-use capability in the residential sector. Mr. Marcus during cross-examination explained that this could be implemented by the Companies performing customer surveys to determine how electricity is used by customers. The Companies could then assess how much electricity is consumed for each use. Whitehorse submitted that end-use forecasting would provide a more reliable data base for designing effective DSM programs.

The Companies submitted in their Argument that:

> "The utilities agree with Mr. Marcus that the Yukon does not need a 'Cadillac model end-use forecast' to deal with electric heat uncertainties. Additional work, in combination with Yukon Government authorities, should be undertaken to document current electric heating use characteristics in the WAF system." (Page 7)

The Board considers it important that the Companies develop accurate forecasts of required demand and energy in a cost effective manner.

Recommendation #8:

The Board recommends that the Companies perform customer surveys to assist in developing end-use capability. The Companies, in performing these customer surveys and in developing end-use capability, should be practical and cognizant of the costs incurred to do so.

7.2.4.3 Line Losses

The line losses in the Companies' forecast were based on the Companies' cost of service study and were held constant over time. Whitehorse expressed the following concern in its submission:

> "As discussed below, we believe that considerably more should be done to reduce losses, and YEC/YECL agree. Yet, nothing has been done to integrate projects which reduce losses into the forecast. To assure that supply decisions are made correctly, future forecasts should trend losses downward over time to reflect loss-reducing decisions."
> (Whitehorse Argument, Page 21)

Recommendation #9:

The Board recommends that line loss-reducing projects and implementation schemes should be described by the Companies in future general rate applications and capital hearings, and should be reflected in future forecasts prepared by the Companies.

7.2.4.4 Peak Load Forecasting

On the basis that Yukon electric systems are primarily capacity constrained, Mr. Druce suggested that the temperature effects should be modeled explicitly in determining the peak demand forecast. Mr. Druce also expressed the concern that the Companies' load factors used to forecast demand are not based on Yukon specific data.

The Board considers it important that, in order to manage the existing resources as efficiently as possible and to plan for new resources on a cost-effective basis, the Companies have a complete understanding of the timing, frequency, duration and cause of peak loads. Forecasting the peak loads with a greater degree of accuracy will assist the Companies in their ability to forecast the effect that DSM or other changes could have on the annual peak load.

Recommendation #10:

The Board recommends that the Companies develop the capability to forecast, up to two years in advance, the hourly loads for the WAF System over the November to April period with and without the Faro Mine in operation and for a range of historical weather conditions. The Board also recommends that the Companies develop a predictive model for the annual peak load for the WAF System.

7.3 Capability of Existing Facilities and Resources to Supply Forecast Loads

7.3.1 Capability of the WAF System to Supply Forecast Loads

The Board's hydrology expert, Mr. Druce, identified the only major issue with respect to the capability of the WAF System to meet the forecast loads. Mr. Druce identified the potential to increase capacity at the Whitehorse Rapids Plant through load factoring.

7.3.1.1 Capacity at Whitehorse Rapids Plant

Mr. Druce suggested that the Whitehorse Rapids Plant could be load factored to provide perhaps less energy but more capacity than is presently planned for under low water conditions. During the course of the hearing YEC indicated that it was not feasible to load factor as Mr. Druce had suggested due to the requirements for maintaining a stable ice cover.

Mr. Cowley of Acres International Limited, an expert witness for YEC, explained that it is necessary for utilities to be fully aware of what impact certain actions will have on ice covers and, thus, flooding. The local conditions must be fully understood in order to determine what impact certain actions would have on ice covers.

Mr. Cowley outlined a plan of action which included a study of ice conditions and water flow conditions, followed by field testing of a plan that included load factoring. After testing, YEC would formalize the plan or a modification of it. The formalized plan may result in an adjustment to the firm capacity of the Whitehorse Rapids Plant.

Mr. Cowley indicated that some of the activities involved in the study of the ice conditions are now under way and that it would likely take 3 to 5 years to complete the plan. He concluded that a dependable capacity of 19 MW is appropriate for the Whitehorse Rapids Plant until the studies are completed. However, there is a real expectation that with full understanding of the ice conditions, the Whitehorse Rapids Plant can be relied on to provide a higher dependable capacity.

Mr. Druce acknowledged the need to ensure that the ice cover can tolerate flow changes associated with load factoring, and recommended that until such time as the studies on the ice conditions are completed the Whitehorse Rapids Plant should be credited with approximately 19 MW of dependable capacity.

The Board recognizes that there is a potential to increase the capacity relied on at the Whitehorse/Aishihik/Faro System after there has been a thorough study of the ice conditions.

The Board considers it important that the appropriate studies be pursued as quickly as possible so that the potential for capacity can be determined and unnecessary supply options are not constructed.

Whitehorse recognized in its submission that if increased load factoring is possible then considerable savings could be realized by deferring the construction of new plant. However, Whitehorse also recognized significant concerns identified by YEC that icing problems leading to flooding could occur.

Whitehorse recommended that the Board require YEC to obtain the needed technical information to determine whether load factoring can be done without the formation of ice dams and attendant flooding.

Recommendation #11:

The Board recommends that the necessary ice studies and testing be performed to determine the potential to use load factoring to increase the capacity of the Whitehorse Rapids Plant. Studies should include:

(1) Creating and maintaining a data base of ice observations and measurements for the portion of the Yukon River that constrains the winter operation at the Whitehorse Rapids Hydro-Electric Project.

(2) Participating in the development of the ice model to ensure that the ice problems on the Yukon River are taken into consideration.

(3) Determining the necessary data requirements to develop the ice model so that the opportunity to collect the necessary data is not lost for the winter of 1992/93.

(4) Developing the capability to simulate the hourly operation of the WAF System resources that would meet the forecasted hourly loads over the November to April period for a range of forecasted or historical water conditions.

(5) Preparing a cost estimate and work schedule for adding the capability for remote operation of the Marsh Lake control structure.

The Board notes that the Companies have acknowledged that the potential for additional firm capacity at the Whitehorse Rapids Plant exists. The Board is concerned that the Companies' resource plan which was to address the potential need for new supply or DSM did not initially identify this potential capacity. The Board considers it important to use the existing facilities on the most efficient basis before constructing new supply options.

The Board is also concerned that the Companies did not plan to have a hydrology expert available for cross-examination until after the Board's hydrology expert had presented his evidence. Introducing an expert witness late in the proceedings makes it difficult for Intervenors and the Board to assess the evidence and cross-examine on a comprehensive basis. The Board considers management of the hydrology resources to be an integral part of the Companies' resource plan and the Companies should have witnesses available on a timely basis to assist the Board in its deliberations.

Recommendation #12:

The Board recommends that, in future proceedings in which the capital resource plan of the Companies is considered, all potential sources of capacity from the existing systems should be identified and that the Companies should have witnesses available on a timely basis to respond to Intervenor and Board questions.

7.3.1.2 Reserve Criteria

YEC reviewed its WAF planning criteria in response to Mr. Druce's suggestion that it may be possible for YEC to revise its reserve capacity if in the future it is possible to rely on more than 19 MW of capacity at the Whitehorse Rapids Plant. As a result of load factoring, the net impact from the loss of Whitehorse Unit #4 would still likely be less than the net impact resulting from the loss of an Aishihik unit.

YEC concluded that load factoring at the Whitehorse Rapids Plant would not change the reliability criteria.

The Board notes Mr. Druce's comment that the Yukon System is not an interconnected system and, thus, has the ability to develop its own reliability criteria specific to Yukon and the importance of using reliability criteria that result in a reliable system without excess capacity.

Recommendation #13:

The Board recommends that the Companies critically review the WAF capacity reliability criteria and provide the results of this review to the Board in the next general rate application or as directed by the Board.

7.3.2 Capability of Other Systems to Supply Forecast Loads

Except for the Mayo System, the Other Systems are predominantly served by diesel, and there were no issues identified by the Intervenors with respect to the existing capacity of the Other Systems. It should be noted that the Mayo System currently has surplus hydro capacity which will continue until well past the year 2010 under the Base Case scenario.

7.4 Water Management Issues

7.4.1 Hydrological Data Bases - Existing Hydro Projects

Mr. Druce identified the need for reliable inflow data for hydrological models used for both short-term and seasonal inflow forecasting and probable maximum flood studies. In response to Mr. Druce's suggestion, Company witnesses indicated that YEC uses daily inflow data to regulate reservoir elevations and flow rates. The Companies have added data collection platforms with satellite links to the water gauging stations at Aishihik Lake, Sekulmun Lake and Marsh Lake.

Company witnesses indicated:

> "At this time we don't feel that we are in a position to progress to a conceptual hydrological model using a daily time step. We feel this is the right direction; however, we are concerned that the expenditures and resource commitments required to get to the hybrid process suggested by Mr. Druce is not prudent at this time." (Tr.281)

The Board notes that YEC did not provide any data with respect to the required expenditures and resource commitments required to develop a conceptual hydrological model. The Board recognizes the importance of managing the existing supply resources on a most efficient basis to avoid expenditures on unnecessary new supply options.

Recommendation #14:

The Board recommends that the Companies create and maintain a data base of daily inflows to Aishihik Lake and Marsh Lake starting in 1987, or earlier if feasible.

The Board recognizes that the Companies have installed data collection platforms at Aishihik Lake, Marsh Lake and Sekulmun Lake, however, the Board considers that it is important that a reliable estimate of the change in reservoir storage over a daily period be available and that there should be a continuous supply of water level data. The Board also recognizes that data collection platforms will facilitate the collection of hydrometeorlogical data in near real time.

Recommendation #15:

The Board recommends that the Companies request that Water Survey of Canada operate water level recorders, with data collection platforms on Marsh Lake and on Aishihik Lake, in addition to the data collection platforms provided by the Companies.

7.4.2 Decision Support

Mr. Druce suggested that a higher level of decision support is feasible for the WAF System. A higher level of decision support will:

(1) Provide WAF System operators with information that will help them do their job better.

(2) Bring the water management practice for the WAF System up to state of the art.

(3) Minimize the cost of supplying electricity from the WAF System resources.

(4) Improve the ability to forecast the operation of Aishihik Lake and Marsh Lake.

(5) Improve the ability to analyze the effects that a new supply option or changes to water license would have on the operation of Aishihik Lake and Marsh Lake, and on the energy supply of the WAF System.

(6) Facilitate reasonable trade-offs between the supply of electricity and environmental concerns for the WAF System.

Mr. Druce suggested an action plan that involves hourly load forecasting, inflow forecasting, the development of several real time models of the WAF System, remote control of the Marsh Lake control structure and installation of data collection platforms on operating reservoir water gauging stations.

In response to Mr. Druce's suggestion, YECL's witness made the following suggestions:

> "Firstly, I would like to say I agree with Mr. Druce, and I will give you what we do now.
>
> Presently our operators are performing hourly load forecasting using a manual process that includes historical graphs. We have realized that our forecast inflow data for both systems -- now I'm talking Aishihik also Whitehorse -- can be improved and should be improved. We have initiated a study to develop forecast procedures. We expect some progress during the next one- to two-year time period.
>
> The utilities are presently installing a new supervisory control system that contains a water management package that will allow the utility to perform some of the support functions suggested by Mr. Druce. The MULRES model that we use that is owned by Acres has been upgraded in 1992 so that it can be used as a real-time model.
>
> As mentioned in my previous answer, we have completed the installation of data collection platforms on all of the WAF reservoir water gauging stations, and that has been in conjunction with Water Survey Canada using their expertise."
>
> (Tr.281-282)

With respect to Mr. Druce's suggestion that YEC develop and implement an hourly cost base economic dispatch, YEC indicated that they are reviewing Mr. Druce's suggestion and many of the suggestions looked to be valid. Company witnesses also indicated that it would be appropriate to develop this ability in the next 5 to 7 years.

Recommendation #16:

The Board recommends that YEC develop the decision support systems that will permit the move to complete economic dispatch of WAF System resources by the year 2000, and report the progress and costs incurred in each future general rate application and capital hearing. YEC should be practical in its approach to developing support systems and should be cognizant of the costs to develop the systems.

7.4.3 Water Management of Aishihik Lake

FAA recommended that the Board not confirm that:

(1) YEC's water management practices are appropriate, and that any changes to the operations of Aishihik could have a significant impact on Yukon power consumers; and

(2) YEC should not be proceeding with further studies to assess or to develop top storage license options at either Aishihik Lake or Marsh Lake.

FAA's principal support for its recommendation is that YEC's intention to draw Aishihik Lake down below 2,999 feet will result in whitefish recruitment failures, depletion of invertebrate populations, devastation of habitat for fur-bearing animals, waterfowls and shorebirds, and will have an impact on cultural and native traditions.

FAA submitted that these environmental impacts will result in significant expense to YEC. FAA also submitted that there will be changes made to the operation of the Aishihik facility in the near future, and that waiting until the year 2002 for license renewal is unacceptable. FAA submitted that top storage at Aishihik Lake should be considered to avoid spillage in years when lake levels are high and to avoid probable environmental costs.

Whitehorse stated in its Argument:

> "b) That absent compelling environmental evidence, the Board recommend against changes in the storage range or top storage at Aishihik Lake because limits on the amount of storage will both increase the need to generate power from diesel oil and shift diesel oil generation across seasons. These changes would limit YEC/YECL's flexibility and ability to displace diesel oil with either DSM or supply options, raising future costs to ratepayers." (Whitehorse Argument, Pages 16-17)

YEC submitted in its Reply Argument that, based on a comparison of the costs and benefits of top storage, there is no rationale for YEC to include top storage in its resource plan under present license conditions or if the minimum level was changed to 2,999 feet. YEC also noted that no Intervenor advocated further pursuit of top storage at Marsh Lake.

YEC does not agree that there will be any significant mitigative costs associated with the draw-down of Aishihik Lake. It indicated in response to an interrogatory that a draw-down below 2,999 feet does not appear to have any effect on the fish species studied, with the exception of whitefish, and that in the years when the lake was drawn down below 2,997 feet whitefish recruitment appears to have been affected. However, notwithstanding the whitefish recruitment problems experienced, the whitefish population in the lake is substantial and these recruitment problems do not appear to have threatened their survival.

YEC concluded that future draw-down of the lake below 2,997 feet will not affect the existing whitefish stock but will likely affect whitefish recruitment during those years. YEC stated that it does not expect to manage the lake differently than it has over the last 18 years. However, YEC also noted that this issue is being comprehensively studied as part of the regulatory process under the jurisdiction of the YTWB. If it is determined that managing the lake levels at below 2,997 feet may be threatening the continued survival of the whitefish population, and if YEC and the fisheries believed or YTWB determined that it was necessary to manage the facility in a different manner, then YEC would manage the facility as directed.

In assessing the information available on the management of Aishihik Lake, the Board has taken note of the DFO's position that the Board defer comment on the Companies' requests on the basis that there are currently three reviews that are concerned with the management of Aishihik Lake. In making its recommendations with respect to the management of Aishihik and Marsh Lakes, the Board is cognizant of the fact that it does not have the jurisdiction to decide on environmental issues. However, the Board considers that it must be fully aware of all potential environmental costs that may impact the Companies' resource plan.

The Board must also be satisfied that the Companies have assessed potential use of top storage on an economic basis in their capital resource plans. The Board notes FAA's concerns with respect to potential environmental costs. However, the Board also notes that there are several reviews going on in conjunction with the DFO and the YCEE.

On the environmental issues affecting the management of Aishihik Lake based on the constraints of the current water license for Aishihik Lake and the evidence presented during the hearing the Board concludes that the current practices with respect to the management of Aishihik Lake levels is acceptable for the interim, until the environmental issues are resolved. However, if the other reviews on the environmental issues indicate there should be a change to the management of Aishihik Lake, then the environmental costs identified and the required changes should be integrated into the Companies'

management of Aishihik Lake and its resource plan. The Board's conclusion based on the evidence presented in this hearing should not preclude any future changes to the management of Aishihik Lake based on the finding of the other reviews with respect to environmental issues.

Recommendation #17:

The Board recommends that until the YCEE review and the DFO review on the management of Aishihik Lake are completed, the Companies' current practices should be continued on an interim basis.

Recommendation #18:

The Board recommends that, if the reviews with respect to the environmental issues at Aishihik Lake indicate that there should be changes to the management of Aishihik Lake, YEC should provide to this Board the changes its proposes, together with supporting rationale, with respect to the management of Aishihik Lake.

Recommendation #19:

The Board recommends that the findings by the Board in this Report should not preclude future changes to the management of Aishihik Lake if environmental costs are identified.

The Board notes that none of the Intervenors identified any specific issues with respect to the use of top storage at Marsh Lake, and it appears that there would be significant costs associated with utilizing top storage on Marsh Lake.

Recommendation #20:

The Board recommends that YEC not pursue the use of top storage at Marsh Lake unless significant environmental costs are identified that may warrant a re-examination of the matter.

7.5 Supply Options and Demand-Side Management Programs

7.5.1 The Need for Supply Options and Demand-Side Management Programs on the WAF System

Table 3 at Pages 11 and 12 of this Report shows the capacity excess or shortage for the years 1992 through 2011. As noted in Section 7.2.3.1 of this Report, the firm demand should be reduced by 1.7 MW for each of the years 1993 through 2011 due to the determination that the Wheaton River Mine will not start up in 1993.

Table 7 shows the capacity requirements for the Low and Base Cases after taking into consideration the impact of the 1.7 MW associated with Wheaton River Mine.

TABLE 7

WAF System
Capacity Requirements

LOW CASE

YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		76.00	2.50
1993	78.50		80.70	-2.20
1994	78.50		81.50	-3.00
1995	73.50	5.00	56.60	16.90
1996	73.50		56.70	16.80
1997	73.50		57.10	16.40
1998	64.40	9.10	57.80	6.60
1999	61.40	3.00	58.60	2.80
2000	48.30	13.10	59.40	-11.10
2001	48.30		57.30	-9.00
2002	48.30		58.00	-9.70
2003	48.30		58.80	-10.50
2004	48.30		59.50	-11.20
2005	48.30		59.30	-11.00
2006	48.30		60.10	-11.80
2007	48.30		60.90	-12.60
2008	48.30		61.70	-13.40
2009	47.30	1.00	62.60	-15.30
2010	44.70	2.60	63.40	-18.70
2011	40.00	4.70	63.60	-23.60

BASE CASE

YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		76.00	2.50
1993	78.50		80.70	-2.20
1994	78.50		81.50	-3.00
1995	73.50	5.00	83.40	-9.90
1996	73.50		84.30	-10.80
1997	73.50		85.20	-11.70
1998	64.40	9.10	86.00	-21.60
1999	61.40	3.00	86.80	-25.40
2000	48.30	13.10	87.60	-39.30
2001	48.30		85.50	-37.20
2002	48.30		86.30	-38.00
2003	48.30		87.10	-38.80
2004	48.30		87.80	-39.50
2005	48.30		87.70	-39.40
2006	48.30		88.50	-40.20
2007	48.30		89.30	-41.00
2008	48.30		63.90	-15.60
2009	47.30	1.00	63.80	-16.50
2010	44.70	2.60	64.40	-19.70
2011	40.00	4.70	64.40	-24.40

Table 7 shows, under the Low Case scenario, that by 1994 approximately 3 MW of capacity will be required. However, in 1995 when it is assumed that the Faro Mine closes, surplus capacity exists until the year 2000 when approximately 11 MW will be required, assuming that the diesel equipment is retired as proposed by the Companies. It should also be noted that, if the Faro Mine closes in 1992 or 1993, no capacity additions would be required in 1993 or 1994.

Table 7 also shows, under the Base Case scenario, that by 1994 approximately 3 MW of capacity will be required and that by 2002 approximately 40 MW will be required assuming that the diesel retirements occur as proposed by the Companies.

To assess the need for capacity, a number of uncertainties must be considered.

It has been identified in this Report that there is a potential to increase the capacity at the Whitehorse Rapids Plant through load factoring. However, as noted by both the Board's expert, Mr. Druce, and the Companies, it will take approximately 3 to 5 years to determine the potential capacity available at the Whitehorse Rapids Plant due to load factoring. It is estimated that there could be potential dependable capacity from load factoring of 3 to 17.5 MW.

The second major uncertainty, as discussed earlier, is the timing of the closure of the Faro Mine. The significance of this uncertainty is illustrated in Table 7.

The Board also recognizes that there is uncertainty as to the timing of the diesel retirements on the WAF System. The Companies have indicated that if the diesel equipment is not utilized to the same extent as proposed in the base case then it is probable that the timing of the diesel retirements could be deferred.

It is very difficult to determine with any degree of precision the impact that these uncertainties are likely to have on future capacity requirements. However, it is imperative that these uncertainties be regularly considered in determining the need for capacity and the type of capacity to be added to the system. These uncertainties create a significant risk that millions of dollars could be expended on capacity additions which will not be required in the future.

