WATER POWER ACT LICENCES

CHURCHILL RIVER DIVERSION FINAL LICENCE REQUEST

SUPPORTING DOCUMENTATION

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HYDRAULIC OPERATIONS DEPARTMENT
POWER SALES & OPERATIONS DIVISION
POWER SUPPLY

CHURCHILL RIVER DIVERSION
REPORT IN SUPPORT OF A REQUEST FOR A FINAL LICENCE UNDER THE WATER POWER ACT AND REGULATIONS

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Executive Summary

This document demonstrates that Manitoba Hydro has fulfilled all of its obligations to obtain a Final Licence for the Churchill River Diversion. The document provides details on the observances of all the terms and conditions under the Interim Licence and its subsequent authorizations as well as Regulation 25/88R pursuant to the Water Power Act. The documentation is provided to assist the minister responsible for the Water Power Act in the issuance of a Final Licence for the Churchill River Diversion. Manitoba Hydro made the request for a Final Licence on May 6, 2009.

The Churchill River Diversion project was constructed under the authority of an Interim Water Power Act Licence issued on May 11, 1973. The project has been operated in accordance with that licence and temporary alterations approved by the minister on an as requested basis. The first such alteration was approved for the 1979/1980 winter. Variations to specific conditions were approved in the years following until 1985/1986. Since 1986 the approved alterations have remained unchanged from season to season.

Section 1 of this document provides an overview of the project. This includes information about the physical works, the operating conditions and hydraulic studies/tests on the Churchill River Diversion. It also includes information about Manitoba Hydro's community involvements in the surrounding areas.

Section 2 of this document shows how Manitoba Hydro has fulfilled specific terms of this Interim Licence, and all subsequent approvals.

Section 3 of this report demonstrates how Manitoba Hydro has fulfilled the articles of Regulation 25/88R pursuant to the Water Power Act that are pertinent to an Interim Licensee and which require a statement indicating observance. The selection of articles deemed to be pertinent was done by mutual agreement with Water Stewardship.

Manitoba Hydro continues to maintain and enhance its relationship with First Nations and communities located close to the Churchill River Diversion project. Efforts include a wide-range of activities and programs for things such as increasing Aboriginal employment with Manitoba Hydro, and supporting and promoting people's safety on waterways. Manitoba Hydro has and will be providing information about the Churchill River Diversion directly to near-by First Nations and communities, and will explain the process of requesting a Final Licence.

As demonstrated in this document, Manitoba Hydro has observed and fulfilled all the requirements necessary and therefore qualifies for a Final Licence.

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Section 1 – Overview

The Churchill River Diversion was initially authorized by an Interim Licence dated 1972 12 19. Manitoba Hydro commenced construction in February 1973. Manitoba Hydro applied for a subsequent interim licence on 1973 04 30 with the following changes:

- The ability to draw the Notigi forebay was lowered to 838 feet from 840 feet.
- The location of the Missi structure was moved from the right bank of the north channel to the left bank of the south channel.
- The diversion channel invert elevations and channel widths were changed. The Notigi dam height, gate widths and tailrace channel invert elevation were changed.
- Timber clearing was to be to the satisfaction of the Minister rather than by agreement between Manitoba Hydro and the Province.
- The date for fixing the completion date was shortened to when "… the initial development commences the diversion of waters of the Churchill River". The 1972 licence included the words "and/or storage on the Rat River and Southern Indian Lake".
- The datum was changed from Canadian Geodetic Datum to a specific Inland Waters Branch Benchmark at the South Indian Lake Settlement (now O-Pipon-Na-Piwin Cree Nation).

These changes provided physical and operational advantages even though they did not alter the concept of the project. The Churchill River Diversion structures are built and operated based on the replacement licence granted by Manitoba and dated 1973 05 11.

Physical Works

The principal physical works of the Churchill River Diversion project are comprised of two control structures, an excavated channel, and two mitigation structures. The location of these works is shown on Figure 1, page 42. They are described as follows:

(a) The Missi Falls Control structure regulates the amount of water allowed to pass down the Churchill River. Major components include the Spillway Control Structure, South Channel Dam, North Channel Dam, Main Dam and South Dyke. Electrical power required for the operation of this control structure is supplied by the Missi House Unit authorized under the Missi Falls Final Site Water Power licence dated 1987 02 05.

(b) The South Bay Diversion Channel diverts water from the South Bay of Southern Indian Lake to Issett Lake. The channel is nominally 200 feet wide at its base and is approximately 5.8 miles long.

(c) The Notigi Control Structure regulates the amount of water diverted to the Nelson River via the Burntwood River. Major components consist of the Spillway with three spillway bays, an adjacent electrical service substation building, Main Dam and a Saddle Dam.

(d) The Manasan Falls Ice Control Structure is a passive control structure designed to reduce the risk of inundation due to ice in the City of Thomson on the Burntwood

River. The project consists of an ice boom across the river upstream of a groin/gap structure, a by-pass channel with a concrete overflow weir and a flood channel protected with a fuse plug dyke. The project was initially constructed in 1976 followed by rehabilitation in 1986 and an incorporation of safety features in 1988.

(e) The Churchill Weir is a mitigatory structure designed to increase water levels on the Churchill River to ensure a potable water source and to enhance recreation and aquatic habitat. The structure was built 10 km south of the Town of Churchill, just upstream of Mosquito Point. The structure consists of an overflow section and two dyke sections. The overflow section also features a fishway segment at the lowest point of the weir. The east dyke incorporates the Goose Creek fishway and an emergency flood relief section. These works were essentially completed in October 1999.

The control structures and diversion channel were constructed between 1972 and 1976. The project was fully operational on 1976 09 09 and full diversion flows began by 1977 08 20.

Initial and subsequent approvals

The conditions set in the licence provide safeguards for communities affected by the Churchill River Diversion. The licence conditions limiting Notigi outflows were set based on anticipated downstream inundation levels at certain flows. After construction was completed, initial operations revealed that impacts downstream of Notigi in open water were about as expected and ice impacts were much less than expected. This led to a decision to explore higher diversion flows. On 1978 07 18, Manitoba Hydro requested approval to test the diversion capacity over a wider range than was set out in the Interim Licence.

In a 1978 09 25 response, the Senior Assistant Deputy Minister of Mines, Resources & Environmental Management requested that the (Manitoba) Environmental Assessment and Review Agency (MEARA) review the proposal because this wider range had environmental implications. Manitoba Hydro submitted a proposal to MEARA who in turn asked for the input of several government agencies representing various disciplines. After this input, Manitoba Hydro put forward a revised proposal on 1979 03 05.

On 1979 09 20, the Minister indicated that he had no objection to the test program provided five conditions were met. Condition one was not to exceed the maximum flow requested. Condition two was to obtain the requisite changes to the Interim Licence. This was granted by the Minister on 1979 11 15. Condition three required that the terms of the Northern Flood Agreement (NFA) and the City of Thompson agreement were not violated. The last two conditions required that Manitoba Hydro provide written communication on the progress of the program to communities along the diversion route, the Provincial Departments of Municipal and Urban affairs, Northern Affairs and MEARA.

A copy of each of these five documents that are referred to by date is located in Appendix A.

In subsequent years further testing, known as "Test Programs", was requested and approved. This permitted the exploration of the physical capabilities of the diversion channel and the lower Churchill River. The ranges were limited to flows and levels that the project could accommodate.

The effects of the test programs were examined and documented in the reports listed below.

Test Program Year/Season	Associated hydraulic reports
1979	• 1979 Time Lag Study – Notigi to Thompson
1979/80	• 2,000 cfs Augment Winter Flow Test 1979/80 • Lower Churchill River, Winter Flow Studies, 1979/80
1980/81	• 2,000 cfs Augment Winter Flow Test; 1980/81 • Lower Churchill River, Winter Flow Studies, 1980/81
1981	• 5,000 cfs Augmented Flow Test 1981 – Open Water Season
1981/82	• Lower Churchill River, Winter Flow Studies, 1981/82
1982	• Churchill River Diversion Summer Augmented Flow 1982 (5,000 cfs)
1982/83	• Churchill River Diversion, Winter Flow Studies, 1982/83 (3,000 cfs)
1983/84	• Churchill River Diversion, Winter Flow Studies, 1983/84 (3,000 cfs)
1984/85	• Churchill River Diversion, Winter Flow Studies, 1984/85 (3,000 cfs)

After this testing phase, approvals to deviate from the terms of the Interim Licence have been the same for each winter and summer period since 1986. This mode of operation has become known as the Augmented Flow Program (AFP).

The AFP allows Manitoba Hydro to divert more water on average from the Churchill River into the Nelson River. This is accomplished with an increase in allowable discharges at Notigi and a wider range of levels on Southern Indian Lake to provide additional operating flexibility. The licence amendments have been as follows:

- The Southern Indian Lake minimum level is reduced from 844 feet to 843 feet and the maximum level is increased from 847 feet to 847.5 feet with a maximum permissible drawdown of 4.5 feet.
- The Notigi minimum level is reduced from 838 feet to 834 feet.
- The maximum flow limit at Notigi is increased from 30,000 cfs to 34,000 cfs during November 1 to May 15 and to 35,000 cfs during May 16 to October 31.
- The limit on the Burntwood River flow at Thompson is replaced with a maximum elevation of 619 feet at the Thompson seaplane base during May 16 to October 31 and 623 feet at the Thompson Pumphouse during November 1 to May 15.

Over the course of several years of operating with the terms of the AFP, the province confirmed that no licence under the Environment Act is required. This was confirmed by two deputy ministers of the Department of Environment in letters dated 1990 04 11,

1991 04 23 and 1992 03 11. The Minister of Conservation reaffirmed this in response to a Winnipeg resident on 2009 09 29. See Appendix A for a copy of these letters.

In addition to the reporting requirements set out in the 1979 approval, Manitoba Hydro has increased the number of stakeholders to which it distributes information.

Public communication with respect to its operations includes 60-day water level forecasts, monthly operating notifications, monthly AFP bulletins as well as local radio station announcements. Water level forecasts are also available on the Manitoba Hydro website.

Community Involvement

Manitoba Hydro has consulted with affected communities on the effects of the project prior to and during the operation of the project. Settlement agreements have been negotiated with affected communities, which set out provisions for mitigation, remediation and compensation. The largest physical mitigation structure on the Churchill River Diversion system is the Churchill weir which was built to moderate project effects.

Communication with the purpose of understanding and resolving community needs will continue indefinitely. Manitoba Hydro has entered into agreements with communities and stakeholders since the project was approved in an effort to provide mitigation and or compensation. The list below is a summary of these:

- Churchill
  - 1978 - Agreement with the L.G.D. of Churchill on water supply
  - 1997 - Agreement with the Town of Churchill on the transfer of water supply facilities and the construction of the Churchill weir.
  - 1998 - Fish Habitat Compensation Agreement for Churchill River Water Level Enhancement Project between Canada and Manitoba Hydro
  - 2000 - Agreement with Kischikamee Treaty Council Inc.

- Federal, Provincial, Community and Corporate
  - 1977 - Northern Flood Agreement
  - 1977 - Agreement between Manitoba, Manitoba Hydro, Northern Flood Committee, and Canada to establish a Development Corporation

- Ilford
  - 1976 - Compensation for fish reduction program and transportation subsidy

- Nelson House / Nisichawayasihk Cree Nation (AFP impacts are recognized in these agreements.):
  - 1992 - Compensation agreement
  - 1996 - Comprehensive Implementation Agreement (CIA) pursuant to the Northern Flood Agreement

  - 2000 - Expanded Corporate Waterways Management programming along with the continuation of Safe Ice Travel Trail provisions set out in the CIA.

- Thompson area:
  - 1976 - Agreement to undertake mitigation works and to transfer lands to the City of Thompson.
  - 1977 - Compensation agreement with Twilight Water Ski Club.
  - 1982 - Amendment to the 1976 agreement with the City of Thompson exchanging the transfer of lands for street lighting.
  - 2000 - Boat patrols during the open water season under the expanded Corporate Waterways Management program.

- Split Lake / Tataskweyak Cree Nation:
  - 1992 - Comprehensive Implementation Agreement (AFP impacts are recognized in this agreement.)
  - 1996 - Predetermined Compensation agreement pursuant to the Northern Flood Agreement
  - 2000 - Expanded Corporate Waterways Management programming along with the continuation of Safe Ice Travel Trail initiatives.
  - 2009 - Implementation agreement referred to as the “2008 Agreement” (Some operating parameters of the AFP are the basis for triggering pre-determined compensation)

- Southern Indian Lake area (AFP impacts are recognized in agreements starting in 1984.):
  - 1975 - Registered Trapline Program
  - 1979 - Commercial Fisherman’s Assistance Program
  - 1984 - South Indian Lake (SIL) Commercial Fisherman’s Association Agreement
  - 1985 - SIL Trapper’s Association Agreement
  - 1990 - SIL Commercial Fisherman’s Association Agreement
  - 1991 - Community Association of South Indian Lake (CASIL) representing the South Indian Lake Housing Association Agreement
  - 1992 - CASIL agreement
  - 1999 - SIL Commercial Fisherman’s Association Agreement
  - 2000 Boat patrols and Safe Travel Trails
  - 2000 - Debris Management Program now called Waterways Management Program (WMP)
  - 2001 - Additional boat patrol under WMP
  - 2003 - Southern Indian Lake Environmental Steering Committee

- York Factory First Nation (AFP impacts are recognized in this agreement.):
  - 1996 - Comprehensive implementation agreement pursuant to the Northern Flood Agreement
  - 2000 - Expanded Corporate Waterways Management programming along with the continuation of Safe Ice Travel Trail provisions set out in the CIA.

Section 2 – Observance of Licence Conditions

This section of the report provides an evaluation of the observance of the Interim Licence on a term by term basis. Authorizations to deviate from several terms of the Interim Licence have been temporarily granted from time to time for various test programs and the Augmented Flow Program. The main body of the report addresses observance of these terms according to the currently approved amendments. The appendices address prior amendments and the original terms of the Interim Licence. The final part of this section sets out the additional conditions imposed on Manitoba Hydro as part of the approval for the Augmented Flow Program and observation of those conditions.

1. **General Construction Plans**

   Licence Term

   The Licensee shall file the general construction plans of the undertaking authorized hereby with the Director in such form and detail as is required by the Regulations within three (3) months from the date of this Interim License.

   Observance

   Manitoba Hydro does not have record of the date(s) that the plans were submitted to the Province, however they must have been submitted in order for the Province to allow commencement of construction. Subsequent to completion of the project, Manitoba Hydro submitted as-built versions of the general construction plans.

2. **Construction Period**

   Licence Term

   After the general construction plans have been approved, the Licensee shall begin the construction of the undertaking authorized hereby within the time limit provided in the Regulations, and shall thereafter without interruption, except such as may be occasioned by act of God or other major cause beyond the control of the said Licensee (other than want of funds), carry on and complete the construction of the said undertaking according to the plans so approved or as the same may be amended or modified at the direction and with prior approval of the Minister during the progress of construction, and subject to the terms of this Interim License and of the Regulations and all amendments thereto as may be made from time to time.

   Observance

   Construction of the project commenced in February 1973 following the issuance of the initial Interim Licence for the project on 1972 12 19. This licence was superseded by the current Interim Licence issued on 1973 05 11. The primary differences between these two authorizations are noted in the Introduction in Section 1 on page 5. Construction commenced within the 6 months following approval of the general construction plans allotted under Section 26(2) of the Regulations. Construction continued without interruption until completion.

3. **Construction Completion**

Licence Term

Within five (5) years from the date of this Interim License, the Licensee shall have satisfactorily completed the undertaking and shall have installed all the machinery and equipment required for a development capable of diverting waters of the Churchill River to the Nelson River, and of impounding an estimated 41,600 c.f.s. months of water above elevation 844.0 feet for the development of water power, as authorized by this License.

Observance

Manitoba Hydro completed the undertaking and installed all machinery and equipment prior to a date five (5) years from the date of the Interim Licence, 1973 05 11. The completion date of 1976 09 01, as determined by the Province in a 1978 02 15 letter, was within the five year limit date of 1978 05 11. A copy of the 1978 02 15 letter can be found in Appendix A.

4. **Notification of Completion**

Licence Term

The Licensee shall notify the Director in writing of the completion of the development, and the Director shall thereupon determine a date which, for the purpose of the Interim License and Regulations, shall be the date of completion of the development and shall be the earlier of:

(a) the actual date on which the development commences the diversion of waters of the Churchill River

(b) the date fixed in Article 3 hereof as the limiting date by which the development is to be completed, whether the same shall have been completed or not.

Observance

A 1978 01 05 letter from the Minister of Mines Resources and Environment indicates to Manitoba Hydro that the Province had been advised the project was in full operation. Manitoba Hydro provided written notification of completion to the province on 1978 01 30. In response, the Province determined that 1976 09 01 was the completion date of the initial development for licence and regulation purposes. This date coincides with the actual date of the first operation and commissioning of the Notigi Control Structure. The development was completed ahead of the date fixed in Article 3, being 1978 05 11. A copy of each of these documents can be found in Appendix A.

5. **Project Lands**

Licence Term

The Licensee may enter upon, use and occupy for making surveys and investigations and constructing works as may be deemed necessary for the undertaking, such lands of the Province as may reasonably be required for the said purposes and may flood such lands as are designated on a plan identified as No. 60-1-1007 or as such plan may be amended and limited from time to time by the Minister provided that, when so requested in writing by the Director, following completion of the development and

the commencement of the diversion and/or storage of water, the Licensee shall cause a survey to be made and a plan prepared by a Manitoba Land Surveyor showing in detail the lands required to be occupied for the purposes of the diversion and storage development and the lands required for flooding purposes only, such survey shall be limited to include only such areas for the said purposes as the Director may approve and shall be prepared in accordance with Section 24 of the Regulations.

Observance

While Manitoba Hydro has no record of such a request having been made by the Director, a severance line has been determined describing the lands required for the project. This line is legally definable either by the provincial section grid or legal survey plans. Surveys have been carried out and survey plans have been prepared at all the communities affected by the project. These include Thompson, Nisichawayasihk Cree Nation (Nelson House), O-Pipon-Na-Piwin Cree Nation (South Indian Lake), Leaf Rapids and Churchill. As the project circumference is well over 2,500 lineal miles (over 4,000 kilometres), most of the severance line is defined according to the provincial section grid. Drawings have been prepared showing the severance line and lands required for the project as shown on drawings 1-00188-PE-11510-0002 (sheets 1 to 32).

6. **Rights-Of-Way**

Licence Term

The Licensee shall also from time to time in accordance with Section 24 of the Regulations cause surveys to be made and plans prepared by a Manitoba Land Surveyor of all lands required as rights-of-way for transmission lines, roads, railways and other purposes of the undertaking, as the locations thereof become defined, as distinct from those purposes described in Article 5 hereof.

Observance

Manitoba Hydro has surveyed and registered plan 21920 PLTO for a road and electrical transmission to supply power to the Notigi Control Structure. Roads required for the project are found at Thompson, Manasan, Notigi, the diversion channel, Missi and Churchill. The majority of these roads are contained within the project licence area which provides a measure of protection from having the land disposed of for some other purpose by the Province. The exception to this clause is the roads located within the boundary of the City of Thompson. These roads are located within lands that by agreement are deemed to be flooded and as such are protected from disposition by the City of Thompson.

7. **Licence Execution**

Licence Term

The Licensee may divert and store for the development of water power the water of the Churchill River which may be flowing from time to time during the term of this Interim License, subject, however, to the provisions of Section 72 of the Regulations and Articles 10 and 11 hereof.

Observance (see next page)

Observance

Manitoba Hydro recognizes that other beneficial uses of the water resource occur and operates in a manner that attempts to minimize the impact of its operations on those other uses as required by Section 72 of the Regulations. More detail regarding observance of this section of the Regulations can be found in Section 3 of this report. Observance of Articles 10 and 11 are included in the appropriate sections below.

8. **Land Rentals**

Licence Term

The Licensee shall pay a rental for the use and occupation of Crown lands required for the purposes described in Articles 5 and 6 hereof in such amounts or at such rates as may be fixed by the Lieutenant Governor in Council.

Observance

Manitoba Hydro has paid $285 000 per annum in land rentals according to Order-In-Council 699/1979 until 1995. As a result of an amendment to Article 48 of Water Power Act Regulation 25/88R, land rentals are now based on the number of acres associated with a project. The annual land rental paid from 1996 until April 2010 was $238 756.90. The annual land rental rate payable since then is $429 762.42.

9. **Maximum Southern Indian Lake Water Level**

Licence Term

Subject to Article 11 hereof, and except as may be otherwise authorized by the Minister, the Licensee shall, during periods when the water level of Southern Indian Lake is above elevation 847 feet, operate the Missi Falls and Notigi control structures in such a manner as to effect the maximum discharge possible under the circumstances then prevailing until the water level of the said lake returns to elevation 847 feet.

Approved alteration

Permit the maximum water level of Southern Indian Lake to be increased from elevation 847.0 feet to 847.5 feet. (Note: This approved alteration was in effect from time to time prior to 1986 and continuously since then.)

Observance since 1986

Manitoba Hydro operates to comply with this term and the approved alterations to the licence. Figure 2 shows that there have been seventeen events where the wind-eliminated water level on Southern Indian Lake rose above 847 feet or 847.5 feet, depending on the authorization in place at that time. An accounting of these events and supporting documentation is included in Appendix B.

During these events, Manitoba Hydro increased outflow from the lake. In consultation with the Province, the magnitude of these increases was moderated according to the circumstances then prevailing as provided for under this term of the licence. Some of the factors influencing the decision include the safety of the users of the affected waterways and environmental concerns.

Observance - Water level determination and limitations prior to 1986
The water level of Southern Indian Lake is based on water level measurements at four Water Survey of Canada gauging stations on the lake. These gauging stations are located at Opachuanau Lake, the community of O-Pipon-Na-Piwin Cree Nation (South Indian Lake), South Bay and Missi Falls. The mean of the daily average water levels from the available gauges is smoothed over a five-day period to eliminate the effects of wind setup and wave uprush.

Until about 1986, the only data available on a day after the fact basis was from Missi Falls spot readings. Depending on the conditions at the time, these readings may or may not have been a true indicator of the actual lake level. There were several occurrences where these spot readings were considered unreliable indicators of average daily conditions. Strip chart readings from the other three locations were gathered approximately once every week to two weeks. Wind-eliminated Southern Indian Lake water levels were then calculated so that an accurate indication of actual water levels was only known some time after operational decisions had to be made. Since then, data has for the most part been available on a real time or a day after the fact basis with the installation of data collection platforms.

10. **Minimum Southern Indian Lake Water Level**

Licence Term
Subject to Article 12 hereof, and except as may be otherwise authorized by the Minister, the Licensee shall regulate the water level of Southern Indian Lake so as to prevent the water level from receding below elevation 844 feet.

Approved alterations
Permit the minimum water level of Southern Indian Lake to be decreased from elevation 844.0 feet to 843.0 feet. (Note: This authorization has been in effect continuously since the winter of 1984/85. Two previous authorizations provided for a decrease to elevation 842.0 feet.)

Observance
Manitoba Hydro operates to comply with this term and the approved alterations. Figure 2 shows that there have been seven events where the water level on Southern Indian Lake has been below 844 feet or 843 feet, depending on the authorization in place at that time. An accounting of these events and supporting documentation is included in Appendix C.

- Operating limitations
  The magnitude of inflows into Southern Indian Lake is largely regulated by releases at upstream generating stations in Saskatchewan. These inflows have a significant influence on Manitoba Hydro's ability to regulate the level of Southern Indian Lake. During low flow conditions, variations in anticipated inflows have resulted in the lake falling below the authorized minimum.

  Limitations on water level determinations prior to 1986 are explained under

licence term #9, in the last paragraph under heading "Observance - Water level determination and limitations prior to 1986".

11. **Maximum Notigi Outflows**

Licence Term

The Licensee shall not release more than an average weekly flow of 30,000 cubic feet per second through the Notigi control structure and shall vary the magnitude of the release through that structure from time to time in order to ensure that the flow in the Burntwood River, as measured at the Provincial Government gauging station at Thompson, shall not exceed the average mean flow plus 30,000 cubic feet per second.

Approved alteration

Summer (May 16 to October 31):

Permit the average weekly flow at the Notigi Control Structure to be increased from 30,000 cfs to 35,000 cfs;

Permit the allowable flow at Thompson to be controlled by a maximum elevation of 619.0 feet above sea level at the Thompson Seaplane Base;

Winter (November 1 to May 15)

Permit the average weekly flow at the Notigi Control Structure to be increased from 30,000 cfs to 34,000 cfs; and

Permit the allowable flow at Thompson to be set by a maximum elevation of 623.0 feet at the Thompson Pumphouse

Note: The approved alteration for both summer and winter has remained unchanged since 1986. The same summer alterations were approved for 1985 and 1984 while the 1983 and 1982 alterations had other time parameters and the 1981 alteration had a 34,000 cfs outflow constraint. Alterations for the winter periods 1986/87 to 1982/83 and 1980/81 to 1979/80 were approved with outflow constraints of 33,000 cfs and 32,000 cfs respectively. Figure 3 shows that there were several events where the flows exceeded the maximum limit. An accounting of these events and supporting documentation is included in Appendix D.

Observance

Notigi outflow

Manitoba Hydro operates to observe the seasonal outflow limits at Notigi by setting the gates such that the weekly average outflow is not exceeded. In spite of this, Figure 3 shows that there have been a number of instances where the weekly average flow through the Notigi Control Structure has exceeded the authorized outflow.

The majority of the days where the outflow constraint has not been adhered to occurred in 1981 and 1982 when the limit on the maximum outflow was reduced to 20,000 cfs.

In the fall of 1986, 1997, 2000, 2006, 2007and 2008, the maximum outflow

constraint was exceeded. These events were the result of the day of the week that the outflow constraint changed from 35,000 to 34,000 cfs and the use of a weekly average flow in reporting. During the week of transition from 35,000 to 34,000 cfs, the weekly average flow may exceed 34,000 cfs. Manitoba Hydro suggests that this is not a violation provided the daily flows are at or below the flow limit.

From 1986 to 2007 there were eight other events where the maximum outflow was exceeded due to errors in predicting the decline of flows.

Thompson water level

Figures 4 and 5 show that Manitoba Hydro has achieved 100% adherence with the seasonal elevation constraints at both the Thompson Seaplane Base and Thompson Pumphouse.

- Accuracy capability

  There are a few factors that affect Manitoba Hydro's ability to set exact flows at Notigi.

  Firstly, the gates are set using coarse instrumentation such that the actual gate position accuracy is in the order of about ± 0.1 feet. The vantage point of the operator is the primary reason for the variation. For example, at high gate settings (above eye level) the gate position is actually lower than it appears, but is recorded based on what is seen. Under these conditions, outflow calculations are generally overstated. An increment of 0.1 feet changes the outflow between 100 to 200 cfs depending on the number of gates being operated and the forebay elevation.

  Secondly, as the structure is normally unmanned, gates are rarely adjusted more than once per day. On average, gate changes are made about once a week. Depending on the circumstances, adjustments are made as frequently as several times in a day to once every few weeks. The normal pattern of operation requires judgement and experience. Gate settings are based on whether the Notigi forebay is rising or falling and also the speed at which it either declines or rises. As the licence is based on a weekly average flow, gates are set either higher or lower than the target flow so that on a weekly basis the average flow is equal to the target flow. This is important to maximize the resource for maximum generation potential as required under section 72 of the Regulations.

  Because of these factors, flows within 100 cfs of the prescribed limit have been considered to be in adherence for the purpose of this report.

12. **Minimum Missi Outflow**

Licence Term

Releases from Missi Falls control structure shall not be less than 500 cubic feet per second during the open water period and 1500 cubic feet per second during the ice cover period. Such greater releases as may be required for the needs of downstream interests shall be released as ordered by the Minister.

Observance

Manitoba Hydro sets the spillway gate openings at Missi Falls Control Structure to observe this term. The outflow from this structure is the sum of the spillway and House Unit flows. The House Unit runs continuously unless it is stopped for maintenance. Median House Unit flows range from about 65 cfs in early August to about 155 cfs during mid-winter. Factors affecting Manitoba Hydro's ability to operate this control structure are outlined below.

- Spillway accuracy capability

  Spillway outflow calculations are based on a combination of gate settings and forebay elevation. Although the level of Southern Indian Lake changes gradually over time, there are local fluctuations due to wind resulting in corresponding changes in calculated daily outflows. When flows approach the targeted amount, it is possible on a daily basis, for flows to temporarily dip below this target even though no gate adjustment was made. Judgement is therefore required to determine the appropriate gate setting.

  The gates are set using coarse instrumentation such that the actual gate position accuracy is in the order of about ± 0.1 feet. At low outflows each 0.1 foot increment is approximately equal to 100 cfs. The vantage point of the operator is the primary reason for the variation. For example, at low gate settings (below eye level) the gate position is actually higher than it appears, but is recorded based on what is seen. Under these conditions, outflow calculations are generally understated. As such, all outflows to date would meet the minimum criteria if 100 cfs were to be added to the outflow.

  Because of these factors, flows within 100 cfs of the prescribed limit have been considered to be in adherence for the purpose of this report.

- Limited access

  As Missi Falls is in a remote location, gate adjustments can not always be made in a timely fashion due to inclement weather. Therefore minor adjustments required to maintain outflow as the level of Southern Indian Lake changes may sometimes be delayed.

- Transition between open water and ice cover periods

  This licence condition allows for some judgment in the determination of open water and ice cover periods. Arbitrary dates of May 1 and November 1 have been used to mark the beginning and end of the open-water and ice-cover periods

to establish some measure of observance. The purpose of the increased flow during the winter is to ensure a potable water supply for the town of Churchill. In actual fact, there is a transition period between ice cover and open water and visa versa with each year being different in terms of the beginning date and length of the transition.

- Determination of open water condition
  In most years, the onset of the spring freshet on the lower Churchill River was deemed to occur when lower Churchill River flows and/or water level gauge readings increased quickly. This event was the trigger to reduce Missi outflow to the open water minimum if conditions allowed. Although this procedure is logical it was never verified in the field. Every spring since 2005, Manitoba Hydro implemented a procedure to aid in determining the timing of reducing Missi outflow to the open water minimum. Water levels and flows are monitored on the Churchill River mainstem and three main tributaries for indications that the spring freshet is underway. Once water level gauges indicate that the spring freshet has occurred, a field check of conditions along the lower Churchill River is performed prior to issuing the operating instruction for Missi Control Structure. Manitoba Hydro will continue this practice until confidence is established in this relationship.

- Winter conditions
  Manitoba Hydro has generally increased outflows well beyond the minimum required to ensure that the town of Churchill has adequate potable water supplies during the ice cover period. Prior to the installation of the Churchill weir the timing of flow increases at Missi was based on anticipated ice-cover conditions at Churchill. Missi flows were increased at least one week in advance of this expected condition. Although the weir now provides adequate water levels without an increase in outflows, they are set according to the historical minimum that occurred between 1986 and 1998.

- Summary
  Using the dates May 1 and November 1 as arbitrary marker points for adherence, Figures 7 (a) & (b) show events where flows have been lower than the prescribed minimum. The maximum excursion during the open water period was 46 cfs below 500 cfs minimum and during the ice cover period was 72 cfs below 1,500 cfs. The median of all the excursions is 13 cfs. All of these are within a 100 cfs tolerance band.

  There were three events with excursions between 50 and 72 cfs that were caused by unexpected flow reductions at the House Unit. These occurred between 1996 and 2000.

  There have been 15 events with excursions less than 50 cfs. Most of these were due to temporary fluctuations in Southern Indian Lake water levels that caused the calculated outflow to dip below the minimum requirement. The last

excursion that took place was in 2004 and was 8 cfs below the 1,500 cfs minimum.

Since 2005 Manitoba Hydro has implemented a policy to set outflows such that the minimum requirement is met from spillway releases alone. This was done to assure the elimination of future excursions below the minimum requirement.

13. **Flow Forecasts**

Licence Term

As and at the times requested by the Minister, the Licensee shall submit to the Minister, for his approval, a schedule of the proposed releases from, over, or through the several works, and the Minister may approve the schedules with or without variation; and subject to any order made under the Act, the Licensee shall comply with the schedules so approved.

Observance

Manitoba Hydro provides weekly notices of its schedule and 90-day forecasts to the Province. Manitoba Hydro also provides copies of its 90-day forecast to those communities affected by the Churchill River Diversion including O-Pipon-Na-Piwin Cree Nation (South Indian Lake), Nisichawayasihk Cree Nation (Nelson House), City of Thompson, Town of Churchill, Tataskweyak Cree Nation (Split Lake), York Factory First Nation, and Nelson House Community Council.

14. **Brush Clearing**

Licence Term

The Licensee shall, to the satisfaction of the Minister, clear and keep clear, from timber, brush and other material, lands which are to be flooded.

Observance

Manitoba Hydro cleared trees prior to impoundment according to the recommendations of the Lake Winnipeg, Churchill and Nelson Rivers Study Board. Manitoba Hydro has an ongoing program to remove debris from the Churchill River Diversion waterways. The program uses locally hired boat patrols to identify and remove debris.

15. **Limit on Flow Changes**

Licence Term

Subject to Articles 10 and 11 hereof, but notwithstanding any other terms or conditions of this Interim License, the Licensee shall operate the Missi Falls and Notigi control structures in such a manner that:

a) Any increase or decrease in the rate of outflow through either structure during any 24 hour period shall not exceed 10,000 cubic feet per second, and,
b) The drawdown in water level in Southern Indian Lake during any 12 month period shall not exceed two feet, and

c) The water level immediately upstream of the Notigi control structure shall not decline to less than elevation 838 feet.

Approved alteration

b) Permit the drawdown of Southern Indian Lake to be 4.5 feet from elevation 847.5 feet to 843 feet;

c) Permit the minimum water level immediately upstream of the Notigi Control Structure to be reduced from elevation 838.0 feet to 834.0 feet.

Other alterations to terms b) and c) were authorized by Manitoba. A discussion of those alterations and Manitoba Hydro's observation is included in Appendix E.

Observance (a) - Missi Falls

There were four instances when the rate of change in outflow constraint at Missi Falls Control Structure was exceeded. These all occurred in the first five years of operations. In each case, Manitoba Hydro attempted to reduce the water level on Southern Indian Lake in accordance with Article 9. When water levels rise rapidly and the lake is near full supply level, a decision must sometimes be made as to whether Article 9 or 15 (a) will be violated. A chart showing the absolute change in rate of flow is shown on Figure 8. Details surrounding these instances are provided in Appendix E.

Observance (a) – Notigi

Manitoba Hydro achieved 100% adherence with the rate of change in outflow constraint at the Notigi Control Structure as shown in Figure 9 until 2006. Documentation of the exceedance in 2007 and the ones in 2009 are provided in Appendix E.

Observance (b) - Southern Indian Lake drawdown

Manitoba Hydro has achieved 100% adherence with the approved alteration of this licence term based on the understanding stated below. A discussion of adherence prior to 1986 can be found in Appendix E. A chart showing the drawdown rate is shown on Figure 10.

General understanding of observance (b)

Based on a 1981 04 29 memo from Manitoba Hydro to Water Resources Branch and their response on 1981 05 12, the drawdown limitation applies to water levels within the range authorized for normal operation. Peak water levels associated with flood events are not used in the calculation of the drawdown limit. Without this understanding, minimum outflows during the winter period may not be possible under certain hydrological conditions. The response from Water Resources Branch also states that this is one of the articles that should be changed when drafting a Final Licence. A copy of each of these documents is located in Appendix E.

Observance (c) - (see next page)

Observance (c) - Minimum Notigi forebay elevation
Manitoba Hydro has achieved 100% adherence with the minimum water level immediately upstream of the Notigi Control Structure as shown in Figure 11.

16. **Landing Stations**

Licence Term
The Licensee shall, as ordered by the Minister, post any "landing" or "refuge" station or stations established along the shorelines of the storage reservoirs maintained under authority of this Interim License on Southern Indian Lake and the Rat River

Observance
Manitoba Hydro, as part of its ongoing waterways management program, removes debris, marks navigational hazards, posts navigation markers and ensures safe mooring sites. This activity is done in coordination with the residents of the affected waterways.

17. Licence Plans

Licence Term
The plans filed by the Licensee and made a part of this Interim License are as follows:

Manitoba Water Resources Branch File Number	Licensee's File Number	Description
60-1-1008	7001-E-59(Sht.1)(Rev.1)	Location plan and preliminary typical sections of control structures
60-1-1007	No file number available	Topographical map Southern Indian Lake and Rat River region

Observance
No statement is required by Manitoba Hydro.

18. **Final Licence**

Licence Term
Upon the satisfactory completion by the Licensee of the development in accordance with Article 3 hereof and upon due observance and fulfillment by it of all the terms and conditions required by this Interim Licence, and under the Regulations and all amendments thereto as may be made from time to time, to be by it observed and fulfilled, the Minister shall and will issue in favour of the Licensee a Final License for the diversion and storage of water for the development of water power and for the use or occupation of those lands of the Province which, in the Minister's opinion, are required for the proper operation and maintenance of the works authorized. The said Final Licence shall be issued subject to the regulations then in force and shall

embody such matters as the Minister may determine in accordance with the regulations.

Observance
Manitoba Hydro is of the opinion that it has observed and fulfilled all the terms and conditions of this Interim Licence and all the amendments thereto and requested a Final Licence on 2009 05 06.

19. **Plans Part of the Licence**

Licence Term
All record plans filed with the Director and referred to in this Interim Licence are incorporated herewith and made a part hereof.

Observance
No statement is required by Manitoba Hydro.

20. **Licence Subject to Regulations**

Licence Term
This Interim License is issued upon the express condition that it shall be subject to the provisions of the Regulations and all amendments thereto as may be made from time to time.

Observance
Manitoba Hydro's adherence with the Regulations is addressed in Section 3 of this report.

21. **Reference Elevation**

Licence Term
All elevations mentioned herein are based on Inland Waters Branch Bench Mark which is a brass cap set in bed rock 5 feet north and 11 feet west of the northwest corner of the Manitoba Government Air, Radio and Technical Services Division dock at the South Indian Lake Settlement. This Bench Mark defines elevation 839.58 feet.

Comment - Observance
The brass cap referred to in this licence term is also known as BM#2 and was inundated as part of the development. Bench Mark L30-1 has been used as a substitute reference point. Both BM#2 and Bench Mark L30-1 are on the same Churchill River Diversion Construction Datum, 1973 Revision. All water surface levels pertinent to this Interim licence are measured based on Bench Mark L30-1.

Approved alterations of the Interim licence since 1981 provide for operations based on water levels at two locations on the Burntwood River near Thompson. These water levels are measured based on Bench Mark L22-1. This Bench Mark is based on Geodetic Survey of Canada, Canadian Geodetic Vertical Datum 1928, 1971 Local Adjustment.

Additional Terms and Conditions Resulting From Augmented Flow Program and Test Programs

1. **Observance of Other Agreements**

   Imposed condition

   Provided in all cases that: 1. The Nelson House Agreement, the Split Lake Agreement, the York Factory Agreement, or the City of Thompson Agreement would not be violated as a direct result of the Augmented Flow Program; (Note: This wording taken from the authorization issued in 2009. There have been modest variations of this since the commencement of these programs.)

   Observance

   - Any excursions from a specified range are not considered violations of the agreements with Nelson House (Nisichawayasihk Cree Nation), Split Lake (Tataskweyak Cree Nation), and York Factory communities as pre-determined compensation has been established.
   - City of Thompson – There are three relevant clauses that apply with regard to adherence to the Augmented Flow Program.
     - **Condition:**
       Article 6 – *Manitoba Hydro, at its cost, and for so long as it shall continue to operate under and by virtue of the Interim Licence and/or the Licence or under such other licence or licences as shall be issued in place thereof, or pursuant to any other authority, covenants and agrees as follows:*
       - **Sub-Condition:**
         (k) *to monitor the flow of water in the Burntwood River within the boundaries of the City, maintain records thereof, and provide copies of such records to the City on a regular basis;*
         Observance:
         Manitoba Hydro provides the City of Thompson with the "Churchill River Diversion Weekly Report". This weekly report provides a status of current flow and water level conditions.
       - **Sub-Condition:**
         (l) *to notify the City prior to causing any change in the water level of the Burntwood River at Thompson as a result of the operation of the Notigi structure and/or any other structure that may be constructed by Manitoba Hydro, and which may affect the level of the Burntwood River at the City;*
         Observance:
         Manitoba Hydro provides the City of Thompson with monthly forecasts of its intended operations.
     - **Condition:**
       Article 7 – *Manitoba Hydro agrees that if at any time hereafter it shall apply to the Water Resources Branch of the Department of Mines, Resources and Environmental Management, or other appropriate authority of the Province of Manitoba, for permission to increase the flow of water in the Burntwood River by means of the Churchill River Diversion beyond 34,000 cubic feet per second measured at the Thompson bridge, it shall concurrently so advise the City in writing.*

Observance:
Manitoba Hydro provides a copy of the requests for the "Churchill River Diversion" Water Power licence deviations to the mayor of Thompson. Part of this request includes an increase to the maximum allowable flows along the Burntwood River.

2. **Program Termination**

Imposed Condition

Manitoba Hydro agrees to terminate its program and decrease diversion flow to appropriate levels if at any time it appears that the above noted conditions may be violated, or if conditions arise which would present a hazard to local residents;

Observance

Manitoba Hydro takes into consideration the safety of those using the waterways. For example, flows at Notigi are reduced if the fuse plug in the Manasan weir is near its operating point. This is done to ensure the safety of the residents in Thompson. Although temporary flow reductions have been made, the program has never been terminated.

3. **Monthly Reporting to Province**

Imposed Condition

The Executive Director of the Regulatory and Operational Services Division of my department be kept fully informed of all aspects of the Augmented Flow Program by means of monthly written reports;

Observance

Monthly reports have been sent to the branches, departments and agencies listed. The reports fulfilling this requirement include 90-day forecasts, operating plan notices and monthly bulletins. The bulletins provide charts showing flows and water levels for the preceding eight months.

The listed recipients have changed over the course of authorizations. The following list indicates these:
2009/2010 to 2007/2008 – Executive Director of the Regulatory and Operational Services Division of my department (Water Stewardship)
2006/2007 to 2005/2006 – Executive Director of the Infrastructure and Operations Division of my department (Water Stewardship)
2004/2005 – Director of the Water Branch of my department (Water Stewardship)
2003/2004 to 2002/2001 – Director of Environmental Approvals Branch and the Director of the Water Branch both of my department (Conservation)
2001/2002 – Director of Approvals and the Director of Water of my department (Conservation)
2000/2001 – Director of Environmental Approvals Branch and the Director of Water Resources of my department (Conservation)
1999/2000 to 1998/1999 – Director of Environmental Approvals Branch and the Director of Water Resources of my department (Natural Resources)

1997/1998 to 1993/1994 – Director of Environmental Approvals of the Department of Environment
1992/1993 to 1991/1992 – Department of Environment
1990/1991 to October 1988 – Department of Environment and Workplace Safety and Health
1987/88 to 1984/1985 – MEARA

4. **Monthly Reporting to Stakeholders**

Imposed Condition

- *From 1997/1998 to present:*
  Monthly written reports on the (fiscal year in question) Augmented Flow Program be forwarded to the Nelson House First Nation, Split Lake First Nation, York Factory First Nation, and affected communities;
- *From 1984/1985 to 1996/1997*
  Monthly written reports on the (fiscal year in question) Augmented Flow Program will be forwarded to the Northern Flood Committee and affected communities.

Observance

Monthly reports were sent to the First Nations listed as well as affected communities, associated agencies, certain government agencies and resource user groups, and during its existence to the Northern Flood Committee. Manitoba Hydro sends monthly reports to numerous other recipients beyond its obligations under this condition.

5. **Mitigation of Effects**

Imposed Condition

Manitoba Hydro fully mitigate any effects of the altered levels and flows; and

Observance

Agreements, mitigation and compensation arrangements have been made with affected communities. A brief summary of this is outlined beginning on page 8 of this report. To ensure the continuance of mitigatory efforts, Manitoba Hydro has staff whose function is to respond to community and resource concerns. These communications and activities are ongoing.

6. **Staged Drawdown**

Imposed Condition

The maximum drawdown of Southern Indian Lake of 4.5 feet be staged over a period of time and in such a manner so as to minimize adverse impacts on Southern Indian Lake residents.

Observance

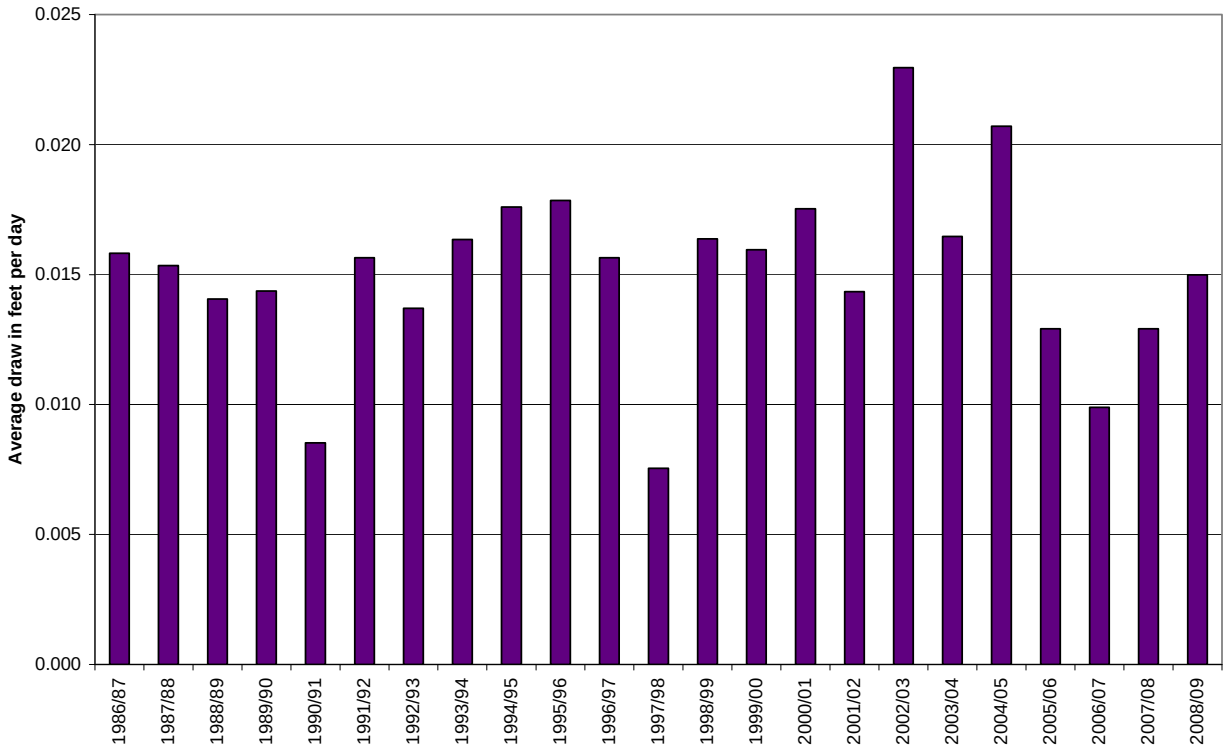
Manitoba Hydro stages the drawdown over a period of time and in such a manner so as to minimize adverse impacts on Southern Indian Lake residents. See table and chart on next page.

Augmented Flow Program Licence Staged Drawdown Condition on Southern Indian Lake:
Manitoba Hydro stages the drawdown over a period of time and in such a manner so as to minimize adverse impacts on Southern Indian Lake residents

Fiscal Year	Date of maximum	Date of minimum	No of days between maximum and minimum	Southern Indian Lake water level in feet			Average draw in feet per day	Average draw in inches per day	Comments
				Maximum	Minimum	Draw			
1986/87	1986 11 01	1987 04 15	165	846.00	843.39	2.61	0.01582	0.18981	Authorization commences 1986 11 01
1987/88	1987 10 06	1988 03 28	174	845.75	843.08	2.67	0.01534	0.18413	
1988/89	1988 08 23	1989 05 04	254	846.66	843.09	3.57	0.01405	0.16866	
1989/90	1989 07 24	1990 04 09	259	846.69	842.97	3.72	0.01436	0.17236	
1990/91	1990 08 05	1991 03 29	236	844.96	842.95	2.01	0.00852	0.10228	
1991/92	1991 08 08	1992 04 27	263	847.09	842.98	4.12	0.01565	0.18779	
1992/93	1992 07 14	1993 02 28	229	846.43	843.29	3.14	0.01370	0.16436	
1993/94	1993 10 03	1994 04 28	207	846.55	843.17	3.38	0.01634	0.19613	
1994/95	1994 07 16	1995 01 30	198	846.75	843.27	3.48	0.01760	0.21121	
1995/96	1995 10 11	1996 05 01	203	846.46	842.84	3.62	0.01785	0.21421	
1996/97	1996 08 13	1997 04 28	258	847.27	843.23	4.04	0.01564	0.18771	
1997/98	1997 09 15	1998 04 20	217	847.50	845.86	1.64	0.00754	0.09050	Minimum draw
1998/99	1998 07 17	1999 04 09	266	847.37	843.01	4.35	0.01637	0.19645	
1999/00	1999 09 28	2000 04 15	200	846.42	843.23	3.19	0.01595	0.19140	
2000/01	2000 07 29	2001 04 23	268	847.73	843.03	4.70	0.01753	0.21041	See Note
2001/02	2001 07 10	2002 05 09	303	847.39	843.04	4.34	0.01434	0.17206	Maximum no. of days
2002/03	2002 10 19	2003 04 06	169	847.05	843.17	3.88	0.02296	0.27552	Maximum average draw
2003/04	2003 10 15	2004 03 06	143	845.48	843.13	2.35	0.01647	0.19759	Minimum no. of days
2004/05	2004 09 30	2005 04 11	193	847.30	843.30	4.00	0.02071	0.24850	
2005/06	2005 07 29	2006 04 27	272	847.67	844.16	3.51	0.01291	0.15498	
2006/07	2006 08 05	2007 04 24	262	847.40	844.81	2.59	0.00990	0.11875	
2007/08	2007 08 04	2008 05 12	282	847.39	843.75	3.64	0.01291	0.15494	
2008/09	2008 08 10	2009 05 03	266	847.42	843.43	3.99	0.01499	0.17983	
Average			230				0.01511	0.18129	

Note: The exceedance of 4.5 feet was not a violation based on the understanding of Article 15(b) established by letters dated 1981 04 29 and 1981 05 12 as shown in Appendix E.

Southern Indian Lake Rate of Draw



Section 3 - Observance of Pertinent Water Power Act Regulation Articles

This purpose of this section is to demonstrate that Manitoba Hydro has fulfilled its obligations under Regulation 25/88R pursuant to the Water Power Act. Manitoba Water Stewardship and Manitoba Hydro have jointly selected those articles of the Regulation that are pertinent to this Interim Licence. Each of the pertinent articles is shown in italics followed by a statement how Manitoba Hydro has fulfilled its obligations.

Definitions

4 *All elevations given in connection with the plans or other information filed by the applicant should be referred, if possible, to mean sea level datum.*

Observance

Elevations shown on plans are based on Geodetic Survey of Canada (GS of C) datum, which in turn use mean sea level as a reference. Although plans may not specifically reference the relationship to a datum, the elevations shown are based on the datum for that region. Within the Churchill River Diversion licence area there are three references to mean sea level depending on the region.

Elevations from Missi Falls to Notigi including Southern Indian Lake are based on Churchill River Diversion (CRD) Construction Datum, 1973 Revision.

Elevations on the Burntwood River are based on GS of C, Canadian Geodetic Vertical Datum (CGVD) 1928, 1971 Local Adjustment, which also has been referred to as GS of C, CGVD28, 1969 Local Adjustment.

Elevations on the Churchill River near Churchill are based on Geodetic Survey of Canada (GS of C), Canadian Geodetic Vertical Datum (CGVD) 1928, 1978 Local Adjustment.

Final construction plans

35(1) *Within 90 days after the completion of the initial development in accordance with the general construction plans or with any authorized changes therein, and within 90 days after the completion of any additional unit of the power development or of the power system, the interim or final licensee, as the case may be, shall file with the director copies of the final construction plans.*

Observance

A 1978 01 05 letter from the Minister of Mines Resources and Environment indicates to Manitoba Hydro that the Province had been advised the project was in full operation. A 1978 01 30 memo from Manitoba Hydro to Water Resources Branch provided written notification of the completion. Final construction plans would have been submitted prior to or about the same time as these documents. Copies of these documents can be found in Appendix A, pages 56 and 57 respectively.

35(2) *The final construction plans, together with drawings and specifications accompanying them, shall show the works as actually constructed in such detail as would be required to be given to construction contractors for the purpose of constructing the works and shall show the precise areas of lands occupied so as to satisfy the requirements of section 24.*

Observance
A detailed list of the final construction plans can be found in Appendix F.

35(3) *The said plans shall be on tracing film, and shall conform to the sizes specified in clause 3(1); the said specification shall be either printed or typed, and both plans and specifications shall be signed by a professional engineer of recognized standing in Canada satisfactory to the director, and shall in other respects satisfy the requirements of the director.*

Observance
Drawings have been submitted in more modern media. All drawings submitted under 35(2) are signed and/or sealed by a professional engineer.

35(4) *In no case shall the interim licensee be entitled to the issue of a final licence until the requirements of this section have been complied with insofar as they relate to the initial development.*

Observance
Manitoba Hydro has provided all the requisite plans under this section.

Fixation of construction costs
36(1) *Upon completion of the initial development and upon the completion of any substantial addition thereto, a sum shall be fixed which shall represent the actual cost of such development or of such addition, or both, and in the event that the minister and the interim or final licensee, as the case may be, cannot agree upon the sum within 90 days after the completion of the development or of additions, or both, or within 90 days after the purchase of any lands or rights of way within the severance line, the minister shall refer the matter to the court for determination.*

Observance
Manitoba Hydro has determined that the capital cost of the project including the cost of the more recently constructed weir near Churchill is $676.3 million (2003 dollars). This year was chosen to include the costs of the Churchill weir. Although this structure was essentially completed in 1999, further capital rehabilitation costs were incurred until 2003.

36(2) *In no case shall a final licence be issued to the interim licensee until such licensee has fully complied with the provisions of this section insofar as they relate to the completion of the initial development.*

Observance
Manitoba Hydro has fulfilled the requirements of this section.

Operation under Interim Licence

37(1) *In the event that the works are put into operation before the issuance of the final licence, the interim licensee shall, pending the issuance of such final licence and until otherwise agreed upon, maintain and operate the same to the satisfaction of the director and shall at no time raise the level of the waters of any river, lake or other body of water or permit such level to be raised higher than the elevation which shall be fixed from time to time by the director and shall abide by all reasonable regulations which may from time to time be promulgated by the minister for the control of the flow of any waters for general conservation purposes.*

Observance
Manitoba Hydro assumes that the director is satisfied with the maintenance and operation of the CRD as it has not been notified otherwise. The minister has not requested that the project be operated beyond the conditions stated in the Interim Licence and those granted at Manitoba Hydro's request. Observation of this Regulation was addressed in Section 2 of this report.

37(2) *The interim licensee shall in such case pay for any water used in the development of power prior to the issuance of the said final licence, such sum or such rate per horsepower as the minister may determine.*

Observance
No payment is required as this project does not develop power directly.

38 *In addition to any obligations specially imposed upon interim licensees in this part of this regulation, every interim licensee shall, insofar as his or her position with respect to the use and occupancy of lands and waters of the province, or the maintenance and operation of his or her works or the carrying on of his or her undertaking for the time being is similar to that of a final licensee, and subject to section 37, observe and comply with all the provisions of this regulation applicable to final licensees.*

Observance
Manitoba Hydro has observed and complied with all the provisions of this regulation as would be applicable to final licensees.

Amending Interim Licence

39 *Subject to this regulation the terms of any interim licence may be amended by a supplementary licence entered into between the minister and the interim licensee, and plans and specifications previously approved may be amended with the consent in writing of the minister, but any such amendment shall affect only the portion specifically covered in such supplementary licence or writing, and shall in no case operate to alter or amend or in any way whatsoever be a waiver of any other part, condition or provision of the original interim licence.*

Observance

All amendments to date have been granted from the minister responsible for the Water Power Act authorizing deviations from certain conditions of the Interim Licence for specific durations. The first such amendment authorized a test program that allowed an increase in Notigi outflows between 1979 09 15 and 1980 04 15. A second test program was authorized for the following winter (1980/81). The first authorization for an increase in summer flows occurred in 1981 along with a change in a flow based constraint at Thompson to a water level constraint. From 1981/82 to 1985 authorizations have been granted variously modifying most of the operating parameters affecting Southern Indian Lake and the Burntwood River. Since 1986 there have been no variations to the authorized deviations. These deviations have become known as the Augmented Flow Program.

Completion of works by Interim Licensee

42(1) *As soon as the interim licensee has completed the initial development and otherwise fulfilled the terms of the interim licence, he or she shall file in the office of the director written notice of such completion and fulfilment in the form supplied by the director.*

Observance

A 1978 01 05 letter from the Minister of Mines Resources and Environment indicates to Manitoba Hydro that the Province had been advised the project was in full operation. A 1978 01 30 memo from Manitoba Hydro to Water Resources Branch provided written notification of the completion. A copy of these documents can be found in this report on pages 56 and 57 respectively.

42(2) *Subject to subsection (3), the director shall thereupon cause an inspection, and if necessary a survey, of the works constructed or used and of the lands and waters used or occupied in connection with the undertaking to be made.*

Observance

Water Stewardship staff have variously toured the project area.

42(4) *Upon compliance on the part of the licensee with subsections (1) to (3), the director shall determine a date which, for the purposes of this regulation, shall be the date of completion of the initial development.*

Observance
A 1978 02 15 letter from the Assistant Deputy Minister of the Department of Mines, Resources and Environmental Management determined that 1976 09 01 was the completion date of the initial development for licence and regulation purposes. A copy of this letter is located in Appendix A on page 60.

Issuance of final licence
43(1) *Upon the completion of the initial development according to the plans previously approved, and upon fulfillment and compliance otherwise with all the terms and conditions of his or her interim licence and of this regulation, the interim licensee shall be entitled to a final licence authorizing one or more of diversion, use, or storage of water at the site in question, for the development of energy therefrom, for the utilization of such energy, for the occupation or use of the lands of the province or whichever one or more of these is, in the minister's opinion, required for the proper maintenance and operation of the works.*

Observance
Manitoba Hydro has taken the necessary steps to fulfill all the terms and conditions required to obtain the final licence. This applies to the licence issued on May 11, 1973 and the amendments thereto as well as the Regulations under the Water Power Act. Section 2 of this report provides detailed accounts with respect to each licence condition. Appendix G provides a list of all the licence amendments and periods to which they apply.

The following paragraphs outline why a final licence had not been requested until 2009:

- Manitoba Hydro requests delay:
  Although the Province was prepared to take steps to finalize the licence in 1978, Manitoba Hydro requested that it be delayed. At that time, Manitoba Hydro was still exploring the optimum operating regime keeping in mind the safety of the users of the waterway. This process took several years as the hydraulic conditions varied from year to year. A discussion of the approvals begins on page 6 under the heading "Initial and Subsequent Approvals". The initial approvals were known as test programs with subsequent approvals evolving to what has now become known as the Augmented Flow Program. Manitoba Hydro anticipates that the terms of this program will form part of the final licence.

- Mitigation (agreements and on-going programs):
  Starting in 1985 one of the conditions of the AFP was to fully mitigate any effects of the altered levels and flows. The need to address project effects with the communities involved also required several years to resolve. This process could not be completed until the operating regime was established. Communities significantly affected by the project are Churchill, O-Pipon-Na-Piwin Cree Nation (South Indian Lake),

Nisichawayasihk Cree Nation (Nelson House) and Thompson. Impacts at the communities of Tataskweyak Cree Nation (Split Lake) and York Landing are a combination of the Churchill River Diversion and Lake Winnipeg Regulation projects. Agreements have been negotiated with each community variously between Manitoba, Manitoba Hydro and Canada. These agreements generally include monetary compensation, land exchange, resource management, communication protocols, dispute resolution mechanisms and programming in recognition of the project effects. Ongoing mitigation programs have been established that continue to evolve over the years to meet the needs of the communities. The last two agreements to be signed in recognition of the impacts of the CRD project were with the Kischikamee Treaty Council in 2000 and the Tataskweyak Cree Nation in 2009. This 2009 agreement also recognizes the effects of other water power projects.

- Mitigatory structures:
  There are two structures that are now associated with the CRD licence that were not specifically included in the Interim Licence. Both of these structures exist to mitigate the effects of the project.

