

# DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE

1 AUGUST 2009  
THROUGH 31 JULY 2010



**COLUMBIA RIVER TREATY ENTITY AGREEMENT ON THE  
DETAILED OPERATING PLAN  
FOR CANADIAN STORAGE  
1 AUGUST 2009 THROUGH 31 JULY 2010**

Article XIV 2.(k) of the Columbia River Treaty between Canada and the United States of America (Treaty) provides that the power and duties of the Entities include "*preparation and implementation of detailed operating plans that may produce results more advantageous to both countries than those that would arise from operation under the plans [Assured Operating Plans (AOP)] referred to in Annexes A and B.*"

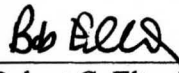
The Entities agree that Treaty storage shall be operated and electric power delivered in accordance with the attached "Detailed Operating Plan for Canadian Storage – 1 August 2009 through 31 July 2010" (the 2009-10 Detailed Operating Plan), dated June 2009.

The Entities agree that the "Columbia River Treaty Principles and Procedures for Preparation and Use of Hydroelectric Operating Plans for Canadian Treaty Storage," dated October 2003, or any future document the Entities agree supersedes the 2003 document, and any Appendices approved by the Operating Committee, will guide the Entities in implementing the 2009-10 Detailed Operating Plan.

In witness thereof, the Entities have caused this agreement to be executed.


Executed for the Canadian Entity this 23<sup>rd</sup> day of June, 2009.

By

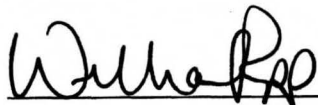
  
Robert G. Elton  
Chair

Executed for the United States Entity this 1<sup>st</sup> day of July, 2009.

By

  
Stephen J. Wright  
Chairman

By

  
Brigadier General William E. Rapp  
Member

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**COLUMBIA RIVER TREATY  
DETAILED OPERATING PLAN  
FOR CANADIAN STORAGE  
1 AUGUST 2009 THROUGH 31 JULY 2010**

**I. REFERENCES AND INTERPRETATION**

In this document:

- A. “Aspects Agreement” means the Entity Agreement on Aspects of the Delivery of the Canadian Entitlement for 1 April 1998 through 15 September 2024 between the Canadian Entity and the United States Entity, dated 29 March, 1999, together with its Attachment A – Points of Delivery and Attachment B - Scheduling Guidelines as they may be subsequently modified or amended by the Operating Committee.
- B. “Assured Operating Plan” (AOP10) means the hydroelectric operating plan developed in accordance with the Columbia River Treaty (Treaty) for the Operating Year as further described in the document “Columbia River Treaty Hydroelectric Operating Plan - Assured Operating Plan for Operating Year 2009-10” dated November 2004.”
- C. “Canadian storage” and “Canadian Treaty Storage” mean the storage provided by Canada under Article II of the Treaty, which is a total of 19.119 cubic kilometers ( $\text{km}^3 = 10^9$  cubic meters) (15.5 million acre feet (Maf)) at the Mica, Duncan, and Arrow reservoirs.
- D. “Detailed Operating Plan” (DOP) means a detailed operating plan prepared for the Operating Year by the Operating Committee pursuant to the guidelines provided in the Principles and Procedures and consisting of the contents of this document.
- E. “Flood Control Operating Plan” (FCOP) means the document “Columbia River Treaty Flood Control Operating Plan,” dated May 2003, including any published updates.
- F. “Libby Coordination Agreement (LCA)” means the “Columbia River Treaty Entity Agreement Coordinating the Operation of the Libby Project With the Operation Of Hydroelectric Plans on the Kootenay River and Elsewhere in Canada”, dated 16 February 2000.
- G. “Libby Operating Plan” (LOP) means the operating plan prepared by the U.S. Army Corps of Engineers (“Corps of Engineers”) on behalf of the U.S. Entity for the Libby project in accordance with Section 9 of the LCA, and incorporated as Attachment B to the LCA.
- H. “Operating Committee” means the Columbia River Treaty Operating Committee.
- I. “Operating Year” means the period from 1 August 2009 through 31 July 2010.
- J. “Principles and Procedures” (POP) means the document “Columbia River Treaty

Principles and Procedures for Preparation and Use of Hydroelectric Operating Plans for Canadian Treaty Storage,” dated October 2003, or any future document the Entities agree supersedes the 2003 document, and any Appendices approved by the Operating Committee.

- K. “Supplemental Operating Agreement” (SOA) means any Entity agreement(s) (signed either by the Entities or the Operating Committee) that authorize Canadian storage operations above or draft below the TSR levels as described in Section IV(A) of this DOP and Section 11 of the LCA, but not including Section 10 of the LCA.
- L. “Treaty Storage Regulation” (TSR) means the Coordinated System hydro regulation study performed for the Operating Committee by Bonneville Power Administration (BPA) staff using actual and forecasted streamflow conditions and implementing operating criteria contained in this DOP, including any changes agreed to under subsection II(E), but excluding subsections IV(D) and SOA operations authorized under subsection IV(A). The TSR is used in accordance with POP and this DOP to determine operational Treaty rights to monthly regulation of Treaty storage.
- M. “Weekly Treaty Storage Operation Agreement” means the note electronically transferred (e-mail or Fax) the last working day of each week from the U.S. Section to the Canadian Section of the Operating Committee to confirm the verbal agreement by the Operating Committee for the weekly Treaty storage changes and outflows that implement this DOP, including any changes agreed to under subsection II(E) and Section IV.

Other capitalized terms used in this document, not defined above, should be interpreted to have the meaning ascribed to them in POP (either in the definitions or the text), the FCOP or the generally accepted meaning within the industry in the Columbia River Basin.

## **II. PREPARATION AND SCOPE**

### **A. General**

This DOP for Canadian storage is based on the operating criteria contained in the AOP10 and its supporting hydro regulation studies with agreed revisions noted in subsection II(D) below, together with scheduling procedures and mutually beneficial changes from the AOP10 data agreed to by the Entities.

This DOP was developed in accordance with the procedures outlined in the POP and incorporates the use of the International System of Units (SI, or Metric); however, for operational purposes, reliance should be placed on measurements in the English system.

### **B. Storage Amounts**

The usable Canadian storage space available for power purposes during the Operating Year is 19.119 km<sup>3</sup> (15.5 Maf) in Canada distributed as follows:

#### Duncan Reservoir

1.727 km<sup>3</sup> (1.4 Maf or 705.8 thousand second-foot-days (ksfd)) between elevations 576.68 meters (m) (1892.0 feet) and 546.87 m (1794.2 feet) as measured at Duncan forebay, and based on British Columbia Hydro and Power Authority (B.C. Hydro) table dated 21 February 1973.

Arrow Reservoir

8.758 km<sup>3</sup> (7.1 Maf or 3579.6 ksf) between elevations 440.13 m (1444.0 feet) and 419.98 m (1377.9 feet) as measured at Fauquier, B.C, and based on B.C. Hydro table dated 28 February 1974.

Mica Reservoir

8.634 km<sup>3</sup> (7 Maf or 3529.2 ksf) between elevations 754.38 m (2475.0 feet) and 707.41 m (2320.9 feet) as measured at Mica forebay, and based on B.C. Hydro table dated 25 March 1974. The total available storage between these elevations is 14.802 km<sup>3</sup> (12 Maf, 6050.0 ksf), but only 8.634 km<sup>3</sup> (7 Maf, 3529.2 ksf) of this storage is utilized for power purposes, except as described in paragraph VII(C)6.

**C. Flood Control**

The requirements for flood control operations are defined in the Treaty and the FCOP. In accordance with Section 6-6 of the FCOP, the Canadian Entity selected for the AOP10 a reallocation of Mica/Arrow system flood control space to be 5.033 km<sup>3</sup> (4.08 Maf) at Mica and 4.441 km<sup>3</sup> (3.6 Maf) at Arrow for the Operating Year. The usable Canadian storage available for normal flood control purposes during the Operating Year will be 1.567 km<sup>3</sup> (1.27 Maf) in Duncan Reservoir below elevation 576.68 m (1892.0 feet), 4.441 km<sup>3</sup> (3.6 Maf) in Arrow Reservoir below elevation 440.13 m (1444.0 feet), and 5.033 km<sup>3</sup> (4.08 Maf) in Mica Reservoir. Additional storage may also be operated for flood control purposes under special circumstances, as described in Section 3-2 of the FCOP.

During the 2009-10 operating year, the Canadian Entity may request a different allocation of Mica/Arrow system flood space. To the extent that the flood control storage allocation differs from that included in the AOP10, the Operating Committee will develop and execute an agreement that will result in the same Treaty flows at the U.S.-Canadian border as that provided in the AOP10, as modified in subsection II(D), unless otherwise agreed by the Operating Committee.

During the refill period, the Canadian Section of the Operating Committee may request local flood control elevations for Arrow with the intent to minimize the occurrence of flows above 165 kcfs at Trail (as measured at Birchbank). The local flood control objective below 225 kcfs will be included in the flood control rule curve and input as the Upper Rule Curve in the TSR studies only to the extent that it does not jeopardize system flood control needs.

In order to accommodate local minimum flow requirements downstream of Duncan Dam, the Canadian Entity has requested a permanent variance for the 2009-10 Operating Year and beyond to the February Duncan flood control draft requirements in the May 2003 FCOP, as described in subsection II(D)2 below. The Corps of Engineers will review this variance request in its normal manner.

**D. Preparation of the Treaty Storage Regulation Study**

The TSR study uses DOP operating criteria for both Canadian and U.S. projects to define a Canadian storage operation. The TSR10 study shall be based on the loads, thermal and other resources, rule curves, non-power constraints, and other plant and operating data contained in the AOP10 Step I hydro regulation study, except for the following changes



agreed to by the Entities.

1. Flood control rule curves for Canadian projects will be defined as noted in subsection II(C) above unless otherwise agreed by the Operating Committee.
2. Contingent on U.S. Entity approval of the Duncan flood control variance request under subsection II(C), limit the Duncan end of February flood control rule curve to no lower than 1812.5 feet (93.1 ksfd). This change does not affect the critical period studies.
3. Use the hydro-independent (HI) generation included in the AER (28 projects) plus the 60-year median values from the AOP10 for HIs not updated in the AER (same procedure as the DOP09). To make this process more consistent with the PNCA AER, we will add the HI operation of the eight Willamette projects to the TSR hydro-regulation model and use the same inflow and elevation data as submitted for the AER.
4. In accordance with Attachment C to the LCA, the maximum January outflow at Arrow in the TSR is limited to 2,265 m<sup>3</sup>/s (80,000 cfs). However, the AOP10 value of 2,011 m<sup>3</sup>/s (71,000 cfs) overrides this requirement as shown in Table 1.
5. Updated forecast errors and distribution factors at Hungry Horse, Grand Coulee, Libby, and Dworshak, based on the July 2008 update to Appendix 8 of the 2003 POP, will be used as shown in Exhibit 10. The Operating Committee may revise forecast errors and distribution factors in accordance with subsection II(E).
6. Updated Canadian forecast errors and distribution factors, based on the July 2008 update to Appendix 8 of the 2003 POP, will be used, as shown in Exhibit 7.
7. For current and future months, Coulee pumping flows from the 1 February 2009 PNCA data submittal, or current forecast values if available, and actual values for after-the-fact months will be used. Adjustments to return flows are not needed because the observed streamflows and streamflow forecasts include return flows.
8. Updated plant data for Mica Storage/Elevation table from the Feb. 2008 NWPP proposal to use 19 data points from the DOP exhibit 15, and from the Canadian Entity Feb. 1, 2009, data submittal, updated plant data for Arrow generation, and adding a data point to the Duncan storage/elevation table. From the Canadian Entity in March 2008, updated Kootenay Lake Storage/Maximum Discharge (MD) data, and from the Canadian Entity in April 2009, updated plant data for Brilliant generation.
9. Updated Grand Coulee and Hungry Horse Storage/Elevation tables to the Feb. 1, 2008 PNCA data submittal, which includes a reduction in total usable storage at Hungry Horse of 45.1 ksfd due to no longer including the assumption of 3% bank storage. The AOP10 rule curves for Hungry Horse (CRC, ARC, VRC, VRCLL, ORCLL, & URC) will be adjusted to subtract 45.1 ksfd from all values, limited to empty, to avoid impact on system storage operation due to the updated data. In the event that the adjustment to Hungry Horse rule curves causes additional Canadian draft in the TSR, which might happen during system operation below the



3<sup>rd</sup> year critical rule curve, the Operating Committee shall agree on a procedure to modify the TSR to prevent the additional Canadian draft.

10. Forecasted streamflows as a percentage of 71-year medians from the 2000 Modified Flows without Grand Coulee pumping will be used.
11. The hydro regulation model used will be PCHYDSIM version 28, or later version if agreed by the Operating Committee.
12. The Dworshak operation will be updated as defined by the February 1, 2009 PNCA data submittal, which is the same as DOP09 except for a slight change in target elevation in July and August. This operation replaces the minimum flow requirement for Lower Granite that was in the AOP10.

Although not changed from the AOP10, some notable assumptions for this TSR include:

13. U.S. flood control curves will include VarQ at Hungry Horse but not at Libby, and will not include Variable End-of-December flood control rule curves at Libby or shifted flood control from Brownlee and/or Dworshak to Grand Coulee.
14. The Canadian flood control curves will not include impacts due to VarQ and Variable End-of-December flood control rule curves at Libby or any impacts related to shifting of flood control from Brownlee and/or Dworshak to Grand Coulee unless otherwise agreed by the Operating Committee.
15. Arrow Project Operating Criteria will be updated based on the procedures defined in subsection VII(B)7 of this DOP.
16. Brownlee's storage operation will be based on critical rule curves and energy content curves included in the AOP10, but the project minimum outflows will be calculated based on the minimum flow requirement at Lime Point.

The TSR includes the operating guides and limits listed in Sections VI and VII of this DOP.

**E. Authorization for Changes to the TSR**

The Operating Committee is authorized to modify the TSR only as needed to correct errors or omissions, update forecast data and procedures, and update the hydroregulation model.

**F. Libby**

Libby operating limits and the expected operation of the Libby project are not included in the DOP. That information is available in the Libby Operating Plan that will be updated by the U.S. Entity when planned operations change. The operation of Libby in the TSR10 will be based on the AOP10 Step 1 operating criteria.

### **III. POWER DELIVERIES**

#### **A. Delivery of the Canadian Entitlement**

The obligation of the United States to return the Canadian Entitlement to Canada for the Operating Year based on the AOP10 is:

$$\begin{array}{lcl} \text{Dependable Capacity} & = & 1,352.3 \text{ MW} \\ \text{Average Annual Usable Energy} & = & 567.1 \text{ aMW} \end{array}$$

Arrangement for the delivery of this Canadian entitlement power, including the point of delivery, transmission losses, and scheduling guidelines, are defined by the Aspects Agreement, and Articles V and VIII of the Columbia River Treaty. Section 11 of Attachment B to the Aspects Agreement delegates to the Operating Committee the responsibility for modifying or amending Attachment B - Scheduling Guidelines, as needed from time to time.

#### **B. LCA Power**

In accordance with Section 7(b) of the LCA, the Canadian Entity shall deliver to the U.S. Entity one (1) average MW, shaped flat, during the Operating Year. In accordance with Section 10 of the LCA, the Entities shall deliver and receive power relating to the provisional draft of Arrow reservoir. The Entities hereby authorize B.C. Hydro and BPA to make suitable arrangements for delivery of LCA power at the points of interconnection between B.C. Hydro and the Federal Columbia River Transmission System.

#### **C. Operational Agreement Power**

In accordance with Section IV of this DOP, the Entities shall make arrangements to deliver and/or receive power required by any SOA. The Entities hereby authorize B.C. Hydro and BPA to make suitable arrangements for delivery of Operational Agreement Power at the points of interconnection between B.C. Hydro and the Federal Columbia River Transmission System.

### **IV. STORAGE OPERATION**

#### **A. Operation Authority**

The operation of Canadian storage by the Operating Committee during the period 1 August 2009 through 31 July 2010 shall be in accordance with this DOP, the FCOP, the LCA, and any SOA applicable to this Operating Year. Consistent with the operating objectives in this section, the Operating Committee is authorized to enter into SOA's consistent with the objectives defined in subsection IV(C) that store above or draft below end-of-month TSR levels, and may include the delivery of power, for mutual benefits that occur during the period covered by this DOP.

#### **B. Canadian Storage Operation**

The Weekly Treaty Storage Operation Agreements shall be based on operating Canadian storage to the end-of-month contents contained in the current TSR study, plus any operations under SOA's and the LCA (as described in subsections C and D below) or as required by the FCOP.

From time to time, due to updated forecasts or differences between forecast and actual inflows, the actual operation of Treaty composite storage will differ from the end of period storage prescribed by the TSR as modified by SOA, LCA, or flood control operations. The Operating Committee will make reasonable efforts to correct these inadvertent differences via the regular Weekly Treaty Storage Operation Agreements in a timely manner without exceeding the specified project limits for discharges and ramp-rates.

**C. Objectives for Supplemental Operating Agreements**

Consistent with the FCOP and operating limits defined in Section VII of this DOP, the objectives for SOA's include the following.

1. Power Objectives:

Power objectives include minimizing spill and optimizing energy production, power marketing, and purchase decisions. Operations for power objectives may be combined with non-power objectives. When appropriate, the Operating Committee will make suitable arrangements for delivery of power relating to sharing of benefits from operational agreements.

2. Non-power Objectives:

Potential Canadian non-power objectives may include, but are not limited to, whitefish and trout spawning downstream of Arrow, dust storm avoidance upstream of Arrow, and recreation needs. Potential U.S. non-power objectives may include, but are not limited to, storage of water up to 1.233 km<sup>3</sup> (1 Maf) for anadromous fish flow augmentation, minimum flows at Bonneville dam and at Vernita Bar for fish spawning, and recreation needs. Non-power objectives considered in this section do not include flood control and operating limits in Section VII.

Recognizing that it may not be possible to meet all non-power objectives, the Operating Committee shall in general attempt to share equally the risk and amount of failure. The parties shall make reasonable efforts to use available flexibility at their projects prior to requesting changes to the Treaty storage operation.

Operations designed to help meet non-power objectives do not imply that either Entity acknowledges any obligation, domestic or international, to meet those objectives. The Entities agree that operations for non-power objectives do not set a precedent concerning any current or future dispute over Treaty rights and obligations, nor do they set a precedent for non-power objectives or flow objectives and contents.

**D. Provisional Draft at Arrow**

The Canadian Section of the Operating Committee may provisionally draft from Arrow reservoir below TSR levels in accordance with Section 10 of the LCA.

**E. General Storage Operation Guidelines**

The values used in the Assured Operating Plan studies to define the various rule curves were period-end values only. In actual operation, it is necessary to operate in such a manner during the course of each period that these period-end values can be achieved in accordance with the operating rules. Due to the normal variation of power load and streamflow during any period, straight-line interpolation between the period-end points should not be assumed. During the storage drawdown season, Canadian storage should

not be drafted below its period-end point at any time during the period unless it can be conservatively demonstrated that sufficient inflow is available, in excess of the minimum outflow required to serve power demand, to refill the reservoir to its end-of-period values as required.

## **V. SCHEDULING STORAGE REGULATION**

### **A. Operating Data**

The Operating Committee will exchange all current operating data necessary for the regulation of Canadian storage projects as soon as available, including the beginning and end of the flood control season.