Recommendation #21:

The Board recommends that the potential capacity available at Whitehorse Rapids Plant due to load factoring, the uncertainty due to timing of diesel retirements and the uncertainty associated with the timing of the Faro Mine closure be regularly considered in assessing the need for capacity and the type and timing of the capacity additions.

7.5.2 Demand-Side Management Programs

7.5.2.1 Importance of DSM in Responsible Energy Management

YCS submitted that DSM is absolutely vital to responsible energy management in Yukon. The evidence from existing studies shows that many DSM options cost less than conventional supply options, while the environment is saved from potential impacts associated with new supply options.

Whitehorse made the following statement in its Argument:

> "The principal recommendation which we make in this proceeding is that demand side management merits greater encouragement than proposed by YEC/YECL." (Whitehorse Argument, Page 36)

Whitehorse also submitted that the Board should state its strong support for flexibly and pragmatically designed DSM programs.

FAA indicated that it supports many of the suggestions made by YCS with respect to energy management and that it would support all appropriate and effective future DSM expenditures being included in rate base.

In its Decision 1992-1, the Board indicated that it supports the concept of DSM. The Board continues to support the concept of DSM and recommends that the Companies continue to pursue DSM activities.

7.5.2.2 Extent of DSM

Both YCS and Whitehorse proposed that the Companies should more aggressively pursue DSM activities. In response to this suggestion, the Companies indicated that their approach allows them to proceed cautiously and prudently to ensure that the necessary information base and experience is obtained before taking on more aggressive and costly programs.

The Board recognizes the importance of implementing DSM activities that will be cost effective in deferring expensive supply options. The Board also recognizes Whitehorse's concern that DSM activities should be implemented to take advantage of opportunities that exist today that will be lost if programs are delayed.

An example of a lost opportunity is the encouragement of the purchase of energy efficient refrigerators. On the basis that the average life of a refrigerator is 20 years, if a less efficient refrigerator is purchased today then it will be 20 years before it will be replaced with a more efficient refrigerator.

The Board recognizes that it is important that DSM programs only be implemented if it can be shown that the expenditures are prudent and that the programs will be effective.

Recommendation #22:

The Board recommends that the Companies aggressively pursue DSM activities to the extent it can be demonstrated that the activities result in lower costs to consumers than alternative supply options.

The Companies should also be required to demonstrate that they are recognizing the importance of pursuing DSM activities expeditiously and are considering the potential for lost opportunities.

At the time of future general rate applications, the Companies should be required to provide detailed support for their decisions to pursue or not to pursue specific DSM programs.

7.5.2.3 Estimating Savings in Demand and Energy

One of the key inputs into assessing the economic viability of a DSM program is the estimate of savings in demand and energy that will occur as a result of the program.

In response to a Board interrogatory, the Companies indicated that the potential savings in demand and energy for each of the DSM programs have been determined from engineering models, results from pilot projects, information from other utilities, survey results and judgment. The Companies recognize that there is significant risk involved in the estimation of the savings in demand and energy, and have performed sensitivity analyses for each of the DSM programs to determine what impact variations in the estimated savings in demand and energy would have on the economic feasibility of the programs.

The Board notes that Mr. Marcus, in response to a Board interrogatory, stated:

> "It is quite important to develop programs with credible, challenging goals that provide guidance to utility staff in the design of cost effective programs. The cornerstone of DSM is that it provides the least cost approach to meeting the future electrical needs. Program designs must meet some economic criteria such as the TRC test. In order to conduct such a cost-effectiveness test, one of the key elements is the estimate of savings of demand and energy." (Information Response BD/COW-2a)

Mr. Marcus further stated:

> "The DSM savings estimation techniques used by YEC are generally adequate if an ex post program evaluation is made to adjust any significant differences and allow refinement of programs. If anything, the results are likely to be somewhat conservative in many cases." (Information Response BD/COW-2b)

In assessing the Companies' methods of estimating savings of demand and energy due to DSM programs, the Board notes the following exchanges which took place during cross-examination. With respect to the Commercial Lighting Buy-Back Program, Company witnesses were questioned on whether it would be appropriate to discriminate between commercial buildings that heat electrically and those that use other sources of heat:

> "Q. In the coldest month of the year, if a building saves 100 kilowatt hours in the month of January from lighting, do you anticipate that the heating bill will go up by 100 kilowatt hours per month?
>
> A. MR. MAISSAN: No, I wouldn't anticipate that. I would anticipate that there would be some replacement of heat from lighting by the heating source, and I believe we've taken that into account. But in my opinion, it would not be 100 percent useful."
>
> (Tr.802-803)

A further exchange took place on the subject at Tr.804:

"Q. Do you know whether it's fairly typical in commercial buildings to have a ceiling space above the ceiling tiles into which all the heat from the lights goes?

A. MR. MAISSAN: I know it's typical to have space. Further than that, my knowledge is limited.

Q. So you don't know that that is normally the return air plenum that takes the air back that keeps the air in the building? You don't know that?

A. MR. MAISSAN: No, I don't know what the norm is, I'm sorry.

Q. Would you agree, then, to look further into this question? You don't know, but you've gone ahead and used 60 percent, and I'm suggesting that it is 100 percent on a heating day. Can we get you to agree somehow to investigate that to see whether you actually should be applying this commercial lighting portion to electrical heat of buildings?

A. MR. MAISSAN: Sure ...".

(Tr.804)

There also appeared to be some question as to the estimated savings to be derived from the tank wrap material proposed by the Companies to be used in the Hot Water Saver Program. The Companies estimated that the Reflectix tank wrap material had an R value of 7, and consequently based the estimated savings in demand and energy on this R value.

Board consultants examined Company witnesses on the Companies' determination of this R-7 value. It appears from the examination that the manufacturers of Reflectix estimate that if the Reflectix material is installed as per the manufacturer's instructions, there are R values of 4 to 5 and that if the Reflectix is used as tank wrap material it is likely that the R values are somewhat less than 4 to 5.

Company witnesses agreed to review the information the Companies have on the R values and to report back to the Board at the next general rate application.

With respect to the Companies' Power Saver Cord Program the following exchange took place:

> "Q. What happens when you have a hose that is not on top of the engine, it comes off the side of the engine to the heater?
>
> A. MR. MAISSAN: I have no information on that. My understanding is that there is the natural convection taking place, and the hose would get heated from the engine block. But how the convection differs between different types of engines, I'm sorry, I don't have that information.
>
> Q. I'm going to suggest that it can't work unless the hose comes off the top of the engine, and that is to do with hot water wanting to rise. Would you investigate that? I suppose as best you can as long as this hearing is going on, give an undertaking and report back on that?
>
> A. MR. MAISSAN: I can't guarantee that we would have the information, but we'll certainly look into that, and if we can provide it during the hearing, we'll provide it."
>
> (Tr.818-819)

Witnesses also acknowledged that, although B.C. Hydro in its study had recommended that it was mandatory that tests be conducted during the winter of 1991/92 to determine the performance of the power saver cord under actual operating conditions in Yukon, the Companies have not performed such tests but rather have relied on a temperature controlled test performed by the manufacturer of the power saver cord.

It is clear from the above exchanges with respect to the Commercial Lighting Program, the Hot Water Saver Program and the Power Saver Program, that the Company witnesses did not have a complete understanding of how the programs should work. The Board is very concerned that this lack of understanding may have led to significant errors in the estimates of the savings in demand and energy to be expected from the DSM programs.

The Board recognizes that in forecasting the estimated savings in demand and energy there is going to be some degree of uncertainty. However, the Board considers it imperative that the Companies fully understand how each of their DSM programs work in Yukon's environment so that a reasonable estimate of savings in demand and energy can be made.

Recommendation #23:

The Board recommends that the Companies develop a full understanding of each of their DSM programs so that they can provide support for the estimated savings in demand and energy to be expected from each program.

7.5.2.4 The Need for Ex Post Evaluation of DSM Programs

Mr. Marcus stated in response to a Board information request:

> "One area that has shown to be especially important is the need for proper program evaluation. Without ex post evaluation the utility may not target its programs well and as such may squander opportunities. Without ex post evaluation there is no basis to determine the cost effectiveness of the program design. Without ex post evaluations the utility (and the ratepayers) will be forced to rely on YEC's judgment as to the appropriateness of the target market, the scope of DSM programs, the impact of its DSM programs on the target markets, and the prudence of the utility expenditure of money on DSM programs." (Information Response BD/COW-1a)

Mr. Marcus also stated:

> "The DSM savings estimation techniques used by YEC are generally adequate if an ex post program evaluation is made to adjust any significant differences and allow refinement of programs. If anything, the results are likely to be somewhat conservative in many cases." (Information Response BD/COW-2b)

During cross-examination it was demonstrated that ex post evaluation of the Power Saver Cord Program provided valuable information with respect to the number of incorrect installations.

Whitehorse recognized in its Argument that although extremely costly measurement and evaluation techniques may not be appropriate in Yukon, some level of program evaluation is needed. During cross-examination Company witnesses indicated that there would be some follow-up procedures implemented with respect to its DSM programs.

The following exchange took place between Board consultants and Company witnesses:

> "Q. Well, I guess what I am thinking of, Mr. Sweatman, is if two years from now this Board becomes extremely interested in the success or lack thereof of a particular project, are you going to be in a position to be able to provide the Board with the necessary data in order for it to gain its satisfaction?
>
> A. MR. SWEATMAN: Yes, we will be able to provide that."
>
> (Tr.983)

The Board considers ex post evaluation of DSM programs to be a vital step in implementing the proposed programs. The Board notes that B.C. Hydro's study recommends certain procedures for each proposed DSM program. The Board also recognizes that the Companies must consider the costs of ex post evaluation when determining what follow-up should be implemented.

Recommendation #24:

The Board recommends that the Companies provide to the Board at the next general rate application an outline of the ex post evaluation steps to be performed on its existing and proposed DSM programs. Included in this outline should be an estimate of the costs of performing the ex post evaluations.

7.5.2.5 RIM Versus TRC Test

A great deal of discussion took place during the course of the proceeding as to whether the RIM test should be utilized to determine the economic feasibility of a DSM project or whether the TRC test should be utilized.

The Companies adopted the use of the RIM test on the basis that its effect is that customers' rates will not increase because of the program cost even if certain customers do not participate in the programs.

The Companies submitted that:

> "DSM programs have a tendency to raise rates as every kW.h saved means the same fixed costs must be recovered over fewer kW.h sold. Yukon customers are concerned about their already high rate levels. The generous DSM expenditures allowed by the TRC test would almost certainly put upward pressure on rates - an effect neither anticipated nor desired by Yukon customers." (YEC Argument, Appendix C, Page 10)

The Companies have noted that, given the stage of development of the DSM initiatives, it is appropriate to use a conservative approach such as the RIM test. The Companies acknowledged that as they become more familiar with DSM they have not ruled out the possibility of using the TRC test or a combination of tests.

Whitehorse submitted in Argument that the TRC test should be used to assess the economic viability of DSM measures. The TRC test essentially compares the cost of DSM measures to the cost of supply options. Whitehorse submitted that the TRC test provides greater flexibility in program design and implementation.

The Board recognizes the importance of effective DSM programs, however, the Board is also cognizant of the high rates charged to Yukon customers and the considerable risks in implementing DSM programs. The Board considers it appropriate at this time that the Companies use the RIM test to assess the economic feasibility of DSM programs. However, this should not preclude the use of the TRC test in the future as experience and knowledge is gained with respect to DSM initiatives.

Recommendation #25:

The Board recommends for the present the use of the RIM test to assess the economic feasibility of DSM programs. The Board recommends that the TRC test be considered for future use in assessing the economic feasibility of DSM programs.

7.5.2.6 Assessment of the Companies' Proposed DSM Program

7.5.2.6.1 Phase I DSM Initiatives

The Companies requested that the Board approve the inclusion of all 1991 and 1992 DSM program expenditures in YEC's rate base as of the next general rate application.

Phase I consisted of the launch of the DSM information program, the launch of the DSM planning study, implementation and evaluation of the Hot Water Saver Program and Power Saver Program, a DSM audit and other initiatives undertaken with Curragh Resources Inc.

Whitehorse submitted in Argument that all of the 1991 and 1992 DSM program expenditures should be included in rate base.

FAA in their submission stated:

> "FAA supports the inclusion of all appropriate and effective future DSM expenditures into the rate base. However, we don't believe there's sufficient reason to retro-actively approve past or present DSM costs,..." (FAA Argument, Pages 18-19)

The Board in its Decision 1992-1 stated:

> "The Board supports the concept of DSM. However, the Board is concerned about the reasonableness of the forecast costs included in the 1991 and 1992 general rate application. The Board notes that the Company implemented several DSM programs in 1991 prior to the finalization of the Company's DSM study. In addition, the Board notes the Company relied primarily on programs that had been implemented in other jurisdictions. When asked for evaluations from other jurisdictions on the DSM programs implemented by YEC, the Company could not provide any studies or evaluations until subsequent to the public hearing." (Pages 45-46)

The Board further stated in that Decision that:

> "The Board considers that at this time it would be inappropriate to include any costs relating to DSM expenditures in YEC's 1991 and 1992 revenue requirement. The Board directs the Company to provide detailed support for its 1991 DSM programs and its planned 1992 DSM programs in the upcoming capital hearing." (Page 47)

The Board was concerned at that time that the Companies had not properly assessed how the programs should be implemented and that very little or no evidence was provided to support the prudency of the expenditures. The Board notes that the ex post evaluation performed on the Power Saver Cord Program indicated that there were significant problems with the installation of the power saver cords that caused a reduction in the savings in demand and energy. The Board considers that, with a little more forethought in implementing DSM programs, the Companies may have been able to avoid the installation problems.

The Board notes with concern that the Companies have not performed Yukon specific tests with respect to the power saver cord, although B.C. Hydro recommended these test be performed. It was also clear that Company witnesses were not certain how the power saver cord would work on different types of engines.

The Board considers it imperative to implement DSM programs only when it can be established that their implementation will be cost effective. The Board considers that the Companies should be able to support the proposed expenditures in DSM to the same extent that would be appropriate for supply options. The Board notes that approximately 43% of the power saver cords were installed incorrectly in 1991 and approximately $48,000 was expended on the Power Saver Program in 1991.

The Board is concerned that the Companies' implementation of the DSM programs in 1991 prior to receipt of any studies and thorough assessment of the DSM programs may have led to expenditures being incurred for which there was no benefit gained. On this basis the Board considers it appropriate to reduce the amount of the DSM expenditures for 1991 to be included in the Companies' future revenue requirement.

The Board also has significant concerns that there is a lack of policy direction on DSM issues being provided by YEC's Board of Directors, and that there is a lack of supervision by senior management on DSM issues.

Recommendation #26:

The Board recommends that $24,000 of the 1991 DSM expenditures be disallowed and that the remaining Phase I expenditures made by the Companies for DSM programs be included in the Companies' future revenue requirements. The Board recommends that the YEC Board of Directors provide policy direction on DSM issues, and that senior management take an active role in supervising DSM activities.

7.5.2.6.2 Phase II DSM Programs

The following Phase II DSM programs will be introduced in 1992 and 1993:

(1) Water Heater Blankets and Energy Efficient Hot Water Heaters

As discussed in Section 7.5.2.3 of this Report, there was some concern expressed with respect to the R values assigned by the Companies to the Reflectix hot water blanket.

Mr. Marcus proposed a direct installation program for any electric domestic hot water program which consists of R-11 hot water heater tank wrap, up to 20 feet of R-3 hot water pipe wrap, high efficiency shower heads, faucet aerators and water heater set point adjustment.

Mr. Marcus also suggested that the use of electrical water heater time clocks would prevent the upper element from operating during peak utility periods and would reduce the system peak demands.

(2) Energy Efficient Refrigerators

Mr. Marcus expressed concern that the Companies' commission to salespersons for the sale of an energy efficient refrigerator would not be effective, and that the program would be more effective if a rebate was provided directly to the individuals purchasing a refrigerator.

It should it be noted that the B.C. Hydro study supported a direct rebate to customers.

The Board also notes that the Companies indicated that all appliance retailers contacted by the Companies are already carrying energy efficient refrigerator models. YEC further indicated in its Reply Argument that:

> "The utilities' work with retailers has already resulted in more of the product being available and being sold even before the formal program (with commissions) is launched." (YEC Reply Argument, Page 20)

It is the Board's view that the Companies have not demonstrated the need for commissions being paid to the retailers to encourage the purchase of energy efficient refrigerators. The Board considers it appropriate for the Companies to discontinue paying commissions to refrigerator salespersons at this time. Further, the Board does not support payment of direct customer rebates at this time.

In response to a Board interrogatory, the Companies indicated that they do not intend to implement a program to remove inefficient refrigerators from the system on the basis that a program would be too expensive and it is impossible to tell whether the old refrigerator had actually been in use.

The Board notes that other utilities have implemented programs to remove inefficient refrigerators from their systems.

The Board considers that greater savings may be realized if inefficient refrigerators are removed, and that the Companies should examine alternative methods of removing old refrigerators from the Companies' systems. The Board recommends that the Companies assess the feasibility of removing old refrigerators by back-haul for safe disposal in British Columbia.

(3) Residential Lighting Program

Mr. Marcus expressed the concern that the Companies' proposals regarding compact fluorescent lighting will limit the penetration of the technology on the basis that the Companies' program favours the more expensive hard wire fluorescent fixtures over the cheaper technology, screw-in light bulbs.

The Power Smart consultants at B.C. Hydro proposed programs for all types of compact fluorescents.

Whitehorse in its Argument made the following statement with respect to the Residential Lighting Program:

> "In sum, YEC/YECL simply shot from the hip based on their preconceived notions without any supporting data or evidence whatsoever." (Whitehorse Argument, Page 42)

(4) Vehicle Timers for Block Heaters

No issues were identified with respect to this program.

(5) Commercial Lighting Program

Mr. Marcus recommended that the full rebate proposed by B.C. Hydro should be offered to encourage customers to install energy efficient lighting rather than the lower rebate proposed by the Companies.

During the course of cross-examination, concern was also expressed with respect to cost effectiveness of the commercial lighting program being implemented for electrically heated commercial buildings.

(6) Commercial Buy-Back Program

No issues were identified with respect to this program during the course of the proceedings.

The Board considers that the development of effective DSM programs should include the assessment of all potential alternatives. The Board recognizes that the DSM programs implemented should be the most effective at the least cost.

The Board considers that valuable information was provided to the Companies with respect to their DSM programs by the Intervenors during the course of this proceeding, and that the Companies should assess the suggestions in the determination of which DSM programs should be implemented.

Recommendation #27:

The Board recommends that the Companies be directed to consider the concerns and suggestions made by the interested parties during the course of this proceeding with respect to DSM programs, and that the Companies implement in Phase II those programs which will be the most effective for the least cost. The Companies should be prepared to provide detailed support for their DSM programs in future general rate applications.

Recommendation #28:

The Board recommends that the Companies cease commission payments to refrigerator salespersons.

The Board further recommends that the Companies examine the costs and benefits of alternative methods of removing inefficient refrigerators from the system, and assess the feasibility of removing old refrigerators by back-haul for safe disposal in British Columbia.

7.5.2.6.3 Phase III DSM Programs

Phase III is to be implemented during the years 1994 to 2000, and is proposed to expand on the Phase II initiatives and to implement fuel switching DSM programs for residential customers with electric heating.

Mr. Marcus suggested that the Companies should implement a weatherization program that will reduce the use of electric heat through improved weatherization of homes. Weatherization programs will help customers who cannot participate in fuel switching to control their bills.

The Companies indicated that the Government had implemented some weatherization programs, and that it did not believe that it was appropriate for the Companies to provide these programs.

The Board considers that weatherization is an effective method of reducing energy consumption and that it should be encouraged to the extent practical.

With respect to the fuel switching programs, Whitehorse made the following submission:

> "However, the Board must be cognizant that very high levels of fuel switching begin to expose ratepayers to demand risks. If we were to implement fuel switching at a 100% penetration rate, it would cost $12 million to save 10 or 12 MW (or perhaps more). (Tr.1117) This is not an insignificant amount of power. As Mr. Marcus cautioned:
>
> > '...It is starting to look like a large supply project. It is still cheaper than any of the other large supply projects that you are looking at, and we would certainly suggest that you go in the direction of fuel switching before approving some of these large hydro projects with the same market risks, but you should be a little bit cognizant of that issue.'(Tr.1117)"
>
> (Whitehorse Argument, Pages 45-46)

Whitehorse further submitted that, because fuel switching is cheaper than supply, the Board should require the Companies to step up the amount of fuel switching before approving any large hydro project.