  The Manasan structure was built in 1976 and is designed to reduce the risk of inundation due to ice in the City of Thomson. Its physical description is summarized on page 5.

  The Churchill Weir was essentially completed in 1999 with refurbishments continuing until 2003. This structure mitigates the effects of lower water levels and flows near Churchill. Its physical description is summarized on page 6 of this report.

- Severance line:
  One of the requirements in the issuance of a final licence is that the licensee and the licensor mutually agree on a severance line pursuant to Article 44 (g).

  There is no severance line specifically defined under the Interim Licence. The licence authorizes the use and flooding of lands as shown on plan 60-1-1007. This plan is a series of three sheets that shows the major water bodies as shown on 1:250000 scale National Topographic Series maps. These sheets do not delineate the extent of the area authorized and do not include the area from Missi to Churchill. In 1995, Manitoba Hydro submitted a schedule to Water Resources Branch for their consideration. The schedule is an assessment of lands required for the project that can be used as an interim definition of the severance line until it is authorized under a Final licence.

  Manitoba Hydro and Water Stewardship have been working cooperatively to establish a severance line that will form part of the Final Licence. The Churchill River Diversion project has a range of hydraulic and geotechnical characteristics that are taken into consideration in the placement of the severance line. The examination of these characteristics along with the conversion of maps into accurate digital form took several years to complete. The final placement of the line is based where

possible on registered plans or otherwise on cadastral data.
The proposed severance line is shown on Manitoba Hydro plan 1-00188-PE-11510-0002 (32 sheets) and Manitoba Water Stewardship File Number 60-1-1009 (32 sheets).

Licence rentals
48(1) *Subject to subsection (2), rentals are payable under this section from the date fixed in the original interim licence for the completion of the initial development, whether or not it is completed.*

Observance
Manitoba Hydro has paid $285 000 per annum in land rentals according to Order-In-Council 699/1979 until 1995. As a result of an amendment to Article 48 of Water Power Act Regulation 25/88R, land rentals are now based on the number of acres associated with a project. The annual land rental paid from 1996 until April 2010 was $238 756.90. The annual land rental rate payable since then is $429 762.42.

Water use rental statement
48(3.4) *A licensee shall, on or before March 1 following each rental period, submit all data required by the director for the determination of the annual water use rental for the rental period. On receipt of the required data, the director shall without delay prepare and provide to the licensee a statement of the water use rent payable by the licensee for the rental period.*

Observance (see next page)
Observance
Water use rental charges are not applicable as the project does not produce electricity. Water use rental charges from the diverted water are realized from the gains in electrical production at downstream generating stations.

Time of payment of rentals
48(3.5) *The rent for each rental period is payable*
(a) in the case of land use rental, on January 2 of the rental period; and
(b) in the case of water use rental, within 60 days after receipt of the director's rental statement for the year for the rental period.

Observance
Manitoba Hydro has provided the payments as required.

Limited rights in lands
51(4) *Every licensee shall, to the satisfaction of the minister, clear and keep clear, from timber, brush and other material, all lands which are to be flooded.*

Observance
Manitoba Hydro has cleared debris since the construction of the project. In more recent years this activity has evolved into programs. Prior to the construction of the project

Manitoba Hydro cleared the lands as recommended by the Lake Winnipeg, Churchill and Nelson Rivers Study Board. Manitoba Hydro currently has a Waterways Management Program that includes debris clearing as one component. No further direction has been received from the Minister.

51(5) *Lands flooded or to be flooded in connection with any undertaking shall not be fenced or otherwise enclosed unless and until the minister's consent in writing has been obtained.*

Observance
Manitoba Hydro has never attempted to fence or enclose flooded lands.

Care of lands
54(1) *The final licensee shall at all times maintain the lands, works and property held or used by the licensee in respect of his or her licence in a manner satisfactory to the minister, including the maintenance of all flooded or other areas in a sanitary condition and the improvement of the lands from the point of view of landscape architecture, and shall do all in his or her power to protect the lands and the interest of the Crown therein against injury by anyone engaged on or about the works, or by any other person.*

Observance
Manitoba Hydro has properly maintained sites with structures for public safety and to provide a safe working environment for employees. An ongoing dam safety program is in place to ensure the integrity of these structures.

54(2) *Every interim or final licensee shall do everything reasonable within his or her power, both independently and on request of the minister to prevent and suppress fires on or near the lands to be occupied under the licence.*

Observance

Manitoba Hydro has properly maintained site lands to reduce the risk of fires. Fire suppression equipment is installed at Missi and Notigi. Manitoba Hydro has a corporate fire prevention and protection program designed to eliminate risks of fire or explosion involving corporate property.

54(3) *For the purpose of limiting the spread of fires or for other reasonable purposes, every interim or final licensee shall clear and keep clear the lands of the province along his or her transmission lines for such width and in such manner as the minister may direct.*

Observance
No transmission rights-of-way are associated with the Churchill River Diversion.

54(4) *Every interim or final licensee shall, to the satisfaction of the minister, dispose of all brush, refuse or unused timber on lands of the province resulting from the construction and maintenance of the works, and shall keep the lands covered by his or her licence clear of unnecessary combustible material at all times.*

Observance
Manitoba Hydro has disposed of brush, refuse and timber including piling and burning. While clean-up was done at these sites, further work is carried out as considered to be necessary.

56 *Every interim or final licensee shall protect all telephone, telegraph and power transmission lines in existence prior to the construction of his or her own lines where crossed by or in close proximity thereto to the satisfaction of the director or competent provincial authority if any, and shall operate, maintain and render safe to the public his or her own transmission, telephone and other lines to the satisfaction of the director or the said authority if any.*

Observance
No transmission rights-of-way are associated with the Churchill River Diversion.

57(1) *Except as expressly provided in this regulation, the interim or final licensee shall not erect any buildings or structures whatever upon any lands of the province without first submitting plans thereof to the director and securing the director's approval for such building or structure and the site thereof.*

Observance
Key structures were included in the project plans. This included general construction camp buildings.

Works, maintenance, and operation
62(1) *The licensee shall at all times install and use first class, modern, standard works, plant, and equipment, giving consideration to their requisite suitability of design, safety, strength, durability, efficiency, and all other relevant factors whatsoever, and shall maintain the same in good repair and condition, and shall exercise all due skill and diligence so as to secure satisfactory operation thereof.*

Observance
Manitoba Hydro has installed and uses state-of-the-art equipment where required and appropriate. While there is a benefit to continuously optimize components that have a role in producing electricity, the regulating equipment and instrumentation at Missi and Notigi is robust to withstand the harsh environment. This is particularly valuable at Missi as it provides assurance of operability in a location that is not readily accessible for repairs.

Safety measures include appropriate safety programs for workers and a dam safety program to ensure the integrity of the structures. Appropriate equipment must be used by employees.

64 *The licensee, before making any material change in any existing works or in their location, shall submit a complete and satisfactory statement and plans of such proposed change to the director, and shall not proceed to carry out the same until such proposed change has been authorized.*

Observance
There have been no changes to the structures listed in the Interim Licence. Two mitigatory structures have been added since the licence was issued. No material change was made in the construction of the Churchill Weir completed in 2000. Manitoba Hydro submitted all design changes for the Manasan Control Structure prior to its rehabilitation in 1984.

65(1) *The director may require any licensee to install and maintain in good operating condition at such places and in such manner as the director shall approve, accurate meters, measuring weirs, gauges or other approved devices which shall be adequate for determining the amount of water used or power developed in the operation of the works, for determining the flow of the stream or streams from which water is or will be diverted, and for determining the amount of water held in or drawn from storage.*

Observance
Manitoba Hydro has installed, operated and maintained an extensive network of gauges to monitor flows and water levels to ensure that licence conditions are observed. This network is more than sufficient to meet the needs for licence adherence, as additional ongoing monitoring is undertaken in various locations where licence conditions have not been imposed. To date the director has not required Manitoba Hydro to install additional gauges.

65(2) *The licensee shall keep accurate and satisfactory records of the determinations referred to in subsection (1) and shall from time to time make such returns, supported if necessary by statutory declaration, as the director may require.*

Observance
Manitoba Hydro has kept records of all gauge readings, many of which are submitted to the Province on a regular basis. All records are available to the Province.

Stream regulation and control

72 *Every licence shall be deemed to have been executed on the express condition that the licensee shall*

(a) *divert, use, or store the water authorized to be diverted, used, or stored by him in such a manner as not to interfere, in the opinion of the minister, with the maximum advantageous development of the power and other resources of the river or stream upon which the works are located;*

Observance - (see next page)

Observance
Manitoba Hydro optimizes the usage of the available water while taking into consideration other waterway users. For example, prior to a major increase in outflow from Missi, a reconnaissance of the area downstream is carried out to ensure the safety of waterway users. In other cases, with the concurrence of the director, the rate of flow increase at Missi will be moderated in consideration of other interests.

(b) *conform to and comply with any orders in respect of the control or regulation of the flow of the waters of such river or stream as may be made from time to time by the minister or any person authorized by the minister in that behalf; and*

Observance
Manitoba Hydro would conform to orders made by the minister. While Manitoba Hydro has sought approvals to vary from the licence, to date no orders have been mandated.

(c) *at no time cause or permit the surface level of the waters of such river or stream or of any storage reservoir operated by the licensee to be raised or lowered beyond the limits which shall be fixed from time to time by the minister or by a person authorized by the minister in that behalf.*

Observance
Section 2 of this report has addressed the observance of the specific terms of the Interim Licence including those pertaining to water level limits.

Accounting

78(1) *Every licensee shall keep a true and detailed account of all expenditures made in each calendar year in respect of the works, lands and properties and such other information as follows:*

(a) respecting the works:

(i) the actual cost …

(ii) amounts expended in that year for enlargements and permanent improvements authorized by the minister, and

(iii) depreciation in value from any and all causes for that year

(b) respecting lands, tenements and appurtenances not included in clause (a), a statement setting out, in each case, the actual cost thereof in accordance with the provisions of section 36;

(c) respecting capital stock:

(i) the amount authorized and the number of shares into which it is divided

(ii) the number of shares subscribed for and allotted, the number of shares forested to date, and the owners, for the time being, of all outstanding shares,

(iii) the amount of calls made on each share, and the total amount received from shareholders in cash on account of stock

(iv) the number of shares, if any, issued as fully paid up shares as consideration for any service rendered or otherwise, specifying in each case for what consideration such shares were issued, and

(v) the amounts of dividends declared and paid;

(d) respecting bonds or debentures:

(i) the amount authorized, and the period of redemption,

(ii) the amount sold (face value) and the rate of interest,

(iii) the amount realized from sales,

(iv) the annual amount set aside sinking fund to meet bonded indebtedness and date of commencement;

(e) the indebtedness other than stock and bonds, specifying the nature and amounts, and the rate of interest such indebtedness is bearing;

(f) a statement showing the total revenues of the undertaking, specifying the amount received from each and every source;

(g) the maintenance and operation expenditures, separating those expenditures which are incurred at or near the works from head office and other expenditures relating to general administration;

(h) the names of officers and the classification of employees, with salaries, expenses, or other remuneration paid or allowed;

(i) the proposed extensions during ensuing years

(j) if a company such annual return shall have attached thereto a copy of the bylaws of the company, showing all amendments thereto during the year covered by that return;

(k) such other data as the minister may require.

Observance

Manitoba Hydro's Annual Report includes each of the above items on a corporate wide basis. Details of the accounting for individual projects are available upon request.

78(2) *Every licensee shall file annually with the director on or before March 1 by a return, for the year ending December 31 preceding a detailed summary of all information included under clauses 1(a) and (b).*

Observance

Manitoba Hydro provides an Annual Report to the minister to which the director is responsible.

87 *Notwithstanding any rights granted or approval given by any licence, every licensee shall comply fully with the provisions of the Navigable Waters Protection Act (Canada) and any rules and regulations promulgated thereunder, and shall also comply fully with the provisions of any provincial statutes or regulations governing the preservation of the purity of waters or governing logging, forestry, fishing, wildlife or other interests present or future which might be affected by any operations conducted under the licence and shall also observe and carry out any instructions of the minister concerning any of those matters not inconsistent with the said statutes and regulations.*

Observance

Manitoba Hydro is committed to and continues to observe the provisions of the Navigable Waters Protection Act and all provincial statutes and regulations.

FIGURES

N
W E
S

CHURCHILL WEIR
Churchill
Churchill River
Southern
Indian Lake
MISSI C.S.
South Indian Lake Community
SOUTH BAY DIVERSION CHANNEL
Leaf Rapids
Burntwood River
NOTIGI C.S.
Nelson House
Thompson
MANASAN C.S.
Nelson River

Manitoba Key Map
Indicates area shown

Churchill River Diversion Proposed Licence Boundary

CRD - Proposed Licence Boundary
Main Water Courses
Existing Water Power Reserve:
Burntwood River
Churchill River

0 15 30 60 90 120
Kilometers

FIGURE 1

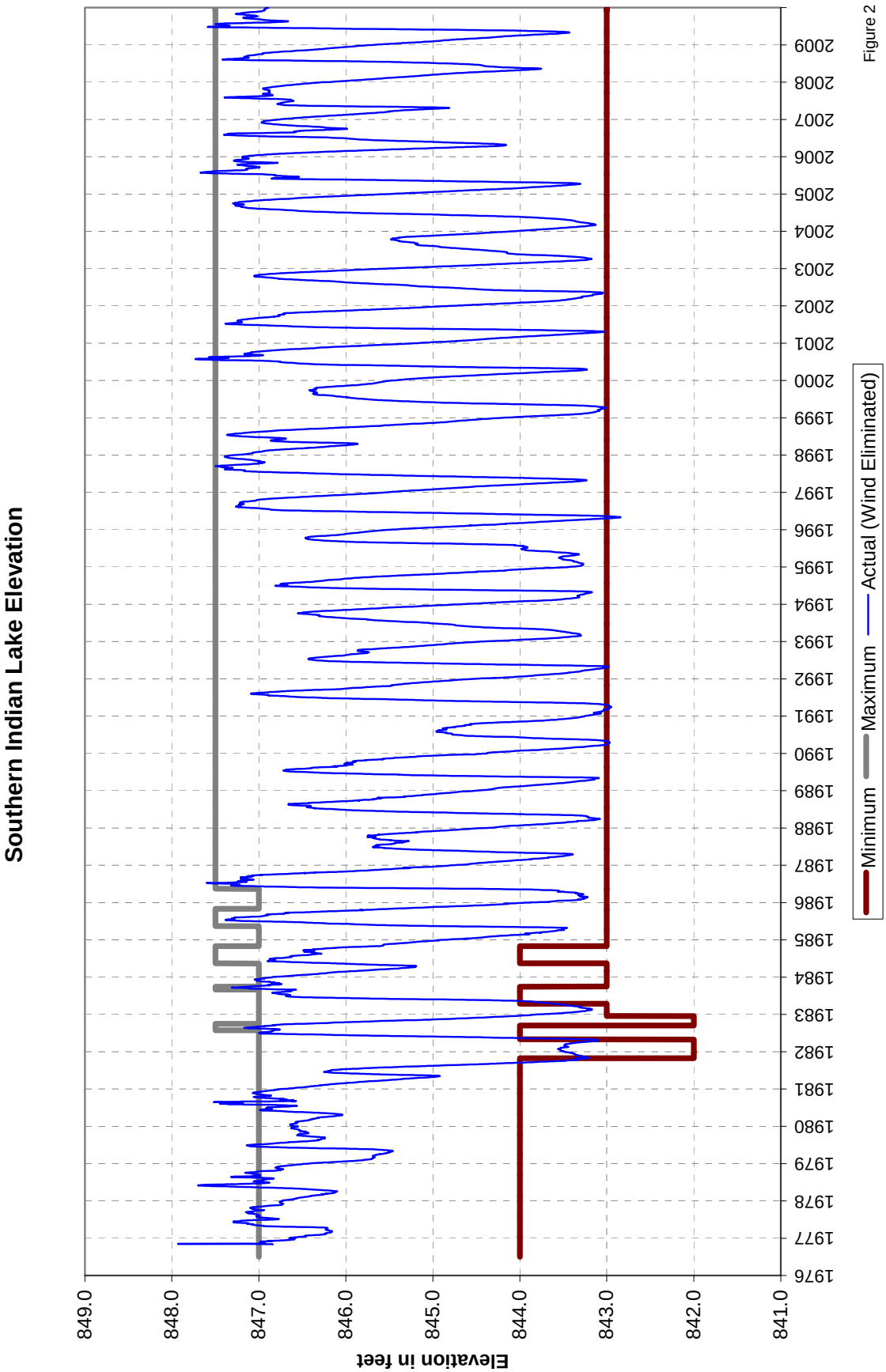

Southern Indian Lake Elevation
Elevation in feet
849.0
848.0
847.0
846.0
845.0
844.0
843.0
842.0
841.0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Minimum
Maximum
Actual (Wind Eliminated)

Figure 2

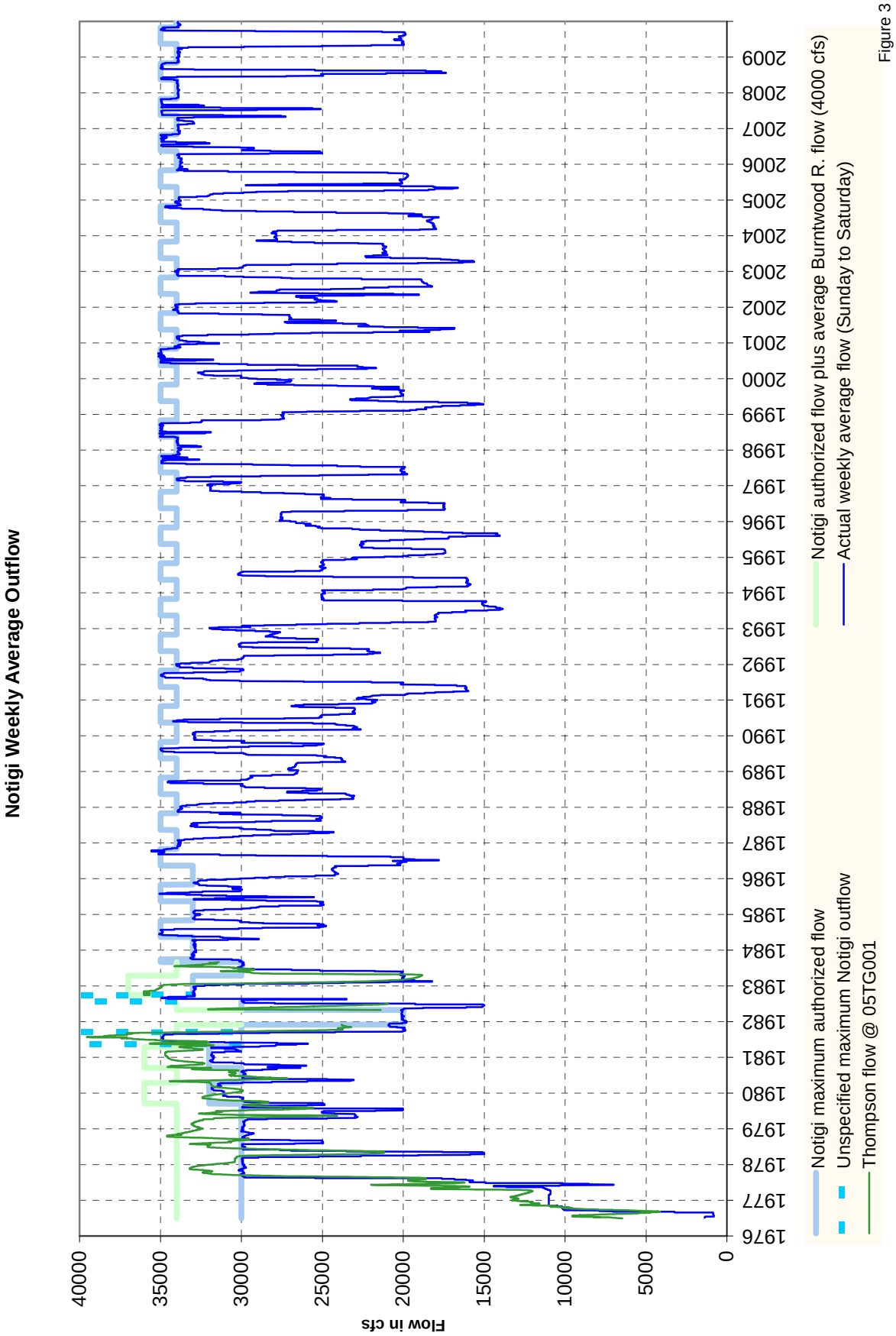

Notigi Weekly Average Outflow
Flow in cfs
40000
35000
30000
25000
20000
15000
10000
5000
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Notigi maximum authorized flow
Unspecified maximum Notigi outflow
Thompson flow @ 05TG001
Notigi authorized flow plus average Burntwood R. flow (4000 cfs)
Actual weekly average flow (Sunday to Saturday)

Figure 3

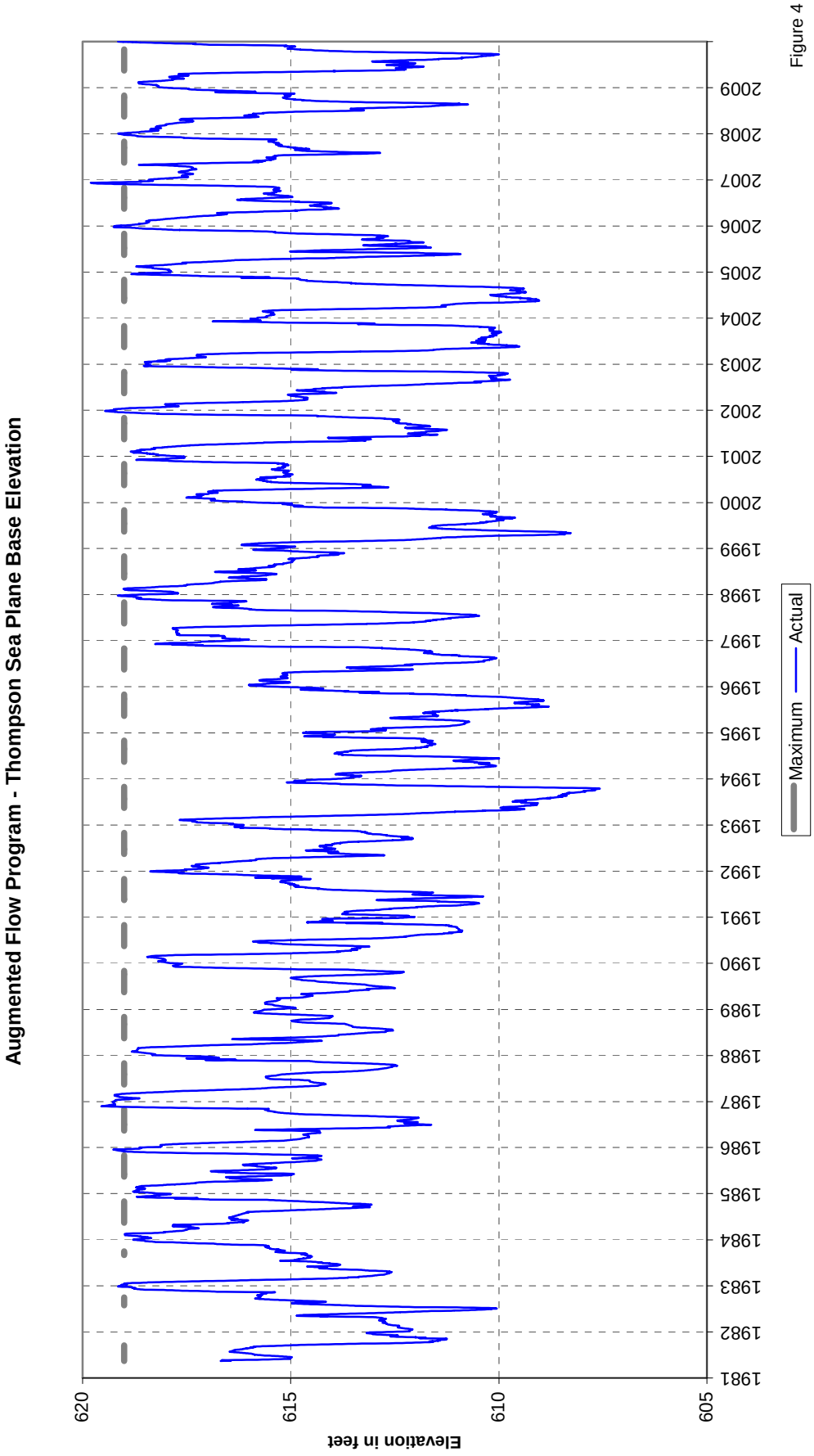

Augmented Flow Program - Thompson Sea Plane Base Elevation
Elevation in feet
620
615
610
605
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Maximum
Actual

Figure 4

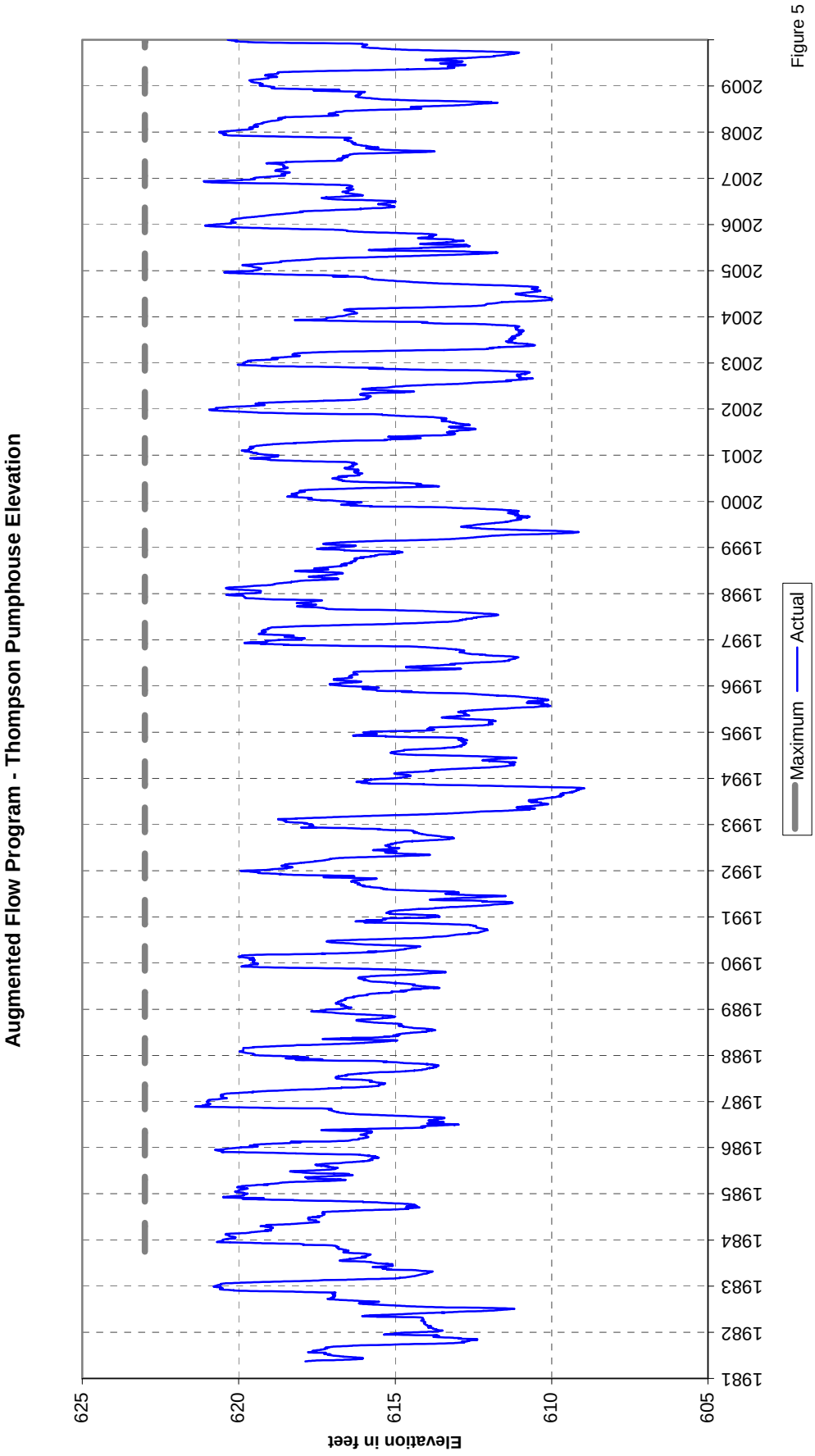

Augmented Flow Program - Thompson Pumphouse Elevation
Elevation in feet
625
620
615
610
605
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Maximum
Actual

Figure 5

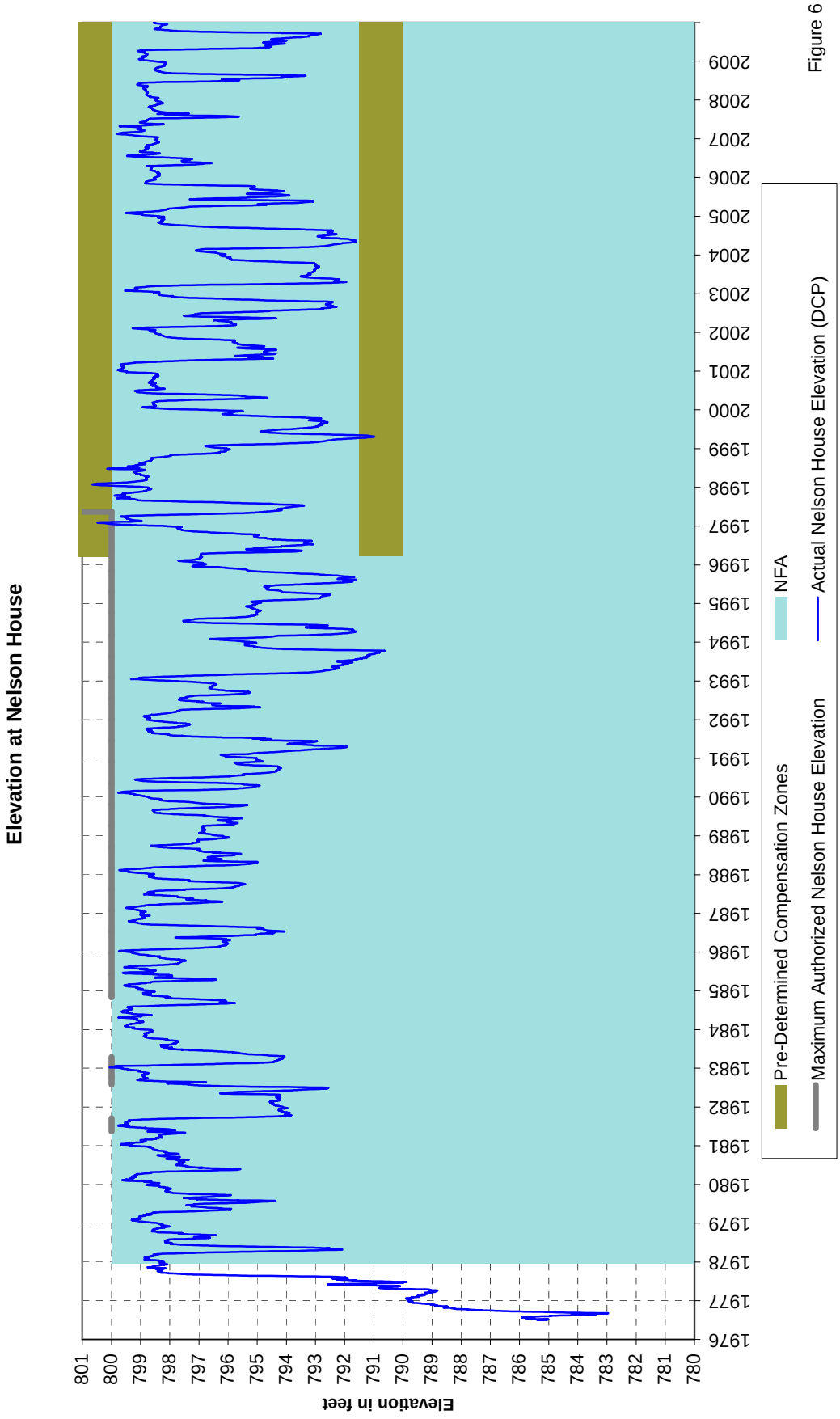

Elevation at Nelson House
Elevation in feet
801
800
799
798
797
796
795
794
793
792
791
790
789
788
787
786
785
784
783
782
781
780
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Pre-Determined Compensation Zones
NFA
Maximum Authorized Nelson House Elevation
Actual Nelson House Elevation (DCP)

Figure 6

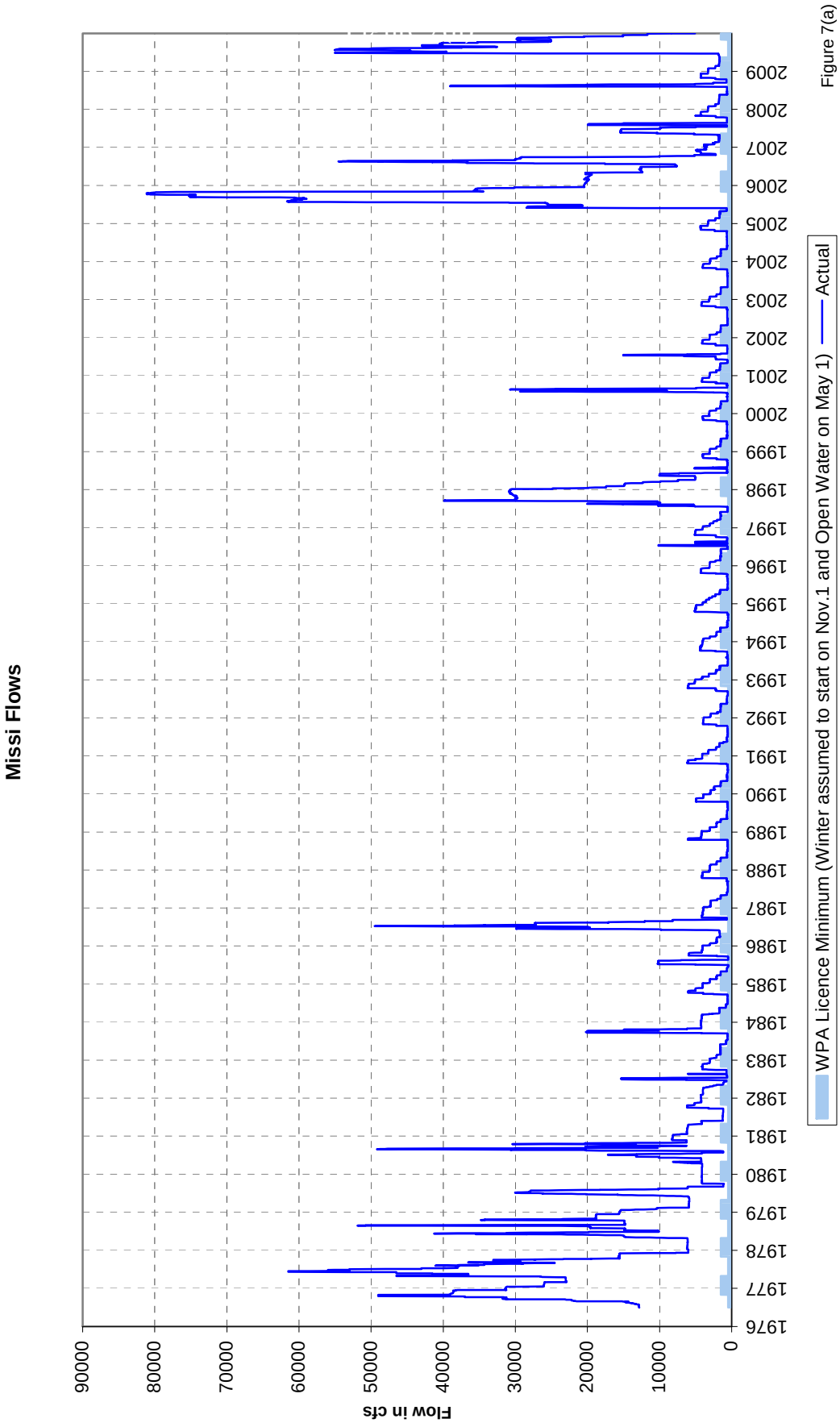

Missi Flows
Flow in cfs
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
WPA Licence Minimum (Winter assumed to start on Nov.1 and Open Water on May 1)
Actual

Figure 7(a)

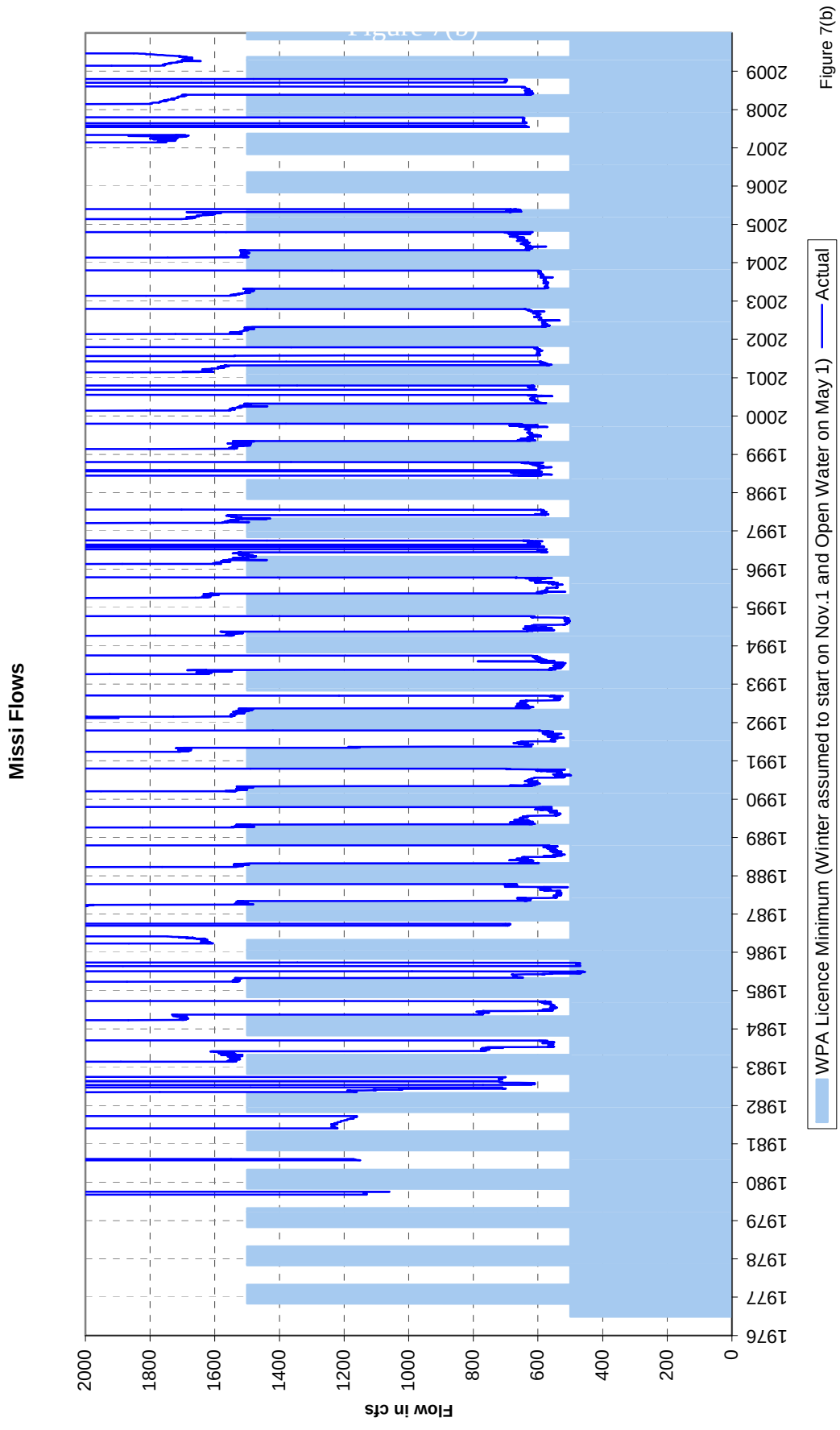

Missi Flows
Flow in cfs
0
200
400
600
800
1000
1200
1400
1600
1800
2000
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
WPA Licence Minimum (Winter assumed to start on Nov.1 and Open Water on May 1)
Actual

Figure 7(b)

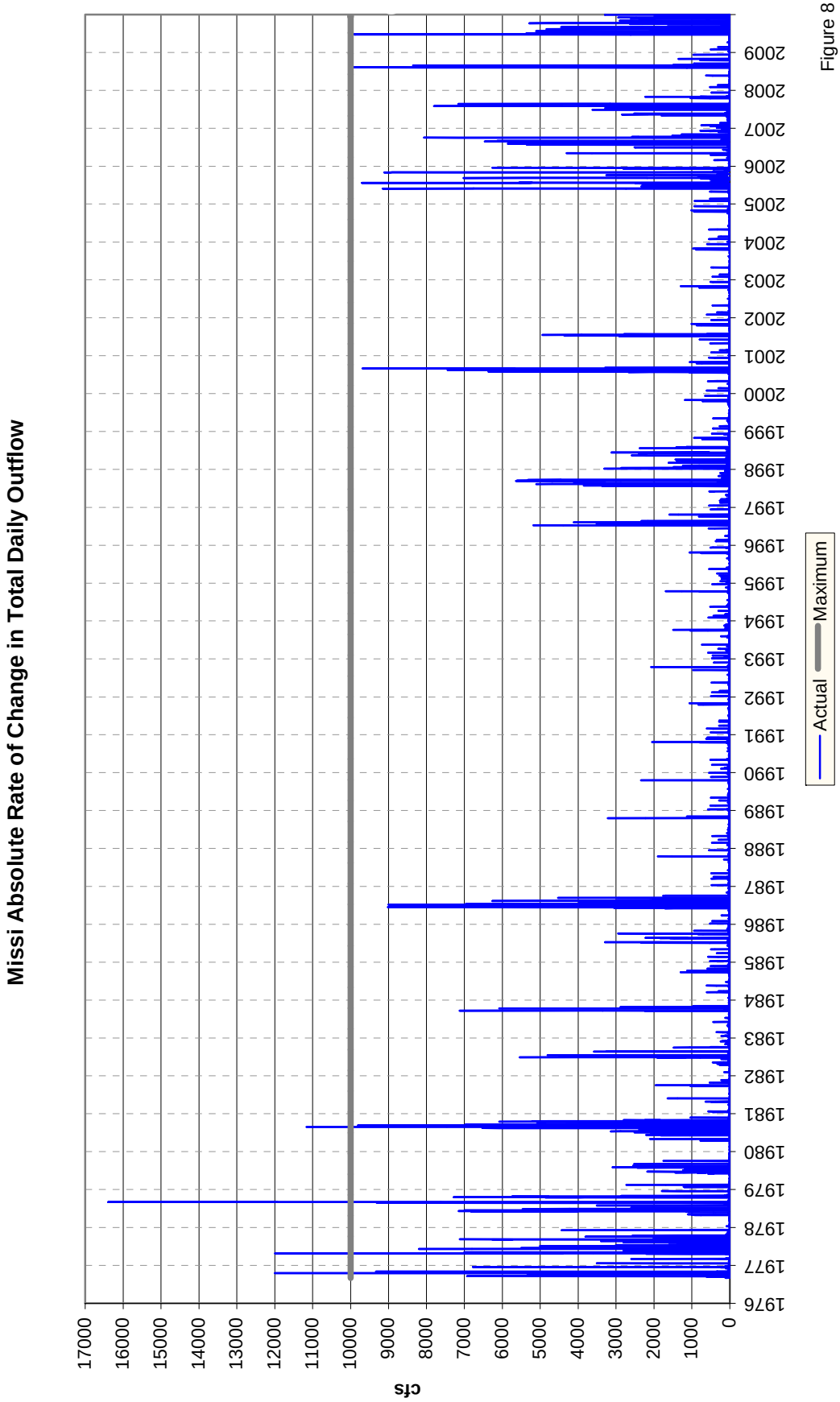

Missi Absolute Rate of Change in Total Daily Outflow
cfs
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Actual
Maximum

Figure 8

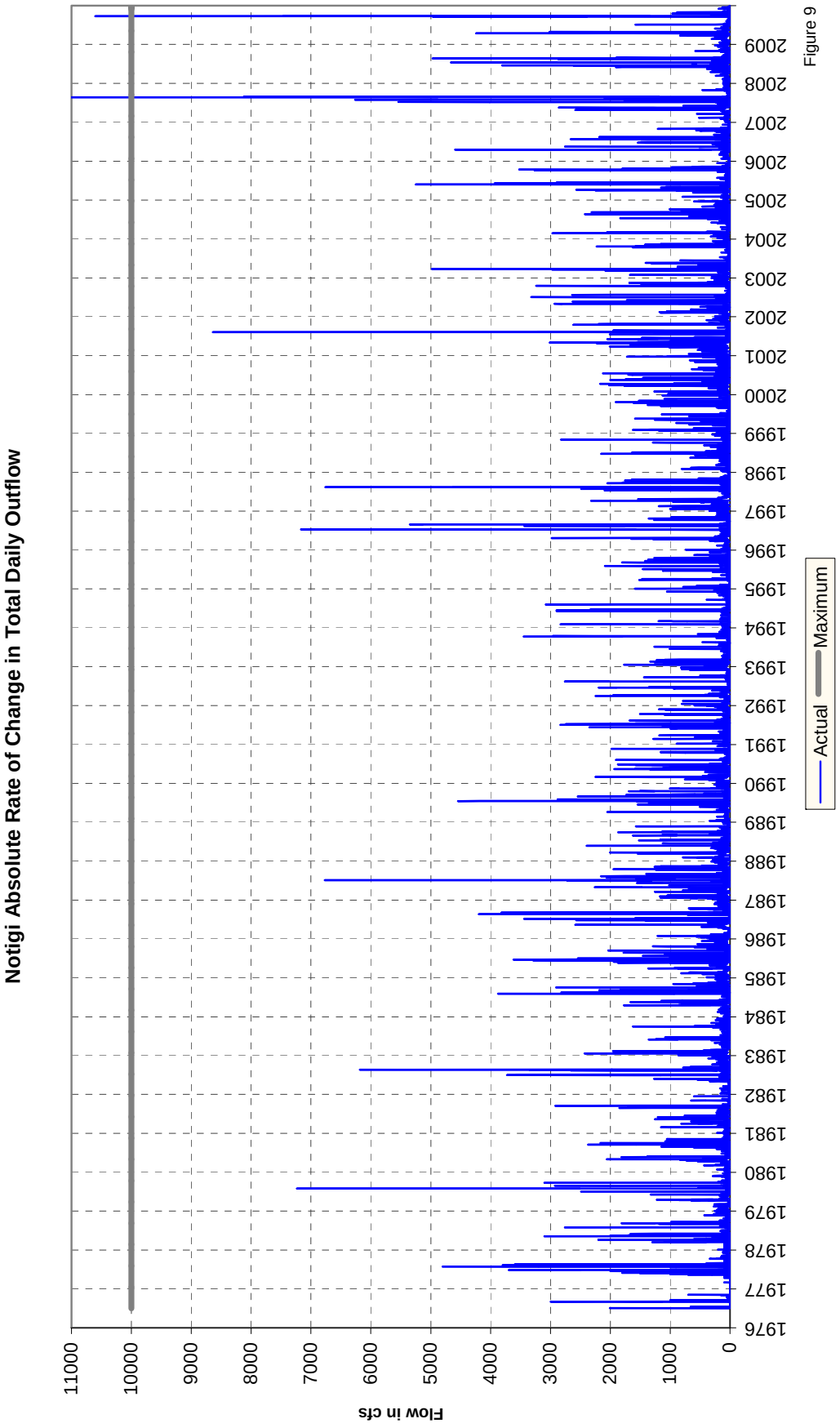

Notigi Absolute Rate of Change in Total Daily Outflow
Flow in cfs
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Actual
Maximum

Figure 9

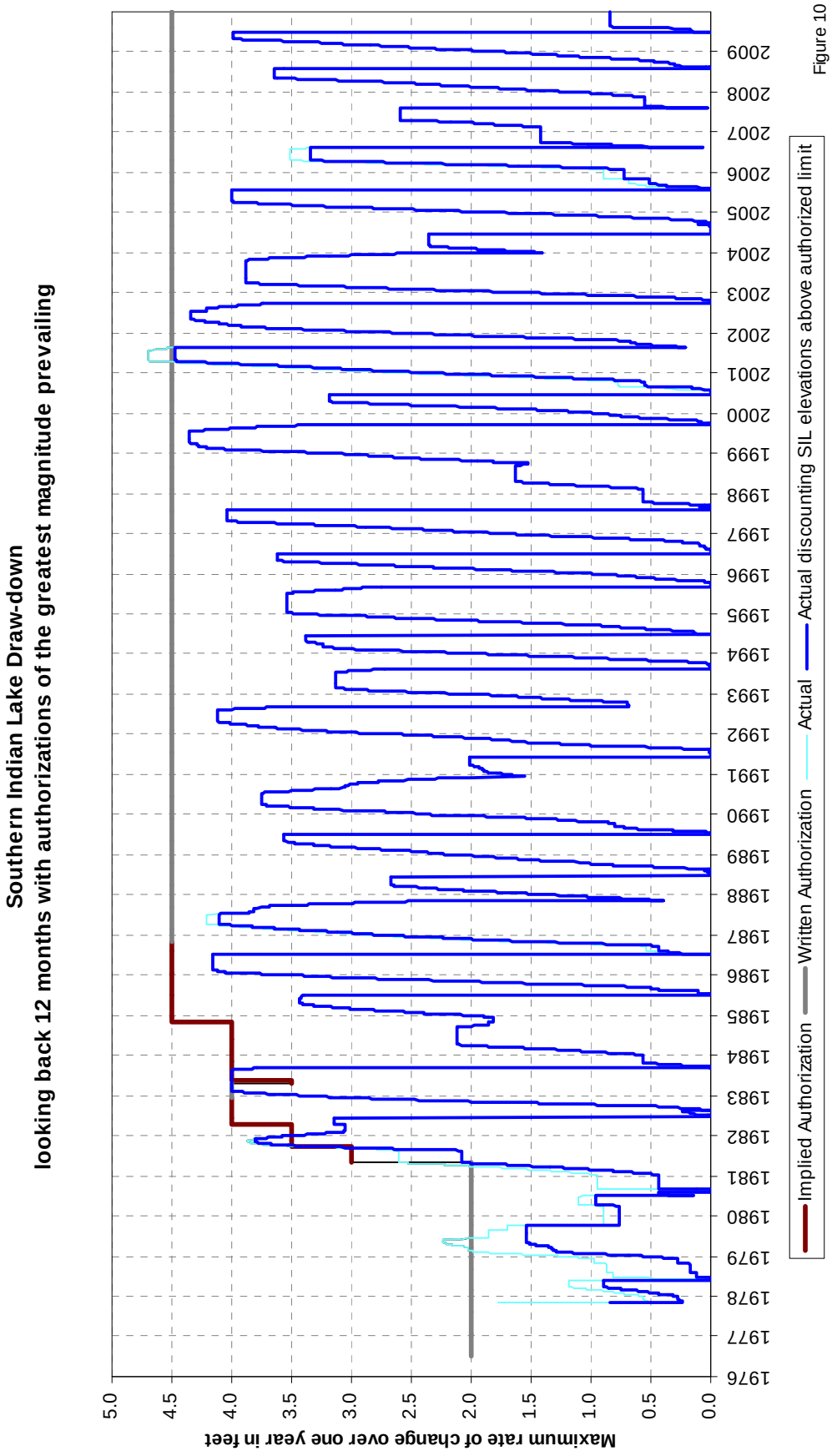
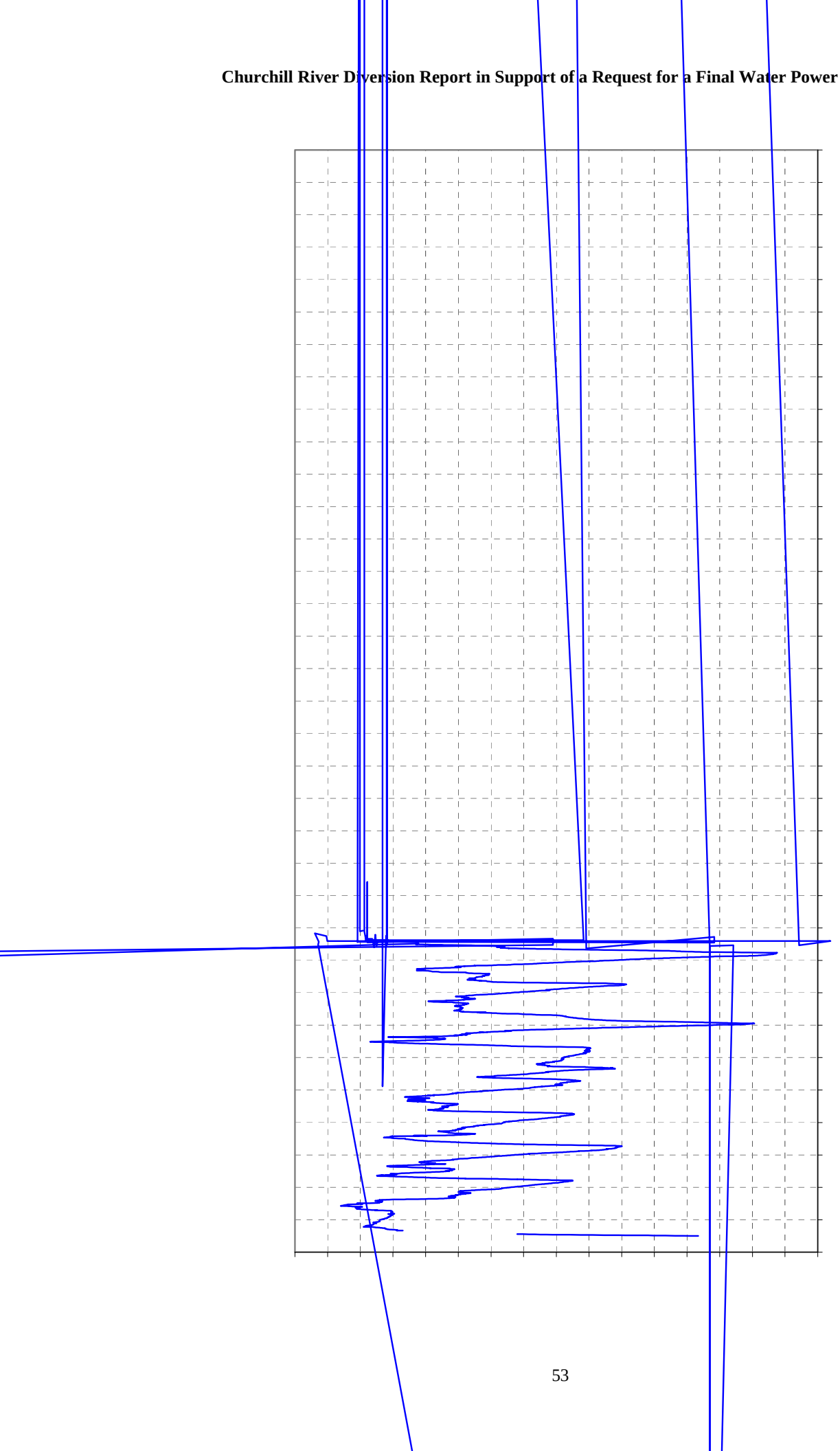

Southern Indian Lake Draw-down
looking back 12 months with authorizations of the greatest magnitude prevailing
Maximum rate of change over one year in feet
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Implied Authorization
Written Authorization
Actual
Actual discounting SIL elevations above authorized limit

Figure 10



APPENDIX A – continued (1978 01 05 letter referred in Section 1, Section 2 (Article 4) and Section 3, Clauses 35(1) & 42(1))

MINISTER
MINES, RESOURCES AND ENVIRONMENTAL MANAGEMENT

RECEIVED

January 5, 1978.

Mr. L. A. Bateman,
Chairman and Chief Executive Officer,
Manitoba Hydro,
P. O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Bateman:

Article 13 of the Interim Licence for the Diversion of Water from the Churchill River to the Nelson River, and the Impoundment of Water on the Rat River and Southern Indian Lake issued on May 11, 1973 in accordance with the provisions of the Water Power Act, Chapter W70, Revised Statutes of Manitoba provides that:

> "13. As and at the times requested by the Minister the Licensee shall submit to the Minister, for his approval, a schedule of the proposed releases from, over, or through the several works, and the Minister may approve the schedules with or without variation; and subject to any order made under the Act, the Licensee shall comply with the schedules so approved."

In view of the fact that the works are now in full operation it would be useful for the Department to have information on a continuing basis relative to these proposed flows. You are therefore requested, in accordance with the aforesaid Article 13, to provide me henceforth with a schedule of these proposed releases on the first day of each month for the ensuing 90 days.

Yours sincerely,

Original Signed By:
A. Brian Ransom
Minister.

78 01 06 - xc: J.J.Arnason - pl. prepare reply for Chairman's signature.

78 01 12 - xc WST for Chairman's sig.

APPENDIX A – continued (1978 01 30 letter referred in Section 2 (Article 4) and Section 3, Clauses 35(1) & 42(1))

75 10

MANITOBA HYDRO

INTER-OFFICE MEMORANDUM

FROM J. F. Funnell
General Counsel & Secretary

TO Mr. T. E. Weber
Senior Assistant Deputy Minister
Water Resources Division

DATE January 30, 1978

FILE NO. 13E

SUBJECT CHURCHILL RIVER DIVERSION LICENCE

Article 4 of the "Interim Licence for the Diversion of Water from the Churchill River to the Nelson River, and the Impoundment of Water on the Rat River and Southern Indian Lake," issued to Manitoba Hydro on May 11, 1973, states:

"4. The Licensee shall notify the Director in writing of the completion of the development and the Director shall thereupon determine a date which, for the purpose of the Interim Licence and Regulations, shall be the date of completion of the development and shall be the earlier of:

(a) the actual date on which the development commences the diversion of waters of the Churchill River

(b) the date fixed in Article 3 hereof as the limiting date by which the development is to be completed, whether the same shall have been completed or not."

The date fixed in Article 3 was five years from the date of issue of the Interim Licence, which was May 11, 1973. Thus the deadline for completion would normally have fallen on May 11, 1978.

In compliance with Article 4, Manitoba Hydro hereby notifies you that the works as described in the Interim Licence, for which the Interim Licence was issued, have been completed, and Manitoba Hydro is in a position to operate these works beneficially for the people of Manitoba.

We would recommend for your consideration the date of September 1, 1976, for the purposes of the Interim Licence and Regulations as the date of completion of the development. It was on Sept. 1, 1976, that Manitoba Hydro first opened the spillgates at Notigi to permit diversion flows from the Churchill River to the Burntwood River, to the extent of 10,000 cfs. Earlier releases between 1,000 and 3,000 cfs had entirely come from the natural drainage basin of the Rat River, and were put into effect to sustain a required riparian flow for downstram communities and users, notably Thompson, Nelson House and INCO. It will be of interest to you to know that our Corporate Accounting and Financial Planning Department placed in the capital accounts the following percentages of the total capital cost on the corresponding dates, such percentages being related to the flow releases put into effect as they bear to the maximum authorized diversion rate of 30,000 cfs:

APPENDIX A – continued (1978 01 30 letter referred in Section 2 (Article 4) and Section 3, Clauses 35(1) & 42(1))

Mr. T. E. Weber
January 30, 1978
Page 2

Date	Flow Release	% Capitalized
Sept. 1, 1976	10,000 cfs	33.33%
June 1, 1977	15,000 cfs	16.67%
Sept. 1, 1977	30,000 cfs	50.00%
		100.00%

Article 8 of the Interim Licence states:

"8. The Licensee shall pay a rental for the use and occupation of Crown lands required for the purposes described in Articles 5 and 6 hereof in such amounts or at such rates as may be fixed by the Lieutenant Governor in Council."

Should the date of Sept. 1, 1976 be selected as the date for the purposes of License, and since land rentals are normally payable on a calendar year basis in advance, then Manitoba Hydro would be subject at the present time to the payment of land rentals occupied by it equal to two years and four months. We feel the rate should be fixed by order in council at some convenient early date.