### **B. Volume Runoff Forecasts**

Seasonal runoff volume forecasts for Canadian Treaty Projects shall be made available by the Canadian Section no later than the fifth working day of each month, as required. The Operating Committee may request forecasts of seasonal runoff volume at periods other than those representing month-end conditions if hydrologic conditions warrant. Seasonal runoff volume forecasts for the Columbia River at The Dalles, Oregon, shall be made available by the U.S. Section no later than the fifth working day of each month, as required.

### **C. Treaty Storage Regulation Study**

The TSR study is performed at least twice each month (within the first nine working days and the last eight working days of each month, unless otherwise agreed by the Operating Committee). Actual unregulated streamflows and forecasted unregulated streamflows will be updated for each TSR study. Variable refill curves, flood control storage evacuation requirements, and variable flood control refill curves will be updated for the first TSR of the month. At the request of either section of the Operating Committee, additional TSR studies shall be performed to reflect the most current unregulated streamflow forecasts and rule curves. The Operating Committee shall agree on procedures for developing streamflow forecasts and rule curves at that time.

Errors and omissions in the TSR will be handled as follows, unless otherwise agreed:

1. All identified errors, omissions, or revisions in the TSR issued during the current Operating Year should be documented and reported to the Operating Committee.
2. Errors/omissions identified within two working days of the initial TSR distribution which, in the view of either Section, may affect the final TSR for the previous operation period or which may impact operations prior to issuance of the next TSR, should be corrected immediately and the TSR re-run. If such errors/omissions are identified after the two-day review period, the TSR will be corrected only if requested by either Section of the Operating Committee.
3. Errors/omissions that do not affect the final TSR for the previous period or impact operations prior to issuance of the next TSR should be corrected in the subsequent TSR.

4. Errors/omissions that affect periods previously finalized and which result in a significant impact to the TSR in future periods, should be brought to the attention of the Operating Committee for resolution.

During the Flood Control Storage Evacuation Period and the Flood Control Refill period, project Flood Control Curves will be determined in August 2009 and January through July 2010 by the Columbia Basin Water Management Division, Northwestern Division, U.S. Army Corps of Engineers, in accordance with the FCOP. These curves will be computed consistent with the timing of the TSR Schedule.

#### **D. Scheduling Agreements**

Unless otherwise agreed, requests by the U.S. Section of the Operating Committee for the regulation of the Canadian storage content will be made to the Canadian Section on a regular basis in accordance with the following procedures:

##### **1. Storage Regulation for Power Operations**

- a) **Timing:** A preliminary request will be made not later than noon each Thursday, followed by a final agreement by noon Friday, or the last working day of the week.
- b) **Confirmation:** The agreed operation will be confirmed in a Weekly Treaty Storage Operation Agreement transmitted via electronic mail or fax on Friday, or the last working day of the week, in accordance with the following format unless otherwise agreed:

This message confirms our verbal agreement on \_\_\_\_\_ (date)  
that the \_\_\_\_\_ (storing/drafting) of an estimated \_\_\_\_\_ ksfd \_\_\_\_\_ (in/from)  
the whole of Canadian storage for the Period \_\_\_\_\_ through \_\_\_\_\_ is  
consistent with the Detailed Operating Plan (DOP).

This agreement is based on an estimated average inflow during the above-mentioned period of \_\_\_\_\_ kcfs to Duncan Reservoir,

\_\_\_\_\_ kcfs to Libby Reservoir,  
\_\_\_\_\_ kcfs to Mica Reservoir, and

Estimated average regulated inflow of \_\_\_\_\_ kcfs to Arrow Reservoir, and an

Estimated regulated outflow of \_\_\_\_\_ kcfs from the Libby Project,

That will result in average weekly Treaty discharges of \_\_\_\_\_ kcfs from the Duncan Project,  
\_\_\_\_\_ kcfs from the Mica Project, and  
\_\_\_\_\_ kcfs from the Arrow Project.

This operation of the whole of Canadian storage is based on the \_\_\_\_\_ (date)  
DOP TSR expected end-of-\_\_\_\_\_ (month, except split April & August)  
storage level for the whole of Canadian storage of \_\_\_\_\_ ksfd.

This operation includes expected \_\_\_\_\_ (storage above/draft below) the  
end-of-\_\_\_\_\_ (month, except April & August) DOP TSR level for the whole  
of Canadian storage of \_\_\_\_\_ ksfd.

Treaty discharges will be made effective at the Canadian-United States border.  
The Weekly Treaty Storage Operation Agreement will be deemed to have been

fulfilled if the total amount of Treaty water agreed to is released from Arrow plus Duncan reservoir provided an amount equal to or greater than the water released from Duncan reservoir is concurrently discharged from Kootenay Lake.

- c) SOA's and LCA: The Weekly Treaty Storage Operation Agreements shall indicate storage operations under any SOA or LCA activity.
  - d) Period Covered by Weekly Treaty Storage Operation Agreement: The period covered by the agreement shall be from Saturday following the date of the weekly request to the following Friday.
  - e) Release Determination: The amount of water released or stored during the period of the Weekly Treaty Operation Storage Agreement will be determined by the changes in reservoir contents based on the recorded reservoir elevation and storage capacity tables for Duncan (Exhibit 12), Arrow (Exhibit 13), and Mica (Exhibit 14). The change in Arrow storage content will be determined using the recorded reservoir elevation at the gauge near Fauquier, B.C.
  - f) Modification: If any modification to a written Weekly Treaty Storage Operation Agreement is agreed by the Operating Committee, a further written Storage Agreement superseding the original will be dispatched immediately by the U.S. Section of the Operating Committee to the Canadian Section of the Operating Committee. In accordance with Section 12 of the LCA, the Canadian Section shall implement at the request of the U.S. Section, up to five (5) mid-week requests for changes to the Canadian storage operation, consistent with this DOP and operating agreements entered into pursuant to this DOP. In addition, upon receipt of the preliminary weekly request each Thursday, the Canadian Section may request a modification to the current week's Treaty Storage Operation as may be necessary to meet flow ramping and fish salvage requirements in transitioning project releases from one Treaty week into the next, subject to agreement by the U.S. Section.
  - g) Provisional Draft: A preliminary request by the Canadian Section for provisional draft from Arrow reservoir, in accordance with Section 10 of the LCA, shall be made concurrent with the preliminary flow request. The provisional draft request will be confirmed not later than 2:00 pm on Thursday, and subsequently documented in the Weekly Treaty Storage Operation Agreement.
  - h) Non-routine Operation: Any special operation that is agreed to by the Operating Committee will be suitably documented.
2. Storage Regulation during Flood Control
- a) Forecasts: Daily time-step streamflow forecasts will be accomplished by use of computer simulation by the National Weather Service River Forecast Center. The regulation center required by the FCOP for the flood regulation will be located in the Columbia Basin Water Management Division, Northwestern Division, U.S. Army Corps of Engineers offices in Portland, Oregon.

- b) Requests for Project Outflows: Pursuant to the operating rules in the FCOP, the outflows from individual Canadian storage projects may be specified, as outlined in the FCOP. Requests will be coordinated by telephone daily or on an as needed basis, by conference calls between members of the Operating Committee or their representatives. The requests will normally prescribe the requested outflows as a mean daily discharge in cubic feet per second, for the 24-hour period from noon to noon of each day. Requests for project outflows will be determined by methods as agreed upon, and documented with a confirmation agreement by a message transmitted via e-mail or Fax from the Corps of Engineers, in Portland, Oregon. The Canadian Section of the Operating Committee or their representative will make acknowledgment of this agreement via e-mail or Fax. Any modification of the documented daily request shall be agreed by the Operating Committee before being put into effect, and shall be documented immediately using the procedure described above.
- c) Regulation during Winter Floods: Daily requests for project outflows from Canadian projects are normally implemented in the flood control refill period. During the occurrence of winter floods (periods of high winter flows) in the Lower Columbia River, if a special regulation of Arrow storage becomes necessary to preserve the natural flood control storage effect, then the outflows from Arrow will be regulated on a day-to-day basis by agreement of the Operating Committee in accordance with the requests of the U.S. Section of the Operating Committee. Insofar as possible the outflows from Arrow will not exceed the calculated natural lake outflows until the space obligated for this purpose as shown on Chart 5 of the FCOP is filled. The requests for such regulation will be in accordance with procedures described above. If, as a result of operation for winter flood control, a reservoir ends up above its flood control rule curve, then an appropriate outflow schedule for that reservoir will be determined to ensure that the reservoir will be drafted to its flood control rule curve as soon as feasible.

## **VI. OPERATING GUIDES**

### **A. Operating Rule Curve**

The ORC for the whole of Canadian storage shall be the sum of the ORC's for each of Duncan, Arrow, and Mica. The ORC for each of the Duncan, Arrow, and Mica Reservoirs during the period 1 August 2009 through 31 July 2010 is determined in accordance with the reference documents of Section I, and is defined as follows:

1. During the period 1 August 2009 through 31 December 2009, the ORC is the higher of the First Critical Rule Curve or the Assured Refill Curve.
2. During the period 1 January 2010 through 31 July 2010, the ORC is the higher of the First Critical Rule Curve or the Assured Refill Curve, unless the Variable Refill Curve (VRC) is below the higher of the above two curves; then it is defined by the VRC.
3. During the period 1 January 2010 through 15 April 2010, the ORC will not be



lower than the Operating Rule Curve Lower Limit designed to protect firm loads with recurrence of 1936-37 hydro conditions unless a lower reservoir elevation is required for flood control (Exhibit 6).

4. During any month in the Operating Year, the ORC will not be higher than the Flood Control Rule Curve, defined as the maximum elevation of each reservoir established by flood control requirements and may be modified on mutual agreement for construction and other contingency requirements.
5. Operation of Mica will be in accordance with the Mica Project Operating Criteria tabulated with specified qualifications in Section VII(C). Differences between Mica's storage operation and its ORC (or Proportional Draft Point (PDP) if different) shall be balanced with equal and opposite changes to Arrow's ORC (or PDP) to the extent possible within agreed Operating Limits. The obligation to operate Mica and Arrow to produce optimum benefits in Canada and downstream in the United States will be deemed to have been fulfilled by operating to these criteria.
6. The VRC's for Arrow, Duncan, and Mica shall be constructed based on procedures, power discharge requirements, and Variable Refill Curve Lower Limits as specified in Exhibit 7 (Total Inflow Method), except that the Operating Committee, in consideration of mutually beneficial operating arrangements, may agree to use an alternate procedure for Arrow which uses Arrow local inflows (Arrow Local Inflow Method) as follows.
  - a) If the current TSR study shows for the end of the current month that 1) the projected Mica Treaty storage content is lower than its ORC, and 2) the Coordinated System draft point is on the ORC, then the TSR shall be rerun with Arrow's VRC calculated as follows:
    - i) The forecast volume of inflow for Arrow will exclude the volume of inflow above the Mica project. This Arrow local inflow volume will be reduced by a forecast error such that there is a 95 percent probability that the reduced forecast is equaled or exceeded.
    - ii) The total Mica target outflow as specified in VII(C) will be added to the forecast volume described in a(i) above.
    - iii) In computing water available for refill of Arrow Reservoir the power discharge requirements for Arrow as specified in Exhibit 7 will be deducted from the volume calculated in a(ii).
  - b) During any period when the Arrow Local Inflow Method is used, the Mica/Arrow balancing (as described in subsection VI(A)5) is not used. This is implemented in BPA's hydro regulation model by setting the composite ORC for Canadian storage equal to the Mica Treaty storage content as defined in subsection VII(C), plus the ORC at Arrow and Duncan.

## **B. Rule Curves and Operating Data**

Rule Curves and operating data are shown in both English and SI (Metric) units. SI

values are displayed with either one or two decimal places to assure consistency with English units and do not imply that level of precision.

- |     |   |            |
|-----|---|------------|
| 1.  | Assured Refill Curve for Duncan, Arrow, and Mica.   | Exhibit 1  |
| 2.  | First Critical Rule Curve for Duncan, Arrow, Mica, and the whole of Canadian storage.           | Exhibit 2  |
| 3.  | Second Critical Rule Curve for Duncan, Arrow, Mica, and the whole of Canadian storage.          | Exhibit 3  |
| 4.  | Third Critical Rule Curve for Duncan, Arrow, Mica, and the whole of Canadian storage.           | Exhibit 4  |
| 5.  | Fourth Critical Rule Curve for Duncan, Arrow, Mica, and the whole of Canadian storage.          | Exhibit 5  |
| 6.  | Operating Rule Curve Lower Limits based on 1936-37 Hydro Conditions.                            | Exhibit 6  |
| 7.  | Variable Refill Curve Procedures.   | Exhibit 7  |
| 8.  | Coordinated System Loads and Resources Used in the TSR  | Exhibit 8  |
| 9.  | TSR Critical Rule Curves for Other Major Projects   | Exhibit 9  |
| 10. | U.S. PDR's, VRCLL's, Forecast Errors and Distribution Factors                                   | Exhibit 10 |
| 11. | U.S. Operating Rule Curve Lower Limits based on 1936-37 Hydro Conditions.                       | Exhibit 11 |
| 12. | Composite Canadian Storage Contents from the DOP10 70-Year Continuous TSR hydroregulation study | Exhibit 12 |

### **C. Reservoir Capacity Tables**

The following tables shall be considered to be the official storage for the projects:

- |    |   |            |
|----|---|------------|
| 1. | Duncan Reservoir Capacity Table (based on B.C. Hydro Table dated 21 February 1973).                 | Exhibit 13 |
| 2. | Arrow Reservoir Capacity Table (based on B.C. Hydro Combined Storage Table dated 28 February 1974). | Exhibit 14 |
| 3. | Mica Reservoir Capacity Table (based on B.C. Hydro Table dated 25 March 1974).                      | Exhibit 15 |

## **VII. OPERATING LIMITS**

### **A. Duncan Project**

1. Maximum outflow is 566.34 m<sup>3</sup>/s (20,000 cfs) through outlets but limited to 283.17 m<sup>3</sup>/s (10,000 cfs) each month in the TSR model.
2. Minimum average weekly outflow is 2.83 m<sup>3</sup>/s (100 cfs).
3. Maximum rate of change in outflow is normally 113.27 m<sup>3</sup>/s (4,000 cfs) per day unless a larger change is necessary to accomplish the objectives of the FCOP.
4. Normal full pool elevation is 576.68 m (1,892.0 feet).
5. Normal minimum pool elevation is 546.87 m (1,794.2 feet).
6. Normal maximum reservoir average monthly draft rate in elevation during any month is limited to 0.30 m (1 foot) per day.

### **B. Arrow Project**

1. Maximum outflow is limited to physical capability only, except during January when Attachment C to the LCA requires that outflows in actual operations be limited to a maximum of 2,265 m<sup>3</sup>/s (80,000 cfs), unless otherwise agreed or higher outflows are needed to meet flood control requirements or compensate for Duncan underruns. In addition, the Arrow maximum monthly outflows in the TSR during January and February are limited by subsection VII(B)7(a).
2. Minimum average weekly outflow is 141.58 m<sup>3</sup>/s (5,000 cfs).
3. Maximum rate of change in outflow is normally 424.75 m<sup>3</sup>/s (15,000 cfs) per day unless a larger change is necessary to accomplish the objectives of the FCOP.
4. Normal full pool elevation is 440.13 m (1,444.0 feet).
5. Normal minimum pool elevation is 419.98 m (1,377.9 feet).
6. Normal maximum reservoir average monthly draft rate in elevation during any month is limited to 0.30 m (1 foot) per day.
7. The Arrow reservoir storage operation in the TSR will be limited to a maximum storage level and/or maximum outflow as defined by the Arrow Project Operating Criteria (APOC) during the period January through June. The APOC shall be calculated as follows:
  - a) Arrow's operation in the TSR will be limited, under all water conditions, to a maximum monthly outflow of 2,011 m<sup>3</sup>/s (71,000 cfs) in January and 1,699 m<sup>3</sup>/s (60,000 cfs) in February, subject to flood control requirements. Maximum storage levels in February through June may apply depending on the forecast for The Dalles residual unregulated runoff for the current month through July. Table 1 shows the criteria levels for Arrow.

**Table 1**  
**(English Units)**  
**ARROW PROJECT OPERATING CRITERIA**  
**FROM 2009-10 ASSURED OPERATING PLAN**

Period	Volume Runoff Period	The Dalles Volume Runoff (Maf)			Maximum Storage Limit <sup>1/ 2/</sup> (ksfd)	Maximum Outflow <sup>3/</sup> (cfs)
January	-				URC	71,000
February	1 Feb - 31 Jul	>70	≤	70	URC to 1800	60,000
			to	<80	1800	
			≥	80	1800	
March	1 Mar - 31 Jul	>65	≤	65	URC to 900	
			to	<75	900	
			≥	75	900	
April 15	1 Apr - 31 Jul	>61	≤	61	URC to 900	
			to	<70	900	
			≥	70	900	
April 30	1 Apr - 31 Jul	>61	≤	61	URC to 1000	
			to	<70	1000	
			≥	70	1000	
May	1 May - 31 Jul	>68	≤	68	URC to 1800	
			to	<70	1800	
			≥	70	1800	
June	1 Jun - 31 Jul	>33	≤	33	URC to 3300	
			to	<35	3300	
			≥	35	3300	

**Notes:**

- 1/ If the Maximum Storage Limit is computed to be above the URC, then the URC will apply.
- 2/ Interpolate when there are two values. For example, if the February-July volume runoff is between 70 Maf and 80 Maf, then the Maximum Storage Limit is interpolated between February's URC and 1800 ksfd.
- 3/ The Maximum Average Monthly Outflow Limit takes precedence over the Maximum Storage Limit. However, the Maximum Outflow Limit may be exceeded to avoid storage above the URC.

Table 1M

(Metric Units)

**ARROW PROJECT OPERATING CRITERIA  
FROM 2009-10 ASSURED OPERATING PLAN**

Period	Volume Runoff Period	The Volume Runoff (k <sup>3</sup> )	Maximum Storage Limit 1/ 2/ (h <sup>3</sup> )	Maximum Outflow Limit 3/ ( <sup>3</sup> /s)
Januar	-		UR	2,010
Februar	1 Feb - 31 Jul	≤ 86 >86 to <99	UR URC 4404	1,699
		≥ 99	4404	
Marc	1 Mar - 31	≤ 80 >80 to <93	UR URC 2202	
		≥ 93	2202	
April	1 Apr - 31	≤ 75 >75 to <86	UR URC 2202	
		≥ 86	2202	
April	1 Apr - 31	≤ 75 >75 to <86	UR URC 2447	
		≥ 86	2447	
Ma	1 May - 31	≤ 84 >84 to <86	UR URC 4404	
		≥ 86	4404	
Jun	1 Jun - 31	≤ 41 >41 to <43	UR URC 8074	
		≥ 43	8074	

**Notes**

- 1/ If the Maximum Storage Limit is computed to be above the URC, then the URC will apply.
- 2/ Interpolate when there are two values. For example, if the February-July volume runoff is between 86 km<sup>3</sup> and 99 <sup>3</sup>, then the Maximum Storage Limit is interpolated between February's URC and 4404 hm<sup>3</sup>.
- 3/ The Maximum Average Monthly Outflow Limit takes precedence over the Maximum Storage Limit. However, the Maximum Outflow Limit may be exceeded to avoid storage above the URC.