As discussed in the preceding section, the Board considers that the Companies should assess all viable alternatives in determining how to implement the DSM programs.

Recommendation #29:

The Board recommends that the Companies be directed to consider the concerns and suggestions made by the interested parties during the course of this proceeding with respect to DSM programs, and that the Companies implement in Phase III those programs which will be the most effective for the least cost. The Companies should be prepared to provide detailed support for their DSM programs in future general rate applications.

Recommendation #30:

The Board recommends that the Companies:

(1) Actively promote the use of energy efficient materials and techniques to the construction and renovation industries.

(2) Review Government weatherization programs and advise the Board whether there are additional opportunities available to increase energy efficiency through weatherization programs.

7.5.2.7 Other DSM Measures

7.5.2.7.1 Electric Heat in New Construction

The Companies recognized that a separate opportunity for significant DSM, but excluded from the DSM programs, is the use of electric heating in new construction. The Companies recognize that unless the installation of electric heating systems in new construction can be reduced, it will be difficult to implement fuel switching programs.

The Companies suggested that electric heat in new construction could be eliminated by forbidding or discouraging installation through the Electric Service Regulations, a connection fee or instituting higher rates for those who use electric heating.

Whitehorse recommended that the use of electric heating in new construction should be banned, with a period of adjustment of two years before the ban takes effect. Whitehorse preferred a ban of electric heating through Electric Service Regulations and noted that Alberta Power Limited had an electric service regulation that disallowed the installation of electric heating.

It was clearly demonstrated during the course of the proceeding that electric heating uses more resources than direct combustion of fuels. Although the capital cost of installing electrical heating is less than for direct combustion fuels, in the long run electric heating is more expensive.

The Board also recognizes that the Companies' Electric Service Regulations discourage the installation of electric heating in those isolated communities served by diesel.

Recommendation #31:

The Board recommends that the installation of new electric heating be strongly discouraged, and that the Companies develop a mechanism that will be effective and fair to customers by the time of the next general rate application.

7.5.2.7.2 Energy Efficiency Standards

Mr. Marcus recommended that the Government establish energy efficiency standards for refrigerators, freezers, furnaces, fluorescent lamp ballasts and electric motors. Establishing standards would reduce future demand while minimizing the costs of DSM programs to ratepayers.

Whitehorse submitted in Argument that:

> "Yukon residents face some of the highest costs of electricity in Canada, and Yukon utilities' marginal costs are even higher. While the Federal Government has begun a process to enact energy efficiency standards through Bill C-41 and accompanying regulations, this process is likely to be slow and is likely not to take the Yukon's specific cost structure into account." (Whitehorse Argument, Page 50)

Whitehorse recommended that the Government adopt Yukon specific energy efficiency standards.

The Board considers that the use of energy efficiency standards by Government is a cost effective way to implement DSM programs. The Board also considers it important to develop energy efficiency standards as soon as possible to minimize "lost opportunities" and to reduce the Companies' operating costs.

Recommendation #32:

The Board recommends that the Government develop energy efficiency standards for electrical appliances in consultation with YEC and YECL as soon as possible.

7.5.2.7.3 DSM Measures at the Faro Mine

YCS made the following submission:

> "With regards to the Curragh Supply agreement (found in YEC/YECL Binder B, Section 3, p. 55), some DSM measures were approved and reviewed, but we feel that a much greater emphasis must be placed on DSM and industry. Further research must be conducted into DSM programmes at the Curragh mine at Faro, and we request that the board recommend that DSM be an integral section in the renewal of the Supply Agreement between YEC and Curragh Resources (which will take place in March/'93)." (YCS Argument, Pages 6-7)

The Board recognizes that the current Curragh contract addresses DSM activities.

Recommendation #33:

The Board recommends that DSM should be an integral section in the renewal of the supply agreement between YEC and Curragh Resources Inc. The Board notes its previous recommendation in its Report to the Commissioner in Executive Council on Rate Design and Cost of Service that the rates to Curragh should be approved by the Board as part of the public hearing process.

7.5.2.8 Accounting for DSM

The Companies proposed that DSM program expenditures should be accounted for in the following manner:

(1) Information program expenditures to be expensed each year (except for expenditures in 1991 and 1992 which the Board has directed to be included in Construction Work in Progress).

(2) Other DSM expenditures to be capitalized and added to rate base starting in 1993.

(3) Capitalize DSM expenditures to be depreciated over 5 years.

(4) For cost of service purposes, DSM expenditures will be included in the generation function and classified in accordance with the average demand/energy split applicable to all other generation costs.

The Board considers that the specific accounting for DSM programs should be considered in the context of a general rate application and need not be considered in assessing the Companies' resource plan.

Recommendation #34:

The Board recommends that the development of an accounting policy for DSM expenditures should be addressed in the Companies' next general rate application.

7.5.3 Supply Options

7.5.3.1 Need for Supply Options

Capacity requirements for new supply options should be determined after giving consideration to improvements in forecasting techniques and changes in the firm demand due to DSM programs and potential changes in available capacity due to load factoring of the Whitehorse Rapids Plant.

Table 8 shows the firm capacity available as provided in the Companies' evidence, together with the firm demand for the Base Case forecast adjusted for the Wheaton River Mine, as discussed in Section 7.2.3.1 and the DSM programs proposed by the Companies. The adjustment for DSM was based on total program savings provided by the Companies until the year 2000, and has been held constant beyond that point.

TABLE 8

WAF System
Capacity Requirements
Adjusted for Companies' Proposed DSM Expenditures

BASE CASE				
YEAR	FIRM CAPACITY	DIESEL RETIREMENTS	FIRM DEMAND	EXCESS (SHORTAGE)
1992	78.50		75.11	3.39
1993	78.50		78.93	-0.43
1994	78.50		78.37	0.13
1995	73.50	5.00	79.03	-5.53
1996	73.50		79.18	-5.68
1997	73.50		79.41	-5.91
1998	64.40	9.10	79.66	-15.26
1999	61.40	3.00	79.64	-18.24
2000	48.30	13.10	79.60	-31.30
2001	48.30		77.50	-29.20
2002	48.30		78.30	-30.00
2003	48.30		79.10	-30.80
2004	48.30		79.80	-31.50
2005	48.30		79.70	-31.40
2006	48.30		80.50	-32.20
2007	48.30		81.30	-33.00
2008	48.30		55.90	-7.60
2009	47.30	1.00	55.80	-8.50
2010	44.70	2.60	56.40	-11.70
2011	40.00	4.70	56.40	-16.40

Based on Table 8, the Companies will require approximately 6 MW of additional capacity by the year 1995 and 30 MW by the year 2001. However, before the Companies should commit to the construction of additional capacity, the potential available capacity from load factoring should be considered. It may be that by 1994 or 1995 the Companies will be able to determine with a greater degree of accuracy the potential capacity available from load factoring at the Whitehorse Rapids Plant. The Companies must also assess if the projected diesel retirements are actually required as set out in Table 8.

It should be noted that the Companies' proposed DSM programs will eliminate any capacity requirements under the Low Case scenario until the year 2000.

The Board considers that it cannot reasonably determine the amount of capacity needed between 1992 and 2001 due to the uncertainty associated with the closure of the Faro Mine, the uncertainty of the potential for load factoring at the Whitehorse Rapids Plant, and other uncertainties.

Recommendation #35:

The Board recommends that before the Companies commit to the construction of a supply option they should critically assess the knowledge they have gained with respect to the savings in demand from DSM programs, potential load factoring at the Whitehorse Rapids Plant, the potential for a closure of the Faro Mine, improvements in forecasting techniques and the necessity for diesel retirements.

7.5.3.2. Mitigating the Significant Market Risks of the Potential Closure of the Faro Mine and Supply Options

The Companies determined that it was appropriate to develop supply options costing in excess of $5 million only in the event that the market risk is reduced. The Companies indicated that flexible debt financing arrangements with the Yukon Government will be required for projects in order to mitigate the market risks associated with such supply options.

Whitehorse submitted in Argument that projects having significant market risk should not be constructed even if the risk is transferred to the Yukon Government. Effectively, all that would be accomplished by this practice would be a transfer of the risk burden from electrical ratepayers to Yukon taxpayers.

The Board considers it important that in determining appropriate mechanisms to mitigate market risks associated with the construction of supply options, it should be recognized that effectively the risk burden is only being shifted to the party which provides the flexible financing.

Recommendation #36:

The Board recommends that if the Government considers it appropriate to provide a mechanism that mitigates the market risks associated with a supply option, it should give due consideration to the fact that the mechanism will only result in a shift of the risk burden to the party which provides the flexible financing.

The Board further recommends that before pursuing construction and feasibility of large projects the Companies should give preference to DSM, small utility owned projects and IPP's.

7.5.3.3 Assessment of Supply Options Proposed by Companies

7.5.3.3.1 Third Turbine at Aishihik Lake

The third turbine at Aishihik Lake will provide 5 MW of dependable capacity and its estimated capital cost is $3.1 million.

Whitehorse submitted that the Board should install a third turbine at Aishihik Lake on the basis that it is a low cost project and will add significant capacity.

FAA expressed the concern that the additional turbine unit at Aishihik Lake may draw down the lake faster and result in recruitment problems for the whitefish. FAA submitted that, should the environmental concerns discussed in Section 7.4.3 of this Report with respect to Aishihik Lake be resolved, then they support the construction of the third turbine.

The Companies recognize that the environmental issues related to the management of Aishihik Lake must be resolved before pursuing construction of the third turbine. The Board recognizes there is a risk that resolution of the environmental issues may impact the economic feasibility of Aishihik #3. The Board considers it important that before commencing construction of Aishihik #3 the environmental issues must be resolved and it must be demonstrated that the project remains feasible.

During cross-examination it was suggested that it may be appropriate to install a turbine at Aishihik Lake that will provide more than 5 MW of capacity. In response to this cross-examination, a Company witness stated:

" Peter, just to talk a bit about the 7 megawatts. Our estimate is it would be about $2 million more than what the present proposal is. The present proposal is around 3 1/2 to $4 million for the 5-megawatt unit. It would probably be in the range of another $2 million for an additional 2 megawatts. That was based on proposals that we got.

Now, we've done the office study on the 7-megawatt. I think once we get into the detailed design, we may be able to go to that 7 megawatts and justify it. But it's still a little too early to say whether it's a firm 5 or a firm 6 or a firm 7. We know that the 5 is okay from an economics point of view, and also that it will fit without too many difficulties.

Once you start getting up higher, then you start getting into, I believe it's velocity concerns with fish in the canal, both the intake and the tailrace, as to whether or not we create a problem with the fish. I know at 5 it's okay. At 7, I don't know how much the velocity goes up, but you may start affecting the fish. So we will have to be looking at that over the next while.

THE CHAIRPERSON: Mr. Kerslake, this is in relation to the same third turbine at Aishihik where you've already selected the particular turbine?

A MR. KERSLAKE: That's where we got this 5 megawatts from. That's where I say we know that that one works, and we've gone through with the Fisheries people about the velocities. Once we get up higher than that, that's what I'm saying, there is a concern that we bring in a whole new set of parameters and possible concerns.

THE CHAIRPERSON: But if you were to decide that it was okay to go to the 7 and the Fisheries people were to agree with you, would you then be dealing with a different selection of turbine?

A MR. KERSLAKE: Yes, if we went to 7."

(Tr.644-645)

The Board considers that additional capacity should be installed to the extent it is economically, technically and environmentally feasible.

Recommendation #37:

The Board recommends that the Companies pursue YTWB approval for the construction of Aishihik #3, assess the environmental costs after giving due consideration to the findings of the environmental reviews, and report back to the Board before commencing construction. The Companies should pursue installation of the maximum capacity that is economically, technically and environmentally feasible.

7.5.3.3.2 McIntyre Creek Project

The McIntyre Creek project is a future development of the existing YECL development of the Fish Lake and McIntyre Creek watersheds. The McIntyre Creek project would provide approximately 6.2 MW of dependable capacity and the estimated cost is $4 million.

Whitehorse submitted in Argument that McIntyre Creek should not be approved at this time.

FAA recommended that the Board should advise the Minister to assist YECL in resolving the land claim conflict to allow this project to be dealt with.

The Board recognizes that McIntyre Creek cannot be constructed until such time as the land claim issue has been resolved. The Board notes that YECL indicated that resolution of the land claim issue may take a considerable length of time and may impact the economic feasibility of the project.

Recommendation #38:

The Board recommends that plans for the McIntyre Creek project not be pursued until resolution of the land claim issue. If, after the land claim issue is settled, it is determined that the project remains economically feasible the Companies should continue to pursue it after giving due consideration to Recommendation #35.

7.5.3.3.3 Assessment of the Need for Feasibility Studies for Hydro Projects at Drury Creek, Morley River, Lapie River and Orchay River

The Companies forecast costs of $175,000 to $300,000 for completion of the Level 3 assessments for each of the Drury Creek, Morley River, Lapie River and Orchay River projects. Each of these hydro projects is subject to considerable market risk as the capital cost is in excess of $5 million.

Whitehorse submitted in Argument that the Board should limit the Companies' spending on feasibility studies on large projects. Whitehorse recognized that the hydro options proposed by the Companies create a significant amount of market risk due to the significant capital costs.

FAA recommended that the Board should not approve any spending on feasibility studies outside of hydrological data collection on the basis that the capacity is not needed and the projects have too high a market risk.

Mr. Von Finster, in his submission on behalf of the DFO, expressed the concern that the environmental studies associated with fish may take a considerable period of time to complete, and that the Companies should be cognizant of this fact in their long range resource plans.

The Board recognizes that significant amounts could be spent on feasibility studies only to discover that the programs are not economically feasible. However, the Board also recognizes that some of the required studies take a considerable length of time and that studies of long-term options are necessary to maintain customer rates at a minimum over the long term.

During the course of the proceedings, Mr. Druce expressed concern about the adequacy of the hydrological data bases for some of the supply options proposed by the Companies.

On the basis that hydrological data bases must be developed over time, the Board considers it necessary that sufficient hydrological data be gathered to facilitate development of hydro resources when required.

Recommendation #39:

The Board recommends that the Companies develop a long-term hydrological data base for Drury Creek, Morley River, Lapie River and Orchay River by requesting Water Survey of Canada to operate a recording stream gauging station, with no data collection platform, close to the site of each short-listed hydro-electric project. The Board further recommends that the Companies not pursue any other feasibility studies for the above-noted projects at this time.

The Board considers that operating and maintenance costs of the data collection network should be minimized to the extent practical. The Board notes that the Companies are recommending that the Moon Lake proposal not be pursued further at this time.

Recommendation #40:

The Board recommends that the Companies should discontinue the operation of the Moon Lake stream gauging station and data collection platform.

7.5.3.3.4 Coal-Fired Generation

The Companies proposed to continue to examine available technologies for small scale coal-fired plants. It is estimated that a 20 MW coal plant would cost $37 million.

The Chamber of Mines in its submission supported the pursuit of coal-fired generation.

Whitehorse submitted in Argument that the coal-fired generation option has too much market risk associated with it. Whitehorse further submitted that the Board should not approve further funding to study the coal-fired generation option.

YCS did not specifically comment on the coal generation option, however, they submitted that preference should be given to small plants over large plants and that investments in large infrastructures should be delayed. YCS also indicated that preference should be given to renewable over non-renewable sources of energy.

The Board recognizes that there may be significant socio-economic benefits from coal-fired generation in Yukon. However, it also recognizes there may be significant environmental costs. The Board is concerned about the expenditure of significant funds to study potential supply options that have significant market risk and may not be economically feasible in the future.

The Board notes that the Companies indicated smaller coal generation fired plants may be more technically feasible in the future.

Recommendation #41:

The Board recommends that the funds expended to study coal-fired generation should be limited to a review of coal technology, particularly with respect to plants having capacity under 20 MW, and monitoring improvements in future technology that may make such projects more viable in Yukon.

7.5.3.3.5 Supply Options - Other Systems

The Companies recommend that further studies should be performed on the North Fork Hydro and Mayo-Dawson transmission projects in the event that a change in demand warrants a further assessment of these projects. The Board notes that the North Fork Hydro project is only economical under the High Case scenario.

As discussed in Section 7.5.4.1 of this Report, independent power production should be encouraged in Yukon. Mr. Randy Clarkson recognized in his evidence that small scale hydro-electric generation is the most environmentally compatible method of replacing diesel generation at remote communities.

The Board recognizes that this matter has been previously studied. However, the Board considers that there may be benefits to ratepayers if diesel generation could be replaced with a small scale hydro development to serve Dawson.

Recommendation #42:

The Board recommends that the Government take steps to encourage IPP's to provide proposals on the feasibility of small scale hydro development at North Fork to replace diesel generation at Dawson.

The Board recommends that no further studies be performed on the Mayo-Dawson transmission projects unless demand changes sufficiently to warrant a further review of the project.

7.5.3.3.6 Wind Generation

YEC recommends that development work continue to allow Yukon to take advantage of wind generation if economically feasible.

Whitehorse submitted in Argument that the Board should encourage further research and development of wind generation. Whitehorse submitted that it does not support a commercial scale development without a further analysis of the economics and demand risks being examined at a future hearing.

YCS submitted that the Board should direct the Companies to more extensively investigate the potential for wind power.

The Board considers that further research and development with respect to wind generation has merit. However, the expenditures incurred in the research and development should be incurred on a prudent basis.

Recommendation #43:

The Board recommends that research and development work continue to be pursued with respect to wind generation. The Board encourages the Companies to closely monitor the technology and progress in wind generation in other jurisdictions.

7.5.3.3.7 Purchasing Policy for Transformers

Whitehorse recommended that the Companies should be directed to change their purchasing policy with respect to transformers, and should investigate the use of amorphous distribution transformers.

In response to Whitehorse's suggestion, Company witnesses stated:

> "I can answer the second part of the undertaking, and, yes, we have been using the Alberta Power evaluation standard on transformers. Mr. Marcus has brought up a good point that we are now looking at, and we will definitely be changing the way we evaluate losses on transformers." (Tr.582)

Recommendation #44:

The Board recommends that the Companies pursue Whitehorse's recommendations with respect to transformer purchasing policies, and report on their progress at the time of the next general rate application.

7.5.4 Independent Power Producers

7.5.4.1 Merits of Independent Power Production in Yukon

NEW ERA Electric Corporation (**"NEW ERA"**) submitted that small scale IPP hydro-electric and wind-electric production are the most environmentally compatible methods of reducing non-renewable diesel generation. The integration of IPP generation systems would result in increased efficiency and reliability.

YCS submitted that preference should be given to small plants over large plants. YCS stated in its submission:

> "By investing in increments, promoting carefully managed independent power production, and operating at a moderate level, the impacts on the environment may be lessened." (YCS Argument, Page 9)

YECL submitted that if an IPP can provide power at a lower cost, YEC is committed to supporting the IPP.

The Board considers that there is merit in encouraging independent power production in Yukon. The Board recognizes that the development of small independent power projects may help to minimize the significant market risks associated with the development of generation in Yukon. The Board also recognizes that small IPP projects may have less of an environmental impact than larger projects.

Recommendation #45:

The Board recommends that independent power production should be encouraged in Yukon.

7.5.4.2 Issues Identified with Respect to an Independent Power Producer Policy

YEC has adopted an interim policy for IPP's for which it requested Board approval. YEC's interim IPP policy is described in Section 3.3.1.4 of this Report. There were a number of significant issues identified with respect to an IPP policy during the course of the proceedings.

(1) Price to be Paid to Independent Power Producers

The most significant IPP issue addressed during the course of the proceedings was the determination of the appropriate price to be paid by the Companies to IPP's for their output.

As described in Section 3.3.1.4 of this Report, YEC proposed that the price should be based on long run avoided costs. YEC calculated the long run avoided cost on the basis of a diesel "proxy unit" approach. YEC submitted that the "proxy unit" approach using a diesel plant involves fewer assumptions and is a more simple model than the alternative of using a Yukon mix of resource options. The diesel proxy unit approach also implies potentially higher customer costs and higher IPP prices than the alternative of using a mix of Yukon resource options.

NEW ERA recognized that long-term avoided costs should be used in establishing the price to IPP's, however, NEW ERA calculated long-term avoided costs on the basis of the historical or embedded cost derived from the Companies' cost of service study.

Whitehorse submitted in Argument that the appropriate method for evaluating independent power production involves the use of marginal costs (avoided costs) and not embedded costs.

During the course of the proceeding, a Small Power Inquiry Report prepared jointly by the Energy Resources Conservation Board of Alberta and the Public Utilities Board of Alberta ("the Boards") was filed as an exhibit. The Board notes that the Boards concluded the following with respect to pricing for IPP contracts:

> "The Boards believe that the AIS long-term avoided costs should be used as the starting point to determine prices for small power generation. They further believe that, by necessity, a number of simplifications must be made in the calculation of these costs. The method chosen should be simple enough so the results can be easily verified and understood and still be accurate and fair to all parties." (Small Power Inquiry, Page 10)

The Board considers it appropriate that long run avoided costs be used to establish the price for IPP contracts.