Toward the fixing of any such amount, you may require a computation of crown lands actually occupied or flooded. We would advise you that no comprehensive calculation exists. The values given in the various reports and appendices of the Lake Winnipeg, Churchill and Nelson Rivers Study Board are a guide, but they are neither complete nor consistent, and we are advised by their author, Mr. R. H. Lamont, Chief, Forest Inventory Section, Mines and Surveys Branch, that they cannot be regarded as very reliable. Nonetheless, we give them as published by the Study Board:

Reach	Flooded to Level	Area
Southern Indian Lake	847	172 sq. mi.
Southern Indian Lake	850	211.8 sq. mi.
South Bay to Notigi	850	101,484 acres 158.5 sq. mi.
Notigi to Wuskwatim	(to 30,000 cfs)	39,771 acres 62.1 sq. mi.
Wuskwatim to Manasan	(to 30,000 cfs)	4,030 acres 6.3 sq. mi.
Manasan to Split Lake	-	not published

APPENDIX A – continued (1978 01 30 letter referred in Section 2 (Article 4) and Section 3, Clauses 35(1) & 42(1))

Mr. T. E. Weber
January 30, 1978
Page 3

We would advise you that contour maps from air photos are available for the entire project including the Manasan - Split Lake reach, at least to a 10-foot contour interval, and in some cases to 5 feet. However, it has been our experience that due to limited ground control, these contour maps are often less reliable than would be desirable. The most reliable computation of flooded land will have to await next summer when an air photo survey can be made. Ideally Southern Indian Lake should be at full supply level and the diversion flow should be 30,000 cfs. It would not be necessary to cover Southern Indian Lake and the Notigi Forebay at the same time as the reaches along the Rat and Burntwood Rivers downstream.

PMA/rm

APPENDIX A – continued (1978 02 15 letter referred in Section 2 (Article 3) and Section 3, Clause 42(4))

78 February 15

File: 61.1.10

Mr. J. F. Funnell,
General Counsel & Secretary,
Manitoba Hydro,
P. O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Funnell:

RE: Churchill River Diversion Interim Water Power Licence.

This will acknowledge receipt of your memorandum of January 30, 1978.

In accordance with Article 4 of the Churchill River Diversion Interim Licence, issued on May 11, 1973, and Section 42 of the Water Power Regulations, I hereby advise that I have determined September 1, 1976 to be the date of completion of the initial development for the purposes of the Interim Licence and the Regulations.

A recommendation shall be submitted to the Minister of this Department in due course in regard to the fixing of rates or amounts by the Lieutenant Governor in Council, for rental for the use and occupation of Crown lands, in accordance with Article 8 of the said Licence. When these rates have been fixed I shall recommend to my Minister that a Final Licence be issued for the Churchill River Diversion in accordance with Section 43 of the Regulations.

Yours truly,

SIGNED BY
T. E. WEBER

T. E. Weber, P. Eng.,
Senior Assistant Deputy Minister.

NM/GS/lh

APPENDIX A – continued (1978 07 18 letter referred in Section 1)

1910 REV. 75 16

MANITOBA HYDRO

INTER-OFFICE MEMORANDUM

FROM: L. A. Bateman
Chairman and
Chief Executive Officer

TO: Mr. T. E. Weber
Director, Water Resources Branch
Department of Mines, Resources
and Environmental Management
Province of Manitoba

RECEIVED
JUL 18 1978
ASST GE. AL MGR.
SYSTEM P. ANNING &
OPERATIONS

DATE: 1978 07 18

FILE NO.: 13E

SUBJECT: WATER POWER LICENCE FOR THE CHURCHILL RIVER DIVERSION

Completion of the undertaking of the Interim Water Power Licence for the Churchill River Diversion has been registered with you. We request a two to three year delay before issuing a Final Water Power Licence, during which period Manitoba Hydro be permitted to test the capability of the route over a wider range of constraints than set out in the Interim Water Power Licence.

Approximately one year ago we forwarded to your Department a System Planning report on the economic benefits of 850 foot storage on Southern Indian Lake. Your review and comments on this report were received in a letter dated June 21, 1977. Your letter was reviewed at a luncheon we had on July 6, 1977, and I confirmed our discussion and Manitoba Hydro's position in a memorandum on that date.

As you are aware, from our confirmation in writing to you dated June 23, 1978, Southern Indian Lake rose temporarily above 847 feet this spring due to large spring precipitation. This indicated the difficulty of precise control and supports the point that some flexibility would be desirable.

We request permission to extend, temporarily, the storage in Southern Indian Lake to elevation 850.0 feet and the minimum drawdown of the Notigi forebay to elevation 834.0 feet. We further request permission to divert more than 30,000 cubic feet per second through the Notigi Control Structure which will enable us to regulate by stage at Thompson, so long as greater releases do not exceed the upper elevations agreed upon in the City of Thompson Agreement nor the Northern Flood Committee Agreement relative to Nelson House.

Original Signed By
L.A. Bateman

JJA/WJT/rdc

APPENDIX A – continued (1978 09 25 letter referred in Section 1)

MANITOBA
DEPARTMENT OF MINES, RESOURCES & ENVIRONMENTAL MANAGEMENT

Water Resources Division
1577 Dublin Avenue
Winnipeg, Manitoba
R3E 3J5

File: 61.2

September 25, 1978.

Mr. L. A. Bateman,
Chairman,
Manitoba Hydro,
P. O. Box 815,
WINNIPEG, Manitoba.
R3C 2P4

Dear Mr. Bateman:

Re: Water Power Licence for the Churchill River Diversion.

This will acknowledge receipt of your memorandum of September 18, 1978 expressing concerns relative to the required environmental impact studies identified in my letter of August 22, 1978, which might result from the relaxing of the constraints contained in the Interim Licence for the Churchill River Diversion.

In your memorandum, it is suggested that this Department could carry out a review of the environmental impact. However, the conditions of the environmental assessment and review process, as presently established, require the proponent department or agency to carry out the necessary studies. The Department, therefore, is not in a position to assume the responsibility to carry out the assessment.

It is, therefore, recommended that Manitoba Hydro submit a proposal to the Environmental Assessment and Review Agency outlining the revised operating procedures. The Agency can then assess the proposal and submit its recommendations to the Minister. The recommendation to follow this procedure is in compliance with the environmental review policy as the proposal could represent a significant change in water levels and regimes on the system.

This is submitted for your consideration. If you have further questions or concerns I would be prepared to discuss them with you.

Yours truly,

Original Signed By:
T.E. Weber

T. E. Weber, P. Eng.,
Senior Assistant Deputy Minister.

c.c. The Honourable A. Brian Ransom.

APPENDIX A – continued (1979 03 05 letter referred in Section 1)

John F. Funnell

General Counsel and Secretary

Manitoba Hydro

RECEIVED
MAR 7 1979
PLANNING

Mr. F. A. Doe, Secretary
Environmental Assessment and
Review Agency
Box 7, Bldg. 2,
139 Tuxedo Blvd.
R3N 0H6

TO: NC
W.L.I.
✓ LEP

March 5, 1979

BURNTWOOD RIVER GENERATION - ENVIRONMENTAL OVERVIEW STUDY - CHURCHILL RIVER DIVERSION

Enclosed is a Project Description for consideration by the Environmental Assessment and Review Agency, and the Interdepartmental Planning Board, of Manitoba Hydro's proposal for conducting an Environmental Overview Study on the Burntwood River System.

The purpose of the "Overview Study" is to define, from a best-resource development viewpoint with environmental and public planning considerations, a Preferred Development Plan of the Burntwood River System for electric power generation.

This submission is not to be taken as an indication that Manitoba Hydro will necessarily be seeking a licence to proceed with the execution of all or any of the potential sites that may be found as part of a Preferred Development Plan.

An application for a Water Power License will be submitted to the property authority when need for such generation can be demonstrated. However, it is the intention that the Environmental Overview Study will be of such quality that it will provide assurance to that authority that the Preferred Development Plan is feasible, has taken all concerns into account, and is the one that should be adopted.

The Project Description includes the detail of the scope of the proposed study and the manner in which it would be executed, and is the substance of the material being submitted for your assessment.

ORIGINAL SIGNED BY
J. F. FUNNELL

LEP/JFF/ac

cc: Mr. D. Johns, Secretary - Interdepartmental Planning Board
Mr. T. E. Weber, Senior Assistant Deputy Minister,
Water Resources Division

- with enclosures

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

PROJECT DESCRIPTION

ENVIRONMENTAL ASSESSMENT
AND
REVIEW PROCESS

PROVINCE OF MANITOBA

SUBMITTED FOR:

MANITOBA HYDRO

BURNTWOOD RIVER GENERATION
ENVIRONMENTAL OVERVIEW STUDY
CHURCHILL RIVER DIVERSION

JANUARY, 1979

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

1979 01 17

PROJECT DESCRIPTION – BURNTWOOD RIVER GENERATION
SITE FEASIBILITY INFORMATION AND TECHNICAL DATA

1. a) – ENVIRONMENTAL STUDY – TECHNICAL INTER-RELATIONS

Manitoba Hydro has completed conceptual engineering studies of potential hydraulic power generation sites on the Burntwood River, over a series of falls identified as Early Morning, Wuskwatim, Kepuche, Manasan, and First Rapids. These and the associated water reservoirs have been developed into a number of possible general physical generation alternatives. These have been tested for engineering feasibility and have been cost estimated. Alternatives have been generated out of considerations of site hydraulic opportunities, economics, water system management restrictions and electric system requirements. Generally speaking, the most economic alternative is one of the least number of installations (three above Thompson, and one below), but which incur larger reservoirs and greater flooding. The whole system with all its possibilities, is referred to as the "Base Reservoir Model", in the study description of the environmental study.

The environmental overview study is to examine the Base Reservoir Model, from the viewpoints identified as the "Natural Environmental Impact", and the "Resource and Socio-Economic Background". The overview may lead to some other final rating of engineering alternatives and the introduction of modifications to the engineering definitions because of environmental considerations.

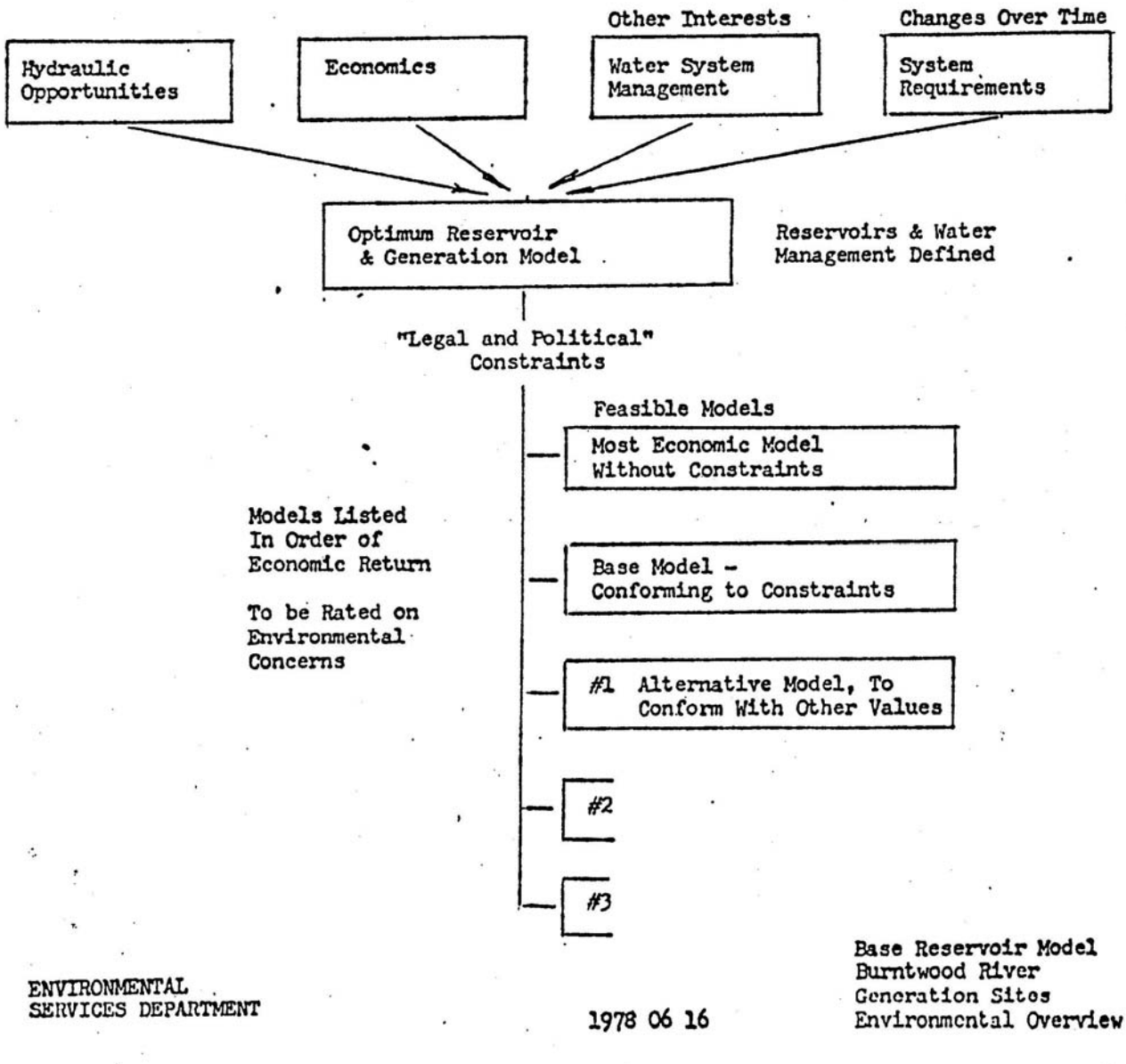
These two viewpoints will be co-ordinated and mutually adjusted in a value matrix, leading to the desired assessments and cataloguing of suggested

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

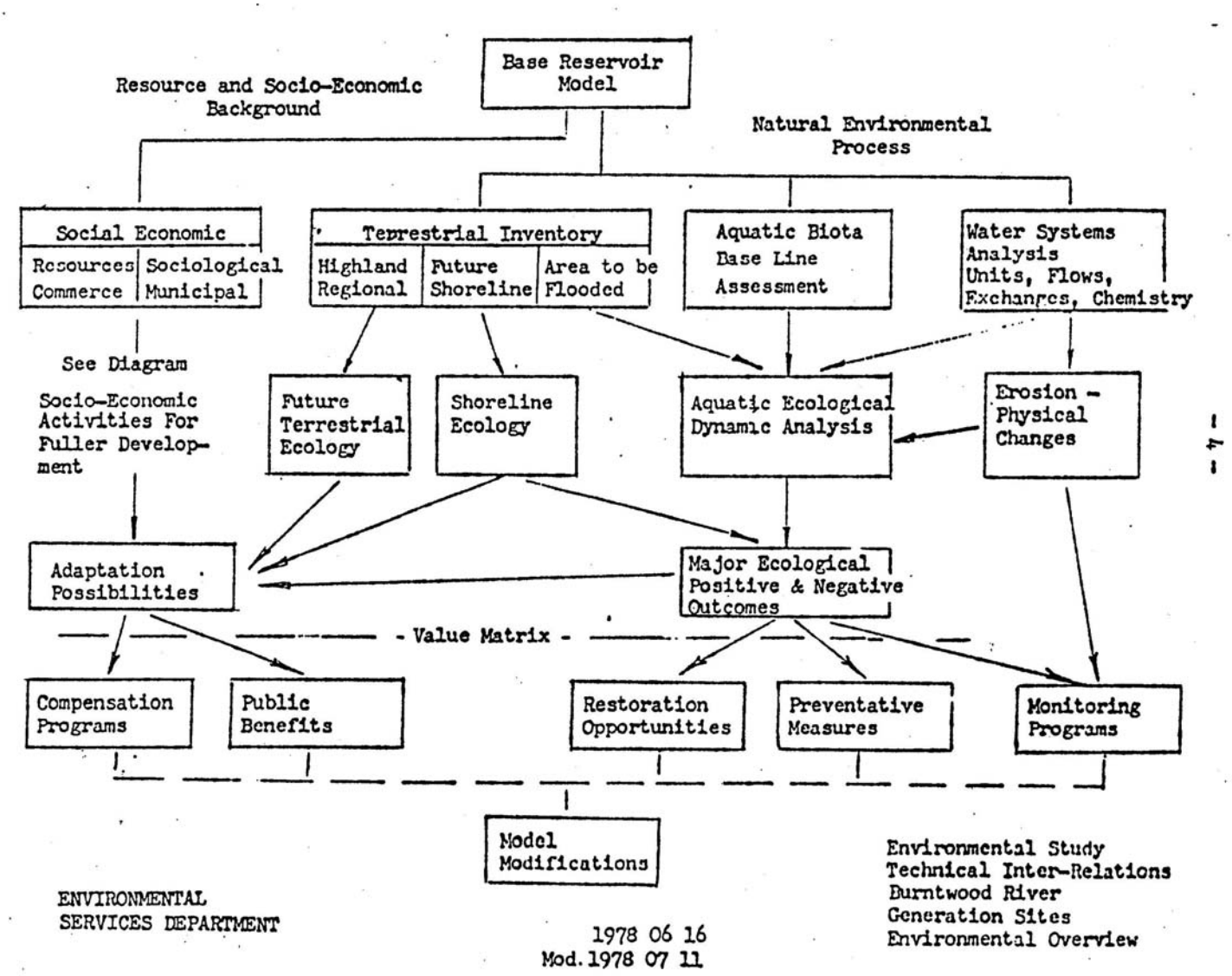
programs involving public benefits, compensation, restoration opportunities and preventative measures. A diagram is submitted to indicate the supposed technical inter-relations to generate the product from which proposals can be based.

This is anticipated to constitute the essential components of the report to be submitted, intended to secure regulatory and governmental approval, of an acceptable reservoir and plant development plan, which may be used when the proper authority in the Province determines that system requirements indicate the suitability of the defined options within the Burntwood System.

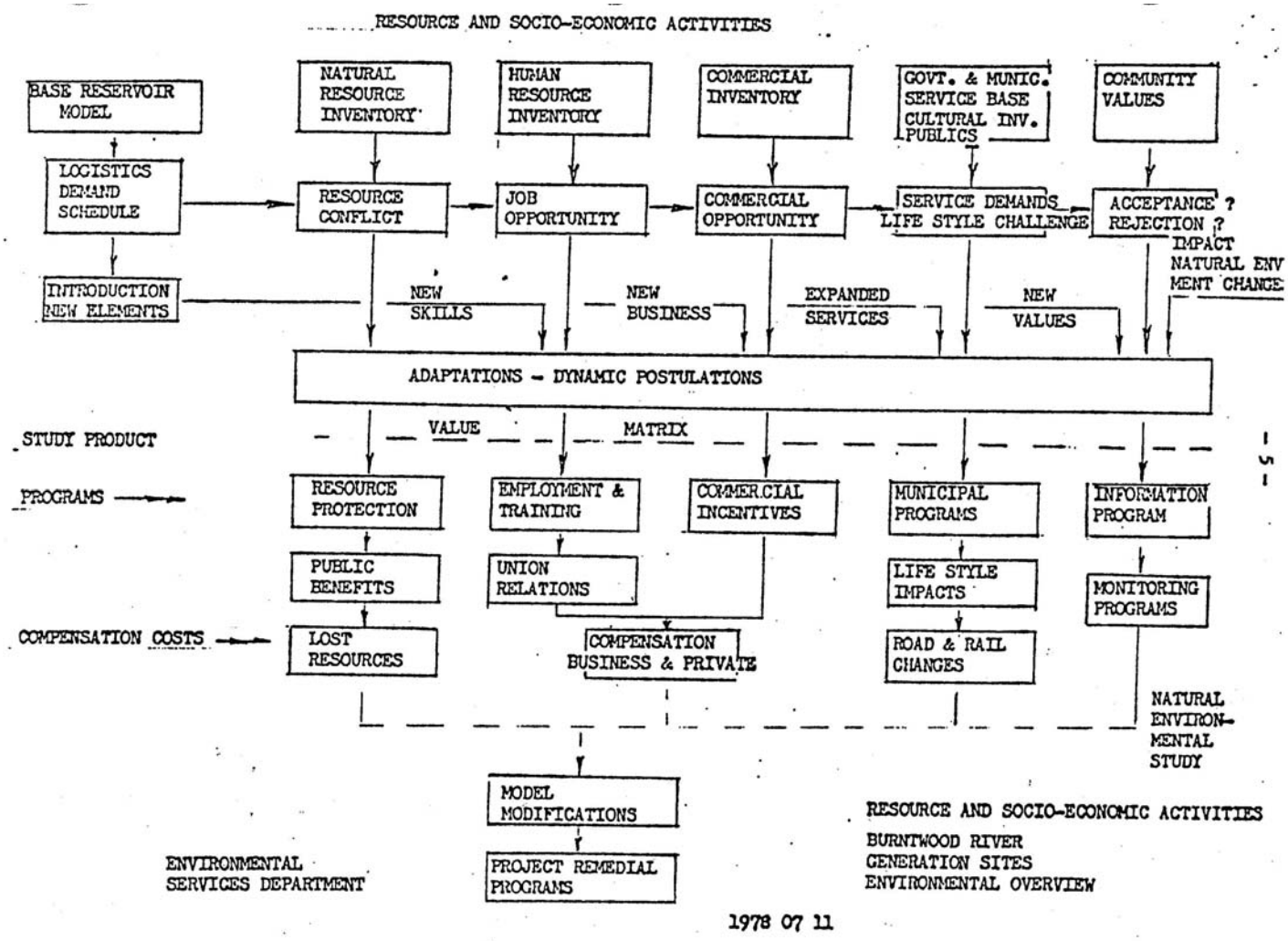
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



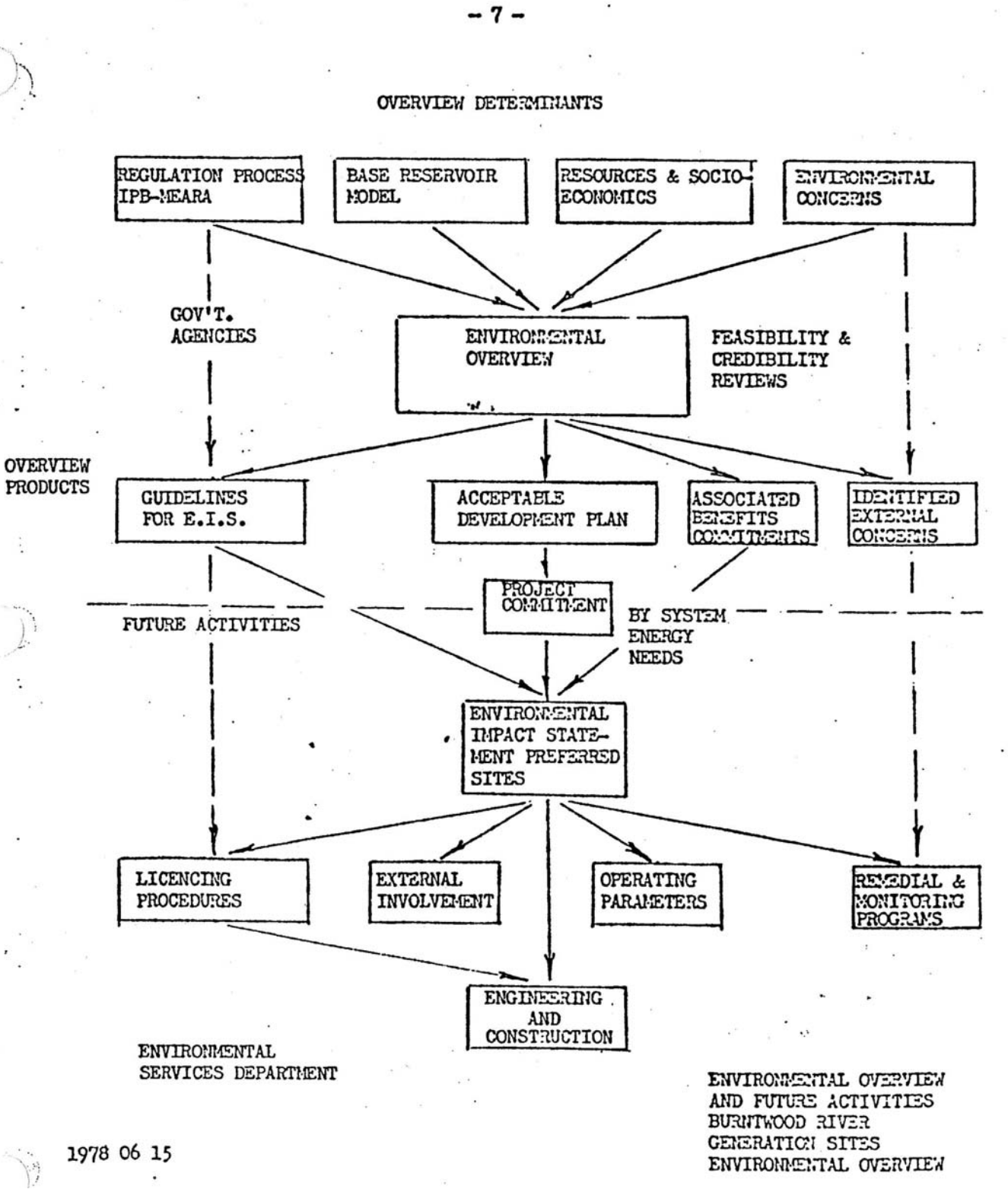
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

1b - ENVIRONMENTAL OVERVIEW ACTIVITIES

A sequence of activities will follow in the course of the overview study involving Manitoba Hydro and the Regulatory Authorities.

A diagram, entitled "Environmental Overview and Future Activities" has been prepared to show future activities of the environmental overview, and how the activities of the study look forward to the preparation of the Environmental Impact Statement and the activities for the application for a licence. This is intended to put current activities into perspective towards supporting the requirements of the future.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

1. c) - LIMITATIONS TO THE STUDY

The scope of study is confined to the choice of configurations of the hydraulic site possibilities on the Diversion, and a rating of their relative merits. The study is not to make comparisons with other potential power source developments, such as the Hydraulic site generation potential of the Lower Nelson, additional thermal generation, or the development of extra-provincial energy transactions.

The socio-economic and resource study will be confined to the impacts on the communities and resources in the study area, and is not to extend to provincial influences and benefits.

Because of these limitations, assumptions may be required in assessing the study area impacts within the general provincial background, or relating to general Manitoba Hydro policy. If these are needed, then these will be formulated by Manitoba Hydro, by its respective specialized groups.

Additional electrical power transmission lines will be needed to effectively connect the new plants to Manitoba Hydro system. Because the lines will run well beyond the Study area, extending into the Southern section of the Province, for the purposes of the overview, the sections of the lines to be considered will be only those within the Study Areas in association with site services of road and rail.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

The appropriate environmental studies for the transmission line routing beyond the Study area will be a separate project according to procedures established in the Province.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

1d – HISTORICAL BACKGROUND OF THE DIVERSION

The first studies and investigations to divert the waters of the Churchill River were carried out by the Dominion Water Branch in 1917-21. The diversion considered was from Trade Lake at Frog Portage on the Churchill River to the Sturgeon-Weir River in Saskatchewan and a proposed diversion flow of 3,000 cfs during the open water season only. This work was reviewed in 1953 by Manitoba Hydro as part of the studies related to the Grand Rapids project. During the period 1963-1970 various studies by Manitoba Hydro, consultants, provincial and federal government agencies led to the present plan adopted by Manitoba Hydro. In December 1972, a licence to proceed was issued to Manitoba Hydro by the Manitoba Department of Mines, Resources and Environmental Management. Actual construction started in 1973.

The basin drained by the Churchill has an area approximately of 109,000 square miles, having its headwaters located in east-central Alberta. The river flows eastward through Saskatchewan some 150 miles north of the Saskatchewan River. In Manitoba, it runs north-east, roughly paralleling the Nelson River located 100 miles to the south.

The Manitoba portion of the river has a hydro-electric potential of more than 3,000 megawatts. Instead of harnessing this potential by building hydro-electric plants on the Churchill, a considerable economic advantage is gained by diverting part of the water into the Burntwood and Nelson River System and using the existing and proposed generating sites on the Nelson River. Diverting Churchill water as opposed to building plants on the Churchill itself reflects a cost advantage in excess of $600 million.

The diversion plan centres around Southern Indian Lake, a widening of the Churchill River. There are three main components:

1) A control dam at Missi, the natural outlet of Southern Indian Lake will control the outflow and also raise the lake level by 10 feet.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

2) An excavated channel from South Bay of Southern Indian Lake to Isset Lake will create a new outlet to allow Churchill water to flow into the Rat River - Burntwood River - Nelson River Systems.
3) A control dam at Notigi, on the Rat River will regulate the flow into the Burntwood - Nelson River System.

As originally conceived, the diversion plan was to raise the level of Southern Indian Lake by 35 feet. However, the "high level diversion" would have required the entire community of Southern Indian Lake and other residents of the region to be moved to higher ground. For this reason and other environmental concerns, the plan was modified to limit the lake level rise to 10 feet.

Under the terms of the licence, Manitoba Hydro is permitted to divert up to 30,000 cfs from the Churchill into the Nelson. The licence stipulates that the outflow from the control dam at Missi Falls must be at least 500 cfs during open water season and 1500 cfs during the ice cover period. Historically, outflows from Southern Indian Lake have varied from 20,000 to 70,000 cfs with a long-term average of 35,000 cfs. Below Missi Falls, tributaries increase the Churchill natural flow to an average of 45,000 cfs emptying into Hudson Bay. With the diversion in operation, the flow will be reduced to an average of 18,000 cfs. The diverted Churchill water can be used at four generating sites along the Burntwood River with a total potential of more than 700 megawatts and at seven Nelson River sites below Split Lake adding near 2,000 megawatts of dependable capacity to the lower Nelson.

While the diversion plan will cause environmental changes on the lower Churchill and in the region along the diversion route, most of these are not expected to be permanent. Manitoba Hydro has assumed responsibility for any loss of livelihood to fishermen and trappers as a result of the project and will replace docks or

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

facilities affected by the changes in water level. Diverting the Churchill will alter the shorelines of Southern Indian Lake and in the vicinity around the Notigi control structure. The principal effects of the flooding will be a loss of forested area and marshes (wildlife habitat and trapping grounds) and changes in the pattern of commercial fishing. Although no community will be flooded out, it will be necessary to relocate a number of residences and some commercial buildings.

To ensure that sociological, economic and environmental interests would be fully explored, the government of Canada and Manitoba in 1971 initiated a $2 million Lake Winnipeg, Churchill and Nelson Rivers Study, to look at every aspect of northern resource development and to recommend modifications, remedial measures mitigating works. Among the areas of concern investigated by the 13 volume Study Board Report issued in June, 1975 were the effects at Thompson, Churchill and Nelson House. At Thompson, because of increased flows in the Burntwood River, it was necessary to modify the city's water intake system and to rebuild the floatplane base. At Churchill, the reduced flows required modifications to the water supply works.

The Churchill River Diversion became operational on June 2, 1976 with an initial flow of 8,200 cfs. In October the flow was increased by 5,000 cfs. During the late spring of 1977, the flow was increased in stages to 15,000 cfs. Again in July, 1977 the flow was increased in stages to 30,000 cfs (full licenced flow). In preparation for spring break-up the C.R.D. flow was reduced in stages to 15,000 cfs by mid April, 1978. The gradual reduction in the flow is intended as a precaution against possible spring flooding at Nelson House and Thompson. Because this spring's break-up will be the first the C.R.D. has been in full operation at 30,000 cfs, the Notigi cutback is deemed prudent to help offset

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

any possible adverse effects, such as those resulting from ice jams which may occur along the Burntwood River.

At present, Manitoba Hydro is involved in follow-up and monitoring programs required by the licence to divert the Churchill River and by the agreement with the Northern Flood Committee.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

2 - RELEVANT DRAWINGS, PLANS, CHARTS

Those drawings that illustrate the scope of the study are appendixed to documents of Item 1, Information and Technical Data.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

3 - RATIONALE OF THE STUDY

The purpose of the Project Study is to develop the definitions of the engineering feasibility and an associated environmental overview towards establishing generation plants on the Burntwood River, as the river is (1978) licenced and being operated to carry waters from the Churchill River into the Nelson River at Split Lake, to the degree that a Governmental approval of the chosen preferred development plant and reservoir configuration may be secured. This will be in terms of:

a) Its engineering feasibility, its capability of producing electrical energy, its financial cost, and its economic return, and:
b) The environmental overview being sought to take into account the project acceptability in its demands on natural resources, its environmental effects, and its impact on and probable acceptance from the public and the commercial enterprises, that will be directly affected in the study area.

The overview will be reviewed from each of the two following viewpoints:

a) The "Natural Environmental Impact" upon Physical Topography and on the biotic and ecological communities. This should outline the impact processes on physical water systems, the impacts on aquatic biotic systems and adjoining terrestrial biotic community. Predictions should be offered on the negative and positive outcomes which will be of ecological, sociological, and commercial interest. Probable remedial, preventative and restitutional programs should be outlined. Possible monitoring programs required to prove these predictions should be outlined.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

b) The "Resource and Socio-Economic Background": (Neighbourhood of Thompson and Nelson House) - Demands upon the total natural resource for the value of lost opportunities because of the denial of access to other resources, such as mining and forestry as examples, should be assessed. Demands being made on municipal infra-structures should be assessed. Impacts upon commercial and industrial opportunities, job opportunities, change of life style, impacts on recreational activities, assessment of scale of probable compensation to injured parties, assessment of public benefits that the public may realize, should be outlined. This should consider impacts during Manitoba Hydro construction and installation and the residual of the system and reservoir presence.

The considerations of engineering, the considerations of resources and environment, and the socio-economic considerations must all be reconciled. The methodology for this reconciliation will be a first product of the study requiring representation from each of the study disciplines that will be involved.

Considerations arising from these reviews may indicate that adjustments should be made on the engineering model presented for appraisal.

It is intended that this Environmental-Socio-Economic overview should anticipate and support the preparation of a rigourous future Environmental Impact Statement (EIS) in anticipation of normal regulatory environmental assessment guidelines. This may be required when Manitoba Hydro commits the implementation of construction following the development plan approved

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

from this study, and when Manitoba Hydro system needs indicate the suitability of this generation. The EIS is not included in the studies to be undertaken at this time.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

4 - DESCRIPTION OF IN SITU RIVER SYSTEM, AND OUTLINE OF PROPOSED RESERVOIRS

Representative mapping has been extracted from the system of Development Reports that Manitoba Hydro has prepared to cover the range of engineering concepts of hydraulic installations and reservoirs that are possible. This selection is intended to demonstrate the scale and the areas of flooding that are to be considered in defining the environmental study.

The study area will be the Burntwood-Rat River System from Split Lake, to the Notigi control structure, taken with the appropriate land areas on either side, judged to be impacted. It includes the town of Thompson, and the community of Nelson House, and the surrounding mining operations.

The mapping selected is the three station-reservoir model of First Rapids, Manasan and Wuskwatim to be considered as the case of greatest flooding. Wuskwatim has been taken with reservoir level of 800 feet, the constraint applied from the provisions of the Northern Flood Agreement. However, there is an economic benefit in raising this to 810 feet, which is also to be evaluated.

The mapping is inadequate to cover all the possibilities that have been considered, and which will be reviewed as part of the study, with the benefit of the detailed reports.

A fourth generating station may be developed at Notigi, utilizing the existing forebay and head developed by the Notigi Control structure.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

Mapping Submission

	Title	Information
1.	Burntwood River Study General Location Plan	- Study Area
2.	Burntwood River Profile. Hydro. Development - Alternate One - 7067-B-1401	- Reservoir Level. Alternative Possibility Suggestions
3.	First Rapids Generation Site and Reservoir	- First Rapids Reservoir
4.	Burntwood River Study Manasan Generation Station Forebay El. 213 (metres). General Location of Dykes Figure 1 (2 sheets).	- Manasan High Level Reservoir
5.	Wuskwatim Generating Station Forebay El. 243.8 and El. 246.9 Flooded Area and Dyke Location Figure 1 (7 sheets).	- Wuskwatim Reservoir 800 foot level

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

6 - APPLIANCE OF PLANNING AND ENVIRONMENTAL REGULATIONS

The guidelines of two established Regulatory Systems governing the process and ingredients of environmental studies in the Province of Manitoba will be recognized. These are:

1. There is a group of thirteen land-use policies, drawn up for the implementation of the Planning Act (1975) and which were published in June 1978. They are not specifically drawn up for Hydraulic Generation Development.
2. There is a published Review Process for Proposed Provincial Projects - July 1976 published by the Department of Mines, Resources and Environmental Management. This has as its intention the requirement that such projects as developments for hydraulic generation should be routinely assessed for requirements for environmental studies and provisions for public involvement, and as the need arises, the required guidelines would be prepared. No guidelines for such Hydraulic Studies are yet in existence.

It is anticipated that guidelines for the Environmental Overview as envisioned in the section "Environmental Study - Technical Relations", will be developed as part of this study, with the involvement of representatives from the two agencies having responsibility on these activities. The manner in which this can be developed as one process is described in the section "Structure of Provincial Government Organization, Relating to the Approval Process".

The principles under which the overview and the process will be

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

developed are anticipated to be:

1. There will be a mechanism developed early in the study for communications between the staff of the two agencies and Manitoba Hydro to determine the study requirements.
2. The agency activities will commence with the receipt of descriptive material of this project description.
3. The regulatory agencies intend to commit themselves to produce such development guidelines and as early in the proponent's study as possible.
4. The overview is essentially a regional overview, and must be reviewed as a whole – i.e. the river system from Notigi to Split Lake.
5. The assessment will be planning in nature, proceeding indirectly from the general to the specific.
6. There will be flexibility in the interpretation of overview assessment guidelines, in which proponent and the agencies may introduce improvements, and remove redundancies as they become apparent. Limited field program may be required.
7. Some special concerns, as may be evolved out of the overview may, with governmental direction, require formal public involvement.
8. The Agencies will be responsible for Federal Government Agency involvement, possibly by arranging representation in the MEARA Agency.

The requirement for the usual Environmental Impact Statement is anticipated to be part of a future activity, to be prepared in application for a licence for the installation and operation of these plants. This will be initiated when the system need for energy is found to be best filled by plants on the Burntwood.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

LISTING OF REGULATORY DOCUMENTS

1. Provincial Land Use Policies - June 1978
   (booklet of thirteen (13) policies)
2. Review Process for Proposed Provincial Projects
   July 1976, Department of Mines, Resources and Environmental Management
3. Lake Winnipeg, Churchill and Nelson Rivers Study Board Reports, 1971-75.
   a) Summary Report - April 1975
   b) Background Documents and Interim Reports
      Technical Report Appendix I
4. Northern Flood Committee Agreement.
   Agreement between the Province of Manitoba, Manitoba Hydro Electric Board, the Northern Flood Committee, and the Dominion of Canada.
5. Surface Water Quality Standards and Stream Classification for the Province of Manitoba.
   Report from Clean Environment Commission to the Minister of MR&EM.
6. Collective Agreement - re labour conditions up to 1986.
   Allied Hydro Council of Manitoba and Hydro Projects Management Association.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

PROJECT DESCRIPTION ITEMS - NOT PART OF OVERVIEW DEFINITION

Section 5 - Anticipated Gaseous Liquid and Solid Wastes

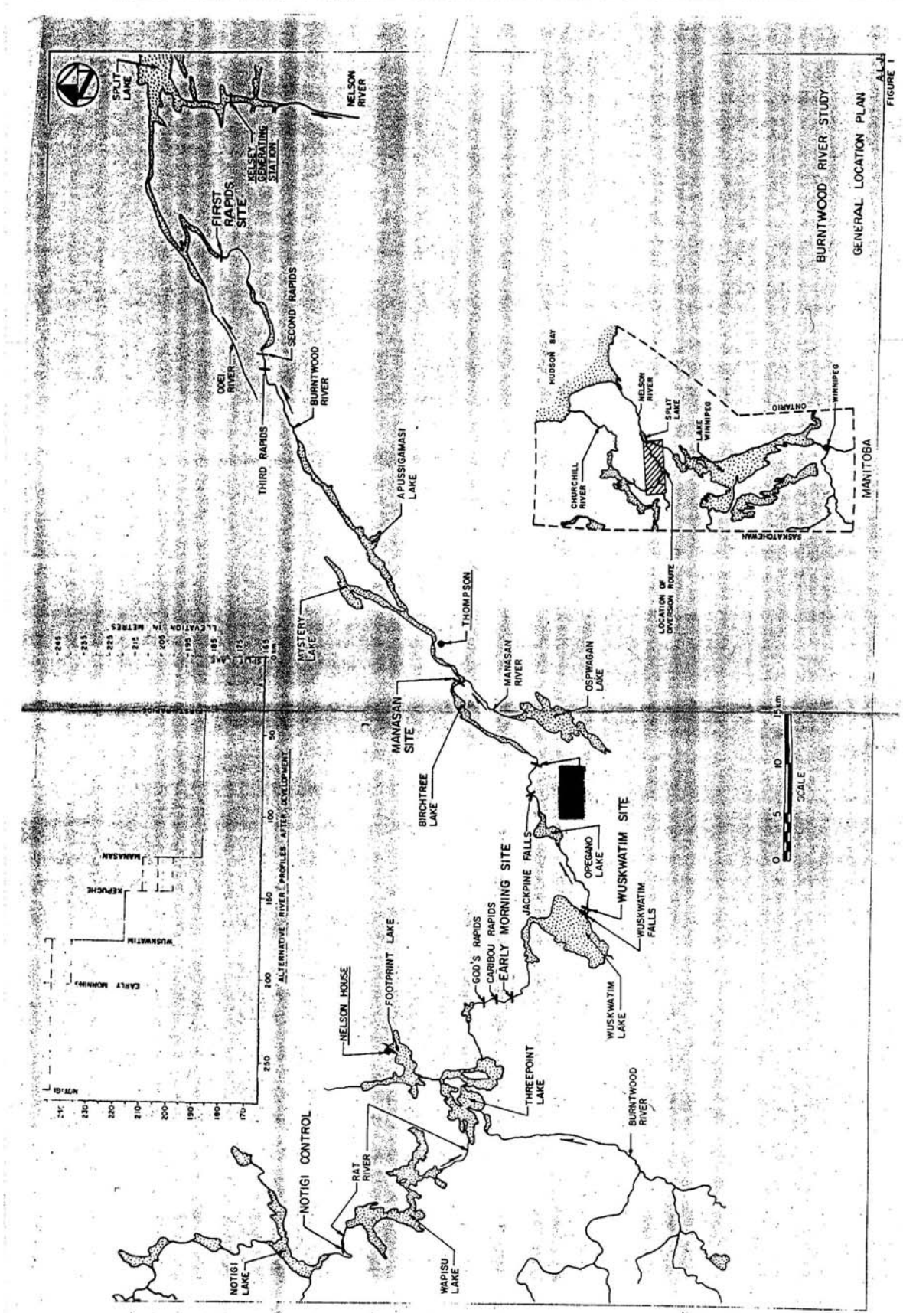
Section 7 - Transportation Requirements

Section 8 - Organizational Provisions

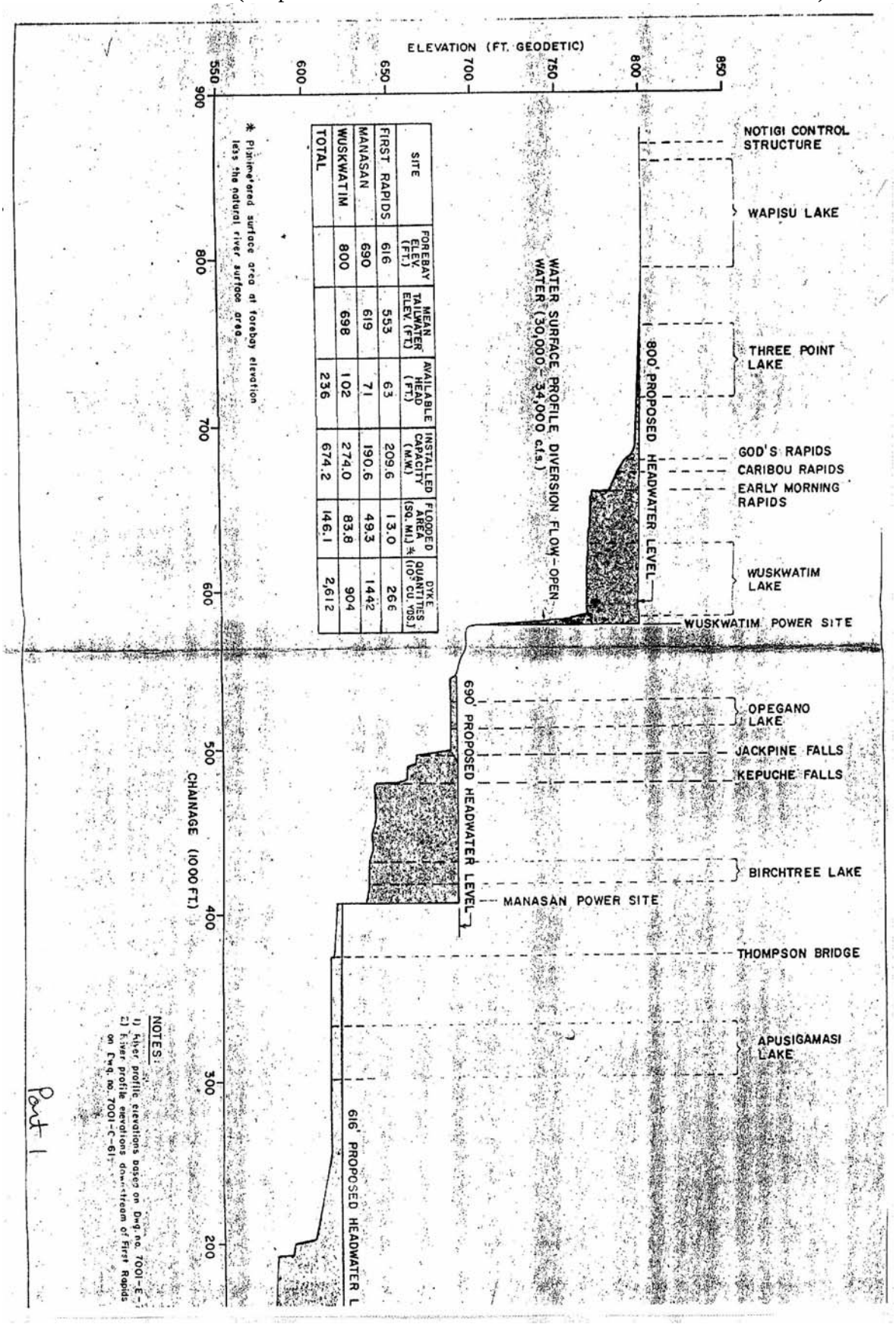
These sections are directed towards the environmental consequences of implementation of construction and operation.

Since the study is not an implementation, but only an overview, leading to identification of a best course of action, these sections are not applicable to defining need for the study. However, impacts of this type will be logically be part of the environment to be considered in coming to study conclusions.

APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

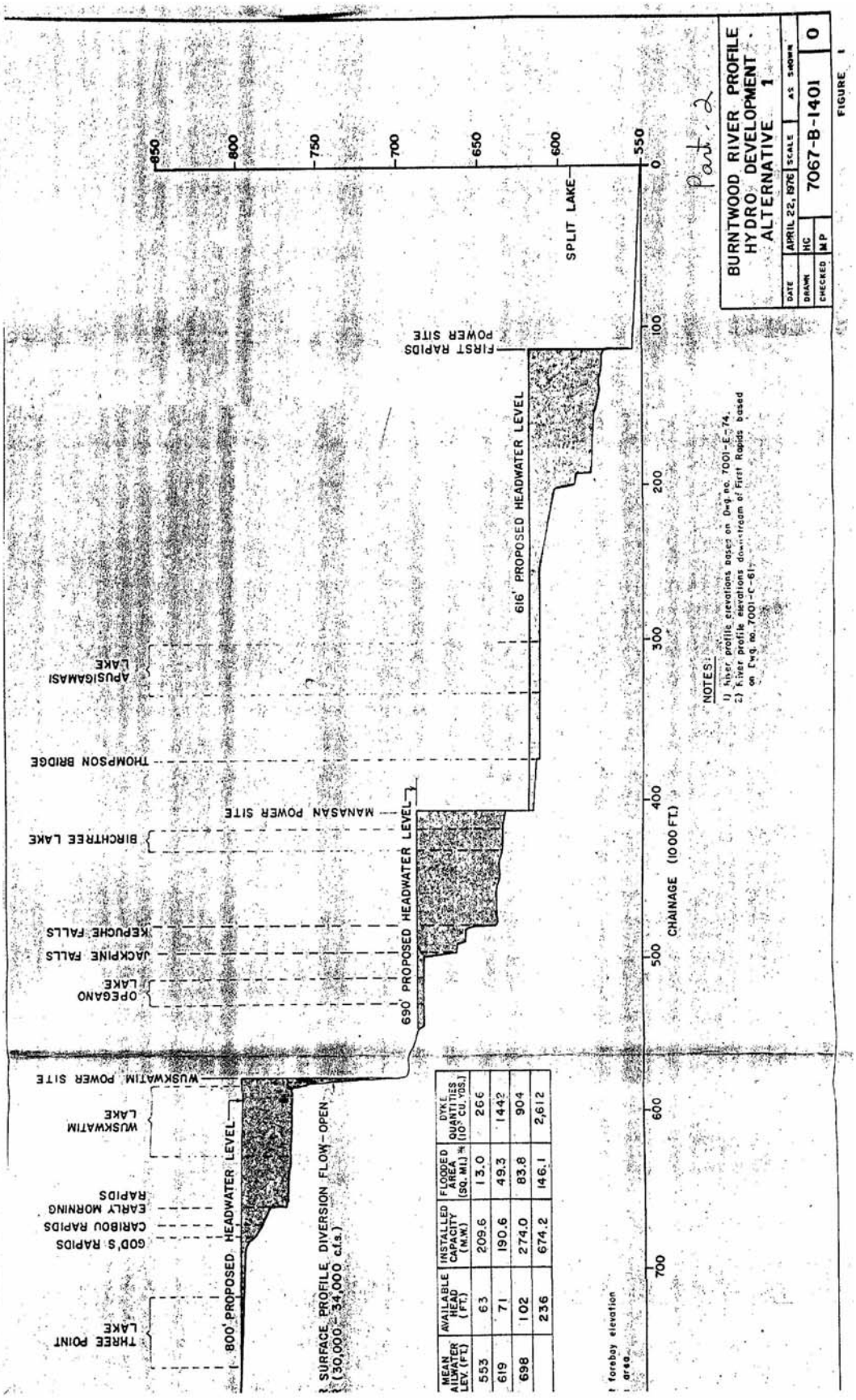


APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)

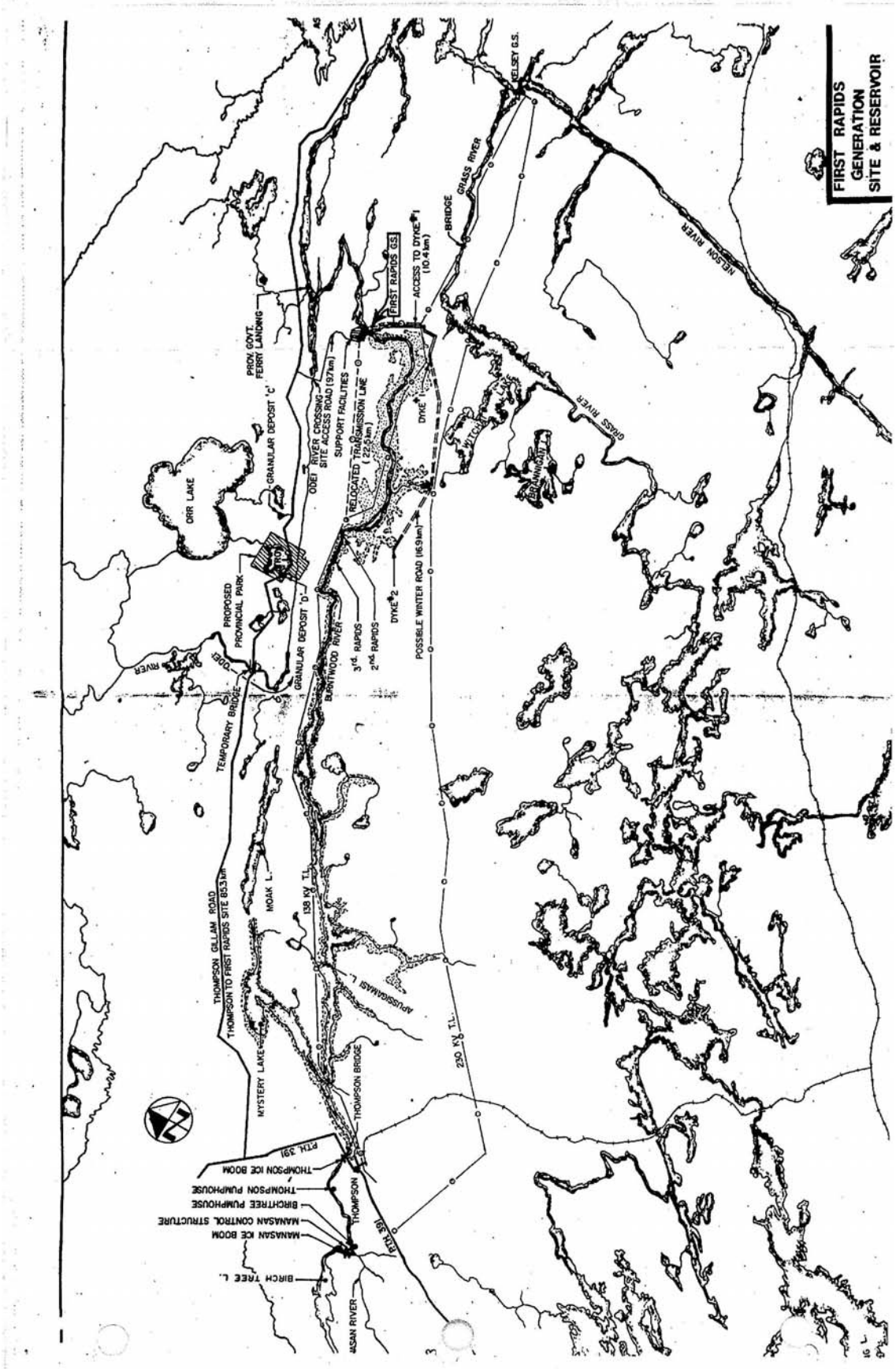


SITE	FOREBAY ELEV. (FT.)	MEAN TAILWATER ELEV. (FT.)	AVAILABLE HEAD (FT.)	INSTALLED CAPACITY (M.W.)	FLOODED AREA (SQ. MI.) *	DYKE QUANTITIES (10³ CU. YDS.)
FIRST RAPIDS	616	553	63	209.6	13.0	266
MANASAN	690	619	71	190.6	49.3	1442
WUSKWATIM	800	698	102	274.0	83.8	904
TOTAL			236	674.2	146.1	2,612

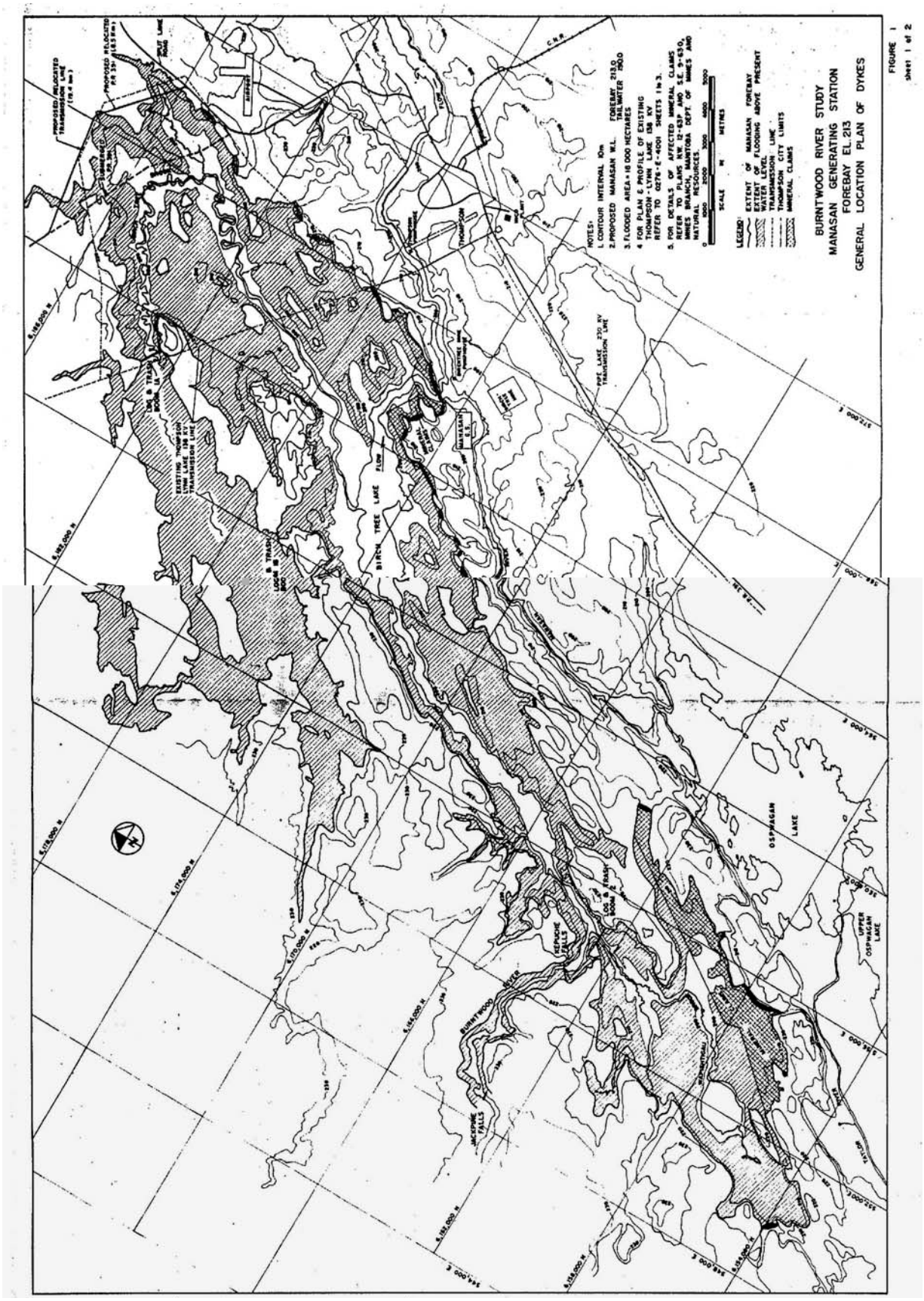
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



