



Box 2250, Yellowknife NT X1A 2P7 Phone (867) 669-3327 Fax (867) 669-3316

Date: December 28, 2011

Roberta Judas
Regulatory Technician
Wek'eezhii Land and Water Board
P.O. Box 32
Wekweeti, NT X0E 1W0

Dear Roberta Judas

Re: Water License **N1L4-0150** Snare Rapids, Snare Falls, Snare Forks and
Water License **MV2003L4-0014** Snare Cascades

Enclosed please find the **Water Management and Reservoir Operating Plan** for December 2011.

If you have any questions or concerns please contact me at 669-3327

Yours truly,

A handwritten signature in black ink, appearing to be "Ken Dies", written over a horizontal line.

Ken Dies
Manager, Systems Control & Hydro Planning

Wek'eezhii Land
& Water Board
File _____
JAN 03 2012
Application: N1L4-0150 /
MV2003L4-0014
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Snare Hydro

Water Management and Reservoir Operating Plan

Water Licence Number N1L4-0150

Water Licence Number MV2003L4-0014

December 2011

Prepared by
Ken Dies
Manager, System Control
NWT Power Corporation

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6.1 - Summary

The snow pack in the Snare Basin averaged 109.8 mm, 90.1% of normal and we were forecasting for a peak inflow on the Indin River of 27.2 m³/s, on July 16. The peak flow at Snare / Ghost was then forecast to be 69.9 m³/s. The actual Indin River peak was 21.9 m³/s on June 4 and the Snare / Ghost peak was 63.5 m³/s on July 20. The actual inflows were close to what was forecast. By mid – December the Snare Rapids forebay was to be at 221.6 and we would have a minimum Snare Rapids forebay of 217.96 in June. This would require the operation of diesel from November to April.

The precipitation from July to October changed everything, the Indin River inflow were as low as 3.75m³/s on August 16 and the Snare / Ghost inflows were as low as 43.9 on September 23. Then because of the fall precipitation the Indin River flows increased to 10.5 m³/s by December 6 and the Snare / ghost inflows increased to 64.1 m³/s by December 5.

The increased inflows meant that NTPC would no longer require diesel to keep Snare Rapids forebay from reaching the water licence minimum. The maximum forebay at Snare Rapids is now forecast to be 221.7 on December 24, with the minimum now forecast to be 202.35 on June 15.

On November 2, logs were pulled in one bay at the Snare Rapids spillway so the Snare Rapids forebay would not exceed 221.7.

In July it was discovered that G2 at Bluefish had a cracked main shaft and it was sent out for repair, NTPC also started to look for a new shaft. A new shaft was found before repairs were made to the old shaft and the new shaft was installed and the unit was back in service on December 1. Diesel was required in November with Bluefish G2 out of service.

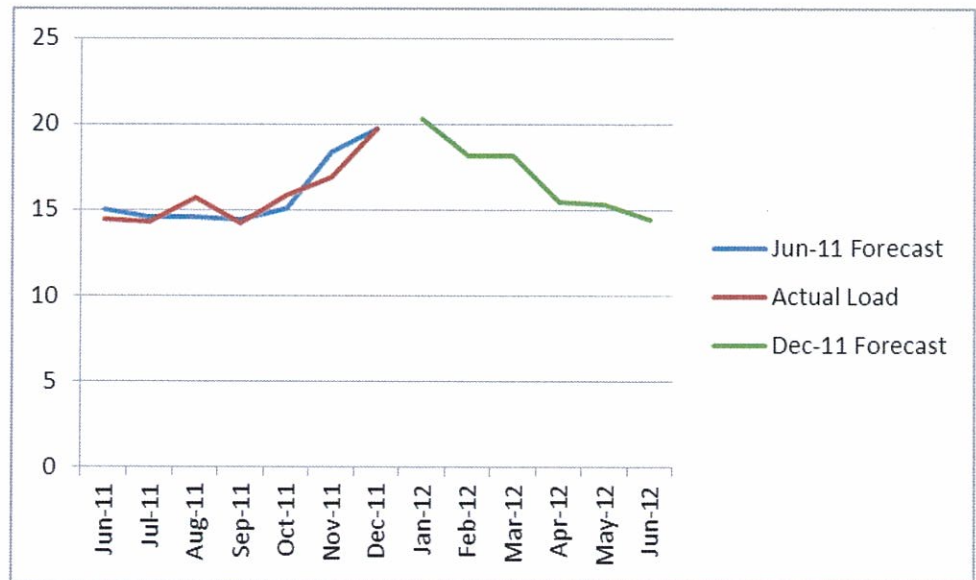
6.2 - Load Forecast and Historical Analysis

The following table and graph compare the forecast load to the observed load during the past six months and forecasts the next six months.