Recommendation #46:
The Board recommends that long run avoided costs be used in establishing prices for IPP contracts.

The Board recognizes that in establishing the long run avoided cost to be used as a price, there are a number of significant issues that need to be addressed. Some of the issues identified during the course of the proceedings are:

(a) the fuel price forecasts;

(b) the calculation of line losses; and

(c) the calculation of diesel operating, maintenance and administration expenses.

The Board considers that a detailed examination is required to resolve these issues.

(2) Other Significant Issues

Other significant issues that require resolution to determine an appropriate IPP policy are:

(a) Whether and how many standard prices should be set.

NEW ERA proposed that standard prices be set for each of the three major rate zones. YEC's interim policy proposed that prices be established for each individual contract, although it was acknowledged during cross-examination that standard prices may be effective.

(b) Whether take-or-pay contracts should be used.

NEW ERA proposed that YEC should be required to negotiate take-or-pay contracts with reliable local IPP's. YEC proposed that it should be authorized to negotiate take-or-pay contracts if it is appropriate. It should be recognized that take-or-pay contracts increase the risk to the utilities that they will be required to take electricity that may not be required.

(c) Whether IPP's should be exempt from PUB regulation.

Both YEC and NEW ERA recognized that one potential limitation to the development of IPP's in Yukon is the Public Utilities Act which deems an IPP to be a public utility. NEW ERA proposed that the Yukon Public Utilities Act be amended so that IPP's are exempt from regulation. YEC proposed that it could sign a contract with an IPP and bring the contract before the Board for approval to minimize the cost of regulation for the IPP.

(d) Whether prices should be levelized.

NEW ERA recommended that levelized prices throughout the IPP contracts should be available to all reliable local IPP's.

(e) Whether preference should be given to local IPP's.

NEW ERA recommended that preference should be given to local IPP's.

(f) Whether IPP output should be limited.

NEW ERA submitted that utilities are reluctant to purchase power from IPP's, and recommended that the Companies should be required to purchase power from any local IPP. Whitehorse proposed limiting total IPP development to 1.5 MW and that contracts should be offered to individual projects of 500 kW or less. Whitehorse submitted that a total megawatt limit is needed to protect against demand risks from IPP. YEC indicated in its Reply Argument that the limits proposed by Whitehorse may be reasonable.

FAA submitted that there should be no per project or per IPP cap on the size or the amount of generating capacity which an IPP would be allowed to place in service, provided that at the time the capacity was put into service it displaced diesel generation with renewable non-polluting generation.

(g) Whether the Companies should be required to release information to IPP's.

NEW ERA submitted that the utilities should be directed to release accurate information beneficial to IPP's, including statistical data, feasibility studies and water flow data.

(h) Whether a price incentive should be provided to IPP's.

During the course of the proceeding, there was some discussion as to the appropriateness of offering IPP's a price incentive to encourage IPP development in Yukon.

With respect to resolving the significant issues, YEC made the following comment in its Reply Argument:

> "Unfortunately, any attempt to bridge the gap between the Companies and NEE has obviously not been successful. NEE's position does not appear to have changed. There is still disagreement as to and a lack of understanding of the fundamental principles universally used by the utilities to evaluate IPPs. Specific comments relating to NEE's argument are outlined below. However, with the help of the Board the Companies are committed to meeting with NEE and other interested parties to resolve the present difficulties." (YEC Reply Argument, Page 2)

Whitehorse submitted in Argument that the Board should adopt an independent power policy which reflects the fact that extensive negotiations of individual contracts for small projects are not cost effective for either ratepayers or developers.

FAA in their Argument made the following recommendation:

> "...an overall IPP Policy could be prepared by the Board which would generally allow for appropriate adjustments to account for the marginal costs and the special conditions encountered in each zone.
>
> As a first step, we recommend that the Board seek approval of the Minister to establish, by a Board Order, an IPP policy binding upon both utilities for the WAF system alone. The policy would be established through either binding arbitration, with the Board as arbiter, or via a separate hearing to review marginal costs and other IPP contract issues particular to the WAF system."
>
> (FAA Argument, Page 16)

The Board considers that if IPP's are to be encouraged and developed in Yukon, it is appropriate that a comprehensive policy be developed. The Board recognizes that there are significant issues to be resolved with respect to the IPP's. The Board considers that it is in the public interest to encourage IPP development, and that the differences between the Companies and IPP's can only be resolved by mediation. The Board considers that it can be of assistance in resolving the differences.

Recommendation #47:

The Board recommends that the Board be directed by the Minister to hold a hearing with respect to IPP policy and to develop a firm IPP policy for Yukon.

8. OTHER ISSUES

8.1 Mayo-Elsa Transmission Line Improvements

With respect to the Mayo-Elsa transmission line improvements, YEC made the following submission:

> "It is felt that YEC acted prudently to protect its assets, ensure employee and general public safety with the modest expenditure of $333,000. The issue of a capital contribution, which was already in dispute (see attached), was of little consequence compared to the overriding issues outlined above. In conclusion, YEC was left with no option but to perform minimal capital improvements on this facility in the spring of 1990." (Submission Overview, Appendix B, Page 2)

FAA submitted that it was not appropriate to include the expenditures for the Mayo-Elsa transmission line improvements in rate base on the basis that the reasons for this expenditure were not absolutely clear.

The Board notes that no evidence was introduced that would put the prudency of the expenditures into question. The Board also notes that the transmission line serves loads at the CBC and NWTel tower sites, Silver Trail Lodge and a number of YTG Highways heat traces in culverts.

Recommendation #48:

The Board recommends that the $333,000 of costs incurred to improve the Mayo-Elsa transmission line be put into rate base at the time of the next general rate application.

8.2 Contribution Policy

The Board notes that none of the Intervenors identified any issues with respect to YEC's contribution policy. The Board considers that YEC's contribution policy is appropriate at this time. The Board recognizes that the contribution policy may be examined on an ongoing basis in future general rate applications.

RESPECTFULLY SUBMITTED
ON BEHALF OF THE
YUKON UTILITIES BOARD

Edith D. Walters, Chairman

SUMMARY OF RECOMMENDATIONS

The Board makes the following recommendations to the Commissioner in Executive Council:

A Framework for Capital Programs to be Pursued

1. That this Report provide a preliminary framework within which the Companies should proceed with their capital program.

2. That the Companies' capital resource plan be reviewed on an ongoing basis as part of the general rate applications or as directed by the Board. The Board notes that before the Companies proceed with a specific project a full regulatory review must be undertaken, including an assessment of the prudence of the timing and costs of each project. The Yukon Public Utilities Act provides the Board with the ability to assess the prudency of constructing a facility and the prudency of the actual costs when added to rate base.

Market Risk

3. That the significant market risks associated with the closure of the Faro Mine should be considered in assessing the Companies' resource plan and in determining the need for new facilities.

4. That in assessing the Companies' capital plan the full impact of the Faro Mine closure, including the impact on demands by all customer classes, should be considered.

Load Forecasts

5. That the Low and Base Case scenarios should be considered in assessing the need and rationale of the supply and DSM options.

6. That the peak demand in the Low and Base Case forecasts be reduced by 1.7 MW for each of the years 1993 through 2001 to reflect the probability that the Wheaton River Mine will not open during that period.

7. That the Board agrees with the position of the City of Whitehorse, and recommends that a more rigorous approach to forecasting use per customer be taken by the Companies. In future general rate applications or reviews of capital plans, the Companies should be able to provide detailed support for such forecasts.

8. That the Companies perform customer surveys to assist in developing end-use capability. The Companies, in performing these customer surveys and in developing end-use capability, should be practical and cognizant of the costs incurred to do so.

9. That line loss-reducing projects and implementation schemes should be described by the Companies in future general rate applications and capital hearings, and should be reflected in future forecasts prepared by the Companies.

10. That the Companies develop the capability to forecast, up to two years in advance, the hourly loads for the WAF System over the November to April period with and without the Faro Mine in operation and for a range of historical weather conditions. The Board also recommends that the Companies develop a predictive model for the annual peak load for the WAF System.

Water Management

11. That the necessary ice studies and testing be performed to determine the potential to use load factoring to increase the capacity of the Whitehorse Rapids Plant. Studies should include:
    (1) Creating and maintaining a data base of ice observations and measurements for the portion of the Yukon River that constrains the winter operation at the Whitehorse Rapids Hydro-Electric Project.
    (2) Participating in the development of the ice model to ensure that the ice problems on the Yukon River are taken into consideration.
    (3) Determining the necessary data requirements to develop the ice model so that the opportunity to collect the necessary data is not lost for the winter of 1992/93.
    (4) Developing the capability to simulate the hourly operation of the WAF System resources that would meet the forecasted hourly loads over the November to April period for a range of forecasted or historical water conditions.
    (5) Preparing a cost estimate and work schedule for adding the capability for remote operation of the Marsh Lake control structure.

12. That, in future proceedings in which the capital resource plan of the Companies is considered, all potential sources of capacity from the existing systems should be identified and that the Companies should have witnesses available on a timely basis to respond to Intervenor and Board questions.

13. That the Companies critically review the WAF capacity reliability criteria and provide the results of this review to the Board in the next general rate application or as directed by the Board.

14. That the Companies create and maintain a data base of daily inflows to Aishihik Lake and Marsh Lake starting in 1987, or earlier if feasible.

15. That the Companies request that Water Survey of Canada operate water level recorders, with data collection platforms on Marsh Lake and on Aishihik Lake, in addition to the data collection platforms provided by the Companies.

16. That YEC develop the decision support systems that will permit the move to complete economic dispatch of WAF System resources by the year 2000, and report the progress and costs incurred in each future general rate application and capital hearing. YEC should be practical in its approach to developing support systems and should be cognizant of the costs to develop the systems.

17. That until the YCEE review and the DFO review on the management of Aishihik Lake are completed, the Companies' current practices should be continued on an interim basis.

18. That, if the reviews with respect to the environmental issues at Aishihik Lake indicate that there should be changes to the management of Aishihik Lake, YEC should provide to this Board the changes its proposes, together with supporting rationale, with respect to the management of Aishihik Lake.

19. That the findings by the Board in this Report should not preclude future changes to the management of Aishihik Lake if environmental costs are identified.

20. That YEC not pursue the use of top storage at Marsh Lake unless significant environmental costs are identified that may warrant a re-examination of the matter.

Supply Options and Demand-Side Management Programs

21. That the potential capacity available at Whitehorse Rapids Plant due to load factoring, the uncertainty due to timing of diesel retirements and the uncertainty associated with the timing of the Faro Mine closure be regularly considered in assessing the need for capacity and the type and timing of the capacity additions.

Demand-Side Management

22. That the Companies aggressively pursue DSM activities to the extent it can be demonstrated that the activities result in lower costs to consumers than alternative supply options.

    The Companies should also be required to demonstrate that they are recognizing the importance of pursuing DSM activities expeditiously and are considering the potential for lost opportunities.

    At the time of future general rate applications, the Companies should be required to provide detailed support for their decisions to pursue or not to pursue specific DSM programs.

23. That the Companies develop a full understanding of each of their DSM programs so that they can provide support for the estimated savings in demand and energy to be expected from each program.

24. That the Companies provide to the Board at the next general rate application an outline of the ex post evaluation steps to be performed on its existing and proposed DSM programs. Included in this outline should be an estimate of the costs of performing the ex post evaluations.

25. For the present the use of the RIM test to assess the economic feasibility of DSM programs. The Board recommends that the TRC test be considered for future use in assessing the economic feasibility of DSM programs.

26. That $24,000 of the 1991 DSM expenditures be disallowed and that the remaining Phase I expenditures made by the Companies for DSM programs be included in the Companies' future revenue requirements. The Board recommends that the YEC Board of Directors provide policy direction on DSM issues, and that senior management take an active role in supervising DSM activities.

27. That the Companies be directed to consider the concerns and suggestions made by the interested parties during the course of this proceeding with respect to DSM programs, and that the Companies implement in Phase II those programs which will be the most effective for the least cost. The Companies should be prepared to provide detailed support for their DSM programs in future general rate applications.

28. That the Companies cease commission payments to refrigerator salespersons.

    The Board further recommends that the Companies examine the costs and benefits of alternative methods of removing inefficient refrigerators from the system, and assess the feasibility of removing old refrigerators by back-haul for safe disposal in British Columbia.

29. That the Companies be directed to consider the concerns and suggestions made by the interested parties during the course of this proceeding with respect to DSM programs, and that the Companies implement in Phase III those programs which will be the most effective for the least cost. The Companies should be prepared to provide detailed support for their DSM programs in future general rate applications.

30. That the Companies:
    (1) Actively promote the use of energy efficient materials and techniques to the construction and renovation industries.
    (2) Review Government weatherization programs and advise the Board whether there are additional opportunities available to increase energy efficiency through weatherization programs.

31. That the installation of new electric heating be strongly discouraged, and that the Companies develop a mechanism that will be effective and fair to customers by the time of the next general rate application.

32. That the Government develop energy efficiency standards for electrical appliances in consultation with YEC and YECL as soon as possible.

33. That DSM should be an integral section in the renewal of the supply agreement between YEC and Curragh Resources Inc. The Board notes its previous recommendation in its Report to the Commissioner in Executive Council on Rate Design and Cost of Service that the rates to Curragh should be approved by the Board as part of the public hearing process.

34. That the development of an accounting policy for DSM expenditures should be addressed in the Companies' next general rate application.

Supply Options

35. That before the Companies commit to the construction of a supply option they should critically assess the knowledge they have gained with respect to the savings in demand from DSM programs, potential load factoring at the Whitehorse Rapids Plant, the potential for a closure of the Faro Mine, improvements in forecasting techniques and the necessity for diesel retirements.

36. That if the Government considers it appropriate to provide a mechanism that mitigates the market risks associated with a supply option, it should give due consideration to the fact that the mechanism will only result in a shift of the risk burden to the party which provides the flexible financing.

    The Board further recommends that before pursuing construction and feasibility of large projects the Companies should give preference to DSM, small utility owned projects and IPP's.

37. That the Companies pursue YTWB approval for the construction of Aishihik #3, assess the environmental costs after giving due consideration to the findings of the environmental reviews, and report back to the Board before commencing construction. The Companies should pursue installation of the maximum capacity that is economically, technically and environmentally feasible.

38. That plans for the McIntyre Creek project not be pursued until resolution of the land claim issue. If, after the land claim issue is settled, it is determined that the project remains economically feasible the Companies should continue to pursue it after giving due consideration to Recommendation #35.

39. That the Companies develop a long-term hydrological data base for Drury Creek, Morley River, Lapie River and Orchay River by requesting Water Survey of Canada to operate a recording stream gauging station, with no data collection platform, close to the site of each short-listed hydro-electric project. The Board further recommends that the Companies not pursue any other feasibility studies for the above-noted projects at this time.

40. That the Companies should discontinue the operation of the Moon Lake stream gauging station and data collection platform.

41. That the funds expended to study coal-fired generation should be limited to a review of coal technology, particularly with respect to plants having capacity under 20 MW, and monitoring improvements in future technology that may make such projects more viable in Yukon.

42. That the Government take steps to encourage IPP's to provide proposals on the feasibility of small scale hydro development at North Fork to replace diesel generation at Dawson.

    The Board recommends that no further studies be performed on the Mayo-Dawson transmission projects unless demand changes sufficiently to warrant a further review of the project.

That research and development work continue to be pursued with respect to wind generation. The Board encourages the Companies to closely monitor the technology and progress in wind generation in other jurisdictions.

44. That the Companies pursue Whitehorse's recommendations with respect to transformer purchasing policies, and report on their progress at the time of the next general rate application.

Independent Power Producers

45. That independent power production should be encouraged in Yukon.

46. That long run avoided costs be used in establishing prices for IPP contracts.

47. That the Board be directed by the Minister to hold a hearing with respect to IPP policy and to develop a firm IPP policy for Yukon.

Other

48. That the $333,000 of costs incurred to improve the Mayo-Elsa transmission line be put into rate base at the time of the next general rate application.

GLOSSARY OF TERMS

CAPACITY:

The load for which a generating unit, generating station or other electrical apparatus is rated either by the user or by the manufacturer.

COST OF SERVICE:

The total cost incurred to provide utility service, including expenses, taxes and return on investment. The cost of service may be thought of as an annual revenue requirement.

COST OF SERVICE STUDY:

An analytical process wherein the utility cost of service is functionalized, classified and allocated or assigned to the various customer classes.

DATA COLLECTION PLATFORM ("DCP"):

An electronic "black box" that allows coded data collected by an automatic water level recorder and/or weather station to be obtained remotely and in near real-time.

DEMAND (ELECTRIC):

The rate of flow of electricity demanded at one point in time and the maximum size (capacity) of facilities required to serve the demands of electric customers, usually expressed in kilowatts.

ECONOMIC DISPATCH:

The criterion that allocates generation sources to meet electricity demand according to the lowest short-run marginal cost.

EMBEDDED COST:

Those costs that are in existence at any point in time regardless of the date originally incurred and that affect current operations on a continuing basis. Cost of service studies are typically prepared using embedded costs.

LONG-TERM AVOIDED COST:

Costs that will not be incurred in the long run if one option is chosen over another option. For example, if a hydro option is chosen over installing diesel then the fixed and variable costs associated with the installation and operation of diesel equipment are avoided or not incurred.

MEGAWATT:

One megawatt equals 1,000 kilowatts.

RESERVE:

Excess generation capacity that is maintained to safeguard against loss of supply due to unexpected equipment failures.

5.3 CAPITAL HEARING

On December 7, 1992, the Board presented to the Commission in Executive Council a report on the Capital Hearing. This report was prepared in response to OIC 1992/92. The Board was requested to review the Companies' major capital projects and contract commitment proposals required for non-diesel fuel generation, transmission and DSM to 1997. In addition, pursuant to Board Order 1992/1, the Board requested the Companies to review issues arising out of the 1991/92 GRA pertaining to water management practices, the 1991/92 DSM expenditures, and the Mayo/Elsa transmission line rebuild.

The Companies' response to the Board's 48 recommendations is provided below, grouped under the broad headings adopted by the Board.

A Framework for Capital Programs to be Pursued

The Companies agree that the Capital Hearing report provides a framework within which the Companies can proceed with their capital projects (**Recommendation 1**), and that the Companies' capital resource plan should be reviewed on an ongoing basis as part of the general rate applications or as directed by the Board (**Recommendation 2**).

Recommendation 2 also states that the Yukon Public Utilities Act provides the Board with the ability to assess the prudency of constructing a facility and the prudency of the actual costs when added to rate base; the recommendation also notes that this regulatory assessment of the prudency of timing and costs of a project should occur before the Companies proceed with a specific project. In response to these comments, the Companies would note that Sections 38 to 42 inclusive of the Yukon Public Utilities Act dealing with an "Energy operation certificate" are applicable only to those projects which are "regulated projects", as defined in Section 38 (namely "any energy project that the Commissioner in Executive Council considers to be significant in the matter of any form of energy and, by order, designates as a regulated project"). The Companies also note the following with respect to anticipated Board review in future of the prudency for DSM and major supply projects of the Companies:

- absent designation of such projects as "regulated projects" under the Yukon Public Utilities Act, the Companies would normally anticipate that such projects would be reviewed by the Board only in conjunction with its review of periodic general rate applications in order to minimize the time and cost for public hearings (see subsequent comments on Aishihik #3 pursuant to Recommendation 37).

- for each major new YEC supply project that is not replacing either hydro or transmission assets, Yukon Government approval is currently required through the responsible Minister (OIC 1987/72).

The Companies also agree with the thrust of the Board's **Recommendations 21 and 35** that various factors should be regularly and critically considered before the Companies commit to new supply or DSM programs, including the potential for a closure of the Faro Mine, uncertainty due to timing of diesel retirements, the most current forecasts or estimates of load forecasts, DSM savings, and load factoring potential at the Whitehorse Rapids Plant. At the present time, for example, the Companies have deferred commitments on various capital projects (including Aishihik #3) pending confirmation that the Faro Mine will reopen with normal loads anticipated to continue over a reasonable number of years.

Market Risks

The Board recognizes that it is impossible for the Companies to forecast with any reasonable degree of precision the timing and likelihood of closure of the Faro Mine. The Companies agree with **Recommendation 3** that the significant market risks associated with the closure of the Faro Mine should be considered in assessing the Companies' resource plan and in determining the need for new facilities.