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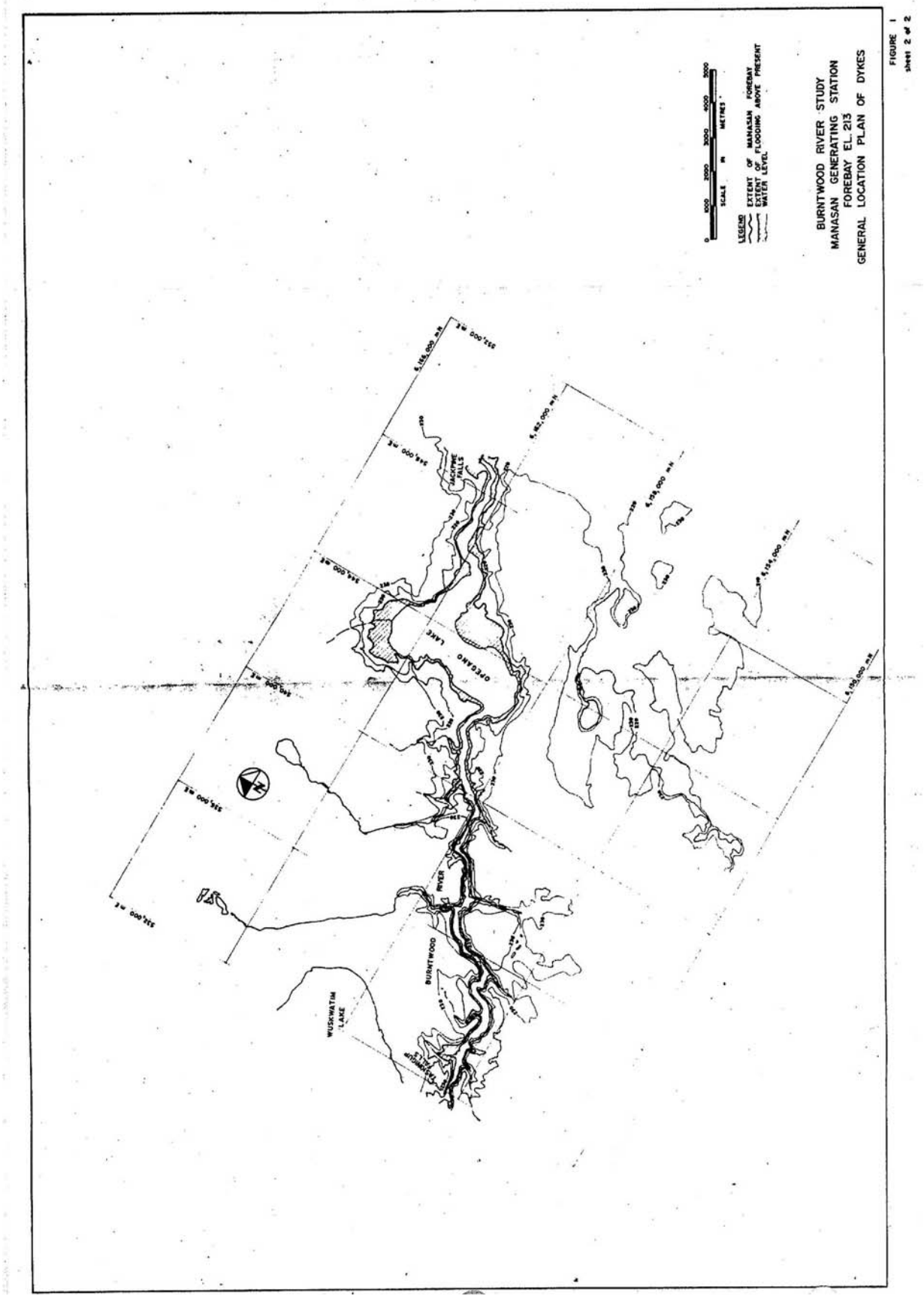
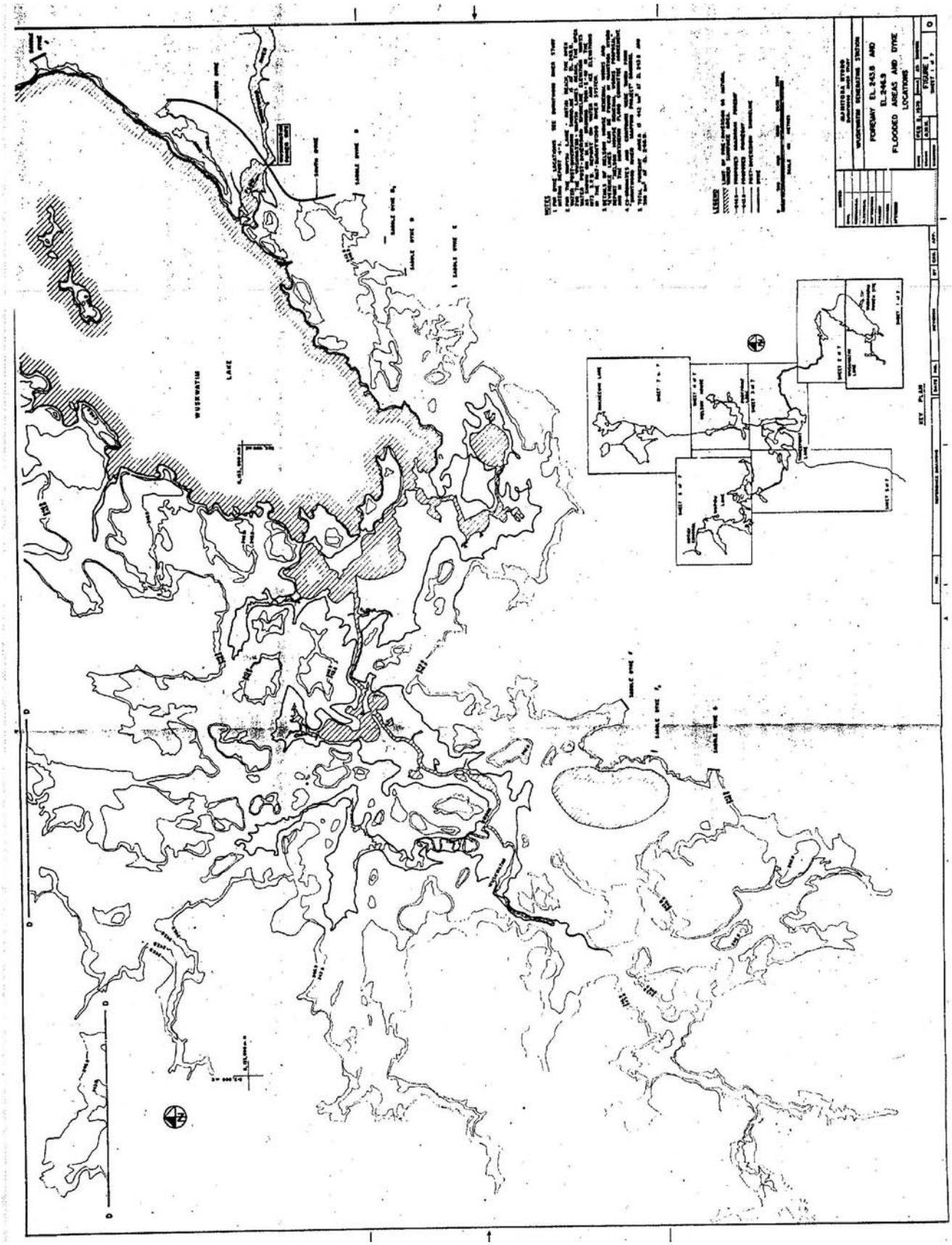
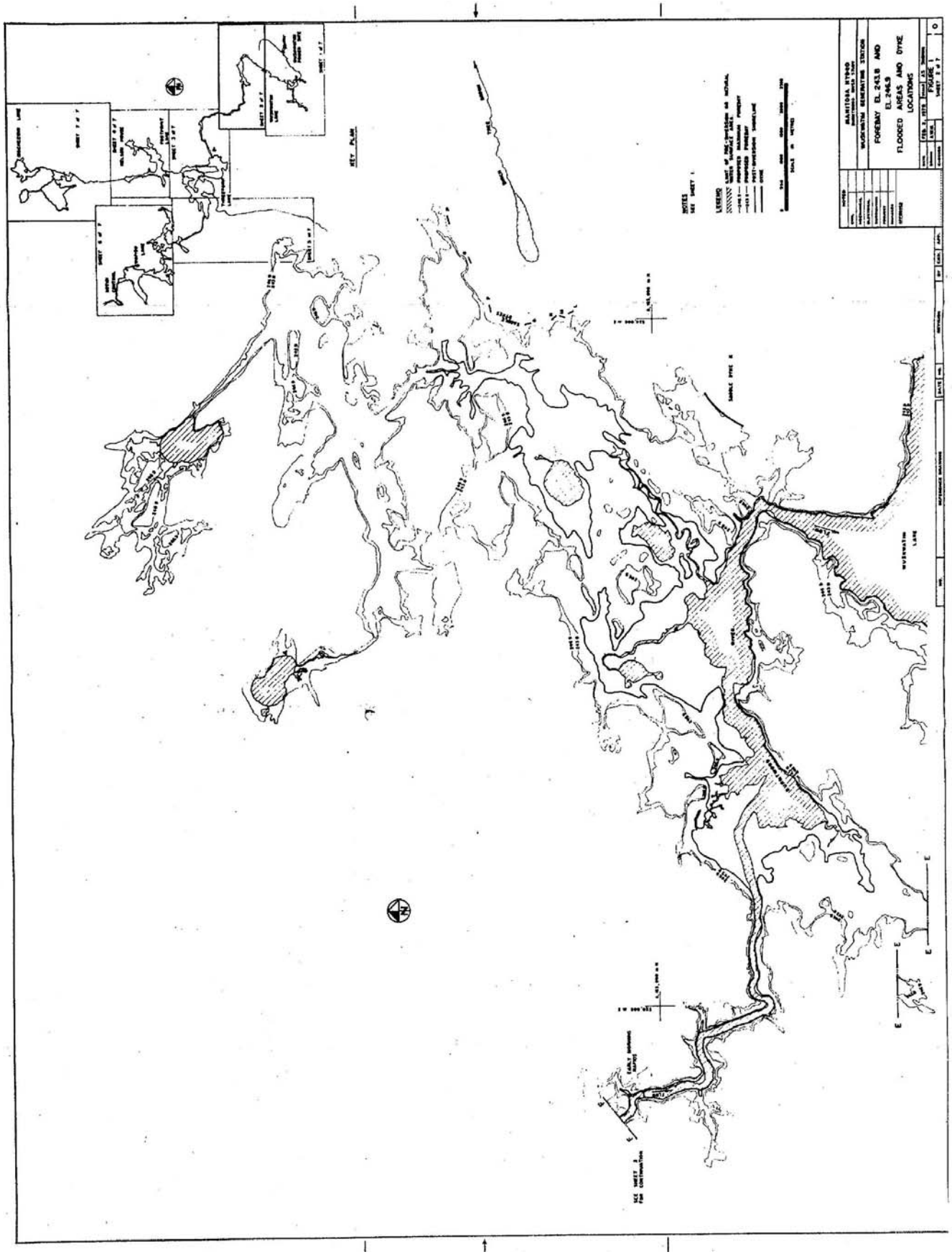


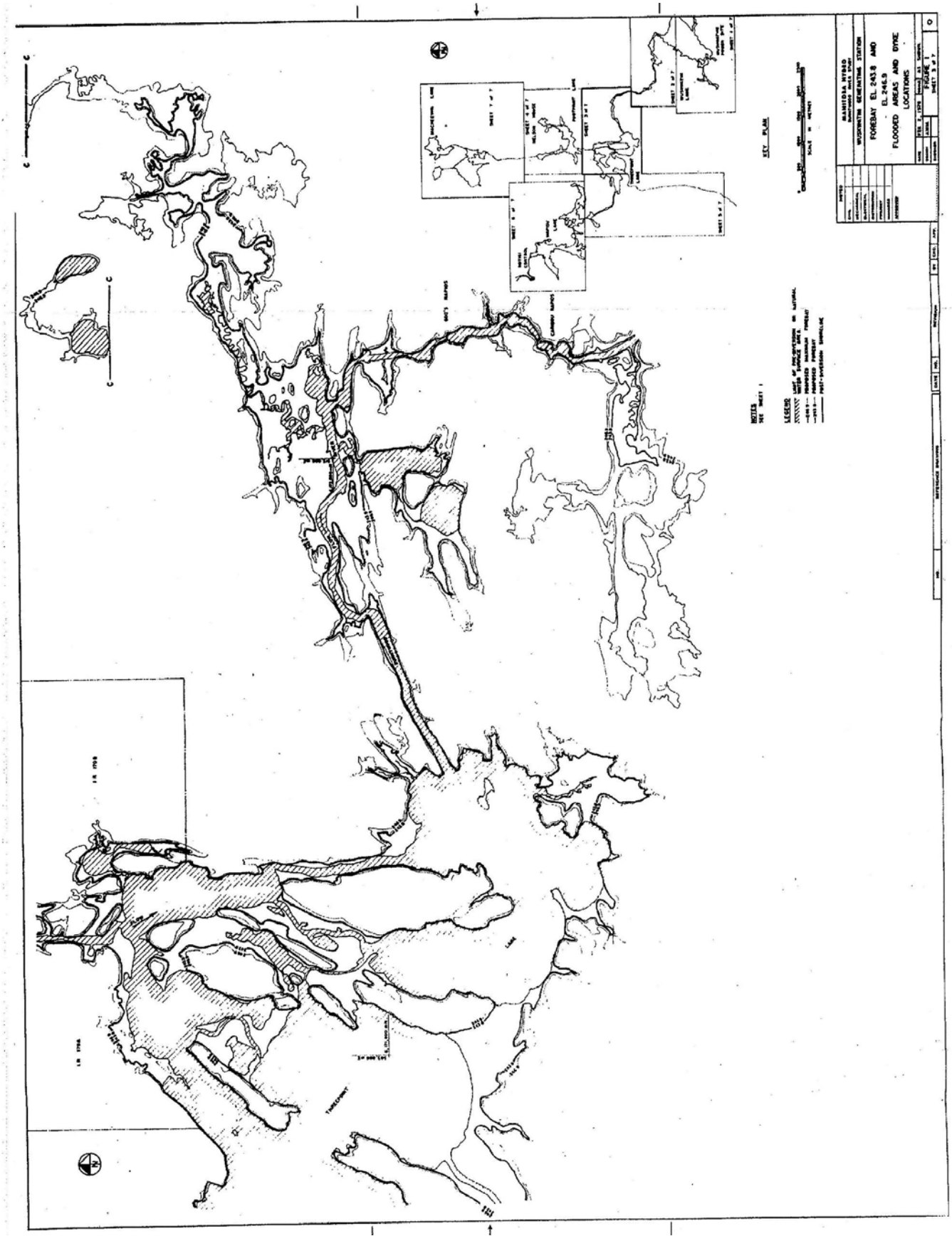
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



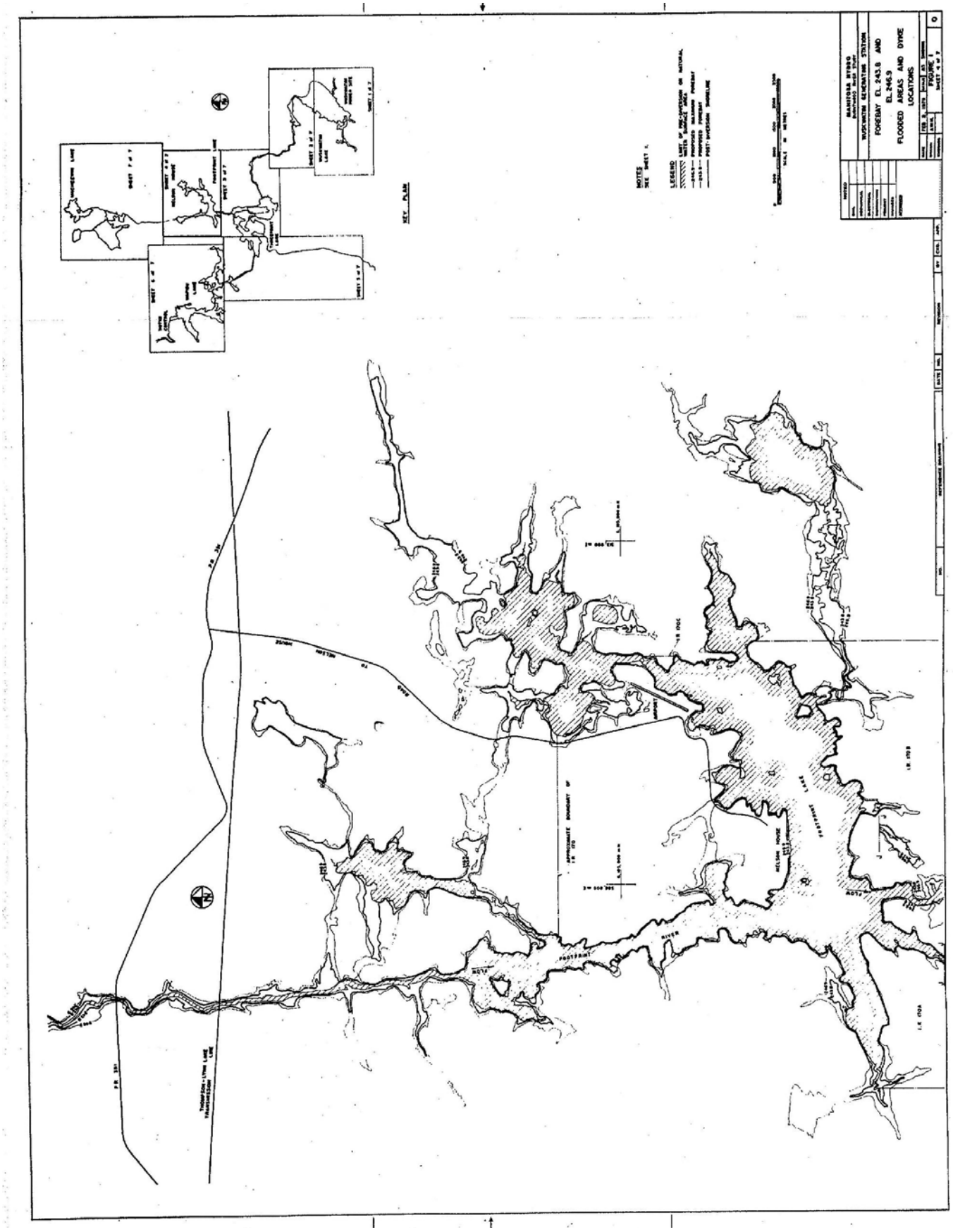
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



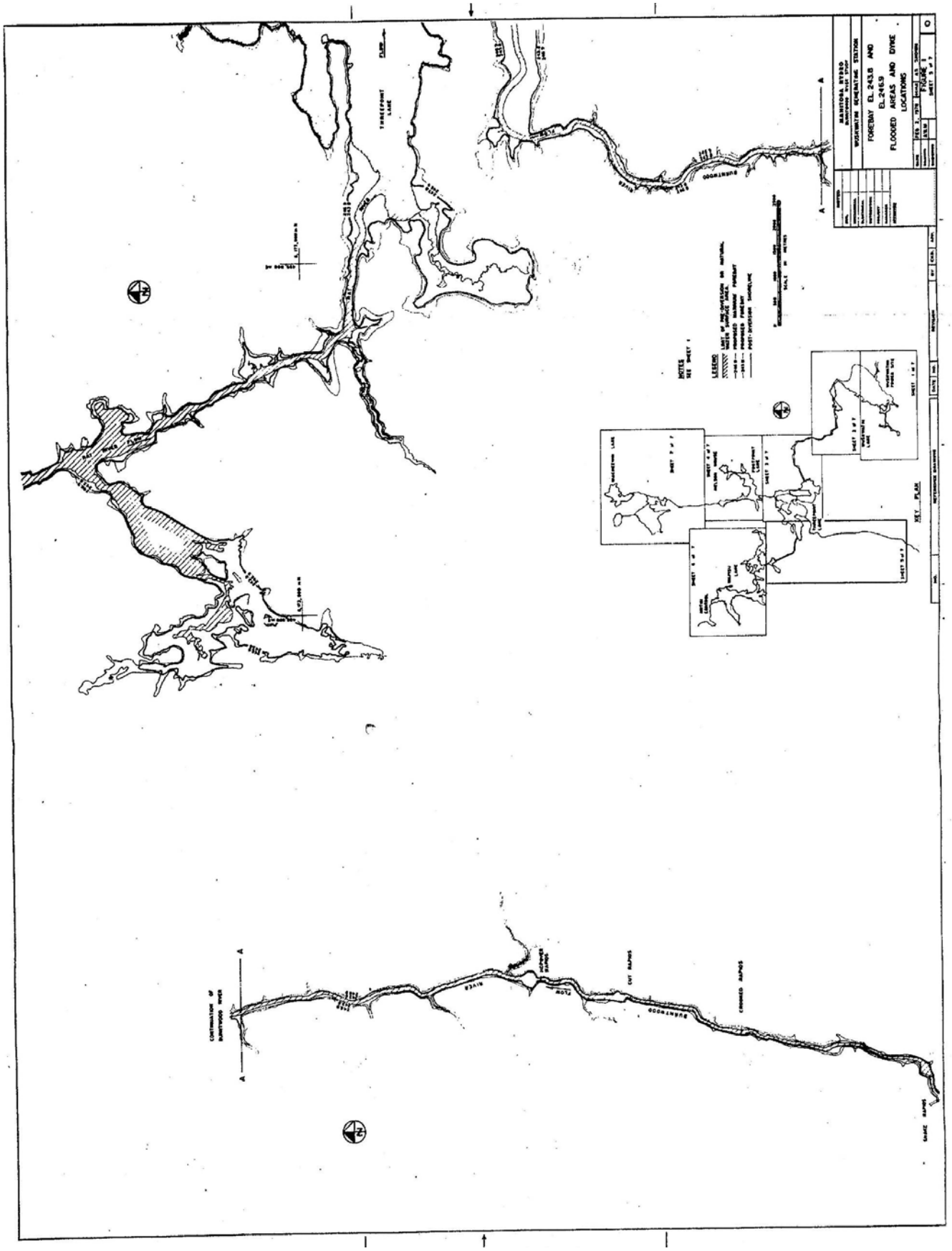
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



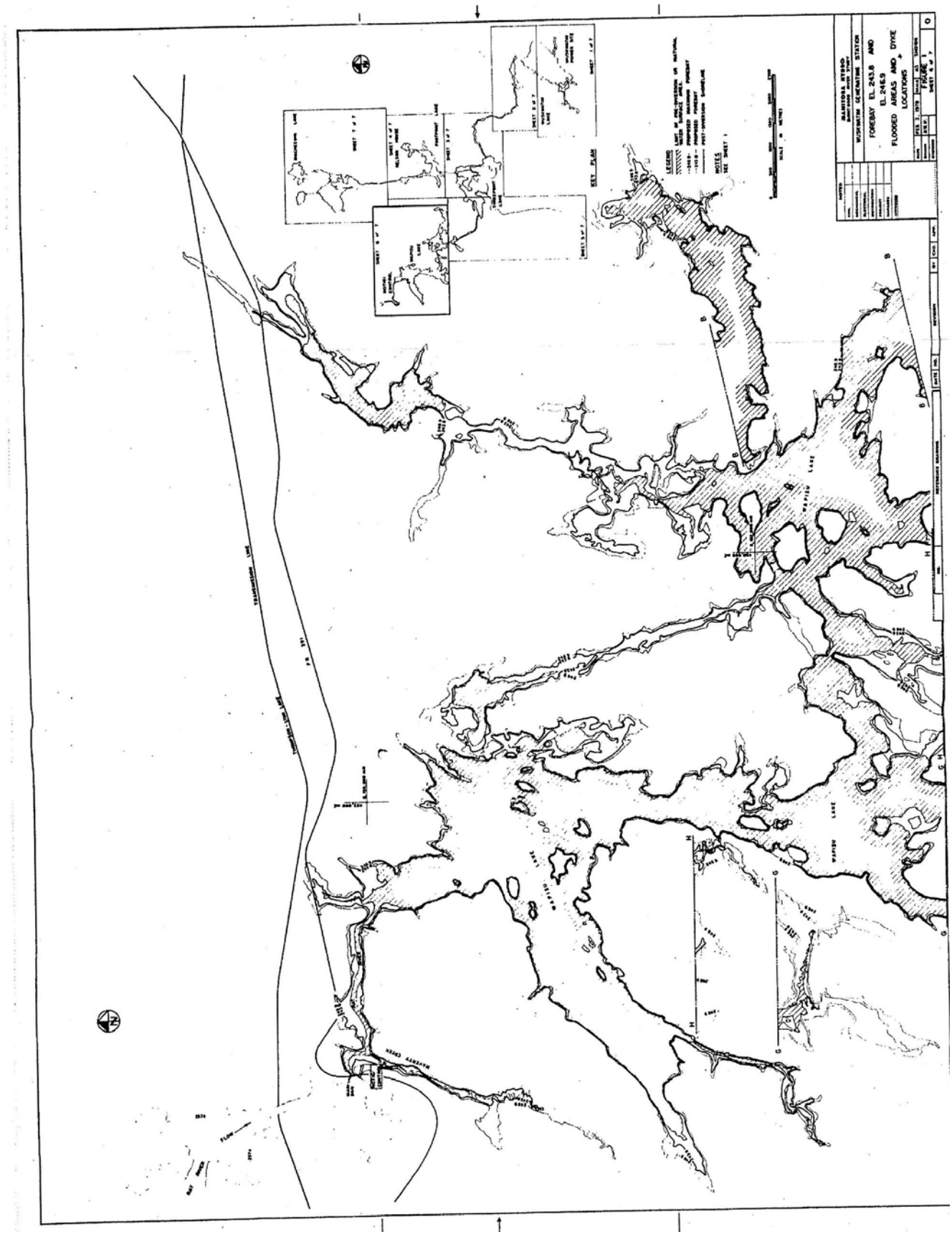
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



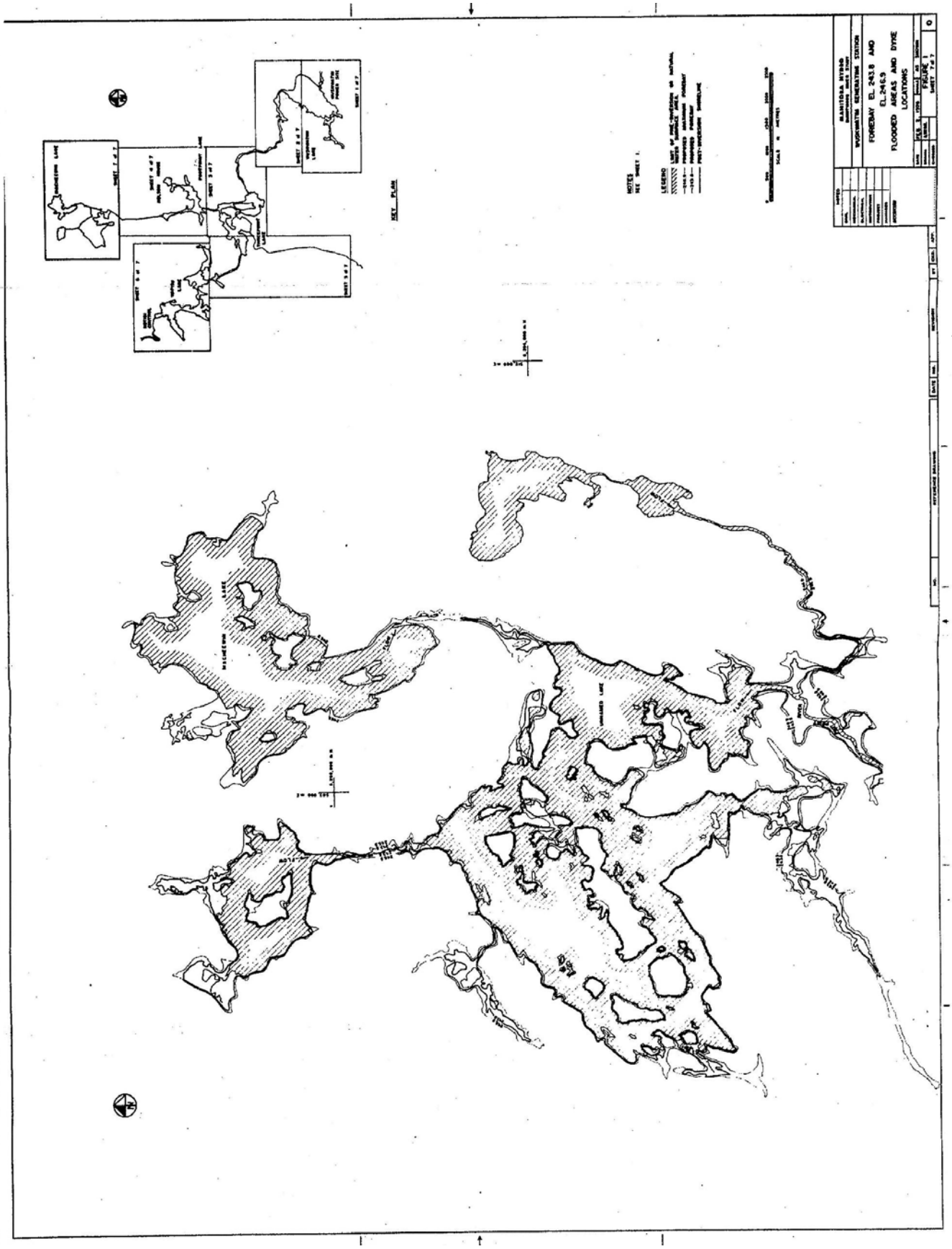
APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (Proposal attached to 1979 03 05 letter referred in Section 1)



APPENDIX A – continued (1979 09 20 letter referred in Section 1)

J. Dantzer

MINISTER
MINES, NATURAL RESOURCES AND ENVIRONMENT

September 20, 1979

Mr. L. Poyser,
Manager,
Environmental Services Department,
Corporate Planning Group,
Manitoba Hydro,
820 Taylor Avenue,
Winnipeg, Manitoba.
R3M 3T1

Dear Mr. Poyser:

Re: Proposed Churchill River Diversion Test Program

On the recommendation of the Manitoba Environmental Assessment and Review Agency, I am advising you that the Province has no objection, on environmental grounds, to the conducting of the proposed Churchill River Diversion Test Program by Manitoba Hydro and that the requirements of the Manitoba Environmental Assessment and Review Process will be fulfilled, when the following conditions have been met:

(1) Manitoba Hydro's test program consists of releasing an additional 2,000 cfs. (or less) over the maximum 30,000 cfs. at Notigi now allowed under the Churchill River Diversion interim operating licence, between September 15, 1979 and April 15, 1980;

(2) Manitoba Hydro obtains the requisite change in its interim operating licence from the Water Resources Branch of the Department of Mines, Natural Resources and Environment;

(3) Manitoba Hydro through its outlined program of monitoring and control, ensures that neither the Northern Flood Agreement nor the City of Thompson agreement is violated as a direct result of the test program;

. . . 2

APPENDIX A – continued (1979 09 20 letter referred in Section 1)

(4) Manitoba Hydro communicates all pertinent information about the progress of the test program on a bi-weekly basis with a monthly written bulletin, to all communities along the diversion route; this communication is to include the Provincial Departments of Municipal and Urban Affairs and Northern Affairs;

(5) Manitoba Hydro supplies regular information to the Province concerning all aspects of the test program on an at least weekly basis, with a monthly written report; this information is to be communicated through M.E.A.R.A. support staff.

Yours sincerely

Original Signed By:
A. Brian Ransom

A. Brian Ransom,
Minister.

cc: Honourable D. Craik
Mr. C. Curtis, A/Chairman

APPENDIX A – continued (1979 11 15 letter referred in Section 1)

MANITOBA

MINISTER
MINES, NATURAL RESOURCES AND ENVIRONMENT
WINNIPEG
R3C 0V8

RECEIVED
NOV 16 1979
GENERAL MANAGER
CORPORATE RESOURCES

November 15, 1979.

RECEIVED
NOV 19 1979
MANITOBA HYDRO
OFFICE OF GENERAL COUNSEL
& SECRETARY

Mr. M. Fraser,
Chief Operating Officer,
Manitoba Hydro,
P.O. Box 815,
WINNIPEG, Manitoba.
R3C 2P4

Dear Mr. Fraser:

Re: PROPOSED CHURCHILL RIVER DIVERSION TEST PROGRAM

There has been considerable correspondence between Manitoba Hydro and my Department in connection with the proposed Churchill River Diversion Test Program by Manitoba Hydro. It is my understanding that this program consists of releasing an additional 2,000 cubic feet per second (or less) over the maximum of 30,000 cubic feet per second at Notigi now allowed under Term No. 11 of the Churchill River Diversion interim licence, between September 15, 1979 and April 15, 1980.

I construe Mr. J. F. Funnell's memorandum of September 27, 1979 to Mr. T. E. Weber, Director, Water Resources Branch to be a request for approval of the proposed increased release through the Notigi control structure.

By the power vested in me under Section 72 of the Water Power Regulations, I hereby approve Manitoba Hydro's request to control the flow of the waters in the Burntwood River during the period from September 15, 1979 to April 15, 1980 by operating the Notigi control structure in accordance with the following directive.

Notwithstanding Term No. 11 of the said licence, Manitoba Hydro shall not release more than an average weekly flow of 32,000 cubic feet per second through the Notigi control structure, and shall vary the magnitude of the release through that structure from time to time in

.../2

APPENDIX A – continued (1979 11 15 letter referred in Section 1)

Mr. M. Fraser - 2 -

order to ensure that the flow in the Burntwood River, as measured at the Provincial Government gauging station at Thompson, shall not exceed the average mean flow plus 32,000 cubic feet per second.

After April 15, 1980 Manitoba Hydro shall, of course, be bound by the restrictions contained in Term No. 11 of the licence unless otherwise authorized.

Yours sincerely,

Original Signed By:
A. Brain Ransom

Minister.

√xc Mr. J.F. Funnell 79 11 19

79 11 19 - XC to P. M. Abel
J. J. Arnason
W. J. Tishinski

APPENDIX A – continued (1990 04 11 letter referred in Section 1)

PS-f-25

Manitoba

RECEIVED
APR 26 1990
MANITOBA HYDRO
OFFICE OF GENERAL COUNSEL

APR 27 1990
EXTERNAL RELATIONS

Memorandum

Date: April 11, 1990

To: J.F. Funnell
General Counsel and Secretary
Manitoba Hydro
820 Taylor Avenue

From: Tanner Elton
Deputy Minister
Department of Environment
Room 350, Legislative Bldg.

Subject: MANITOBA HYDRO'S AUGMENTED FLOW PROGRAM REQUEST FOR THE PERIOD MAY 16, 1990 TO MAY 15, 1991

Telephone

I am writing pursuant to your memorandum to Mr. L. Whitney dated March 16, 1990 concerning the above referenced matter.

As you know, the Augmented Flow Program predates the Manitoba Environment Act by a number of years. In view of the on-going nature of the program, this Department has concluded that an Environment Act Licence will not be necessary provided that the licence deviations remain the same as specified in past approvals. We are satisfied with this application provided that the terms of the augmented flows are the same as past years including storage to a maximum of 847.5' ASL. Environment Act licencing would be necessary for a maximum Southern Indian Lake Storage in excess of 847.5' ASL.

For your information, I have attached a copy of my previous correspondence to Mr. D. Stewart, dated April 19, 1989 which outlines this Department's conditions of approval for the period May 16, 1989 to May 15, 1990.

18

Original Signed By:
Tanner Elton

Attachment

c.c. L. Whitney, Water Resources

APPENDIX A – continued (Attachment to 1990 04 11 letter referred in Section 1)

April 18, 1989

Dale Stewart
Deputy Minister
Natural Resources
314 Legislative Bldg.

Tanner Elton
Deputy Minister
Environment and Workplace
Safety and Health
350 Legislative Bldg.

Manitoba Hydro's CRD Augmented Flow Program Request for the Period May 16, 1989 to May 15, 1990.

Manitoba Hydro's application to deviate from the terms of the Churchill River Diversion Interim Licence for the period from May 16, 1989 to May 15, 1990 has been reviewed. I am recommending that Hydro's request be granted for the period of time specified under the same conditions applied to previous approvals, namely that:

1. Neither the Northern Flood Agreement nor Manitoba Hydro's Agreement with the City of Thompson is violated as a direct result of the augmented flow program.

2. Manitoba Hydro agrees to terminate its program and decrease diversion flows to appropriate levels, if at any time it appears that the above noted agreements may be violated, or if conditions arise which present a hazard to local residents.

3. The Director of Environmental Management Services, Department of Environment and Workplace Safety and Health is kept fully informed on all aspects of the Augmented Flow Program by means of monthly written reports.

4. Monthly written reports on the augmented flow program will be forwarded to the Northern Flood Committee and affected communities.

5. The maximum water level on Southern Indian Lake will remain at 847.5' ASL pending the results of the environmental impact assessment for the Augmented Flow Programs initiated by Manitoba Hydro, in consultation with the Northern Flood Committee Inc.

6. The Southern Indian Lake maximum drawdown of 4.5 feet be staged over a period of time and in such a manner so as to minimize adverse impacts on Southern Indian Lake residents.

I would appreciate your transmitting this information to Manitoba Hydro, as the authority responsible for administering Hydro's Churchill River Diversion Interim Operating Licence.

Tanner Elton

bc: N. B. Brandson
C. B. Orcutt
B. Blunt

APR

BB:kk

APPENDIX A – continued (1991 04 23 letter referred in Section 1)

JM/AM
your file HZ-3

Manitoba

Memorandum

Date: April 23, 1991

File:

To: K.D. Munro
General Counsel and Secretary
Manitoba Hydro

From: N.B. Brandson
Acting Deputy Minister
Manitoba Environment
350 Legislative Bldg.
450 Broadway Avenue
WINNIPEG, Manitoba
R3C OV8

RECEIVED
APR 24 1991
MANITOBA HYDRO
GENERAL COUNSEL

SUBJECT: MANITOBA HYDRO'S AUGMENTED FLOW PROGRAM REQUEST FOR THE PERIOD MAY 16, 1991 TO MAY 15, 1991

With regard to your memorandum of March 20, 1991 to Mr. L. Whitney and copied to myself concerning Manitoba Hydro's 1991/92 augmented flow program request, I can provide the following comment.

At the time of our review of this matter during the 1990/91 augmented flow program request, it was decided that licencing under The Environment Act would not be required provided the conditions of past Approvals remain unchanged. This decision was made on the basis of the on-going nature of the augmented flow program which predates The Environment Act. However, Manitoba Hydro was also advised at that time that any change to the maximum Southern Indian Lake water levels in excess of 847.5' ASL could not be authorized by this Department without prior review under The Environment Act. This would involve Manitoba Hydro applying to Environment directly under The Environment Act. The environmental impact assessment report can be used to support such a Proposal under The Environment Act.

We are otherwise satisfied with the 1991/92 request provided that the terms of the program remain the same as in past years including storage to a S.I.L. maximum of 847.5' ASL.

.../2

APPENDIX A – continued (1991 04 23 letter referred in Section 1)

K.D. Munro
April 23, 1991
- Page 2 -

As information, I have attached a copy of this Department's previous correspondence to Mr. D. Stewart which outlines our conditions of approval for the period May 16, 1989 to May 15, 1990.

Original Signed By:
Norman B. Brandson

Attachment
c.c.: L. Whitney, Water Resources

1991 04 25 xc: P.M. Abel
M.D. McKay
"KDM"

APPENDIX A – continued (1992 03 11 letter referred in Section 1)

Manitoba

Memorandum

DATE: March 11, 1992

TO: K. D. Munro
General Council and Secretary
Manitoba Hydro

FROM: Norm Brandson
Deputy Minister
Department of Environment
350 Legislative Building

SUBJECT: MANITOBA HYDRO'S AUGMENTED FLOW PROGRAM REQUEST FOR THE PERIOD MAY 16, 1992 TO MAY 15, 1993

I am responding to your memorandum dated February 19, 1992 addressed to Mr. Larry Whitney and copied to myself concerning Manitoba Hydro's 1992/93 Churchill River Diversion Augmented Flow Program request.

I note that Manitoba Hydro continues to request a maximum elevation of 848 feet ASL. on Southern Indian Lake for the period May 16, 1992 to May 15, 1993. In my response to Hydro regarding the 1992/93 request, you may recall I advised Hydro that Licencing under the Environment Act would not be required provided the conditions of past approvals remain unchanged. This decision was made on the basis of the on-going nature of the augmented flow program which predates the Environment Act. However, Hydro was also advised at that time that any change to the maximum Southern Indian Lake water levels in excess of 847.5 feet ASL could not be authorized by this Department without prior review under the Environment Act. Licencing would be required because any change in water level in excess of 847.5 feet ASL would constitute a Class 3 development as defined by Regulation 164/88 under the Act respecting " works resulting in modification to lake or river levels and affecting a water surface area greater than 200 square kilometers. Manitoba Hydro would have to file a Proposal under the Environment Act with this Department to initiate the environment review process.

We are otherwise satisfied with the 1992/93 augmented flow program request provided that the terms of the program remain the same as in past years including storage to a maximum of 847.5 feet ASL on Southern Indian Lake.

APPENDIX A – continued (1992 03 11 letter referred in Section 1)

As information, I have attached a copy of this Department's previous correspondence to the Department of Natural Resources which outlines our conditions of approval for the period May 16, 1989 to May 15, 1990. As you are aware, the 1990/91 and the 1991/92 programs were approved on the basis of these same conditions.

Original Signed By:
Norm Brandson

Norm Brandson

Attachment

cc. L. Whitney, Water Resources

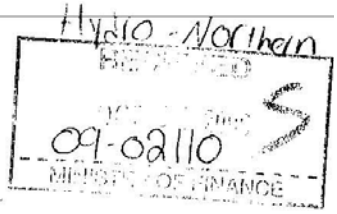
1992 03 26 xc: I.W. Dickson

"KDM"

92 03 27 - xc: A. Miles
D. Gunter

"IWD"/lcp

APPENDIX A – continued (2009 09 29 letter referred in Section 1)



MINISTER OF CONSERVATION

Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

Ms. Anne Lindsey
335 Rosedale Avenue
Winnipeg MB R3L 1L9

SEP 2 9 2009

Dear Ms. Lindsey:

Thank you for your recent letter regarding the final licensing of the Churchill River Diversion (CRD). Specifically, you question why the final licensing process is being done under *The Water Power Act* and not *The Environment Act*.

The CRD has been operating under an interim Water Power Act Licence since 1977. Manitoba Hydro has now applied for a final licence. The CRD development preceded the Environment Act which was proclaimed in 1988. Developments which preceded the coming into force of *The Environment Act* do not require an Environment Act licence to continue their operation.

Nevertheless, environmental impacts of the CRD have been extensively documented and continually monitored. For example, environmental studies of the CRD have been conducted by both government and Manitoba Hydro, most notably the comprehensive Lake Winnipeg, Churchill and Nelson Rivers Study Board Review conducted jointly by Canada and the Province of Manitoba (1971-1975). More recently, a Memorandum of Understanding was signed between the Province of Manitoba and Manitoba Hydro to jointly monitor the ecological health of waterways affected by Manitoba Hydro, including the CRD.

The Department of Water Stewardship will be initiating a process for input into the licence finalization process under *The Water Power Act*. This process will provide another opportunity to solicit the opinions and concerns from interested individuals, communities and organizations.

Again, thank you for your interest regarding this matter.

Yours sincerely,

ORIGINAL SIGNED BY
STAN STRUTHERS

Stan Struthers
Minister

cc: Minister of Finance
Honourable Christine Melnick

APPENDIX B

SPECIFIC OBSERVANCES RELEVANT TO ARTICLE 9 OF THE INTERIM WATER POWER ACT LICENCE (Maximum Southern Indian Lake Water Level)

This appendix provides an account of specific events and the supporting documents referred to in Section 2, Article 9 of this report. Article 9 refers to Interim Licence condition #9 and subsequent approved alterations. Subject to certain conditions, maximum discharges are required at Missi and Notigi when the water level of Southern Indian Lake reaches a specific elevation.

1977 05 10 to 1977 06 26

Manitoba Hydro sent a 1977 04 28 letter to the Province requesting permission to exceed 847.0 feet on Southern Indian Lake and provided an explanation for this request. Notigi outflow was kept constant at 11,000 cfs because construction of the Thompson Pumphouse was not yet completed and the cofferdam at the works was being pushed to its design limit by the existing diversion flow and natural runoff. The early spring freshet along the Churchill River had resulted in ice jamming at Churchill and threatened the pumphouse and access road. Missi outflows were; (a) increased in late April to 46,000 cfs; (b) reduced temporarily as Notigi outflow increased and; (c) then increased again to 61,500 cfs in early June as Notigi outflow was reduced to 7,000 cfs.

The following three pages are a copy of the 1977 04 28 letter.

APPENDIX B – continued (1977 04 28 letter)

April 28, 1977

Our File No. 73D6-1

Mr. T. E. Weber, P. Eng.
Assistant Deputy Minister
Water Resources Division
Department of Mines, Resources &
Environmental Management
1577 Dublin Avenue
Winnipeg, Manitoba
R3E 3J5

Dear Mr. Weber:

Re: Churchill River Diversion Licence

For the reasons which we will enumerate below, we formally request written permission to temporarily exceed the full supply level of Southern Indian Lake of 847.0 as provided by the Churchill River Diversion licence.

During the course of the past winter, we have drawn Southern Indian Lake down to Elevation 846.25 primarily with spillage at Missi, with the intention of slowly ponding the lake back up to 847.0 by October 1st. We were aware that snow cover on the ground was approximately normal and expected a normal spring run-off. However, with the unusually warm weather and with spring approximately three weeks early, the run-off around the immediate lake was so rapid that the lake has virtually fully reponded in 10 days time, a phenomenon we had not expected. We nave continued with a diversion flow at Notigi of 11,000 cfs and up until 10 days ago the lake had been completely under control with a release of 23,000 at Missi.

While the main diversion works were completed last summer, a number of mitigation projects are still under construction or consideration. These include the two pumphouses at Thompson, the pumphouse at the Town of Churchill and the negotiations at Nelson House.

The rapid run-off has also been experienced on the natural Burntwood, where we are now recording a total discharge at Thompson of 17,000 to 18,000 cfs. The cofferdams surrounding the Thompson pumphouses at this moment in time cannot take a higher stage than the present 610.0 but sheet steel piling ordered two months ago and presently being installed should permit stages of 614 within a week's time. The present stage at Nelson House of 790.57 is running fairly close to the limit of 793.0, but could probably sustain a total flow through Three Point Lake of 20,000 cfs. But for the moment we think it would be unwise and imprudent to increase the discharge at Notigi.

APPENDIX B – continued (1977 04 28 letter)

As with Southern Indian Lake and the Burntwood River, the spring melt along the lower Churchill has raised the discharge to 30,000 cfs but has been accompanied by ice jams at the lower end. This has raised the stage adjacent to the Churchill pumphouse and its access road to within a couple of inches of flooding out. We are presently mobilizing to raise the access road and cofferdam, but this is hampered by the unavailability locally of appropriate haulage trucks.

When Southern Indian Lake suddenly rose to within a few inches of 847, our System Operating Department immediately took steps to increase the discharge at Missi in three steps to 46,000 cfs (total calculated inflow 60,000 cfs) and were contemplating to go up to 56,000 cfs. We calculate at the moment that flows through the South Bay Channel is almost nil and the Notigi forebay has filled with its own local run-off. However, our Churchill River Diversion project group issued the warning that such additional flows in the lower Churchill at this time would certainly overtop the access road leading to the pumphouse and perhaps the pumphouse itself, thereby delaying further work of this project by at least six weeks. This would delay the completion past the end of the 1977 construction season, and we would have to reschedule completion to 1978. Such delay would again require a discharge of 20,000 cfs down the lower Churchill so as to keep the old pumphouse in operation during next winter. Flows of this magnitude at Missi would be achieved only with a comparable loss at Notigi and would have very serious consequences in meeting our customers' load and energy demands next winter in view of the critical dry situation elsewhere in the system. We therefore wish to return flows at Missi during the next two or three weeks to about the 26,000 cfs range.

While it is our considered opinion that the rapid rise of Southern Indian Lake has largely run its course and the lake may not in fact rise above 847, nonetheless it is possible that spring inflows could continue and the lake would rise above 847. Local rain at this time would worsen the situation. Island Falls in Saskatchewan has taken initial steps to increase discharge, but the effects of this are not expected to reach Southern Indian Lake for another two or three weeks. We have calculated under the worst possible combination that Southern Indian Lake may rise to as high as 848.0. We note that the licence does not permit levels up to 850 in an emergency condition with maximum discharge at both Missi and Notigi, but we recognize that the present situation does not fall within the intent of this provision. On the other hand, our construction works are not complete. We expect that within two or three weeks we will be in a position to release an additional 5,000 cfs at Notigi, unless local Burntwood run-off rises beyond 6,000 cfs, and with a raised access road at Churchill we should be able to again resume the necessary spillage at Missi.

... 3

APPENDIX B – continued (1977 04 28 letter)

In summation, we therefore request formal written permission to temporarily exceed the upper licence limit of 847.0 on Southern Indian Lake.

Yours very truly,

ORIGINAL SIGNED BY
J. F. FUNNELL

J. F. Funnell
General Counsel
and Secretary

PMA/rdc

APPENDIX B - continued

1977 08 13 to 1977 09 27

Notigi outflow was increased from 25,000 cfs to 30,000 cfs in mid-August and Missi outflow was similarly reduced to balance outflow with inflow. The maximum deviation from 847.0 feet was 0.17 feet (2 inches).

1977 10 07 to 1977 11 04

Notigi outflow was constant at the licence maximum of 30,000 cfs during this period and Missi outflow was being reduced to match inflow and keep the level of Southern Indian Lake at or about 847.0 feet. The maximum deviation from 847.0 feet was 0.10 feet (1.2 inches).

1978 05 14 to 1978 06 19

A 1978 05 04 cover letter accompanying the 90-day forecast to the Province indicated that Notigi outflow could not be increased from its present level of 15,000 cfs to 27,000 cfs prior to 1978 05 10 due to the possibility of inducing ice jams on the Burntwood River. Missi outflows were increased immediately to 15,000 cfs and were being held constant in order to prevent Southern Indian Lake from rising above elevation 847.0 feet and to protect waterfowl nesting habitat downstream of Missi by not increasing outflow during the nesting season. A 1978 06 02 cover letter accompanying the 90-day forecast to the Province indicated that Missi outflow was being increased slowly up to 36,000 cfs due to a continued concern with waterfowl nesting habitat. An increase in Notigi outflow to 30,000 cfs was moved up to 1978 06 02 from 1978 06 21 to provide flood relief on Southern Indian Lake. A 1978 06 23 letter was sent to the Province explaining Manitoba Hydro's approach to regulating water levels in excess of 847.0 feet on Southern Indian Lake. A 1978 07 18 letter of response was received from the Province thanking Manitoba Hydro for its letter of explanation.

The following five pages are copies of the 1978 05 04, 1978 06 02, 1978 06 23 and 1978 07 18 documents.

APPENDIX B – continued (1978 05 04 letter)

W. J. Tishinski

Director

System Operations Division

The Honourable A. Brian Ransom

Minister – Mines, Resources

& Environmental Management

May 4, 1978

73D6-2

CHURCHILL RIVER DIVERSION – 90-DAY FORECAST

We attach a schedule of proposed releases for the ensuing 90 days from May 1, 1978.

The resumption of Notigi outflow to 27,000 cfs is rescheduled to May 10, 1978 due to the lateness of spring breakup. Increasing Notigi outflow now could result in ice prematurely breaking up and causing ice jams. As soon as the natural breakup occurs the Notigi outflow will be increased a 1000 cfs/day to 27,000 cfs.

Missi Falls outflow will be increased to 15,000 cfs and kept constant till the end of July, 1978. The reason for this increase is twofold: to prevent Southern Indian Lake from rising beyond the licence limit of 847.0 and to protect the water fowl nesting habitats downstream of Missi Falls. The nesting season begins in early May and ends by mid-July. Any increase in Missi Falls outflow during this period could jeopardize the safety of these birds.

Original Signed By
W. J. TISHINSKI

MSM/rm
Att.

APPENDIX B – continued (1978 06 02 letter)

W. J. Tishinski

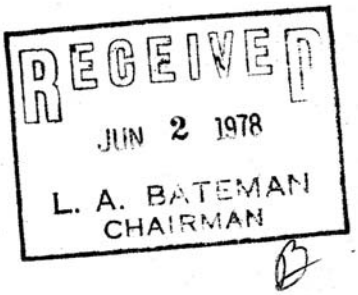
Director

System Operations Division

The Honourable A. Brian Ransom

Minister - Mines, Resources

& Environmental Management



June 2, 1978

73D6-1 2

CHURCHILL RIVER DIVERSION - 90-DAY FORECAST

We attach a schedule of proposed releases for the ensuing 90 days from June 1, 1978.

Missi Falls outflow has been increased by 1,000 cfs per day beginning May 26, 1978 and is scheduled to stop at 36,000 cfs by June 15,1978. The decision to increase flows at Missi Falls was due to the high inflows being experienced on Southern Indian Lake at the present time. We are still concerned about waterfowl nesting habitats downstream of Missi Falls and it was decided to increase the outflow gradually so if the inflows recede soon, the increasing outflow at Missi Falls will be halted. If inflows do not recede, we will have no alternative but to continue to increase Missi Falls outflow to 36,000 cfs. The outflow at Missi Falls is expected to remain at 36,000 cfs until the end of June, 1978 at which time flows will be reduced to keep the level of Southern Indian Lake at 847.0.

The resumption of Notigi to 30,000 cfs scheduled for June 21, 1978 has been rescheduled to June 2, 1978. It was felt that every attempt must be made now to relieve the situation on Southern Indian Lake.

Original Signed By
W. J. TISHINSKI

MSM/rdc
Att.

APPENDIX B – continued (1978 06 23 letter)

J. J. Arnason

General Manager

Corporate Operations

Mr. T. E. Weber

Senior Assistant Deputy Minister
Water Resources Division
Dept. of Mines, Resources & Environmental Management

1978 06 23

73D6

SOUTHERN INDIAN LAKE

This letter is a follow-up to your recent telephone conversation with Mr. L. A. Bateman regarding Southern Indian Lake levels. Manitoba Hydro's approach towards regulating water levels in excess of elevation 847.0 on Southern Indian Lake is governed by Article 9 of the Churchill River Diversion interim licence which states:

> "9. Subject to Article 11 hereof, and except as may be otherwise authorized by the Minister, the Licensee shall, during periods when the water level of Southern Indian Lake is above elevation 847 feet, operate the Missi Falls and Notigi control structures in such a manner as to effect the maximum discharge possible under the circumstances then prevailing until the water level of the said lake returns to elevation 847 feet."

It had been anticipated during the first few days of May that the level of Southern Indian Lake might exceed 847.0, which would then require us to discharge extra water at Missi "at the maximum discharge possible" to return it to 847.0. At about this time, we received a request from Mr. P. Boothroyd of the Canadian Wildlife Service to consider the nesting waterfowl, including swans, mergansers, scaup ducks and especially the Lesser Canada Geese, for whom the lower Churchill lakes are the principal breeding grounds. Their requirements consist of relatively stable elevations (not absolutely stable) during the period from May 7 to July 20. Their nests are mostly built on islands in the grass and willow cover, and excess flooding would obviously destroy the nests.

Between April 29 and May 4, releases at Missi Falls were increased slowly from 6,000 cfs to 10,000 cfs under solid ice conditions.

On May 8, one of our staff flew a reconnaissance of the Burntwood River to assess the progress of spring breakup and the safety with which diversion flows could be increased, and the lower Churchill to assess the amount by which Missi flows could be increased under the still existing ice conditions and to which extent this might disturb nesting birds. As a result, diversion flows were stepped up in 3,000 cfs increments on May 9, May 12, May 16, May 19, when 27,000 cfs was reached, this being the fastest rate considered prudent considering downstream communities and stream conditions. On June 2, it was raised to the full 30,000 cfs, as the natural spring freshet on the Burntwood River proper appeared to have peaked. Simultaneously, the discharge at Missi was raised to 15,000 cfs in daily stages of 1,000 cfs

APPENDIX B – continued (1978 06 23 letter)

between May 3 and May 7, this being the fastest rate deemed prudent under the presisting ice conditions. The Southern Indian Lake local basin at this time received significant snowfall, and the enhanced local runoff drove the level of the lake, which was still entirely ice bound, to a full 847.0 by May 12. The ice finally broke up and dissipated by May 25, and Missi discharges were raised to 30,000 cfs in daily stages of 1,000 cfs beginning at 15,000 cfs on May 26 and ending by June 9. The level of Southern Indian Lake had risen to 847.8 by May 28, but was under effective control against any further rise.

Missi flow was increased to 40,000 cfs on June 10 to lower the level of the lake to 847.0 by the third week of June. The flow was returned to 30,000 cfs by June 13 as the inflows had peaked and were falling. The result of these regulation measures has lowered the lake to 847.0 by June 19. Missi flows have been reduced to 25,000 cfs as of June 20 and more reductions are forthcoming to maintain Southern Indian Lake at 847.0.

Original Signed By
J. J. ARNASON

JJA/rdc

APPENDIX B – continued (1978 07 18 letter)

MANITOBA

DEPARTMENT OF MINES, RESOURCES & ENVIRONMENTAL MANAGEMENT

Water Resources Division
1577 Dublin Avenue
Winnipeg, Manitoba
R3E 3J5

78 July 18

File: 61.2

RECEIVED
JUL 19 1978
GENERAL MANAGER
CORPORATE OPERATIONS

Mr. J. J. Arnason,
General Manager,
Corporate Operations,
Manitoba Hydro,
P. O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Arnason:

RE: Southern Indian Lake.

Thank you for your letter dated June 23, 1978 explaining why Southern Indian Lake levels exceeded elevation 847.0 during May and June of this year and the steps Manitoba Hydro took to bring the level back to elevation 847.0.

No procedure has been established by means of which we can be advised in advance when Southern Indian Lake is likely to exceed its upper limit. The weekly "Churchill River Diversion Schedule" which we have just started receiving contains useful information but does not include lake level forecasts. The three month forecasts that Manitoba Hydro has been asked to provide on a monthly basis meets the requirements of Article 9 of the Churchill River Diversion Interim Licence but it does not indicate probable future levels. Incidentally we have not received the three month forecast since the end of March. Would it be possible to have the three month forecast expanded to include inflows and levels as is the case with the Lake Winnipeg forecast? If this cannot be done readily, then we would ask that this Division be informed well in advance whenever it becomes evident that a limiting flow or level is likely to be exceeded.

It would be desirable if future requests from special interest groups like the recent request of the Canadian Wildlife Service relative to flows in the lower Churchill River were to be directed to this Division for review and recommended action. This of course would be confined to those requests that could result in variations to limiting levels or flows which are specified in the Churchill River Diversion Interim Licence.

Original Signed By:
T.E. Weber

for Senior Assistant Deputy Minister.

APPENDIX B – continued

1978 07 06 to 1978 07 16

Notigi outflow was constant at the licence maximum of 30,000 cfs during this period and Missi outflow was increased from 10,000 cfs to 15,000 cfs on 1978 07 11. The maximum deviation from 847.0 feet was 0.07 feet (0.84 inches).

1978 08 15 to 1978 08 31

A 1978 08 23 letter was sent to the Province advising them of recent developments in the Churchill and Burntwood systems and of the regulation decisions to handle the high inflows. Missi gates were adjusted on August 22, 24 and 26 to increase outflows from 20,000 cfs to 53,000 cfs. Notigi outflow was constant at about 25,000 cfs during this period. The maximum deviation from 847.0 feet was 0.32 feet (3.84 inches).

The following two pages are a copy of the 1978 08 23 letter.

1978 09 09 to 1978 10 16

Notigi outflow was increased from 25,000 cfs to 27,000 cfs on 1978 09 02 and then to the licence maximum of 30,000 cfs on 1978 09 09. Notigi flows remained constant at this flow for the rest of this period. Missi outflows were maintained at about 15,000 cfs until 1978 10 16 when flows were increased to 34,000 cfs. The maximum deviation from 847.0 feet was 0.16 feet (1.92 inches).

APPENDIX B – continued (1978 08 23 letter)

P. M. Abel

Reservoir & Energy Resources Engineer

System Operations Division

Mr. T. E. Weber

Senior Assistant Deputy Minister
Water Resources Division
Dept. of Mines, Resources & Environmental Management

1978 08 23

73D6-1

CHURCHILL RIVER DIVERSION - REGULATION

This memo is to confirm a telephone call to Mr. N. Mudry to advise him of recent developments in the Churchill and Burntwood River Systems.

You will recall that we were endeavouring to fulfill a clause in our Agreement with the City of Thompson, to demonstrate the length of time for a 5,000 cfs cut at Notigi to reach the City. This cut was put into effect on August 1.

In the past two weeks, there has been continuous heavy precipitation over the upper Burntwood and Rat Rivers and over the immediate drainage basin of Southern Indian Lake. Natural flows have risen so quickly on the Burntwood River, that our river flow monitoring team had to report a 5 foot rise in stage at Snake Rapids, with the loss of their metering boat. The extra flow has probably ruined the demonstration for the City of Thompson, and we will have to try it again next year. It may turn out that the 5,000 cfs flow reduction was extremely timely in preventing flows at Thompson from exceeding 34,000 cfs, or the levels on Footprint Lake from exceeding 800. ft. We will watch the Burntwood River flows very carefully to see if yet another flow reduction at Notigi is required, although it seems doubtful that natural flows would exceed 9,000 cfs at this time of year. We will also carefully review the resumption of 30,000 cfs at Notigi on September 1, as planned, and it may be necessary to postpone this a week or two if very heavy precipitation persists.

Co-incident with the reduction at Notigi on August 1, we increased the outflow from Missi by 5,000 cfs, for a total of 20,000 cfs. In the past week, the lake very suddenly and dramatically rose a half a foot, taking elevations to 747.24 as of Sunday, August 20, and to 847.45 on Tuesday, Aug. 22, an apparent rise of .10 a day. We calculate inflows have risen from about 45,000 cfs to about 65,000 cfs. We also calculate to prevent the lake from rising further will require a Missi discharge of 39,000 cfs, but to bring it down again in a short period will require somewhat more.