- b) APOC Implementation: In the DOP, the default implementation of the APOC will use the distribution factors shown in Table 2. These distribution factors are multiplied by the current month through July forecast volumes at The Dalles, to calculate future month through July volume forecasts. The resulting residual month-July volumes are then used to determine the maximum storage levels from the criteria provided in Table 1. To assist implementation of this new procedure, an example is shown at the bottom of Table 2.

Table 2

(English Units)  
**APOC IMPLEMENTATION: DISTRIBUTION FACTORS FOR THE DALLES  
 FROM 2009-10 ASSURED OPERATING**

Forecas Dat	Forecas Perio	The Dalles Distribution Factors <sup>1/</sup>					
		Jan-Jul	Feb-Jul	Mar-Jul	Apr-Jul	May-	Jun-Jul
<b>1-</b>	1 Jan - 31 Jul	1.000	0.939	0.858	0.773	0.717	0.439
<b>1-</b>	1 Feb - 31 Jul		1.000	0.914	0.823	0.763	0.467
<b>1-Mar</b>	1 Mar - 31 Jul			1.000	0.900	0.835	0.511
<b>1-Apr</b>	1 Apr - 31 Jul				1.000	0.927	0.567
<b>1-May</b>	1 May - 31 Jul					1.000	0.612
<b>1-</b>	1 Jun - 31 Jul						1.000

**Notes**

- <sup>1/</sup> Unless otherwise agreed, the DOP10 will apply these distribution factors to the monthly volume forecast at The Dalles for computing the Month-July runoff volumes required by the APOC.
2. These distribution factors are calculated from the median 71 year Jan-Jul, Feb-Jul, etc., volumes.

For Example, in the month of May:

	From Table		Look up Table	
	The Distribution Facto	Month- Volum Runoff (Maf)	The Volum Runoff (Maf)	Maximum Storag Limit (ksfd)
1 May Forecast Forecast Volume = 65 Maf (May-Jul)				
May	1.000	65.	≤ 6	UR
Jun	0.612	39.	≥ 3	330

Table 2M

(Metric Units)

**APOC IMPLEMENTATION: DISTRIBUTION FACTORS FOR THE DALLES  
FROM 2009-10 ASSURED OPERATING**

Forecas Dat	Forecas Perio	The Dalles Distribution Factors <sup>1/</sup>					
		Jan-Jul	Feb-Jul	Mar-Jul	Apr-Jul	May-	Jun-Jul
1-	1 Jan - 31 Jul	1.000	0.939	0.858	0.773	0.717	0.439
1-	1 Feb - 31 Jul		1.000	0.914	0.823	0.763	0.467
1-Mar	1 Mar - 31 Jul			1.000	0.900	0.835	0.511
1-Apr	1 Apr - 31 Jul				1.000	0.927	0.567
1-May	1 May - 31 Jul					1.000	0.612
1-	1 Jun - 31 Jul						1.000

**Notes**

- 1/ Unless otherwise agreed, the DOP10 will apply these distribution factors to the monthly volume forecast at The Dalles for computing the Month-July runoff volumes required by the APOC.
2. These distribution factors are calculated from the median 71 year Jan-Jul, Feb-Jul, etc., volumes.

For Example, in the month of May:

	From Table 2M		Look up Table 1M	
	The Distribution Facto	Month- Volum Runoff (km <sup>3</sup> )	The Volum Runoff (km <sup>3</sup> )	Maximum Storag Limit (hm <sup>3</sup> )
1 May Forecast Forecast Volume = 80.2 <sup>3</sup> (May-Jul)				
May	1.000	80.	≤	UR
Jun	0.612	49.	≥	807

**C. Mica Project**

The Mica Project Treaty storage operation in the TSR will be according to the Mica Project Operating Criteria shown in Table 3 (and Table 3M) except as qualified in subsections VII(C)1 through VII(C)6.

1. VRC's shall be constructed according to Exhibit 7 with the 31 July Treaty storage content of 8,634.5 hm<sup>3</sup> (3,529.2 ksf). However, the Operating Committee may agree to set Mica's VRC July refill target equal to the Mica End of Month Storage



Content of 8,267.6 hm<sup>3</sup> (3,379.2ksfd) indicated on the following “Mica Project Operating Criteria” table.

2. Mica project operation will be determined by the End of Previous Month Arrow Storage Content as shown in Table 3 (and Table 3M), except for the limitations or changes required by subsections VII(C)3 through VII(C)6. The End of Previous Month Arrow Storage Content shall be determined from the current TSR study, except when the Arrow Local Inflow Method was used for the prior month the TSR with the Arrow Total Inflow Method shall be used. Mica's target operation will be defined either by a Target End of Month Storage Content or a Target Month Average Outflow.
3. Mica operation to the Target End-of-Month Treaty Storage Contents shall be limited by the Minimum and Maximum Outflows shown in Table 3 (and Table 3M), unless needed to accomplish the objectives of the FCOP.
4. Mica operation to the Target Month Average Outflow shall be limited by the Minimum Target Treaty Content shown in Table 3 (and Table 3M). Mica outflows shall be reduced as required down to a lower limit of the Minimum Outflow shown in the table below, to prevent draft below the Minimum Target Treaty Storage Content. Minimum Outflows may cause the reservoir to draft below the Minimum Target Treaty Content.
5. Mica outflows will be increased during the months October through July as required to avoid violation of the Flood Control Rule Curve.
6. Treaty storage releases from Mica in excess of 8.634 km<sup>3</sup> (7 Maf) that result from operating Mica under the criteria described in VII(C)2 through VII(C)6 above will be retained in the Arrow reservoir, subject to flood control and minimum flow requirements at Arrow, and Mica will be reduced to Minimum Outflow as required to minimize releases in excess of 8.634 km<sup>3</sup> (7 Maf). The total combined storage draft from Mica and Arrow will not exceed 17.392 km<sup>3</sup> (14.1 Maf) unless flood control or minimum flow criteria at Arrow will not permit the excess Mica storage releases to be retained at Arrow. If such a release should occur, the target Mica operation will remain as specified in Mica Project Operating Criteria, and the excess release will be returned as soon as the operating criteria permit.

Table 3

## MICA PROJECT OPERATING CRITERIA (English)

Month	Target Operation			Target Operation Limits		
	End of Previous Month Arrow Storage Content (KSFD)	Month Average Outflow (CFS)	End-of-Month Storage Content 1/ (KSFD)	Minimum Target Treaty Content at Mica 2/ (KSFD)	Maximum Outflow (CFS)	Minimum Outflow (CFS)
August 1-15	3,500 - FULL	-	3,454.2	-	34,000	15,000
	2,520 - 3,500	25,000	-	0.0	-	15,000
	0 2,520	32,000	-	0.0	-	15,000
August 16-31	2,500 - FULL	-	3,529.2	-	34,000	15,000
	2,000 - 2,500	25,000	-	0.0	-	15,000
	0 2,000	32,000	-	0.0	-	15,000
September	3,570 - FULL	-	3,529.2	-	34,000	10,000
	3,210 - 3,570	22,000	-	0.0	-	10,000
	2,300 3,210	27,000	-	0.0	-	10,000
	0 - 2,300	32,000	-	0.0	-	10,000
October	3,570 - FULL	-	3,428.4	-	34,000	10,000
	3,180 - 3,570	19,000	-	0.0	-	10,000
	500 3,180	22,000	-	0.0	-	10,000
	0 - 500	32,000	-	0.0	-	10,000
November	3,150 - FULL	22,000	-	0.0	-	10,000
	3,100 - 3,150	19,000	-	0.0	-	10,000
	410 3,100	25,000	-	0.0	-	10,000
	0 - 410	32,000	-	0.0	-	10,000
December	2,860 - FULL	25,000	-	204.1	-	10,000
	1,520 - 2,860	27,000	-	204.1	-	10,000
	600 1,520	22,000	-	204.1	-	10,000
	0 - 600	32,000	-	204.1	-	10,000
January	2,700 - FULL	23,000	-	154.1	-	12,000
	2,500 - 2,700	26,000	-	154.1	-	12,000
	2,150 2,500	28,000	-	154.1	-	12,000
	0 - 2,150	30,000	-	154.1	-	12,000
February	1,500 - FULL	20,000	-	0.0	-	12,000
	1,230 - 1,500	21,000	-	0.0	-	12,000
	1,150 1,230	23,000	-	0.0	-	12,000
	0 - 1,150	26,000	-	0.0	-	12,000
March	1,100 - FULL	17,000	-	0.0	-	12,000
	320 - 1,100	19,000	-	0.0	-	12,000
	40 320	24,000	-	0.0	-	12,000
	0 - 40	21,000	-	0.0	-	12,000
April 1-15	990 - FULL	18,000	-	0.0	-	12,000
	860 - 990	19,000	-	0.0	-	12,000
	80 860	14,000	-	0.0	-	12,000
	0 80	19,000	-	0.0	-	12,000
April 16-30	850 - FULL	11,000	-	0.0	-	10,000
	500 - 850	13,000	-	0.0	-	10,000
	20 500	10,000	-	0.0	-	10,000
	0 20	17,000	-	0.0	-	10,000
May	650 - FULL	10,000	-	0.0	-	8,000
	500 - 650	8,000	-	0.0	-	8,000
	160 - 500	10,000	-	0.0	-	8,000
	0 160	8,000	-	0.0	-	8,000
June	2,200 - FULL	10,000	-	0.0	-	8,000
	1,100 2,200	8,000	-	0.0	-	8,000
	620 1,100	16,000	-	0.0	-	8,000
	0 - 620	10,000	-	0.0	-	8,000
July	2,550 - FULL	-	3,436.2	-	34,000	10,000
	1,520 2,550	19,000	-	0.0	-	10,000
	0 - 1,520	31,000	-	0.0	-	10,000

Notes: 1/ If the Mica target End-of-Month Storage Content target is less than 3529.2 ksf, then a maximum outflow of 34,000 cfs will apply. These maximum flows may be exceeded for flood control.

2/ For month average outflow target operation, Mica outflows will be reduced to minimum to maintain the reservoir above the Minimum Target Treaty Storage Content.

**Table 3M**  
**MICA PROJECT OPERATING CRITERIA (SI)**

Month	Target Operation			Target Operation Limits		
	End of Previous Month Arrow Storage Content (hm <sup>3</sup> )	Month Average Outflow (m <sup>3</sup> /s)	End-of-Month Storage Content 1/ (hm <sup>3</sup> )	Minimum Target Treaty Content at Mica 2/ (hm <sup>3</sup> )	Maximum Outflow (m <sup>3</sup> /s)	Minimum Outflow (m <sup>3</sup> /s)
August 1-15	8563.1 - FULL	-	8451.0	-	962.77	424.75
	6165.4 - 8563.1	707.92	-	0.0	-	424.75
	0.0 - 6165.4	906.14	-	0.0	-	424.75
August 16-31	6116.5 - FULL	-	8634.5	-	962.77	424.75
	4893.2 - 6116.5	707.92	-	0.0	-	424.75
	0.0 - 4893.2	906.14	-	0.0	-	424.75
September	8734.4 - FULL	-	8634.5	-	962.77	283.17
	7853.6 - 8734.4	622.97	-	0.0	-	283.17
	5627.2 - 7853.6	764.55	-	0.0	-	283.17
October	0.0 - 5627.2	906.14	-	0.0	-	283.17
	8734.4 - FULL	-	8387.9	-	962.77	283.17
	7780.2 - 8734.4	538.02	-	0.0	-	283.17
November	1223.3 - 7780.2	622.97	-	0.0	-	283.17
	0.0 - 1223.3	906.14	-	0.0	-	283.17
	7706.8 - FULL	622.97	-	0.0	-	283.17
December	7584.5 - 7706.8	538.02	-	0.0	-	283.17
	1003.1 - 7584.5	707.92	-	0.0	-	283.17
	0.0 - 1003.1	906.14	-	0.0	-	283.17
January	6997.3 - FULL	707.92	-	499.4	-	283.17
	3718.8 - 6997.3	764.55	-	499.4	-	283.17
	1468.0 - 3718.8	622.97	-	499.4	-	283.17
February	0.0 - 1468.0	906.14	-	499.4	-	283.17
	6605.8 - FULL	651.29	-	377.0	-	339.80
	6116.5 - 6605.8	736.24	-	377.0	-	339.80
March	5260.2 - 6116.5	792.87	-	377.0	-	339.80
	0.0 - 5260.2	849.50	-	377.0	-	339.80
	3669.9 - FULL	566.34	-	0.0	-	339.80
April 1-15	3009.3 - 3669.9	594.65	-	0.0	-	339.80
	2813.6 - 3009.3	651.29	-	0.0	-	339.80
	0.0 - 2813.6	736.24	-	0.0	-	339.80
April 16-30	2691.3 - FULL	481.39	-	0.0	-	339.80
	782.9 - 2691.3	538.02	-	0.0	-	339.80
	97.9 - 782.9	679.60	-	0.0	-	339.80
May	0.0 - 97.9	594.65	-	0.0	-	339.80
	2422.1 - FULL	509.70	-	0.0	-	339.80
	2104.1 - 2422.1	538.02	-	0.0	-	339.80
June	195.7 - 2104.1	396.44	-	0.0	-	339.80
	0.0 - 195.7	538.02	-	0.0	-	339.80
	2079.6 - FULL	311.49	-	0.0	-	283.17
July	1223.3 - 2079.6	368.12	-	0.0	-	283.17
	48.9 - 1223.3	283.17	-	0.0	-	283.17
	0.0 - 48.9	481.39	-	0.0	-	283.17
August	1590.3 - FULL	283.17	-	0.0	-	226.53
	1223.3 - 1590.3	226.53	-	0.0	-	226.53
	391.5 - 1223.3	283.17	-	0.0	-	226.53
September	0.0 - 391.5	226.53	-	0.0	-	226.53
	5382.5 - FULL	283.17	-	0.0	-	226.53
	2691.3 - 5382.5	226.53	-	0.0	-	226.53
October	1516.9 - 2691.3	453.07	-	0.0	-	226.53
	0.0 - 1516.9	283.17	-	0.0	-	226.53
	6238.8 - FULL	-	8407.0	-	962.77	283.17
November	3718.8 - 6238.8	538.02	-	0.0	-	283.17
	0.0 - 3718.8	877.82	-	0.0	-	283.17

Notes:

- 1/ If the Mica target End-of-Month Storage Content is less than 8634.5 hm<sup>3</sup>, then a maximum outflow of 962.77 m<sup>3</sup>/s will apply. These maximum flows may be exceeded for flood control.
- 2/ For month average outflow target operation, Mica outflows will be reduced to minimum to maintain the reservoir above the Minimum Target Treaty Storage Content.

**EXHIBITS****Exhibit 1 - Assured Refill Curves (English) 1**

Month	DUNCAN					MICA					ARROW						
	1931 Inflow cfs 3/	PDR cfs 4/	Water Available for Refill		ARC ksfd	1931 Inflow cfs	PDR cfs 4/	Water Available for Refill		CRC1 ksfd	ARC ksfd	1931 Inflow cfs	PDR cfs 4/	Water Available for Refill		MICA Refill ksfd 2/	ARC ksfd
			cfs	ksfd				cfs	ksfd					cfs	ksfd		
July	7320	2453	4866	150.8	705.8	56494.3	46748	9746	302.1	3045.1	3529.2	88802.5	72118	16685	517.2	302.1	3579.6
June	8030	3071	4959	148.8	555.0	60134	24336	35798	1073.9	2026.3	3227.1	114433	61159	53274	1598.2	1073.9	3364.5
May	5170	122	5048	156.5	406.2	28065.4	20439	7626	236.4	384.2	2153.1	69070.5	18016	51055	1582.7	236.4	2840.2
Apr2	1137	100	1037	15.6	249.7	7218	3000	4218	63.3	138.4	1916.7	20470	5000	15470	232.1	63.3	1493.9
Apr1	825	100	725	10.9	234.1	4666	3000	1666	25.0	142.2	1853.5	12047	5000	7047	105.7	25.0	1325.1
Mar	555	100	455	14.1	223.3	3217.9	3000	218	6.8	456.7	1828.5	7848.5	5000	2849	88.3	6.8	1244.4
Feb	428	100	328	9.2	209.2	2589.4	3000	-411	-11.5	712.4	1821.7	5759.3	5000	759	21.3	-11.5	1162.9
Jan	428	100	328	10.2	200.0	2833.9	3000	-166	-5.1	1474.5	1833.2	6450.8	5000	1451	45.0	-435.8	1130.1
Dec	461	100	361	11.2	189.8	3531.3	3000	531	16.5	2269.0	1838.4	6479.9	5000	1480	45.9	-708.9	649.3
Nov	684	100	584	17.5	178.6	5175.5	3000	2176	65.3	2977.9	1821.9	9369	5000	4369	131.1	-427.4	0.0
Oct	1089	100	989	30.7	161.1	8760.6	3000	5761	178.6	3405.3	1756.6	14426.7	5000	9427	292.2	-108.5	0.0
Sep	2310	100	2210	66.3	130.4	23080	3000	20080	602.4	3513.8	1578.0	38806.5	5000	33807	1014.2	-14.3	0.0
Aug2	3875	100	3775	60.4	64.1	39436	3000	36436	583.0	3528.1	975.6	61741	5000	56741	907.9	-1.1	0.0
Aug1	5228	100	5128	76.9	3.7	52209	3000	49209	738.1	3529.2	392.7	81724	5000	76724	1150.9	3529.2	0.0

**Exhibit 1M - Assured Refill Curves (SI) 1/**

Month	DUNCAN					MICA						ARROW					
	1931 Inflow	PDR	Water Available for Refill		ARC	1931 Inflow	PDR	Water Available For Refill		CRC1	ARC	1931 Inflow	PDR	Water Available For Refill		MICA Refill	ARC
			m³/s 3/	m³/s				m³/s	hm³					m³/s	hm³		
July	207.29	69.46	137.79	369.1	1726.8	1599.74	1323.75	275.98	739.2	7450.1	8634.5	2514.60	2042.15	472.47	1265.5	739.2	8757.8
June	227.38	86.96	140.42	364.0	1357.8	1702.80	689.12	1013.69	2627.5	4957.5	7895.4	3240.36	1731.83	1508.55	3910.2	2627.5	8231.6
May	146.40	3.45	142.94	382.9	993.8	794.72	578.77	215.94	578.4	940.0	5267.9	1955.86	510.16	1445.72	3872.2	578.4	6948.9
Apr2	32.20	2.83	29.36	38.1	610.9	204.39	84.95	119.44	154.8	338.6	4689.5	579.65	141.58	438.06	567.7	154.8	3655.0
Apr1	23.36	2.83	20.53	26.6	572.8	132.13	84.95	47.18	61.1	347.9	4534.7	341.13	141.58	199.55	258.6	61.1	3242.1
Mar	15.70	2.83	12.88	34.5	546.2	91.12	84.95	6.17	16.5	1117.4	4473.5	222.24	141.58	80.67	216.1	16.5	3044.6
Feb	12.12	2.83	9.29	22.5	511.7	73.32	84.95	-11.64	-28.2	1743.0	4457.0	163.09	141.58	21.49	52.0	-28.2	2845.0
Jan	12.12	2.83	9.29	24.9	489.3	80.25	84.95	-4.70	-12.6	3607.5	4485.2	182.67	141.58	41.09	110.1	-1066.2	2764.9
Dec	13.05	2.83	10.22	27.4	464.4	100.00	84.95	15.04	40.3	5551.3	4497.7	183.49	141.58	41.91	112.3	-1734.4	1588.7
Nov	19.37	2.83	16.54	42.9	437.0	146.55	84.95	61.62	159.7	7285.7	4457.5	265.30	141.58	123.72	320.7	-1045.7	0.0
Oct	30.85	2.83	28.01	75.0	394.1	248.07	84.95	163.13	436.9	8331.4	4297.8	408.52	141.58	266.94	715.0	-265.5	0.0
Sep	65.41	2.83	62.58	162.2	319.1	653.55	84.95	568.60	1473.8	8596.9	3860.8	1098.88	141.58	957.31	2481.4	-35.0	0.0
Aug2	109.73	2.83	106.90	147.8	156.9	1116.70	84.95	1031.75	1426.3	8631.8	2387.0	1748.31	141.58	1606.72	2221.2	-2.7	0.0
Aug1	148.04	2.83	145.21	188.2	9.1	1478.39	84.95	1393.44	1805.9	8634.5	960.7	2314.16	141.58	2172.58	2815.7	8634.5	0.0

Notes on Exhibit 1 and Exhibit 1M:

- 1/ The Assured Refill Curve (ARC) indicates the end-of-month storage content required to assure refill of Canadian storage by 31 July based on 1931 historical monthly inflow. The monthly inflow at each reservoir is reduced by deducting the Power Discharge Requirements (PDR) and water required for refill, if any, at upstream reservoirs. The Entities may agree to revise the data upon the completion of the Refill Study by the Operating Committee.
- 2/ Upstream refill requirement: these values are computed by subtracting current month from previous month's higher of Mica's ARC or first critical rule curve (CRC1) except July value is Mica full minus previous month's higher of Mica's ARC or CRC1. CRC1 is shown in Exhibit 2.
- 3/ Inflows are from the 2000 Level Modified streamflow (HydSim file).
- 4/ PDR's are from the AOP10.