Table 1 – Observed and Forecast System Load

System Load (gwh)

	Jun-11 Forecast	Actual Load	Dec-11 Forecast
Jun-11	15.03	14.46	
Jul-11	14.59	14.26	
Aug-11	14.59	15.67	
Sep-11	14.45	14.19	
Oct-11	15.08	15.84	
Nov-11	18.38	16.85	
Dec-11	19.73	19.72	
Jan-12			20.32
Feb-12			18.12
Mar-12			18.13
Apr-12			15.49
May-12			15.34
Jun-12			14.46



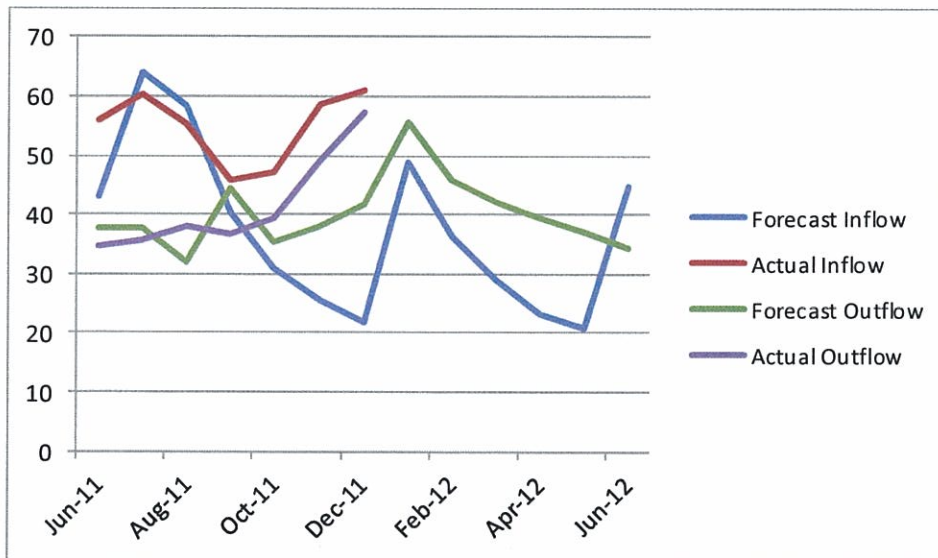
6.3 - Review of Previous Operating Plan

The following table and graph compares the previous operating plan's forecast with actual data regarding inflows and outflows at Snare Rapids. The peak Indin River inflow on June 4, 2011 of 21.9 m³/s predicted a peak at Snare / Ghost of 69.9 m³/s. The Snare River peaked at 63.5 m³/s, on July 20. Due to Fall precipitation the second peaks were 10.5 m³/s at Indin River and 64.1 m³/s at Snare / Ghost.

Table 2 - Observed and Forecast Flows at Snare Rapids

Snare River Flows (m³/s)