We have therefore made the following regulation decisions, advising Mr. Mudry as follows:

Tues. Aug. 22 Gates 3 and 4 raised to 12.0 feet; flow = 26,000 cfs

Thurs. Aug. 24 Gates 3 and 4 to be fully opened; flow = 36,000 cfs

Sat. Aug. 26 Gate 3 and 4 remain open
Gates 2 and 5 opened to 9.0 feet; flow = 53,000 cfs

APPENDIX B – continued (1978 08 23 letter)

This is calculated to bring Southern Indian Lake back down to 847.0 by September 15. However, we will keep the situation closely monitored, and revise Missi outflows upward or downward as inflow conditions dictate.

We have undertaken to advise the Town of Churchill, who will have over a month's advance notice, and we will fly the Churchill River downstream of Missi to advise a number of canoe groups believed to be on the river. Mr. Mudry indicated that he would advise Renewable Resources. Mr. Mudry also indicated that he felt the measures we are taking at the moment seem reasonable and adequate. We will advise you if other measures or modifications are needed.

Original Signed By:
P.M. Abel

PMA/rm

cc: J. Atkins
E. T. Mills
M. D. McKay

APPENDIX B – continued

1979 06 18 to 1979 07 05

The 1979 05 11 and 1979 06 12 90-day forecasts sent to the Province show that Notigi outflow was being held constant at 25,000 cfs in order to comply with the flow constraint at Thompson. Missi outflow was advanced in an attempt to pass increased inflow without causing the level of Southern Indian Lake to rise above 847.0 feet. The maximum deviation from 847.0 feet was 0.14 feet (1.68 inches).

The following eight pages are a copy of the 90-day forecasts sent to the minister on 1979 05 11 and 1979 06 12.

APPENDIX B – continued (1979 05 11 letter)

W. J. Tishinski
Director
System Operations Division

The Honourable A. Brian Ransom
Minister - Mines, Resources
& Environmental Management

1979 05 11

73D6-2

CHURCHILL RIVER DIVERSION - 90-DAY FORECAST

Enclosed please find a copy of the Churchill River Diversion 90-Day Forecast commencing ~~April~~ 1, 1979.

MAY

Original Signed By
W. J. TISHINSKI

AWF/rm
Att.

cc: J. J. Arnason
C. E. Birston
C. J. Goodwin

APPENDIX B – continued (Forecast attached to 1979 05 11 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
May 1	6000	23,000	845.48	842.13	796.49	617.41	30,200
2	6000	23,000	845.46	842.26	796.39	617.24	30,000
3	6000	23,000	845.49	842.38	796.29	617.06	29,800
4	6000	23,000	845.49	842.49	796.19	616.89	29,600
5	6000	23,000	845.50	842.60	796.09	616.72	29,400
6	6000	23,000	845.51	842.71	795.99	616.55	29,200
7	6000	23,000	845.53	842.82	795.90	616.38	29,000
8	6000	23,000	845.56	842.93	795.80	616.20	28,800
9	6000	23,000	845.58	843.03	795.70	616.03	28,600
10	6000	23,000	845.60	843.13	795.60	615.86	28,400
11	6000	23,000	845.62	843.23	795.50	615.67	28,200
12	6000	23,000	845.65	843.33	795.40	615.52	28,000
13	6000	23,000	845.67	843.43	795.30	615.34	27,800
14	6000	23,000	845.69	843.53	795.20	615.17	27,600
15	6000	23,000	845.72	843.62	795.10	615.00	27,400
16	6000	23,000	845.74	843.71	795.14	615.02	27,500
17	6000	23,000	845.77	843.80	795.18	615.04	27,600
18	6000	23,000	845.79	843.89	795.21	615.07	27,600
19	6000	23,000	845.82	843.98	795.25	615.09	27,700
20	6000	23,000	845.84	844.06	795.29	615.11	27,800
21	6000	23,000	845.87	844.14	795.32	615.14	27,800
22	6000	23,000	845.90	844.22	795.36	615.16	27,900
23	6000	23,000	845.94	844.30	795.40	615.18	28,000
24	6000	23,000	845.97	844.38	795.49	615.20	28,100
25	6000	23,000	846.00	844.46	795.58	61 .23	28,200
26	6000	23,000	846.04	844.53	795.68	615.25	28,200
27	6000	23,000	846.07	844.60	795.77	615.27	28,300
28	6000	23,000	846.11	844.67	795.86	615.30	28,400
29	6000	23,000	846.14	844.74	795.96	615.32	28,400
30	6000	23,000	846.18	844.81	796.05	615.34	28,500
31	6000	23,000	846.22	844.87	796.14	615.36	28,600

Manitoba Hydro
System Operations Division
1979 05 11

AWF/rm

APPENDIX B – continued (Forecast attached to 1979 05 11 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
June 1	7000	23,000	846.26	844.93	796.24	615.38	28,700
2	7000	23,000	846.29	844.99	796.33	615.41	28,700
3	8000	23,000	846.33	845.05	796.42	615.43	28,800
4	8000	25,000	846.34	845.08	796.51	615.45	29,000
5	9000	25,000	846.35	845.12	796.62	615.53	29,100
6	9000	25,000	846.36	845.15	796.72	615.61	29,300
7	10000	25,000	846.37	845.19	796.83	615.68	29,500
8	10000	25,000	846.38	845.22	796.94	615.76	29,600
9	11000	25,000	846.39	845.26	797.04	615.84	29,800
10	11000	25,000	846.40	845.29	797.15	615.92	30,000
11	12000	25,000	846.40	845.33	797.25	616.00	30,100
12	12000	25,000	846.41	845.36	797.36	616.08	30,300
13	14000	25,000	846.41	845.40	797.47	616.16	30,500
14	14000	25,000	846.42	845.43	797.57	616.24	30,600
15	14000	25,000	846.42	845.47	797.68	616.31	30,800
16	14000	25,000	846.43	845.50	797.79	616.39	31,000
17	14000	25,000	846.43	845.54	797.89	616.47	31,100
18	14000	25,000	846.43	845.57	798.00	616.55	31,300
19	14000	25,000	846.43	845.61	798.00	616.55	31,300
20	14000	25,000	846.44	845.64	798.00	616.53	31,200
21	14000	25,000	846.44	845.68	798.00	616.52	31,200
22	14000	25,000	846.44	845.71	798.00	616.50	31,200
23	14000	25,000	846.45	845.75	798.00	616.48	31,100
24	14000	25,000	846.45	845.78	798.00	616.46	31,100
25	14000	25,000	846.46	845.82	798.00	616.45	31,000
26	14000	25,000	846.47	845.85	798.00	616.43	31,000
27	14000	25,000	846.48	845.89	798.00	616.41	31,000
28	14000	25,000	846.50	845.92	798.00	616.40	30,900
29	14000	25,000	846.51	845.96	798.00	616.38	30,900
30	14000	25,000	846.52	845.99	798.00	616.36	30,900

Manitoba Hydro
System Operations Division
1979 05 11

AWF/rm

APPENDIX B – continued (Forecast attached to 1979 05 11 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
July 1	14,000	25,000	846.53	846.01	798.00	616.35	30,800
2	14,000	25,000	846.54	846.03	798.00	616.35	30,800
3	14,000	20,000	846.56	846.05	797.87	616.22	30,400
4	14,000	20,000	846.57	846.07	797.75	616.09	30,100
5	14,000	20,000	846.59	846.09	797.62	615.96	29,700
6	14,000	20,000	846.60	846.11	797.49	615.83	29,300
7	14,000	20,000	846.61	846.13	797.37	615.70	29,000
8	14,000	20,000	846.63	846.15	797.24	615.57	28,600
9	14,000	20,000	846.64	846.17	797.11	615.44	28,200
10	14,000	20,000	846.64	846.19	796.99	615.31	27,900
11	14,000	20,000	846.65	846.21	796.86	615.18	27,500
12	14,000	20,000	846.66	846.23	796.73	615.05	27,100
13	14,000	20,000	846.66	846.25	796.61	614.92	26,800
14	14,000	20,000	846.67	846.27	796.48	614.79	26,400
15	14,000	20,000	846.68	846.29	796.35	614.66	26,000
16	14,000	20,000	846.68	846.31	796.23	614.53	25,700
17	14,000	20,000	846.69	846.33	796.10	614.40	25,300
18	14,000	20,000	846.69	846.35	796.04	614.34	25,200
19	14,000	20,000	846.70	846.37	795.99	614.28	25,200
20	14,000	20,000	846.70	846.39	795.94	614.22	25,200
21	14,000	20,000	846.71	846.41	795.88	614.17	25,100
22	14,000	20,000	846.71	846.43	795.83	614.11	25,100
23	14,000	20,000	846.71	846.45	795.77	614.05	25,000
24	14,000	20,000	846.71	846.47	795.72	613.99	25,000
25	14,000	20,000	846.71	846.49	795.67	613.93	25,000
26	14,000	20,000	846.71	846.51	795.61	613.88	24,900
27	14,000	20,000	846.71	846.53	795.56	613.82	24,900
28	14,000	20,000	846.71	846.55	795.50	613.76	24,800
29	14,000	20,000	846.71	846.57	795.45	613.70	24,800
30	14,000	30,000	846.72	846.55	795.66	613.94	25,300

Manitoba Hydro
System Operations Division
1979 05 11

AWF/rm

APPENDIX B – continued (1979 06 12 letter)

W. J. Tishinski
Director
System Operations Division

The Honourable A. Brian Ransom
Minister - Mines, Resources
& Environmental Management

1979 06 12

73D6-2

CHURCHILL RIVER DIVERSION - 90-DAY FORECAST

Enclosed please find a copy of the Churchill River Diversion 90-Day Forecast commencing June 1, 1979.

Original Signed By
W. J. TISHINSKI

AWF/rm
Att.
Aw7.
cc: J. J. Arnason
C. E. Birston
C. J. Goodwin

APPENDIX B – continued (Forecast attached to 1979 06 12 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
June 1	6 000	23 000	846.46	844.70	796.83	616.36	31 500
2	6 000	23 000	846.48	844.80	796.89	616.45	31 800
3	6 000	23 000	846.50	844.88	796.95	616.55	31 900
4	7 000	23 000	846.53	844.94	797.01	616.58	32 100
5	7 000	25 000	846.55	844.95	797.05	616.52	31 200
6	8 000	25 000	846.58	844.94	797.07	616.53	31 200
7	8 000	25 000	846.61	845.00	797.09	616.55	31 300
8	9 000	25 000	846.64	845.06	797.10	616.56	31 300
9	9 000	25 000	846.66	845.08	797.14	616.57	31 400
10	10 000	25 000	846.69	845.10	797.18	616.58	31 400
11	10 000	25 000	846.69	845.12	797.22	616.60	31 500
12	12 000	25 000	846.69	845.14	797.26	616.61	31 500
13	12 000	25 000	846.69	845.16	797.30	616.62	31 600
14	14 000	25 000	845.69	845.18	797.30	616.64	31 600
15	14 000	25 000	845.69	845.20	797.30	616.65	31 700
16	16 000	25 000	846.69	845.22	797.30	616.66	31 700
17	16 000	25 000	846.69	845.24	797.30	616.68	31 800
18	18 000	25 000	846.70	845.26	797.30	616.69	31 800
19	18 000	25 000	846.70	845.28	797.30	616.70	31 900
20	20 000	25 000	846.71	845.30	797.30	616.72	31 900
21	20 000	25 000	846.72	845.32	797.30	616.73	32 000
22	22 000	25 000	846.72	845.34	797.30	616.74	32 000
23	22 000	25 000	846.73	845.36	797.30	616.75	32 000
24	22 000	25 000	846.74	845.38	797.30	616.77	32 000
25	22 000	25 000	846.74	845.40	797.30	616.78	32 000
26	22 000	25 000	846.74	845.42	797.30	616.79	32 100
27	22 000	25 000	846.74	845.44	797.30	616.81	32 100
28	22 000	25 000	846.74	845.46	797.30	616.82	32 100
29	22 000	25 000	846.74	845.48	797.30	616.83	32 100
30	22 000	25 000	846.74	845.50	797.30	616.85	32 200

Manitoba Hydro
System Operations Division
1979 06 12

AWF/rm

APPENDIX B – continued (Forecast attached to 1979 06 12 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date		Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
July	1	22 000	25 000	846.74	845.52	797.30	616.85	32 200
	2	22 000	25 000	846.74	845.54	797.30	616.85	32 200
	3	22 000	20 000	846.74	845.56	797.30	616.74	31 900
	4	22 000	20 000	846.74	845.60	797.06	616.63	31 700
	5	22 000	20 000	846.73	845.64	796.82	616.53	31 400
	6	22 000	20 000	846.73	845.68	796.59	616.42	31 200
	7	22 000	20 000	846.73	845.72	796.35	616.31	30 900
	8	22 000	20 000	846.73	845.76	796.11	616.20	30 600
	9	22 000	20 000	846.73	845.80	795.87	616.09	30 400
	10	22 000	20 000	846.72	845.84	795.63	615.99	30 100
	11	22 000	20 000	846.71	845.88	795.40	615.88	29 900
	12	22 000	20 000	846.71	845.92	795.16	615.77	29 600
	13	22 000	20 000	846.70	845.96	794.92	615.66	29 400
	14	22 000	20 000	846.69	846.00	794.68	615.55	29 100
	15	22 000	20 000	846.68	846.04	794.44	615.45	28 800
	16	22 000	20 000	846.67	846.08	794.20	615.34	28 600
	17	22 000	20 000	846.66	846.12	794.20	615.23	28 300
	18	22 000	20 000	846.65	846.16	794.20	615.12	28 100
	19	22 000	20 000	846.64	846.20	794.20	615.01	27 800
	20	22 000	20 000	846.63	846.24	794.20	614.91	27 600
	21	22 000	20 000	846.62	846.28	794.20	614.80	27 300
	22	22 000	20 000	846.60	846.32	794.20	614.69	27 000
	23	22 000	20 000	846.58	846.36	794.20	614.58	26 800
	24	22 000	20 000	846.57	846.40	794.20	614.47	26 500
	25	22 000	20 000	846.55	846.44	794.20	614.37	26 300
	26	22 000	20 000	846.53	846.48	794.20	614.25	26 000
	27	22 000	20 000	846.52	846.52	794.20	614.25	26 000
	28	22 000	20 000	846.51	846.56	794.20	614.25	26 000
	29	22 000	20 000	846.50	846.60	794.20	614.25	26 000
	30	22 000	30 000	846.50	846.62	794.20	614.25	26 000
	31			846.49	846.64	794.20	614.25	26 000

Manitoba Hydro
System Operations Division
1979 06 12

APPENDIX B – continued (Forecast attached to 1979 06 12 letter)

CHURCHILL RIVER DIVERSION

90-DAY FORECAST

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson Elevation	Thompson Discharge
Aug. 1	22 000	30 000	846.48	846.61	794.42	614.25	26 000
2	22 000	30 000	846.48	846.58	794.65	614.25	26 000
3	22 000	30 000	846.47	846.55	794.87	614.43	26 400
4	22 000	30 000	846.47	846.52	795.10	614.61	26 800
5	22 000	30 000	846.46	846.49	795.32	614.80	27 300
6	22 000	30 000	846.47	846.46	795.54	614.98	27 700
7	22 000	30 000	846.48	846.43	795.77	615.16	28 100
8	22 000	30 000	846.49	846.40	795.99	615.34	28 500
9	22 000	30 000	846.50	846.37	796.22	615.52	28 900
10	22 000	30 000	846.51	846.34	796.44	615.71	29 400
11	22 000	30 000	846.52	846.31	796.66	615.89	29 800
12	22 000	30 000	846.54	846.28	796.89	616.07	30 200
13	22 000	30 000	846.58	846.25	797.11	616.25	30 600
14	22 000	30 000	846.62	846.22	797.34	616.43	31 000
15	22 000	30 000	846.65	846.19	797.56	616.62	31 500
16	22 000	30 000	846.69	846.16	797.78	616.80	31 900
17	22 000	30 000	846.73	846.13	798.01	616.98	32 300
18	22 000	30 000	846.77	846.10	798.23	617.16	32 700
19	22 000	30 000	846.81	846.07	798.45	617.34	33 200
20	22 000	30 000	846.83	846.04	798.45	617.53	33 600
21	22 000	30 000	846.85	846.01	798.45	617.70	34 000
22	22 000	30 000	846.87	846.98	798.45	617.70	34 000
23	22 000	30 000	846.89	846.95	798.45	617.70	34 000
24	22 000	30 000	846.91	845.92	798.45	617.70	34 000
25	22 000	30 000	846.93	845.89	798.45	617.70	34 000
26	22 000	30 000	846.96	845.86	798.45	617.70	34 000
27	22 000	25 000	846.97	845.84	798.45	617.70	34 000
28	22 000	25 000	846.97	845.82	798.45	617.70	34 000
29	22 000	25 000	846.98	845.80	798.40	617.70	34 000
30	22 000	25 000	846.98	845.78	798.35	617.70	34 000
31	22 000	25 000	846.99	845.76	798.30	617.70	34 000

Manitoba Hydro
System Operations Division
1979 06 12

AWF/rm

APPENDIX B – continued

1980 07 31 to 1980 08 31

The 1980 07 02 and 1980 08 06 90-day forecasts show that an attempt was being made to maximize the level of Southern Indian Lake at 847.0 feet for most of the forecast period. The covering letter for the August forecast points out that Missi flows were at 1,000 cfs to facilitate the recovery of a body after a boating mishap on June 26 (previous Missi flows were 4,000 cfs). The letter also indicates that it was hoped that the body could be recovered before it was necessary to increase discharges in order not to exceed 847 feet. This is evidence that the ability to obtain actual data in 1980 was delayed as records now show that the level of 847 had already been exceeded six-day earlier (July 31). At the time the August forecast was written, Manitoba Hydro was unaware of the July 30 to 31 water level rise of 3.6 inches that brought the water level to 847.11 feet. Flow increases to reduce the water level were made at Missi on Aug 12, 13, 14, 15, 19, 22, 26 and 27. The peak water level during this period occurred on Aug. 25 at 847.52 feet (6.24 inches).

The following eight pages are a copy of the 1980 07 02 and 1980 08 06 forecasts.

APPENDIX B – continued (1980 07 02 letter)

W. J. Tishinski

Acting Asst. General Manager

System Planning & Operations

Mr. T. E. Weber, P. Eng.
Director Water Resources Branch
Department of Natural Resources
1577 Dublin Avenue
Winnipeg, Manitoba R3E 3J5

July 2, 1980

73D6-2

CHURCHILL RIVER DIVERSION 90-DAY FORECAST

Attached please find a copy of the Churchill River Diversion 90-Day Forecast commencing July 1, 1980.

Local inflows to Southern Indian Lake have been running well above median for the past month and this has made it possible to repond the lake to its full supply level of 847.0 much sooner than we would normally expect, and has also necessitated an increased discharge at Missi. Notigi outflow has been set at the maximum licence limit of 30,000 cfs for the past month and it is anticipated that it will remain there for the duration of this forecast, unless ministerial permission is applied for and received to temporarily increase the discharge this summer as a drought measure.

Southern Indian Lake elevation will be monitored closely and Missi Falls outflow will be adjusted as required in order to maintain a Southern Indian Lake elevation of 847.0. Missi reductions are shown in July on the assumption that local inflows will return from 80 percentile to median.

ORIGINAL SIGNED BY
P. M. ABEL

DEM/fg

Attach.

APPENDIX B – continued (Forecast attached to 1980 07 02 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
JULY 1	13,000	30,000	847.00	844.60	797.80	616.00	30,000
2	13,000	30,000	847.00	844.60	797.83	616.09	30,100
3	13,000	30,000	847.00	844.60	797.86	616.17	30,200
4	13,000	30,000	847.00	844.59	797.89	616.25	30,300
5	13,000	30,000	847.00	844.59	797.92	616.34	30,400
6	13,000	30,000	847.00	844.59	797.95	616.42	30,500
7	13,000	30,000	847.00	844.58	797.98	616.51	30,600
8	13,000	30,000	847.00	844.58	798.01	616.59	30,700
9	13,000	30,000	847.00	844.58	798.04	616.68	30,800
10	10,000	30,000	847.00	844.57	798.07	616.76	30,900
11	10,000	30,000	847.00	844.57	798.10	616.85	31,000
12	10,000	30,000	847.00	844.57	798.13	616.94	31,100
13	10,000	30,000	847.00	844.56	798.16	617.02	31,200
14	10,000	30,000	847.00	844.56	798.19	617.10	31,300
15	10,000	30,000	847.00	844.56	798.22	617.17	32,500
16	10,000	30,000	847.00	844.55	798.25	617.24	32,700
17	10,000	30,000	847.00	844.55	798.28	617.30	32,900
18	10,000	30,000	847.00	844.55	798.31	617.37	33,100
19	10,000	30,000	847.00	844.54	798.34	617.44	33,300
20	7,000	30,000	847.00	844.54	798.37	617.50	33,500
21	7,000	30,000	847.00	844.54	798.40	617.54	33,600
22	7,000	30,000	847.00	844.53	798.41	617.58	33,700
23	7,000	30,000	847.00	844.53	798.42	617.62	33,800
24	7,000	30,000	847.00	844.53	798.43	617.66	33,900
25	7,000	30,000	847.00	844.52	798.44	617.70	34,000
26	7,000	30,000	847.00	844.52	798.45	617.70	34,000
27	7,000	30,000	847.00	844.52	798.46	617.70	34,000
28	7,000	30,000	847.00	844.51	798.47	617.70	34,000
29	7,000	30,000	847.00	844.51	798.48	617.70	34,000
30	7,000	30,000	847.00	844.51	798.49	617.70	34,000
31	7,000	30,000	847.00	844.50	798.50	617.70	34,000

Manitoba Hydro
System Operating Department
1980 07 02

APPENDIX B – continued (Forecast attached to 1980 07 02 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
AUG. 1	7,000	30,000	847.00	844.50	798.49	617.70	34,000
2	7,000	30,000	847.00	844.49	798.48	617.70	34,000
3	7,000	30,000	847.00	844.48	798.47	617.70	34,000
4	7,000	30,000	847.00	844.47	798.46	617.68	33,900
5	7,000	30,000	847.00	844.46	798.45	617.67	33,900
6	7,000	30,000	847.00	844.45	798.44	617.65	33,800
7	7,000	30,000	847.00	844.44	798.43	617.62	33,800
8	7,000	30,000	847.00	844.43	798.42	617.60	33,800
9	7,000	30,000	847.00	844.42	798.41	617.58	33,700
10	7,000	30,000	847.00	844.41	798.40	617.57	33,700
11	7,000	30,000	847.00	844.40	798.38	617.55	33,600
12	7,000	30,000	847.00	844.39	798.36	617.54	33,600
13	4,000	30,000	847.00	844.38	798.34	617.52	33,600
14	4,000	30,000	847.00	844.37	798.32	617.51	33,500
15	4,000	30,000	847.00	844.36	798.30	617.49	33,500
16	4,000	30,000	847.00	844.35	798.28	617.48	33,400
17	4,000	30,000	847.00	844.34	798.26	617.46	33,400
18	4,000	30,000	847.00	844.33	798.24	617.45	33,400
19	4,000	30,000	847.00	844.32	798.22	617.43	33,300
20	4,000	30,000	847.00	844.31	798.20	617.42	33,300
21	4,000	30,000	847.00	844.30	798.18	617.40	33,200
22	4,000	30,000	847.00	844.29	798.16	617.39	33,200
23	4,000	30,000	847.00	844.28	798.14	617.37	33,200
24	4,000	30,000	847.00	844.27	798.12	617.36	33,100
25	4,000	30,000	847.00	844.26	798.10	617.34	33,100
26	4,000	30,000	847.00	844.25	798.08	617.33	33,000
27	4,000	30,000	847.00	844.24	798.06	617.31	33,000
28	4,000	30,000	847.00	844.23	798.04	617.30	33,000
29	4,000	30,000	847.00	844.22	798.02	617.27	32,900
30	4,000	30,000	847.00	844.21	798.00	617.23	32,900
31	4,000	30,000	847.00	844.20	797.98	617.20	32,800

Manitoba Hydro
System Operating Department
1980 07 02

APPENDIX B – continued (Forecast attached to 1980 07 02 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
SEPT. 1	7,000	30,000	847.00	844.19	797.96	617.20	32,800
2	7,000	30,000	847.00	844.16	797.95	617.20	32,800
3	7,000	30,000	847.00	844.13	797.93	617.20	32,800
4	7,000	30,000	847.00	844.11	797.92	617.20	32,800
5	7,000	30,000	847.00	844.08	797.91	617.20	32,800
6	7,000	30,000	847.00	844.05	797.89	617.20	32,800
7	7,000	30,000	847.00	844.03	797.88	617.20	32,800
8	7,000	30,000	847.00	843.00	797.87	617.20	32,800
9	7,000	30,000	847.00	843.97	797.85	617.20	32,800
10	7,000	30,000	847.00	843.95	797.84	617.20	32,800
11	7,000	30,000	847.00	843.92	797.83	617.20	32,800
12	7,000	30,000	847.00	843.89	797.81	617.20	32,800
13	7,000	30,000	847.00	843.87	797.79	617.20	32,800
14	7,000	30,000	847.00	843.84	797.78	617.20	32,800
15	7,000	30,000	847.00	843.81	797.76	617.20	32,800
16	7,000	30,000	847.00	843.79	797.75	617.20	32,800
17	7,000	30,000	847.00	843.76	797.74	617.20	32,800
18	7,000	30,000	847.00	843.73	797.72	617.20	32,800
19	7,000	30,000	847.00	843.71	797.71	617.20	32,800
20	7,000	30,000	847.00	843.68	797.70	617.20	32,800
21	7,000	30,000	847.00	843.65	797.69	617.20	32,800
22	7,000	30,000	847.00	843.63	797.68	617.20	32,800
23	7,000	30,000	847.00	843.60	797.67	617.20	32,800
24	7,000	30,000	847.00	843.57	797.66	617.20	32,800
25	7,000	30,000	847.00	843.56	797.65	617.20	32,800
26	7,000	30,000	847.00	843.52	797.64	617.20	32,800
27	7,000	30,000	847.00	843.49	797.63	617.20	32,800
28	7,000	30,000	847.00	843.47	797.62	617.20	32,800
29	7,000	30,000	847.00	843.44	797.61	617.20	32,800
30	7,000	30,000	847.00	843.40	797.60	617.20	32,800

Manitoba Hydro
System Operating Department
1980 07 02

APPENDIX B – continued (1980 08 06 letter)

W. J. Tishinski
Acting Asst.
General Manager

System Planning & Operations

Mr. T. E. Weber, P. Eng.
Director, Water Resources Branch
Department of Natural Resources
1577 Dublin Avenue
Winnipeg, Manitoba R3E 3J5

August 6, 1980

7306-2

CHURCHILL RIVER DIVERSION 90-DAY FORECAST

Forecast

Attached please find a copy of the Churchill River Diversion 90-Day
commencing August 1, 1980.

than ex-
diversion
to Aug-

Since local inflows into Southern Indian Lake have declined faster
pected, to the point where they were about equal to the 30,000 cfs
requirement, discharge at Missi has been reduced to 1,000 cfs prior
ust 1, 1980.

s, flows
olution to

While the licence allows a minimum riparian flow at Missi of 500 cf
this low produce a tailrace too low to operate the house unit. A s
this problem has not yet been carried out in the field.

ng. Flows
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A boating mishap on June 26, 1980 resulted in an unfortunate drowni
of 1,000 cfs at Missi are expected to facilitate recovery of the bo
hoped that recovery can be made before it is necessary to implement
discharges at Missi, which would be required if Southern Indian Lak
exceed 847.0 feet. Our forecast indicates that this may happen bef
end of August.

t Missi to
hill River
ater supply
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et con-
nder

We would draw your attention to the gradual build-up of discharge a
4,000 cfs on October 10, 1980 to raise stages along the Lower Churc
prior to freeze-up in the expectation of providing a trouble-free w
to the Churchill pumphouse for the winter. While the licence stipu
minimum riparian flow through the winter of 1,500 cfs, we are not y
fident that a flow this low would continue to flow satisfactorily u
severe ice conditions.

roval to
under the
our fore-

It is Manitoba Hydro's intention to again apply for ministerial app
increase the Notigi outflow to 32,000 cfs during the winter months
same conditions as last winter. However, we have not shown this in
cast as we have not yet applied.

Original Signed By
W. J. TISHINSKI

DEM/fg

Attach.

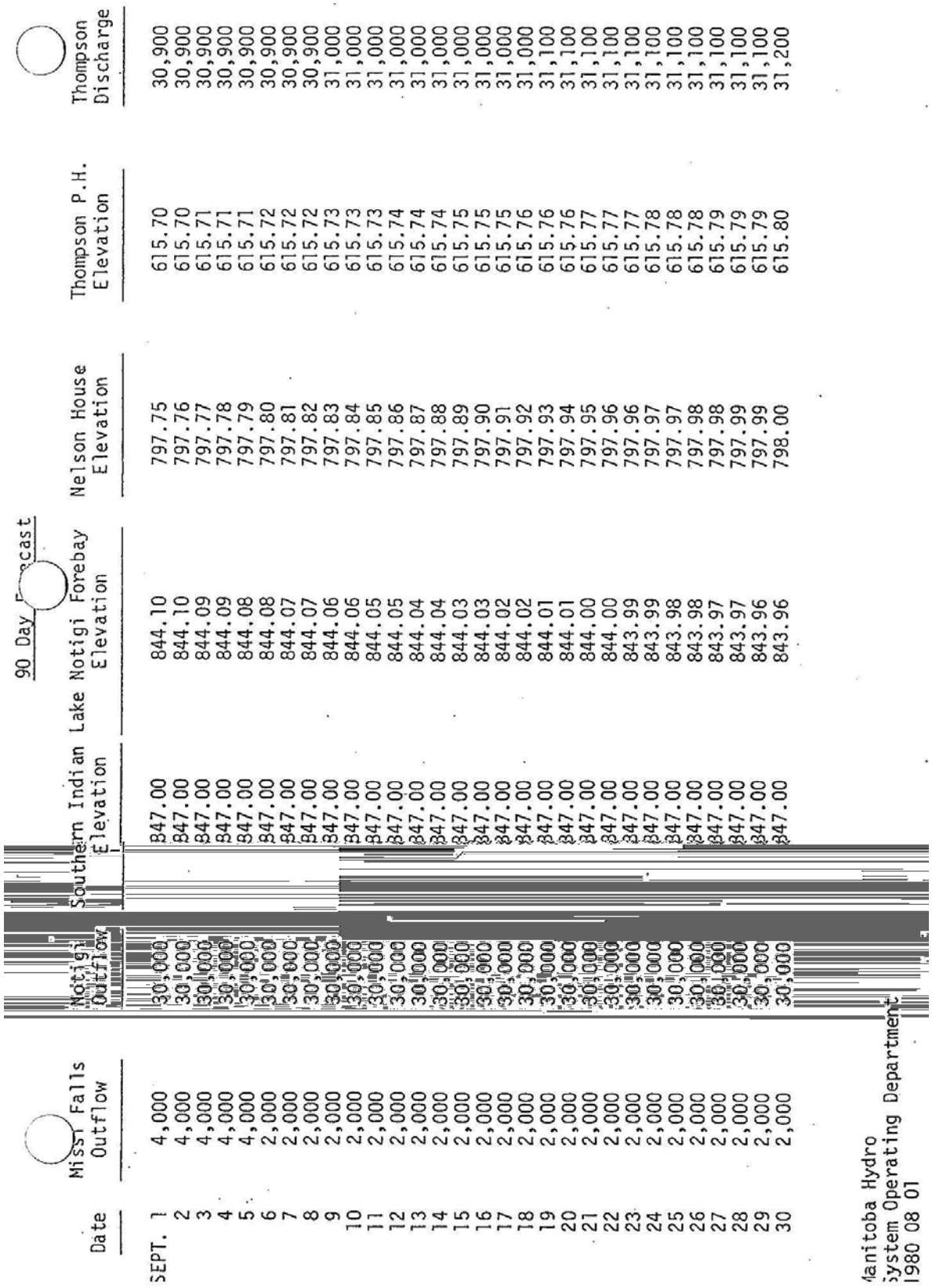
APPENDIX B – continued (Forecast attached to 1980 08 06 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
AUG. 1	1,000	30,000	846.75	844.00	797.60	615.60	30,600
2	1,000	30,000	846.76	844.00	797.60	615.60	30,600
3	1,000	30,000	846.77	844.00	797.61	615.60	30,600
4	1,000	30,000	846.78	844.01	797.61	615.61	30,600
5	1,000	30,000	846.79	844.01	797.62	615.61	30,600
6	1,000	30,000	846.80	844.01	797.62	615.61	30,600
7	1,000	30,000	846.81	844.02	797.63	615.62	30,600
8	1,000	30,000	846.82	844.02	797.63	615.62	30,600
9	1,000	30,000	846.83	844.02	797.64	615.62	30,600
10	1,000	30,000	846.84	844.03	797.64	615.63	30,600
11	1,000	30,000	846.85	844.03	797.65	615.63	30,700
12	1,000	30,000	846.86	844.03	797.65	615.63	30,700
13	1,000	30,000	846.87	844.04	797.66	615.64	30,700
14	1,000	30,000	846.88	844.04	797.66	615.64	30,700
15	1,000	30,000	846.89	844.04	797.67	615.64	30,700
16	1,000	30,000	846.90	844.05	797.67	615.65	30,700
17	1,000	30,000	846.91	844.05	797.68	615.65	30,700
18	1,000	30,000	846.92	844.05	797.68	615.65	30,700
19	1,000	30,000	846.93	844.06	797.69	615.66	30,700
20	1,000	30,000	846.94	844.06	797.69	615.66	30,700
21	1,000	30,000	846.95	844.06	797.70	615.66	30,800
22	1,000	30,000	846.96	844.07	797.70	615.67	30,800
23	1,000	30,000	846.97	844.07	797.71	615.67	30,800
24	1,000	30,000	846.98	844.07	797.71	615.67	30,800
25	1,000	30,000	846.99	844.08	797.72	615.68	30,800
26	4,000	30,000	847.00	844.08	797.72	615.68	30,800
27	4,000	30,000	847.00	844.08	797.73	615.68	30,800
28	4,000	30,000	847.00	844.09	797.73	615.69	30,800
29	4,000	30,000	847.00	844.09	797.74	615.69	30,800
30	4,000	30,000	847.00	844.09	797.74	615.69	30,800
31	4,000	30,000	847.00	844.10	797.75	615.70	30,900

anitoba Hydro
ystem Operating Department
980 08 01

APPENDIX B – continued (Forecast attached to 1980 08 06 letter)



90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
SEPT. 1	4,000	30,000	847.00	844.10	797.75	615.70	30,900
2	4,000	30,000	847.00	844.10	797.76	615.70	30,900
3	4,000	30,000	847.00	844.09	797.77	615.71	30,900
4	4,000	30,000	847.00	844.09	797.78	615.71	30,900
5	4,000	30,000	847.00	844.08	797.79	615.71	30,900
6	2,000	30,000	847.00	844.08	797.80	615.72	30,900
7	2,000	30,000	847.00	844.07	797.81	615.72	30,900
8	2,000	30,000	847.00	844.07	797.82	615.72	30,900
9	2,000	30,000	847.00	844.06	797.83	615.73	31,000
10	2,000	30,000	847.00	844.06	797.84	615.73	31,000
11	2,000	30,000	847.00	844.05	797.85	615.73	31,000
12	2,000	30,000	847.00	844.05	797.86	615.74	31,000
13	2,000	30,000	847.00	844.04	797.87	615.74	31,000
14	2,000	30,000	847.00	844.04	797.88	615.74	31,000
15	2,000	30,000	847.00	844.03	797.89	615.75	31,000
16	2,000	30,000	847.00	844.03	797.90	615.75	31,000
17	2,000	30,000	847.00	844.02	797.91	615.75	31,000
18	2,000	30,000	847.00	844.02	797.92	615.76	31,000
19	2,000	30,000	847.00	844.01	797.93	615.76	31,100
20	2,000	30,000	847.00	844.01	797.94	615.76	31,100
21	2,000	30,000	847.00	844.00	797.95	615.77	31,100
22	2,000	30,000	847.00	844.00	797.96	615.77	31,100
23	2,000	30,000	847.00	843.99	797.96	615.77	31,100
24	2,000	30,000	847.00	843.99	797.97	615.78	31,100
25	2,000	30,000	847.00	843.98	797.97	615.78	31,100
26	2,000	30,000	847.00	843.98	797.98	615.78	31,100
27	2,000	30,000	847.00	843.97	797.98	615.79	31,100
28	2,000	30,000	847.00	843.97	797.99	615.79	31,100
29	2,000	30,000	847.00	843.96	797.99	615.79	31,100
30	2,000	30,000	847.00	843.96	798.00	615.80	31,200

Manitoba Hydro
System Operating Department
1980 08 01

APPENDIX B – continued (Forecast attached to 1980 08 06 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
OCT. 1	3,000	30,000	847.00	843.95	798.00	615.80	31,200
2	3,000	30,000	847.00	843.94	798.01	615.81	31,200
3	3,000	30,000	847.00	843.93	798.02	615.81	31,200
4	3,000	30,000	847.00	843.92	798.03	615.81	31,200
5	3,000	30,000	847.00	843.91	798.04	615.83	31,200
6	3,000	30,000	847.00	843.90	798.05	615.83	31,300
7	3,000	30,000	847.00	843.89	798.06	615.84	31,300
8	3,000	30,000	847.00	843.88	798.07	615.85	31,300
9	3,000	30,000	847.00	843.87	798.08	615.85	31,300
10	4,000	30,000	847.00	843.86	798.09	615.86	31,300
11	4,000	30,000	847.00	843.85	798.10	615.87	31,300
12	4,000	30,000	847.00	843.84	798.11	615.87	31,300
13	4,000	30,000	847.00	843.83	798.12	615.88	31,300
14	4,000	30,000	847.00	843.82	798.13	615.89	31,400
15	4,000	30,000	847.00	843.81	798.14	615.89	31,400
16	4,000	30,000	847.00	843.80	798.15	615.90	31,400
17	4,000	30,000	847.00	843.79	798.16	615.91	31,400
18	4,000	30,000	847.00	843.78	798.17	615.91	31,400
19	4,000	30,000	847.00	843.77	798.18	615.92	31,400
20	4,000	30,000	847.00	843.76	798.19	615.93	31,400
21	4,000	30,000	847.00	843.75	798.20	615.93	31,400
22	4,000	30,000	847.00	843.74	798.21	615.94	31,500
23	4,000	30,000	847.00	843.73	798.22	615.95	31,500
24	4,000	30,000	847.00	843.72	798.23	615.95	31,500
25	4,000	30,000	847.00	843.71	798.24	615.96	31,500
26	4,000	30,000	847.00	843.70	798.25	615.97	31,500
27	4,000	30,000	847.00	843.69	798.26	615.97	31,500
28	4,000	30,000	847.00	843.68	798.27	615.98	31,500
29	4,000	30,000	847.00	843.67	798.28	615.99	31,500
30	4,000	30,000	847.00	843.66	798.29	615.99	31,500
31	4,000	30,000	847.00	843.65	798.30	616.00	31,600

nitoba Hydro
stem Operating Department
80 08 01

APPENDIX B – continued

1980 10 14 to 1980 10 15

The 1980 10 06 90-day forecast shows that an attempt was being made to maximize the level of Southern Indian Lake at 847.0 feet for most of the forecast period. The Weekly Report dated October 16 indicates that the mean lake level was 847.04 feet on Sunday, October 12 and that flow increases were made at Missi and Notigi on the 14th. The maximum deviation was 0.06 feet (0.7 inches).

The following five pages are a copy of the 1980 10 06 forecast and the Weekly Report dated October 16, 1980.

APPENDIX B – continued (1980 10 06 letter)

W. J. Tishinski

Acting Assistant General Manager

System Planning & Operations

Mr. T. E. Weber, P. Eng.
Director
Water Resources Division
1577 Dublin Avenue
Winnipeg, Manitoba R3E 3J5

1980 10 06

73D6-2

Churchill River Diversion 90-Day Forecast

Attached please find a copy of the Churchill River Diversion 90-day Forecast commencing October 1, 1980.

The local unregulated inflow to Southern Indian Lake and the Rat-Burntwood River System, has remained very high (95 percentile) over the past month, due to amounts of precipitation far exceeding normal. As a result of these high unregulated inflows, the flow through the City of Thompson rose to approximately 35,000 c.f.s. and therefore, we reduced the Notigi outflow from 30,000 c.f.s. to 26,000 c.f.s. on October 1, 1980. It is anticipated that this unregulated inflow will decline over the next week or two and since we have received permission from the Minister of Natural Resources to proceed with this year's Churchill River Diversion Test Program, which allows for an increased Notigi outflow of 32,000 c.f.s. from September 15, 1980 to April 15, 1981, we hope to begin increasing Notigi outflow from 26,000 c.f.s. to 32,000 c.f.s. by October 20, 1980.

As freeze-up normally occurs somewhere around November 10 in this Northern region, any further delay in increasing Notigi outflow could cause rupturing of the ice cover, which would certainly hinder the Nelson House riprap program and would threaten any ice crossings.

Since the elevation of Southern Indian Lake was just slightly below the maximum license limit of 847.0' and since Notigi outflow was cut back by 4,000 c.f.s. on October 1, 1980, we, therefore, were forced to increase Missi outflow from 6,000 c.f.s. to 13,000 c.f.s. on October 2, 1980. If the unregulated inflow to Southern Indian Lake does not decline, further increases may be necessary. It is desirable to have Southern Indian Lake elevation as close to 847.0' as is possible at the beginning of the winter period and, therefore, this situation will be monitored closely.

DEM/eeh
Attach.

ORIGINAL SIGNED BY
D. W. GUNTER for W.J.T.

cc: J. J. Arnason
C. E. Birston

APPENDIX B – continued (Forecast attached to 1980 10 06 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Oct 1	6000	27 600	846.85'	844.88'	798.42'	617.10'	34 800
2	9900	26 000	846.87	845.08	798.42	617.10	34 800
3	13000	26 000	846.89	845.12	798.41	617.10	34 800
4	13000	26 000	846.91	845.14	798.40	617.10	34 800
5	13000	26 000	846.93	845.16	798.39	617.10	34 800
6	13000	26 000	846.95	845.17	798.38	617.10	34 800
7	20 000	26 000	846.96	845.18	798.37	617.10	34 800
8	20 000	26 000	846.97	845.18	798.36	617.10	34 800
9	20 000	26 000	846.98	845.18	798.35	617.10	34 800
10	20 000	26 000	846.99	845.17	798.34	617.09	34 750
11	20 000	26 000	847.00	845.16	798.33	617.08	34 700
12	20 000	26 000	847.00	845.16	798.32	617.07	34 650
13	20 000	26 000	847.00	845.13	798.32	617.06	34 600
14	20 000	26 000	847.00	845.10	798.32	617.05	34 550
15	20 000	28 000	847.00	845.06	798.32	617.04	34 500
16	20 000	28 000	847.00	845.00	798.35	617.03	34 450
17	20 000	28 000	847.00	844.95	798.38	617.02	34 400
18	20 000	30 000	847.00	844.90	798.42	617.01	34 350
19	20 000	30 000	847.00	844.86	798.46	617.00	34 300
20	16 000	32 000*	847.00	844.81	798.50	616.98	34 250
21	16 000	32 000	847.00	844.80	798.54	616.96	34 200
22	16 000	32 000	847.00	844.79	798.58	616.94	34 100
23	16 000	32 000	847.00	844.78	798.62	616.92	34 000
24	16 000	32 000	847.00	844.77	798.66	616.90	33 900
25	16 000	32 000	847.00	844.76	798.70	616.88	33 800
26	16 000	32 000	847.00	844.75	798.75	616.86	33 750
27	16 000	32 000	847.00	844.74	798.80	616.84	33 700
28	16 000	32 000	847.00	844.73	798.85	616.83	33 650
29	16 000	32 000	847.00	844.72	798.90	616.82	33 600
30	16 000	32 000	847.00	844.71	798.95	616.81	33 550
31	16 000	32 000	847.00	844.70	799.00	616.80	33 500

* Augmented Winter Flow Test originally scheduled for September 15, 1980 has been delayed during review by M.E.A.R.A. . October 20, 1980 is now the proposed date.

Manitoba Hydro
System Operating Department
1980 10 03

APPENDIX B – continued (Forecast attached to 1980 10 06 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Nov 1	10 000	32 000	847.00	845.68	799.05	616.79	33 500
2	10 000	32 000	847.00	845.62	799.08	616.79	33 500
3	10 000	32 000	847.00	845.56	799.10	616.80	33 500
4	10 000	32 000	847.00	845.50	799.10	616.80	33 500
5	10 000	32 000	847.00	845.44	799.10	616.81	33 500
6	10 000	32 000	847.00	845.38	799.10	616.81	33 400
7	10 000	32 000	847.00	845.31	799.10	616.83	33 300
8	10 000	32 000	847.00	845.25	799.10	616.85	33,200
9	10 000	32 000	847.00	845.19	799.10	616.87	33 100
10	10 000	32 000	847.00	845.13	799.10	616.89	33 000
11	6 000	32 000	847.00	845.07	799.10	616.91	32 900
12	6 000	32 000	847.00	845.01	799.10	616.93	32 800
13	6 000	32 000	847.00	844.95	799.10	616.95	32 700
14	6 000	32 000	847.00	844.88	799.10	617.10	32 650
15	6 000	32 000	847.00	844.82	799.10	617.25	32 600
16	6 000	32 000	847.00	844.76	799.10	617.40	32 550
17	6 000	32 000	847.00	844.70	799.10	617.55	32 500
18	6 000	32 000	847.00	844.64	799.10	617.75	32 450
19	6 000	32 000	847.00	844.58	799.10	617.95	32 400
20	6 000	32 000	847.00	844.52	799.10	618.20	32 400
21	6 000	32 000	847.00	844.45	799.10	618.30	32 450
22	6 000	32 000	847.00	844.39	799.10	618.40	32 500
23	6 000	32 000	847.00	844.33	799.10	618.50	32 550
24	6 000	32 000	847.00	844.26	799.10	618.60	32 600
25	6 000	32 000	847.00	844.20	799.10	618.70	32 650
26	6 000	32 000	847.00	844.14	799.10	618.80	32 700
27	6 000	32 000	847.00	844.08	799.10	618.90	32 750
28	6 000	32 000	847.00	844.02	799.10	619.00	32 800
29	6 000	32 000	847.00	843.96	799.10	619.10	32 850
30	6 000	32 000	847.00	843.90	799.10	619.20	32 900

APPENDIX B – continued (Forecast attached to 1980 10 06 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Dec 1	6 000	32 000	847.00	843.84	799.10	619.30	32 900
2	6 000	32 000	846.99	843.79	799.09	619.35	32 900
3	6 000	32 000	846.98	843.74	799.08	619.38	32 900
4	6 000	32 000	846.97	843.69	799.07	619.40	32 950
5	6 000	32 000	846.96	843.64	799.06	619.42	32 950
6	6 000	32 000	846.95	843.60	799.05	619.44	32 950
7	6 000	32 000	846.94	843.56	799.04	619.46	32 950
8	6 000	32 000	846.93	843.52	799.03	619.48	32 950
9	6 000	32 000	846.92	843.48	799.02	619.50	32 950
10	6 000	32 000	846.91	843.44	799.01	619.52	33 000
11	6 000	32 000	846.90	843.40	799.00	619.54	33 000
12	6 000	32 000	846.89	843.36	798.99	619.56	33 000
13	6 000	32 000	846.88	843.32	798.98	619.58	33 000
14	6 000	32 000	846.87	843.28	798.97	619.60	33 000
15	6 000	32 000	846.86	843.24	798.96	619.62	33 000
16	6 000	32 000	846.85	843.20	798.95	619.64	33 050
17	6 000	32 000	846.84	843.16	798.94	619.66	33 050
18	6 000	32 000	846.83	843.12	798.93	619.68	33 050
19	6 000	32 000	846.82	843.08	798.92	619.70	33 050
20	6 000	32 000	846.81	843.04	798.91	619.72	33 050
21	6 000	32 000	846.80	843.00	798.90	619.74	33 050
22	6 000	32 000	846.79	842.96	798.89	619.76	33 100
23	6 000	32 000	846.78	842.92	798.88	619.78	33 100
24	6 000	32 000	846.77	842.88	798.87	619.80	33 100
25	6 000	32 000	846.76	842.84	798.86	619.82	33 100
26	6 000	32 000	846.75	842.80	798.85	619.84	33 100
27	6 000	32 000	846.74	842.76	798.84	619.86	33 150
28	6 000	32 000	846.73	842.72	798.83	619.88	33 150
29	6 000	32 000	846.72	842.68	798.82	619.90	33 150
30	6 000	32 000	846.71	842.64	798.81	619.92	33 150
31	6 000	32 000	846.70	842.60	798.80	619.94	33 200

CHURCHILL RIVER DIVERS[illegible] WEEKLY REPORT DATE OCTOBER 16, [illegible]0

A. TWO WEEK RECAPITULATION (WEEKEND ELEVATIONS; WEEKLY AVERAGE FLOWS) - IN ENGLISH UNITS

FOR WEEK ENDING SUNDAY	OCTOBER 5	OCTOBER 12	CHANGE
REINDEER LAKE - ROCKY FALLS	1,101.55	1,101.92	+0.37
REINDEER RIVER - WHITESAND DAM	13,680CFS	13,740CFS	+60CFS
CHURCHILL RIVER - ISLAND FALLS	21,290CFS	22,180CFS	+890CFS
CHURCHILL RIVER - LEAF RAPIDS	35,630CFS	36,360CFS	+730CFS
SOUTHERN INDIAN LAKE - SETTLEMENT	846.88	847.02	+0.14
" " " - OPACHUANAU L	846.89	847.02	+0.13
" " " - MISSI	847.09	847.07	-0.02
" " " - S.I.L. MEAN	846.95	847.04	+0.09
" " " - INFLOW	46,910CFS	42,850CFS	-4060CFS
MISSI FOREBAY	847.19	847.17	-0.02
CHURCHILL RIVER - MISSI FALLS	10,720CFS	13,300CFS	+2580CFS
DIVERSION CHANNEL - S. BAY OUTFLOW	26,410CFS	24,350CFS	-2060CFS
SOUTHERN INDIAN LAKE - TOT. OUTFLOW	37,120CFS	37,650CFS	+530CFS
NOTIGI FOREBAY	845.21	845.60	+0.39
NOTIGI FOREBAY INFLOW	29,780CFS	31,680CFS	+1900CFS
RAT RIVER - NOTIGI CONTROL OUTFLOW	27,350CFS	25,970CES	-1380CFS
FOOTPRINT LAKE - NELSON HOUSE	798.16	797.77	-0.39
BURNTWOOD RIVER - THOMPSON	616.94	616.68	-0.26
" " - THOMPSON	34,350CFS	33,460CFS	-890CFS

B. PRESENT OPERATION FOR THE WEEK COMMENCING MONDAY OCTOBER 13, 1980

NOTIGI: CHANGE FROM LAST WEEK

GATE	1	2	3	TOTAL ESTIMATED OUTFLOW
OPENING(FT)	8.5	8.5	8.5	28000 CFS

MISSI: CHANGE FROM LAST WEEK

GATE	1	2	3	4	5	6
OPENING(FT)	CLOSED	CLOSED	10.3	10.3	CLOSED	CLOSED

ESTIMATED HOUSE UNIT 180 CFS ESTIMATED SPILLWAY 19820 CFS TOTAL ESTIMATED OUTFLOW 2000[illegible] CFS

C. RECENT REGULATION CHANGES AND OTHER COMMENTS:

NOTIGI GATES RAISED TO 8.5' ON OCT 14,1980 @ 14:30 HRS. Q=28000 CFS.
MISSI GATES 3+4 RAISED TO 10.3' ON OCT 14,1980 @ 9:25 HRS. Q=20000 CFS.

MANITOBA HYDRO
SYSTEM OPERATING DEPT.

AUTHORIZED BY [signature] RESERVOIR & ENERGY RESOURCES ENGINEER

APPENDIX B – continued

1980 11 20 to 1980 11 26

The 90-day forecast dated 1980 11 03 shows that the level of Southern Indian Lake was anticipated to be about 0.25 feet lower than the upper limit of 847 feet between the 20th and 26th. The 90-day forecast cover letter dated 1980 12 03 indicates that the local unregulated inflow to Southern Indian Lake had remained slightly higher than anticipated and as a result the water level crept over the maximum limit of 847 feet. Missi flows were increased accordingly to reduce the water levels. The forecast indicated that water levels were still at 847.05 feet at the beginning of December. This demonstrates that the ability to determine water levels on a real-time basis during 1980 was not yet exact as the actual deviations above 0.05 feet only took place from November 20 to 26. The actual maximum deviation during this period was 0.07 feet (0.8 inches).

The following eight pages are a copy of the 1980 11 03 and 1980 12 03 Churchill River Diversion forecasts.

APPENDIX B – continued (1980 11 03 letter)

W. J. Tishinski

Acting Assistant General Manager

System Planning and Operations

Mr. T. E. Weber, P. Eng.
Director
Water Resources Division
1577 Dublin Avenue
Winnipeg, Manitoba R3E 3J5

1980 11 03

73D6-2

Churchill River Diversion 90 Day-Forecast

Attached please find a copy of the Churchill River Diversion 90-Day Forecast commencing November 1, 1980.

The local unregulated inflow on the Rat-Burntwood River System has declined and as a result the flow through the City of Thompson has fallen to well below the license limit of 34,000 c.f.s. The elevation of Southern Indian Lake is slightly below the upper license limit of 847.0'. It is anticipated that the elevation of Southern Indian Lake will decline at a very slow rate over the course of this forecast.

There has been some confusion as to which Government Department is responsible for the granting of permission to carry out this year's Augmented Winter Flow Test Program on the Churchill River Diversion. Although we have been granted permission from the Department of Natural Resources, we feel compelled to await approval from the Manitoba Environmental Assessment and Review Agency (MEARA), Department of Consumer and Corporate Affairs and Environment. We have been advised that their decision is forthcoming. If MEARA's decision is favourable to Manitoba Hydro, Notigi outflow will be increased immediately to 32,000 c.f.s. where it will be maintained for the duration of this forecast period. It is hoped that no serious problems will arise with the Nelson House rip-rap program nor with the development of ice-crossings downstream of Notigi, as a result of this late augmentation of Notigi outflow.

Original Signed By
W. J. TISHINSKI

DEM/eeh
Attach.

xc: J. J. Arnason
C. E. Birston

APPENDIX B – continued (Forecast attached to 1980 11 03 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Nov. 1	6 000	30 000	846.80	844.70	798.20	616.32	32 400
2	6 000	30 000	846.80	844.68	798.19	616.34	32 400
3	6 000	30 000	846.80	844.65	798.18	616.36	32 400
4	6 000	31 000	846.79	844.63	798.17	616.38	32 500
5	6 000	32 000	846.79	844.60	798.16	616.40	32 500
6	6 000	32 000	846.79	844.58	798.15	616.42	32 500
7	6 000	32 000	846.78	844.55	798.16	616.44	32 400
8	6 000	32 000	846.78	844.53	798.19	616.46	32 300
9	6 000	32 000	846.78	844.50	798.22	616.48	32 200
10	6 000	32 000	846.77	844.48	798.26	616.50	32 000
11	6 000	32 000	846.77	844.45	798.29	616.60	31 800
12	6 000	32 000	846.77	844.43	798.32	616.70	31 600
13	6 000	32 000	846.76	844.40	798.36	616.80	31 400
14	6 000	32 000	846.76	844.38	798.39	616.90	31 200
15	6 000	32 000	846.76	844.35	798.42	617.00	31 000
16	6 000	32 000	846.75	844.33	798.46	617.10	31 100
17	6 000	32 000	846.75	844.30	798.49	617.20	31 200
18	6 000	32 000	846.75	844.28	798.52	617.30	31 300
19	6 000	32 000	846.74	844.25	798.56	617.40	31 400
20	6 000	32 000	846.74	844.23	798.59	617.50	31 500
21	6 000	32 000	846.74	844.20	798.62	617.60	31 600
22	6 000	32 000	846.73	844.18	798.66	617.70	31 700
23	6 000	32 000	846.73	844.15	798.69	617.80	31 800
24	6 000	32 000	846.73	844.13	798.72	617.90	31 900
25	6 000	32 000	846.72	844.10	798.76	618.00	32 000
26	6 000	32 000	846.72	844.08	798.80	618.10	32 100
27	6 000	32 000	846.72	844.05	798.84	618.20	32 200
28	6 000	32 000	846.71	844.02	798.88	618.30	32 300
29	6 000	32 000	846.71	843.98	798.92	618.40	32 400
30	6 000	32 000	846.71	843.95	798.95	618.50	32 500

Manitoba Hydro
System Operating Department
1980 10 31

APPENDIX B – continued (Forecast attached to 1980 11 03 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Dec. 1	6 000	32 000	846.70	843.92	798.98	618.60	32 600
2	6 000	32 000	846.70	843.90	799.00	618.70	32 600
3	6 000	32 000	846.70	843.88	798.98	618.80	32 600
4	6 000	32 000	846.69	843.85	798.97	618.90	32 700
5	6 000	32 000	846.69	843.83	798.96	619.00	32 700
6	6 000	32 000	846.69	843.81	798.95	619.10	32 800
7	6 000	32 000	846.68	843.78	798.94	619.20	32 800
8	6 000	32 000	846.68	843.76	798.93	619.30	32 900
9	6 000	32 000	846.68	843.74	798.92	619.40	32 900
10	6 000	32 000	846.67	843.71	798.90	619.50	33 000
11	6 000	32 000	846.67	843.69	798.89	619.60	33 000
12	6 000	32 000	846.67	843.67	798.88	619.62	33 000
13	6 000	32 000	846.66	843.64	798.87	619.64	33 000
14	6 000	32 000	846.66	843.62	798.86	619.66	33 100
15	6 000	32 000	846.66	843.60	798.85	619.68	33 100
16	6 000	32 000	846.65	843.57	798.84	619.70	33 100
17	6 000	32 000	846.65	843.55	798.82	619.72	33 100
18	6 000	32 000	846.65	843.53	798.81	619.74	33 200
19	6 000	32 000	846.64	843.50	798.80	619.76	33 200
20	6 000	32 000	846.64	843.48	798.79	619.78	33 200
21	6 000	32 000	846.64	843.46	798.78	619.80	33 200
22	6 000	32 000	846.63	843.43	798.77	619.82	33 300
23	6 000	32 000	846.63	843.41	798.76	619.84	33 300
24	6 000	32 000	846.63	843.38	798.74	619.86	33 300
25	6 000	32 000	846.62	843.36	798.73	619.88	33 300
26	6 000	32 000	846.62	843.34	798.72	619.90	33 300
27	6 000	32 000	846.62	843.31	798.71	619.92	33 400
28	6 000	32 000	846.61	843.29	798.70	619.94	33 400
29	6 000	32 000	846.61	843.27	798.69	619.96	33 400
30	6 000	32 000	846.61	843.25	798.68	619.98	33 400
31	6 000	32 000	846.60	843.24	798.67	619.99	33 400

Manitoba Hydro
System Operating Department
1980 10 31

APPENDIX B – continued (Forecast attached to 1980 11 03 letter)

90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Jan. 1	6 000	32 000	846.60	843.23	798.67	620.00	33 400
2	6 000	32 000	846.60	843.21	798.66	619.98	33 400
3	6 000	32 000	846.60	843.19	798.65	619.96	33 400
4	6 000	32 000	846.59	843.17	798.64	619.94	33 400
5	6 000	32 000	846.59	843.15	798.63	619.92	33 400
6	6 000	32 000	846.59	843.13	798.62	619.90	33 400
7	6 000	32 000	846.58	843.11	798.61	619.88	33 400
8	6 000	32 000	846.58	843.09	798.60	619.86	33 300
9	6 000	32 000	846.58	843.07	798.59	619.84	33 300
10	6 000	32 000	846.57	843.05	798.58	619.82	33 300
11	6 000	32 000	846.57	843.03	798.57	619.80	33 300
12	6 000	32 000	846.57	843.01	798.56	619.78	33 300
13	6 000	32 000	846.56	842.99	798.55	619.76	33 300
14	6 000	32 000	846.56	842.97	798.54	619.74	33 300
15	6 000	32 000	846.56	842.95	798.53	619.72	33 200
16	6 000	32 000	846.55	842.93	798.52	619.70	33 200
17	6 000	32 000	846.55	842.91	798.51	619.68	33 200
18	6 000	32 000	846.55	842.89	798.50	619.66	33 200
19	6 000	32 000	846.54	842.87	798.49	619.64	33 200
20	6 000	32 000	846.54	842.85	798.48	619.62	33 200
21	6 000	32 000	846.54	842.83	798.47	619.60	33 200
22	6 000	32 000	846.53	842.81	798.46	619.58	33 100
23	6 000	32 000	846.53	842.79	798.45	619.56	33 100
24	6 000	32 000	846.53	842.77	798.44	619.54	33 100
25	6 000	32 000	846.52	842.75	798.43	619.52	33 100
26	6 000	32 000	846.52	842.73	798.42	619.50	33 100
27	6 000	32 000	846.52	842.71	798.41	619.48	33 100
28	6 000	32 000	846.51	842.69	798.40	619.46	33 100
29	6 000	32 000	846.51	842.67	798.39	619.44	33 100
30	6 000	32 000	846.51	842.65	798.38	619.42	33 100
31	6 000	32 000	846.50	842.63	798.37	619.40	33 000

Manitoba Hydro
System Operating Department
1980 10 31

APPENDIX B – continued (1980 12 03 letter)

W. J. Tishinski
Acting Assistant General Manager
System Planning & Operations

Mr. T. E. Weber, P. Eng.
Director
Water Resources Division

1980 12 03

73D6-2

Churchill River Diversion 90-Day Forecast

Attached please find a copy of the Churchill River Diversion 90-Day Forecast commencing December 1, 1980.