**Exhibit 2 - First Critical Rule Curves (English & SI)**

End-of-Month Usable Storage Content

	(English) (ksfd)				(SI) (hm <sup>3</sup> )			
Month	Mica	Arrow	Duncan	Total	Mica	Arrow	Duncan	Total
August 15	3529.2	3579.6	705.8	7814.6	8634.5	8757.8	1726.8	19119.2
August 31	3528.1	3577.7	705.8	7811.6	8631.8	8753.2	1726.8	19111.9
September	3513.8	3204.5	688.8	7407.1	8596.9	7840.1	1685.2	18122.2
October	3405.3	2881.1	685.3	6971.7	8331.4	7048.9	1676.7	17057.0
November	2977.9	2654.6	596.1	6228.6	7285.7	6494.7	1458.4	15238.9
December	2269	2378.6	462.9	5110.5	5551.3	5819.5	1132.5	12503.3
January	1474.5	1362	365.3	3201.8	3607.5	3332.3	893.7	7833.5
February	712.4	829.2	190	1731.6	1743.0	2028.7	464.9	4236.5
March	456.7	496.2	124.9	1077.8	1117.4	1214.0	305.6	2636.9
April 15	142.2	434.9	94.4	671.5	347.9	1064.0	231.0	1642.9
April 30	138.4	416	105.7	660.1	338.6	1017.8	258.6	1615.0
May	384.2	1547.9	223.2	2155.3	940.0	3787.1	546.1	5273.2
June	2026.3	3089.7	498	5614.0	4957.5	7559.3	1218.4	13735.2
July	3045.1	3499.3	624.5	7168.9	7450.1	8561.4	1527.9	17539.4

Source: First-year critical rule curves from the AOP10.

**Exhibit 3 - Second Critical Rule Curves (English & SI)**

End-of-Month Usable Storage Content

	(English) (ksfd)				(SI) (hm <sup>3</sup> )			
Month	Mica	Arrow	Duncan	Total	Mica	Arrow	Duncan	Total
August 15	3390.2	3532.0	672	7594.2	8294.5	8641.4	1644.1	18580.0
August 31	3515.4	3557.6	662.7	7735.7	8600.8	8704.0	1621.4	18926.2
September	3362.2	2980.7	602.6	6945.5	8226.0	7292.6	1474.3	16992.9
October	2482.1	2826.0	592.5	5900.6	6072.7	6914.1	1449.6	14436.4
November	2035.1	2007.0	596.1	4638.2	4979.1	4910.3	1458.4	11347.8
December	1540.9	1458.2	462.9	3462.0	3770.0	3567.6	1132.5	8470.1
January	583.9	479.1	365.3	1428.3	1428.6	1172.2	893.7	3494.5
February	248.7	209.4	170.4	628.5	608.5	512.3	416.9	1537.7
March	1.5	0.0	1.9	3.4	3.7	0.0	4.6	8.3
April 15	1.8	0.8	2.8	5.4	4.4	2.0	6.9	13.2
April 30	138.4	237.0	32.6	408.0	338.6	579.8	79.8	998.2
May	384.2	1324.1	147.3	1855.6	940.0	3239.5	360.4	4539.9
June	1195.3	2630.3	366.9	4192.5	2924.4	6435.3	897.7	10257.4
July	2582.1	3461.4	583.8	6627.3	6317.4	8468.7	1428.3	16214.4

Adjusted for Crossover 1/

Source: Second-year critical rule curves from the AOP10, except when higher than the first-year critical rule curve use the first-year critical curve.

1/ A "crossover" occurs when a critical rule curve is higher than another critical rule curve in earlier time sequence (e.g. when a second critical rule curve is higher than the first critical rule curve). During proportional draft, no individual project is permitted to refill while other projects are proportionately drafting. This is accomplished by eliminating crossovers, i.e. by reducing all subsequent critical rule curves to being no greater than previous critical rule curves.

**Exhibit 4 - Third Critical Rule Curves (English & SI)**

End-of-Month Usable Storage Content

	<b>(English)</b> (ksfd)				<b>(SI)</b> (hm <sup>3</sup> )			
<b>Month</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>	<b>Total</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>	<b>Total</b>
August 15	2943.0	3497.0	660.7	7100.7	7200.3	8555.8	1616.5	17372.6
August 31	3270.5	3449.1	582.3	7301.9	8001.6	8438.6	1424.7	17864.8
September	3272.9	2942.6	602.6	6818.1	8007.5	7199.4	1474.3	16681.2
October	2482.1	2766.1	592.5	5840.7	6072.7	6767.5	1449.6	14289.9
November	2035.1	1909.8	596.1	4541.0	4979.1	4672.5	1458.4	11110.0
December	1324.1	1437.8	384.5	3146.4	3239.5	3517.7	940.7	7698.0
January	583.9	475.1	188.2	1247.2	1428.6	1162.4	460.5	3051.4
February	209.7	111.8	36.0	357.5	513.1	273.5	88.1	874.7
March	0.4	0.0	1.4	1.8	1.0	0.0	3.4	4.4
April 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
April 30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
May	252.7	1013.0	127.0	1392.7	618.3	2478.4	310.7	3407.4
June	974.9	1872.0	92.0	2938.9	2385.2	4580.0	225.1	7190.3
July	2135.0	1755.6	179.2	4069.8	5223.5	4295.3	438.4	9957.2

Adjusted for Crossover

Source: Third-year critical rule curves from the AOP10.

**Exhibit 5 - Fourth Critical Rule Curves (English & SI)**

End-of-Month Usable Storage Content

	<b>(English)</b> (ksfd)				<b>(SI)</b> (hm <sup>3</sup> )			
<b>Month</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>	<b>Total</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>	<b>Total</b>
August 15	2035.2	1775.2	205.5	4015.9	4979.3	4343.2	502.8	9825.3
August 31	1865.7	1882.6	124.1	3872.4	4564.6	4606.0	303.6	9474.2
September	1198.7	1743.0	122.4	3064.1	2932.7	4264.4	299.5	7496.6
October	1051.1	1166.4	79.8	2297.3	2571.6	2853.7	195.2	5620.6
November	661.9	1018.8	0.0	1680.7	1619.4	2492.6	0.0	4112.0
December	55.5	193.4	0.0	248.9	135.8	473.2	0.0	609.0
January	4.8	0.0	0.0	4.8	11.7	0.0	0.0	11.7
February	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Fourth-year critical rule curves from the AOP10.

**Exhibit 6 - Operating Rule Curve Lower Limits (English & SI)**

End-of-Month Usable Storage Content

	<b>(English)</b> (ksfd)			<b>(SI)</b> (hm <sup>3</sup> )		
<b>Month</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>	<b>Mica</b>	<b>Arrow</b>	<b>Duncan</b>
January	364.0	293.7	118.4	890.6	718.6	289.7
February	108.9	58.2	18.7	266.4	142.4	45.8
March	0.1	0.0	0.2	0.2	0.0	0.5
Apr15	0.0	0.0	0.0	0.0	0.0	0.0

Source: Operating Rule Curve Lower Limits from the AOP10.



## Exhibit 7 - Variable Refill Curve Procedures (English)

The Variable Refill Curves (VRC) indicate the end-of-month storage content required to refill Canadian storage based on forecasts of natural inflow volume. The probable forecast volume at each reservoir is reduced by deducting the 95 percent confidence forecast error, Power Discharge Requirements (PDR), and water required for refill at upstream reservoirs based on the ORC. The Entities have agreed to limit the VRC to be no lower than the Variable Refill Curve Lower Limit (VRCLL), which is defined by studies that optimize power production during the refill period. The VRCLL's are a function of the unregulated January through July runoff volume at The Dalles, Oregon. The following schedule for PDR's and VRCLL's will apply when computing the VRC's during the period January 1 through June 1, unless the Operating Committee agrees to use updated study results.

### POWER DISCHARGE REQUIREMENTS, IN CFS, AND VARIABLE REFILL CURVE LOWER LIMITS, IN KSF, FOR JANUARY - JULY VOLUME RUNOFF OF THE COLUMBIA RIVER AT THE DALLES, OREGON

Project	Dec *	Jan	Feb	Mar	Apr	May	Jun	Jul
<b>Mica</b>								
ARC PDR's		3000	3000	3000	3000	3000	20439	24336
80 MAF PDR's		3000	3000	3000	3000	3000	3000	25000
95 MAF PDR's		3000	3000	3000	3000	3000	3000	24000
110 MAF PDR's		3000	3000	3000	3000	3000	3000	18000
80 MAF VRCLL's		224.9	241.3	270.8	331.0	470.1	1460.8	2823.8
95 MAF VRCLL's		39.3	0.0	20.7	27.3	0.0	681.8	2297.2
110 MAF VRCLL's		11.9	0.0	0.0	0.0	3.7	658.7	1809.5
Distribution Factors		0.976	0.980	0.976	0.982	0.966	0.791	0.506
Forecast Errors (ksfd)	741	728	522	455	420	420	401	397
<b>Arrow</b>								
ARC PDR's		5000	5000	5000	5000	5000	18016	61159
80 MAF PDR's		5000	5000	5000	5000	5000	5000	53000
95 MAF PDR's		5000	5000	5000	5000	5000	5000	51000
110 MAF PDR's		5000	5000	5000	5000	5000	5000	27000
80 MAF VRCLL's		138.7	211.9	378.4	553.0	833.0	2118.5	3039.6
95 MAF VRCLL's		14.6	0.2	18.9	32.1	26.7	1164.4	2953.5
110 MAF VRCLL's		2.0	0.0	17.2	0.0	4.7	900.0	2703.8
Distribution Factors – Total		0.974	0.977	0.971	0.975	0.952	0.743	0.468
Forecast Errors (ksfd) – Total	1659	1485	1095	954	810	810	723	679
Distribution Factors – Local		0.972	0.975	0.966	0.969	0.938	0.694	0.425
Forecast Errors (ksfd) - Local	1100	897	730	638	534	534	462	404
<b>Duncan</b>								
ARC PDR's		100	100	100	100	100	122	3071
80 MAF PDR's		100	100	100	100	100	100	800
95 MAF PDR's		100	100	100	100	100	100	500
110 MAF PDR's		100	100	100	100	100	100	400
80 MAF VRCLL's		365.3	40.6	62.1	81.9	114.8	323.1	598.4
95 MAF VRCLL's		27.6	18.8	16.9	0.0	33.2	204.6	522.7
110 MAF VRCLL's		5.9	0.0	0.3	4.8	2.9	105.5	444.6
Distribution Factors		0.975	0.981	0.976	0.979	0.958	0.753	0.482
Forecast Errors (ksfd)	144	128	104	105	94	94	87	78

Notes:

- (1) If the forecasted natural January through July volume runoff at The Dalles is less than 80 Maf, the Power Discharge Requirement in the 80 Maf schedule will be used. For intermediate forecasted volumes, the Power Discharge Requirement will be interpolated linearly between the values shown above.
  - (2) PDR's and VRCLL's are from the AOP10. Data may be revised upon completion of any Refill Studies agreed to by the Operating Committee.
  - (3) Distribution factors and forecast errors updated based on the July 2008 update to 2003 POP Appendix 8.
- \* These values are used in calculating VECC's for the TSR only prior to the forecast season.

## Exhibit 7M - Variable Refill Curve Procedures (SI)

The Variable Refill Curves (VRC) indicate the end-of-month storage content required to refill Canadian storage based on forecasts of natural inflow volume. The probable forecast volume at each reservoir is reduced by deducting the 95 percent confidence forecast error, Power Discharge Requirements (PDR), and water required for refill at upstream reservoirs based on the ORC. The Entities have agreed to limit the VRC to be no lower than the Variable Refill Curve Lower Limit (VRCLL), which is defined by studies that optimize power production during the refill period. The VRCLL's are a function of the unregulated January through July runoff volume at The Dalles, Oregon. The following schedule for PDR's and VRCLL's will apply when computing the VRC's during the period January 1 through June 1, unless the Operating Committee agrees to use updated study results.

### POWER DISCHARGE REQUIREMENTS, IN m<sup>3</sup>/s, AND VARIABLE REFILL CURVE LOWER LIMITS, IN hm<sup>3</sup>, FOR JANUARY - JULY VOLUME RUNOFF OF THE COLUMBIA RIVER AT THE DALLES, OREGON

Project	Dec*	Jan	Feb	Mar	Apr	May	Jun	Jul
<b>Mica</b>								
ARC PDR's		84.95	84.95	84.95	84.95	84.95	578.77	689.12
98.68 km <sup>3</sup> PDR's		84.95	84.95	84.95	84.95	84.95	84.95	707.92
117.18 km <sup>3</sup> PDR's		84.95	84.95	84.95	84.95	84.95	84.95	679.60
135.69 km <sup>3</sup> PDR's		84.95	84.95	84.95	84.95	84.95	84.95	509.70
98.68 km <sup>3</sup> VRCLL		550.2	590.4	662.5	809.8	1150.1	3574.0	6908.7
117.18 km <sup>3</sup> VRCLL		96.2	0.0	50.6	66.8	0.0	1668.1	5620.3
135.69 km <sup>3</sup> VRCLL		29.1	0.0	0.0	0.0	9.1	1611.6	4427.1
Distribution Factors		0.976	0.980	0.976	0.982	0.966	0.791	0.506
Forecast Errors (hm <sup>3</sup> )	1812.9	1780.9	1276.6	1113.7	1028.1	1028.1	982.1	971.3
<b>Arrow</b>								
ARC PDR's		141.58	141.58	141.58	141.58	141.58	510.16	1731.83
98.68 km <sup>3</sup> PDR's		141.58	141.58	141.58	141.58	141.58	141.58	1500.79
117.18 km <sup>3</sup> PDR's		141.58	141.58	141.58	141.58	141.58	141.58	1444.16
135.69 km <sup>3</sup> PDR's		141.58	141.58	141.58	141.58	141.58	141.58	764.55
98.68 km <sup>3</sup> VRCLL		339.3	518.4	925.8	1353.0	2038.0	5183.1	7436.7
117.18 km <sup>3</sup> VRCLL		35.7	0.5	46.2	78.5	65.3	2848.8	7226.0
135.69 km <sup>3</sup> VRCLL		4.9	0.0	42.1	0.0	11.5	2201.9	6615.1
Distribution Factors - Total		0.974	0.977	0.971	0.975	0.952	0.743	0.468
Forecast Errors (hm <sup>3</sup> ) - Total	4058.9	3633.4	2679.8	2334.5	1981.0	1981.0	1769.4	1662.2
Distribution Factors - Local		0.972	0.975	0.966	0.969	0.938	0.694	0.425
Forecast Errors (hm <sup>3</sup> ) - Local	2691.3	2194.8	1787.2	1561.9	1307.7	1307.7	1130.8	988.2
<b>Duncan</b>								
ARC PDR's		2.83	2.83	2.83	2.83	2.83	3.45	86.96
98.68 km <sup>3</sup> PDR's		2.83	2.83	2.83	2.83	2.83	2.83	22.65
117.18 km <sup>3</sup> PDR's		2.83	2.83	2.83	2.83	2.83	2.83	14.16
135.69 km <sup>3</sup> PDR's		2.83	2.83	2.83	2.83	2.83	2.83	11.33
98.68 km <sup>3</sup> VRCLL		893.7	99.3	151.9	200.4	280.9	790.5	1464.0
117.18 km <sup>3</sup> VRCLL		67.5	46.0	41.3	0.0	81.2	500.6	1278.8
135.69 km <sup>3</sup> VRCLL		14.4	0.0	0.7	11.7	7.1	258.1	1087.8
Distribution Factors		0.975	0.981	0.976	0.979	0.958	0.753	0.482
Forecast Errors (hm <sup>3</sup> )	352.3	312.2	255.2	256.9	229.5	229.5	212.6	190.8

Notes:

- (1) If the forecasted natural January through July volume runoff at The Dalles is less than 98.7 km<sup>3</sup>, the Power Discharge Requirement in the 98.7 km<sup>3</sup> schedule will be used. For intermediate forecasted volumes, the Power Discharge Requirement will be interpolated linearly between the values shown above.
  - (2) PDR's and VRCLL's are from the AOP10. Data may be revised upon completion of any Refill Studies agreed to by the Operating Committee.
  - (3) Distribution factors and forecast errors updated based on the July 2008 update to the 2003 POP Appendix 8.
- \* These values are used in calculating VECC's for the TSR only prior to the forecast season.

**Exhibit 8 - Coordinated System Loads and Resources Used in the TSR  
(Energy in aMW)**

Month	PNW Area Firm Loads <u>1/</u>	Export, Imports and Resources <u>2/</u>	Coordinated Hydro Load <u>3/</u>
August 15	21258	10120	11138
August 31	21258	10092	11166
September	20114	9264	10850
October	20639	10856	9783
November	22855	11698	11157
December	25071	11878	13193
January	25459	12383	13076
February	24455	12553	11901
March	22548	11233	11316
April 15	21445	10855	10590
April 30	21420	8596	12823
May	20689	7198	13491
June	21050	6971	14079
July	21743	9019	12724

Notes: Data for columns 1, 2, and 3 are from Table 1A of the AOP10. References to line numbers in the notes below are references to lines in Table 1A of the AOP10.