Recommendation 4 of the Board is that the full impact of the Faro Mine closure, including the impact on demands by all customer classes, should be considered in assessing the Companies' capital plan. The Board considers that an understatement of the impact of the Faro Mine will result in an understatement of any surplus capacity available after closure of the Faro Mine. The Companies indicated that none of the supply or DSM options examined in the Capital Hearing would be economically feasible over the next five years if the Faro Mine closed on or before 1995. Subsequent to the Capital Hearing, the Companies have reviewed in more depth the full impact of the Faro Mine closure in the 1980's. The Companies note the following from this additional review:

(a) Closure of the Faro Mine during 1982 led to a reduction over two years of slightly more than 100 GW.h in NCPC industrial sales on the WAF system, i.e., NCPC sales to the Faro Mine were 125 GW.h in 1981/82, 44 GW.h in 1982/83 and 22 GW.h in 1983/84 and 1984/85

(b) Closure of the Faro Mine was associated with major reductions over several years in NCPC's residential and general service sales at Faro; without considering the impact of other factors (e.g., annual weather differences), NCPC sales at Faro were reduced as follows after 1981/82 (stated as percent of 1981/82 levels):

-	1982/83	residential	86%	general service	73%
-	1983/84	residential	54%	general service	61%
-	1984/85	residential	44%	general service	58%
-	1985/86	residential	14%	general service	40%

(c) Closure of the Faro Mine between March 1982 and March 1983 overlapped with closure, in calendar 1983, of the Whitehorse Copper mine; YECL industrial sales therefore fell from 36 GW.h in 1982 to 2 GW.h in 1983, 1 GW.h in 1984 and less than 0.5 GW.h in 1986

(d) Closure of both the Faro Mine and Whitehorse Copper did not, however, result in major reductions in power sales by YECL to residential and general service customers in Whitehorse or the total Yukon (see response to BD-1-8(b) in the Capital Hearing, which confirms that the number of YECL residential and general service customers remained reasonably stable over the 1981 to 1983 period, and resumed modest growth thereafter; annual fluctuations in total sales to these customer classes primarily reflected variations in weather conditions)

In summary, the full impact on non-industrial customer classes of Faro Mine closure is currently assessed by the Companies on the following basis:

(a) major reductions are assumed after Faro Mine closure in the number of residential and general service customers served by YEC at Faro, e.g., 50% reduction within one year and 90% reduction within three years

(b) the number of YECL residential and general service customers in Yukon is assumed to remain constant for two years after Faro Mine closure, and then to resume growth at one-half the rate forecast to occur without Faro Mine closure

(c) no adjustments are assumed after Faro Mine closure to average use per residential or general service customer

(d) secondary sales on the WAF system (interruptible energy) after Curragh shut down are assumed at 5,000 MW.h's per year (based on Whitehorse hospital currently having one boiler versus two boilers during the 1980's period of Faro Mine shutdown)

Load Forecast - Specific Items

The Companies agree with the Board's **Recommendation 5** that the Low and Base Case scenarios (rather than the High Case) should be considered in assessing today the need and rationale for the supply and DSM options. In addition, the Companies agree with **Recommendation 6** that the peak demand in the Low and Base Case forecasts excludes the Wheaton River Mine in the 1993 through 2001 period. (The Companies note that the load forecast in the 1993/94 GRA reflects the present best estimate for test years, and excludes the Wheaton River load.)

The Companies also agree with the Board's **Recommendation 9** that line loss-reducing projects and implementation schemes should be described in future GRA's and Capital Hearings. To the extent practical, the Companies also will attempt to reflect these projects and implementation schemes in future forecasts; however, as noted in the Capital Hearing, there has not been any basis to date for adjusting load forecasts to reflect these factors. On a similar basis, the Companies are not able at present to assess in a meaningful way the relative impacts on load forecasts of marginal versus average line losses related to forecast changes in sales.

Load Forecast - End Use Methods and Research

The Board's **Recommendations 7 and 8** propose that the Companies take a more rigorous approach to forecasting residential and general service use per customer, including performing customer surveys and providing detailed support for future forecasts. The Board also notes that the Companies "should be practical and cognizant of the costs incurred" to perform customer surveys. These recommendations reflect concerns about possible overestimation of electricity requirements due to inadequate assessment of electric heat use trends.

The Companies note that the 1993/94 GRA residential load forecast reviews the current penetration of electric heat used in new construction (20%) and adjusts residential sales forecasts for Whitehorse customers to reflect the assumed declining trend in electrically heated housing additions. The Companies believe that these modifications are the most practical way at this time to deal with the end use forecasting concerns noted by the Board. The Companies will also continue to monitor the

penetration of electric heating use in new construction in order to assess whether further adjustments are merited for future load forecasts.

Focusing on proposed customer surveys, the Companies' major concern has been the practicality of asking the Board to approve the recovery through rates of the necessary additional costs. The Companies have estimated the following options and costs for review by the Board in response to Recommendations 7 and 8 (no costs are presently included in the 1993/94 GRA for these options):

(a) A minimum approach would need a sample of 1,000 residential households and 400 commercial operations in order to be statistically significant. The survey would simply indicate appliance saturation rates; in order to determine the energy intensity of each end use, monthly and annual billing information is required for each surveyed customer as well as Conditional Demand Analysis (i.e., an econometric technique which combines the saturation information and the billing or consumption information to determine energy use by appliance). The Conditional Demand Analysis would require an analyst of sound statistical and econometric background. In total, annual costs are estimated for the minimum approach at about $165,000 (roughly evenly divided between the residential and general service samples). In order to achieve useful results and to help track the impact of DSM programs, it might be considered necessary to repeat this work on an annual basis for several years.

(b) A more ideal approach would involve a larger sample (2,000 residential, 500 general service), and supplementing the billing information with a sampling of directly metered customers. Metering costs might involve total capital costs of about $1.0 million for the two sectors. More advanced techniques would be used for analysis (Mixed Frequency Estimation). Annual costs are estimated at about $216,400 plus the capital costs for the meters (about $1.0 million).

(c) An advanced method would involve a large sample (e.g., 4,000 residential, 800 general service), as well as end use meters installed on a selection of appliances to track real time consumption behaviour. Annual costs are estimated at about $284,800 plus the capital costs for the meters (about $3.0 million).

The Companies noted at the Capital Hearing that smaller utilities in California which utilize end-use modelling are able to rely extensively on assistance from the

Northern California Power Agency as well as from the California Energy Commission. The Companies would be concerned about the cost effectiveness for customers of pursuing this type of research in Yukon without extensive assistance from external agencies.

The Companies will continue to explore opportunities to carry out additional research, in combination with the Yukon Government and others, to document current electric heating use characteristics in the WAF system.

Load Forecasts - Hourly WAF Peak Loads in Winter

The Board's **Recommendation 10** proposes that the Companies develop the capability to forecast, up to two years in advance, the hourly loads for the WAF system over the November to April period with and without the Faro Mine in operation and for a range of historical weather conditions. The Board also recommends that the Companies develop a predictive model for the annual peak load for the WAF system.

The Companies currently forecast annual peak load for each system, including the WAF system (see Table 2.3, Vol. 1, 1993/94 GRA). A three month "look ahead" model is also presently used for dispatch purposes. The Companies are investigating the use of the Mulres model using real time data for monthly forecast dispatch scenarios. The ability for hourly forecasting can be reassessed in future as these developments progress; however, the Companies do not believe it is cost effective for such a small hydro system to develop hourly load forecasting capability at this time, given the availability of data and the sensitivity of the system.

The Companies have provided the Board with a detailed review of the methods used to estimate load factors used in the peak load forecast (Capital Hearing transcript, Vol. 12, pages 1439-1443).

Water Management - General

The Companies provided the Board with evidence on present and past policies on hydrological management of YEC's resources as well as on specific top storage or other development options for existing facilities. This evidence included the February 1989 Acres Water Management Study. The Companies indicated that they were continuing to pursue many of the suggestions on water management raised during the Capital Hearing.

The Companies agree with the Board's **Recommendation 20**, and are not pursuing the use of top storage at Marsh Lake.

The Companies agree with the Board's **Recommendation 12** since, as standard practice, all potential sources of capacity from existing systems are identified in the capital planning process. The Companies have also endeavoured to have witnesses available on a timely basis as suggested in the Board's recommendation; an expert witness was available, for example, at the Capital Hearing from Acres International Limited to respond on ice and water management matters. The Companies note, however, that it is extremely expensive to have witnesses available for entire hearings; in addition, it is useful in advance of the hearing to know any witnesses that the Board would like to be present.

In response to the Board's **Recommendation 13**, the Companies critically reviewed the WAF capacity reliability criteria in preparation for the Capital Hearing, and continue such reviews on an ongoing basis. The Companies are aware of customer concerns about reliable service. The Companies are not aware of any evidence that the current reliability criteria for WAF would result in excess capacity when reviewed in the context of capacity reliability criteria currently used by other similar utilities. The current WAF criteria have been developed and modified over the years to reflect this system's specific features, e.g., its largest single hydro unit outage risk during the winter peak (Aishihik 15 MW unit), the relevance of diesel capacity on the system (reserve includes 10% of this capacity), and additional specific features related to dependable flows during winter at Whitehorse Rapids. During 1993, the Companies expect to examine the system load duration as a function of time and assess the present capacity of the system to meet peak hourly loads as well as alternatives such as co-generation and load shedding.

In response to the Board's **Recommendation 14**, the Companies presently maintain a data base of daily inflows to Aishihik Lake and Marsh Lake that dates back prior to 1987, and these data form the basis of the present forecasting ability.

In response to the Board's **Recommendation 15**, data collection platforms are currently operated on Marsh Lake and on Aishihik Lake by Water Survey of Canada. The Companies are not aware of the need to add more stations at this time.

<u>Water Management - Aishihik Lake</u>

The Companies agree with the Board's **Recommendation 17** that the Companies' current practice with respect to the management of Aishihik Lake levels is

acceptable for the interim, until the environmental issues are resolved by the relevant agencies. In addition, in accordance with the Board's **Recommendation 18**, YEC will inform the Board on a timely basis of any changes it proposes (or any changes that regulatory agencies such as YTWB require) to the management of Aishihik Lake, together with supporting rationale and impacts on utility costs and rates, as a result of the reviews with respect to environmental issues.

Water Management - Load Factoring Research

The Board's **Recommendation 11** proposes that the Companies perform various studies and tests to determine the potential to use load factoring to increase capacity relied on at the Whitehorse Rapids Plant.

The Companies outlined work to date, as well as planned ongoing work, on this matter. Ice data, for example, have already been collected for a period of time. The Companies also intend to implement the CEA ice model that is being developed; through Acres International, the Companies have been continuously apprised of the progress in this model's development, including delays due to Federal Government and consultant disagreements. Unfortunately, it is uncertain at present whether or not (let alone when) this model will ever be completed. The Companies, however, do not have the resources or funds to develop such a model on their own.

The Companies are continuing to experiment with load factoring as much as possible. Unfortunately, however, flooding of the Marwell area has occurred frequently when load factoring has been used. Ice stability and flooding must always be considered both upstream and downstream of this dam, as this past winter has again demonstrated.

Cost estimates for Marsh Lake structure automation have not been completed, and will be prepared when the requirements are better defined on the basis of a developed load factoring operating plan.

The Companies reiterate that WAF "firm capacity" at the Whitehorse Rapids Plant is assessed to include 19 MW of dependable capacity plus 5 MW of "other capacity" assumed to be available from these units for 80% or more of the years (and to be capable of import of diesel capacity on a short term rental basis in the remaining 20% of the years). From an overall system planning perspective, enhanced load factoring at Whitehorse Rapids of up to 5 MW, if proved feasible in future, may potentially serve to reduce correspondingly the current 5 MW of "other capacity"; under these

circumstances, no significant capacity planning benefits would occur until the plant's low flow dependable capacity exceeded 24 MW.

Water Management - WAF Economic Dispatch

The Board's **Recommendation 16** proposes that YEC develop the decision support systems to permit the move to complete economic dispatch of WAF system resources by the year 2000. The Board states that YEC should be practical in its approach, and cognizant of the costs to develop the systems.

In response, the Companies are concerned about the potential for considerable complexity and costs with respect to development of the proposed decision support systems. As a practical first step, the Companies suggest that a small group of specialists be commissioned to develop the scope of a cost effective model, to assess the benefits of such an approach, and to advise on the most appropriate course of action. The estimated cost for such a specialist group is $50,000. This cost has not been included in the 1993/94 GRA; however, if approved by the Board, it would be added to the revenue requirement and rates. This preliminary work would ensure a minimization of the costs associated with the actual model design, assuming that it is determined after further review that such a model should be developed.

Demand-Side Management

The Board's **Recommendations 22 through 34** address Demand-Side Management programs and proposals. The Companies review details on these matters in the DSM May 1993 Update, including responses to the following Board recommendations:

- **Recommendation 22:** provide detailed support for their decisions to pursue or not to pursue specific DSM programs, and that they recognize the importance of pursuing DSM activities expeditiously and are considering the potential for lost opportunities

- **Recommendation 23:** develop a full understanding of each of their DSM programs so that they can provide support for the estimated savings in demand and energy to be expected from each program

- **Recommendation 24:** provide an outline of the ex post evaluation steps to be performed on existing and proposed DSM programs, including cost estimates for the evaluations

- **Recommendations 27 and 29:** consider concerns and suggestions, implement programs which will be the most effective for the least cost, and be prepared to provide detailed support for DSM programs in future GRA's

- **Recommendations 28, 30 and 31:** specific proposals on refrigerator programs, energy efficient materials and techniques, weatherization programs, and discouragement of new electric heating.

The Companies initiated DSM activities in Yukon, and have aggressively pursued DSM since the 1991/92 GRA. The Board's **Recommendation 22** supports aggressive DSM activities to the extent it can be demonstrated that the activities result in lower costs to consumers than alternative supply options. The Board has recommended **(Recommendation 25)** the Companies' present use of the RIM test to assess the economic feasibility of DSM programs; the Companies also provide assessments using the TRC test.

The Companies provided the Board and intervenors during the Capital Hearing with a large amount of detailed information on a three phase DSM program, including studies prepared by others on Yukon DSM potentials. The Companies are concerned that the Board is recommending that further detailed information be provided in future GRA's on Phase II and III DSM programs, and that no approvals have been suggested to date of programs proposed for these phases.

The Companies are also concerned by the Board's **Recommendation 26** that an amount ($24,000) already spent on 1991 DSM should be disallowed, apparently on the grounds that an ex post evaluation by the Companies of this program indicated that there were significant installation problems which the Board believes the Companies might have been able to avoid. The Companies note that the 1991 expenditures on power saver cords were part of a development initiative which, in other jurisdictions, would be viewed as a pilot program; furthermore, the program was successfully implemented in a cost effective manner using a design obtained from a successful program in another jurisdiction. One of the purposes of such a program is to identify specific problems, so that improvements can be made; in this instance, the Companies took steps to identify and correct such problems.

The Companies do not agree that DSM programs should be included in rates on the basis of ex post proof of cost effectiveness for each specific program expenditure. This approach is not in accordance with normal principles applicable in Canada for

similar utilities; it is also not consistent, in the Companies' view, with the DSM directions set out in OIC 1991/62.

The Board's **Recommendation 26** also recommends that the YEC Board of Directors provide policy direction on DSM issues, and that senior management take an active role in supervising DSM activities. The Companies have been proceeding on this basis throughout with respect to DSM. YEC's Board of Directors initiated the DSM program, and has continuously provided policy direction and review on DSM issues. Senior management has continuously taken an active role in supervising DSM activities. A senior YECL project coordinator has recently been appointed to direct this important initiative on a full time basis.

The Companies note that the accounting policy for DSM expenditures is addressed in the 1993/94 GRA (**Recommendation 34**).

With respect to the Board's **Recommendation 33**, an interim rate for Curragh has already been approved by the Board; in addition, DSM was an integral part of the previous agreement with Curragh, and the relevant provisions continue to be in effect today.

Supply Options - General

The Board's **Recommendation 36** states that before pursuing construction and feasibility of "large projects", the Companies should give preference to DSM, small utility owned projects and IPP's. The Companies generally agree with this recommendation, provided that preference will only be given to DSM, small utility owned projects and IPP's that are cost effective for consumers. In their submission, the Companies defined "large projects" as options costing in excess of $5 million, and indicated that such projects would only be developed subject to establishment of satisfactory mechanisms to deal with market risks related to Low Load scenarios.

Supply Options - Aishihik #3

The Board's **Recommendation 37** states that the Companies should pursue approval for the construction of Aishihik #3, at the maximum capacity that is economically, technically and environmentally feasible, assess the environmental costs after giving due consideration to the findings of the environmental reviews, and report back to the Board before commencing construction.

The Companies have reported back to the Board on Aishihik #3 in Tab 4, Vol. 1 of the 1993/94 GRA. The Companies do not assess there to be any significant environmental costs associated with the project. The Companies are delaying activity on this project pending confirmation that the Faro Mine will be reopened at normal operating levels for an extended period of time.

Supply Options - Other Utility-Owned Hydro Projects

The Companies agree with the Board's **Recommendation 38** that the Companies should continue to pursue the McIntyre Creek project after the land claim issue is settled, provided that the project remains economically feasible.

The Board's **Recommendation 39** states that the Companies should not pursue any feasibility studies at this time for Drury Creek, Morley River, Lapie River and Orchay River, other than developing a long-term hydrological data base for the above-noted projects by requesting Water Survey of Canada to operate a recording stream gauging station, with no data collection platform, close to the site of each short-listed hydroelectric project. The Companies note the following in response to this recommendation:

(a) No work is being undertaken at this time on the above hydro projects except for hydrological monitoring.

(b) If Water Survey Canada agrees to set up stations at locations selected by the Companies, the cost of the installation and monitoring and maintenance is paid by the Companies. It is not unusual that such arrangements require two to three years lead-time; recent Federal Government cutbacks have added to the problems of this agency. The Companies have had the most success in assisting Water Survey Canada in identifying sites, and then installing them for Water Survey Canada to operate. Record keeping of hydrological records has been initiated on Drury Creek (four to five years of record) and Morley River (four to five years of spot measurements).

(c) The Companies are concerned about the cost-effectiveness of continuing hydrological studies for short-listed hydro sites without also continuing with the engineering and geotechnical studies previously planned to provide overall assessment of feasibility for each site. The lead time to develop such sites is typically affected by a matrix of engineering, geotechnical and environmental study considerations; the hydrological data base for these

four projects, however, is adequate at the present time for the purpose of screening (see Druce evidence at Capital Hearing). Based on these considerations, it is not apparent how the hydrological studies recommended by the Board will significantly enhance either the timing or feasibility assessment of the four noted projects.

The Companies do not agree with the Board's **Recommendation 40** that the operation of the Moon Lake stream gauging station and data collection platform should be discontinued. This station and platform provide useful information at minimal cost on water flows and levels that could impact the Whitehorse Rapids Plant operation (Moon Lake is an important tributary to the Yukon River water basin).

Supply Options - Other Utility Projects

The Companies agree with the Board's **Recommendation 41** that funds expended to study coal-fired generation should be limited to a review of coal technology, particularly with respect to plants having capacity under 20 MW, and monitoring improvements in future technology that may make such projects more viable in Yukon.

The Companies agree with the portion of the Board's **Recommendation 42** stating that no further studies be performed on the Mayo-Dawson transmission projects unless demand changes sufficiently to warrant a further review of the project. The Board, however, proposed also in this recommendation that the Government take steps to encourage IPP's to provide proposals on the feasibility of small scale hydro development at North Fork to replace diesel generation at Dawson. Based on numerous previous studies of North Fork hydro options, the Companies believe that any ratepayer benefit potential from North Fork projects is dependent on higher levels of demand and/or diesel fuel prices. The Companies also recommend that, when conditions become appropriate, any such small scale development at North Fork should continue to be pursued by the utilities as well as any interested IPP's in order to protect the ratepayers' interest in securing the lowest cost impact on overall utility costs.

The Companies agree with the Board's **Recommendation 43** stating that research and development work should continue to be pursued with respect to wind generation. The 1993/94 GRA includes the purchase and installation of a 150 kW wind turbine on Haeckel Hill to assess operation in the Yukon.

The Companies agree with the Board's **Recommendation 44** to pursue the City of Whitehorse's recommendations with respect to transformer purchase policy. The

1993 transformer requirements are being tendered using a new "loss evaluation" formula that takes into account the marginal cost of energy and demand in the Yukon.

Independent Power Producers

The Companies agree with the Board's **Recommendation 45** that IPP's should be encouraged in Yukon, provided that there are no negative rate impacts to consumers.