The local unregulated inflow to Southern Indian Lake has remained slightly higher than anticipated and as a result Southern Indian Lake elevation has crept over the maximum licence limit of 847.0'. The outflow through Missi Falls has, therefore, been stepped up and it is expected that the elevation will return to 847.0' over the next few weeks.

A letter was received from M.E.A.R.A. during the first week of November, 1980, advising that a decision had been made to forego an environmental assessment. With this decision, and acting upon the Minister's approval to proceed dated August 28, 1980, the Notigi outflow was increased from 30,000 to 32,000 cfs on November 6, 1980, where it is expected to remain for the duration of this forecast.

DEM/eeh
Attach.
xc: J. J. Arnason
C. E. Birston

APPENDIX B – continued (Forecast attached to 1980 12 03 letter)

Churchill R. Diversion
90 Day Forecast

Date	Missi Falls Outflow	Notigi Outflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Dec 1/80	8 000	32 000	847.05	844.02	798.49	618.30	32 100
2	8 000	32 000	847.05	844.00	798.50	618.50	32 200
3	8 000	32 000	847.05	843.98	798.51	618.70	32 300
4	8 000	32 000	847.04	843.96	798.52	618.80	32 400
5	8 000	32 000	847.04	843.93	798.53	618.90	32 500
6	8 000	32 000	847.04	843.90	798.54	619.00	32 600
7	8 000	32 000	847.03	843.87	798.55	619.10	32 700
8	8 000	32 000	847.03	843.84	798.56	619.20	32 800
9	8 000	32 000	847.03	843.81	798.57	619.30	32 900
10	8 000	32 000	847.02	843.78	798.58	619.40	33 000
11	8 000	32 000	847.02	843.75	798.59	619.45	33 000
12	8 000	32 000	847.02	843.72	798.60	619.50	33 000
13	8 000	32 000	847.01	843.69	798.61	619.55	33 100
14	8 000	32 000	847.01	843.66	798.62	619.60	33 100
15	8 000	32 000	847.01	843.63	798.63	619.65	33 100
16	8 000	32 000	847.00	843.60	798.64	619.70	33 200
17	8 000	32 000	847.00	843.57	798.66	619.72	33 200
18	8 000	32 000	847.00	843.54	798.68	619.74	33 200
19	8 000	32 000	846.99	843.51	798.70	619.76	33 200
20	8 000	32 000	846.99	843.48	798.72	619.78	33 200
21	8 000	32 000	846.99	843.45	798.74	619.80	33 300
22	8 000	32 000	846.98	843.42	798.76	619.82	33 300
23	8 000	32 000	846.98	843.39	798.78	619.84	33 300
24	8 000	32 000	846.98	843.36	798.80	619.86	33 300
25	8 000	32 000	846.97	843.33	798.82	619.88	33 300
26	8 000	32 000	846.97	843.30	798.84	619.90	33 300
27	8 000	32 000	846.97	843.27	798.86	619.86	33 300
28	8 000	32 000	846.96	843.24	798.88	619.82	33 300
29	8 000	32 000	846.96	843.21	798.90	619.78	33 200
30	8 000	32 000	846.96	843.18	798.92	619.74	33 200
31	8 000	32 000	846.95	843.15	798.94	619.70	33 200

Manitoba Hydro
System Operating Department
1980 12 03

APPENDIX B – continued (Forecast attached to 1980 12 03 letter)

Churchill at Diversion

90 Day Forecast

Date	Missi Falls Outflow	Notigi Cutflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Jan 1/81	8 000	32 000	846.95	843.12	798.96	619.66	33 200
2	8 000	32 000	846.94	843.09	798.98	619.62	33 200
3	8 000	32 000	846.93	843.06	799.00	619.58	33 200
4	8 000	32 000	846.92	843.03	799.02	619.57	33 200
5	8 000	32 000	846.91	843.00	799.04	619.56	33 200
6	8 000	32 000	846.90	842.97	799.06	619.55	33 200
7	8 000	32 000	846.89	842.94	799.08	619.54	33 200
8	8 000	32 000	846.88	842.91	799.10	619.53	33 200
9	8 000	32 000	846.87	842.88	799.12	619.52	33 200
10	8 000	32 000	846.86	842.85	799.14	619.51	33 100
11	8 000	32 000	846.85	842.83	799.16	619.50	33 100
12	8 000	32 000	846.84	842.80	799.18	619.49	33 100
13	8 000	32 000	846.83	842.78	799.20	619.48	33 100
14	8 000	32 000	846.82	842.76	799.22	619.47	33 100
15	8 000	32 000	846.81	842.74	799.24	619.46	33 100
16	8 000	32 000	846.80	842.72	799.25	619.45	33 100
17	8 000	32 000	846.79	842.70	799.26	619.44	33 100
18	8 000	32 000	846.78	842.68	799.27	619.43	33 100
19	8 000	32 000	846.77	842.66	799.28	619.42	33 100
20	8 000	32 000	846.76	842.64	799.29	619.41	33 100
21	8 000	32 000	846.75	842.62	799.30	619.40	33.000
22	8 000	32 000	846.74	842.60	799.31	619.39	33 000
23	8 000	32 000	846.73	842.58	799.32	619.38	33 000
24	8 000	32 000	846.72	842.56	799.33	619.37	33 000
25	8 000	32 000	846.71	842.54	799.34	619.36	33 000
26	8 000	32 000	846.70	842.52	799.35	619.35	33 000
27	8 000	32 000	846.69	842.50	799.36	619.34	33 000
28	8 000	32 000	846.68	842.48	799.37	619.33	33 000
29	8 000	32 000	846.67	842.46	799.38	619.32	33 000
30	8 000	32 000	846.66	842.44	799.39	619.31	33 000
31	8 000	32 000	846.65	842.42	799.40	619.30	33 000

Manitoba Hydro
System Operating Department
1980 12 03

APPENDIX B – continued (Forecast attached to 1980 12 03 letter)

Churchill R. Diversion
90 Day Forecast

Date	Missi Falls Outflow	Notigi Cutflow	Southern Indian Lake Elevation	Notigi Forebay Elevation	Nelson House Elevation	Thompson P.H. Elevation	Thompson Discharge
Feb 1/81	8 000	32 000	846.65	842.40	799.39	619.29	33 000
2	8 000	32 000	846.64	842.38	799.38	619.28	33 000
3	8 000	32 000	846.63	842.35	799.37	619.32	33 000
4	8 000	32 000	846.62	842.32	799.36	619.36	33 000
5	8 000	32 000	846.61	842.29	799.35	619.40	33 100
6	8 000	32 000	846.60	842.26	799.34	619.44	33 100
7	8 000	32 000	846.59	842.23	799.33	619.48	33 100
8	8 000	32 000	846.58	842.20	799.32	619.52	33 200
9	8 000	32 000	846.57	842.17	799.31	619.56	33 200
10	8 000	32 000	846.56	842.14	799.30	619.60	33 200
11	8 000	32 000	846.55	842.11	799.29	619.64	33 200
12	8 000	32 000	846.54	842.08	799.28	619.68	33 200
13	8 000	32 000	846.53	842.05	799.27	619.72	33 200
14	8 000	32 000	846.52	842.02	799.26	619.76	33 300
15	8 000	32 000	846.51	841.99	799.25	619.80	33 300
16	8 000	32 000	846.50	841.96	799.24	619.79	33 300
17	8 000	32 000	846.49	841.93	799.23	619.78	33 300
18	8 000	32 000	846.48	841.91	799.22	619.77	33 300
19	8 000	32 000	846.47	841.88	799.21	619.76	33 200
20	8 000	32 000	846.46	841.85	799.20	619.75	33 200
21	8 000	32 000	846.45	841.82	799.19	619.74	33 200
22	8 000	32 000	846.44	841.79	799.18	619.73	33 200
23	8 000	32 000	846.43	841.76	799.17	619.72	33 200
24	8 000	32 000	846.42	841.73	799.16	619.71	33 200
25	8 000	32 000	846.41	841.70	799.15	619.70	33 200
26	8 000	32 000	846.40	841.67	799.14	619.69	33 200
27	8 000	32 000	846.39	841.64	799.13	619.68	33 200
28	8 000	32 000	846.38	841.61	799.12	619.67	33 200

Manitoba Hydro
System Operating Department
1980 12 03

APPENDIX B – continued

1983 10 01 to 1983 10 06

Notigi outflow was 30,000 cfs in September and was increased to 33,000 cfs on October 1, the maximum outflow authorized following that date. Missi flows were 500 cfs during September and were increased to 20,000 between September 16 and 22 in response to increased inflow due to heavy basin precipitation. The maximum deviation from 847.0 feet was 0.10 feet (1.2 inches) on 1983 10 01, the date the authorization for a maximum level of 847.5 feet on Southern Indian Lake expired.

1986 07 08 to 1986 07 10

Notigi outflow was 20,000 cfs during June and early July due to high Lake Winnipeg Regulation flows. The flow was reduced to 16,000 on July 6 due to heavy rainfall over the entire Burntwood River basin. Once the rainfall effects had passed, the flow was returned to 20,000 cfs. Missi outflow was increased from 20,000 cfs on 1986 07 01 to 50,000 cfs on 1986 07 10 in response to increased local inflow. The maximum deviation from 847.5 feet was 0.1 feet (1.2 inches).

2000 07 22 to 2000 08 03

A 2000 07 21 letter to the Province explained the reason that the water level of Southern Indian Lake exceeded 847.5 feet and what Manitoba Hydro was doing in response. A 2000 07 21 briefing note on the matter was also sent to the minister responsible for Manitoba Hydro. Notigi outflow was at the authorized maximum of 35,000 cfs during this period. Missi outflow was increased from 500 cfs on 2000 07 20 to 29,000 cfs by 2000 07 30 to pass the increased local inflow. The maximum deviation from 847.5 feet was 0.23 feet (2.76 inches).

The following page is a copy of the 2000 07 21 letter.

APPENDIX B – continued (2000 07 21 letter)

Manitoba Hydro

PO Box 815 • Winnipeg Manitoba Canada • R3C 2P4
Telephone / N° de téléphone : (204) 474-3018 • Fax / N de télécopieur : (204) 452-5639
hszbigniewicz@hydro.mb.ca

2000 07 21

Mr. S.D. Topping, Director
Water Resources Branch
Box 11, 200 Saulteaux Cresc.
Winnipeg MB R3J 3W3

Dear Mr. Topping:

Re: **CHURCHILL RIVER DIVERSION**

During our Wednesday, July 19, 2000 conversation we agreed on actions required by Manitoba Hydro to manage the rapidly increasing inflow to Southern Indian Lake resulting from a major rainstorm over the Churchill River basin during July 14-16.

Missi outflows are scheduled to be increased from 500 cfs to 30 000 cfs over the next ten days. Manitoba Hydro is informing local communities and resources users of these operations through written and broadcast notices in English and Cree. A helicopter has been scheduled to travel the waterway downstream of Missi to inform and assist resource users.

Under the Churchill River Diversion Interim Licence and Augmented Flow Program, Manitoba Hydro is required to effect maximum discharge from Southern Indian Lake, if the level rises above 847.5 ft. Notigi outflow is currently at the maximum of 35 000 cfs. Increasing Missi outflow to maximum (112 000 cfs) would dramatically increase downstream levels and compromise the safety of fishers and other downstream users.

The tempered release schedule will alleviate excessive rises on Southern Indian Lake while allowing downstream waterway users to safely prepare for and avoid rising water levels. Southern Indian Lake is at 847.4 ft and rising. The lake will rise above 847.5 ft but is expected to remain below 847.9 ft. It is expected that the lake will fall below 847.5 ft by early August. For additional information please contact Marc Drouin, P.Eng., at 474-3441.

Yours truly,

Original signed by *Marc Drouin* for *Halina Zbigniewicz*

H.S. Zbigniewicz, P. Eng., Manager, Hydraulic Engineering & Operations

TMM/ljm/000721-1.w61

APPENDIX B – continued

2000 08 15 to 2000 08 16

A 2000 08 16 letter to the Province explained the reason that the water level of Southern Indian Lake had again exceeded 847.5 feet and what Manitoba Hydro was doing in response. Notigi outflow was at the authorized maximum of 35,000 cfs during this period. Missi outflow was increased from 15,000 cfs to 30,000 cfs. The maximum deviation from 847.5 feet was 0.07 feet (0.84 inches).

The following page is a copy of the 2000 08 16 letter.

APPENDIX B – continued (2000 08 16 letter)

Manitoba Hydro

PO Box 815 · Winnipeg Manitoba Canada · R3C 2P4
Telephone / N° de téléphone : (204) 474-3018 · Fax / N° de télécopieur : (204) 452-5639
hszbigniewicz@hydro.mb.ca

2000 08 16

Mr. S.D. Topping, Director
Water Resources Branch
Box 11, 200 Saulteaux Cresc.
Winnipeg MB R3J 3W3

Dear Mr. Topping:

Re: **CHURCHILL RIVER DIVERSION (CRD) - UPDATE**

As discussed during your Monday, August 14, 2000 conversation with T.M. Miles, a rainstorm during August 11-12 resulted in up to 3 inches of rain falling directly on Southern Indian Lake and over the Churchill River basin in Manitoba. Southern Indian Lake rose from 847.3 feet on August 11 to 847.6 feet on August 14 and continues to rise. In response to these rapidly changing conditions, Missi outflows were increased from 15 000 to 25 000 cfs on August 15. Missi outflow may have to be increased to as high as 45 000 cfs by August 22. Notigi outflow will be maintained at the approved maximum of 35 000 cfs.

Manitoba Hydro has informed local communities and resource users of these operations through written and broadcast notices in English and Cree. The waterway downstream of Missi will be travelled by helicopter to inform and assist resource users prior to any flow increases at Missi.

On August 11, CRD was still being operated in response to the July 14-16 rainstorm identified in the attached letter to you dated July 21, 2000. As a result of this event, Southern Indian Lake peaked at an elevation of 847.7 feet on July 29 and was declining, reaching 847.3 feet by August 11.

For additional information please contact Terry Miles, P. Eng., at 474-3052.

Yours truly,

Original signed by: *Terry Miles* for *Halina Zbigniewicz*

H.S. Zbigniewicz, P. Eng.
Manager, Hydraulic Engineering & Operations

KDG/ljm/000816-1
Att.

APPENDIX B – continued

2005 07 24 to 2005 08 12

A 2005 07 27 letter to the Province explained the reason that the water level of Southern Indian Lake had exceeded 847.5 feet and Manitoba Hydro's response to the high inflow event. Notigi outflow was at 20,000 cfs during this period to provide flood relief to the lower Nelson River, which included the communities of Tataskweyak Cree Nation (Split Lake) and York Landing. The maximum authorized outflow was 35,000 cfs. Missi outflow had been increased from 30,000 cfs to 60,000 cfs by July 27 with increases to 81,000 cfs after August 12. Missi outflows were not increased to the maximum of 112,000 cfs to avoid compromising the safety of fishers as well as other downstream users and infrastructure. The maximum deviation from 847.5 feet was 0.17 feet (2.05 inches).

The following two pages are a copy of the 2005 07 27 letter.

APPENDIX B – continued (2005 07 27 letter)

Manitoba Hydro

P.O. Box 815 • Winnipeg Manitoba Canada • R3C 2P4
Telephone / *N° de téléphone :* (204) 474-3018 • Fax / *N° de télécopieur :* (204) 452-5639
tmmiles@hydro.mb.ca

2005 07 27

Mr. S.D. Topping, P. Eng.
Executive Director, Infrastructure and Operations
Manitoba Water Stewardship
Box 11 - 200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

Dear Mr. Topping:

RE: CHURCHILL RIVER DIVERSION - MISSI OUTFLOW

During our Tuesday, July 26, 2005 conversation we agreed on actions required by Manitoba Hydro to manage the rapidly increasing inflow to Southern Indian Lake resulting from a series of major rainstorms over the Churchill River basin during the past two weeks.

Over the past few days, Missi outflows have been increased from 30,000 cubic feet per second (cfs) to 60,000 cfs. Notigi outflow will be maintained at 20,000 cfs. We expect to maintain this level of outflow until the level of Southern Indian Lake recedes below 847.5 feet. Manitoba Hydro informed local communities and resource users of these operations through written and broadcast notices in English and Cree. A helicopter has travelled the waterway downstream of Missi to inform and assist resource users.

Under the Churchill River Diversion Interim Licence and Augmented Flow Program, Manitoba Hydro is required to effect maximum discharge from Southern Indian Lake, if the level rises above 847.5 feet. Notigi outflow is below the maximum of 35,000 cfs to provide flood relief to the lower Nelson River including Split Lake. Increasing Missi outflow to maximum (112,000 cfs) would dramatically increase downstream water levels, compromise the safety of fishers and other downstream users and put infrastructure at risk.

The current release schedule will alleviate excessive rises on Southern Indian Lake without further increasing downstream water levels. Missi outflow is currently the highest experienced since the Churchill River Diversion became fully operational. Southern Indian Lake is at 847.6 feet and rising. The lake is expected to peak at around 847.7 feet and will fall below 847.5 feet by early August. No significant precipitation is forecast for the region over the next week. Manitoba Hydro will continue to monitor the situation and will keep you informed of any significant changes.

If you have any further questions related to this issue, please call me at 474-3018.

APPENDIX B – continued (2005 07 27 letter)

Yours truly,

Originally signed by:

Terry Miles

T.M. Miles, P. Eng.
Manager
Hydraulic Engineering & Operations

BWG/ljm/20050727-1.doc

APPENDIX B – continued

2009 06 23 to 2009 06 29

A 2010 03 05 letter, as shown on the next page, documents the agreed actions and circumstances discussed in a telephone conversation with the Executive Director of Regulatory and Operational Services.

Notigi outflow was at 20,000 cfs during this period to provide flood relief on the lower Nelson River including the communities on Split Lake. The maximum authorized outflow was 35,000 cfs.

Missi outflow was at 1,800 cfs on June 19 and was raised to 55,000 cfs by June 26. Missi outflows were not increased to the maximum of 112,000 cfs to avoid compromising the safety of fishers as well as other downstream users and infrastructure.

The maximum deviation from 847.5 feet was 0.09 feet (1.08 inches).

APPENDIX B – continued (2010 03 05 letter)

Manitoba Hydro

P.O. Box 815 • Winnipeg Manitoba Canada • R3C 2P4
Telephone / *N° de téléphone :* (204) 360-3018 • Fax / *N° de télécopieur :* (204) 360-6136
wvpenner@hydro.mb.ca

2010 03 05

Our file: 00188-09600-0010_00

Mr. S.D. Topping, P. Eng.
Executive Director, Regulatory and Operational Services
Manitoba Water Stewardship
Box 11 - 200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

Dear Mr. Topping:

Re: **CHURCHILL RIVER DIVERSION - MISSI OUTFLOW**

The level of Southern Indian Lake rose above 847.5 feet between June 23 and 29, 2009. During a telephone conversation we agreed on actions required by Manitoba Hydro to manage the rapidly increasing inflow to the lake resulting from the spring freshet and rainfall events in the area.

Between June 20 and 26, 2009, Missi outflow was increased from 1,800 cubic feet per second (cfs) to 55,000 cfs. The flow increases did not occur earlier due to poor weather conditions not allowing staff to fly along the river downstream of Missi. Notigi outflow was maintained at 20,000 cfs. This level of outflow was maintained for several days until the level of Southern Indian Lake receded below 847.5 feet. The level of Southern Indian Lake remained above 847.5 feet for seven days - June 23 to 29, 2009 - and reached a maximum of 847.6 feet. Manitoba Hydro informed local communities and resource users of these operations through written and broadcast notices in English and Cree. A helicopter travelled the waterway downstream of Missi to inform and assist resource users prior to the flow changes.

Under the Churchill River Diversion Interim Licence and Augmented Flow Program, Manitoba Hydro is required to effect maximum discharge from Southern Indian Lake, if the level rises above 847.5 feet. Notigi outflow was below the maximum of 35,000 cfs to provide flood relief to the lower Nelson River including Split Lake. Increasing Missi outflow to maximum (112,000 cfs) would have dramatically increased downstream water levels, compromised the safety of fishers and other downstream users and put infrastructure at risk.

The Missi outflow increases alleviated excessive rises on Southern Indian Lake without further increasing downstream water levels. Missi outflow peaked and remained at 55,000 cfs between June 26 and 29. The lake peaked at 847.6 feet and returned below 847.5 feet by June 30.

If you have any further questions related to this issue, please call me at 360-3018.

Yours truly,

Original signed by: *Wesley Penner*

W.V. Penner, P.Eng.
Manager
Hydraulic Operations Department

JP/ljm/00188-09600-0010_00.doc

bc: G. Ratushniak

APPENDIX C
SPECIFIC OBSERVANCES RELEVANT TO ARTICLE 10 OF THE INTERIM WATER POWER ACT LICENCE
(Minimum Southern Indian Lake Water Level)

This appendix provides an account of specific events and the supporting documents referred to in Section 2, Article 10 of this report. Article 10 refers to Interim Licence condition #10 and subsequent approved alterations. This condition requires the licensee to prevent the water level of Southern Indian Lake from receding below certain elevations.

1981 09 16 to 1981 10 29

This event occurred during a drought that compelled Manitoba Hydro to request a lower authorized minimum water level on Southern Indian Lake. The request was authorized a few weeks later.

The unregulated local inflow to Southern Indian Lake was below historical minimums since August. The summer test program with Notigi outflow up to 33,000 cfs was terminated early due to low inflow conditions that followed an above average spring freshet. Notigi outflow was reduced to 20,000 cfs by September 20. Missi outflow was increased to 6,000 cfs to assure the water supply for Churchill as local tributary flow was very low. The maximum deviation during this period was 0.77 feet (9.24 inches). A 1981 10 14 letter, as shown on the following six pages, from Manitoba Hydro to the Province, provided a review of events leading up to the present condition. The letter concluded with a request to temporarily reduce the minimum level of Southern Indian Lake to 842.0 feet. The authorization was granted in a 1981 10 30 letter.

The following seven pages are a copy of the 1981 10 14 and 1981 10 30 letters.

APPENDIX C – continued (1981 10 14 letter)

Director [illegible]water Resources
Dept. of Natural Resources
1577 Dublin Avenue
Winnipeg, Manitoba
R3E 3J5

RECEIVED
OCT 15 1981
ACTING ASST GENERAL MGR.
SYSTEM PLANNING & OPERATIONS

General Counsel

Manitoba Hydro

October 14, 1981

429M14 & 73D6-1

CHURCHILL RIVER DIVERSION

As promised in our recent telephone conversation, this memorandum is to advise you of the circumstances leading up to the present situation on the Churchill River Diversion, and Southern Indian Lake in particular, and what may be expected in the coming months. This is also our formal request for permission to operate the Churchill River Diversion in a manner which differs from the provisions of the Interim License, particulars of which will be detailed later. This will be the fourth time this year that such permission has been requested.

The first such occasion occurred last spring when the maximum draw from Southern Indian Lake over the winter had exhausted the two-foot draw provision, with an elevation of 845.02 on April 28. Because it was expected the lake to fall a further 0.20 feet before the coming spring freshet would reverse the trend, we wrote on April 29 requesting permission to fall below the 845.0 limit for a period of two weeks. The lake subsequently fell only to 844.00 and was back up to 845.0 by May 13.

This had been preceded by a normal snowfall and good groundwater conditions, and was followed by excellent runoff in May, averaging 90%-ile local inflow. For some years, it had been planned to undertake an augmented summer flow program, the object of which was to examine the performance of the Churchill River Diversion waterway under open water conditions to determine its upper reasonable safe operating limits from a physical and environmental point of view. It seemed that water conditions were sufficiently good last spring to undertake such a project during the upcoming open water season. Accordingly, the second request for special permission was made on May 15, to undertake the summer augmented flow program. Attached to this request was a comprehensive program description, specifically requesting permission to exceed the upper limit of 30,000 cfs release at Notigi and to exceed the 34,000 cfs limit of flow in the Burntwood River at Thompson between the dates of May 15 and September 15, 1981, on condition that elevation 800 feet A.S.L. at Nelson House and 619 feet A.S.L. at the Thompson seaplane base would not be exceeded. It was also made clear that the extent to which the program could be carried out would be dependent upon the availability of surplus inflows to Southern Indian Lake which would otherwise be spilled at Missi. We quote from page 15 of the project description:

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.../2

APPENDIX C – continued (1981 10 14 letter)

quartile local

"From Table II it can be seen that only with upper quartile local inflows (or better) can the full proposed augmented flow program be carried out."

The decision to file this request was based on inflows at the time which were in the 90%-ile range. But the program description went on:

"From Table II it can be seen that if local inflows are only median, then the maximum average Notigi release will not exceed the 30,000 cfs maximum outflow provision of the Interim License ... Again from Table II it can be seen that if local inflows to Southern Indian Lake are only 25%-ile, then no augmented flow program would be possible, and in fact, it would be necessary to conserve water in Southern Indian Lake for the next winter season."

Permission was granted by the Minister on May 22 with clarification on May 25, and the program was put into effect on May 26, with a series of flow increases during the following three weeks, reaching 35,000 cfs on June 16. Stable conditions with these new higher flows had been achieved at Nelson House by about July 6, with an elevation of 799.74, and at Thompson by about July 15, with an elevation at the seaplane base of about 615.96. Local rains drove the elevation slightly higher to 616.47 by July 27. The extensive monitoring program that was being carried out obtained all of the information needed to make the program a success in meeting the objectives of open water optimization assessment.

However, during June, local inflows had fallen off very sharply from 90%-ile to about 50%-ile, and with extremely poor rainfall during July had fallen alarmingly to 2%-ile, for the local runoff average for that month. By June 16, Southern Indian Lake had ponded only up to 846.25, a gain of 1.25 feet during the spring freshet. It held close to this elevation until July 10, and then commenced to fall at the alarming rate of half a foot per month. With the objectives of the test program met, it seemed clear that the summer augmented flow program should be immediately terminated, and that a significant reduction in flow should be put into effect to conserve available water supplies for the coming winter. Accordingly, on July 23, a decision was made to give the necessary two-week notice under the terms of the Northern Flood Agreement that flows would be dropped starting August 7 to 20,000 cfs. Subsequently, however, it was decided to carry out the full summer augmented flow program as originally planned, on the basis that a return to median precipitation conditions was most probable. Notigi discharges were reduced from 35,000 cfs to 30,000 cfs between September 8 to 15, which in effect delayed the proposed flow reduction by one month. At that time, it was still hoped that the winter augmented flow program, phase II, could proceed.

By August 10, Southern Indian Lake had fallen to 845.25 feet. It therefore became evident that certain other Interim License conditions would be exceeded. Accordingly, on August 13, so as to provide the maximum time possible for Ministerial consideration, we applied the third time for special permission to draw Southern Indian Lake the

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APPENDIX C – continued (1981 10 14 letter)

full three feet to the minimum allowable reservoir limit of 844.0, and to allow for the draw of the Notigi forebay to elevation 834.0, four feet below the mimimum license limit of 838.0, during the remainder of the fiscal year.

The next day, on August 14, two weeks notice was given as required by the Northern Flood Agreement that flow reductions would commence a week earlier, on August 28. Permission to carry out our third request was received on August 27. In the meantime, during the month of August, far from returning to median inflows, the almost total failure of basin precipitation caused the local runoff into Southern Indian Lake to fall to a new minimum of record, 1,800 cfs compared to the previous minimum of 3,000 cfs. Elevations on Southern Indian Lake continued to plummet unabated, and as the end of the month approached, the level was only 844.6.

Flow reductions were commenced on August 28, as announced, reducing from 35,000 cfs to 32,000 cfs, followed by a reduction on September 4 to 29,000 cfs, on September 11 to 26,000 cfs, on September 17 to 23,000 cfs and finally on September 18 to 20,000 cfs, where outflows have since remained.

During the course of July and August, the Saskatchewan Power Corporation, equally aware of the poor precipitation conditions, coupled with the poor recovery of Reindeer Lake during the spring freshet and anxious to protect the power supplies to the Flin Flon area over the next two years until the Cranberry Portage-The Pas transmission line is commissioned, operated the Island Falls plant as conservatively as possible, dropping the discharge down to the 18,000 cfs range. This was somewhat below the plans they had anticipated in the spring. The average discharge that has been released through Island Falls this summer has been the lowest since 1953. Such low flows at Island Falls contributed to the failing situation on Southern Indian Lake. The Saskatchewan Power Corporation was therefore approached, initially informally, but followed on September 15 with a formal presentation in Regina. At this presentation, an appeal was made to spill an additional 5,000 cfs during the coming fall and winter over and above the Island Falls plant requirement. It was demonstrated that with median winter inflows to Reindeer Lake, there was only a 4% probability that the Flin Flon power supply would be imperilled during the winter of 1983, before commissioning of the new transmission line. With lower quartile inflows into Reindeer Lake this winter, the probability would rise to 15%. Current inflows to Reindeer Lake are probably also producing new minimums of record, below 0%-ile. It is not surprising, therefore, that both the Saskatchewan Power Corporation and the Saskatchewan Government have been reluctant to meet this request. We were advised on October 7 that the request has been denied on the grounds of the environmental consequences of drawing Reindeer Lake to the bottom. At the same time, we were advised of the denial of our request for 5,000 cfs additional flow, we were also advised by Saskatchewan Power Corporation that the Government of Saskatchewan intends to narrow the range of storage on Reindeer Lake in the license they will be issuing to Saskatchewan Power Corporation. The indication is that the minimum level will be raised approximately four feet to 1097.9. With the present level of Reindeer

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APPENDIX C – continued (1981 10 14 letter)

lake at 1099.47, there is only about 1.5 feet of storage in the lake to secure the power requirements at Flin Flon this winter. Under present inflow conditions, it will require 3.5 feet of storage out of Reindeer Lake as a minimum. There will undoubtedly be continued refusal on the part of Saskatchewan Power Corporation to discharge any more than the absolute minimum to meet the Flin Flon area requirement, and this includes next year during and after the spring freshet. It could therefore impose an additional burden on Manitoba Hydro to recover an adequate storage position in Southern Indian Lake next spring and summer.

The next problem to be met was the winter riparian flow release at Missi, primarily to assure a continuous reliable water supply for the Town of Churchill. While the License stipulates a minimum winter release of 1,500 cfs, we have not satisfied ourselves that a flow of this magnitude will assure Churchill of an uninterrupted supply. Toward this end, we have pursued a staged program each winter, moving progressively downward in easy stages with monitoring to identify safe limits. We have moved from 10,000 cfs, through 8,000, 6,000 to 4,000 cfs two winters ago. A more abundant water supply last winter did not require us to stint and average flows of 6,000 cfs were maintained through the coldest part of the winter. With a tight water supply situation, it was decided to advance to the next natural step of 3,000 cfs. Accordingly, on September 23, the Missi discharge was raised to 3,000 cfs from 1,000 cfs, where the outflow had remained all summer. However, information gathered from the local basin below Missi indicated the same dry conditions as upstream, with the lowest local runoff experienced in years. The stage on the Churchill River opposite the Churchill pumphouse stands 1½ feet lower than it was two years ago, with a recent flow measurement of only 4,800 cfs, compared to about 11,000 cfs two years ago at this time. Since Manitoba Hydro cannot risk the failure of the Churchill water supply, and since there does not appear to be any alternative source, even during a temporary emergency, it was concluded that under the prevailing circumstances a flow of only 3,000 cfs at Missi was simply too risky. Therefore, the Missi discharge was raised to 6,000 cfs on October 1, although under better water supply conditions, we would have preferred 8,000 cfs, to bring the flow at Churchill to 10,000 cfs. As it takes approximately three weeks after a flow change to establish something approaching the new stable regime downstream, and since the shore ice is already starting to form in the estuary, there is barely enough time to establish the required ice cover at the desired level, to assure continuous winter flow. It is hoped that after ice cover has become competent, if monitoring indicates it would be safe, some progressive modest flow reductions at Missi may be considered, such as a reduction to 5,000 cfs in mid-December, 4,000 cfs at the end of January and 3,000 cfs in mid-March. It is almost certain that any attempt to increase Missi discharge, once the ice cover has formed, will end in failure, with the water merely running over the ice and freezing in progressively thickening sheets. Otherwise, it is proposed to assume, for the time being, that a flow of 6,000 cfs at Missi will be required all winter.

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APPENDIX C – continued (1981 10 14 letter)

The same is also true for flow releases at Notigi, concerning the need to establish stable conditions along the Burntwood in time for freeze-up, although the problem is perhaps greater because of the longer time required to reach stability (between 5 and 6 weeks) and because of the communities of Nelson House and Thompson. With freeze-up of the Burntwood normally expected in the first ten days of November, there is now virtually no time to institute a last-minute program of conservation with the hope of a later increase in flow after freeze-up. It is almost essential to establish that flow which will remain for the balance of the winter, right now. We had hoped to receive a favourable response from Saskatchewan so that the flow for the winter could be set at about 24,000 cfs. It would now appear more prudent (even if Saskatchewan agrees to the extra 5,000 cfs release or a portion thereof) to make no further increase at Notigi, but rather to use it to reduce the extent of draw on Southern Indian Lake.

As at October 7, the elevation of Southern Indian Lake stands at 843.45, having passed the license minimum of 844.0 on September 14. It has continued to fall at a rate of about 0.9 feet per month. The forebay at Notigi stands at 841.3 with a discharge of 20,000 cfs, while the Missi discharge is 6,000 cfs. It is estimated that the total collapse of the water supply conditions of the Churchill basin will cost Manitoba Hydro about $10.5 million for the balance of this fiscal year, assuming that a Notigi discharge of 20,000 cfs is maintained for the balance of the fiscal year.

If the Notigi discharge is held to 20,000 cfs, and the Missi discharge remains at 6,000 cfs until April 30, 1982, the average on which break-up occurs, and if Island Falls is raised to a discharge of 23,000 cfs for the winter, as is customary, and if local inflow to Southern Indian Lake continues to set new minimums of record, (assumed to be in the order of 1,000 cfs from now until spring break-up), then the level of Southern Indian Lake will continue to decline from now until April 30, 1982 with an elevation on that date of 842.47. During this time, the minimum Notigi forebay elevation will fall to approximately 838.7, barring the development of ice difficulties between South Bay and Notigi. We attach a sheet of calculations showing the weekly flows and elevations for this pattern of regulation, and also a hydrograph covering the period.

Because the Interim License for the Churchill River Diversion does not specifically provide for the course of action to be taken once the level of Southern Indian Lake has fallen below the minimum license level of 844.0 feet, we must now seek your specific direction or apply for permission to pursue a course of action to be selected by Manitoba Hydro.

We therefore submit this 4th application for permission to deviate from the terms of the Interim License, to draw the level of Southern Indian Lake down to elevation 842.0 between now and April 30, 1982.

.../6

APPENDIX C – continued (1981 10 14 letter)

The object of this is to permit a continuous discharge of 20,000 cfs at Notigi until spring break-up. You will note that 842.0 is slightly lower than the calculated minimum required, but is requested to provide for a margin in the event that the Island Falls discharge this winter is something below 23,000 cfs. In the same way, with somewhat smaller discharges at Notigi than normal, the forebay is not expected to be drawn below 838.0 (the minimum of the license), but because performance of the South Bay Channel under ice at these unusually low level conditions is unknown, we feel it prudent to reconfirm the permission earlier granted to draw the Notigi forebay down to 834.0 feet.

ORIGINAL SIGNED BY
J. F. FARRELL

PMA/JFF/as
encl.

APPENDIX C – continued (1981 10 30 letter)

MANITOBA
MINISTER
NATURAL RESOURCES
WINNIPEG
R3C 0V8

October 30, 1981

Mr. L.D. Blachford,
President and Chief Executive Officer,
Manitoba Hydro,
P.O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Blachford:

This is in response to Mr. J.F. Funnell's memorandum of October 14, 1981 to Mr. T.E. Weber in which Manitoba Hydro requested permission to exceed the provision contained in Article 10 of the Interim Licence for the diversion of water from the Churchill River to the Nelson River, and the impoundment of water on the Rat River and Southern Indian Lake. The specific request was to receive permission to allow the lowering of Southern Indian Lake to elevation 842.0 feet. The memorandum further requested reconfirmation of the permission earlier granted to draw the Notigi forebay down to 834.0 feet.

Accordingly, Manitoba Hydro is hereby authorized to exceed the limit imposed by Article 10 of the above quoted licence and may draw Southern Indian Lake down to an elevation of 842.0 feet during the period between now and April 30, 1982. Furthermore, this will reconfirm the permission granted earlier to draw the Notigi forebay down to 834.0 feet during the period from now to March 31, 1982. During these periods all other articles of the licence shall remain in force and it is further understood that the necessary notices re changes in flow required under the Northern Flood Agreement are issued to the appropriate authorities.

Original Signed By:
Harry J. Enns

c.c. Honourable D.W. Craik

APPENDIX C – continued

1982 05 01 to 1982 05 13

This event occurred as Southern Indian Lake was being reponded from drought conditions and during a transition period from an authorized level of 842 to 844 feet.

The deviation that occurred during this period was authorized by a 1981 11 30 letter from Water Resources Branch. Although Figure 2 shows that the minimum authorized water level for May 1 is 844 feet, the letter provides for some latitude in the reponding process. The letter stated that "the intention of the variance was that reponding of Southern Indian Lake would commence on May 1, 1982 with the objective of reaching the elevation 844 as quickly as possible". The water level of Southern Indian Lake started reponding from its lowest point on 1982 04 27. This was in part due to several flow reductions at Missi between 1982 04 13 and 1982 04 27 from about 3,900 cfs to about 2,500 cfs respectively. The level of Southern Indian Lake reached 844 feet on May 14, 1982. A 1982 04 13 letter explains why Notigi outflows were not reduced during this period for environmental reasons (bank subsidence at Nisichawayasihk Cree Nation/Nelson House and Thompson). The maximum deviation was 0.83 feet (9.96 inches).

The following four pages are a copy of the 1981 11 30 and 1982 04 13 letters.

APPENDIX C – continued (1981 11 30 letter)

MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH
1577 DUBLIN AVENUE
WINNIPEG, MANITOBA
R3E 3J5

File: 61.1.10

November 30, 1981.

RECEIVED
DEC 07 1981
GENERAL MANAGER
CORPORATE OPERATIONS

RECEIVED
DEC 8 1981
MANITOBA HYDRO

Mr. J. F. Funnell,
General Counsel,
Manitoba Hydro,
P. O. Box 815,
WINNIPEG, Manitoba.
R3C 2P4

Dear Mr. Funnell:

Re: Churchill River Water Supply.

I have for reference your memorandum of November 23, 1981 requesting verification on the Minister's letter of October 30, 1981, under which permission was granted to Manitoba Hydro to vary the terms of the Interim Licence for the diversion of water from the Churchill River to the Nelson River, and the impoundment of water on the Rat River and Southern Indian Lake.

In respect to your request for clarification, I provide the following comments:

1. WAS IT YOUR INTENTION THAT THIS PERMISSION LIMIT THE MAXIMUM DISCHARGE AT NOTIGI TO 20,000 C.F.S., OR WOULD MANITOBA HYDRO BE PERMITTED A HIGHER DISCHARGE AT NOTIGI AS LONG AS THE SOUTHERN INDIAN LAKE ELEVATION DID NOT FALL BELOW 842.0?

   It was the understanding of the Department that Manitoba Hydro would be permitted to draw the water elevation on Southern Indian Lake down to 842.0 to maintain a flow of 20,000 c.f.s. through the Notigi structure. The objective of the variance granted was not related to the elevation of Southern Indian Lake but was related to Hydro's requirement of 20,000 c.f.s. through Notigi, and in order to reach this objective Southern Indian Lake could recede to elevation 842.0 but it was not the intention to permit Hydro to exceed the 20,000 c.f.s. discharge nor to allow Southern Indian Lake to drop below elevation 842.0.

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APPENDIX C – continued (1981 11 30 letter)

WAS IT YOUR INTENTION THAT BY MAY 1, 1982, THE ELEVATION OF SOUTHERN INDIAN LAKE SHOULD BE BACK WITHIN THE LICENCE RANGE, I.E. ABOVE 844, OR WAS IT YOUR EXPECTATION THAT REPONDING FROM 842 TO 844 WOULD TAKE PLACE DURING THE SPRING FRESHET AFTER APRIL 30, 1982?

The intention of the variance was that reponding of Southern Indian Lake would commenc on May 1, 1982 with the objective of reaching the elevation 844 as quickly as possible.

Yours truly,

Original Signed By:
T.E. Weber

Director.

2 02 - XC to J.J. Arnason
W.J. Tishinski
P.M. Abel

2 03 xc L.D. Blachford, "JJA"

APPENDIX C – continued (1982 04 13 letter)

W. J. Tishinski
Acting Assistant General Manager
System Planning and Operations

Mr. T. E. Weber
Director
Water Resources Branch

1982 04 13

73D6-2

CHURCHILL RIVER DIVERSION 90-DAY FORECAST

Attached please find a copy of the Churchill River Diversion 90-day forecast dated April 13, 1982 for the period April 1, 1982 to June 30, 1982.

The unregulated inflow into Southern Indian Lake, as calculated for the month of March, was approximately 45%-ile. This, once again, indicates some moderate improvement over the previous months of January and February which were calculated to be 20 and 35%-ile respectively. Therefore, for the purpose of preparing this forecast, it has been assumed that the unregulated inflow into Southern Indian Lake will remain in a median conditions for the entire forecast period.

On April 3 Saskatchewan Power Corp. reduced the Reindeer Lake outflow from 11,000 cfs to 9500 cfs. It is expected that they will reduce the outflow from 9500 cfs to the minimum riparian outflow of 5000 cfs in small steps to coincide with increased flow on the Upper Churchill River with the commencement of the spring freshet. If the upper Churchill runoff turns out to be higher than they anticipate, the Churchill River Power Company has advised us that they are prepared to violate the 5000 minimum riparian flow, reducing Reindeer outflows to zero, if necessary, a measure they have carried out in the past, with no complaint from the Saskatchewan Government. These outflow reductions will make it possible to repond Reindeer Lake at an accelerated rate without interfering with Island Fall's ability to meet the Flin Flon power demand over the next few months. There is still concern for meeting Flin Flon loads next winter if Reindeer Lake cannot be partially reponded to provide for it. Reindeer Lake is now the lowest it has been since 1938.

The flow on the Upper Churchill River was calculated to be in the 10%-ile range during the month of March. Since the Upper Churchill River basin has received a normal amount of precipitation over the winter period, it has been assumed that the Upper Churchill River flows will remain at 10%-ile for the month of April, increase to 30%-ile during May and re[illegible]

APPENDIX C – continued (1982 04 13 letter)

this period they have advised us that Island Falls total outflow will average 13,000 cfs, the same flow as at the present. Island Falls could therefore remain at 13,000 from now until mid-August unless the Upper Churchill alone exceeds this number. Median Upper Churchill for June is 15,500 cfs, which we have shown in the forecast.

We have established a plan to maintain 20,000 cfs through Notigi throughout the entire forecast period. Although this plan will delay the reponding of Southern Indian Lake to the minimum licence elevation of 844.00 feet by approximately two weeks, in comparison with our earlier plan to reduce Notigi outflow to 10 000 cfs, it will eliminate the possibility of creating unnecessary environmental damage downstream of Notigi, such as bank subsidence, particularly in the vicinity of the Nelson House and Thompson communities. It is noted that the 20,000 cfs discharge, pursued in the interests of the environment, will not pond Southern Indian Lake beyond 844.52 at the end of June. We calculate that continued discharges of 20,000 can raise Southern Indian Lake to 846.0 by the end of September. However, if the spring freshet, as it develops through May and June, turns out to be poorer than forecast, it will be prudent to reduce Notigi outflows below those shown in this forecast.

Missi outflow will be reduced in weekly steps of 500 cfs, from 4000 cfs to 1000 cfs (a minimum imposed by the tailrace requirements of the house unit) over a period of five weeks, from April 13 to May 17. The operation of Missi this past winter has resulted in a completely satisfactory operation at the Churchill town pumphouse.

Original Signed By
W. J. TISHINSKI

DEM/eeh
Attach.

xc: Mr. L. D. Blachford, President and Chief Executive Officer
Mr. J. J. Arnason, General Manager, Corporate Operations

APPENDIX C – continued

1983 04 16 to 1983 05 12

This event occurred under conditions that had some similarities to the spring of 1982. Here again, Southern Indian Lake was being reponded from drought conditions and during a transition period from an authorized level of 842 to 844 feet.

The deviation during this period was due to low natural inflows combined with obligations to provide minimum base flows below Missi and Notigi. The winter test program was terminated early (1983 01 21) to avoid violating the authorization to draw Southern Indian Lake below 843.0 feet and Notigi forebay to 834.0 feet. On this day Notigi outflow was reduced from 33,000 cfs to 26,000 cfs with subsequent reductions to about 18,000 cfs by February 11. On February 18 and 25 flows were progressively increased to 20,000 cfs. As was the case in the spring of 1982, Notigi flows were not materially reduced below 20,000 cfs. Missi flows were also reduced in steps beginning January 18 from 3,000 cfs to 1,500 cfs by February 23. Reponding began on February 24 and the lake reached 844 feet on May 13. The 1983 04 11 cover letter for the 90-day forecast indicated that the level of Southern Indian Lake was 843.47 feet and that reponding was well underway. The maximum deviation was 0.39 feet (4.68 inches).

The next four pages are a copy of the 1983 01 10 cover letter for January 1983 Churchill River Diversion 90-Day Forecast and a part copy of the April 1983 Churchill River Diversion 90-Day Forecast dated 1983 04 11. The 1983 01 10 letter indicates the anticipated curtailment of the winter test program to be 1983 01 21.

APPENDIX C – continued (1983 01 10 letter)

W.J. Tishinski
Assistant General Manager
System Planning & Operations

Mr. T.E. Weber
Director
Water Resources Branch

1983 01 10

73D6-2

CHURCHILL RIVER DIVERSION 90-DAY FORECAST

We enclose a copy of the Churchill River Diversion 90-day forecast dated January 7, 1983 for the period January 1, 1983 to March 31, 1983.

The Saskatchewan Power Corporation is currently passing approximately 21 000 cfs through their Island Falls plant. This flow will be held for the duration of the forecast period.

The unregulated inflows into Southern Indian Lake were taken from a study based on correlations of previous winter historical inflows.

Southern Indian Lake elevation was 843.82 on December 31, 1982. Notigi outflow had been held at 33 000 cfs. All three gates at Notigi are out of the water, the third gate being pulled out on January 5, 1983. On that date, the Notigi forebay was at 836.09, but has been falling continuously. Thus Notigi outflows of 33 000 cfs can no longer be maintained. The elevation of Notigi forebay has dropped to 835.33 as of January 10, 1983, with the Notigi outflow having fallen accordingly to 31 600 cfs. The elevation will continue dropping and cause further reductions in outflow.

In order to prevent violation of the special permission granted to draw the Notigi forebay down to 834.0 and Southern Indian Lake down to 843.0, it will be necessary to put the gates back in the water and restrict the flow. Under present conditions, it is expected that it will be necessary to limit outflows to 26 000 cfs starting January 21, 1983 and decrease the outflows in steps down to 20 000 cfs by the end of February and hold at this flow for the forecast period. This is only marginally lower than would have taken place if the gates were left wide open.

Missi outflow is currently 3 000 cfs. We are giving serious thought to lowering this outflow (the licence permits a reduction to 1 500 cfs) and for this purpose we have assumed a flow of 2 000 cfs starting February 1 in this forecast. If conditions do not warrant a decrease, the plan will be abandoned and flows will be maintained at 3 000 cfs.

NA/PF48(2)

APPENDIX C – continued (1983 04 11 letter)

W.J. Tishinski
Assistant Vice President
System Planning & Operations

Mr. T.E. Weber
Division Manager
Water Resources Branch

1983 04 11

73D6-2

CHURCHILL RIVER DIVERSION 90-DAY FORECAST

We enclose a copy of the Churchill River Diversion 90-day forecast dated April 7, 1983 for the period April 1, 1983 to May 31, 1983.

The Saskatchewan Power Corporation is currently passing approximately 18 000 cfs through their Island Falls plant. Their preliminary operating plan for the next fiscal year shows an outflow of 10 000 cfs in May and 12 000 cfs in June.

Southern Indian Lake was 843.47 feet on March 31. Notigi outflow is currently 20 000 cfs. This outflow is planned to be maintained for April and May, with an increase to 25 000 cfs in June.

Missi outflow is currently 1 500 cfs. The reponding program at Southern Indian Lake is now well underway. An outflow of 700 cfs is planned to commence May 1 and to be maintained for the forecast period.

Accumulated precipitation over the local basin flowing directly into Southern Indian Lake has been heavy this winter. Last forecast we expressed concerns about this heavy spring freshet and how it could affect Notigi and Missi releases. At the present time conditions do not look any different than last month but we will be carefully monitoring the situation.

Original Signed By
W. J. TISHINSKI

NA/PTP118-18

APPENDIX C – continued (Forecast attached to 1983 04 11 letter)

CHURCHILL RIVER DIVERSION

91 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 83 / 04 / 07

FOR THE PERIOD APRIL 1 TO JUNE 30, 1983

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE SOUTH LOCAL INFLOW	MISSI OUTFLO	RAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV	NELSON HOUSE ELEV	THOMPS PUMPHS ELEV	THOMPS FLOW
83 APR 1	18830	4216	1500	1912	20620	843.40	19240	20000	840.58	794.17	613.95	20400
83 APR 2	18800	4216	1500	1933	20830	843.47	19440	20000	840.56	794.14	613.93	20400
83 APR 3	18800	4216	1500	1952	21020	843.47	19630	20000	840.53	794.11	613.91	20410
83 APR 4	18816	4216	1500	1966	21166	843.48	19770	20000	840.53	794.08	613.89	20400
83 APR 5	18830	4216	1500	1980	21310	843.48	19910	20000	840.52	794.06	613.87	20390
83 APR 6	18830	4216	1500	2001	21516	843.49	20130	20000	840.52	794.03	613.84	20380
83 APR 7	18830	4216	1500	2016	21666	843.51	20270	20000	840.53	793.98	613.82	20370
83 APR 8	18830	4216	1500	2030	21806	843.52	20400	20000	840.53	793.96	613.79	20350
83 APR 9	18830	4216	1500	2046	21966	843.53	20520	20000	840.55	793.94	613.77	20340
83 APR 10	18800	4156	1500	2060	22060	843.54	20620	20000	840.55	793.92	613.74	20330
83 APR 11	18800	4440	1500	2062	22120	843.51	20730	20000	840.57	793.90	613.72	20320
83 APR 12	18820	4550	1500	2073	22230	843.51	20840	20000	840.58	793.88	613.69	20310
83 APR 13	18826	4682	1500	2083	22330	843.52	20940	20000	840.60	793.87	613.67	20300
83 APR 14	18826	4682	1500	2093	22430	843.52	21030	20000	840.62	793.85	613.65	20290
83 APR 15	18826	4941	1500	2102	22520	843.53	21130	20000	840.64	793.83	613.62	20280
83 APR 16	18826	5145	1500	2116	22660	843.53	21270	20000	840.67	793.81	613.60	20270
83 APR 17	18826	5336	1500	2118	22680	843.53	21370	20000	840.70	793.79	613.58	20260
83 APR 18	18826	5512	1500	2125	22750	843.54	21470	20000	840.73	793.77	613.56	20260
83 APR 19	18826	5733	1500	2132	22820	843.54	21560	20000	840.76	793.76	613.54	20270
83 APR 20	18826	6113	1500	2139	22890	843.55	21640	20000	840.80	793.75	613.53	20290
83 APR 21	18826	6538	1500	2144	22940	843.55	21770	20000	840.84	793.74	613.53	20320
83 APR 22	18826	6999	1500	2149	22990	843.56	21900	20000	840.88	793.74	613.53	20350
83 APR 23	18826	7499	1500	2155	23050	843.57	22020	20000	840.92	793.74	613.53	20390
83 APR 24	18826	8068	1500	2158	23080	843.58	22120	20000	840.97	793.75	613.54	20440
83 APR 25	18826	8730	1500	2163	23130	843.59	22240	20000	841.01	793.75	613.55	20500
83 APR 26	18826	9466	1500	2168	23180	843.60	22360	20000	841.06	793.76	613.56	20570
83 APR 27	18826	10306	1500	2172	23220	843.61	22480	20000	841.11	793.77	613.58	20640
83 APR 28	18826	11234	1500	2176	23260	843.62	22590	20000	841.16	793.78	613.60	20710
83 APR 29	18826	12244	1500	2179	23290	843.63	22690	20000	841.22	793.79	613.62	20780
83 APR 30	18826	13238	1500	2181	23310	843.65	22780	20000	841.27	793.81	613.64	20850
AVERAGE	18800	5938	1500	2086	22360	843.54	21161	20000	840.75	793.88	613.68	20410

SYSTEM OPERATING DEPARTMENT
H.C. SAXTON / D.E. MOLLARD
83 / 04 / 07

APPENDIX C – continued (Forecast attached to 1983 04 11 letter)

C H U R C H I L L R I V E R D I V E R S I O N

91 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 83 / 04 / 07

FOR THE PERIOD APRIL 1, 1983 TO JUNE 30, 1983

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE SOUTH LOCAL INFLOW	MISSI OUTFLO	RAY OUTFLO	TOTAL OUTFLO	HEAD ELEV	TOTAL INFLOW	NOTIGI OUTFLO	NOTIGI FOREBAY ELEV	WEST SUB FOREBAY ELEV	THOMPSON FOREBAY ELEV	THOMPSON FLOW
83 MAY 1	10000	10960	700	21530	22230	843.66	24490	20000	841.37	704.11	613.84	21420
83 MAY 2	10000	11740	700	21298	21998	843.68	24420	20000	841.44	704.15	613.95	21790
83 MAY 3	10000	12500	700	21177	21877	843.71	24410	20000	841.54	704.30	614.06	22130
83 MAY 4	10000	13250	700	20879	21579	843.73	24460	20000	841.63	704.44	614.15	22500
83 MAY 5	10000	13980	700	20693	21393	843.76	24420	20000	841.71	704.57	614.27	22890
83 MAY 6	10000	14490	700	20533	21233	843.79	24460	20000	841.77	704.71	614.38	23290
83 MAY 7	10000	14970	700	20370	21070	843.82	24500	20000	841.85	704.84	614.49	23690
83 MAY 8	10000	15480	700	20220	20920	843.85	24560	20000	841.93	704.97	614.60	24090
83 MAY 9	10000	16020	700	20078	20778	843.89	24610	20000	842.03	705.11	614.71	24490
83 MAY 10	10000	16560	700	19956	20656	843.93	24680	20000	842.13	705.22	614.81	24890
83 MAY 11	10000	17130	700	19852	20552	843.97	24760	20000	842.19	705.35	614.92	25290
83 MAY 12	10000	17730	700	19771	20471	844.01	24840	20000	842.26	705.47	615.01	25680
83 MAY 13	10000	18320	700	19699	20399	844.05	24903	20000	842.34	705.61	615.11	26080
83 MAY 14	10000	18870	700	19551	20251	844.08	24941	20000	842.42	705.71	615.18	26420
83 MAY 15	10000	19460	700	19444	20144	844.10	24980	20000	842.49	705.79	615.23	26740
83 MAY 16	10000	19980	700	19366	20066	844.10	24740	20000	842.56	705.85	615.28	27040
83 MAY 17	10000	20320	700	19308	20008	844.23	24720	20000	842.62	705.95	615.31	27300
83 MAY 18	10000	20735	700	19337	20037	844.24	24771	20000	842.65	706.02	615.33	27550
83 MAY 19	10000	21136	700	19337	20037	844.33	24771	20000	842.75	706.18	615.34	27780
83 MAY 20	10000	21556	700	19399	20099	844.35	24772	20000	842.82	706.17	615.34	27980
83 MAY 21	10000	22020	700	19418	20118	844.44	24755	20000	842.88	706.14	615.33	28160
83 MAY 22	10000	22522	700	19446	20146	844.49	24780	20000	842.94	706.22	615.31	28330
83 MAY 23	10000	23022	700	19488	20188	844.54	24822	20000	843.01	706.26	615.29	28480
83 MAY 24	10000	23510	700	19538	20238	844.60	24892	20000	843.13	706.39	615.25	28620
83 MAY 25	10000	24010	700	19584	20284	844.66	24986	20000	843.19	706.35	615.21	28746
83 MAY 26	10000	24455	700	19704	20404	844.71	25056	20000	843.25	706.37	615.17	28856
83 MAY 27	10000	24950	700	19712	20412	844.77	25110	20000	843.32	706.39	615.12	28950
83 MAY 28	10000	25450	700	19778	20478	844.81	25195	20000	843.42	706.46	615.06	29050
83 MAY 29	10000	25950	700	19619	20319	844.85	24895	20000	843.47	706.42	615.01	29130
83 MAY 30	10000	26450	700	19478	20178	844.89	24811	20000	843.47	706.42	614.95	29210
83 MAY 31	10000	26450	700	19379	20079	844.93	24710	20000	843.54	706.43	614.88	29270
AVERAGE	10000	19450	700	19890	20598	844.23	24720	20000	842.51	795 61	614 90	26320

YSTEM OPERATING DEPARTMENT
•C. SAXTON / D.E. MOLLARD
3 / 04 / 07

APPENDIX C – continued

1990 03 31 to 05 01

The 1990 03 02 version of the 90-day forecast shows that the level of Southern Indian Lake would approach but not recede below 843.0 feet based on the forecast of local inflow and the operating schedule for Missi and Notigi. Missi outflow was following the pattern established to ensure a reliable supply of potable water for the town of Churchill. Notigi outflow was reduced from a winter maximum of 33,000 cfs to 27,500 cfs in mid February and to 23,000 in early March to match outflow with inflow in an attempt to keep the lake level at 843.0 feet. The maximum deviation from 843.0 feet was 0.03 feet (0.36 inches).

The following three pages are a copy of the 1990 03 02 forecast.