- 1/ The Pacific Northwest Area Firm Load including pumping, but excluding Utah Power and Light loads in Idaho (line 1c).
- 2/ Includes total flows out (line 2g), total load served by flows-in (line 3e), load served by other resources (lines 4d – 4b), total thermal installations (line 6c), and hydro maintenance (line 7a). Other resources include hydro independents (1929 for example) that will be updated as described in subsection II(D)3.
- 3/ AOP10 Coordinated Hydro Model Load, DDPB Table 1A, line 7b.

**Exhibit 9 – TSR Critical Rule Curves for Other Major Projects (English)**  
**End-of-Month Usable Storage Content in ksfd**  
**Unadjusted for Crossovers**

YEAR	AUG15	AUG31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR15	APR30	MAY	JUN	JUL
							<b>LIBBY</b>							
1928-29	2510.5	2510.2	2358.2	2420.4	2106.4	1501.6	1436.3	1389.8	1197.1	1154.5	1060.9	1539.2	2507.9	2449.5
1929-30	2489.3	2506.2	2372.8	2354.3	2102.5	1497.8	1345.8	1306.1	1092.4	1132.6	1284.0	1760.4	2504.1	2500.0
1930-31	2503.7	2480.0	2494.5	2370.4	2107.6	1494.0	1122.5	818.9	447.0	431.6	429.2	883.0	1429.7	1638.6
1031-32	1670.0	1682.9	1693.2	1524.7	1030.0	358.1	130.0	0.0						
							<b>CORRA LINN</b>							
1928-29	285.4	285.4	396.9	396.9	396.9	396.9	322.8	234.8	69.8	69.8	69.8	69.8	285.4	285.4
1929-30	285.4	285.4	396.9	396.9	396.9	396.9	322.8	234.8	69.8	69.8	69.8	69.8	285.4	285.4
1930-31	285.4	285.4	396.9	396.9	396.9	396.9	322.8	234.8	69.8	69.8	69.8	69.8	285.4	285.4
1031-32	285.4	285.4	396.9	396.9	396.9	396.9	322.8	57.6						
							<b>HUNGRY HORSE *</b>							
1928-29	1503.4	1437.7	1290.9	1306.5	1308.1	1053.3	832.8	818.4	819.3	826.0	870.5	1196.6	1503.3	1503.4
1929-30	1398.8	1255.8	1134.6	1056.8	791.4	599.1	339.7	336.8	331.9	422.7	574.5	846.9	1039.2	956.4
1930-31	917.3	852.9	640.0	656.2	594.8	345.6	180.4	8.3	0.0	0.0	42.1	395.7	554.0	374.8
1031-32	328.7	243.5	164.5	139.5	152.1	61.6	0.0	0.0						
							<b>KERR</b>							
1928-29	614.7	614.7	614.7	614.4	614.1	589.3	489.2	216.6	0.0	0.0	17.7	426.3	614.7	614.7
1929-30	614.7	614.7	614.7	614.6	612.8	494.4	399.5	189.4	0.0	0.0	218.7	426.3	614.7	614.7
1930-31	614.7	614.7	614.7	614.6	568.9	483.2	362.0	168.8	0.0	0.0	26.7	426.3	614.7	614.7
1031-32	614.7	614.7	614.7	567.8	362.1	195.0	31.4	0.0						
							<b>ALBENI FALLS</b>							
1928-29	582.4	582.4	465.7	190.4	57.6	57.6	57.6	57.6	57.6	57.6	190.4	279.0	582.4	582.4
1929-30	582.4	582.4	465.7	190.4	57.6	57.6	57.6	57.6	57.6	57.6	190.4	279.0	582.4	582.4
1930-31	582.4	582.4	465.7	190.4	57.6	57.6	57.6	57.6	57.6	57.6	190.4	279.0	582.4	582.4
1031-32	582.4	582.4	465.7	190.4	57.6	57.6	57.6	0.0						
							<b>GRAND COULEE</b>							
1928-29	2614.3	2531.9	2531.9	2531.9	2531.9	2490.7	2490.7	2490.7	2288.3	2197.0	1491.0	1808.4	2614.3	2614.3
1929-30	2614.3	2531.9	2531.9	2531.9	2531.9	2490.7	2490.7	2490.7	2174.9	2125.4	2281.5	2414.6	2614.3	2614.3
1930-31	2614.3	2531.9	2531.9	2531.9	2531.9	2490.7	2490.7	2490.7	2288.3	2237.8	1618.6	2353.3	2614.3	2614.3
1031-32	2614.3	2531.9	2531.9	2531.9	2531.9	2449.4	1021.9	0.0						
							<b>CHELAN</b>							
1928-29	341.5	341.5	314.4	340.4	331.8	284.2	232.9	185.9	136.6	112.1	97.9	210.7	341.2	340.4
1929-30	341.5	341.0	309.2	261.3	209.5	158.1	98.4	56.7	19.4	52.5	86.8	175.5	279.0	341.5
1930-31	340.6	340.9	310.5	261.3	212.8	160.9	111.5	67.1	23.9	9.3	12.6	157.4	259.1	267.6
1031-32	252.2	234.8	199.7	159.4	114.3	65.9	20.3	0.0						
							<b>BROWNLEE</b>							
1928-29	432.1	455.9	448.8	491.7	491.7	491.7	478.5	392.1	442.5	467.5	491.7	344.6	491.7	393.9
1929-30	362.6	332.6	332.0	368.6	437.0	444.6	290.6	442.5	467.5	479.9	491.7	446.0	491.7	363.2
1930-31	333.8	306.5	315.6	392.7	437.0	392.1	290.6	439.4	470.9	481.3	491.7	439.7	475.8	347.6

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1031-32	313.7	273.2	249.8	283.2	306.5	318.2	222.6	0.0						
DWORSHAK														
1928-29	395.8	395.8	388.6	395.3	397.5	391.3	380.5	372.4	420.8	445.2	554.1	907.8	1016.0	800.6
1929-30	673.4	530.2	385.6	379.7	365.2	379.9	367.6	417.9	510.0	693.0	867.6	1016.0	1016.0	779.7
1930-31	648.7	501.3	387.5	391.3	403.2	399.4	408.2	423.7	536.1	679.9	789.1	1016.0	1016.0	767.0
1031-32	633.5	483.8	385.6	376.7	375.9	375.4	375.4	218.4						

Note: This data is the same as in the AOP10 studies, and is provided here to verify the critical rule curves used in the TSR studies.

\* Adjusted for 0% bank storage.

**Exhibit 9M – TSR Critical Rule Curves for Other Major Projects (SI)**  
**End-of-Month Usable Storage Content in hm<sup>3</sup>**  
**Unadjusted for Crossovers**

YEAR	AUG15	AUG31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR15	APR30	MAY	JUN	JUL
<b>LIBBY</b>														
1928-29	6142.2	6141.5	5769.6	5921.8	5153.5	3673.8	3514.1	3400.3	2928.8	2824.6	2595.6	3765.8	6135.8	5992.9
1929-30	6090.3	6131.7	5805.3	5760.0	5144.0	3664.5	3292.6	3195.5	2672.7	2771.0	3141.4	4307.0	6126.5	6116.5
1930-31	6125.6	6067.6	6103.0	5799.4	5156.5	3655.2	2746.3	2003.5	1093.6	1056.0	1050.1	2160.3	3497.9	4009.0
1031-32	4085.8	4117.4	4142.6	3730.3	2520.0	876.1	318.1	0.0						
<b>CORRA LINN</b>														
1928-29	698.3	698.3	971.1	971.1	971.1	971.1	789.8	574.5	170.8	170.8	170.8	170.8	698.3	698.3
1929-30	698.3	698.3	971.1	971.1	971.1	971.1	789.8	574.5	170.8	170.8	170.8	170.8	698.3	698.3
1930-31	698.3	698.3	971.1	971.1	971.1	971.1	789.8	574.5	170.8	170.8	170.8	170.8	698.3	698.3
1031-32	698.3	698.3	971.1	971.1	971.1	971.1	789.8	140.9						
<b>HUNGRY HORSE*</b>														
1928-29	3678.2	3517.5	3158.3	3196.5	3200.4	2577.0	2037.5	2002.3	2004.5	2020.9	2129.8	2927.6	3678.0	3678.2
1929-30	3422.3	3072.4	2775.9	2585.6	1936.2	1465.8	831.1	824.0	812.0	1034.2	1405.6	2072.0	2542.5	2339.9
1930-31	2244.3	2086.7	1565.8	1605.5	1455.2	845.5	441.4	20.3	0.0	0.0	103.0	968.1	1355.4	917.0
1031-32	804.2	595.7	402.5	341.3	372.1	150.7	0.0	0.0						
<b>KERR</b>														
1928-29	1503.9	1503.9	1503.9	1503.2	1502.5	1441.8	1196.9	529.9	0.0	0.0	43.3	1043.0	1503.9	1503.9
1929-30	1503.9	1503.9	1503.9	1503.7	1499.3	1209.6	977.4	463.4	0.0	0.0	535.1	1043.0	1503.9	1503.9
1930-31	1503.9	1503.9	1503.9	1503.7	1391.9	1182.2	885.7	413.0	0.0	0.0	65.3	1043.0	1503.9	1503.9
1031-32	1503.9	1503.9	1503.9	1389.2	885.9	477.1	76.8	0.0						
<b>ALBENI FALLS</b>														
1928-29	1424.9	1424.9	1139.4	465.8	140.9	140.9	140.9	140.9	140.9	140.9	465.8	682.6	1424.9	1424.9
1929-30	1424.9	1424.9	1139.4	465.8	140.9	140.9	140.9	140.9	140.9	140.9	465.8	682.6	1424.9	1424.9
1930-31	1424.9	1424.9	1139.4	465.8	140.9	140.9	140.9	140.9	140.9	140.9	465.8	682.6	1424.9	1424.9
1031-32	1424.9	1424.9	1139.4	465.8	140.9	140.9	140.9	0.0						
<b>GRAND COULEE</b>														
1928-29	6396.1	6194.5	6194.5	6194.5	6194.5	6093.7	6093.7	6093.7	5598.6	5375.2	3647.9	4424.4	6396.1	6396.1
1929-30	6396.1	6194.5	6194.5	6194.5	6194.5	6093.7	6093.7	6093.7	5321.1	5200.0	5581.9	5907.6	6396.1	6396.1
1930-31	6396.1	6194.5	6194.5	6194.5	6194.5	6093.7	6093.7	6093.7	5598.6	5475.0	3960.1	5757.6	6396.1	6396.1
1031-32	6396.1	6194.5	6194.5	6194.5	6194.5	5992.7	2500.2	0.0						
<b>CHELAN</b>														
1928-29	835.5	835.5	769.2	832.8	811.8	695.3	569.8	454.8	334.2	274.3	239.5	515.5	834.8	832.8
1929-30	835.5	834.3	756.5	639.3	512.6	386.8	240.7	138.7	47.5	128.4	212.4	429.4	682.6	835.5
1930-31	833.3	834.0	759.7	639.3	520.6	393.7	272.8	164.2	58.5	22.8	30.8	385.1	633.9	654.7
1031-32	617.0	574.5	488.6	390.0	279.6	161.2	49.7	0.0						
<b>BROWNLEE</b>														
1928-29	1057.2	1115.4	1098.0	1203.0	1203.0	1203.0	1170.7	959.3	1082.6	1143.8	1203.0	843.1	1203.0	963.7
1929-30	887.1	813.7	812.3	901.8	1069.2	1087.8	711.0	1082.6	1143.8	1174.1	1203.0	1091.2	1203.0	888.6
1930-31	816.7	749.9	772.1	960.8	1069.2	959.3	711.0	1075.0	1152.1	1177.5	1203.0	1075.8	1164.1	850.4
1031-32	767.5	668.4	611.2	692.9	749.9	778.5	544.6	0.0						
<b>DWORSHAK</b>														
1928-29	968.4	968.4	950.7	967.1	972.5	957.4	930.9	911.1	1029.5	1089.2	1355.7	2221.0	2485.7	1958.7
1929-30	1647.5	1297.2	943.4	929.0	893.5	929.5	899.4	1022.4	1247.8	1695.5	2122.7	2485.7	2485.7	1907.6
1930-31	1587.1	1226.5	948.1	957.4	986.5	977.2	998.7	1036.6	1311.6	1663.4	1930.6	2485.7	2485.7	1876.5
1031-32	1549.9	1183.7	943.4	921.6	919.7	918.5	918.5	534.3						

Note: This data is the same as in the AOP10 studies, and is provided here to verify the critical rule curves used in the TSR studies.

\* Adjusted for 0% bank storage.

### Exhibit 10 – PDR's in cfs, VRC Lower limits in ksfd, and 95% Confidence Forecast Errors (Hedges) and Distribution Factors (English)

Project	Median *	Dec *	Jan	Feb	Mar	Ap1	Ap2	May	Jun	Jul
<b>Libby</b>										
ARC PDR's			4000	4000	4000	4000	4000	5427	9585	6850
80 MAF PDR's			4000	4000	4000	4000	4000	4000	6000	8000
95 MAF PDR's			4000	4000	4000	4000	4000	4000	6000	8000
110 MAF PDR's			4000	4000	4000	4000	4000	4000	6000	8000
80 MAF VRCLL's			1455.6	1414.3	1394.2	1420.0	1519.0	2233.4	2510.6	2510.5
95 MAF VRCLL's			180.6	122.2	17.6	12.2	94.4	727.4	1747.0	2510.5
110 MAF VRCLL's			171.8	20.0	0.0	0.0	1.9	898.4	1976.6	2510.5
Distribution Factors			0.969	0.971	0.963	0.969	0.938	0.670	0.358	N/A
Hedges (ksfd)	1204	933	651	489	457	443	443	401	385	N/A
<b>Dworshak</b>										
ARC PDR's			1300	1300	1300	1300	1300	1300	1300	1300
80 MAF PDR's			1300	1300	1300	1300	1300	1300	1300	1300
95 MAF PDR's			1300	1300	1300	1300	1300	1300	1300	1300
110 MAF PDR's			1300	1300	1300	1300	1300	1300	1300	1300
80 MAF VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
95 MAF VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
110 MAF VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Distribution Factors			0.943	0.930	0.883	0.891	0.828	0.467	0.242	N/A
Hedges (ksfd)	856	700	627	482	345	258	258	222	136	N/A
<b>Hungry Horse **</b>										
ARC PDR's			400	400	400	400	2208	2536	5663	1386
80 MAF PDR's			400	400	400	400	400	400	900	1200
95 MAF PDR's			400	400	400	400	400	400	900	1200
110 MAF PDR's			400	400	400	400	400	400	900	1200
80 MAF VRCLL's			937.5	917.7	947.6	990.0	1072.3	1377.4	1503.4	1503.4
95 MAF VRCLL's			484.5	498.8	521.9	542.7	618.8	970.5	1341.1	1503.4
110 MAF VRCLL's			428.5	433.2	462.0	506.0	665.5	1090.4	1404.8	1503.4
Distribution Factors			0.972	0.973	0.962	0.955	0.900	0.552	0.245	N/A
Hedges (ksfd)	440	440	313	229	173	149	149	129	107	N/A
<b>Grand Coulee</b>										
ARC PDR's			30000	30000	30000	30000	30000	107984	112749	118991
80 MAF PDR's			30000	30000	30000	30000	30000	30000	30000	30000
95 MAF PDR's			30000	30000	30000	30000	30000	30000	30000	30000
110 MAF PDR's			30000	30000	30000	30000	30000	30000	30000	30000
80 MAF VRCLL's			2490.8	2490.7	2288.3	2197.0	1800.2	2155.2	2614.3	2614.3
95 MAF VRCLL's			818.2	889.9	493.0	193.5	0.0	1314.4	2614.3	2614.3
110 MAF VRCLL's			652.4	97.7	0.0	0.0	4.5	843.8	2210.3	2614.3
Distribution Factors			0.962	0.961	0.943	0.953	0.914	0.650	0.385	N/A
Hedges (ksfd)	10179	10179	7688	5656	4912	4056	4056	3288	2926	N/A
<b>Chelan</b>										
ARC PDR's			50	50	50	50	50	2030	2061	1958
80 MAF PDR's			50	50	50	50	50	50	50	50
95 MAF PDR's			50	50	50	50	50	50	50	50
110 MAF PDR's			50	50	50	50	50	50	50	50
80 MAF VRCLL's			173.3	131.9	107.4	118.3	163.1	270.1	341.3	341.5
95 MAF VRCLL's			47.1	17.9	18.6	3.6	10.7	142.2	326.0	341.5
110 MAF VRCLL's			47.3	0.0	0.0	0.0	7.3	239.7	288.1	341.5
Distribution Factors			0.967	0.965	0.951	0.930	0.830	0.550	0.300	N/A
Hedges (ksfd)	N/A	N/A	203	180	153	66	66	64	59	N/A

## Notes:

1/ PDR's and VRCLL's from the AOP10.

2/ Distribution factors and forecast errors updated based on the July 2008 update to 2003 POP Appendix 8.

\* These values are used in calculating VECC's for the TSR only prior to the forecast season.

\*\* VRCLL's adjusted for 0% bank storage.