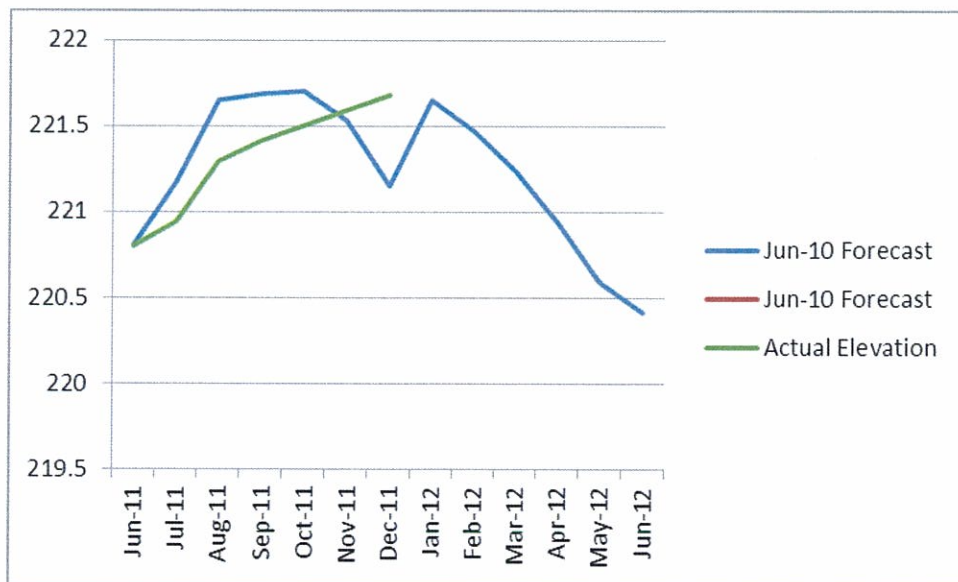
	Forecast Inflow	Actual Inflow	Forecast Outflow	Actual Outflow
Jun-11	43.10	55.90	37.59	34.62
Jul-11	64.00	60.15	37.59	35.69
Aug-11	58.30	55.33	32.04	37.96
Sep-11	40.40	45.93	44.55	36.74
Oct-11	30.90	47.12	35.41	39.37
Nov-11	25.50	58.63	38.16	49.06
Dec-11	21.70	62.45	41.64	57.27
Jan-12	48.70		55.48	
Feb-12	36.18		45.94	
Mar-12	28.82		42.06	
Apr-12	23.11		39.26	
May-12	20.74		37.14	
Jun-12	44.67		34.31	



The following table and graph compares the previous operating plan's forecast with actual data regarding the forebay elevation of Bigspruce Reservoir at Snare Rapids. We were able to fill the Big Spruce reservoir to 222.29 meters and it is expected that it will not get below 221.14. The forebays at Snare Falls, Snare Cascades, and Snare Forks are regulated between maximum and minimum licensed levels on a daily and weekly basis.

Table 3 – Observed and Forecast Reservoir Levels
Big Spruce Forebay Level (m)

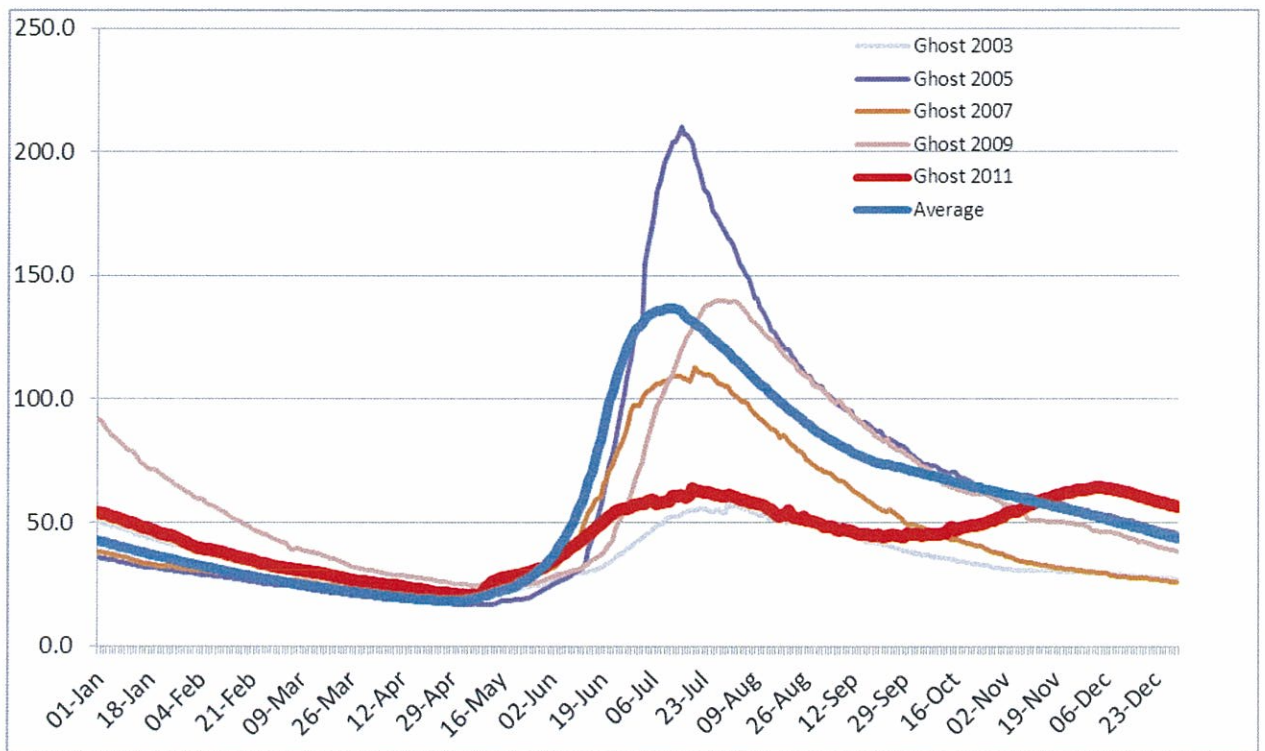
	Jun-10 Forecast	Actual Elevation
Jun-11	220.81	220.8
Jul-11	221.17	220.94
Aug-11	221.65	221.29
Sep-11	221.69	221.41
Oct-11	221.7	221.5
Nov-11	221.53	221.59
Dec-11	221.15	221.68
Jan-12	221.65	
Feb-12	221.47	
Mar-12	221.24	
Apr-12	220.94	
May-12	220.59	
Jun-12	220.41	