APPENDIX C – continued (1990 03 02 forecast)

C H U R C H I L L R I V E R D I V E R S I O N PAGE 1 OF 3

92 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 90 / 03 / 02

FOR THE PERIOD MARCH 1, 1990 TO MAY 31, 1990

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE LOCAL INFLOW	SOUTHERN INDIAN LAKE MISSI OUTFLO	SOUTHERN INDIAN LAKE SOUTH BAY OUTFLO	SOUTHERN INDIAN LAKE TOTAL OUTFLO	SOUTHERN INDIAN LAKE MEAN ELEV	NOTIGI TOTAL INFLOW	NOTIGI OUTFLO	FORBAY ELEV	NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
90 MAR 1	21500	4180	2500	27500	30000	843.36	27690	27000	835.10	799.21	620.01	32880
90 MAR 2	21500	4180	2500	27360	29860	843.34	27550	23000	835.24	799.02	620.01	32960
90 MAR 3	21500	4180	2500	27220	29720	843.32	27400	23000	835.37	798.79	619.87	32700
90 MAR 4	21500	4180	2500	27060	29560	843.30	27250	23000	835.51	798.56	619.64	32180
90 MAR 5	21500	4180	2500	26920	29420	843.27	27110	23000	835.64	798.34	619.44	31740
90 MAR 6	21500	4180	2500	26760	29260	843.25	26950	23000	835.77	798.12	619.21	31260
90 MAR 7	21500	4180	2500	26580	29080	843.23	26760	23000	835.89	797.89	619.00	30800
90 MAR 8	21500	4180	2500	26440	28940	843.21	26630	23000	836.01	797.67	618.79	30330
90 MAR 9	21500	4180	2500	26300	28800	843.19	26490	23000	836.12	797.45	618.57	29880
90 MAR 10	21500	4180	2500	26170	28670	843.18	26360	23000	836.22	797.24	618.36	29420
90 MAR 11	21500	4180	2500	26050	28550	843.16	26240	23000	836.32	797.04	618.15	28960
90 MAR 12	21500	4180	2500	25940	28440	843.15	26130	23000	836.42	796.86	617.94	28520
90 MAR 13	21500	4180	2500	25830	28330	843.14	26020	23000	836.51	796.69	617.73	28090
90 MAR 14	21500	4180	2500	25720	28220	843.12	25910	23000	836.60	796.54	617.54	27680
90 MAR 15	21500	4180	1500	25600	27100	843.11	25790	23000	836.68	796.40	617.35	27300
90 MAR 16	21500	4180	1500	25500	27000	843.10	25690	23000	836.77	796.27	617.17	26940
90 MAR 17	21500	4200	1500	25410	26910	843.09	25600	23000	836.84	796.16	617.01	26620
90 MAR 18	21500	4220	1500	25330	26830	843.08	25520	23000	836.92	796.05	616.86	26320
90 MAR 19	21500	4260	1500	25240	26740	843.07	25450	23000	836.99	795.95	616.72	26040
90 MAR 20	21500	4300	1500	25120	26620	843.05	25340	23000	837.07	795.86	616.59	25800
90 MAR 21	21500	4360	1500	24970	26470	843.04	25210	23000	837.14	795.77	616.46	25570
90 MAR 22	21500	4430	1500	24920	26420	843.04	25170	23000	837.20	795.69	616.35	25370
90 MAR 23	21500	4520	1500	24870	26370	843.04	25140	23000	837.26	795.62	616.25	25180
90 MAR 24	21500	4600	1500	24820	26320	843.04	25110	23000	837.32	795.55	616.15	25010
90 MAR 25	21500	4680	1500	24760	26260	843.03	25080	23000	837.38	795.49	616.06	24860
90 MAR 26	21500	4760	1500	24710	26210	843.03	25050	23000	837.43	795.43	615.97	24730
90 MAR 27	21500	4850	1500	24670	26170	843.03	25020	23000	837.48	795.38	615.89	24600
90 MAR 28	21500	4930	1500	24630	26130	843.03	25010	23000	837.53	795.32	615.82	24490
90 MAR 29	21500	5010	1500	24590	26090	843.04	24990	23000	837.59	795.27	615.75	24390
90 MAR 30	21500	5090	1500	24560	26060	843.04	24980	23000	837.63	795.23	615.69	24300
90 MAR 31	21500	5180	1500	24530	26030	843.04	24970	23000	837.68	795.19	615.62	24220
AVERAGE	21500	4400	1950	25680	27630	843.13	25920	23130	836.63	796.65	617.48	27710

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
90 / 03 / 02

C H U R C H I L L R I V E R D I V E R S I O N

92 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 90 / 03 / 02

FOR THE PERIOD MARCH 1, 1990 TO MAY 31, 1990

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

		SOUTHERN INDIAN LAKE					NOTIGI					
DATE	ISLAND FALLS OUTFLO	LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV	NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
90 APR 1	21500	4670	1500	24570	26070	843.04	24960	23000	837.73	795.17	615.56	24140
90 APR 2	21500	4740	1500	24600	26100	843.04	25000	23000	837.78	795.16	615.50	24080
90 APR 3	21500	4810	1500	24620	26120	843.04	25050	23000	837.83	795.15	615.45	24030
90 APR 4	21500	4890	1500	24650	26150	843.04	25090	23000	837.89	795.14	615.39	23980
90 APR 5	21500	4960	1500	24670	26170	843.04	25130	23000	837.94	795.13	615.34	23940
90 APR 6	21500	5030	1500	24690	26190	843.04	25170	23000	838.00	795.13	615.30	23910
90 APR 7	21500	5110	1500	24710	26210	843.05	25210	23000	838.05	795.13	615.25	23880
90 APR 8	21500	5180	1500	24730	26230	843.05	25250	23000	838.11	795.12	615.21	23860
90 APR 9	21500	5250	1500	24750	26250	843.05	25280	23000	838.16	795.12	615.17	23840
90 APR 10	21500	5330	1500	24760	26260	843.05	25310	23000	838.22	795.12	615.13	23830
90 APR 11	21500	5390	1500	24780	26280	843.05	25350	23000	838.28	795.12	615.09	23820
90 APR 12	21500	5440	1500	24790	26290	843.06	25370	23000	838.34	795.12	615.06	23810
90 APR 13	21500	5490	1500	24810	26310	843.06	25390	23000	838.40	795.12	615.02	23800
90 APR 14	21500	5520	1500	24820	26320	843.06	25410	23000	838.46	795.12	614.99	23800
90 APR 15	21500	5540	1500	24830	26330	843.06	25430	23000	838.52	795.13	614.95	23800
90 APR 16	21500	5610	1500	24840	26340	843.07	25460	23000	838.58	795.13	614.92	23800
90 APR 17	21500	5740	1500	24890	26390	843.07	25550	24000	838.61	795.13	614.89	23800
90 APR 18	21500	5940	1500	24940	26440	843.07	25650	24000	838.65	795.14	614.86	23810
90 APR 19	21500	6200	1500	24980	26480	843.08	25770	24000	838.69	795.15	614.82	23810
90 APR 20	19000	6520	1500	25030	26530	843.08	25910	24000	838.74	795.16	614.79	23820
90 APR 21	19000	6920	1500	25070	26570	843.09	26070	24000	838.78	795.18	614.76	23830
90 APR 22	19000	7370	1500	25110	26610	843.10	26240	24000	838.83	795.21	614.74	23840
90 APR 23	19000	7830	1500	25150	26650	843.11	26410	24000	838.89	795.24	614.71	23870
90 APR 24	19000	8280	1500	25190	26690	843.12	26580	24000	838.94	795.28	614.69	23900
90 APR 25	19000	8740	1500	25230	26730	843.13	26750	24000	839.00	795.32	614.67	23940
90 APR 26	19000	9190	1500	25270	26770	843.15	26920	24000	839.06	795.35	614.66	23990
90 APR 27	22000	9650	1500	25300	26800	843.16	27090	24000	839.13	795.39	614.65	24050
90 APR 28	22000	10110	1500	25340	26840	843.18	27260	24000	839.19	795.42	614.65	24120
90 APR 29	22000	10560	1500	25380	26880	843.20	27430	24000	839.26	795.45	614.64	24190
90 APR 30	22000	11020	1500	25420	26920	843.22	27600	24000	839.34	795.52	614.73	24500
AVERAGE	20980	6570	1500	24930	26430	843.09	25840	23470	838.51	795.20	614.99	23930

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
90 / 03 / 02

CHURCHILL RIVER DIVERSION

92 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 90 / 03 / 02

FOR THE PERIOD MARCH 1, 1990 TO MAY 31, 1990

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE LOCAL INFLOW	SOUTHERN INDIAN LAKE MISSI OUTFLO	SOUTHERN INDIAN LAKE SOUTH BAY OUTFLO	SOUTHERN INDIAN LAKE TOTAL OUTFLO	SOUTHERN INDIAN LAKE MEAN ELEV	NOTIGI TOTAL INFLOW	NOTIGI OUTFLO	NOTIGI FORBAY ELEV	NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
90 MAY 1	22200	14350	1500	25280	26780	843.25	29210	24000	839.45	795.57	614.84	24940
90 MAY 2	22200	14920	1500	25220	26720	843.29	29370	24000	839.55	795.64	614.99	25500
90 MAY 3	22200	15490	1500	25160	26660	843.32	29530	24000	839.65	795.73	615.18	26150
90 MAY 4	22200	16070	1500	25110	26610	843.36	29700	24000	839.76	795.84	615.39	26880
90 MAY 5	22200	16640	1500	25050	26550	843.40	29870	24000	839.87	795.96	615.62	27680
90 MAY 6	22200	17210	1500	25000	26500	843.45	30040	24000	839.98	796.09	615.87	28530
90 MAY 7	22200	17780	1500	24950	26450	843.49	30210	24000	840.09	796.23	616.13	29440
90 MAY 8	22200	18350	1500	24900	26400	843.54	30390	24000	840.20	796.38	616.40	30400
90 MAY 9	22200	18920	1500	24850	26350	843.59	30560	24000	840.32	796.53	616.67	31400
90 MAY 10	22200	19490	1500	24810	26310	843.65	30740	24000	840.43	796.65	616.85	32130
90 MAY 11	22200	19980	1500	24760	26260	843.70	30880	24000	840.55	796.73	616.96	32670
90 MAY 12	22200	20380	1500	24720	26220	843.76	31000	24000	840.67	796.80	617.02	33090
90 MAY 13	22200	20710	1500	24680	26180	843.81	31090	24000	840.79	796.84	617.05	33400
90 MAY 14	22200	20950	1500	24640	26140	843.87	31150	24000	840.91	796.87	617.04	33620
90 MAY 15	22200	21120	1500	24610	26110	843.93	31180	24000	841.03	796.88	617.01	33770
90 MAY 16	22200	21200	1500	24580	26080	843.98	31180	24000	841.15	796.88	616.96	33860
90 MAY 17	22200	21220	1500	24480	25980	844.03	31070	24000	841.27	796.87	616.89	33890
90 MAY 18	22200	21250	1500	24380	25880	844.09	30950	24000	841.39	796.84	616.81	33870
90 MAY 19	22200	21310	1500	24300	25800	844.14	30840	24000	841.50	796.81	616.71	33820
90 MAY 20	22200	21380	1500	24220	25720	844.19	30720	24000	841.61	796.76	616.60	33720
90 MAY 21	22200	21480	1500	24150	25650	844.24	30610	24000	841.72	796.71	616.48	33600
90 MAY 22	22200	21590	500	24350	24850	844.30	30750	27000	841.76	796.65	616.35	33440
90 MAY 23	22200	21720	500	24570	25070	844.36	30900	27000	841.80	796.59	616.21	33260
90 MAY 24	22200	21840	500	24860	25360	844.43	31130	27000	841.84	796.53	616.07	33050
90 MAY 25	22200	21970	500	25380	25880	844.49	31580	30000	841.81	796.47	615.92	32830
90 MAY 26	22200	22100	500	25850	26350	844.56	31980	30000	841.79	796.44	615.76	32600
90 MAY 27	22200	22230	500	26270	26770	844.62	32340	30000	841.79	796.43	615.61	32360
90 MAY 28	22200	22360	500	26660	27160	844.68	32660	30000	841.79	796.43	615.46	32140
90 MAY 29	22200	22490	500	27020	27520	844.74	32950	30000	841.80	796.46	615.31	31940
90 MAY 30	22200	22620	500	27340	27840	844.80	33210	30000	841.82	796.51	615.18	31770
90 MAY 31	22200	22750	500	27640	28140	844.86	33450	30000	841.84	796.56	615.06	31640
AVERAGE	22200	20060	1180	25150	26330	844.00	31010	25650	840.97	796.47	616.14	31530

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
90 / 03 / 02

APPENDIX C – continued

1991 03 12 to 1991 04 20

The 1991 01 15 version of the 90-day forecast shows that the level of Southern Indian Lake would approach but not recede below 843.0 feet based on the forecast of local inflow and the operating schedule for Missi and Notigi. Missi outflow was following the pattern established to ensure a reliable supply of potable water for the town of Churchill. Notigi outflow was set at 22,000 cfs in November 1990 and remained constant through the winter. Notigi outflow was reduced to 20,000 cfs on February 22 with further reductions throughout March resulting in an end of month outflow of 16,000 cfs. These flow reductions were intended to match outflow with inflow conditions and prevent the lake from declining below 843.0 feet. The maximum deviation from 843.0 feet was 0.05 feet (0.62 inches).

The following three pages are a copy of the 1991 01 15 forecast.

C H U R C H I L L R I V E R D I V E R S I O N

REVISED

90 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 91 / 01 / 15

FOR THE PERIOD JANUARY 1, 1991 TO MARCH 31, 1991

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE					NOTIGI			NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
		LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV			
91 JAN 1	20130	4910	4000	20240	24240	843.23	20520	22000	840.74	794.79	615.07	22490
91 JAN 2	20130	4910	4000	20250	24250	843.23	20520	22000	840.71	794.73	615.50	23480
91 JAN 3	20130	4910	4000	20320	24320	843.24	20600	22000	840.68	794.68	615.82	24210
91 JAN 4	20130	4910	4000	20390	24390	843.24	20660	22000	840.64	794.64	615.78	24100
91 JAN 5	20130	4910	4000	20460	24460	843.24	20730	22000	840.61	794.61	615.74	24010
91 JAN 6	20130	4910	4000	20520	24520	843.24	20800	22000	840.58	794.58	615.67	23850
91 JAN 7	20130	4910	4000	20570	24570	843.24	20840	22000	840.55	794.55	615.61	23700
91 JAN 8	20130	4910	4000	20610	24610	843.24	20890	22000	840.52	794.53	615.55	23560
91 JAN 9	20130	4910	4000	20720	24720	843.24	21000	23000	840.47	794.51	615.50	23440
91 JAN 10	20130	4910	4000	20810	24810	843.24	21080	23000	840.42	794.50	615.45	23320
91 JAN 11	20130	4910	4000	20860	24860	843.24	21140	23000	840.38	794.49	615.41	23220
91 JAN 12	20130	4910	4000	20910	24910	843.23	21190	23000	840.34	794.49	615.37	23130
91 JAN 13	20130	4910	4000	20960	24960	843.23	21240	23000	840.30	794.49	615.34	23050
91 JAN 14	20130	4910	4000	20990	24990	843.22	21260	23000	840.26	794.51	615.31	22980
91 JAN 15	20130	4910	4000	21010	25010	843.21	21280	23000	840.22	794.53	615.29	22930
91 JAN 16	20130	4910	3000	21030	24030	843.21	21300	23000	840.19	794.56	615.28	22890
91 JAN 17	20130	4900	3000	21060	24060	843.21	21340	23000	840.15	794.59	615.27	22860
91 JAN 18	20130	4900	3000	21090	24090	843.20	21370	23000	840.11	794.62	615.27	22850
91 JAN 19	20130	4890	3000	21130	24130	843.20	21400	23000	840.08	794.65	615.27	22860
91 JAN 20	20130	4870	3000	21150	24150	843.19	21430	23000	840.04	794.68	615.28	22880
91 JAN 21	17870	4860	3000	21170	24170	843.19	21440	23000	840.01	794.71	615.29	22900
91 JAN 22	17870	4830	3000	21190	24190	843.19	21460	23000	839.97	794.74	615.31	22930
91 JAN 23	17870	4810	3000	21220	24220	843.19	21480	23000	839.94	794.77	615.33	22960
91 JAN 24	17870	4790	3000	21280	24280	843.19	21540	23000	839.90	794.80	615.34	23000
91 JAN 25	17870	4760	3000	21340	24340	843.20	21600	23000	839.86	794.83	615.36	23030
91 JAN 26	17870	4740	3000	21380	24380	843.20	21640	23000	839.83	794.85	615.38	23070
91 JAN 27	17870	4710	3000	21420	24420	843.20	21680	23000	839.79	794.88	615.40	23110
91 JAN 28	17870	4690	3000	21460	24460	843.20	21710	23000	839.76	794.91	615.42	23140
91 JAN 29	17870	4670	3000	21490	24490	843.20	21750	23000	839.73	794.93	615.43	23170
91 JAN 30	17870	4640	3000	21520	24520	843.20	21770	23000	839.69	794.96	615.45	23210
91 JAN 31	17870	4620	3000	21550	24550	843.20	21800	23000	839.66	794.99	615.47	23240
AVERAGE	19330	4850	3480	20970	24450	843.22	21240	22740	840.20	794.68	615.42	23210

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
91 / 01 / 15

CHURCHILL RIVER DIVERSION

90 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 91 / 01 / 15

FOR THE PERIOD JANUARY 1, 1991 TO MARCH 31, 1991

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE					NOTIGI			NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
		LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV			
91 FEB 1	17870	4340	3000	21530	24530	843.20	21770	22000	839.66	795.03	615.51	23290
91 FEB 2	17870	4320	3000	21510	24510	843.20	21750	22000	839.65	795.06	615.54	23330
91 FEB 3	17870	4290	3000	21500	24500	843.20	21730	22000	839.64	795.09	615.58	23380
91 FEB 4	17870	4270	3000	21480	24480	843.20	21710	22000	839.64	795.12	615.62	23420
91 FEB 5	17870	4250	3000	21460	24460	843.20	21690	22000	839.63	795.14	615.66	23460
91 FEB 6	17870	4230	3000	21450	24450	843.20	21670	22000	839.62	795.15	615.69	23490
91 FEB 7	17870	4200	3000	21430	24430	843.20	21660	22000	839.61	795.16	615.72	23520
91 FEB 8	17870	4180	3000	21420	24420	843.20	21640	22000	839.61	795.16	615.75	23540
91 FEB 9	17870	4160	3000	21400	24400	843.20	21620	22000	839.60	795.17	615.77	23550
91 FEB 10	17870	4140	3000	21390	24390	843.20	21610	22000	839.59	795.17	615.79	23550
91 FEB 11	17870	4120	3000	21380	24380	843.20	21600	22000	839.58	795.17	615.81	23540
91 FEB 12	17870	4100	3000	21370	24370	843.20	21580	22000	839.57	795.18	615.82	23530
91 FEB 13	17870	4090	3000	21360	24360	843.20	21570	22000	839.56	795.19	615.83	23500
91 FEB 14	17870	4080	3000	21350	24350	843.20	21560	22000	839.55	795.20	615.84	23480
91 FEB 15	17870	4090	3000	21340	24340	843.20	21550	22000	839.54	795.21	615.84	23460
91 FEB 16	17870	4100	3000	21330	24330	843.19	21540	22000	839.52	795.22	615.85	23430
91 FEB 17	17870	4130	3000	21270	24270	843.18	21480	22000	839.52	795.24	615.86	23410
91 FEB 18	17870	4160	3000	21220	24220	843.17	21430	22000	839.51	795.25	615.87	23390
91 FEB 19	17870	4190	3000	21180	24180	843.16	21390	22000	839.51	795.27	615.88	23380
91 FEB 20	17870	4230	3000	21140	24140	843.16	21350	22000	839.50	795.28	615.90	23360
91 FEB 21	17870	4280	3000	21100	24100	843.15	21310	22000	839.49	795.30	615.91	23350
91 FEB 22	17870	4320	3000	21060	24060	843.14	21270	22000	839.47	795.32	615.92	23340
91 FEB 23	17870	4360	3000	21030	24030	843.14	21240	22000	839.46	795.33	615.94	23330
91 FEB 24	17870	4400	3000	21000	24000	843.13	21220	22000	839.45	795.35	615.95	23320
91 FEB 25	17870	4440	3000	20980	23980	843.12	21190	22000	839.43	795.37	615.97	23320
91 FEB 26	17870	4490	3000	20960	23960	843.12	21170	22000	839.42	795.39	615.99	23310
91 FEB 27	17870	4530	3000	20940	23940	843.11	21150	22000	839.40	795.41	616.00	23310
91 FEB 28	17870	4570	3000	20920	23920	843.11	21130	22000	839.39	795.43	616.02	23310
AVERAGE	17870	4250	3000	21270	24270	843.17	21490	22000	839.54	795.23	615.82	23410

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
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CHURCHILL RIVER DIVERSION

90 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 91 / 01 / 15

FOR THE PERIOD JANUARY 1, 1991 TO MARCH 31, 1991

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

		SOUTHERN INDIAN LAKE					NOTIGI					
DATE	ISLAND FALLS OUTFLO	LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV	NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW
91 MAR 1	18510	4660	2500	20960	23460	843.10	21150	22000	839.37	795.41	615.99	23310
91 MAR 2	18510	4700	2500	21010	23510	843.10	21200	22000	839.35	795.39	615.97	23300
91 MAR 3	18510	4750	2500	21050	23550	843.10	21240	22000	839.34	795.37	615.94	23300
91 MAR 4	18510	4790	2500	21100	23600	843.09	21290	22000	839.32	795.35	615.92	23300
91 MAR 5	18510	4830	2500	21140	23640	843.09	21330	22000	839.31	795.33	615.89	23300
91 MAR 6	18510	4870	2500	21180	23680	843.09	21370	22000	839.30	795.31	615.87	23300
91 MAR 7	18510	4910	2500	21220	23720	843.08	21410	22000	839.29	795.29	615.84	23300
91 MAR 8	18510	4960	2500	21250	23750	843.08	21440	22000	839.28	795.27	615.82	23300
91 MAR 9	18510	5000	2500	21290	23790	843.08	21480	22000	839.27	795.25	615.79	23310
91 MAR 10	18510	5040	2500	21320	23820	843.07	21510	22000	839.26	795.24	615.77	23310
91 MAR 11	18510	5080	2500	21350	23850	843.07	21540	22000	839.25	795.22	615.75	23310
91 MAR 12	18510	5110	2500	21380	23880	843.07	21570	22000	839.24	795.20	615.72	23320
91 MAR 13	18510	5130	2500	21410	23910	843.06	21600	22000	839.23	795.18	615.70	23320
91 MAR 14	18510	5150	2500	21440	23940	843.06	21630	22000	839.23	795.16	615.68	23330
91 MAR 15	18510	5160	2000	21470	23470	843.06	21650	22000	839.22	795.15	615.66	23330
91 MAR 16	18510	5170	2000	21500	23500	843.06	21690	22000	839.22	795.13	615.63	23340
91 MAR 17	18510	5180	2000	21530	23530	843.06	21720	22000	839.21	795.11	615.61	23340
91 MAR 18	18510	5210	2000	21560	23560	843.05	21760	22000	839.21	795.09	615.59	23350
91 MAR 19	18510	5260	2000	21590	23590	843.05	21790	22000	839.20	795.07	615.56	23350
91 MAR 20	18510	5330	2000	21620	23620	843.05	21820	22000	839.20	795.05	615.54	23360
91 MAR 21	18510	5400	2000	21650	23650	843.05	21860	22000	839.20	795.03	615.52	23360
91 MAR 22	18510	5500	2000	21670	23670	843.05	21890	22000	839.20	795.02	615.49	23370
91 MAR 23	18510	5610	2000	21700	23700	843.05	21930	22000	839.20	795.00	615.47	23370
91 MAR 24	18510	5720	2000	21730	23730	843.05	21970	22000	839.20	794.98	615.45	23380
91 MAR 25	18510	5830	2000	21750	23750	843.05	22000	22000	839.20	794.96	615.42	23380
91 MAR 26	18510	5940	2000	21780	23780	843.05	22040	22000	839.20	794.94	615.40	23390
91 MAR 27	18510	6050	2000	21800	23800	843.05	22070	22000	839.20	794.93	615.38	23400
91 MAR 28	18510	6160	2000	21840	23840	843.05	22120	22000	839.20	794.91	615.35	23400
91 MAR 29	18510	6270	2000	21880	23880	843.06	22170	22000	839.20	794.89	615.33	23410
91 MAR 30	18510	6380	2000	21920	23920	843.06	22220	22000	839.20	794.88	615.31	23420
91 MAR 31	18510	6490	2000	21950	23950	843.06	22270	22000	839.21	794.86	615.29	23430
AVERAGE	18510	5340	2230	21490	23710	843.07	21700	22000	839.24	795.13	615.63	23340

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
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APPENDIX C – continued

1992 04 22 to 1992 05 01

The 1992 03 27 90-day forecast anticipated that the level of SIL would increase throughout April as a result of the spring freshet. Missi outflow was at the minimum possible under terms of the Interim Licence. Missi outflow was adjusted on May16 to reduce the target outflow from 1,500 cfs to 500 cfs. Notigi gates were adjusted on April 1 to reduce target outflows from 30,000 to 26,000 cfs, and on April 8 to 22,000 cfs. The anticipated spring inflows did not materialize until mid May. The maximum deviation from 843.0 feet was 0.02 feet (0.29 inches).

The following three pages are a copy of the 1992 03 27 forecast.

APPENDIX C – continued (1992 03 27 forecast)

C H U R C H I L L R I V E R D I V E R S I O N

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91 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 92 / 03 / 27

FOR THE PERIOD APRIL 1, 1992 TO JUNE 30, 1992

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE: LOCAL INFLOW	SOUTHERN INDIAN LAKE: MISSI OUTFLO	SOUTHERN INDIAN LAKE: SOUTH BAY OUTFLO	SOUTHERN INDIAN LAKE: TOTAL OUTFLO	SOUTHERN INDIAN LAKE: MEAN ELEV	NOTIGI: TOTAL INFLOW	NOTIGI: OUTFLO	NOTIGI: FORBAY ELEV	NELSON HOUSE ELEV	THOMPS PUMPHS ELEV	THOMP FLOW	AVG WK THOMP FLOW
=========	======	======	======	======	======	======	======	======	======	======	======	======	======
92 APR 1	18500	7280	1500	26060	27560	843.16	26450	26000	836.98	798.37	618.54	31600	
92 APR 2	18500	7280	1500	26240	27740	843.16	26630	26000	836.99	798.22	618.49	31600	
92 APR 3	18500	7280	1500	26410	27910	843.16	26800	26000	837.01	798.06	618.42	31560	
92 APR 4	18500	7280	1500	26570	28070	843.17	26970	26000	837.03	797.93	618.33	31460	
92 APR 5	18500	7280	1500	26740	28240	843.17	27130	26000	837.06	797.80	618.21	31280	31500
92 APR 6	18500	7280	1500	26910	28410	843.17	27300	26000	837.08	797.69	618.07	31040	
92 APR 7	18500	7280	1500	27070	28570	843.18	27460	26000	837.12	797.60	617.92	30770	
92 APR 8	18500	7280	1500	27080	28580	843.19	27480	22000	837.25	797.51	617.77	30490	
92 APR 9	18500	7280	1500	27100	28600	843.19	27490	22000	837.39	797.42	617.61	30230	
92 APR 10	18500	7280	1500	27100	28600	843.20	27500	22000	837.53	797.33	617.47	29980	
92 APR 11	18500	7280	1500	27090	28590	843.20	27490	22000	837.67	797.23	617.33	29740	
92 APR 12	18500	7280	1500	27080	28580	843.20	27480	22000	837.81	797.12	617.19	29510	30250
92 APR 13	18500	7280	1500	27060	28560	843.20	27450	22000	837.94	796.98	617.06	29280	
92 APR 14	18500	7280	1500	27030	28530	843.20	27430	22000	838.08	796.83	616.91	29040	
92 APR 15	18500	7280	1500	27000	28500	843.21	27400	22000	838.22	796.68	616.77	28780	
92 APR 16	18500	7350	1500	26960	28460	843.21	27370	22000	838.35	796.52	616.61	28500	
92 APR 17	18500	7500	1500	26920	28420	843.21	27340	22000	838.48	796.38	616.44	28190	
92 APR 18	18500	7730	1500	26870	28370	843.21	27300	22000	838.62	796.24	616.27	27870	
92 APR 19	18500	8030	1500	26810	28310	843.22	27280	22000	838.75	796.12	616.10	27540	28460
92 APR 20	18500	8410	1500	26760	28260	843.22	27260	22000	838.88	796.02	615.93	27210	
92 APR 21	18500	8860	1500	26720	28220	843.23	27250	22000	839.01	795.92	615.76	26900	
92 APR 22	18500	9380	1500	26670	28170	843.24	27250	22000	839.13	795.83	615.60	26610	
92 APR 23	18500	9910	1500	26630	28130	843.25	27250	22000	839.25	795.76	615.44	26330	
92 APR 24	18500	10440	1500	26600	28100	843.26	27270	22000	839.38	795.69	615.30	26080	
92 APR 25	18500	10960	1500	26580	28080	843.28	27290	22000	839.50	795.62	615.16	25850	
92 APR 26	18500	11490	1500	26560	28060	843.29	27310	22000	839.61	795.57	615.04	25650	26380
92 APR 27	18500	12020	1500	26540	28040	843.30	27340	22000	839.73	795.52	614.92	25460	
92 APR 28	18500	12540	1500	26460	27960	843.31	27310	22000	839.85	795.48	614.81	25290	
92 APR 29	18500	13070	1500	26390	27890	843.33	27280	22000	839.97	795.44	614.70	25140	
92 APR 30	18500	13600	1500	26320	27820	843.34	27260	22000	840.09	795.40	614.60	25000	
AVERAGE	18500	8680	1500	26740	28240	843.22	27260	22930	838.33	796.68	616.63	28470	

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
92 / 03 / 27

APPENDIX C – continued (1992 03 27 forecast)

C H U R C H I L L R I V E R D I V E R S I O N

PAGE 2 OF 3

91 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 92 / 03 / 27

FOR THE PERIOD APRIL 1, 1992 TO JUNE 30, 1992

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE					NOTIGI			NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW	AVG WK THOMP FLOW
		LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	OUTFLO	FORBAY ELEV				
	======	======	======	======	======	======	======	======	======	======	======	======	======
92 MAY 1	21000	18380	1500	26040	27540	843.38	27400	22000	840.21	795.34	614.50	24880	
92 MAY 2	21000	19070	1500	25910	27410	843.41	27330	22000	840.31	795.29	614.41	24780	
92 MAY 3	21000	19750	1500	25800	27300	843.45	27290	22000	840.41	795.25	614.33	24710	25040
92 MAY 4	21000	20440	1500	25720	27220	843.50	27270	22000	840.50	795.21	614.25	24660	
92 MAY 5	21000	21120	1500	25660	27160	843.54	27270	22000	840.59	795.19	614.19	24620	
92 MAY 6	21000	21810	1500	25610	27110	843.59	27290	22000	840.67	795.17	614.13	24610	
92 MAY 7	21000	22500	1500	25590	27090	843.64	27330	22000	840.76	795.15	614.08	24610	
92 MAY 8	21000	23180	1500	25580	27080	843.69	27380	22000	840.84	795.14	614.03	24630	
92 MAY 9	21000	23870	1500	25590	27090	843.75	27460	22000	840.92	795.13	613.99	24670	
92 MAY 10	21000	24550	1500	25620	27120	843.80	27540	22000	841.01	795.13	613.96	24720	24650
92 MAY 11	21000	25140	1500	25650	27150	843.86	27630	22000	841.09	795.13	613.92	24780	
92 MAY 12	21000	25630	1500	25700	27200	843.92	27720	22000	841.17	795.13	613.90	24860	
92 MAY 13	21000	26020	1500	25750	27250	843.98	27810	22000	841.25	795.14	613.87	24950	
92 MAY 14	21000	26320	1500	25810	27310	844.05	27890	22000	841.33	795.15	613.85	25040	
92 MAY 15	21000	26510	500	25860	26360	844.11	27970	22000	841.42	795.16	613.84	25150	
92 MAY 16	21000	26610	500	25950	26450	844.18	28060	22000	841.50	795.17	613.82	25260	
92 MAY 17	21000	26580	500	26030	26530	844.25	28140	22000	841.58	795.18	613.81	25380	25060
92 MAY 18	21000	26540	500	26100	26600	844.31	28220	22000	841.67	795.20	613.80	25500	
92 MAY 19	21000	26460	500	26160	26660	844.38	28280	22000	841.76	795.22	613.79	25640	
92 MAY 20	21000	26360	500	26200	26700	844.44	28330	22000	841.84	795.24	613.78	25770	
92 MAY 21	21000	26240	500	26240	26740	844.51	28380	22000	841.93	795.25	613.77	25910	
92 MAY 22	21000	26090	500	26270	26770	844.57	28420	22000	842.03	795.27	613.77	26060	
92 MAY 23	21000	25920	500	26290	26790	844.63	28450	22000	842.12	795.29	613.76	26210	
92 MAY 24	21000	25750	500	26290	26790	844.69	28460	22000	842.21	795.32	613.76	26370	25920
92 MAY 25	21000	25570	500	26290	26790	844.75	28470	22000	842.30	795.34	613.75	26520	
92 MAY 26	21000	25400	500	26280	26780	844.82	28470	22000	842.40	795.36	613.75	26680	
92 MAY 27	21000	25230	500	26260	26760	844.88	28470	22000	842.49	795.38	613.74	26840	
92 MAY 28	21000	25060	500	26320	26820	844.95	28540	22000	842.58	795.40	613.74	27010	
92 MAY 29	21000	24890	500	26370	26870	845.02	28600	22000	842.67	795.43	613.74	27180	
92 MAY 30	21000	24710	500	26400	26900	845.09	28640	22000	842.76	795.45	613.73	27340	
92 MAY 31	21000	24540	500	26420	26920	845.15	28670	22000	842.85	795.47	613.73	27510	27010
AVERAGE	21000	24390	950	25990	26940	844.20	27970	22000	841.52	795.25	613.92	25580	

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
92 / 03 / 27

APPENDIX C – continued (1992 03 27 forecast)

C H U R C H I L L R I V E R D I V E R S I O N

PAGE 3 OF 3

91 DAY FORECAST OF FLOWS AND ELEVATIONS
AS OF 92 / 03 / 27

FOR THE PERIOD APRIL 1, 1992 TO JUNE 30, 1992

LOCAL INFLOWS AS FORECAST FOR PRESENT CONDITIONS

DATE	ISLAND FALLS OUTFLO	SOUTHERN INDIAN LAKE LOCAL INFLOW	MISSI OUTFLO	SOUTH BAY OUTFLO	TOTAL OUTFLO	MEAN ELEV	TOTAL INFLOW	NOTIGI OUTFLO	FORBAY ELEV	NELSON HOUSE ELEV	THOMP PUMPHS ELEV	THOMP FLOW	AVG WK THOMP FLOW
	======	=======	======	======	======	======	======	======	======	======	======	======	======
92 JUN 1	21000	22620	500	26830	27330	845.21	29000	26000	842.86	795.52	613.78	27690	
92 JUN 2	21000	22460	500	27110	27610	845.26	29290	26000	842.88	795.57	613.83	27840	
92 JUN 3	21000	22300	500	27350	27850	845.32	29540	26000	842.91	795.62	613.87	27980	
92 JUN 4	21000	22140	500	27550	28050	845.37	29750	26000	842.94	795.68	613.91	28110	
92 JUN 5	21000	21980	500	27720	28220	845.42	29930	26000	842.98	795.76	613.95	28240	
92 JUN 6	21000	21820	500	27860	28360	845.47	30080	26000	843.03	795.86	613.99	28380	
92 JUN 7	21000	21660	500	27970	28470	845.52	30210	26000	843.08	795.98	614.04	28530	28110
92 JUN 8	21000	21500	500	28070	28570	845.57	30320	26000	843.13	796.10	614.09	28710	
92 JUN 9	21000	21340	500	28150	28650	845.62	30410	26000	843.19	796.22	614.15	28920	
92 JUN 10	21000	21180	500	28200	28700	845.67	30480	26000	843.24	796.34	614.23	29150	
92 JUN 11	21000	21040	500	28250	28750	845.71	30530	26000	843.30	796.44	614.31	29420	
92 JUN 12	21000	20930	500	28280	28780	845.76	30570	26000	843.36	796.53	614.39	29690	
92 JUN 13	21000	20840	500	28310	28810	845.80	30600	26000	843.42	796.61	614.48	29960	
92 JUN 14	21000	20770	500	28320	28820	845.85	30620	26000	843.49	796.68	614.56	30230	29440
92 JUN 15	21000	20720	500	28720	29220	845.89	31030	30000	843.47	796.74	614.63	30480	
92 JUN 16	21000	20660	500	29060	29560	845.94	31370	30000	843.46	796.80	614.70	30710	
92 JUN 17	21000	20590	500	29360	29860	845.98	31660	30000	843.45	796.86	614.76	30920	
92 JUN 18	21000	20480	500	29610	30110	846.02	31910	30000	843.46	796.93	614.82	31110	
92 JUN 19	21000	20330	500	29830	30330	846.05	32120	30000	843.47	797.02	614.87	31290	
92 JUN 20	21000	20150	500	30010	30510	846.09	32300	30000	843.48	797.13	614.92	31470	
92 JUN 21	21000	19930	500	30160	30660	846.13	32450	30000	843.50	797.25	614.98	31660	31090
92 JUN 22	21000	19670	500	30290	30790	846.16	32570	30000	843.53	797.38	615.04	31880	
92 JUN 23	21000	19420	500	30400	30900	846.19	32670	30000	843.55	797.50	615.12	32130	
92 JUN 24	21000	19160	500	30480	30980	846.23	32750	30000	843.59	797.62	615.20	32400	
92 JUN 25	21000	18910	500	30540	31040	846.26	32800	30000	843.62	797.72	615.28	32690	
92 JUN 26	21000	18650	500	30590	31090	846.29	32850	30000	843.65	797.81	615.37	33000	
92 JUN 27	21000	18400	500	30620	31120	846.31	32870	30000	843.69	797.89	615.46	33290	32710
92 JUN 28	21000	18140	500	30640	31140	846.34	32890	30000	843.73	797.95	615.54	33580	
92 JUN 29	21000	17880	500	30650	31150	846.37	32890	30000	843.77	798.01	615.62	33840	
92 JUN 30	21000	17630	500	30650	31150	846.40	32880	30000	843.81	798.07	615.69	34080	
AVERAGE	21000	20440	500	29050	29550	845.87	31310	28130	843.37	796.79	614.65	30580	

MANITOBA HYDRO
SYSTEM OPERATING DIVISION
RESERVOIR & ENERGY RESOURCES
92 / 03 / 27

APPENDIX C – continued

1996 04 21 to 1996 05 11

The 1996 03 27 90-day forecast showed that the level of Southern Indian Lake would decline to about 843.3 feet by late April and begin rising thereafter as a result of the spring freshet. A revised forecast was issued on 1996 04 19 that showed that the minimum level of Southern Indian Lake would be 842.93 feet at the beginning of May. Missi outflow was at the minimum possible under the terms of the Interim Licence. Notigi outflow was reduced from 27,500 cfs on April 12 to 17,500 cfs on April 24 in several steps to halt the decline in lake elevation. A 1996 04 25 letter to the province advised that the level dropped below 843.0 feet because of lower than expected inflows. The maximum deviation from 843.0 feet was 0.16 feet (1.91 inches).

The next three pages is a copy of the 1996 03 27 forecast. A copy of the 1996 04 19 forecast and the 1996 04 25 letter are located on pages 203 and 206 respectively.

APPENDIX C – continued (1996 03 27 forecast)

Churchill River
Water Level and Flow Forecast from
96mar25 TO 96jun30

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
========	=======	========	==========	========	========	==========	========	==========	========	==========	==========	========
96mar25	1.500	23.038	843.61	26.717	-0.866	839.61	27.500	796.94	28.025	616.42	615.20	28.227
96mar26	1.500	23.136	843.59	26.647	-0.874	839.58	27.500	796.95	28.036	616.41	615.29	28.217
96mar27	1.500	23.236	843.57	26.572	-0.882	839.56	27.500	796.95	28.040	616.40	615.19	28.241
96mar28	1.500	23.323	843.55	26.519	-0.889	839.53	27.500	796.95	28.040	616.40	615.19	28.236
96mar29	1.500	23.389	843.54	26.474	-0.894	839.50	27.500	796.95	28.040	616.40	615.19	28.243
96mar30	1.500	23.445	843.52	26.420	-0.897	839.46	27.500	796.95	28.040	616.40	615.19	28.243
96mar31	1.500	23.500	843.50	26.386	-0.900	839.43	27.500	796.95	28.039	616.40	615.19	28.245
96apr01	1.500	23.557	843.49	26.357	-0.903	839.39	27.500	796.95	28.038	616.40	615.19	28.245
96apr02	1.500	23.617	843.47	26.318	-0.907	839.36	27.500	796.95	28.038	616.40	615.19	28.246
96apr03	1.500	23.676	843.46	26.298	-0.910	839.32	27.500	796.95	28.038	616.40	615.19	28.246
96apr04	1.500	23.737	843.44	26.281	-0.913	839.28	27.500	796.95	28.037	616.40	615.19	28.245
96apr05	1.500	23.801	843.43	26.241	-0.916	839.24	27.500	796.95	28.037	616.40	615.19	28.245
96apr06	1.500	23.864	843.41	26.205	-0.919	839.20	27.500	796.95	28.037	616.40	615.19	28.243
96apr07	1.500	23.929	843.40	26.175	-0.922	839.16	27.500	796.95	28.036	616.39	615.19	28.240
96apr08	1.500	23.995	843.39	26.148	-0.925	839.11	27.500	796.95	28.034	616.39	615.19	28.237
96apr09	1.500	24.064	843.37	26.140	-0.929	839.07	27.500	796.95	28.032	616.39	615.17	28.233
96apr10	1.500	24.132	843.36	26.120	-0.932	839.02	27.500	796.95	28.029	616.38	615.17	28.229
96apr11	1.500	24.200	843.35	26.095	-0.935	838.98	27.500	796.94	28.026	616.38	615.17	28.224
96apr12	1.500	24.271	843.34	26.076	-0.938	838.93	27.500	796.94	28.022	616.38	615.17	28.219
96apr13	1.500	24.341	843.33	26.047	-0.941	838.88	27.500	796.94	28.018	616.38	615.17	28.213
96apr14	1.500	24.411	843.31	26.021	-0.944	838.83	27.500	796.94	28.013	616.38	615.17	28.229
96apr15	1.500	24.496	843.30	25.999	-0.948	838.78	27.500	796.94	28.010	616.38	615.13	28.267
96apr16	1.500	25.006	843.29	25.985	-0.998	838.73	27.500	796.94	28.011	616.40	615.18	28.295
96apr17	1.500	25.926	843.29	25.989	-1.095	838.70	25.000	796.92	27.976	616.40	615.18	28.300
96apr18	1.500	26.845	843.28	26.083	-1.193	838.70	25.000	796.87	27.847	616.40	615.17	28.261
96apr19	1.500	27.765	843.28	26.333	-1.290	838.70	25.000	796.78	27.651	616.38	615.14	28.172
96apr20	1.500	28.684	843.28	26.630	-1.387	838.71	25.000	796.69	27.448	616.35	615.13	28.045
96apr21	1.500	29.603	843.28	26.932	-1.485	838.71	25.000	796.61	27.259	616.30	615.05	27.899
96apr22	1.500	30.524	843.29	27.251	-1.582	838.72	25.000	796.54	27.092	616.25	615.03	27.750
96apr23	1.500	31.442	843.30	27.559	-1.680	838.73	25.000	796.48	26.947	616.19	614.96	27.606
96apr24	1.500	32.360	843.31	27.843	-1.777	838.75	25.000	796.43	26.823	616.13	614.97	27.474
96apr25	1.500	33.278	843.32	28.036	-1.874	838.76	25.000	796.38	26.716	616.08	614.83	27.366
96apr26	1.500	34.196	843.33	28.145	-1.972	838.78	25.000	796.34	26.629	616.04	614.80	27.290
96apr27	1.500	35.112	843.35	28.258	-2.069	838.79	25.000	796.31	26.566	616.01	614.87	27.241
96apr28	1.500	36.028	843.37	28.388	-2.167	838.80	25.000	796.30	26.526	615.99	614.75	27.219
96apr29	1.500	36.942	843.40	28.521	-2.264	838.81	25.000	796.29	26.506	615.97	614.74	27.217
96apr30	1.500	37.857	843.42	28.671	-2.362	838.82	25.000	796.29	26.516	615.95	614.70	27.236
96may01	1.500	38.769	843.45	28.849	-2.459	838.82	25.000	796.29	26.551	615.92	614.77	27.279
96may02	1.500	39.681	843.48	29.055	-2.556	838.83	25.000	796.30	26.597	615.90	614.65	27.343
96may03	1.500	40.591	843.52	29.286	-2.654	838.83	25.000	796.31	26.665	615.88	614.67	

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APPENDIX C – continued (1996 03 27 forecast)

Churchill River
Water Level and Flow Forecast from
96mar25 TO 96jun30

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
96may04	1.500	41.501	843.55	29.528	-2.751	838.84	25.000	796.33	26.739	615.87	614.64	27.426
96may05	1.500	42.409	843.59	29.793	-2.849	838.85	25.000	796.34	26.808	615.86	614.64	27.524
96may06	1.500	43.315	843.63	30.065	-2.946	838.86	25.000	796.36	26.883	615.87	614.63	27.631
96may07	1.500	44.220	843.68	30.331	-3.043	838.87	25.000	796.39	26.966	615.87	614.64	27.746
96may08	1.500	45.124	843.72	30.545	-3.141	838.92	22.500	796.39	27.022	615.87	614.64	27.865
96may09	1.500	46.026	843.77	30.711	-3.238	839.00	22.500	796.36	26.980	615.87	614.63	27.975
96may10	1.500	46.927	843.82	30.862	-3.336	839.07	22.500	796.30	26.863	615.86	614.62	28.050
96may11	1.500	47.826	843.88	31.031	-3.433	839.15	22.500	796.24	26.746	615.83	614.59	28.080
96may12	1.500	48.725	843.93	31.202	-3.530	839.22	22.500	796.18	26.648	615.78	614.55	28.076
96may13	1.500	49.622	843.99	31.389	-3.628	839.29	22.500	796.14	26.585	615.74	614.50	28.057
96may14	1.500	50.517	844.05	31.605	-3.725	839.37	22.500	796.10	26.541	615.70	614.45	28.040
96may15	1.500	51.395	844.12	31.834	-3.823	839.44	22.500	796.08	26.503	615.64	614.40	28.009
96may16	0.500	51.973	844.18	32.083	-3.887	839.51	22.500	796.05	26.479	615.58	614.34	27.965
96may17	0.500	51.979	844.25	32.337	-3.886	839.59	22.500	796.03	26.457	615.51	614.27	27.919
96may18	0.500	51.698	844.32	32.570	-3.853	839.67	22.500	796.01	26.444	615.46	614.21	27.878
96may19	0.500	51.416	844.38	32.779	-3.819	839.77	22.500	795.99	26.426	615.40	614.15	27.839
96may20	0.500	51.133	844.45	32.968	-3.785	839.87	22.500	795.96	26.390	615.34	614.09	27.800
96may21	0.500	50.849	844.51	33.136	-3.752	839.97	22.500	795.93	26.352	615.28	614.03	27.758
96may22	0.500	50.563	844.57	33.246	-3.718	840.08	22.500	795.90	26.313	615.22	613.96	27.710
96may23	0.500	50.276	844.63	33.330	-3.684	840.20	22.500	795.88	26.285	615.16	613.90	27.660
96may24	0.500	49.988	844.69	33.399	-3.651	840.32	22.500	795.85	26.256	615.09	613.83	27.608
96may25	0.500	49.699	844.74	33.474	-3.617	840.44	22.500	795.82	26.212	615.03	613.77	27.558
96may26	0.500	49.409	844.80	33.535	-3.583	840.57	22.500	795.79	26.169	614.97	613.70	27.505
96may27	0.500	49.118	844.85	33.571	-3.550	840.70	22.500	795.76	26.127	614.90	613.64	27.450
96may28	0.500	48.826	844.90	33.598	-3.516	840.83	22.500	795.73	26.096	614.84	613.57	27.394
96may29	0.500	48.533	844.96	33.617	-3.482	840.96	22.500	795.70	26.063	614.78	613.51	27.340
96may30	0.500	48.240	845.01	33.555	-3.449	841.10	22.500	795.67	26.018	614.71	613.44	27.287
96may31	0.500	47.946	845.06	33.442	-3.415	841.23	22.500	795.64	25.973	614.65	613.38	27.232
96jun01	0.500	47.651	845.10	33.334	-3.381	841.36	22.500	795.61	25.928	614.59	613.32	27.175
96jun02	0.500	47.356	845.15	33.232	-3.348	841.49	22.500	795.58	25.896	614.53	613.25	27.116
96jun03	0.500	47.060	845.20	33.134	-3.314	841.62	22.500	795.54	25.862	614.46	613.19	27.062
96jun04	0.500	46.764	845.25	33.042	-3.280	841.75	22.500	795.51	25.815	614.40	613.13	27.008
96jun05	0.500	46.468	845.29	32.953	-3.247	841.87	22.500	795.48	25.770	614.34	613.07	26.951
96jun06	0.500	46.171	845.34	32.867	-3.213	842.00	22.500	795.45	25.724	614.28	613.01	26.893
96jun07	0.500	45.874	845.38	32.680	-3.179	842.12	22.500	795.42	25.680	614.22	612.95	26.833
96jun08	0.500	45.576	845.43	32.512	-3.146	842.24	22.500	795.39	25.647	614.16	612.89	26.774
96jun09	0.500	45.280	845.47	32.346	-3.112	842.36	22.500	795.36	25.613	614.10	612.83	26.717
96jun10	0.500	44.982	845.51	32.208	-3.078	842.48	22.500	795.33	25.567	614.05	612.77	26.661
96jun11	0.500	44.684	845.56	32.082	-3.045	842.59	22.500	795.30	25.521	613.99	612.71	26.605
96jun12	0.500	44.387	845.60	31.965	-3.011	842.70	22.500	795.27	25.475	613.93	612.65	26.546

Manitoba Hydro
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APPENDIX C – continued (1996 03 27 forecast)

Page 3

Churchill River
Water Level and Flow Forecast from
96mar25 TO 96jun30

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
=========	========	========	=========	========	========	========	========	========	========	==========	==========	========
96jun13	0.500	44.089	845.64	31.851	-2.977	842.81	22.500	795.24	25.442	613.87	612.58	26.487
96jun14	0.500	43.790	845.68	31.742	-2.944	842.92	22.500	795.21	25.407	613.82	612.52	26.430
96jun15	0.500	43.492	845.72	31.609	-2.910	843.03	22.500	795.18	25.360	613.77	612.47	26.374
96jun16	0.500	43.221	845.76	31.382	-2.880	843.13	22.500	795.15	25.303	613.72	612.43	26.319
96jun17	0.500	42.976	845.80	31.172	-2.852	843.23	22.500	795.13	25.252	613.69	612.39	26.264
96jun18	0.500	42.732	845.84	30.963	-2.825	843.32	22.500	795.10	25.217	613.65	612.35	26.209
96jun19	0.500	42.488	845.88	30.781	-2.797	843.41	22.500	795.08	25.185	613.61	612.31	26.159
96jun20	0.500	42.244	845.92	30.634	-2.770	843.50	22.500	795.06	25.144	613.58	612.28	26.113
96jun21	0.500	42.000	845.96	30.502	-2.742	843.58	22.500	795.04	25.107	613.54	612.24	26.068
96jun22	0.500	41.756	846.00	30.369	-2.715	843.67	22.500	795.02	25.084	613.51	612.21	26.026
96jun23	0.500	41.512	846.03	30.242	-2.687	843.75	22.500	795.00	25.050	613.48	612.18	25.986
96jun24	0.500	41.267	846.07	30.138	-2.660	843.83	22.500	794.98	25.019	613.45	612.15	25.949
96jun25	0.500	41.024	846.11	30.042	-2.632	843.90	22.500	794.96	24.999	613.43	612.11	25.913
96jun26	0.500	40.781	846.14	29.942	-2.605	843.98	22.500	794.94	24.968	613.40	612.09	25.879
96jun27	0.500	40.537	846.18	29.751	-2.577	844.05	22.500	794.92	24.940	613.37	612.06	25.847
96jun28	0.500	40.293	846.21	29.571	-2.550	844.12	22.500	794.91	24.924	613.34	612.03	25.815
96jun29	0.500	40.050	846.25	29.420	-2.522	844.19	22.500	794.89	24.898	613.31	612.01	25.785
96jun30	0.500	39.807	846.28	29.273	-2.495	844.26	22.500	794.87	24.873	613.28	611.98	25.756

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/local/db/qsim/system/churchill_river/reports/expected/crd_90_day.rpt

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APPENDIX C – continued (1996 04 19 forecast)

Churchill River
Water Level and Flow Forecast from
96apr17 TO 96jul31

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
96apr17	1.500	21.183	843.11	25.738	0.509	839.13	22.500	796.66	27.362	616.29	615.20	27.617
96apr18	1.500	21.285	843.09	25.402	0.510	839.24	22.500	796.48	26.959	616.26	615.17	27.549
96apr19	1.500	21.328	843.07	25.131	0.506	839.34	22.500	796.31	26.549	616.22	615.13	27.443
96apr20	1.500	21.341	843.05	24.892	0.498	839.43	22.500	796.15	26.172	616.14	615.05	27.216
96apr21	1.500	21.351	843.03	24.672	0.490	839.52	22.500	796.00	25.834	616.03	614.95	26.934
96apr22	1.500	21.359	843.01	24.468	0.482	839.60	22.500	795.87	25.536	615.93	614.83	26.646
96apr23	1.500	21.366	843.00	24.279	0.475	839.68	22.500	795.74	25.262	615.83	614.73	26.376
96apr24	1.500	21.371	842.98	24.023	0.467	839.78	20.000	795.62	24.975	615.72	614.63	26.117
96apr25	1.500	21.442	842.97	23.686	0.466	839.90	20.000	795.46	24.627	615.60	614.50	25.817
96apr26	1.500	21.647	842.96	23.256	0.479	840.04	17.500	795.28	24.214	615.46	614.36	25.528
96apr27	1.500	21.919	842.95	22.693	0.500	840.20	17.500	795.07	23.746	615.32	614.22	25.224
96apr28	1.500	22.190	842.94	22.186	0.520	840.34	17.500	794.85	23.270	615.16	614.06	24.888
96apr29	1.500	22.460	842.94	21.740	0.540	840.47	17.500	794.65	22.830	615.00	613.88	24.533
96apr30	1.500	22.727	842.93	21.360	0.560	840.58	17.500	794.47	22.456	614.83	613.71	24.173
96may01	1.500	22.993	842.93	21.029	0.580	840.69	17.500	794.32	22.151	614.67	613.54	23.844
96may02	1.500	23.351	842.94	20.753	0.610	840.78	17.500	794.20	21.899	614.51	613.38	23.537
96may03	1.500	23.800	842.94	20.529	0.649	840.87	17.500	794.09	21.699	614.36	613.21	23.272
96may04	1.500	24.247	842.95	20.349	0.688	840.95	17.500	794.00	21.527	614.21	613.07	23.049
96may05	1.500	25.016	842.96	20.159	0.761	841.03	17.500	793.91	21.371	614.08	612.93	22.857
96may06	1.500	26.431	842.98	19.956	0.899	841.10	17.500	793.84	21.233	613.97	612.80	22.688
96may07	1.500	28.168	843.00	19.831	1.071	841.16	17.500	793.77	21.116	613.85	612.68	22.542
96may08	1.500	29.903	843.03	19.767	1.243	841.22	17.500	793.71	21.029	613.76	612.57	22.417
96may09	1.500	31.636	843.06	19.776	1.415	841.27	17.500	793.67	20.960	613.66	612.47	22.315
96may10	1.500	33.367	843.10	19.840	1.587	841.33	17.500	793.63	20.897	613.58	612.39	22.236
96may11	1.500	35.096	843.15	19.942	1.759	841.38	17.500	793.60	20.851	613.51	612.31	22.175
96may12	1.500	36.823	843.20	20.083	1.931	841.44	17.500	793.57	20.818	613.45	612.24	22.133
96may13	1.500	38.549	843.26	20.261	2.103	841.49	17.500	793.55	20.807	613.39	612.18	22.104
96may14	1.500	40.272	843.32	20.469	2.275	841.56	17.500	793.53	20.805	613.34	612.12	22.092
96may15	1.500	41.978	843.39	20.826	2.447	841.59	20.000	793.54	20.842	613.29	612.07	22.081
96may16	0.500	43.667	843.46	21.330	2.619	841.61	20.000	793.60	20.976	613.24	612.02	22.082
96may17	0.500	45.354	843.54	21.835	2.791	841.63	20.000	793.68	21.180	613.22	611.99	22.132
96may18	0.500	47.039	843.63	22.314	2.963	841.67	20.000	793.77	21.413	613.22	611.99	22.247
96may19	0.500	47.699	843.72	22.740	3.030	841.72	20.000	793.86	21.639	613.25	612.01	22.403
96may20	0.500	47.334	843.80	23.106	2.992	841.78	20.000	793.95	21.834	613.28	612.04	22.579
96may21	0.500	46.967	843.89	23.427	2.955	841.85	20.000	794.01	22.005	613.31	612.07	22.758
96may22	0.500	46.598	843.97	23.698	2.917	841.93	20.000	794.07	22.153	613.34	612.10	22.930
96may23	0.500	46.227	844.05	23.891	2.879	842.01	20.000	794.12	22.288	613.36	612.13	23.090
96may24	0.500	45.856	844.12	23.958	2.841	842.10	20.000	794.15	22.404	613.38	612.15	23.236
96may25	0.500	45.483	844.20	24.031	2.803	842.19	20.000	794.18	22.494	613.40	612.15	23.365
96may26	0.500	45.108	844.27	24.101	2.765	842.28	20.000	794.21	22.571	613.40	612.16	23.476

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APPENDIX C – continued (1996 04 19 forecast)

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Churchill River ..ecast from
Water Level and Flow Fo..31
96apr17 TO 96jul..