## Exhibit 10M – PDR's in m<sup>3</sup>/s , VRC Lower Limits in hm<sup>3</sup>, and 95% Confidence Forecast Errors (Hedges) and Distribution Factors (SI)

Project	Median *	Dec. *	Jan	Feb	Mar	Ap1	Ap2	May	Jun	Jul
<b>Libby</b>										
ARC PDR's			113.27	113.27	113.27	113.27	113.27	153.68	271.42	193.97
98.68 km <sup>3</sup> PDR's			113.27	113.27	113.27	113.27	113.27	113.27	169.90	226.53
117.18 km <sup>3</sup> PDR's			113.27	113.27	113.27	113.27	113.27	113.27	169.90	226.53
135.69 km <sup>3</sup> PDR's			113.27	113.27	113.27	113.27	113.27	113.27	169.90	226.53
98.68 km <sup>3</sup> VRCLL's			3561.3	3460.2	3411.0	3474.2	3716.4	5464.2	6142.4	6142.2
117.18 km <sup>3</sup> VRCLL's			441.9	299.0	43.1	29.8	231.0	1779.7	4274.2	6142.2
135.69 km <sup>3</sup> VRCLL's			420.3	48.9	0.0	0.0	4.6	2198.0	4835.9	6142.2
Distribution Factors			0.969	0.971	0.963	0.969	0.938	0.670	0.358	N/A
Hedges (hm <sup>3</sup> )	2945.7	2283.2	1593.7	1195.2	1118.8	1084.3	1084.3	980.6	941.2	N/A
<b>Dworshak</b>										
ARC PDR's			36.81	36.81	36.81	36.81	36.81	36.81	36.81	36.81
98.68 km <sup>3</sup> PDR's			36.81	36.81	36.81	36.81	36.81	36.81	36.81	36.81
117.18 km <sup>3</sup> PDR's			36.81	36.81	36.81	36.81	36.81	36.81	36.81	36.81
135.69 km <sup>3</sup> PDR's			36.81	36.81	36.81	36.81	36.81	36.81	36.81	36.81
98.68 km <sup>3</sup> VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
117.18 km <sup>3</sup> VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
135.69 km <sup>3</sup> VRCLL's			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Distribution Factors			0.943	0.930	0.883	0.891	0.828	0.467	0.242	N/A
Hedges (hm <sup>3</sup> )	2094.3	1713.4	1533.3	1179.3	843.8	631.5	631.5	542.7	333.0	N/A
<b>Hungry Horse **</b>										
ARC PDR's			11.33	11.33	11.33	11.33	62.52	71.81	160.36	39.25
98.68 km <sup>3</sup> PDR's			11.33	11.33	11.33	11.33	11.33	11.33	25.49	33.98
117.18 km <sup>3</sup> PDR's			11.33	11.33	11.33	11.33	11.33	11.33	25.49	33.98
135.69 km <sup>3</sup> PDR's			11.33	11.33	11.33	11.33	11.33	11.33	25.49	33.98
98.68 km <sup>3</sup> VRCLL's			2293.7	2245.2	2318.4	2422.1	2623.5	3369.9	3678.2	3678.2
117.18 km <sup>3</sup> VRCLL's			1185.4	1220.4	1276.9	1327.8	1514.0	2374.4	3281.1	3678.2
135.69 km <sup>3</sup> VRCLL's			1048.4	1059.9	1130.3	1238.0	1628.2	2667.8	3437.0	3678.2
Distribution Factors			0.972	0.973	0.962	0.955	0.900	0.552	0.245	N/A
Hedges (hm <sup>3</sup> )	1075.8	1075.8	765.1	561.3	424.0	363.8	363.8	315.9	262.3	N/A
<b>Grand Coulee</b>										
ARC PDR's			849.50	849.50	849.50	849.50	849.50	3057.76	3192.69	3369.45
98.68 km <sup>3</sup> PDR's			849.50	849.50	849.50	849.50	849.50	849.50	849.50	849.50
117.18 km <sup>3</sup> PDR's			849.50	849.50	849.50	849.50	849.50	849.50	849.50	849.50
135.69 km <sup>3</sup> PDR's			849.50	849.50	849.50	849.50	849.50	849.50	849.50	849.50
98.68 km <sup>3</sup> VRCLL's			6094.0	6093.7	5598.6	5375.2	4404.4	5272.9	6396.1	6396.1
117.18 km <sup>3</sup> VRCLL's			2001.8	2177.2	1206.2	473.4	0.0	3215.8	6396.1	6396.1
135.69 km <sup>3</sup> VRCLL's			1596.2	239.0	0.0	0.0	11.0	2064.4	5407.7	6396.1
Distribution Factors			0.962	0.961	0.943	0.953	0.914	0.650	0.385	N/A
Hedges (hm <sup>3</sup> )	24903.9	24903.9	18809.7	13838.5	12018.2	9922.2	9922.2	8045.4	7159.0	N/A
<b>Chelan</b>										
ARC PDR's			1.42	1.42	1.42	1.42	1.42	57.48	58.36	55.44
98.68 km <sup>3</sup> PDR's			1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
117.18 km <sup>3</sup> PDR's			1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
135.69 km <sup>3</sup> PDR's			1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
98.68 km <sup>3</sup> VRCLL's			424.0	322.7	262.8	289.4	399.0	660.8	835.0	835.5
117.18 km <sup>3</sup> VRCLL's			115.2	43.8	45.5	8.8	26.2	347.9	797.6	835.5
135.69 km <sup>3</sup> VRCLL's			115.7	0.0	0.0	0.0	17.9	586.5	704.9	835.5
Distribution Factors			0.967	0.965	0.951	0.930	0.830	0.550	0.300	N/A
Hedges (hm <sup>3</sup> )	N/A	N/A	496.7	440.4	374.3	161.5	161.5	156.6	144.3	N/A

### Notes

1/ PDR's and VRCLL's from the AOP10.

2/ Distribution factors and forecast errors updated based on the July 2008 update to 2003 POP Appendix 8.

\* These values are used in calculating VECC's for the TSR only prior to the forecast season.

\*\* VRCLL's adjusted for 0% bank storage.

**Exhibit 11 – U.S. Operating Rule Curve Lower Limits**  
(End-of-Month Usable Storage Contents)

**English Units in ksf**

<b>Month</b>	<b>Libby</b>	<b>Dworshak</b>	<b>Hungry Horse *</b>	<b>Grand Coulee</b>	<b>Chelan</b>
January	735.2	321.8	93.8	1924.9	86.6
February	425.4	310.6	0.0	1293.9	37.6
March	70.5	332.7	0.0	343	3.1
April 15	15.1	390.2	0.0	74.2	0.3

**Metric Units in hm<sup>3</sup>**

<b>Month</b>	<b>Libby</b>	<b>Dworshak</b>	<b>Hungry Horse *</b>	<b>Grand Coulee</b>	<b>Chelan</b>
January	1798.7	787.3	229.5	4709.5	211.9
February	1040.8	759.9	0.0	3165.7	92.0
March	172.5	814.0	0.0	839.2	7.6
April 15	36.9	954.7	0.0	181.5	0.7

Source: Operating Rule Curve Lower Limits from the AOP10.

## Exhibit 12 - Composite Canadian Storage Contents in ksfd (English)

### From the DOP10 70-Year Continuous TSR Study

Water Year	AU1	AU2	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL
1928-1929	7814.6	7811.6	7393.0	6971.7	6228.6	5066.2	3103.2	1684.0	1031.8	612.6	640.1	2091.6	5527.6	7078.2
1929-1930	7516.2	7664.8	6913.7	5886.0	4603.1	3382.5	1374.0	593.0	3.1	111.5	817.7	2525.6	4042.3	6318.6
1930-1931	6752.7	6937.5	6485.4	5500.1	4249.3	2720.3	1142.9	366.5	1.5	0.0	0.0	1458.0	2695.2	3767.8
1931-1932	3727.8	3594.0	2852.2	2138.0	1495.2	413.0	129.2	0.0	1.3	252.2	517.4	2165.4	5791.6	7721.6
1932-1933	7814.6	7811.6	7061.2	6314.2	6205.6	5110.5	2968.6	1317.5	528.1	503.3	588.2	2540.1	5767.0	7768.3
1933-1934	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	3093.2	1503.7	559.9	423.2	1018.3	2970.0	5182.5	6600.4
1934-1935	7049.0	7191.2	6601.6	5818.9	5921.5	5012.5	2880.6	1817.6	1145.2	931.8	994.6	2531.6	5642.1	7721.6
1935-1936	7814.6	7811.6	7386.7	6651.3	5572.2	4173.1	2141.8	1481.0	930.4	811.7	1048.8	4101.0	6615.0	7720.7
1936-1937	7814.6	7794.4	7164.5	6253.1	4981.6	3552.1	1384.1	444.0	1.7	0.0	0.0	1491.2	4514.9	6343.6
1937-1938	6392.4	6253.8	5556.6	4828.7	4367.7	3677.0	1749.8	1292.6	709.6	608.8	742.6	2308.1	5684.8	7639.6
1938-1939	7686.7	7763.6	7272.6	6645.6	5768.7	4779.4	3191.7	2374.9	1383.0	1424.6	1572.8	3807.3	5594.7	7721.6
1939-1940	7814.6	7811.6	7235.4	6579.9	5726.2	4926.0	2845.2	2295.6	1655.0	1901.5	2308.2	4430.0	6209.2	7316.2
1940-1941	7564.7	7627.3	7043.6	6719.5	5791.9	4785.9	3154.9	2197.5	1884.9	2279.1	2667.6	3935.9	4691.1	6108.7
1941-1942	6286.4	6354.7	6292.7	6573.3	6228.6	5110.5	3420.5	2713.6	1395.7	1176.2	1273.1	2953.9	5256.7	7672.1
1942-1943	7814.6	7811.6	7316.0	6585.4	6000.1	5110.5	3317.4	2684.2	1362.8	1224.8	1450.9	2610.2	5007.3	7434.1
1943-1944	7739.6	7811.6	7386.2	6965.1	6114.3	5060.9	3223.5	1951.0	998.7	716.3	769.9	1870.4	3500.0	4546.7
1944-1945	4625.9	4557.9	3810.3	3243.0	2576.5	1071.1	510.3	189.5	0.5	0.0	0.0	1807.0	4761.1	6477.0
1945-1946	6542.1	6438.0	5735.1	5066.1	4283.3	3332.2	1109.2	375.8	241.7	206.5	304.8	2398.3	5971.9	7721.6
1946-1947	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2885.9	1237.3	624.6	643.3	1027.4	3111.8	6205.2	7814.6
1947-1948	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2922.0	1189.3	351.3	311.5	438.9	2630.7	5997.6	7808.3
1948-1949	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	3420.5	2863.1	1534.0	1324.1	1419.6	4125.9	5942.6	6865.6
1949-1950	7271.6	7439.7	6926.5	6185.9	5908.5	5110.5	2884.2	1208.6	644.3	608.9	735.7	2059.5	4996.2	7721.6
1950-1951	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	3014.7	1397.1	955.2	916.2	1211.8	2945.4	5906.8	7721.6
1951-1952	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2885.3	1292.1	1152.3	929.7	1079.7	2809.9	5928.0	7721.6
1952-1953	7814.6	7811.6	7321.0	6559.0	5487.8	4283.1	2663.4	2167.0	958.9	825.6	872.5	2265.7	5436.2	7364.4
1953-1954	7732.2	7811.6	7407.1	6971.7	6228.6	5110.5	2944.6	1392.4	437.1	252.7	343.3	2138.9	5356.0	7798.0
1954-1955	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2992.5	1818.5	1387.1	1155.4	878.4	2001.3	5016.8	7710.7
1955-1956	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2990.1	1260.4	552.6	520.2	615.4	2812.2	6057.8	7721.6
1956-1957	7776.9	7811.6	7407.1	6971.7	6228.6	5110.5	2905.5	1250.9	728.9	708.2	804.4	2804.6	6359.9	7288.0
1957-1958	7570.4	7706.4	6986.6	6463.9	5672.6	4888.5	2712.9	1110.1	635.7	622.3	737.0	2795.4	6237.1	7225.3
1958-1959	7542.7	7733.0	7105.9	6839.0	6228.6	5110.5	3027.4	1390.5	595.7	568.2	672.5	2444.9	5650.9	7721.6
1959-1960	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2974.5	1476.2	1367.6	1260.8	1342.9	2945.3	5483.8	7721.6
1960-1961	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2966.5	1435.5	556.3	362.5	530.8	2530.4	5858.2	7429.2
1961-1962	7684.8	7802.5	7225.6	6885.5	6141.5	5110.5	2900.7	1967.3	1312.6	1112.6	1280.7	2980.3	5817.2	7691.8
1962-1963	7814.6	7811.6	7392.8	6971.7	6228.6	5110.5	2965.6	2086.1	1496.7	1312.2	1452.7	3222.9	6194.7	7721.6
1963-1964	7814.6	7811.6	7407.1	6919.7	6228.6	5110.5	2943.0	1229.8	1049.0	999.5	1024.4	2175.7	5635.3	7721.6
1964-1965	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2970.1	1348.4	1108.1	1118.8	1312.3	2707.4	5914.1	7721.6
1965-1966	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2960.2	1330.8	1227.0	1276.4	1391.9	3761.3	6248.7	7721.6
1966-1967	7814.6	7811.6	7407.1	6828.4	6176.3	5110.5	3005.1	1432.3	521.8	302.2	143.8	1726.2	5217.1	7814.6
1967-1968	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2982.7	1359.4	1098.7	1126.5	624.4	2476.2	6086.7	7720.3
1968-1969	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2954.9	1312.0	549.2	528.5	739.2	3021.4	6175.9	7805.7
1969-1970	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	3420.5	2853.2	1538.3	1325.0	1044.9	2525.6	5847.9	7567.3
1970-1971	7739.6	7797.5	7317.8	6735.0	6161.4	5110.5	2916.4	1359.7	1039.8	951.4	1030.7	2783.7	6136.5	7713.3
1971-1972	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2924.6	1240.4	359.4	162.3	70.2	1664.2	5389.9	7807.5
1972-1973	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	3548.3	2973.9	2763.2	2562.1	2544.7	4290.4	5795.8	7019.8
1973-1974	7442.2	7437.2	6904.6	6238.9	6228.6	5110.5	3018.3	1439.8	759.0	747.7	861.9	2341.1	5714.9	7686.5
1974-1975	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2934.2	2295.0	1610.3	1402.5	1463.0	2669.9	4616.1	7363.0
1975-1976	7684.8	7811.6	7407.1	6971.7	6228.6	5110.5	3052.8	1384.9	633.4	610.7	778.9	2736.2	5730.5	7422.4
1976-1977	7671.4	7766.8	7407.1	6971.7	6161.8	4984.8	3156.1	1986.7	1011.9	561.9	674.6	1607.7	2803.8	3457.5
1977-1978	3445.2	3403.0	2632.1	2018.5	1561.9	1180.2	896.2	557.4	381.9	298.9	445.3	1804.4	4856.4	6885.0
1978-1979	7325.7	7497.5	7407.1	6971.7	6228.6	5110.5	3484.6	3045.0	1915.8	2013.5	2225.5	3996.0	6104.1	7546.2
1979-1980	7661.5	7769.1	7139.0	6311.3	5204.8	4351.4	2749.7	2228.0	1037.9	900.0	1178.5	4042.2	6228.5	7689.2
1980-1981	7735.7	7787.5	7407.1	6956.6	6228.6	5110.5	3067.9	1476.6	1307.6	1348.4	1438.9	3274.2	5973.3	7721.6
1981-1982	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2960.3	1340.8	780.9	766.3	854.5	2448.0	5660.3	7717.8
1982-1983	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2959.8	1466.9	1368.8	1318.6	1445.4	2900.8	5896.4	7709.4
1983-1984	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2990.6	2208.5	1530.7	1329.2	1398.6	2329.3	4602.4	6911.0
1984-1985	7472.3	7768.7	7407.1	6971.7	6228.6	5110.5	3420.5	2664.2	1345.1	1154.1	1233.5	3669.9	6045.1	7149.1
1985-1986	7373.7	7450.8	7045.9	6910.3	6228.6	5110.5	2916.8	1279.3	827.3	894.9	1014.8	2904.4	6055.2	7654.5
1986-1987	7814.6	7803.7	7407.1	6971.7	6228.6	5110.5	2979.7	2380.3	2334.3	2507.6	2925.6	4987.4	6169.9	7069.5
1987-1988	7346.4	7303.7	6769.5	5630.8	4300.1	3080.8	1266.7	344.7	1.8	19.1	798.2	3085.3	5438.1	6159.6
1988-1989	6016.1	5867.2	4919.6	4327.3	3841.4	2737.9	1219.3	524.4	667.7	669.0	815.1	2709.7	5373.0	6945.3
1989-1990	7380.3	7669.9	7095.0	6405.7	6228.6	5110.5	3027.6	1419.0	886.1	964.2	1406.4	2924.8	6123.6	7721.6
1990-1991	7814.6	7811.6	7311.5	6774.0	6228.6	5110.5	3072.8	1608.7	692.2	516.7	573.9	2802.9	5914.9	7651.9
1991-1992	7803.7	7811.6	7377.7	6529.9	5754.2	4783.3	2939.1	2464.0	2454.8	2595.5	3064.4	4901.9	5706.1	6858.9
1992-1993	7026.2	6971.6	6293.9	5460.3	4421.0	3097.5	1292.0	549.4	682.0	846.6	1034.9	3728.9	5648.4	6523.2
1993-1994	6797.4	7031.8	6902.4	6082.5	4920.3	3788.9	1929.0	762.3	696.6	923.8	1643.7	4267.8	5589.0	6928.1
1994-1995	7214.5	7158.1	6409.5	5265.5	4113.3	3028.5	2300.8	1980.2	835.5	754.8	823.6	2372.8	5586.3	7345.8
1995-1996	7739.6	7804.0	7277.4	6971.7	6228.6	5151.7	3125.3	1539.4	583.4	619.0	784.4	2596.1	5757.8	7782.9
1996-1997	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2997.4	1429.0	570.2	596.3	701.2	2437.0	5816.1	7768.5
1997-1998	7814.6	7811.6	7407.1	6971.7	6228.6	5110.5	2986.4	1749.1	1528.7	1349.4	1499.8	3549.9	6107.2	7708.1
<b>Max</b>	7814.6	7811.6	7407.1	6971.7	6228.6	5151.7	3548.3	3045.0	2763.2	2595.5	3064.4	4987.4	6615.0	7814.6
<b>Average</b>														