6.4 - Indicators

6.4.1 Flows and Trends

The Snare River Inflows from January to June were above average, with the snow pack at 90% normal the inflows from June to August were well below average, but the rain in the fall increased the inflows and we are above average for November and December.



6.4.2 Precipitation

The following table is the recorded precipitation at Yellowknife and Snare Rapids.

Table 4 – Yellowknife and Snare Rapids Precipitation

Precipitation (in mm)

Month	YK Normals	Yellowknife	Snare Rapids
Jun-10	26.9	34.2	37.1
Jul-10	35.0	60.0	61.2
Aug-10	40.9	77.0	81.1
Sep-10	32.9	25.2	26.1
Oct-10	35.0	51.6	50.8
Nov-10	23.5	34.8	35.2
Dec-10	16.3	15.2	20.1
Jun - Dec	210.5	298.0	311.6

6.4.3 Snow Survey

The snow survey will be started in January, 2011 and end in early April, 2012 in conjunction with the Meteorological Service of Canada, Climate Processes and Earth Observation Division using their satellite imaging to determine the water equivalency in the snow pack of the Snare Basin. Then manual measurements will be done in early April.

6.4.4 Expected Inflows

In the spring of 2001 AMEC E&C Services Limited was retained to develop flow forecasting procedures for the Snare Hydro System. The following is the section on winter forecast.

In most years the mean daily temperature in the Snare Basin remains consistently below 0 °C from mid-October until mid-April.

During this period, virtually no liquid surface runoff enters the water courses and only water already “enroute” continues to flow. This process (ground water plus lake outflow) can be approximated quite accurately by a recession equation, as below:

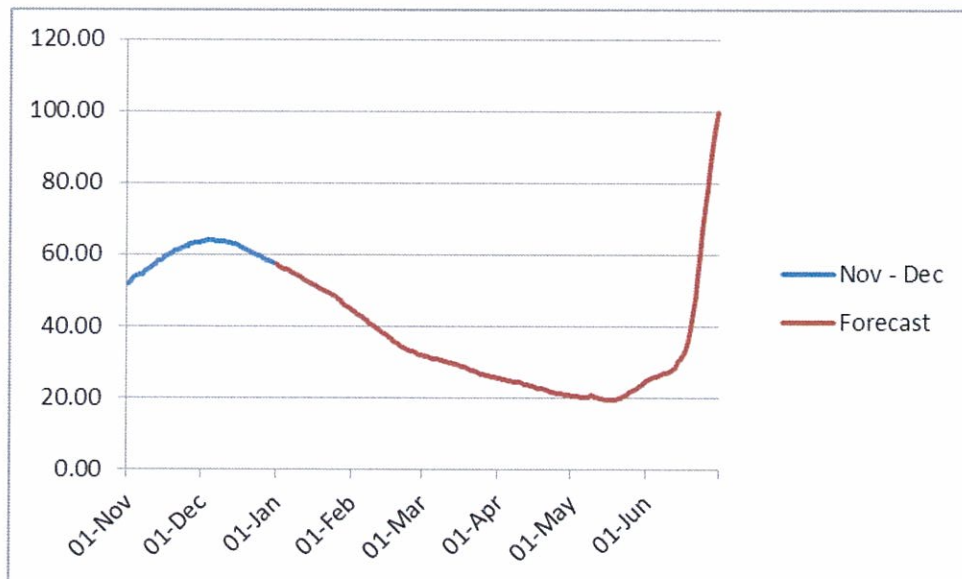
$$Q = Q_0 \cdot e^{-k(t-t_0)}$$

Where: Q = Snare Ghost flow at time t days
 Q_0 = Snare Ghost initial flow at t_0
 $e = 2.7183$
 k = exponential co-efficient
 $t-t_0$ = elapsed time (days)

k is not perfectly constant but can be estimated from the following equation:

$$k = 0.00424 + 7.088 \cdot 10^{-5}$$

Using the above formula and the November/December actuals the following curve is produced.



6.5 - Forecast Water Flows and Levels

6.5.1 Big Spruce Reservoir

The following table summarizes the expected flows and Bigspruce reservoir level for the next six months.

Table 5 Big Spruce Reservoir Forecast

MONTH	# DAYS	INFLOW (cfs)	OUTFLOW (cfs)	DELTA S (ft ³)	AREA (acres)	DELTA H (ft)	H.W.L.
JAN/12	31	1720	1960	-642816000	32176	-0.46	728.84
FEB	28	1278	1623	-834624000	32080	-0.60	728.24
MAR	31	1018	1486	-1253491200	31954	-0.90	727.34
APRIL/12	30	816	1387	-1480032000	31765.15	-1.0696	725.69
MAY	31	733	1312	-1550793600	31417.9	1.13313	725.81
JUNE	30	1592	1212	984960000	31443.1	0.71911	726.39

6.5.2 Downstream Plants

The outflow of Snare Rapids will be the inflow and outflow of the downstream plants for the forecast period.

6.5.3 Water Use Efficiencies

The water use efficiency has been over 90%. Although the inflows started out far less than average the Fall rain has provided a second inflow peak and enough water that on November 2, NTPC was spilling at the Snare Rapids spillway and no diesel will be required to keep from reaching the minimum water licence level.

6.6 - System Generation Forecast

6.6.1 Hydro Generation Forecast

The Hydro generation expected with the available water flow is shown in the following table. This assumes the annual maintenance of the hydro plants will occur in May.

Table 6 – Hydro Generation Forecast

	<u>Load</u>	<u>Diesel</u>	<u>Bluefish</u>	<u>Share</u>
	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>
Jan-12	2033	033	420	1580
Feb	1813	013	380	1420
Mar	1813	013	360	1440
Apr.	1554	008	244	1302
May	1540	010	288	1241
Jun	1451	010	302	1139

6.6.2 Bluefish Forecast

The forecast for Bluefish Hydro is as follows:

Table 7 – Bluefish Forecast

	<u>Load</u>	<u>Diesel</u>	<u>Bluefish</u>	<u>Share</u>
	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>
Jan-12	2033	033	420	1580
Feb	1813	013	800	1420
Mar	1813	013	360	1440
Apr.	1554	008	244	1302
May	1540	010	288	1241
Jun	1451	010	302	1139

6.6.3 Diesel Generation Forecast

The resultant diesel generation to meet the Load forecast and allow for hydro maintenance is as follows:

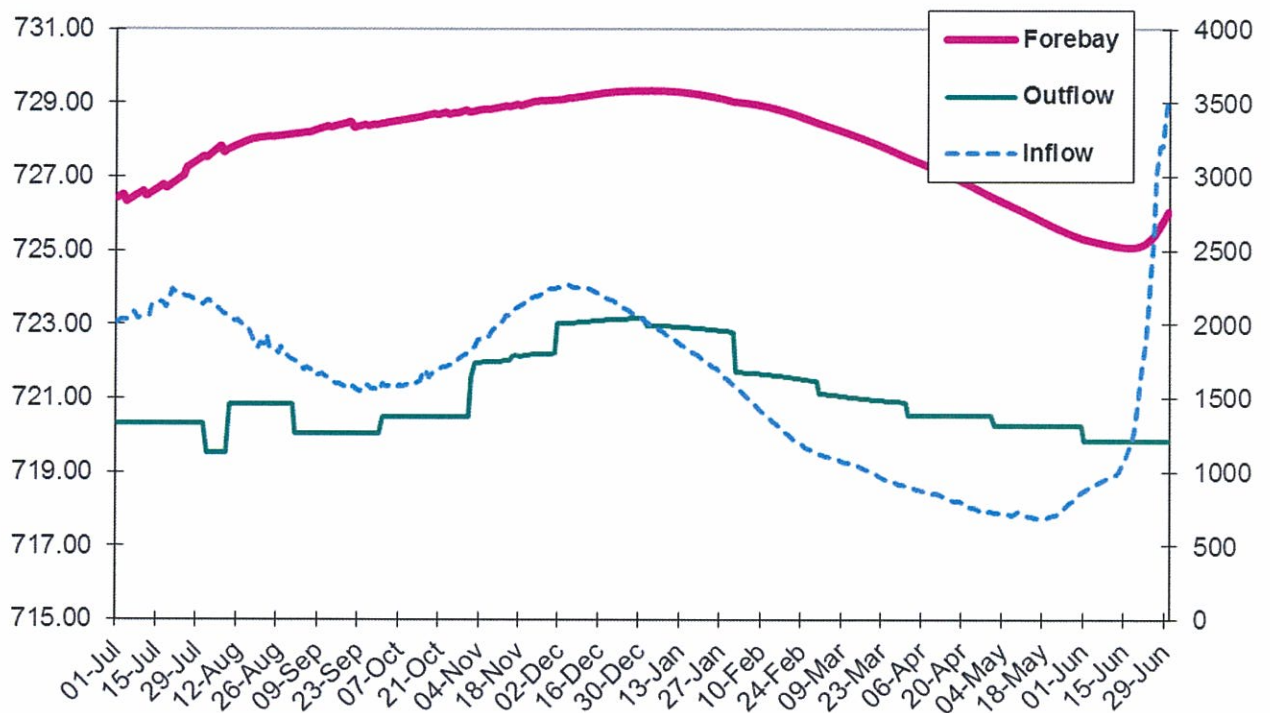
Table 8 – Diesel Generation Forecast

	<u>Load</u>	<u>Diesel</u>	<u>Bluefish</u>	<u>Share</u>
	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>	<u>GWh</u>
Jan-12	2033	033	420	1580
Feb	1813	013	380	1420
Mar	1813	013	360	1440
Apr.	1554	008	244	1302
May	1540	010	288	1241
Jun	1451	010	302	1139

6.6.4 Long Term Forecast

With the current Bigspruce reservoir level and inflows the hydro plants will operate at full capacity. It is expected that we will only have to operate diesel during peak times. (See following graph, in English units)

Snare Water Management 2011



6.7 - Commentary on Operations and Compliance

The Snare Hydro facilities were operated within compliance of the water license throughout the previous six months.

The Annual Report was submitted March 4/11

Surveillance network data for the period Jan - Mar, 2011 was submitted on April 14/11.

The June Water Management & Reservoir Operating Plan was submitted June 17/11

Surveillance network data for the period Apr - Jun, 2011 was submitted on July 27/11.

Surveillance network data for the period Jul - Sep, 2011 was submitted on Oct 20/11.

6.8 - Commentary on Reports and Inspections

NWT Power personnel performed annual electrical, mechanical and governor maintenance and internal inspections in May.

AANDC conducted the Hydroelectric & Small Dam Inspection on July 21

MECO Engineers did a Dam Safety Review from July 18 to July 20, a draft report was submitted to NTPC in December, by the time of this submission the report had not been submitted to the Water Board.