The Companies have stated that the appropriate method for evaluating IPP's involves the use of long run avoided costs and not embedded costs in order to establish the maximum rate that ratepayers could reasonably consider for such a project. The Board reflects this perspective in its **Recommendation 46**. The Companies, however, also reiterate the need for fair treatment of all supply and demand options in order to ensure the lowest possible rate impacts on consumers. The McIntyre 3 project, for example, is a small scale project similar in size to an IPP project; however, it is unlikely that the Companies would be permitted to develop McIntyre 3 (or any other similar project) on the basis that ratepayers would guarantee to pay for the power based on today's long run marginal avoided diesel costs plus escalations.

During the Capital Hearing, the Companies and other parties were eager to have the participation of the Board in mediating and facilitating a process outside the parameters of the hearing in order to address and resolve various significant issues related to IPP development. It was acknowledged that this process may require policy directions from Yukon Government. The Companies looked forward to proceeding with such a process as soon as possible after the Board's report had been submitted. The Companies, however, did not anticipate that the Board would recommend (**Recommendation 47**) that it be directed by the Minister to hold a hearing with respect to IPP policy and to develop a firm IPP policy for Yukon. The Companies are concerned that the Capital Hearing has demonstrated that a different approach, involving mediation and discussion, is required for cost effective resolution of the major IPP policy issues. To date, further progress on this matter is in abeyance pending a response to the Board's recommendation and the establishment of an effective process, as previously contemplated.

Other Issues

The Companies note that the Board's **Recommendation 48** states that the $333,000 of costs incurred to improve the Mayo-Elsa transmission line should be put into rate base at the next GRA. These costs are included in rate base for the 1993/94 GRA.

The Board also stated that it considers YEC's contribution policy to be appropriate at this time.

REFERENCE: General

QUESTION:

Please provide a copy of the following:

Order-in-Council 1995/90 governing the requirement for industrial customers to pay the full cost to serve them and any new customers also required to pay all cost to connect the existing grid to their site (including any new transmission lines or new energy supply options) such that existing customers are not adversely impacted by the new customer;

Please give Yukon Energy's interpretation of this OIC.

ANSWER:

See UCG-YEC-2-2 Attachment 1.

The summary of OIC 1995/90 provided in the question is not correct – the OIC only addresses the requirement for major industrial customers as a class to pay at least the full cost of service. It does not specifically address "costs to connect the existing grid to their site"[1] or the new energy supply options that may be linked to a specific new customers.

Interpretation is a legal question. Yukon Energy's application of this part of the OIC reflects that OIC 1995/90 in respect of industrial rates is simply a continuation of provisions set out as far back as OIC 1991/62. Yukon Energy practice with respect to implementing the OIC in respect of industrial rates is reflected in the extensive materials reviewed at both the 1992 Cost of Service proceeding (a special hearing in Yukon to address all matters related to cost of service) as well as the 1996/97 GRA which set new rates for industrial service to the Faro mine pursuant to OIC 1995/90. The OIC requires that a single Cost- of-Service (COS) study be prepared for the entire Yukon (at least at the bulk power level) and that industrial customer rates be set so as to be no lower than 100% cost of service (i.e., 1.00 Revenue:Cost ratio) assessed for Yukon as a single rate zone and considering all relevant costs for both YEC and YECL. As reviewed in detail at the 2005 Yukon Energy Required Revenues and Related Matters Application, no current

[1] The utility framework for costs to connect the existing systems to the industrial customers' site is based on normal utility principles, and on the terms for utility extensions pursuant to the Yukon Electrical Service Regulations governing service from YEC and YECL's systems.

cost of service study has been prepared for Yukon since the 1996/97 GRA, and no new industrial customers have connected to the system. For this reason, the firm industrial rate in Yukon remains interim and refundable (since Board Order 1998-5) and is expected to be finalized and confirmed for new industrial customers only after a full COS study is performed for the Yukon as a whole, and that a new rate based on this COS study is reviewed and approved by the Board.

YUKON TERRITORY

CANADA

Whitehorse, Yukon

ORDER-IN-COUNCIL 1995/ 90

PUBLIC UTILITIES ACT

Pursuant to sections 17 and 18 of the *Public Utilities Act*, the Commissioner in Executive Council orders as follows:

1. Order-in-Council 1991/062 is hereby revoked.

2. The annexed Rate Policy Directive (1995) is hereby made.

Dated at Whitehorse, in the Yukon Territory, this 29 day of May , 1995.

TERRITOIRE DU YUKON

CANADA

Whitehorse, Yukon

DÉCRET 1995/90

LOI SUR LES SERVICES PUBLICS

Le Commissaire en conseil exécutif, conformément aux articles 17 et 18 de la *Loi sur les services publics*, décrète ce qui suit :

1. Le décret 1991/062 est, par les présentes, abrogé.

2. Les instructions sur la politique tarifaire (1995), paraissant en annexe, sont par les présentes adoptées.

Fait à Whitehorse, dans le territoire du Yukon, ce 29 mai 1995.

Commissioner of the Yukon/Commissaire du Yukon

95 05 26

95 05 26

RATE POLICY DIRECTIVE (1995)

Interpretation

1. In this Directive

"customer" refers to a purchaser of electricity; «client»

"government customer" means a retail customer

(a) who is a federal or territorial department or agency;

(b) a body, other than one carrying on a business with a view to making a profit, that derives all or substantially all of its funding from a body referred to in paragraph (a); «client gouvernemental»

"isolated industrial customer" means a customer engaged in manufacturing, processing, or mining and whose electrical service is not inter-connected with electrical service provided to any other customer; «client industriel isolé»

"major industrial customer" means a customer engaged in manufacturing, processing, or mining, whose peak demand for electricity exceeds 1 MW, but it does not include an isolated industrial customer; «client industriel majeur»

"province" has the same meaning as in the *Interpretation Act*; «province»

"retail customer" means a customer of Yukon Energy Corporation or of The Yukon Electrical Company Limited, other than a major indus-

INSTRUCTIONS SUR LA POLITIQUE TARIFAIRE (1995)

Définitions

1. Les définitions qui suivent s'appliquent aux présentes instructions :

«client» Acheteur d'électricité; "client"

«client au détail» Client de la Société d'énergie du Yukon ou de la Yukon Electrical Company Limited qui n'est ni un client industriel majeur, ni un client industriel isolé, ni un client en gros; "retail Customer"

«client en gros» La Yukon Electrical Company Limited lorsqu'elle achète de l'énergie de la Société d'énergie du Yukon; "wholesale customer"

«client gouvernemental» Client au détail qui est:

a) soit un organisme gouvernemental, un ministère fédéral ou territorial;

b) soit un organisme qui n'exploite aucune entreprise à des fins lucratives et dont le financement provient en totalité, ou pour l'essentiel, d'un organisme décrit à l'alinéa a); "government customer"

«client industriel isolé» Client qui se livre à une activité de fabrication, de traitement ou à l'exploitation d'une mine et dont l'approvisionnement en électricité est indépendant de celui de tout autre client; "isolated industrial customer"

trial customer, an isolated industrial customer, or a wholesale customer; «client au détail»

"wholesale customer" means the Yukon Electrical Company Limited when it purchases electricity from Yukon Energy Corporation. «client en gros»

«client industriel majeur» Client autre qu'un client industriel isolé qui se livre à une activité de fabrication, de traitement ou à l'exploitation d'une mine et dont la demande de pointe d'électricité dépasse 1 MW. "major industrial customer"

«province» S'entend d'une province au sens de la *Loi d'interprétation*. "province"

Normal return on equity

2. The Board must include in the rates of Yukon Energy Corporation provision to recover a normal commercial return on Yukon Energy Corporation's equity, less one-half of one percent (.5%).

Rendement normal sur la valeur nette

2. La Commission prévoit dans les tarifs de la Société d'énergie du Yukon les mesures pour réaliser un rendement commercial normal sur sa valeur nette, moins 5 dixièmes pour cent (,5 %).

Normal principles to apply

3. Except to the extent otherwise stated by this Directive or the *Act*, the Board must review and approve rates in accordance with principles established in Canada for utilities, including those principles established by regulatory authorities of the Government of Canada or of a province regulating hydro and non-hydro electric utilities.

Application des principes normaux

3. Sauf indication contraire dans les présentes instructions ou dans la loi, la Commission examine et approuve les tarifs aux clients selon les principes établis au Canada pour des services publics, y compris les principes établis par les organismes régulateurs des gouvernements fédéral et provinciaux réglementant les entreprises de services publics, que ces derniers soient reliés à l'électricité ou pas.

Retail rates: non-government customers

4.(1) The Board must fix rates for retail customers, other than government customers, in accordance with the following rate policy for Yukon,

(a) the rates for non-government retail customers must be sufficient to recover

Tarifs au détail pour les clients non-gouvernementaux

4.(1) La Commission fixe les tarifs pour les clients au détail non-gouvernementaux selon la politique tarifaire suivante pour le Yukon :

a) les tarifs pour les clients non-gouvernementaux doivent suffire à

costs that are not to be recovered from government customers or from major industrial customers;

(b) rates for each class of non-governmental retail customer must be the same throughout the Yukon without variation between Yukon Energy Corporation and The Yukon Electrical Company Limited customers;

(2) The Board must fix a runoff rate block for each non-government retail customer class applicable to all consumption by each customer of the class in excess of a specified consumption level per billing period, and such specified consumption level per customer is not to be less than 1,000 kWh for residential non-government retail customers and 2,000 kWh for general service non-government retail customers.

(3) The Board must fix runoff rates for each non-government retail customer class on the basis of rate design principles to promote economy and efficiency, and separate runoff rates may be allowed in this regard for customers in different communities or rate zones, provided that such runoff rates for customers in each non-government retail customer class are fixed for each community or rate zone throughout Yukon in accordance with the same rate design principles.

générer les recettes nécessaires afin de recouvrer les coûts, lesquels ne doivent pas être récupérés des clients gouvernementaux ou des clients industriels majeurs;

b) les tarifs pour chaque catégorie de clients au détail non-gouvernementaux s'appliquent uniformément à la grandeur du Yukon et sans distinction entre la Société d'énergie du Yukon et la Yukon Electrical Company Limited.

(2) La Commission doit déterminer une série de primes de dépassement pour chaque catégorie visée de clients au détail non-gouvernementaux, lesquelles s'appliquent à la consommation de chaque client qui excède un niveau de consommation déterminée, au cours d'une période de facturation et un tel niveau de consommation déterminé par client ne peut s'appliquer qu'à la consommation atteignant 1 000 kWh ou plus pour la catégorie résidentielle de clients au détail non-gouvernementaux et de 2 000 kWh pour la catégorie de services généraux de clients au détail non-gouvernementaux.

(3) La Commission doit déterminer des primes de dépassement pour chaque catégorie de clients au détail non-gouvernementaux sur la base de principes pour l'élaboration des taux afin de favoriser l'efficacité et l'économie et, dans cette optique, des primes de dépassement peuvent être permises à l'intention de clients demeurant dans différentes communautés ou dans des zones où les taux diffèrent, en autant que ces primes de dépassement dans chaque catégo-

rie de clients au détail non-gouvernementaux soient les mêmes pour chaque communauté ou chaque zone tarifaire à travers le Yukon, conformément aux principes pour l'élaboration des tarifs.

Retail rates: government customers

5.(1) The Board must fix rates for government customers in accordance with the following power rate policy for Yukon

(a) rates for government customers may be adjusted so as to simplify the rate structure and make the rates more consistent throughout Yukon;

(b) the rate for government customers in a community may not be lower than the rate for similar service to non-government retail customers in that community.

Tarifs au détail pour les clients gouvernementaux

5.(1) La Commission fixe les tarifs pour les clients gouvernementaux selon la politique tarifaire énergétique du Yukon qui suit :

a) les tarifs pour les clients gouvernementaux peuvent être ajustés aux fins de simplifier la structure tarifaire et d'uniformiser les tarifs à la grandeur du Yukon;

b) le tarif pour les clients gouvernementaux dans une agglomération ne peut être moindre que le tarif pour un service semblable pour les clients au détail non-gouvernementaux dans cette agglomération.

(2) Upon application of Yukon Energy Corporation, The Yukon Electrical Company Limited, or a customer, the Board must determine whether a customer is or is not a government customer.

(2) À la demande de la Société d'énergie du Yukon ou de la Yukon Electrical Company Limited, ou d'un client, la Commission prend une décision sur le statut de client gouvernemental d'un client.

Rates - major and isolated industrial customers

6.(1) The Board must ensure that the rates charged to major industrial power customers, whether pursuant to contracts or otherwise, are sufficient to recover the costs of service to that customer class; those costs must be determined

Tarifs pour les clients industriels majeurs et isolés

6.(1) La Commission doit s'assurer que les tarifs facturés aux clients industriels majeurs, en vertu d'un contrat ou autrement, suffisent à recouvrer les coûts du service pour cette catégorie de clients. Ces coûts

by treating the whole Yukon as a single rate zone and the rates charged by both utilities must be the same.

(2) Rates of isolated industrial customers served by Yukon Energy Corporation or The Yukon Electrical Company Limited must conform with any contract between the customer and Yukon Energy Corporation or The Yukon Electrical Company Limited and the costs and revenues related to those contracts may not be considered by the Board when establishing rates for other customers.

Wholesale rates

7. The Board must fix rates of Yukon Energy Corporation for the wholesale power customer in accordance with the following rate policy for Yukon:

(a) Yukon Energy Corporation shall sell electricity to The Yukon Electrical Company Limited at the same demand rate and the same energy rate throughout the Yukon and those rates must be sufficient to enable Yukon Energy Corporation to recover its costs that are not recovered from its other customers;

(b) the wholesale rate to The Yukon Electrical Company Limited shall include appropriate provisions to ensure that Yukon Energy Corporation will recover its costs for retail and major industrial power service with adoption of the rates for retail power customers and major industrial power customers as specified herein.

sont déterminés en considérant tout le Yukon comme une zone tarifaire unique et les tarifs facturés par les deux services publics doivent être les mêmes.

(2) Les tarifs s'appliquant aux clients industriels et isolés desservis par la Société d'énergie du Yukon ou la Yukon Electrical Company Limited doivent être conformes à tout contrat entre le client et ces sociétés; les coûts et les revenus reliés à ces contrats ne peuvent être considérés par la Commission lorsqu'elle établit les tarifs pour d'autres clients.

Tarifs de gros

7. La Commission doit déterminer les tarifs facturés par la Société d'énergie du Yukon au client en gros selon la politique tarifaire du Yukon qui suit :

a) la Société d'énergie du Yukon vend de l'électricité à la Yukon Electrical Company Limited au même tarif de demande et au même tarif d'énergie à la grandeur du Yukon et ces tarifs doivent suffire à la Société d'énergie du Yukon pour recouvrer les coûts qui ne sont pas recouverts de ses autres clients;

b) le tarif de gros facturé à la Yukon Electrical Company Limited comprend les mesures appropriées pour permettre à la Société d'énergie du Yukon de recouvrer ses coûts de service au détail et ses coûts de service aux clients industriels majeurs au moyen de tarifs qui s'appliquent à ces services en vertu des présentes.

Fuel Price adjustment

8. The Board must permit Yukon Energy Corporation and The Yukon Electrical Company Limited to adjust their rates to retail customers, major industrial customers, and isolated industrial customers so as to reflect fluctuations in the prices for which the two utilities pay for diesel fuel, without the requirement for specific application to and approval of the Board.

Ajustement du prix du combustible

8. La Commission permet à la Société d'énergie du Yukon et à la Yukon Electrical Company Limited d'ajuster les tarifs facturés aux clients au détail, aux clients industriels majeurs et aux clients industriels isolés de manière à refléter les fluctuations des prix payés pour le mazout par ces deux sociétés, sans avoir à faire une demande particulière à la Commission pour obtenir son autorisation.

REFERENCE: General

QUESTION:

Please provide a copy of the following:

The cost allocation and rate design model that will be used to determine costs to serve these new industrial customers including:

i. the cost per kilowatt-hour to serve Sherwood Copper
ii. the cost per kilowatt-hour to serve Carmacks Copper
iii. the cost per kilowatt-hour to serve each of the other rate groups after each new customer has been added to the system.

ANSWER:

See UCG-YEC-2-2 as to previous review by the Board of the cost allocation and rate design "model" to determine costs to serve the major Industrial customer class. Specific costs for any new customer cannot be determined by YEC at this time.

REFERENCE: General

QUESTION:

Please provide a copy of the following:

Aishihik Water License as well as details of the costs incurred to procure this license (including internal costs and overhead) and an explanation of how Yukon Energy has accounted for these costs within its revenue requirement.

ANSWER:

A copy of the water license #HY99-011 is attached (UCG-YEC-2-4 Attachment 1). The costs incurred to procure this license were reviewed as part of the 2005 Revenue Requirement hearing (see table 3.1, page 3-3 of the application for a description of the treatment of water license costs in revenue requirement).

YUKON TERRITORY WATER BOARD

Pursuant to the *Yukon Waters Act* and *Regulations*, the Yukon Territory Water Board, hereinafter referred to as the Board, hereby grants to

Yukon Energy Corporation
P.O. Box 5920
Whitehorse, Yukon Y1A 6S7

hereinafter called the Licensee, the right to divert, store, alter or otherwise use water subject to the restrictions and conditions contained in the *Yukon Waters Act* and *Regulations* made thereunder and subject to and in accordance with the conditions specified in this licence:

Licence Number: HY99-011 Water Management Area: 03 Alsek

Licence Type: A Nature of Undertaking: Power, Class 4

Location: Aishihik Lake, Sekulmun River, Canyon Lake and East Aishihik River and West Aishihik River.

Tributary of: Dezadeash River

Latitude: 61° 38' (max) Longitude: 137° 34' (max)
Latitude: 61° 02' (min) Longitude: 136° 58' (min)

Purpose: To divert water, store and alter a flow of water and to carry out shoreline works for a Power Undertaking.

Effective Date of Licence: November 30, 2002

Expiry Date of Licence: December 31, 2019

This licence is a renewal of water use licence Y3L5-0307, and all amendments thereto.

PART A - GENERAL CONDITIONS

1. Definitions

a) "*Act*" means the *Yukon Waters Act* and any amendments thereto.

b) "Application" collectively means Water Use Application HY99-011 and any additional submissions and/or revisions submitted to the Board by the Licensee up to the date of the Board's decision to issue this licence.

c) "Board" means the Yukon Territory Water Board.

d) "Dam Safety Guidelines" means the Dam Safety Guidelines issued by the Canadian Dam Association (1999) or its most recent revision.

e) "Deleterious Substance" means deleterious substance as defined in Section 34(1) of the *Fisheries Act*.

f) "Draft Fisheries Authorization" means the document that was accepted as exhibit 13.5.2 to water use register HY99-011 on May 4, 2002.

g) "Fisheries Authorization" means an authorization issued pursuant to Section 35(2) of the *Fisheries Act*.

h) "Generating Station" means that part of the facility containing generators and located underground, as described in exhibit 1.7 of the Application, and also known as the powerhouse.

i) "Inspector" means any person designated as an inspector under the *Act*.

j) "*Regulations*" means the *Yukon Waters Regulations*

k) "Waste" means any substance defined in Section 2 of the *Act*.

Representations, Warranties and Undertakings

2. The Board has relied on the representations, warranties and undertakings provided by the Licensee in the material filed in the Application. Such representations, warranties and undertakings are considered by the Board to be a part of the licence, but shall be subject to, and may be modified by, the conditions of the licence.

3. Where there is a discrepancy between the Application and the conditions of this licence, the conditions of this licence shall prevail.

4. If, subsequent to the issuing of this licence, the Licensee uses water and/or deposits waste in one or more ways not authorized in this licence, and the combined effect of those uses and/or deposits of wastes, as determined by an Inspector:

   a) has no potential for significant adverse environmental effects;
   b) does not interfere with existing rights of other water users or waste depositors; and
   c) satisfies the criteria set out in column II of Schedule IX of the *Regulations*,

   no amendment to this licence will be required for that use of water and/or deposit of waste.

Other Laws

5. No condition of this licence limits the application of any other federal, territorial, first nation or municipal legislation.

Correspondence

6. Where any direction, notice, order, or report under this licence is required to be in writing, it shall be given:

   a) To the Licensee, if delivered, faxed or mailed by registered mail to the following address:

      Yukon Energy Corporation
      P.O. Box 5920
      Whitehorse, Yukon Y1A 6S7
      Fax: (867) 393-5323

      and shall be deemed to have been given to the Licensee on the day it was delivered or faxed, or seven (7) days after the day it was mailed, as the case may be.

   b) To the Board, if delivered, faxed or sent by registered mail to the following address:

      Yukon Territory Water Board
      Suite 106, 419 Range Road
      Whitehorse, Yukon Y1A 3V1
      Fax: (867) 668-3628

      and shall be deemed to have been given to the Board on the day it was delivered or faxed, or seven days after the day it was mailed, as the case may be.