## Exhibit 12M - Composite Canadian Storage Contents in hm<sup>3</sup> (SI)

### From the DOP10 70-Year Continuous TSR Study

Water Year	AU1	AU2	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL
1928-1929	19119.2	19111.9	18087.7	17057.0	15238.9	12395.0	7592.3	4120.1	2524.4	1498.8	1566.1	5117.3	13523.8	17317.5
1929-1930	18389.1	18752.7	16915.1	14400.7	11261.9	8275.6	3361.6	1450.8	7.6	272.8	2000.6	6179.1	9889.9	15459.1
1930-1931	16521.2	16973.3	15867.2	13456.5	10396.3	6655.5	2796.2	896.7	3.7	0.0	0.0	3567.1	6594.1	9218.3
1931-1932	9120.4	8793.1	6978.2	5230.8	3658.2	1010.4	316.1	0.0	3.2	617.0	1265.9	5297.9	14169.7	18891.7
1932-1933	19119.2	19111.9	17275.9	15448.3	15182.6	12503.3	7263.0	3223.4	1292.0	1231.4	1439.1	6214.6	13882.0	19005.9
1933-1934	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7567.8	3679.0	1369.9	1035.4	2491.4	7266.4	12679.5	16148.5
1934-1935	17246.1	17594.0	16151.5	14236.5	14487.5	12263.6	7047.7	4446.9	2801.8	2279.7	2433.4	6193.8	13804.0	18891.7
1935-1936	19119.2	19111.9	18072.3	16273.1	13632.9	10209.9	5240.1	3623.4	2276.3	1985.9	2566.0	10033.5	16184.3	18889.5
1936-1937	19119.2	19069.8	17528.7	15298.8	12188.0	8690.6	3386.3	1086.3	4.2	0.0	0.0	3648.4	11046.2	15520.3
1937-1938	15639.6	15300.5	13594.8	11813.9	10686.0	8996.1	4281.1	3162.5	1736.1	1489.5	1816.8	5647.0	13908.4	18691.0
1938-1939	18806.3	18994.4	17793.1	16259.1	14113.7	11693.3	7808.8	5810.4	3383.6	3485.4	3848.0	9314.9	13688.0	18891.7
1939-1940	19119.2	19111.9	17702.1	16098.4	14009.7	12052.0	6961.1	5616.4	4049.1	4652.2	5647.2	10838.4	15191.4	17899.8
1940-1941	18507.8	18661.0	17232.9	16439.9	14170.5	11709.2	7718.8	5376.4	4611.6	5576.0	6526.6	9629.6	11477.2	14945.5
1941-1942	15380.3	15547.4	15395.7	16082.2	15238.9	12503.3	8368.6	6639.1	3414.7	2877.7	3114.8	7227.0	12861.0	18770.6
1942-1943	19119.2	19111.9	17899.3	16111.8	14679.8	12503.3	8116.4	6567.2	3334.2	2996.6	3549.8	6386.1	12250.9	18188.3
1943-1944	18935.7	19111.9	18071.1	17040.8	14959.2	12382.0	7886.6	4773.3	2443.4	1752.5	1883.6	4576.1	8563.1	11124.0
1944-1945	11317.7	11151.4	9322.3	7934.3	6303.7	2620.6	1248.5	463.6	1.2	0.0	0.0	4421.0	11648.5	15846.6
1945-1946	16005.9	15751.2	14031.5	12394.7	10479.5	8152.6	2713.8	919.4	591.3	505.2	745.7	5867.7	14610.9	18891.7
1946-1947	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7060.6	3027.2	1528.1	1573.9	2513.6	7613.3	15181.6	19119.2
1947-1948	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7149.0	2909.7	859.5	762.1	1073.8	6436.3	14673.7	19103.8
1948-1949	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	8368.6	7004.9	3753.1	3239.5	3473.2	10094.4	14539.2	16797.4
1949-1950	17790.7	18202.0	16946.4	15134.4	14455.7	12503.3	7056.5	2957.0	1576.3	1489.7	1800.0	5038.8	12223.7	18891.7
1950-1951	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7375.8	3418.1	2337.0	2241.6	2964.8	7206.2	14451.6	18891.7
1951-1952	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7059.2	3161.3	2819.2	2274.6	2641.6	6874.7	14503.4	18891.7
1952-1953	19119.2	19111.9	17911.6	16047.2	13426.5	10479.0	6516.3	5301.8	2346.0	2019.9	2134.7	5543.3	13300.2	18017.7
1953-1954	18917.6	19111.9	18122.2	17057.0	15238.9	12503.3	7204.3	3406.6	1069.4	618.3	839.9	5233.0	13104.0	19078.6
1954-1955	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7321.5	4449.1	3393.7	2826.8	2149.1	4896.4	12274.1	18865.0
1955-1956	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7315.6	3083.7	1352.0	1272.7	1505.6	6880.3	14821.0	18891.7
1956-1957	19027.0	19111.9	18122.2	17057.0	15238.9	12503.3	7108.6	3060.5	1783.3	1732.7	1968.0	6861.7	15560.1	17830.8
1957-1958	18521.7	18854.5	17093.4	15814.6	13878.6	11960.2	6637.4	2716.0	1555.3	1522.5	1803.1	6839.2	15259.7	17677.4
1958-1959	18454.0	18919.6	17385.3	16732.3	15238.9	12503.3	7406.8	3402.0	1457.4	1390.2	1645.3	5981.7	13825.5	18891.7
1959-1960	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7277.4	3611.7	3346.0	3084.7	3285.5	7206.0	13416.7	18891.7
1960-1961	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7257.8	3512.1	1361.0	886.9	1298.7	6190.9	14332.7	18176.3
1961-1962	18801.6	19089.6	17678.2	16846.1	15025.8	12503.3	7096.9	4813.2	3211.4	2722.1	3133.4	7291.6	14232.4	18818.8
1962-1963	19119.2	19111.9	18087.2	17057.0	15238.9	12503.3	7255.6	5103.9	3661.8	3210.4	3554.2	7885.1	15156.0	18891.7
1963-1964	19119.2	19111.9	18122.2	16929.7	15238.9	12503.3	7200.3	3008.8	2566.5	2445.4	2506.3	5323.1	13787.3	18891.7
1964-1965	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7266.6	3299.0	2711.1	2737.3	3210.7	6623.9	14469.4	18891.7
1965-1966	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7242.4	3255.9	3002.0	3122.8	3405.4	9202.4	15288.1	18891.7
1966-1967	19119.2	19111.9	18122.2	16706.4	15110.9	12503.3	7352.3	3504.3	1276.6	739.4	351.8	4223.3	12764.2	19119.2
1967-1968	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7297.5	3325.9	2688.1	2756.1	1527.7	6058.3	14891.7	18888.5
1968-1969	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7229.5	3209.9	1343.7	1293.0	1808.5	7392.2	15110.0	19097.4
1969-1970	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	8368.6	6980.6	3763.6	3241.7	2556.5	6179.1	14307.5	18514.2
1970-1971	18935.7	19077.4	17903.7	16477.9	15074.5	12503.3	7135.3	3326.6	2544.0	2327.7	2521.7	6810.6	15013.6	18871.4
1971-1972	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7155.3	3034.8	879.3	397.1	171.8	4071.6	13186.9	19101.8
1972-1973	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	8681.3	7275.9	6760.4	6268.4	6225.9	10496.9	14180.0	17174.6
1973-1974	18208.1	18195.9	16892.8	15264.1	15238.9	12503.3	7384.6	3522.6	1857.0	1829.3	2108.7	5727.7	13982.1	18805.8
1974-1975	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7178.8	5614.9	3939.8	3431.4	3579.4	6532.2	11293.8	18014.3
1975-1976	18801.6	19111.9	18122.2	17057.0	15238.9	12503.3	7469.0	3388.3	1549.7	1494.1	1905.7	6694.4	14020.2	18159.6
1976-1977	18768.8	19002.3	18122.2	17057.0	15075.5	12195.8	7721.7	4860.7	2475.7	1374.7	1650.5	3933.4	6859.8	8459.1
1977-1978	8429.0	8325.8	6439.7	4938.5	3821.3	2887.5	2192.6	1363.7	934.4	731.3	1089.5	4414.6	11881.7	16844.8
1978-1979	17923.1	18343.4	18122.2	17057.0	15238.9	12503.3	8525.4	7449.9	4687.2	4926.2	5444.9	9776.6	14934.3	18462.5
1979-1980	18744.6	19007.9	17466.3	15441.2	12734.1	10646.1	6727.4	5451.0	2539.3	2201.9	2883.3	9889.6	15238.6	18812.4
1980-1981	18926.2	19052.9	18122.2	17020.0	15238.9	12503.3	7505.9	3612.6	3199.2	3299.0	3520.4	8010.7	14614.3	18891.7
1981-1982	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7242.7	3280.4	1910.5	1874.8	2090.6	5989.3	13848.5	18882.4
1982-1983	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7241.4	3588.9	3348.9	3226.1	3536.3	7097.1	14426.1	18861.8
1983-1984	19119.2	19111.9	18122.2	17057.0	15238.9	12503.3	7316.8	5403.3	3745.0	3252.0	3421.8	5698.9	11260.2	16908.5
1984-1985	18281.7	19006.9	18122.2	17057.0	15238.9	12503.3	8368.6	6518.2	3290.9	2823.6	3017.9	8978.8	14789.9	17491.0
1985-1986	18040.5	18229.1	17238.5	16906.7	15238.9	12503.3	7136.2	3129.9	2024.1	2189.5	2482.8	7105.9	14814.7	18727.5
1986-1987	19119.2	19092.5	18122.2	17057.0	15238.9	12503.3	7290.1	5823.6	5711.1	6135.1	7157.8	12202.2	15095.3	17296.2
1987-1988	17973.7	17869.2	16562.3	13776.3	10520.6	7537.5	3099.1	843.3	4.4	46.7	1952.9	7548.5	13304.9	15070.1
1988-1989	14719.0	14354.7	12036.3	10587.2	9398.4	6698.5	2983.1	1283.0	1633.6	1636.8	1994.2	6629.6	13145.6	16992.4
1989-1990	18056.6	18765.2	17358.6	15672.2	15238.9	12503.3	7407.3	3471.7	2167.9	2359.0	3440.9	7155.8	14982.0	18891.7
1990-1991	19119.2	19111.9	17888.3	16573.3	15238.9	12503.3	7517.9	3935.8	1693.5	1264.2	1404.1	6857.6	14471.4	18721.1
1991-1992	19092.5	19111.9	18050.3	15976.1	14078.2	11702.8	7190.8	6028.4	6005.9	6350.2	7497.4	11993.0	13960.5	16781.0
1992-1993	17190.3	17056.7	15398.7	13359.2	10816.4	7578.3	3161.0	1344.2	1668.6	2071.3	2532.0	9123.1	13819.4	15959.7
1993-1994	16630.5	17204.0	16887.4	14881.4	12038.0	9269.9	4719.5	1865.0	1704.3	2260.2	4021.5	10441.6	13674.0	16950.3
1994-1995	17651.0	17513.0	15681.5	12882.6	10063.6	7409.5	5629.1	4844.8	2044.1	1846.7	2015.0	5805.3	13667.4	17972.2
1995-1996	18935.7	19093.3	17804.9	17057.0	15238.9									

**Exhibit 13 – Duncan Reservoir Capacity Table, dated 21 Feb. 1973**

English Units - ksf

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1892.	705.8										
1891.	696.9	697.8	698.7	699.6	700.5	701.3	702.2	703.1	704.0	704.9	0.89
1890.	688.0	688.9	689.8	690.7	691.6	692.4	693.3	694.2	695.1	696.0	0.89
1889.	679.2	680.1	681.0	681.8	682.7	683.6	684.5	685.4	686.2	687.1	0.88
1888.	670.4	671.3	672.2	673.0	673.9	674.8	675.7	676.6	677.4	678.3	0.88
1887.	661.5	662.4	663.3	664.2	665.1	665.9	666.8	667.7	668.6	669.5	0.89
1886.	652.8	653.7	654.5	655.4	656.3	657.1	658.0	658.9	659.8	660.6	0.87
1885.	644.0	644.9	645.8	646.6	647.5	648.4	649.3	650.2	651.0	651.9	0.88
1884.	635.3	636.2	637.0	637.9	638.8	639.6	640.5	641.4	642.3	643.1	0.87
1883.	626.6	627.5	628.3	629.2	630.1	630.9	631.8	632.7	633.6	634.4	0.87
1882.	617.9	618.8	619.6	620.5	621.4	622.2	623.1	624.0	624.9	625.7	0.87
1881.	609.2	610.1	610.9	611.8	612.7	613.5	614.4	615.3	616.2	617.0	0.87
1880.	600.6	601.5	602.3	603.2	604.0	604.9	605.8	606.6	607.5	608.3	0.86
1879.	592.0	592.9	593.7	594.6	595.4	596.3	597.2	598.0	598.9	599.7	0.86
1878.	583.4	584.3	585.1	586.0	586.8	587.7	588.6	589.4	590.3	591.1	0.86
1877.	574.8	575.7	576.5	577.4	578.2	579.1	580.0	580.8	581.7	582.5	0.86
1876.	566.3	567.1	568.0	568.8	569.7	570.5	571.4	572.2	573.1	573.9	0.85
1875.	557.8	558.6	559.5	560.3	561.2	562.0	562.9	563.7	564.6	565.4	0.85
1874.	549.3	550.1	551.0	551.8	552.7	553.5	554.4	555.2	556.1	556.9	0.85
1873.	540.9	541.7	542.6	543.4	544.3	545.1	545.9	546.8	547.6	548.5	0.84
1872.	532.4	533.2	534.1	534.9	535.8	536.6	537.5	538.3	539.2	540.0	0.85
1871.	524.0	524.8	525.7	526.5	527.4	528.2	529.0	529.9	530.7	531.6	0.84
1870.	515.7	516.5	517.4	518.2	519.0	519.8	520.7	521.5	522.3	523.2	0.83
1869.	507.3	508.1	509.0	509.8	510.7	511.5	512.3	513.2	514.0	514.9	0.84
1868.	499.0	499.8	500.7	501.5	502.3	503.1	504.0	504.8	505.6	506.5	0.83
1867.	490.7	491.5	492.4	493.2	494.0	494.8	495.7	496.5	497.3	498.2	0.83
1866.	482.4	483.2	484.1	484.9	485.7	486.5	487.4	488.2	489.0	489.9	0.83
1865.	474.2	475.0	475.8	476.7	477.5	478.3	479.1	479.9	480.8	481.6	0.82
1864.	466.0	466.8	467.6	468.5	469.3	470.1	470.9	471.7	472.6	473.4	0.82
1863.	457.8	458.6	459.4	460.3	461.1	461.9	462.7	463.5	464.4	465.2	0.82
1862.	449.7	450.5	451.3	452.1	452.9	453.7	454.6	455.4	456.2	457.0	0.81
1861.	441.6	442.4	443.2	444.0	444.8	445.6	446.5	447.3	448.1	448.9	0.81
1860.	433.5	434.3	435.1	435.9	436.7	437.5	438.4	439.2	440.0	440.8	0.81
1859.	425.4	426.2	427.0	427.8	428.6	429.4	430.3	431.1	431.9	432.7	0.81
1858.	417.4	418.2	419.0	419.8	420.6	421.4	422.2	423.0	423.8	424.6	0.80
1857.	409.4	410.2	411.0	411.8	412.6	413.4	414.2	415.0	415.8	416.6	0.80
1856.	401.4	402.2	403.0	403.8	404.6	405.4	406.2	407.0	407.8	408.6	0.80
1855.	393.5	394.3	395.1	395.9	396.7	397.4	398.2	399.0	399.8	400.6	0.79
1854.	385.6	386.4	387.2	388.0	388.8	389.5	390.3	391.1	391.9	392.7	0.79
1853.	377.7	378.5	379.3	380.1	380.9	381.6	382.4	383.2	384.0	384.8	0.79
1852.	369.9	370.7	371.5	372.2	373.0	373.8	374.6	375.4	376.1	376.9	0.78
1851.	362.1	362.9	363.7	364.4	365.2	366.0	366.8	367.6	368.3	369.1	0.78
1850.	354.3	355.1	355.9	356.6	357.4	358.2	359.0	359.8	360.5	361.3	0.78

### Exhibit 13 – Duncan Reservoir Capacity Table (English) Continued ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1849.	346.6	347.4	348.1	348.9	349.7	350.4	351.2	352.0	352.8	353.5	0.77
1848.	338.9	339.7	340.4	341.2	342.0	342.7	343.5	344.3	345.1	345.8	0.77
1847.	331.2	332.0	332.7	333.5	334.3	335.0	335.8	336.6	337.4	338.1	0.77
1846.	323.6	324.4	325.1	325.9	326.6	327.4	328.2	328.9	329.7	330.4	0.76
1845.	316.0	316.8	317.5	318.3	319.0	319.8	320.6	321.3	322.1	322.8	0.76
1844.	308.5	309.2	310.0	310.7	311.5	312.2	313.0	313.7	314.5	315.2	0.75
1843.	300.9	301.7	302.4	303.2	303.9	304.7	305.5	306.2	307.0	307.7	0.76
1842.	293.5	294.2	295.0	295.7	296.5	297.2	297.9	298.7	299.4	300.2	0.74
1841.	286.0	286.7	287.5	288.2	289.0	289.7	290.5	291.2	292.0	292.7	0.75
1840.	278.6	279.3	280.1	280.8	281.6	282.3	283.0	283.8	284.5	285.3	0.74
1839.	271.2	271.9	272.7	273.4	274.2	274.9	275.6	276.4	277.1	277.9	0.74
1838.	263.9	264.6	265.4	266.1	266.8	267.5	268.3	269.0	269.7	270.5	0.73
1837.	256.6	257.3	258.1	258.8	259.5	260.2	261.0	261.7	262.4	263.2	0.73
1836.	249.4	250.1	250.8	251.6	252.3	253.0	253.7	254.4	255.2	255.9	0.72
1835.	242.2	242.9	243.6	244.4	245.1	245.8	246.5	247.2	248.0	248.7	0.72
1834.	235.0	235.7	236.4	237.2	237.9	238.6	239.3	240.0	240.8	241.5	0.72
1833.	227.9	228.6	229.3	230.0	230.7	231.4	232.2	232.9	233.6	234.3	0.71
1832.	220.8	221.5	222.2	222.9	223.6	224.3	225.1	225.8	226.5	227.2	0.71
1831.	213.8	214.5	215.2	215.9	216.6	217.3	218.0	218.7	219.4	220.1	0.70
1830.	206.8	207.5	208.2	208.9	209.6	210.3	211.0	211.7	212.4	213.1	0.70
1829.	199.9	200.6	201.3	202.0	202.7	203.3	204.0	204.7	205.4	206.1	0.69
1828.	193.0	193.7	194.4	195.1	195.8	196.4	197.1	197.8	198.5	199.2	0.69
1827.	186.1	186.8	187.5	188.2	188.9	189.5	190.2	190.9	191.6	192.3	0.69
1826.	179.3	180.0	180.7	181.3	182.0	182.7	183.4	184.1	184.7	185.4	0.68
1825.	172.6	173.3	173.9	174.6	175.3	175.9	176.6	177.3	178.0	178.6	0.67
1824.	165.9	166.6	167.2	167.9	168.6	169.2	169.9	170.6	171.3	171.9	0.67
1823.	159.2	159.9	160.5	161.2	161.9	162.5	163.2	163.9	164.6	165.2	0.67
1822.	152.6	153.3	153.9	154.6	155.2	155.9	156.6	157.2	157.9	158.5	0.66
1821.	146.1	146.7	147.4	148.0	148.7	149.3	150.0	150.6	151.3	151.9	0.65
1820.	139.6	140.2	140.9	141.5	142.2	142.8	143.5	144.1	144.8	145.4	0.65
1819.	133.2	133.8	134.5	135.1	135.8	136.4	137.0	137.7	138.3	139.0	0.64
1818.	126.8	127.4	128.1	128.7	129.4	130.0	130.6	131.3	131.9	132.6	0.64
1817.	120.5	121.1	121.8	122.4	123.0	123.6	124.3	124.9	125.5	126.2	0.63
1816.	114.3	114.9	115.5	116.2	116.8	117.4	118.0	118.6	119.3	119.9	0.62
1815.	108.1	108.7	109.3	110.0	110.6	111.2	111.8	112.4	113.1	113.7	0.62
1814.	102.0	102.6	103.2	103.8	104.4	105.0	105.7	106.3	106.9	107.5	0.61
1813.	96.0	96.6	97.2	97.8	98.4	99.0	99.6	100.2	100.8	101.4	0.60
1812.	90.0	90.6	91.2	91.8	92.4	93.0	93.6	94.2	94.8	95.4	0.60
1811.	84.1	84.7	85.3	85.9	86.5	87.0	87.6	88.2	88.8	89.4	0.59
1810.	78.3	78.9	79.5	80.0	80.6	81.2	81.8	82.4	82.9	83.5	0.58

### Exhibit 13 – Duncan Reservoir Capacity Table (English) Continued ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1809.	72.5	73.1	73.7	74.2	74.8	75.4	76.0	76.6	77.1	77.7	0.58
1808.	66.9	67.5	68.0	68.6	69.1	69.7	70.3	70.8	71.4	71.9	0.56
1807.	61.3	61.9	62.4	63.0	63.5	64.1	64.7	65.2	65.8	66.3	0.56
1806.	55.8	56.3	56.9	57.4	58.0	58.5	59.1	59.6	60.2	60.7	0.55
1805.	50.4	50.9	51.5	52.0	52.6	53.1	53.6	54.2	54.7	55.3	0.54
1804.	45.1	45.6	46.2	46.7	47.2	47.7	48.3	48.8	49.3	49.9	0.53
1803.	39.9	40.4	40.9	41.5	42.0	42.5	43.0	43.5	44.1	44.6	0.52
1802.	34.8	35.3	35.8	36.3	36.8	37.3	37.9	38.4	38.9	39.4	0.51
1801.	29.8	30.3	30.8	31.3	31.8	32.3	32.8	33.3	33.8	34.3	0.50
1800.	25.0	25.5	26.0	26.4	26.9	27.4	27.9	28.4	28.8	29.3	0.48
1799.	20.3	20.8	21.2	21.7	22.2	22.6	23.1	23.6	24.1	24.5	0.47
1798.	15.7	16.2	16.6	17.1	17.5	18.0	18.5	18.9	19.4	19.8	0.46
1797.	11.3	11.7	12.2	12.6	13.1	13.5	13.9	14.4	14.8	15.3	0.44
1796.	7.1	7.5	7.9	8.4	8.8	9.2	9.6	10.0	10.5	10.9	0.42
1795.	3.0	3.4	3.8	4.2	4.6	5.0	5.5	5.9	6.3	6.7	0.41
1794.			0.0	0.4	0.8	1.1	1.5	1.9	2.3	2.6	0.37