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
=========	========	========	=========	========	========	=========	======	=========	========	=========	=========	========
96may27	0.500	44.732	844.35	24.160	2.728	842.38	20.000	794.23	22.637	613.40	612.15	23.570
96may28	0.500	44.355	844.42	24.223	2.690	842.47	20.000	794.24	22.702	613.40	612.14	23.649
96may29	0.500	43.977	844.48	24.270	2.652	842.57	20.000	794.25	22.757	613.38	612.13	23.717
96may30	0.500	43.598	844.55	24.317	2.614	842.67	20.000	794.26	22.792	613.37	612.12	23.774
96may31	0.500	43.218	844.62	24.363	2.576	842.77	22.500	794.26	22.819	613.35	612.10	23.819
96jun01	0.500	42.838	844.68	24.539	2.538	842.84	22.500	794.28	22.881	613.33	612.07	23.855
96jun02	0.500	42.457	844.74	24.799	2.500	842.89	22.500	794.33	23.040	613.31	612.05	23.898
96jun03	0.500	42.076	844.80	25.007	2.463	842.95	22.500	794.41	23.258	613.30	612.04	23.971
96jun04	0.500	41.694	844.86	25.160	2.425	843.01	22.500	794.50	23.469	613.31	612.04	24.090
96jun05	0.500	41.311	844.92	25.194	2.387	843.08	22.500	794.57	23.667	613.33	612.06	24.244
96jun06	0.500	40.928	844.97	25.231	2.349	843.14	22.500	794.64	23.846	613.36	612.09	24.410
96jun07	0.500	40.546	845.03	25.246	2.311	843.21	22.500	794.70	24.004	613.39	612.12	24.577
96jun08	0.500	40.162	845.08	25.260	2.273	843.28	22.500	794.75	24.153	613.41	612.14	24.737
96jun09	0.500	39.779	845.13	25.275	2.236	843.34	22.500	794.79	24.282	613.42	612.15	24.886
96jun10	0.500	39.396	845.18	25.291	2.198	843.41	22.500	794.83	24.383	613.44	612.16	25.024
96jun11	0.500	39.013	845.22	25.299	2.160	843.48	22.500	794.85	24.468	613.45	612.17	25.143
96jun12	0.500	38.630	845.27	25.297	2.122	843.55	22.500	794.87	24.540	613.45	612.17	25.242
96jun13	0.500	38.247	845.31	25.289	2.084	843.62	22.500	794.89	24.610	613.45	612.17	25.326
96jun14	0.500	37.864	845.35	25.270	2.046	843.69	22.500	794.90	24.667	613.44	612.16	25.398
96jun15	0.500	37.481	845.40	25.242	2.009	843.76	23.750	794.90	24.703	613.43	612.14	25.457
96jun16	0.500	37.201	845.44	25.284	1.981	843.82	23.750	794.92	24.741	613.42	612.14	25.507
96jun17	0.500	37.021	845.48	25.369	1.964	843.86	23.750	794.95	24.826	613.42	612.14	25.553
96jun18	0.500	36.841	845.52	25.424	1.947	843.91	23.750	794.99	24.953	613.42	612.14	25.610
96jun19	0.500	36.663	845.55	25.470	1.930	843.96	23.750	795.04	25.082	613.43	612.15	25.688
96jun20	0.500	36.484	845.59	25.501	1.913	844.01	23.750	795.08	25.187	613.45	612.16	25.783
96jun21	0.500	36.306	845.63	25.400	1.896	844.05	23.750	795.11	25.281	613.47	612.18	25.882
96jun22	0.500	36.128	845.66	25.330	1.879	844.10	23.750	795.14	25.376	613.49	612.19	25.980
96jun23	0.500	35.950	845.70	25.289	1.862	844.14	23.750	795.16	25.447	613.50	612.21	26.072
96jun24	0.500	35.773	845.73	25.243	1.845	844.18	23.750	795.19	25.510	613.51	612.22	26.156
96jun25	0.500	35.596	845.77	25.208	1.828	844.23	23.750	795.20	25.576	613.52	612.23	26.231
96jun26	0.500	35.419	845.80	25.196	1.811	844.27	23.750	795.22	25.622	613.52	612.24	26.298
96jun27	0.500	35.243	845.84	25.177	1.794	844.31	23.750	795.23	25.662	613.53	612.24	26.357
96jun28	0.500	35.067	845.87	25.157	1.777	844.35	23.750	795.24	25.707	613.53	612.24	26.407
96jun29	0.500	34.891	845.90	25.151	1.759	844.39	23.750	795.25	25.735	613.53	612.24	26.451
96jun30	0.500	34.716	845.94	25.138	1.742	844.43	25.000	795.26	25.758	613.53	612.23	26.489
96jul01	0.500	34.541	845.97	25.220	1.725	844.46	25.000	795.29	25.811	613.52	612.22	26.522
96jul02	0.500	34.366	846.00	25.383	1.708	844.48	25.000	795.33	25.897	613.51	612.22	26.559
96jul03	0.500	34.192	846.03	25.495	1.691	844.50	25.000	795.38	26.014	613.51	612.22	26.612
96jul04	0.500	34.018	846.05	25.573	1.674	844.52	25.000	795.42	26.144	613.52	612.23	26.686
96jul05	0.500	33.844	846.08	25.642	1.657	844.54	.		26.253	613.54	612.24	26.778

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APPENDIX C – continued (1996 04 19 forecast)

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Churchill River
Water Level and Flow Forecast from
96apr17 TO 96jul31

Date	Missi Falls Outflow (kcfs)	Southern Indian Lake Total Inflow (kcfs)	Southern Indian Lake Elevation (ft)	South Bay Channel Outflow (kcfs)	Notigi Forebay Local Inflow (kcfs)	Notigi Forebay Elevation (ft)	Notigi Outflow (kcfs)	Footprint Lake Elevation (ft)	Gods Rapids Outflow (kcfs)	Thompson Pumphouse Elevation (ft)	Thompson Seaplane Base Elevation (ft)	Thompson Seaplane Base Outflow (kcfs)
====	========	========	=========	========	========	=========	========	=========	=========	=========	=========	========
96jul6	0.500	33.670	846.11	25.684	1.640	844.57	25.000	795.45	26.351	613.56	612.26	26.877
96jul7	0.500	33.497	846.13	25.715	1.623	844.60	25.000	795.48	26.450	613.58	612.27	26.978
96jul8	0.500	33.324	846.16	25.748	1.606	844.63	25.000	795.51	26.524	613.59	612.29	27.073
96jul9	0.500	33.151	846.18	25.761	1.589	844.66	25.000	795.53	26.589	613.60	612.30	27.159
96jul10	0.500	32.978	846.20	25.770	1.572	844.69	25.000	795.55	26.657	613.61	612.31	27.237
96jul11	0.500	32.806	846.23	25.784	1.555	844.72	25.000	795.56	26.703	613.61	612.32	27.306
96jul12	0.500	32.634	846.25	25.793	1.538	844.75	25.000	795.57	26.744	613.62	612.32	27.366
96jul13	0.500	32.463	846.27	25.774	1.521	844.78	25.000	795.58	26.789	613.62	612.32	27.415
96jul14	0.500	32.290	846.29	25.755	1.504	844.81	25.000	795.59	26.817	613.62	612.32	27.457
96jul15	0.500	32.119	846.31	25.746	1.487	844.84	25.000	795.59	26.839	613.62	612.31	27.492
96jul16	0.500	31.942	846.33	25.734	1.469	844.87	25.000	795.59	26.858	613.62	612.32	27.521
96jul17	0.500	31.753	846.35	25.721	1.450	844.90	25.000	795.60	26.848	613.64	612.34	27.541
96jul18	0.500	31.559	846.37	25.705	1.431	844.93	25.000	795.60	26.838	613.65	612.35	27.550
96jul19	0.500	31.365	846.39	25.688	1.411	844.96	25.000	795.60	26.826	613.66	612.37	27.549
96jul20	0.500	31.171	846.41	25.669	1.392	844.99	25.000	795.60	26.813	613.67	612.38	27.541
96jul21	0.500	30.976	846.42	25.561	1.372	845.02	25.000	795.60	26.810	613.68	612.39	27.528
96jul22	0.500	30.783	846.44	25.458	1.353	845.05	25.000	795.59	26.793	613.69	612.39	27.514
96jul23	0.500	30.589	846.46	25.379	1.334	845.07	25.000	795.59	26.776	613.70	612.40	27.497
96jul24	0.500	30.396	846.47	25.316	1.314	845.09	25.000	795.59	26.758	613.70	612.41	27.476
96jul25	0.500	30.202	846.49	25.265	1.295	845.11	25.000	795.59	26.739	613.70	612.41	27.453
96jul26	0.500	30.009	846.50	25.218	1.275	845.13	25.000	795.59	26.720	613.71	612.42	27.429
96jul27	0.500	29.816	846.52	25.178	1.256	845.15	25.000	795.58	26.700	613.71	612.42	27.403
96jul28	0.500	29.623	846.53	25.144	1.236	845.17	25.000	795.58	26.692	613.71	612.43	27.377
96jul29	0.500	29.430	846.55	25.113	1.217	845.19	25.000	795.58	26.670	613.72	612.43	27.351
96jul30	0.500	29.238	846.56	25.086	1.197	845.20	25.000	795.57	26.648	613.72	612.44	27.325
96jul31	0.500	29.046	846.57	25.055	1.178	845.22	25.000	795.57	26.625	613.72	612.44	27.295

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APPENDIX C – continued (1996 04 25 letter)

manitoba hydro

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1996 04 25

Mr. S.D. Topping
Director
Water Resources Branch
Department of Natural Resources
1495 St. James Street
Winnipeg, MB R3H 0W9

Dear Mr. Topping:

The purpose of this memorandum is to advise you that as of April 24, 1996 the mean elevation of Southern Indian Lake had fallen below the minimum elevation of 843.0 feet. A minimum elevation of 843.0 feet had been authorized by the Minister of Natural Resources in a letter from the Minister to Manitoba Hydro dated April 24, 1995, for the period May 16, 1995 to May 15, 1996. For your convenience a copy of the letter is enclosed.

The level of Southern Indian Lake has fallen below the minimum elevation because inflows to the lake over the last month have been below expectations. Recognizing that the level could fall below the minimum, outflows reductions at Notigi were made beginning April 12. Outflows have been reduced 40% since then, on four occasions from a nominal 27,500 cfs to the present outflow of 17,500 cfs.

The level of Southern Indian Lake is forecast to fall to a minimum level of 842.93 feet by May 1. By that time the effects of the flow reductions from Notigi will have worked their way upstream reducing outflows from Southern Indian Lake below inflows. As a consequence, the level of the lake is expected to begin to rise, reaching the minimum elevation of 843.0 feet on May 7.

In Provision 2, in the Minister's letter of April 24, 1995 on page 2, Manitoba Hydro is required to reduce diversion flows should any of the conditions of the program be violated. I believe the flow reductions already implemented at Notigi are consistent with what is required by Provision 2.

Yours truly,

Original Signed By
E.A. Zaleski

E.A. Zaleski, P.Eng.
Division Manager
System Operating Division

ADC/mdm
Encl.

ADC96-02.ltr

APPENDIX D
SPECIFIC OBSERVANCES RELATED TO ARTICLE 11 OF THE INTERIM WATER POWER ACT LICENCE
(Maximum Notigi Flows)

This appendix provides an account of specific events and the supporting documents referred to in Section 2, Article 11 of this report. Article 11 refers to Interim Licence condition #11 and subsequent approved alterations. Various test programs in the early 1980s were undertaken to prove the capacity of the diversion route under open water and ice covered conditions. Approvals for these test programs altered the maximum outflow licence term for set periods of time. In some instances, the flow constraint at Thompson was replaced with a water level constraint at Nisichawayasihk Cree Nation (Nelson House) and/or at Thompson. During the time between test program authorizations, the terms of the Interim Licence were in effect. Observance of these authorizations is discussed in the following pages under three headings:

- Observance during periods without alterations
- Approved alterations and observance
- Additional conditions

Observance limitations at Thompson:

- It takes four to six days for a flow change at Notigi to affect flows at Thompson. Therefore, if a local rainfall event causes flows at Thompson to exceed the "maximum" allowable flow, Manitoba Hydro has a limited ability to respond.
- The provincial gauge stipulated in the licence may or may not accurately represent the actual flows occurring at the time. Manitoba Hydro also uses a Water Survey of Canada gauge and its own set of gauges for indicators of flow for operational purposes.

APPENDIX D – continued

Observance during periods without alterations:
The two parameters requiring observance are a 30,000 cfs maximum outflow at Notigi and a maximum flow not exceeding the average mean flow plus 30,000 cfs at Thompson.

Notigi
There were two events when the flow exceeded 30,000 cfs during these periods.

- November 1977 – 181 cfs. According to the weekly CRD Schedule sheets for October and November, the maximum outflow was 30,050 cfs. With no gate changes, the outflow fluctuated +/- 150 cfs based on Notigi forebay level.
- June/July 1983 – 261 cfs. The target outflow was 30,000 cfs throughout this period. The initial deviation was not known until 2 weeks later when the outflow calculation was revised and Notigi gates were immediately lowered to reduce outflow to achieve the target value of 30,000 cfs.

Thompson
The maximum limit at Thompson under terms of the Interim Licence is understood to be 34,000 cfs. This understanding is based on a 1982 10 26 letter by Al Mackling, Minister of Natural Resources where he states that, "… the average mean flow of the Burntwood River, taken to be 4000 cfs from Water Survey of Canada records". There were three events when flow exceeded 34,000 cfs during these periods.

- Oct 1978 – 608 cfs – No gate changes were made during this event, so it appears that the deviation may have been the result of basin precipitation. The Water Survey of Canada gauge at Thompson does not appear to have been working properly at this time as the flow values are estimated from October 15 to 29.
- April/May 1980 – 432 cfs – The flow records at the time of the operations indicated that flows were below 34,000 cfs.
- May 1981 – 185 cfs – This was a one day event. The authorized outflow for the following day was 38,000 cfs. Some uncertainty exists with the flow record as the Water Survey of Canada gauge at Thompson does not appear to have been working properly at this time. Published flow values were estimated from May 11 to June 7 with one actual flow measurement taken on May 27.

The next two pages is a copy of the 1982 10 26 letter.

APPENDIX D – continued (1982 10 26 letter)

MANITOBA
MINISTER
NATURAL RESOURCES
WINNIPEG
R3C 0V8

October 26, 1982

Mr. L.D. Blachford,
President & Chief Executive Officer,
Manitoba Hydro,
P.O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Blachford:

This is in response to your memorandum of July 15, 1982 to Mr. Weber in which you advised that Manitoba Hydro wishes to be in a position to augment winter releases at Notigi if local inflows exceed median flows. In order to do so and consistent with operating measures taken in 1979/80 and 1980/81, when permission was also given to augment flows, it would be necessary for authorization to be provided to deviate from the provisions of Articles 11 and 15 of the Interim License. The specific actions involved in such a deviation would be as follows:

1. Between September 15, 1982 and April 15, 1983, allow for a three foot draw to elevation 844.0 on Southern Indian Lake.

2. Between September 15, 1982 and April 15, 1983, allow a draw in the Notigi forebay of an additional four feet below the present minimum of 838.0 ft. A.S.L.

3. Between September 15, 1982 and April 15, 1983, allow a discharge of up to 3,000 cfs above the maximum allowed by licence of 30,000 cfs, but under no circumstances to permit a level on Footprint Lake above elevation 800.0 ft. A.S.L. as allowed under the terms of the Northern Flood Agreement.

4. Between September 15, 1982 and April 15, 1983, allow a discharge in the Burntwood River at the City of Thompson of up to 3,000 cfs above the maximum allowed by licence, which is 30,000 cfs plus the average mean flow of the Burntwood River, taken to be 4,000 cfs from Water Survey of Canada records; thus the maximum flow at Thompson would be 37,000 cfs.

. . . 2

APPENDIX D – continued (1982 10 26 letter)

Accordingly, Manitoba Hydro is hereby authorized to deviate from Article 11 by increasing the average weekly discharge through the Notigi control structure from 30,000 cubic feet per second to 33,000 cubic feet per second provided however that such increase in discharge will not cause the level of Footprint Lake to rise above elevation 800.0 feet A.S.L, and further shall not cause the flow at Thompson to exceed 37,000 cubic feet per second. This authorized deviation shall be confined to the period September 15, 1982 to April 15, 1983.

In addition, I hereby authorize Manitoba Hydro to deviate from Article 15 by increasing the allowable draw down on Southern Indian Lake from two feet to three during the period September 15, 1982 to April 15, 1983 provided that such draw down does not cause the level of Southern Indian Lake to recede below elevation 842.0 feet A.S.L. This authorization also permits Manitoba Hydro to maintain a minimum level immediately upstream of the Notigi control structure during the specified period of September 15, 1982 to April 15, 1983 of elevation 834.0 feet A.S.L., that is, four feet below elevation 838.0 feet A.S.L., the minimum specified in Article 15.

This authorization is issued on the understanding that you will undertake a consultation program with the communities involved and the Northern Flood Committee regarding the water level and flow changes and further that you will advise representative organizations such as the Manitoba Keewatinowi Okemakanak and the Northern Association of Community Councils of these consultations. Furthermore, this authorization is issued on the understanding that Manitoba Hydro will comply with the conditions specified by MEARA and which are detailed in Mr. McBryde's letter of September 17, 1982.

It is understood that Manitoba Hydro will undertake to cover the cost of mitigating any environmental damage incurred by the higher water levels and flows resulting from the authorized variations in the license.

Yours truly,

Original Signed By:
Al Mackling

JJA
W.J. Tishinski
J.F. Funnell
"JJA"

82 11 09 xc: C.J. Goodwin
D.W. Gunter

APPENDIX D – continued

Approved alterations and observance:
The conditions replacing clause 11 are shown below along with a statement of observance for the period prior to 1986.

Notigi outflows:

- Notigi winter flow authorizations from 1979/80 to 1980/81:
  Condition:
  Permission was granted to increase the average weekly flow at the Notigi Control Structure from 30,000 cfs to 32,000 cfs;
  Observance:
  The weekly average flow never exceeded the 32,000 cfs as shown in Figure 3.

- Notigi summer flow authorization for 1981 (May 15 to September 15)
  Condition:
  On 1981 05 22 the Minister of Natural Resources authorized the average weekly flows at Notigi to be increased from 30,000 cfs to 34,000 cfs such that the flow at Thompson would not exceed 34,000 cfs plus local inflow. This authorization was granted on the conditions that the levels on Threepoint and Footprint Lakes not exceed 800 feet and that the water level at the Thompson Seaplane Base not exceed 619 feet. In a subsequent letter dated 1981 05 25, the Minister modified the authorization such that the flow constraint was completely replaced with the elevation constraints.

  The level of 800 feet is in accordance with article 3.9.1.3 of the document known as the Northern Flood Agreement.
  Observance:
  No constraint with regard to flow is applicable during this period. See Figure 3. For observation of terms specific to Threepoint and Footprint Lakes see Figure 6 and for Thompson see Figure 4.

  A copy of the 1981 05 22 and 1981 05 25 letters are on the following two pages.

APPENDIX D – continued (1981 05 22 letter)

MANITOBA
MINISTER
NATURAL RESOURCES
WINNIPEG
R3C 0V8

MAN. HYDRO
MAY 26 1981
PRESIDENT & CHIEF
EXECUTIVE OFFICER

May 22, 1981

Mr. L.D. Blachford,
President and Chief Executive Officer,
Manitoba Hydro,
P.O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Blachford:

This is in response to your memorandum of May 15, 1981 to Mr. Weber in which you made application for a variation of Article 11 of the Interim Licence for the Churchill River Diversion. It is noted that you are asking for the allowable average weekly discharge from the Notigi control structure to be increased from 30,000 c.f.s. to 34,000 c.f.s. Accordingly, Manitoba Hydro is hereby authorized to maintain during the period May 15, 1981 to September 15, 1981, an average weekly flow through the Notigi control structure of 34,000 c.f.s. provided that such flow is regulated to ensure that the flow in the Burntwood River at the Provincial Government gauging station at Thompson does not at any time exceed the average mean flow of the Burntwood River at Thompson plus 34,000 c.f.s.

In authorizing the increase in discharge from the Notigi control structure it is noted that the level of Footprint Lake and Threepoint Lake will not be allowed to exceed elevation 800 feet A.S.L. nor will the stage at the Manitoba Hydro gauge at the Thompson Seaplane Base be permitted to rise above elevation 619 A.S.L.

Original Signed By:
Harry J. Enns

xc J.J. Arnason 81 05 26
K. Kristjanson 81 05 26

APPENDIX D – continued (1981 05 25 letter)

MANITOBA
MINISTER
NATURAL RESOURCES

May 25, 1981.

RECEIVED
MAY 27 1981
GENERAL MANAGER
CORPORATE OPERATIONS

RECEIVED
MAY 27 1981

Mr. L. D. Blachford,
President and Chief Executive Officer,
Manitoba Hydro,
P. O. Box 815,
WINNIPEG, Manitoba.
R3C 2P4

Dear Mr. Blachford:

This is further to my letter of May 22, 1981 in which I authorized a variation of Article 11 of the Interim Licence for the Churchill River Diversion. I am now advised that the variation authorized, whereby the average weekly flow through the Notigi Control Structure could be increased from 30,000 c.f.s. to 34,000 c.f.s., did not fully meet the desired variation of Manitoba Hydro. Upon receiving clarification of the requested variation our officials reviewed the matter and I now have their recommendation.

I hereby authorize Manitoba Hydro to increase the discharge through the Notigi Control Structure beyond the limits allowed in Article 11 of the Interim Licence for the Churchill River Diversion provided that such increased flows when combined with downstream tributary inflows do not cause the elevation of Threepoint Lake and Footprint Lake to exceed 800 feet A.S.L. Geodetic Datum, as measured at the Water Survey of Canada gauge located at Nelson House nor cause the stage of the Burntwood River at Thompson to exceed 619 feet A.S.L. Geodetic Datum, as measured at the Manitoba Hydro gauge located at the Thompson Seaplane Base. The authorized increased flows through the Notigi Control Structure are limited to the period May 15, 1981 to September 15, 1981.

Yours truly,

Original Signed By:
Harry J. Enns

W.J. Tishinski

xc J.J. Arnason 81 05 26
K. Kristjanson 81 05 26
D. W. Gunter
L. Ingram
D. B. Sinclair 81 05 28

APPENDIX D – continued

- Notigi winter flow imposition for 1981/82:

  Condition:

  The maximum allowable average weekly flow at Notigi was reduced from 30,000 cfs to 20,000 cfs. Although the Minister intended to reduce the maximum flow in his 1981 10 30 authorization that lowered the minimum elevation on Southern Indian Lake to 842 feet, it was not specified until 1981 11 30;

  Observance:

  The Minister's letter was not received by Manitoba Hydro until 1981 12 02. According to the gate adjustment record, the Committee on Priorities and Policy was the body that gave the instruction to reduce the flow. The gate change to reduce the flow from 21,000 to 20,000 cfs was made on Monday 1981 12 14. From 1981 12 02 to 1981 12 12 the weekly average flows were 20,877 and 20,860 cfs. During the remaining part of that winter, there were three events where weekly average flows ranged from 20,105 to 20,133 cfs. Figure 3 shows this graphically.

  A copy of the 1981 10 30 and 1981 11 30 letters are located on pages 216 and 217 respectively.

- Notigi summer flow authorizations from 1982 to 1985

  Condition:

  Permit the average weekly flow at the Notigi Control Structure to be increased from 30,000 cfs to 35,000 cfs;

  Observance:

  Figure 3 shows that Notigi outflows never exceeded 35,000 cfs during this period.

- Notigi winter flow authorizations from 1982/83 to 1985/86

  Condition:

  Various statements providing permission to increase the average weekly flow at the Notigi Control Structure from 30,000 cfs to 33,000 cfs;

  Observance:

  There was one event (1983 10 02 to 1983 10 15) when the flow exceeded the maximum by up to 171 cfs. The target outflow throughout this period was 33,000 cfs in accordance with the authorization. The deviations were caused by fluctuations in the Notigi forebay.

Additional Conditions: (see next page)

Additional Conditions:

- Nelson House maximum permissible level for the summers of 1981 and 1982:

  Condition:

  Maximum level was set at 800 feet.

  Observance:

  The level of 800 feet was not exceeded as shown in Figure 6.

- Footprint Lake maximum permissible water level for the winter of 1982/83:

  Condition:

  Maximum level was set at 800 feet.

  Observance:

  The level of 800 feet was not exceeded as shown in Figure 6.

APPENDIX D – continued (1981 10 30 letter)

MANITOBA
MINISTER
NATURAL RESOURCES
WINNIPEG
R3C 0V8

MAN HYDRO
NOV 3 1981
PRESIDENT & CHIEF
EXECUTIVE OFFICER

October 30, 1981

Mr. L.D. Blachford,
President and Chief Executive Officer,
Manitoba Hydro,
P.O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Blachford:

This is in response to Mr. J.F. Funnell's memorandum of October 14, 1981 to Mr. T.E. Weber in which Manitoba Hydro requested permission to exceed the provision contained in Article 10 of the Interim Licence for the diversion of water from the Churchill River to the Nelson River, and the impoundment of water on the Rat River and Southern Indian Lake. The specific request was to receive permission to allow the lowering of Southern Indian Lake to elevation 842.0 feet. The memorandum further requested reconfirmation of the permission earlier granted to draw the Notigi forebay down to 834.0 feet.

Accordingly, Manitoba Hydro is hereby authorized to exceed the limit imposed by Article 10 of the above quoted licence and may draw Southern Indian Lake down to an elevation of 842.0 feet during the period between now and April 30, 1982. Furthermore, this will reconfirm the permission granted earlier to draw the Notigi forebay down to 834.0 feet during the period from now to March 31, 1982. During these periods all other articles of the licence shall remain in force and it is further understood that the necessary notices re changes in flow required under the Northern Flood Agreement are issued to the appropriate authorities.

Yours truly,

Original Signed By:
Harry J. Enns

c.c. Honourable D.W. Craik

APPENDIX D – continued (1981 11 30 letter)

MANITOBA

DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH
1577 DUBLIN AVENUE
WINNIPEG, MANITOBA
R3E 3J5

File: 61.1.10

November 30, 1981.

Mr. J. F. Funnell,
General Counsel,
Manitoba Hydro,
P. O. Box 815,
WINNIPEG, Manitoba.
R3C 2P4

Dear Mr. Funnell:

Re: Churchill River Water Supply.

I have for reference your memorandum of November 23, 1981 requesting verification on the Minister's letter of October 30, 1981, under which permission was granted to Manitoba Hydro to vary the terms of the Interim Licence for the diversion of water from the Churchill River to the Nelson River, and the impoundment of water on the Rat River and Southern Indian Lake.

In respect to your request for clarification, I provide the following comments:

1. WAS IT YOUR INTENTION THAT THIS PERMISSION LIMIT THE MAXIMUM DISCHARGE AT NOTIGI TO 20,000 C.F.S., OR WOULD MANITOBA HYDRO BE PERMITTED A HIGHER DISCHARGE AT NOTIGI AS LONG AS THE SOUTHERN INDIAN LAKE ELEVATION DID NOT FALL BELOW 842.0?

   It was the understanding of the Department that Manitoba Hydro would be permitted to draw the water elevation on Southern Indian Lake down to 842.0 to maintain a flow of 20,000 c.f.s. through the Notigi structure. The objective of the variance granted was not related to the elevation of Southern Indian Lake but was related to Hydro's requirement of 20,000 c.f.s. through Notigi, and in order to reach this objective Southern Indian Lake could recede to elevation 842.0 but it was not the intention to permit Hydro to exceed the 20,000 c.f.s. discharge nor to allow Southern Indian Lake to drop below elevation 842.0.

– – – 2

APPENDIX D – continued (1981 11 30 letter)

WAS IT YOUR INTENTION THAT BY MAY 1, 1982, THE ELEVATION OF SOUTHERN INDIAN LAKE SHOULD BE BACK WITHIN THE LICENCE RANGE, I.E. ABOVE 844, OR WAS IT YOUR EXPECTATION THAT REPONDING FROM 842 TO 844 WOULD TAKE PLACE DURING THE SPRING FRESHET AFTER APRIL 30, 1982?

The intention of the variance was that reponding of Southern Indian Lake would commenc on May 1, 1982 with the objective of reaching the elevation 844 as quickly as possible.

Yours truly,

T. E. Weber, P. Eng.,
Director.

2 02 - XC to J.J. Arnason
W.J. Tishinski
P.M. Abel

2 03 xc L.D. Blachford, "JJA"

APPENDIX E
SPECIFIC OBSERVANCES RELATED TO ARTICLE 15 OF THE INTERIM WATER POWER ACT LICENCE
(Limit on flow changes)

15 (a) - Missi

Discussion on observation of Interim Licence term 15(a)

Missi outflow is calculated using the daily average water level from the Missi control structure forebay gauge and the spill gate setting records. The time of day of consecutive gate changes can lead to adherence issues with this term of the licence. Four instances exist where Manitoba Hydro deviated from this term of the licence.

1976 10 17

Missi outflow was increased from 37,000 cfs to 49,000 cfs to keep the level of Southern Indian Lake below 847.0 feet during a period of high inflow. This increase was disclosed to the Province in the 1976 10 20 Churchill River Diversion Schedule as shown on the following page.

1977 04 27

High local inflow caused a rapid rise in the level of Southern Indian Lake. Outflow was increased from 26,500 cfs to 36,500 cfs at 13:25 on 1977 04 27. An additional 10,000 cfs was added on 1977 04 27 at 08:20 resulting in a deviation from this term of the licence. This increase was disclosed to the Province in the 1977 04 27 Churchill River Diversion Schedule as shown on page 221.

1978 09 03

A rapid increase in outflow from Missi control structure in late August 1978 was successful in halting the rise in water level on Southern Indian Lake. Once the lake began declining Missi outflow was decreased to minimize spill. The flow reduction was too aggressive resulting in a 24-hour change of 16,400 cfs and 11,930 cfs on 1978 09 02 and 03 respectively. This decrease was disclosed to the Province in the 1978 09 06 Churchill River Diversion Schedule as shown on page 222.

1980 08 26

Extremely heavy rainfall over northern Manitoba necessitated a steady increase in Missi outflow up to 50,000 cfs. The last increase from 30,480 cfs to 50,000 cfs was performed on 1980 08 26 at 10:00 resulting in a daily average outflow of 41,630 cfs a difference of 11,160 cfs over the previous day. This increase was disclosed to the Province in the 1980 08 27 Churchill River Diversion Schedule as shown on page 223.

APPENDIX E – continued (1976 10 20 weekly Churchill River Diversion Schedule)

DATE October 20, 1976

I- 610

CHURCHILL RIVER DIVERSION SCHEDULE

For the week commencing Monday October 25, 1976 and ending Sunday October 31, 1976

A. PRESENT CONDITIONS (Weekend elevations; weekly average flows)

As of Sunday	October 10	October 17	Change
Reindeer Lake – Rocky Falls	109.92	109.94	+ 0.02
Reindeer River – Whitesand Dam	23,190 cfs	23,140 cfs	+ 50 cfs
Churchill River – Island Falls	39,570 cfs	39,490 cfs	– 80 cfs
Southern Indian Lake – South Bay	846.81	846.88	+0.07
" " " – Missi	846.87	846.97	+0.10
" " " – Weighted Av.	846.84	846.92	+0.08
" " " – Inflow	53,610 cfs	48,300 cfs	–5310 cfs
Missi Forebay	846.78	846.80	+0.02
Churchill River – Missi Falls	37,000 cfs	37,000 cfs	0 cfs
Notigi Forebay	846.62	846.82	+0.20
Notigi Forebay Inflow	11,870 cfs	13,190 cfs	+1320 cfs
Rat River – Notigi Control Outflow	10,200 cfs	10,800 cfs	+600 cfs
Footprint Lake – Nelson House	787.80	788.30	+0.50
Burntwood River – Thompson	606.22	606.54	+0.32
" " – Thompson	10,050 cfs	10,900 cfs	+850 cfs

B. REGULATION SCHEDULE for the week commencing Monday October 25, 1976

NOTIGI: ☐ Change from last week ☒ No Change from last week

GATE	1	2	3
OPENING	4.3	4.3	Closed

Total estimated outflow 10,800 cfs

MISSI: ☒ Change from last week ☐ No Change from last week

GATE	1	2	3	4	5	6
OPENING	Closed	8	Full Open	Full Open	8	Closed

Estimated house unit 0 cfs

Estimated spillway 49,000 cfs

Total estimated outflow 49,000 cfs

C. FUTURE REGULATION PLANS AND OTHER COMMENTS:

Miss Falls gates changed on October 19 at 14:30 hrs.
This increase is due to high inflows into Southern Indian Lake and is only a temporary measure till inflows have declined.

Manitoba Hydro
System Operating Dept.
System Operations Division

Authorized by Norm Mullin
Reservoir & Energy Resources Engineer

PMA/rd

APPENDIX E – continued (1977 04 27 weekly Churchill River Diversion Schedule)

DATE April 27, 1977

I- 610

CHURCHILL RIVER DIVERSION SCHEDULE

For the week commencing Monday May 2, 1977 and ending Sunday May 8, 1977

A. PRESENT CONDITIONS (Weekend elevations; weekly average flows)

As of Sunday	April 17	April 24	Change
Reindeer Lake – Rocky Falls	108.21	108.42	+0.21
Reindeer River – Whitesand Dam	17,317 cfs	13,539 cfs	-3778 cfs
Churchill River – Island Falls	25,483 cfs	27,895 cfs	+2412 cfs
Southern Indian Lake – South Bay	846.19	846.65	+0.46
" " " – Missi	846.36	846.86	+0.50
" " " – Weighted Av.	846.27	846.76	+0.49
" " " – Inflow	33,630 cfs	60,550 cfs	+26,920 cfs
Missi Forebay	846.43	846.86	+0.43
Churchill River – Missi Falls	23,010 cfs	25,610 cfs	+2600 cfs
Notigi Forebay	846.48	846.86	+0.48
Notigi Forebay Inflow	16,810 cfs	16,380 cfs	-430 cfs
Rat River – Notigi Control Outflow	11,000 cfs	11,080 cfs	+80 cfs
Footprint Lake – Nelson House	789.05	790.57	+1.52
Burntwood River – Thompson	608.07	609.61	+1.54
" " – Thompson	13,120 cfs	16,580 cfs	+3460 cfs

B. REGULATION SCHEDULE for the week commencing Monday May 2, 1977

NOTIGI: ☐ Change from last week ☒ No Change from last week

GATE	1	2	3
OPENING	4.7	4.7	Closed

Total estimated outflow 11,100 cfs

MISSI: ☒ Change from last week ☐ No Change from last week

GATE	1	2	3	4	5	6
OPENING	Closed	6.6	Full Open	Full Open	6.6	Closed

Estimated house unit – cfs

Estimated spillway 46,500 cfs

Total estimated outflow 46,500 cfs

C. FUTURE REGULATION PLANS AND OTHER COMMENTS:

High local inflows have caused a rapid rise in stage in the Churchill River Diversion system including Southern Indian Lake. Missi Falls outflow was increased in two steps:

1) April 26 – 36,500 cfs @ 13:25 hrs.
2) April 27 – 46,500 cfs @ 8:20 hrs.

This is a temporary measure till the lake level subsides.

Manitoba Hydro
System Operating Dept.
System Operations Division

Authorized by Peter M Bohl
Reservoir & Energy Resources Engineer

PMA/rd

APPENDIX E – continued (1978 09 06 weekly Churchill River Diversion Schedule)

CHURCHILL RIVER DIVERSION SCHEDULE — DATE SEPTEMBER 6, 1978

FOR THE WEEK COMMENCING MONDAY SEPTEMBER 4, 1978 AND ENDING SUNDAY SEPTEMBER 10, 1978

A. PRESENT CONDITIONS (WEEKEND ELEVATIONS; WEEKLY AVERAGE FLOWS)

AS OF SUNDAY	AUGUST 27	SEPTEMBER 3	CHANGE
REINDEER LAKE - ROCKY FALLS	*1,103.94	1,104.38	+0.44
REINDEER RIVER - WHITESAND DAM	7,630CFS	7,690CFS	+60CFS
CHURCHILL RIVER - ISLAND FALLS	*25,130CFS	24,360CFS	-770CFS
SOUTHERN INDIAN LAKE - SETTLEMENT	847.27	847.00	-0.27
" " " - OPACHUANAU L	847.25	847.02	-0.23
" " " - MISSI	847.42	846.92	-0.50
" " " - WEIGHTED AV.	847.31	846.98	-0.33
" " " - INFLOW	*54,800CFS	53,820CFS	-980CFS
MISSI FOREBAY	847.29	846.92	-0.37
CHURCHILL RIVER - MISSI FALLS	32,950CFS	42,850CFS	+9900CFS
DIVERSION CHANNEL - S. BAY OUTFLOW	*21,850CFS	20,030CFS	-1820CFS
SOUTHERN INDIAN LAKE - TOT. OUTFLOW	*54,800CFS	62,880CFS	+8080CFS
NOTIGI FOREBAY	846.16	845.76	-0.40
NOTIGI FOREBAY INFLOW	25,320CFS	19,230CFS	-7090CFS
RAT RIVER - NOTIGI CONTROL OUTFLOW	24,940CFS	25,230CFS	+340CFS
FOOTPRINT LAKE - NELSON HOUSE	796.96	796.71	-0.25
BURNTWOOD RIVER - THOMPSON	615.73	615.48	-0.25
" " - THOMPSON	*30,260CFS	29,610CFS	-650CFS

B. REGULATION SCHEDULE FOR THE WEEK COMMENCING MONDAY SEPTEMBER 4, 1978

NOTIGI: CHANGE FROM LAST WEEK

GATE	1	2	3	
OPENING	8.1	8.1	8.1	TOTAL ESTIMATED OUTFLOW 27000 CFS

MISSI: CHANGE FROM LAST WEEK

GATE	1	2	3	4	5	6
OPENING	CLOSED	CLOSED	7.5	7.5	CLOSED	CLOSED

ESTIMATED HOUSE UNIT 180 CFS — ESTIMATED SPILLWAY 15000 CFS — TOTAL ESTIMATED OUTFLOW 15180 CFS

C. FUTURE REGULATION PLANS AND OTHER COMMENTS:

MISSI FALLS GATES ADJUSTED ON SEPTEMBER 1,1978 @ 14:20 HRS.
MISSI FALLS GATES ADJUSTED ON SEPTEMBER 2,1978 @ 12:20 HRS.
NOTIGI GATES ADJUSTED ON SEPTEMBER 2,1978 @ 10:00 HRS.
* REVISED

MANITOBA HYDRO
SYSTEM OPERATING DEPT.
SYSTEM OPERATIONS DIVISION

AUTHORIZED BY A. W. Franchuk
RESERVOIR & ENERGY RESOURCES Assistant

APPENDIX E – continued (1980 08 27 weekly Churchill River Diversion Schedule)

CHURCHILL RIVER DIVERSION — WEEKLY REPORT — DATE AUGUST 27, 80

A 168-HOUR RECAPITULATION (WEEKEND ELEVATIONS) — WEEKLY AVERAGE FLOWS) — IN ENGLISH UNITS

FOR WEEK ENDING SUNDAY AUGUST 17 AUGUST 24 CHANGE

REINDEER LAKE – ROCKY FALLS	1,101.64	1,101,187	+0.23
REINDEER RIVER – WHITESAND DAM	15,750CFS	15,780CFS	+30CFS
CHURCHILL RIVER – ISLAND FALLS	22,960CFS	22,410CFS	-550CFS
CHURCHILL RIVER – LEAF RAPIDS	31,510CFS	31,620CFS	+110CFS
SOUTHERN INDIAN LAKE – SETTLEMENT	* 847.23	847.15	-0.08
" " – UPACHUANAU L	* 847.29	847.12	-0.17
" " – MISSI	847.50	847.42	-0.08
" " – WEIGHTED AV.	* 847.34	847.23	-0.11
" " – INFLOW	* 37,370CFS	46,950CFS	+9580CFS
MISSI FOREBAY	* 847.37	847.60	+0.23
CHURCHILL RIVER – MISSI FALLS	11,100CFS	25,370CFS	+14270CFS
DIVERSION CHANNEL – S. BAY OUTFLOW	* 29,770CFS	27,980CFS	-1790CFS
SOUTHERN INDIAN LAKE – TOT. OUTFLOW	* 40,870CFS	53,350CFS	+12480CFS
NOTIGI FOREBAY	844.79	845.26	+0.47
NOTIGI FOREBAY INFLOW	30,320CFS	35,630CFS	+5310CFS
NOTIGI CONTROL OUTFLOW	29,810CFS	29,700CFS	-110CFS
FOURPRINT LAKE – NELSON HOUSE	797.77	797.70	-0.07
BURNTWOOD RIVER – THOMPSON	615.37	615.92	+0.55
– THOMPSON	* 30,600CFS	31,660CFS	+1060CFS

PRESENT OPERATION FOR THE WEEK COMMENCING MONDAY AUGUST 25, 1980

NOTIGI: CHANGE FROM LAST WEEK

GATE	1	2	3			TOTAL ESTIMATED OUTFLOW
OPENING(FT)	---8.0---	---8.0---	---8.0---			---28000--- CFS

MISSI: CHANGE FROM LAST WEEK

GATE	1	2	3	4	5	6
OPENING(FT)	CLOSED	---8.0---	FULL OPEN	FULL OPEN	---8.0---	CLOSED
ESTIMATED HOUSE UNIT	---180--- CFS	ESTIMATED SPILLWAY	---49820--- CFS	TOTAL ESTIMATED OUTFLOW	---50000--- CFS	

CHURCHILL REGULATION CHANGES AND OTHER COMMENTS:

NOTIGI GATES LOWERED TO 9.3' ON AUG 20,1980 @17:30 HRS.Q=30000 CFS
MISSI GATES #3+4 RAISED TO 10.1' ON AUG 22,1980 @09:00 HRS.Q=20000 CFS
MISSI GATES #2+5 RAISED TO 5.4' ON AUG 22,1980 @09:00 HRS.Q=30000 CFS
MISSI GATES #3+4 FULLY OPEN ON AUG 26,1980 @10:00 HRS.
MISSI GATES #2+5 RAISED TO 7.5' ON AUG 26,1980 @10:00 HRS.Q=50000 CFS
NOTIGI GATES LOWERED TO 8.6' ON AUG 26,1980 @12:00 HRS.Q=28000 CFS
MISSI GATES #2+5 RAISED TO 8.0' ON AUG 27,1980 @08:30 HRS.Q=50000 CFS

* – REVISED

MANITOBA HYDRO
SYSTEM OPERATING DEPT.

AUTHORIZED BY
RESERVOIR & ENERGY RESOURCES ENGINEER

APPENDIX E – continued

15 (a) - Notigi

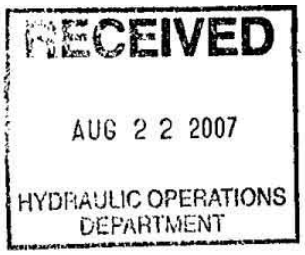
2007 08 24

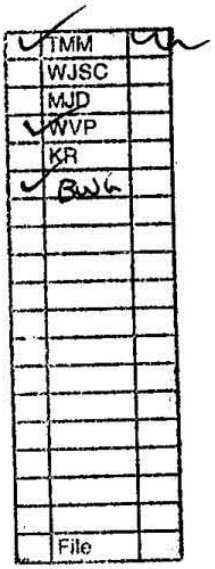
The change in outflow of more than 10,000 cfs was authorized in a 2007 08 16 letter by the Executive Director of Regulatory and Operational Services to facilitate dam safety inspection. A copy of the letter is shown on the following two pages.

2009 09 23

The exceedance in change of more than 10,000 cfs occurred during October 19 and 20, 2009 during two flow reductions required to remove a public safety boom for the winter. A 2010 03 17 letter to the Executive Director of Regulatory and Operational Services provides an explanation of these occurrences. The letter also indicates that measures have been taken to ensure that future operations of this nature either comply with the terms of the licence or are pre-authorized. A copy of this letter is shown on page 227.

APPENDIX E – continued (2007 08 16 letter)





Manitoba

Water Stewardship
Executive Director
Regulatory and Operational Services
Box 11, 200 Saulteaux Crescent
Winnipeg, Manitoba, Canada R3J 3W3
T 204-945-7488 **F** 204-945-7419
Steve.Topping@gov.mb.ca

FILES: 61.1.10

August 16, 2007

T. M. Miles, P. Eng.
Manager
Hydraulic Operations Department
Manitoba Hydro
820 Taylor Avenue
Winnipeg MB R3M 3T1

Dear Mr. Miles:

RE: NOTIGI CONTROL STRUCTURE - DAM SAFETY INSPECTION - 2007

I have reviewed your request for authorization to deviate from Article 15(a) of the CRD Water Power Act Licence and change the Notigi Control Structure outflow by more than 10,000 cubic feet per second (cfs) in a 24 hour period to facilitate a dam safety inspection between the dates of August 24, 2007 and August 26, 2007 inclusive. Prior to the reductions in excess of 10,000 cfs in a 24 hour period, the flow through the Notigi Control Structure will be increased from 35,000 cfs to 38,000 cfs on August 20, 2007.

Manitoba Hydro is hereby authorized to make changes to the Notigi Control Structure outflow by more than 10,000 cubic cfs in a 24 hour period in accordance with the following schedule:

1. August 24, 2007 - decrease flow from 38,000 cfs to 0 cfs for a period of approximately 8 – 10 hours, after which flow will be increased back to 38,000 cfs

2. August 25, 2007 - decrease flow from 38,000 cfs to 0 cfs for a period of approximately 8 - 10 hours, after which flow will be increased back to 38, 000 cfs.

3. August 26, 2007 - decrease flow from 38,000 cfs to 0 cfs for a period of approximately 4 - 5 hours, after which flow will be increased back to 35,000 cfs.

Manitoba
spirited energy

APPENDIX E – continued (2007 08 16 letter)

Subject to:

1. The Northern Flood Committee and the local residents are advised of the operating schedule prior to its implementation; and

2. Manitoba Hydro will fully mitigate any effects of the altered levels and flows.

Yours truly,

for Steve D. Topping, P. Eng.
Executive Director

c: A/Deputy Minister
D. Dodds

APPENDIX E – continued (2010 03 17 letter)

Manitoba Hydro

P.O. Box 815 • Winnipeg Manitoba Canada • R3C 2P4
Telephone / *N° de téléphone :* (204) 360-3018 • Fax / *N° de télécopieur :* (204) 360-6136
wvpenner@hydro.mb.ca

2010 03 17

Our file: 00188-09600-0011_00

Mr. S.D. Topping, P.Eng.
Executive Director, Regulatory and Operational Services
Manitoba Water Stewardship
Box 11 - 200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

Dear Mr. Topping:

Re: **CHURCHILL RIVER DIVERSION (NOTIGI CONTROL STRUCTURE) - WATER POWER ACT LICENCE - 24-HOUR DISCHARGE RATE OF CHANGE ABOVE LICENCE LIMIT**

The 24-hour discharge rate of change licence limit at Notigi Control Structure was exceeded during operations required for maintenance on October 19 and 20, 2009.

Flow reduction was required in order to remove the public safety boom for the winter. The boom was removed in two parts over two days. On October 19, the flow was reduced from 35,000 cubic feet per second to 22,900 cfs around 1:00 PM, resulting in the 24-hour rate of change limit of 10,000 cfs being exceeded. The flow reduction lasted approximately two hours and the flow was returned to 35,000 cfs at 3:00 PM.

A similar flow reduction occurred on October 20 at 11:00 AM when the flow decreased from 35,100 cfs to 23,000 cfs, once again resulting in the licence limit exceedance. The flow was returned to 35,000 cfs at 1:00 PM. These flow reductions were necessary for safety reasons since the boom removal crew had to work from a boat in close proximity to the control structure.

We have taken measures to ensure that future operations of this nature either comply with the terms of the Churchill River Diversion Water Power Act licence or are pre-authorized by you or your staff.

If you have any further questions related to this issue, please call me at 360-3018.

Yours truly,

Original signed by: *Wesley Penner*

W.V. Penner, P.Eng.
Manager
Hydraulic Operations Department

JP/lm/00188-09600-0011_00.doc

bc: G. Ratushniak

APPENDIX E - continued

Discussion on observation of Interim Licence Term 15(b)

There are several years where authorizations were granted that either reduced the lower limit or increased the upper limit or both where this clause (15(b)) was not specifically amended. In these cases Manitoba Hydro has assumed that there was an implied permission. The approvals in which these occurred are for the winter of 1981/82 to the summer of 1982 and for the period from the summer of 1983 to the summer of 1986. Manitoba Hydro also assumes that where seasonal drawdown variations were granted, that the drawdown limit having the greater limit applies for that 12 month period. Figure 10 shows the drawdown limit applying to the 12 months preceding the last day of the applicable period.

Manitoba Hydro's interpretation and the Water Resources Branch concurrence can be seen in the copies of the 1981 04 29 and 1981 05 12 letters on the following three pages.

Observation of Interim Licence term 15(b) during periods without approved alterations

Based on the understanding stated above, Manitoba Hydro achieved 100% adherence as shown in Figure 10.

Implied Authorizations

The range of authorization varied from 3.0 feet to 5.0 feet.

Observance:

- The 1981 to 1982 excursion was authorized by implication in a 1981 11 30 letter that authorized the elevation of Southern Indian Lake to be drawn down to 842 feet. As the upper limit was 847.0, the drawdown range would be 5.0 feet. The maximum water level was 846.2 feet, so that the actual draw was around four feet. A copy of the 1981 11 30 letter is shown in Appendix D, page 217.
- The apparent 1983/84 violation was due to a four-month four-foot drawdown authorization followed by a two-foot drawdown which is calculated on the previous 12 months. The four-foot drawdown period was authorized by a 1982 12 17 letter from Water Resources Branch and was valid from the date of the letter to 1983 04 15. As the drawdown during this period was not exceeded it is not considered a violation. A copy of the 1982 12 17 letter is shown on page 232.

Observation of Interim Licence term 15(c) during periods with and without approved alterations:

Manitoba Hydro achieved 100% adherence with the minimum water level immediately upstream of the Notigi Control Structure as shown in Figure 11.

APPENDIX E – continued (1981 04 29 memo referred to in Section 2 – Article 15)

P. M. Abel, P. Eng.

Reservoir and Energy Resources Engineer
System Operating Department

Mr. T. E. Weber, P. Eng.

Director

Water Resources Division

1981 04 29

73D6

Churchill River Diversion

Provision 15(b) of the Interim License for the Churchill River Diversion Project reads as follows:

"15(b) The drawdown in water level in Southern Indian Lake during any 12 month period shall not exceed two feet".

We interpret this to mean drawdown within the license limits of elevations 847.0 to 844.0 and not to include draw which was a result of spillage during a flood condition. This occurred last summer when Southern Indian Lake rose to 847.52 on August 25, 1981 as the result of heavy summer rains and was returned to elevation 847.0 by heavy spillage at Missi Falls.

Therefore under provision 15(b) as interpreted above, the present limiting draw elevation would be 845.0.

During the winter there is the normal development of ice along the waterway from South Bay, through several lakes to Notigi, which requires a significant hydraulic gradient for the water to flow. However with the coming of spring, the ice disappears in the faster flowing reaches, thereby reducing the resistance to flow and leading to the much gentler gradients required for the open water season. But in the process there is a short period of steep gradients and open water which results in heavy outflows from Southern Indian Lake.

This situation has occurred this year with the lake falling faster than planned. As of April 28 Southern Indian Lake is at 845.02 and is forecast to decline further to 844.80 before beginning to repond around the end of the first week of May. Recent reductions in Notigi outflows from 32,000 cfs to 28,000 cfs and Missi outflows from 6,000 cfs to 4,000 cfs will make this turnaround possible when combined with the natural spring freshet on the basin.

Further reductions at Missi Falls to 1500 cfs as provided under section 12 of the Interim License from the present 4,000 cfs are possible, to keep the lake from violating the two foot draw rule. However as there are approximately seven weeks until breakup occurs on the Lower Churchill River, any reduction at Missi now will risk the water supply to the Town of Churchill. Therefore we would prefer not to exercise this option in order to keep the two foot draw rule.

APPENDIX E – continued (1981 04 29 memo referred to in Section 2 – Article 15)

The other option available would be an immediate cutback at Notigi. The volume required to repond the forebay to 845.0, thus stemming the outflow through the South Bay Channel is approximately 20,000 cfs weeks. A cutback of this magnitude would cause the water supply at Kettle and Long Spruce to be reduced at a critical time when flows at these plants are already extremely low. It would therefore be our preference not to cut Notigi flows either.

Therefore, as Southern Indian Lake will be reponding very shortly with the coming of spring and flows at Missi and Notigi are at practical minimums, we request your written permission to exceed the two foot draw limit as stipulated in section 15(b) of the Interim Licence of the Churchill River Diversion. As indicated above we estimate the extent of violation to be 0.20 feet and we would further estimate the duration of the violation to be approximately two weeks.

ORIGINAL SIGNED BY
P. M. ABEL

ADC/eeh

APPENDIX E – continued (1981 05 12 memo referred to in Section 2 – Article 15)

May 12, 1981

TO Mr. P.M. Abel, P. Eng.
Reservoir & Energy Resources
Engineer
Manitoba Hydro
P.O. Box 815
Winnipeg, Manitoba

T.E. Weber, P. Eng.
Director
Water Resources Branch
1577 Dublin Avenue

File: 61.1.10

CHURCHILL RIVER DIVERSION

This is in response to your memorandum of April 29, 1981 in which you indicated that it would not be advisable to meet the terms of Article 15(b) of the Interim License for the Churchill River Diversion Project because this would necessitate a reduction in the outflow at Missi Falls below 4,000 c.f.s. thereby causing a risk to the water supply for the Town of Churchill. I agree that this would not be desirable and therefore have no objection to your exceeding slightly the drawdown beyond that stipulated in Article 15(b) of the license of two feet in a 12 month period.

It is apparent from information gained to date that certain articles in the Interim License should be changed. These will be considered when drafting the Final License for the Churchill River Diversion. In the meantime, I would ask that we be informed of the need for variations of the requirements of the Interim License as far in advance as possible in order that official Ministerial approval of such action can be given prior to taking the action.

ORIGINAL SIGNED BY
T. E. WEBER

T.E. Weber

NM:jph
c.c. Hon. Harry J. Enns
J.D. McNairnay, Q.C.
D.C. Surrendi

APPENDIX E – continued (1982 12 17 letter)

MANITOBA
MINISTER
NATURAL RESOURCES
WINNIPEG
R3C 0V8

December 17, 1982

Mr. J.J. Arnason,
General Manager,
Corporate Operations,
Manitoba Hydro,
P.O. Box 815,
Winnipeg, Manitoba.
R3C 2P4

Dear Mr. Arnason:

This is in response to your memorandum of December 2, 1982 to Mr. Weber in which you requested permission to draw Southern Indian Lake down to the same level as last winter. It is noted that last winter's program was monitored with monthly bulletins issued to all interested parties and that no adverse impacts were reported.

In response to this request I wish to advise that Manitoba Hydro is hereby authorized to exceed the limits imposed by Articles 10 and 15 (b) of the Churchill River Diversion Interim Licence and may draw Southern Indian Lake down to an elevation of 843.0 feet A.S.L. between now and April 15, 1983.

I am pleased to note from the last paragraph of your memorandum of December 2, 1982 that copies of that memorandum have been forwarded to all parties normally receiving monthly bulletins of Churchill River Diversion operations and special test programs. I would further request that you consult with all these parties to ascertain whether or not there are objections. If there are objections I would request that these be overcome before initiating the action authorized herein.

It is understood that Manitoba Hydro will undertake to cover the cost of mitigating any environmental damage incurred by the lower level on Southern Indian Lake and the changes in flow resulting from

. . . . 2

APPENDIX E – continued (1982 12 17 letter)

Mr. J.J. Arnason 2

the authorized variation in the licence.

Yours truly,

Original Signed By:
Al Mackling

c. Honourable Jay Cowan
J.I. Keeper, NFC Inc.
Chief Rodney Spence, Nelson House Band
V.J. Martin, Man. Keewatinowi Okemakanak
Mayor S. Ducharme, S.I.L.
N. Meade, NACC
Mayor D. McLean, Thompson
B. Thompson, LGD of Mystery Lake
G. Bloodworth, DIAND
A. Miles, Northern Affairs
N. Brandson, MEAR/IPB

83 01 06 xc W.J. Tishinski
C.J. Goodwin

APPENDIX F
LIST OF FINAL CONSTRUCTION PLANS

Water Branch Drawing No.	Manitoba Hydro Drawing No.	Description
---------- General ----------		
60-1-1009 (Sheets 1 to 32)	1-00188-PE-11510-0002 (32 Sheets)	Severance Line and Lands Required for Flooding and Other Purposes
---------- Churchill Weir ----------		
	1-00531-DE-13510-0001 (Sheet 1)	Churchill Weir – Project Layout and General Arrangement
	1-00531-DE-13510-0002 (Sheet 1)	Churchill Weir – Material Sources, Gradation Curves and Access Route
	1-00531-DE-13510-0003 (Sheet 1)	Churchill Weir – Plan & Profile
	1-00531-DE-13510-0003 (Sheets 2 & 3)	Churchill Weir – Sections & Details
	1-00531-DE-13510-0004 (Sheets 1 & 2)	Churchill Weir – D/S Drainage Clearing & Details
	1-00531-DE-13510-0005 (Sheet 1)	Churchill Weir – Fishway Station 18+15 to 21+15 Layout
	1-00531-DE-13510-0005 (Sheet 2)	Churchill Weir – Fishway Station 18+15 to 21+15 Sections & Details
	1-00531-DE-13510-0006 (Sheet 1)	Churchill Weir – Goose Creek Fishway Structure Fill Placement Detail
	1-00531-DE-13510-0007 (Sheet 1)	Churchill Weir – Goose Creek Bridge Crossing Structure Plan, Sections and Details
	1-00531-DE-13510-0008 (Sheet 1)	Churchill Weir – Goose Creek Culvert Crossing Plan, Sections and Detail
	1-00531-DE-13510-0009 (Sheet 1)	Churchill Weir – Marina Access Road, Layout & Details

APPENDIX F – continued

Water Branch Drawing No.	Manitoba Hydro Drawing No.	Description
---------- Manasan ----------		
	1-00188-B-00513 0001/00	Manasan Bypass Channel - Site Plan
	00188-C-00618	Manasan Falls Ice Boom Plan & Foundation Details
	00188-E-03909	Manasan Control Structure Rehabilitation
	00188-E-03920	Manasan Bypass Channel-As Built Structures
	1-00188-E-03914 0001	Manasan Bypass Channel Completed Structure Plan & Sections
	1-00188-E-03914 0002	Manasan Bypass Channel Completed Structure Plan & Sections
	7-00188-D-00102	Manasan Control Thompson As Built Plan, Elevations, Contours & Station
---------- Missi ----------		
	7-00187-D-00113	Breakwater-As Built
	1-00187-DF-21000-0002	Earth Dams, Dykes and Breakwater Typical Cross-Sections
	7-00187-D-00093 (8 sheets)	Plan & As Built X-Sections of Main Dyke Permanent Connector Road
	7-00187-D-00109 (38 sheets)	Plan and As-Built X-Sections of Main Dyke
	1-00187-DF-21110-0002 0001/01	North Channel Dam Excavation and Fill (Apr 7/76)
	7-00187-D-00110 (16 sheets)	Plan and As-Built X-Sections of South Channel Dam and Connector Road
	7-00187-D-00091 (6 sheets)	Plan & As Built X-Sections South Dykes
	1-00187-DD-10100-0007	Location of Project and Vicinity Map
	1-00187-DD-10100-0008	Area Plan
	1-00187-DF-21000-0001	General Arrangement of South Channel Structures
	7-00187-D-00094 (4 sheets)	Plan & As Built X-Sections Rock Groin

APPENDIX F – continued

Water Branch Drawing No.	Manitoba Hydro Drawing No.	Description
---------- Missi (continued) ----------		
	7-00187-D-00037 (4 sheets)	Plan & X-Sections of South Transition Structure
	1-00187-E-00202 (2 sheets)	Missi Falls Spillway Channel Cross Sections 1979 (MR)
	1-00187-DF-23100-0004 0001/01	Spillway Plan of Structure and Channel Cross Sections Excavation Plan
	1-00187-DF-23100-0005 0001/01	Spillway Downstream Elevation and Cross-Sections
---------- Notigi ----------		
	7-00185-E-00106 0001/00	Upstream Cofferdam As Constructed After Removal of Crest To 815'
	7-00185-E-00106 0002/00	Upstream Cofferdam As Constructed After Removal of Crest To 815'
	1-00185-DF-23100-0003 0001/01	Spillway Downstream Elevation and Cross Sections /Plate N-4/
	1-00185-DF-23100-0004 0001/01	Plan of Spillway /Plate N-3/
	1-00185-DF-10100-0008 0001/01	Area Plan /Plate N-1/
	1-00185-DF-10100-0009 0001/01	General Arrangement of Structures/ Plate N-2/
	7-00185-D-00107	Site Plan of Project As Constructed
	1-00185-DF-21100-0006 0001/01	Earth Dams Typical Cross Sections/ Plate N-5/
	7-00185-D-00100 (4 sheets)	Main Dam As Constructed
	1-00185-DD-21100-0004 0001/02	Saddle Dam
	7-00185-D-00101 (5 sheets)	Saddle Dam As Constructed

APPENDIX F – continued

Water Branch Drawing No.	Manitoba Hydro Drawing No.	Description
---------- Notigi (continued) ----------		
	7-00185-D-00105	Saddle Dam 2E As Constructed
	1-00185-DD-13310-0001 0001/01	Spillway Channel Slope Protection
	1-00185-DF-23110-0003 0001/05	Spillway Channel Excavation
	1-00185-E-00202 (2 sheets)	Notigi Spillway Channel Cross Sections & Contours 1978
---------- South Bay Diversion Channel ----------		
	7-00186-E-00393 (6 sheets)	South Bay Channel As Built
	7-00186-E-00394 (2 sheets)	South Bay Channel As Built Plan Layout

APPENDIX G
DATE AND PERIOD OF LICENCE AMENDMENTS

Date of amendment	Period of amendment
1979 11 15 and 1979 09 20	1979 09 15 to 1980 04 15 (Winter Test Program)
1980 10 21 and 1980 08 28	1980 09 15 to 1981 04 15 (Winter Test Program)
1981 05 25 and 1981 05 22	1981 05 15 to 1981 09 15
1981 11 30 and 1981 10 30	1981 10 30 to 1982 04 30
1982 07 30	1982 07 30 to 1982 09 30
1982 10 26	1982 09 15 to 1983 04 15
1982 12 17	1982 12 17 to 1983 04 15
1983 09 02	1983 09 02 to 1984 05 15
1984 05 15	1984 05 15 to 1984 10 31
1984 11 02	1984 11 01 to 1985 05 15
1985 05 14	1985 05 15 to 1985 10 31
1985 10 22	1985 11 01 to 1986 05 15
1986 04 14	1986 05 15 to 1986 10 31
1986 10 02	1986 11 01 to 1987 05 15
1987 06 09	1987 05 15 to 1987 10 31
1987 11 04	1987 11 01 to 1988 05 15
1988 05 17	1988 05 15 to 1988 10 31
1988 09 26	1988 11 01 to 1989 05 15
1989 05 10	1989 05 16 to 1990 05 15
1990 04 25	1990 05 16 to 1991 05 15
1991 05 14	1991 05 16 to 1992 05 15
1992 04 10	1992 05 16 to 1993 05 15
1993 05 18	1993 05 16 to 1994 05 15
1994 06 13	1994 05 16 to 1995 05 15
1995 04 24	1995 05 16 to 1996 05 15
1996 04 30	1996 05 16 to 1997 05 15
1997 05 09	1997 05 16 to 1998 05 15
1998 05 19	1998 05 16 to 1999 05 15

APPENDIX G – continued

Date of amendment	Period of amendment
1999 04 26	1999 05 16 to 2000 05 15
2000 04 26	2000 05 16 to 2001 05 15
2001 05 14 and 2001 04 19	2001 05 16 to 2002 05 15
2002 04 25	2002 05 16 to 2003 05 15
2003 04 24	2003 05 16 to 2004 05 15
2004 05 14	2004 05 16 to 2005 05 15
2005 07 11	2005 05 16 to 2006 05 15
2006 06 19	2006 05 16 to 2007 05 15
2007 05 02	2007 05 16 to 2008 05 15
2008 05 13	2008 05 16 to 2009 05 15
2009 05 05	2009 05 16 to 2010 05 15