Non-Compliance

7. In the event that the Licensee fails to comply with any condition of this licence, the Board may, with the approval of the Minister and subject to the *Act*, cancel the licence.

Deleterious Substances

8. Subject to the conditions of this licence, deleterious substances shall be used, transported, stored and disposed of in such a manner that they are not deposited in, or allowed to be deposited in, any waters.

Term of Licence

9. The term of this licence is from the Effective Date to December 31, 2019.

Reports

10. All monitoring data and reports shall be submitted to the Board in an unbound printed form that is reproducible by standard photocopier and shall be accompanied by five copies.

11. All monitoring data and reports shall also be submitted in digital form on diskette using an IBM compatible format that is readable using commonly available software, or by e-mail.

Quarterly Reports

12. Quarterly reports shall be submitted to the Board by the Licensee. The reports shall cover the periods ending March 31, June 30, September 30 and December 31 of each year and shall be submitted to the Board within 30 days of the end of each reporting period.

13. Quarterly reports shall include, but not necessarily be limited to:

    a) mean daily water levels on Aishihik (Water Survey of Canada Stations Nos. 08AA005 and 08AA012), Sekulmun (Water Survey of Canada Station No. 08AA007) and Canyon Lakes (Yukon Energy Corporation's Benchmark #2 located on the top of the concrete sill of the Canyon Lake Control Structure at elevation 907.423 metres);

    b) mean daily flows in the East Aishihik River below Aishihik Lake (Water Survey of Canada Station No. 08AA010).

    c) mean daily flows in Giltana Creek near the mouth (Water Survey of Canada Station No. 08AA009);

    d) mean daily flows through the Canyon Lake Control Structure;

    e) mean daily flows through the Aishihik Generating Station;

    f) any other quarterly information or reports required by this licence.

Annual Reports

14. Annual reports shall be submitted to the Board by the Licensee. The reports shall cover the period from January 1 to December 31 of each year and shall be submitted to the Board on or before May 1 of the following year.

15. Annual reports shall include the information required by this licence and by the *Regulations*, including, but not necessarily limited to:

a) monthly maximum, minimum and mean water levels on Aishihik (Water Survey of Canada Stations Nos. 08AA005 and 08AA012), Sekulmun (Water Survey of Canada Station No. 08AA007) and Canyon Lakes (Yukon Energy Corporation's Benchmark #2 located on the top of the concrete sill of the Canyon Lake Control Structure at elevation 907.423 metres);

b) monthly maximum, minimum and mean flows in the East Aishihik River below Aishihik Lake (Water Survey of Canada Station No. 08AA010);

c) monthly maximum, minimum and mean flows in Giltana Creek near the mouth (Water Survey of Canada Station No. 08AA009);

d) monthly maximum, minimum and mean flows through the Canyon Lake Control Structure;

e) monthly maximum, minimum, mean and total flows through the Aishihik Generating Station;

f) an annual energy demand and power generating forecast for the Aishihik Generating Station;

g) an annual forecast of the level of Aishihik Lake, based on available snowcourse information, precipitation data, historical data and the generating forecast for the Aishihik Generating Station;

h) information regarding the purpose, nature and extent of any maintenance work carried out to keep the works in good order in accordance with sound engineering and environmental practices;

i) an identification of any recommendations from the annual physical monitoring inspections or the most recent five year dam safety review that were either not implemented or that did not comply with a schedule proposed in an inspection or dam safety review report, and an explanation of why any recommendation was not implemented;

j) a description of work undertaken during the preceding year and work planned to be undertaken during the upcoming year to develop and implement a community based monitoring program to monitor the ongoing environmental and socio-economic effects of the undertaking on traditional users, including applicable components of the Lake Whitefish Monitoring Program; and

k) any other information or reports required by this licence or the *Regulations*.

Spills and Unauthorized Discharges

16. The Licensee shall keep the spill contingency plan current. Any revisions to the plan shall be delivered to the Board within ten days of the revision.

17. The Licensee shall immediately contact the 24-hour Yukon Spill Report telephone number (867) 667-7244 and implement the most recent spill contingency plan that has been filed with the Board, should a spill or an unauthorized discharge occur. A detailed written report on any such event, including but not limited to, dates, quantities, parameters, causes and other relevant details and explanations, shall be delivered to the Board not later than ten days after its occurrence.

Hazardous Materials Storage

18. A complete inventory of chemicals, fuels, oils, lubricants and other hazardous materials, and their locations, shall be maintained by the Licensee.

19. Except at the Generating Station, construction equipment and materials shall be stored a minimum of thirty metres from any watercourse. Except at the Generating Station, fuel, lubricants, hydraulic fluids and coolants shall be stored or transferred a minimum of thirty metres from any watercourse.

PART B - COMPENSATION

20. The Licensee shall provide compensation to the Champagne and Aishihik First Nations, in the total amount of two hundred and seventy thousand dollars ($270,000.00).

21. The schedule and purpose of payment of the compensation to the Champagne and Aishihik First Nations shall be as follows:

    a) Twenty thousand dollars ($20,000.00) within sixty days of the Effective Date of this licence, and an additional twenty thousand dollars ($20,000.00) on each anniversary of the Effective Date commencing in 2003 and continuing until 2011, for a total amount of two hundred thousand dollars ($200,000.00), for the purpose of constructing and maintaining a heritage camp; and

    b) Five thousand dollars ($5,000.00) within sixty days of the Effective Date of this licence, and an additional five thousand dollars ($5,000.00) on each anniversary date of the Effective Date, commencing in 2003 and continuing until 2011, for a total amount of fifty thousand dollars ($50,000.00), for the purpose of conducting programs at a heritage camp; and

    c) Twenty thousand dollars ($20,000.00) within sixty days of the Effective Date of this licence, for the purpose of providing drinking water at Aishihik Village.

22. The Licensee shall provide compensation to the following individuals in the following amounts, within sixty days of the Effective Date of this Licence.

NAME	AMOUNT
Allen, Chris	$ 1,004.25
Blanchard, Michelle	$ 1,004.25
Brown, Frieda Salina	$ 2,008.50
Brown, Karrie Ann	$ 3,012.75
Brown, Kathleen M	$ 2,008.50
Brown, Fred Jr.	$ 2,008.50
Brown, Shanita	$ 1,004.25
Brown, Brittney	$ 1,004.25
Brown, Mathew	$ 1,004.25
Kushniruk, Rosemarie	$ 3,012.75
Kushniruk, Jonnie-Lyn	$ 1,004.25
O'Brien, Joanne	$ 1,004.25
Green, Sophie	$ 1,004.25
Green, Angelica	$ 1,004.25
Patchet, Amanda	$ 1,004.25
Patchet, Natalee	$ 1,004.25
Green, Thearon Isaac	$ 1,004.25
Green, Bruce	$ 1,004.25
Green, Michael	$ 2,008.50
Green, Shayla	$ 1,004.25
Gleason, Ryan	$ 1,004.25
Gleason, Chris	$ 1,004.25
Green, Victor	$ 1,004.25
Green, Tyrel	$ 1,004.25
Green, Kelsey	$ 1,004.25
MacDonald, Delmer	$ 2,008.50
MacDonald, Amy	$ 1,004.25
MacDonald, Mariah Caroline	$ 1,004.25
Smith, Dallayce	$ 1,004.25
Smith, Dayna	$ 1,004.25
Smith, Derrick	$ 1,004.25
Smith, Kara	$ 1,004.25
Smith-Tutin, Marlene	$ 2,008.50
Smith-Tutin, Chase	$ 1,004.25
Stick, Fred	$ 1,004.25
Total	$45,191.25

23. Where compensation is payable to a minor, the Licensee may provide payment to a parent, legal guardian or authorized representative of that minor.

PART C - OPERATING CONDITIONS

Water Use

24. Subject to the conditions of this licence, the Licensee is hereby authorised to:

    a) store the flow of the East Aishihik River, except for minimum flows specified in this licence, in Aishihik and Canyon Lakes for the purposes of a power undertaking, and

    b) divert the flow of the East Aishihik River, except for minimum flows specified in this licence, through the Aishihik Generating Station for the purposes of a power undertaking, and

    c) modify the bed and banks of Sekulmun River for the purpose of maintaining a weir

    all as described in the Application and subject to the conditions of this licence.

25. a) A minimum flow shall be maintained over Otter Falls in accordance with the following schedule:

Period	Minimum Flow
May 1 to 18, inclusive	0.425 m^3/s
May 19 to September 7, inclusive	0.708 m^3/s
September 8 to 21, inclusive	0.425 m^3/s
September 22 to April 30, inclusive	0.142 m^3/s

    b) During the period of May 1 to May 18 of any year, the minimum flow over Otter Falls shall be increased gradually to 0.708 m^3/s. If, during that period, a minimum flow cannot be achieved because of ice conditions, then the average minimum flow shall be at least 0.425 m^3/s.

Aishihik Lake

26. The mean daily water surface elevation on Aishihik Lake shall be maintained between a controlled minimum of 913.0 metres and a controlled maximum of 915.16 metres (Water Survey of Canada datum 08AA005), subject to the following requirements:

    a) The minimum of the mean daily water surface elevation on Aishihik Lake, during any calendar year, may be below 913.7 metres only twice in any five year period. During those two years, there is no restriction on the time that the water level may be below 913.7 metres or the number of times that the level may be lowered below 913.7 metres.

b) Paragraph 26 a) does not apply where the provisions of a Fisheries Authorization are in place, including all of the provisions contained in the Draft Fisheries Authorization.

c) The mean daily water surface elevation on Aishihik Lake shall not be below 914.0 metres (Water Survey of Canada datum 08AA005) after April 30, 2005 until boat access to the lake has been provided for Aishihik Village for all lake levels within the licenced range. The Licensee shall report on progress towards development of this access in the annual report.

d) The level of Aishihik Lake shall not be above 914.86 metres (Water Survey of Canada datum 08AA005) until physical berms and erosion stabilization structures are constructed to protect sites JjVi-07, JjVi-01, JjVi-30, and Aishihik Village Grave Sites #2, as identified in exhibit 1.8.7 of the Application.

Canyon Lake

27. The mean daily water surface elevation on Canyon Lake shall be maintained between a controlled minimum of 905.87 metres and a controlled maximum of 907.42 metres as measured from Yukon Energy Corporation's Benchmark #2 located on the top of the concrete sill of the Canyon Lake Control Structure at elevation 907.423 metres.

28. All outlet gates in the Canyon Lake Control Structure shall be in the fully open position whenever the water surface elevation on Canyon Lake reaches 907.42 metres.

Canyon River and Canyon Pond

29. The minimum flow release from Aishihik Lake is to be no less than 4.64 m^3/s. The minimum flow downstream of Canyon Pond is to be no less than 9.29 m^3/s, including Giltana Creek flows.

PART D - DESIGN, CONSTRUCTION AND MAINTENANCE

30. During the term of this licence, the Licensee shall maintain all works in good order in accordance with sound engineering and environmental practices.

31. At least ten days prior to the proposed date of commencement of construction of any structure or facility, the Licensee shall submit to the Board a written notification, together with a detailed construction schedule and the name and contact number(s) of the construction superintendent.

32. During construction, where site conditions require minor design modifications to a structure or facility authorized by this licence, the Licensee shall notify the Board, in advance of implementation, of the details of any modifications or variations from final detailed designs, specifications and quality assurance/quality control procedures previously submitted to the Board. The notice shall include an explanation of the reasons for the change and an assessment of the potential impact on the performance of the structure. The notice shall be sealed by a Professional Engineer licenced to practice in Yukon.

33. As-constructed (record) drawings and construction reports for all structures and facilities shall be submitted to the Board within ninety days of the completion of construction. Each submission shall be sealed by a Professional Engineer licenced to practice in Yukon.

34. No later than December 31, 2003, the Licensee shall carry out repairs to the stop-logs in the spillway overflow structure adjacent to the Aishihik Lake Control Structure to ensure that the stop-logs are in an operable condition.

35. No later than December 31, 2003, the Licensee shall submit to the Board detailed design construction drawings and specifications for modifications to the earth-fill structures adjacent to the Aishihik Lake Control Structure to prevent overtopping during a Probable Maximum Flood event. The modifications shall be completed by December 31, 2004.

36. The Licensee shall carry out and complete a data collection program and stability analysis for the Aishihik Power Canal in accordance with the Dam Safety Guidelines. The results of the analysis, together with recommendations and an implementation plan for any modifications required to conform with the Guidelines, shall be submitted to the Board no later than December 31, 2003. The Licensee shall carry out the implementation plan according to the schedule submitted with the plan.

37. The Licensee shall maintain public safety measures, including but not limited to warning signs, booms, or grablines, at the Aishihik Lake Control Structure, the Canyon Lake Control Structure, in the power canal at the pressure tunnel intake, and at the tailrace during each open water season. A report on the safety measures implemented shall be submitted to the Board no later than 10 days after the start of the open water season each year. Any changes to the safety measures implemented shall be submitted to the Board within ten days.

38. No later than September 30, 2003, the Licensee shall install signage at all public vehicular access points to Canyon Lake warning of unpredictable ice conditions, and shall maintain these signs for the duration of the licence.

Third Turbine

39. Subject to the conditions of this licence, the Licensee is hereby authorised to install a third turbine and associated appurtenances with a maximum generating capacity of 7 MW.

40. The Licensee shall submit to the Board a plan that describes the operating protocols for the third turbine. Until the plan has been submitted to the Board, and the Board has instructed the Licensee to implement the plan, the Licensee shall not operate more than two turbines at any one time. The Licensee must operate the third turbine in compliance with the plan.

Submissions

41. The Licensee shall submit to the Board final detailed design construction drawings, specifications, quality assurance/quality control procedures and/or operating procedures for the construction of any facilities or structures authorized by this licence, but shall not begin construction until such time as the Board has notified the Licensee to proceed. These facilities and structures shall include but not be limited to:

    a) modifications to the earth-fill structures adjacent to the Aishihik Lake Control Structure; and

    b) the third turbine and associated appurtenances.

42. As a part of the design submission for the third turbine, the Licensee shall submit a assessment of the acid rock drainage potential of material to be excavated as part of the construction of the turbine and related appurtenances, together with a plan for the handling and disposal of any rock identified as having an acid rock drainage potential.

Heritage Mitigation Plan

43. The Licensee shall, by March 1, 2005, submit a plan to carry out the projects described in the Heritage Mitigation Plan, dated February 18, 2000 and the addendum dated June 15, 2001, that was submitted as exhibit 2.3.3 of the Application. The Licensee shall obtain the necessary approvals and implement those projects when instructed to do so by the Board.

PART E - PHYSICAL MONITORING AND SURVEILLANCE

44. All water retaining structures, appurtenances and erosion control structures shall be inspected by September 30 of each year of this licence by a Professional Engineer licenced to practice in Yukon. The results of the inspection, including all problems identified, remedial measures proposed, and remedial measures implemented, shall be compiled in a report that shall be submitted to the Board by November 30 of each year. The report shall contain the following at a minimum:

    a) instrumentation readings for the previous year;

    b) graphical and/or tabulated historic data for the instrumentation;

    c) notes of visual observations;

    d) analysis of the data and observations; and

    e) recommendations for any additional monitoring or actions arising from the results of the monitoring.

45. The Licensee shall complete a dam safety review for all water retaining structures and appurtenances at least once every five years, or more frequently if so recommended as a result of any dam safety inspection. The first review shall be completed and reported to the Board no later than November 30, 2005. Subsequent reports shall be submitted by November 30 of the year in which the inspection is carried out. The review shall be conducted in accordance with the Dam Safety Guidelines and shall include, but not necessarily be limited to:

    a) documentation of the dam safety review process, procedures, activities and results;

    b) any recommendations for maintenance, operation, surveillance, reporting and/or emergency preparedness;

    c) documentation of actions taken on the recommendations of previous dam safety reviews and annual inspection reports; and

    d) the planned response to each recommendation in the dam safety review report, including schedules for completion.

46. Details of any maintenance, inspection and/or surveillance activities undertaken in the previous year in relation to dam safety shall be included in the Annual Report.

Operation, Maintenance and Surveillance Manual

47. No later than December 31, 2002, the Licensee shall submit to the Board an operation, maintenance and surveillance manual ("OMS Manual") that documents procedures for safe operation, maintenance and surveillance of all dams and appurtenances. The Licensee shall prepare the OMS Manual in accordance with the Dam Safety Guidelines and shall provide an updated manual when the results of the annual dam safety inspections and/or the five year dam safety reviews recommend that an update is necessary. The OMS Manual shall include, but not necessarily be limited to:

    a) procedures for operation, maintenance and surveillance that are consistent with the recommendations contained in the Dam Safety Guidelines; and

    b) a program for recording and reporting inspection and maintenance activities.

Emergency Preparedness Plan

48. No later than December 31, 2002, the Licensee shall submit to the Board an emergency preparedness plan that documents procedures for dealing with emergencies for all dams and appurtenances. The plan shall be prepared in accordance with the Dam Safety Guidelines.

PART F - BIOLOGICAL MONITORING AND SURVEILLANCE

Implementation of Study Plans

49. Where this licence requires the Licensee to submit a study plan, the Licensee shall not implement the plan until notified by the Board to do so. This requirement applies to the Fish and Aquatic Habitat Monitoring Program, the Lake Whitefish Monitoring Program, and the Littoral Habitat Monitoring Program.

Lake Whitefish Monitoring Program

50. By April 30, 2005, the Licensee shall submit to the Board a plan for detailed index-gillnetting programs to be undertaken in 2007 and 2017 to obtain age-class strength for adult lake whitefish in Aishihik Lake. The program methodology shall be described in sufficient detail to be replicated at a future date. The plan shall include a schedule for reporting data, conclusions and any proposed mitigative measures. The Licensee shall implement the program when instructed to do so by the Board.

51. Within three months of the effective date of this licence, the Licensee shall submit to the Board a plan for a monitoring program to follow the health and recruitment of juvenile lake whitefish in Aishihik Lake. The plan should address the estimation of potential suitable spawning habitat substrates at various lake levels. The plan shall also include a schedule for reporting data, conclusions and any proposed mitigative measures. The Licensee shall implement the program when instructed to do so by the Board.

52. Within one year of the effective date of this licence, the Licensee shall submit to the Board a plan for a subsistence fishery monitoring program to be carried out on an annual basis through the term of this license. The plan shall include a schedule for reporting data and conclusions. The Licensee shall implement the program when instructed to do so by the Board.

Littoral Habitat Monitoring Program

53. Within three months of the effective date of this licence, the Licensee shall submit to the Board a plan for a monitoring program to follow changes in the area and quality of littoral habitat in Aishihik Lake. The plan shall include, but not necessarily be limited to, those areas of the lake to the north of latitude 61° 34' and to the west of longitude 137° 23'. The program shall identify and monitor aquatic plants as an indicator of primary productivity and/or changing conditions in the lake, and the quality and quantity of suitable spawning substrates potentially available to lake whitefish. The plan shall include a schedule for reporting data, conclusions, and any proposed mitigative measures. The Licensee shall implement the program when instructed to do so by the Board.

PART G - DECOMMISSIONING

54. In the event of decommissioning of the undertaking, the Licensee shall ensure that all structures and appurtenances authorized by this licence are either removed or left in stable condition which does not present a risk to people or the environment. Prior to the commencement of decommissioning work, the Licensee shall submit to the Board a final plan for the reclamation of the project site. The plan shall be designed to ensure long-term stability, maintenance and/or replacement of any structures remaining after closure, minimize and/or mitigate environmental impacts, and provide for ongoing monitoring.

Approved by the Minister of Indian Affairs and Northern Development

This 21 day of

November, 2002

R. House
Witness

Minister of Indian Affairs and
Northern Development

Issued by the Yukon Territory Water Board

This 25 day of

November, 2002

Witness

Chairperson

Yukon Territory Water Board

Office des eaux du Territoire du Yukon

November 25, 2002

Don Willems, President & CEO
Yukon Energy Corporation
PO Box 5920
Whitehorse, YT Y1A 5L6

Re: WATER USE LICENCE HY99-011, CORRECTION TO CLAUSE 29

Please note the following correction to Clause 29 of Water Use Licence HY99-011

Canyon River and Canyon Pond

29. The minimum flow release from Aishihik Lake is to be no less than 1.416 m^3/s. The minimum flow downstream of Canyon Pond is to be no less than 2.832 m^3/s, including Giltana Creek flows.

The Board's intention, as indicated in the Reasons for Decision, was that the minimum flow requirements stipulated in Clause 4 of Water Use Licence Y3L5-0307 should be carried forward into water use licence HY99-011. The Board's technical advisor has confirmed that a calculation error occurred when the numbers were converted from imperial to metric.

In situations such as this, where the licence does not express the decision that was actually made, or where there is a clerical error in the drafting of the licence, then the licence can be amended by attaching a letter of correction.

The Board has asked me to express their regret for any inconvenience that this error may have caused.

Judi White, Manager
Water Board Secretariat

cc Distribution List, HY99-011

COPY

YUKON WATER BOARD
AMENDMENT OF LICENCE

2006 JUN 22 PM 12: 07

LICENSEE: Yukon Energy Corporation

LICENCE NUMBER: HY99-011

AMENDMENT NUMBER: One (1)

Application Number: HY05-015

Pursuant to the *Waters Act*, Water Use Licence HY99-011 is hereby amended as follows:

1. Clause 35 is hereby withdrawn and replaced by:

35. No later than June 30, 2006, the Licensee shall submit to the Board detailed design construction drawings and specifications for modifications to the earth-fill structures adjacent to the Aishihik Lake Control Structure to pass an Inflow Design Flood. The modifications shall be completed by December 31, 2007.

Dated this 9 day of June, 2006

Witness

YUKON WATER BOARD

Chairperson

Dated this 19 day of June, 2006

Witness

Minister, Executive Council Office

REFERENCE: General

QUESTION:

Please provide a copy of the following:

Whitehorse Facility Water License as well as details of the costs to procure this license (including internal costs and overhead) and an explanation of how Yukon Energy has accounted for these costs within its revenue requirement.

ANSWER:

A copy of the water license HY99-101 is attached (UCG-YEC-2-5 Attachment 1). The costs incurred to procure this license were reviewed as part of the 2005 Revenue Requirement hearing (see table 3.1, page 3-3 of the application for a description of the treatment of water license costs in revenue requirement).

YUKON TERRITORY WATER BOARD

WATER USE LICENCE

Pursuant to the *Yukon Waters Act* and Regulations, the Yukon Territory Water Board hereby grants a Type A Water Use Licence for a power undertaking to:

Yukon Energy Corporation
P.O. Box 5920
Whitehorse, Yukon
Y1A 5L6

LICENCE NUMBER: HY99-010

LICENCE TYPE: A

UNDERTAKING: Power, Class 4

LOCATION: Yukon River at Whitehorse

EFFECTIVE DATE: The effective date of this licence shall be the date on which the signature of the Minister of Indian and Northern Affairs Canada is affixed.

EXPIRY DATE: May 31, 2025

PURPOSE: Operation of the Whitehorse Rapids Generating Station and the Lewes Dam as proposed in Water Use Applications HY99-009 and HY99-010.

This licence shall be subject to the restrictions and conditions contained herein and to the restrictions and conditions contained in the Yukon Waters Act and the Regulations made thereunder.

Dated this 13th day of January, 2000

YUKON TERRITORY WATER BOARD

Witness

Chairperson

Dated this 14 day of February, 2000

APPROVED BY:

Witness

Minister of Indian Affairs and Northern Development

PART A - GENERAL CONDITIONS

1. Definitions

(a) "Act" means the Yukon Waters Act and any amendments thereto.

(b) "Regulations" means the Regulations made under the Act.

(c) "Board" means the Yukon Territory Water Board.

(d) "Application" and "Water Use Application" mean Water Use Applications HY99-009 and/or HY99-010, including any additional submissions and/or revisions, submitted to the Board by the Licensee.

(e) "Deleterious Substance" means deleterious substance as defined in Section 34(1) of the Fisheries Act.

Representations, Warranties and Undertakings

2. The Board has relied on the representations, warranties and undertakings provided by the applicant in the material filed as Applications HY99-009 and HY99-010. Such representations, warranties and undertakings are considered by the Board to be a part of the licence, but shall be subject to, and may be modified by the terms and conditions of the licence.

Other Laws

3. No term of this licence limits the application of any other Federal, Territorial or First Nation Law.

Correspondence

4. Where any direction, notice, order, or report under this licence is required to be in writing, it shall be given:

(a) To the Licensee, if left at, faxed to, or mailed by registered mail to the following address:

Yukon Energy Corporation
P.O. Box 5920
Whitehorse, Yukon
Y1A 5L6

Fax: (867) 393-6909

and shall be deemed to have been given to the Licensee on the day it was left or faxed, or seven (7) days after the day it was mailed, as the case may be.

(b) To the Board, if left at, faxed to, or sent by registered mail to the following address:

Yukon Territory Water Board
Suite 106, 419 Range Road
Whitehorse, Yukon
Y1A 3V1

Fax: (867) 668-3628

and shall be deemed to have been given to the Board on the day it was left or faxed, or seven (7) days after the day it was mailed, as the case may be.

Non-Compliance

5. In the event that the Licensee fails to comply with any provision or condition of this licence, the Board may, with the approval of the Minister and subject to the Act, cancel the licence.

Deleterious Substances

6. Subject to the provisions of this licence, deleterious substances shall be used, transported, stored and disposed of in such a manner that they are not deposited in, or allowed to be deposited in, any waters.

Water Use

7. Subject to the terms of this licence, the Licensee is hereby authorised to :

(a) store the flow of the Yukon River, except for a minimum flow of 85 m^3/s, behind the Lewes Dam for the purposes of a power undertaking;

(b) store the flow of the Yukon River, except for a minimum flow of 85 m^3/s, behind the Whitehorse Rapids Dam for the purposes of a power undertaking; and

(c) divert the flow of the Yukon River through the Whitehorse Rapids Powerhouse for the purposes of a power undertaking.

Term of Licence

8. The term of this licence is from the effective date to May 31, 2025.

Reports

9. All reports shall be submitted to the Board in an unbound printed form that is reproducible by standard photocopier and shall be accompanied by five (5) copies.

10. All monitoring data and reports shall be submitted in digital form on diskette using an IBM compatible format readable using commonly available software.

Annual Reports

11. Annual reports shall be submitted to the Board by the Licensee. The initial report shall cover the period from the effective date of this licence to March 31, 2000 and shall be submitted to the Board on or before May 31, 2000. Subsequent reports shall cover the period from April 1 to March 31 of each year and shall be submitted to the Board on or before May 31 in the year in which the reporting period ends.

12. Annual reports shall include the information required by this licence and by the Regulations, including, but not necessarily limited to:

    (a) monthly maximum and minimum mean daily water levels on Schwatka Lake and Marsh Lake;

    (b) monthly maximum and minimum mean daily water levels in the Whitehorse Rapids powerhouse tailrace;

    (c) monthly maximum and minimum mean daily flows through the Whitehorse Rapids powerhouse turbines;

    (d) monthly maximum and minimum mean daily flows through the Whitehorse Rapids spillway;

    (e) monthly maximum and minimum number of gate openings at the Lewes Dam;

    (f) information regarding the purpose, nature and extent of any significant maintenance work carried out; and

    (g) any other information or reports required by this licence or the Regulations.

Quarterly Reports

12. Quarterly reports shall be submitted to the Board by the Licensee. The reports shall cover the periods ending March 31, June 30, September 30 and December 31 of each year and shall be submitted to the Board within 30 days of the end of each reporting period.

13. Quarterly reports shall include the information required by this licence and by the Regulations, including, but not necessarily limited to:

    (a) mean daily water levels on Schwatka Lake and Marsh Lake;

    (b) mean daily water levels in the Whitehorse Rapids powerhouse tailrace;

    (c) mean daily flows through the Whitehorse Rapids powerhouse turbines;

    (d) mean daily flows through the Whitehorse Rapids spillway;

    (e) daily number of gate openings at the Lewes Dam; and

    (f) any other information or reports required by this licence or by the Regulations.

Dam Safety Monitoring Reports

14. An annual dam safety inspection and monitoring report for the Whitehorse Rapids and Lewes Dams and related structures shall be submitted to the Board by the Licensee. The report shall be submitted by November 30 of each year and shall contain the following information:

    (a) monitoring instrumentation readings for the previous year;

    (b) graphical and/or tabulated historic data for the monitoring instrumentation;

    (c) notes of visual observations;

    (d) analysis of the data and observations; and

    (e) recommendations for any additional monitoring or actions arising from the results of the monitoring.

15. Every five years, or more frequently if recommended as a result of any dam safety inspection, the Licensee shall submit a report detailing the results of a comprehensive dam safety review. The first report shall be submitted by November 30, 2000. Subsequent reports shall be submitted by November 30 of the year in which the inspection is carried out. The report shall contain the following information:

    (a) monitoring data;

    (b) notes of observations;

    (c) analysis of the data and observations; and

    (d) recommendations for actions arising from the analysis.

Spills and Unauthorized Discharges

16. The Licensee shall immediately contact the 24-hour Yukon Spill Report telephone number (867) 667-7244, should a spill or an unauthorized discharge occur. A detailed written report on any such event, including but not limited to, dates, quantities, parameters, causes and other relevant details and explanations, shall be submitted to the Board not later than fifteen (15) days after its occurrence.

Hazardous Materials Storage

17. A complete inventory of chemicals, fuels, oils and other hazardous materials and their locations shall be maintained by the Licensee. A spill contingency plan suitable for each material shall be developed and submitted to the Board as part of the first annual report. Any revisions to the plan shall be submitted to the Board within 60 days of the revision.

PART B - OPERATING CONDITIONS

18. A minimum instantaneous flow of 85 m^3/s shall be maintained in the channels downstream of the Lewes Dam and of the Whitehorse Rapids Powerhouse.

19. The water surface elevation on Schwatka Lake shall be maintained between a minimum of 652.272 m and a maximum of 653.339 m as measured from Geodetic Survey of Canada benchmark 86G114A.

20. The mean daily water surface elevation on Marsh Lake shall be maintained between a controlled minimum of 653.796 m and a controlled maximum of 656.234 m as measured from Water Survey of Canada gauge 9AB004.

21. With respect to the Lewes Dam, the Licensee shall comply with the following:

    a) Except as permitted by sub-clause b) of this licence, or as required for repairs and maintenance, all gates shall remain open from May 15 to August 15 of each year.

    b) The following exceptions shall be permitted to the requirements of sub-clause a) of this licence:

        i) If, on July 7 of any year, the water surface elevation of Marsh Lake is less than 654.82 metres, then up to twenty gates may be closed and at least ten gates must remain open. If the water surface elevation equals or exceeds 654.82 metres, then all gates must remain open.

        ii) If, on July 21 of any year, the water surface elevation of Marsh Lake is less than 655.15 metres, then up to twenty gates may be closed and at least ten gates must remain open. If the water surface elevation equals or exceeds 655.15 metres, then all gates must remain open.

        iii) If, on August 10 of any year, the water surface elevation of Marsh Lake is less than 655.65 metres, then up to twenty gates may be closed and at least ten gates must remain open. If the water surface elevation equals or exceeds 655.65 metres, then all gates must remain open.

22. The Licensee shall maintain existing fish passage facilities at the Whitehorse Rapids and Lewes Dams and shall ensure that the fish passage facilities are open and functioning from April 1 to November 15 of each year.

23. Existing boat passage facilities at the Lewes Dam shall be maintained by the Licensee.

24. Annually, the Licensee shall carry out a dam safety monitoring inspection of all water management structures associated with the Whitehorse Rapids and Lewes Dams. The inspection shall be carried out by a qualified professional engineer licenced to practice in the Yukon, and shall follow the recommendations contained in the most current edition of the *Canadian Dam Safety Guidelines*.

25. **Every five years, or more often if recommended as a result of any dam safety inspection, the Licensee shall engage an independent, qualified, professional engineer, licenced to practice in the Yukon, to carry out a comprehensive dam safety inspection and review of all water management structures associated with the Whitehorse Rapids and Lewes Dams. The inspection and review shall be carried out in accordance with the recommendations contained in the most current edition of the *Canadian Dam Safety Guidelines*.**

26. **All works associated with this licence shall be maintained by the Licensee in good order, consistent with sound engineering and environmental practices.**

Yukon Territory Water Board
Office des eaux du Territoire du Yukon

March 28, 2000

Rob McWilliam, President & CEO
Yukon Energy Corporation
PO Box 5920
Whitehorse, Yukon
Y1A 3V1

RE: WATER USE LICENCE HY99-010,
WHITEHORSE RAPIDS AND LEWES DAM

In response to concerns raised by your office, we have undertaken a review of this water use licence and I can confirm that the licence does have some typographical errors. These errors are of a minor nature, and this letter will provide sufficient correction.

1. Clause 12 (page 3 of 7)

Subsections (a) through (d) of this clause should reference "monthly maximum and minimum of the mean daily water levels", as follows

12. Annual reports shall include the information required by this Licence and by the Regulations, including, but not necessarily limited to:

(a) monthly maximum and minimum of the mean daily water levels on Schwatka Lake and Marsh Lake;

(b) monthly maximum and minimum of the mean daily water levels in the Whitehorse Rapids powerhouse tailrace;

(c) monthly maximum and minimum of the mean daily flows through the Whitehorse Rapids powerhouse turbines;

(d) monthly maximum and minimum of the mean daily flows through the Whitehorse Rapids spillway;

(e) monthly maximum and minimum number of gate openings at the Lewes Dam;

Suite 106, 419 Range Road, Whitehorse, Yukon Y1A 3V1 Ph: 867-667-3980 Fax: 867-668-3628
419 Chemin Range, bureau 106, Whitehorse (Yukon) Y1A 3V1 Tél: 867-667-3980 Fax: 867-668-3628

(f) information regarding the nature, extent and significance of any significant maintenance work carried out; and

(g) any other information or reports required by this Licence or the Regulations.

Clause 22, page 6 of 7

The intent of this clause is that fish passage facilities are maintained at both locations and are kept open at Lewes Dam between April 1 and November 15, and the words "at Lewes Dam" should have been included, as follows:

22. The Licensee shall maintain existing fish passage facilities at the Whitehorse Rapids and Lewes Dams and shall ensure that the fish passage facilities at Lewes Dam are open and functioning from April 1 to November 15 of each year.

3. Clause 11, Annual Reports page 3 of 7

The intent of this clause is that the first report would cover January 1, 1999 to March 31, 2000.

4. Numbering

The licence includes two clause #12. This is unfortunate, but I don't think it will prove to be a serious problem.

I apologize for any inconvenience these errors may cause.

Kindest Regards,

Dale J. Eftoda, Chairperson
Yukon Territory Water Board

cc DIAND Water Resources
DFO, EP

REFERENCE: Issues List – Lack of Joint Planning Process

QUESTION: PRELIMINARY ISSUES LIST

a) Has the proposed 20-year resource plan and proposed projects been developed and evaluated with appropriate information and input from Yukon Electrical Company Limited (YECL)?
b) Please provide details of how the proposed 20-year resource plan accounts for YECL production in its forecasting models?
c) Please explain how Yukon Energy accounted for any potential expansion of YECL production and/or new YECL capacity projects.

ANSWER:

a), b) and c)

See YUB-YEC-1-18.

REFERENCE: Issues List – Capability of Existing Facilities and Resources to Supply Forecast Loads

QUESTION: PRELIMINARY ISSUES LIST

a) What is the capability of Yukon Energy's existing facilities and resources to provide reliable electrical power generation to meet the forecast load forecast requirements?

ANSWER:

This is set out in detail in Chapter 3 of the Resource Plan.

REFERENCE: Issues List - Near-term peak shaving consideration

QUESTION: PRELIMINARY ISSUES LIST

YEC indicates that if loads develop, further consideration will be given to Demand Side Management programming focused on both the reduction of system peak demand and energy conservation, and development of new wind generation (if attractive sites near established utility grids can be identified).

a) What is the current status of wind development?
b) Why hasn't a demand-side management plan been established for this review?
c) Should a joint interested party panel be implemented to promote more efficient use of energy over the longer-term?

ANSWER:

a)

Yukon Energy is not actively pursuing the development of new wind farm sites. If attractive sites were to be identified near existing electrical lines on systems that have diesel on the margin (e.g., at some point in the future when MD or WAF loads have grown to required baseload diesel generation), then YEC would assess the sites on a case by case basis. Currently YEC is monitoring the wind resource at a location near Dawson. YEC is in the process of cataloguing all the sites monitored thus far so as to determine which sites are the best for future commercial wind development.

This is further set out at Appendix A of the Resource Plan and under the proposed actions for the very large (25 MW or larger) industrial development scenarios (section 5.5.2).

b)

See YCS-YEC-2-A2.

c)

No. Yukon Energy is not proposing any joint interested party panel be established to promote more efficient use of energy over the longer-term.

REFERENCE: **Issues List - Possibility of long-term stability for secondary power rates**

QUESTION: **PRELIMINARY ISSUES LIST**

In the event of future load growth, will secondary power rates be discontinued?

ANSWER:

Yes, in the event of sufficient load growth to require baseload diesel generation on the WAF system (or MD system where relevant). Secondary power is only available when it can be supplied from surplus hydro.

REFERENCE: Issues List - $3 Million capital spending threshold for YUB Review

QUESTION: PRELIMINARY ISSUES LIST

At what time during the project life should a YUB review take place?

ANSWER:

There is only one required aspect to YUB reviews under the Yukon legislation. This is a review to determine the addition of an asset to the utility's ratebase. These reviews occur within the scope of a GRA or similar proceeding, which can occur before a project is constructed (in the case of a prospective test year project), or after (in the case of a project constructed in between test years).

In the case of YEC, the company has committed to seek an additional YUB review for all projects over $3 million. However, for any given project the timing of this review is dependent on the specifics of the project in question and receipt of all necessary direction to the Board from either the Minister of Justice or the Commissioner in Executive Council. For the projects set out in the Resource Plan, the current review is being conducted pursuant to the Minister's letter and comprises all aspects of the YEC commitment to have these projects reviewed by the YUB. All matters related to the projects are part of the current review.

With respect to timing, the near term current projects over $3 million being reviewed in the current proceeding emphasize the variations that might apply to the timing of such a YUB review:

1. For **Aishihik 3rd Turbine**, the review is occurring well in advance of actual construction (which is not expected to occur until 2009 at the earliest) and after YEC has secured all environmental approvals for this project (as part of the relicencing of the Aishihik Generating Station).
2. For the **Mirrlees Life Extension**, the review is occurring immediately prior to undertaking the planned major overhaul activities (starting in spring 2007), but concurrent with various necessary planning and commitment activities, such as scheduling the major overhaul and conducting ongoing assessment of the unit.

3. For **Carmacks-Stewart**, the current review allows for timely development to ensure the maximum benefits can be secured from the Minto mine (which will be into full production using its own diesel generation before YEC can connect the mine to grid power). The review is occurring concurrently with environmental reviews and licencing processes and with initial engineering, such that YUB recommendations will be available prior to incurring major design costs and shortly before other regulatory reviews are completed. If the current YUB review was to be delayed (or a subsequent YUB process was determined to be required) the company would likely not be able to provide grid power to Minto or Carmacks Copper in a timely way and would defer or miss entirely the ability to secure major benefits for WAF customers from the sale of otherwise surplus hydro generation.

REFERENCE: Non-Industrial vs. Industrial Customers

QUESTION:

Please identify investment options that exist for Yukon Energy to supply energy to industry that do not negatively impact other ratepayers?

ANSWER:

At the present time, Yukon Energy has two main options for supplying power to major industrial customers that do not negatively impact other ratepayers:

1. **Isolated Service:** Pursuant to OIC 1995/90, YEC can supply power to industrial customers as "isolated industrial customers" by not interconnecting the service facilities for these customers with facilities serving any other load in Yukon. This in all likelihood means serving industrial customers using an isolated diesel plant. The OIC sets out that in these cases, the costs and revenues related to serving the isolated loads are not to be considered by the Board in setting the rates charged to any other customers. Under this scenario, existing ratepayers are neither positively nor negatively impacted by industrial customers.

2. **Grid Connected Service:** YEC can currently connect new industrial customers to the existing WAF or MD grid systems and can currently serve them primarily or in part using existing surplus hydro at firm power rates. Pursuant to OIC 1995/90, these rates must recover 100% of the costs of serving the industrial customer class (where costs are determined by treating the whole Yukon as a single rate zone). This approach will not negatively impact other ratepayers; however, depending on the level of capital investment made by the utility versus the customer, will positively impact the rates paid by other customers.

In addition to the above two "investment options" if sufficiently large new customer loads arise YEC can pursue opportunities to provide long-term beneficial impacts on existing ratepayers via development of a new baseload generating plant that will be lower cost over time than diesel generation. This is similar to the opportunities presented by past industrial customers that led to the developments of today's beneficial baseload generation, such as Aishihik hydro, Mayo hydro and most of the hydro units at Whitehorse (as reviewed at page 8 of the Resource Plan Overview document).

REFERENCE: Non-Industrial vs. Industrial Customers

QUESTION:

Please identify the supply and investment options that will support rate stability goals, reduce barriers to industrial development and minimize environmental impacts.

ANSWER:

See UCG-YEC-2-21.