**Exhibit 13M – Duncan Reservoir Capacity Table, dated 21 Feb. 1973**SI Units -  $\text{hm}^3$ 

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
576.68	1726.8										
576.38	1705.0	1707.2	1709.4	1711.6	1713.8	1715.8	1718.0	1720.2	1722.4	1724.6	2.18
576.07	1683.3	1685.5	1687.7	1689.9	1692.1	1694.0	1696.2	1698.4	1700.6	1702.8	2.18
575.77	1661.7	1663.9	1666.1	1668.1	1670.3	1672.5	1674.7	1676.9	1678.9	1681.1	2.15
575.46	1640.2	1642.4	1644.6	1646.6	1648.8	1651.0	1653.2	1655.4	1657.3	1659.5	2.15
575.16	1618.4	1620.6	1622.8	1625.0	1627.2	1629.2	1631.4	1633.6	1635.8	1638.0	2.18
574.85	1597.1	1599.3	1601.3	1603.5	1605.7	1607.7	1609.9	1612.1	1614.3	1616.2	2.13
574.55	1575.6	1577.8	1580.0	1582.0	1584.2	1586.4	1588.6	1590.8	1592.7	1594.9	2.15
574.24	1554.3	1556.5	1558.5	1560.7	1562.9	1564.8	1567.0	1569.2	1571.5	1573.4	2.13
573.94	1533.0	1535.2	1537.2	1539.4	1541.6	1543.6	1545.8	1548.0	1550.2	1552.1	2.13
573.63	1511.8	1514.0	1515.9	1518.1	1520.3	1522.3	1524.5	1526.7	1528.9	1530.8	2.13
573.33	1490.5	1492.7	1494.6	1496.8	1499.0	1501.0	1503.2	1505.4	1507.6	1509.6	2.13
573.03	1469.4	1471.6	1473.6	1475.8	1477.7	1479.9	1482.2	1484.1	1486.3	1488.3	2.10
572.72	1448.4	1450.6	1452.5	1454.7	1456.7	1458.9	1461.1	1463.1	1465.3	1467.2	2.10
572.42	1427.3	1429.5	1431.5	1433.7	1435.7	1437.9	1440.1	1442.0	1444.2	1446.2	2.10
572.11	1406.3	1408.5	1410.5	1412.7	1414.6	1416.8	1419.0	1421.0	1423.2	1425.1	2.10
571.81	1385.5	1387.5	1389.7	1391.6	1393.8	1395.8	1398.0	1399.9	1402.1	1404.1	2.08
571.50	1364.7	1366.7	1368.9	1370.8	1373.0	1375.0	1377.2	1379.1	1381.4	1383.3	2.08
571.20	1343.9	1345.9	1348.1	1350.0	1352.2	1354.2	1356.4	1358.4	1360.6	1362.5	2.08
570.89	1323.4	1325.3	1327.5	1329.5	1331.7	1333.6	1335.6	1337.8	1339.8	1342.0	2.06
570.59	1302.6	1304.5	1306.7	1308.7	1310.9	1312.8	1315.0	1317.0	1319.2	1321.2	2.08
570.28	1282.0	1284.0	1286.2	1288.1	1290.3	1292.3	1294.3	1296.5	1298.4	1300.6	2.06
569.98	1261.7	1263.7	1265.9	1267.8	1269.8	1271.7	1273.9	1275.9	1277.9	1280.1	2.03
569.67	1241.2	1243.1	1245.3	1247.3	1249.5	1251.4	1253.4	1255.6	1257.6	1259.8	2.06
569.37	1220.9	1222.8	1225.0	1227.0	1228.9	1230.9	1233.1	1235.0	1237.0	1239.2	2.03
569.06	1200.5	1202.5	1204.7	1206.7	1208.6	1210.6	1212.8	1214.7	1216.7	1218.9	2.03
568.76	1180.2	1182.2	1184.4	1186.4	1188.3	1190.3	1192.5	1194.4	1196.4	1198.6	2.03
568.45	1160.2	1162.1	1164.1	1166.3	1168.3	1170.2	1172.2	1174.1	1176.3	1178.3	2.01
568.15	1140.1	1142.1	1144.0	1146.2	1148.2	1150.1	1152.1	1154.1	1156.3	1158.2	2.01
567.84	1120.1	1122.0	1124.0	1126.2	1128.1	1130.1	1132.0	1134.0	1136.2	1138.2	2.01
567.54	1100.2	1102.2	1104.2	1106.1	1108.1	1110.0	1112.2	1114.2	1116.1	1118.1	1.98
567.23	1080.4	1082.4	1084.3	1086.3	1088.2	1090.2	1092.4	1094.4	1096.3	1098.3	1.98
566.93	1060.6	1062.6	1064.5	1066.5	1068.4	1070.4	1072.6	1074.5	1076.5	1078.5	1.98
566.62	1040.8	1042.7	1044.7	1046.7	1048.6	1050.6	1052.8	1054.7	1056.7	1058.6	1.98
566.32	1021.2	1023.2	1025.1	1027.1	1029.0	1031.0	1033.0	1034.9	1036.9	1038.8	1.96
566.01	1001.6	1003.6	1005.6	1007.5	1009.5	1011.4	1013.4	1015.3	1017.3	1019.3	1.96
565.71	982.1	984.0	986.0	987.9	989.9	991.9	993.8	995.8	997.7	999.7	1.96
565.41	962.7	964.7	966.7	968.6	970.6	972.3	974.2	976.2	978.2	980.1	1.93
565.10	943.4	945.4	947.3	949.3	951.2	953.0	954.9	956.9	958.8	960.8	1.93
564.80	924.1	926.0	928.0	930.0	931.9	933.6	935.6	937.5	939.5	941.5	1.93
564.49	905.0	907.0	908.9	910.6	912.6	914.5	916.5	918.5	920.2	922.1	1.91
564.19	885.9	887.9	889.8	891.5	893.5	895.5	897.4	899.4	901.1	903.0	1.91
563.88	866.8	868.8	870.7	872.5	874.4	876.4	878.3	880.3	882.0	884.0	1.91



## Exhibit 13M – Duncan Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
563.58	848.0	849.9	851.7	853.6	855.6	857.3	859.2	861.2	863.2	864.9	1.88
563.27	829.2	831.1	832.8	834.8	836.7	838.4	840.4	842.4	844.3	846.0	1.88
562.97	810.3	812.3	814.0	815.9	817.9	819.6	821.6	823.5	825.5	827.2	1.88
562.66	791.7	793.7	795.4	797.3	799.1	801.0	803.0	804.7	806.6	808.4	1.86
562.36	773.1	775.1	776.8	778.8	780.5	782.4	784.4	786.1	788.0	789.8	1.86
562.05	754.8	756.5	758.4	760.2	762.1	763.8	765.8	767.5	769.5	771.2	1.83
561.75	736.2	738.1	739.9	741.8	743.5	745.5	747.4	749.1	751.1	752.8	1.86
561.44	718.1	719.8	721.7	723.5	725.4	727.1	728.8	730.8	732.5	734.5	1.81
561.14	699.7	701.4	703.4	705.1	707.1	708.8	710.7	712.4	714.4	716.1	1.83
560.83	681.6	683.3	685.3	687.0	689.0	690.7	692.4	694.3	696.1	698.0	1.81
560.53	663.5	665.2	667.2	668.9	670.9	672.6	674.3	676.2	678.0	679.9	1.81
560.22	645.7	647.4	649.3	651.0	652.8	654.5	656.4	658.1	659.8	661.8	1.79
559.92	627.8	629.5	631.5	633.2	634.9	636.6	638.6	640.3	642.0	643.9	1.79
559.61	610.2	611.9	613.6	615.6	617.3	619.0	620.7	622.4	624.4	626.1	1.76
559.31	592.6	594.3	596.0	597.9	599.7	601.4	603.1	604.8	606.8	608.5	1.76
559.00	575.0	576.7	578.4	580.3	582.0	583.8	585.5	587.2	589.1	590.9	1.76
558.70	557.6	559.3	561.0	562.7	564.4	566.1	568.1	569.8	571.5	573.2	1.74
558.39	540.2	541.9	543.6	545.3	547.1	548.8	550.7	552.4	554.2	555.9	1.74
558.09	523.1	524.8	526.5	528.2	529.9	531.6	533.4	535.1	536.8	538.5	1.71
557.79	506.0	507.7	509.4	511.1	512.8	514.5	516.2	517.9	519.7	521.4	1.71
557.48	489.1	490.8	492.5	494.2	495.9	497.4	499.1	500.8	502.5	504.2	1.69
557.18	472.2	473.9	475.6	477.3	479.0	480.5	482.2	483.9	485.7	487.4	1.69
556.87	455.3	457.0	458.7	460.5	462.2	463.6	465.3	467.1	468.8	470.5	1.69
556.57	438.7	440.4	442.1	443.6	445.3	447.0	448.7	450.4	451.9	453.6	1.66
556.26	422.3	424.0	425.5	427.2	428.9	430.4	432.1	433.8	435.5	437.0	1.64
555.96	405.9	407.6	409.1	410.8	412.5	414.0	415.7	417.4	419.1	420.6	1.64
555.65	389.5	391.2	392.7	394.4	396.1	397.6	399.3	401.0	402.7	404.2	1.64
555.35	373.4	375.1	376.5	378.2	379.7	381.4	383.1	384.6	386.3	387.8	1.61
555.04	357.4	358.9	360.6	362.1	363.8	365.3	367.0	368.5	370.2	371.6	1.59
554.74	341.5	343.0	344.7	346.2	347.9	349.4	351.1	352.6	354.3	355.7	1.59
554.43	325.9	327.4	329.1	330.5	332.2	333.7	335.2	336.9	338.4	340.1	1.57
554.13	310.2	311.7	313.4	314.9	316.6	318.1	319.5	321.2	322.7	324.4	1.57
553.82	294.8	296.3	298.0	299.5	300.9	302.4	304.1	305.6	307.0	308.8	1.54
553.52	279.6	281.1	282.6	284.3	285.8	287.2	288.7	290.2	291.9	293.3	1.52
553.21	264.5	265.9	267.4	269.1	270.6	272.1	273.5	275.0	276.7	278.2	1.52
552.91	249.6	251.0	252.5	254.0	255.4	256.9	258.6	260.1	261.5	263.0	1.49
552.60	234.9	236.3	237.8	239.3	240.7	242.2	243.7	245.1	246.6	248.1	1.47
552.30	220.2	221.7	223.1	224.6	226.1	227.5	229.0	230.5	231.9	233.4	1.47
551.99	205.8	207.2	208.7	210.2	211.6	212.9	214.3	215.8	217.3	218.7	1.44
551.69	191.6	193.0	194.5	195.7	197.2	198.7	200.1	201.6	202.8	204.3	1.42

### Exhibit 13M – Duncan Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
551.38	177.4	178.8	180.3	181.5	183.0	184.5	185.9	187.4	188.6	190.1	1.42
551.08	163.7	165.1	166.4	167.8	169.1	170.5	172.0	173.2	174.7	175.9	1.37
550.77	150.0	151.4	152.7	154.1	155.4	156.8	158.3	159.5	161.0	162.2	1.37
550.47	136.5	137.7	139.2	140.4	141.9	143.1	144.6	145.8	147.3	148.5	1.35
550.17	123.3	124.5	126.0	127.2	128.7	129.9	131.1	132.6	133.8	135.3	1.32
	110.3	111.6	113.0	114.3	115.5	116.7	118.2	119.4	120.6	122.1	1.30
549.56	97.6	98.8	100.1	101.5	102.8	104.0	105.2	106.4	107.9	109.1	1.27
549.25	85.1	86.4	87.6	88.8	90.0	91.3	92.7	93.9	95.2	96.4	1.25
548.95	72.9	74.1	75.4	76.6	77.8	79.0	80.2	81.5	82.7	83.9	1.22
548.64	61.2	62.4	63.6	64.6	65.8	67.0	68.3	69.5	70.5	71.7	1.17
548.34	49.7	50.9	51.9	53.1	54.3	55.3	56.5	57.7	59.0	59.9	1.15
548.03	38.4	39.6	40.6	41.8	42.8	44.0	45.3	46.2	47.5	48.4	1.13
547.73	27.6	28.6	29.8	30.8	32.1	33.0	34.0	35.2	36.2	37.4	1.08
547.42	17.4	18.3	19.3	20.6	21.5	22.5	23.5	24.5	25.7	26.7	1.03
547.42	17.4	18.3	19.3	20.6	21.5	22.5	23.5	24.5	25.7	26.7	1.03
546.81			0.0	1.0	2.0	2.7	3.7	4.6	5.6	6.4	0.91

**Exhibit 14 – Arrow Reservoir Capacity Table, dated 28 Feb. 1974**

English Units - ksf

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1444.	3579.6										
1443.	3514.1	3520.6	3527.2	3533.7	3540.3	3546.8	3553.4	3559.9	3566.5	3573.0	6.55
1442.	3448.9	3455.4	3461.9	3468.5	3475.0	3481.5	3488.0	3494.5	3501.1	3507.6	6.52
1441.	3384.0	3390.5	3397.0	3403.5	3410.0	3416.4	3422.9	3429.4	3435.9	3442.4	6.49
1440.	3319.5	3325.9	3332.4	3338.8	3345.3	3351.7	3358.2	3364.6	3371.1	3377.5	6.45
1439.	3255.2	3261.6	3268.1	3274.5	3280.9	3287.3	3293.8	3300.2	3306.6	3313.1	6.43
1438.	3191.4	3197.8	3204.2	3210.5	3216.9	3223.3	3229.7	3236.1	3242.4	3248.8	6.38
1437.	3127.8	3134.2	3140.5	3146.9	3153.2	3159.6	3166.0	3172.3	3178.7	3185.0	6.36
1436.	3064.6	3070.9	3077.2	3083.6	3089.9	3096.2	3102.5	3108.8	3115.2	3121.5	6.32
1435.	3001.7	3008.0	3014.3	3020.6	3026.9	3033.1	3039.4	3045.7	3052.0	3058.3	6.29
1434.	2939.2	2945.4	2951.7	2957.9	2964.2	2970.4	2976.7	2982.9	2989.2	2995.4	6.25
1433.	2877.0	2883.2	2889.4	2895.7	2901.9	2908.1	2914.3	2920.5	2926.8	2933.0	6.22
1432.	2815.1	2821.3	2827.5	2833.7	2839.9	2846.0	2852.2	2858.4	2864.6	2870.8	6.19
1431.	2753.5	2759.7	2765.8	2772.0	2778.1	2784.3	2790.5	2796.6	2802.8	2808.9	6.16
1430.	2692.3	2698.4	2704.5	2710.7	2716.8	2722.9	2729.0	2735.1	2741.3	2747.4	6.12
1429.	2631.5	2637.6	2643.7	2649.7	2655.8	2661.9	2668.0	2674.1	2680.1	2686.2	6.08
1428.	2570.9	2577.0	2583.0	2589.1	2595.1	2601.2	2607.3	2613.3	2619.4	2625.4	6.06
1427.	2510.7	2516.7	2522.7	2528.8	2534.8	2540.8	2546.8	2552.8	2558.9	2564.9	6.02
1426.	2450.8	2456.8	2462.8	2468.8	2474.8	2480.7	2486.7	2492.7	2498.7	2504.7	5.99
1425.	2391.2	2397.2	2403.1	2409.1	2415.0	2421.0	2427.0	2432.9	2438.9	2444.8	5.96
1424.	2331.9	2337.8	2343.8	2349.7	2355.6	2361.5	2367.5	2373.4	2379.3	2385.3	5.93
1423.	2272.8	2278.7	2284.6	2290.5	2296.4	2302.3	2308.3	2314.2	2320.1	2326.0	5.91
1422.	2214.1	2220.0	2225.8	2231.7	2237.6	2243.4	2249.3	2255.2	2261.1	2266.9	5.87
1421.	2155.7	2161.5	2167.4	2173.2	2179.1	2184.9	2190.7	2196.6	2202.4	2208.3	5.84
1420.	2097.7	2103.5	2109.3	2115.1	2120.9	2126.7	2132.5	2138.3	2144.1	2149.9	5.80
1419.	2040.1	2045.9	2051.6	2057.4	2063.1	2068.9	2074.7	2080.4	2086.2	2091.9	5.76
1418.	1982.9	1988.6	1994.3	2000.1	2005.8	2011.5	2017.2	2022.9	2028.7	2034.4	5.72
1417.	1926.1	1931.8	1937.5	1943.1	1948.8	1954.5	1960.2	1965.9	1971.5	1977.2	5.68
1416.	1869.6	1875.2	1880.9	1886.5	1892.2	1897.8	1903.5	1909.1	1914.8	1920.4	5.65
1415.	1813.5	1819.1	1824.7	1830.3	1835.9	1841.5	1847.2	1852.8	1858.4	1864.0	5.61
1414.	1757.8	1763.4	1768.9	1774.5	1780.1	1785.6	1791.2	1796.8	1802.4	1807.9	5.57
1413.	1702.4	1707.9	1713.5	1719.0	1724.6	1730.1	1735.6	1741.2	1746.7	1752.3	5.54
1412.	1647.4	1652.9	1658.4	1663.9	1669.4	1674.9	1680.4	1685.9	1691.4	1696.9	5.50
1411.	1592.7	1598.2	1603.6	1609.1	1614.6	1620.0	1625.5	1631.0	1636.5	1641.9	5.47
1410.	1538.4	1543.8	1549.3	1554.7	1560.1	1565.5	1571.0	1576.4	1581.8	1587.3	5.43
1409.	1484.5	1489.9	1495.3	1500.7	1506.1	1511.4	1516.8	1522.2	1527.6	1533.0	5.39
1408.	1430.9	1436.3	1441.6	1447.0	1452.3	1457.7	1463.1	1468.4	1473.8	1479.1	5.36
1407.	1377.7	1383.0	1388.3	1393.7	1399.0	1404.3	1409.6	1414.9	1420.3	1425.6	5.32
1406.	1324.7	1330.0	1335.3	1340.6	1345.9	1351.2	1356.5	1361.8	1367.1	1372.4	5.30
1405.	1272.1	1277.4	1282.6	1287.9	1293.1	1298.4	1303.7	1308.9	1314.2	1319.4	5.26

## Exhibit 14 – Arrow Reservoir Capacity Table (English) Continued

ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1404.	1219.5	1224.8	1230.0	1235.3	1240.5	1245.8	1251.1	1256.3	1261.6	1266.8	5.26
1403.	1167.3	1172.5	1177.7	1183.0	1188.2	1193.4	1198.6	1203.8	1209.1	1214.3	5.22
1402.	1115.4	1120.6	1125.8	1131.0	1136.2	1141.3	1146.5	1151.7	1156.9	1162.1	5.19
1401.	1063.9	1069.0	1074.2	1079.3	1084.5	1089.6	1094.8	1099.9	1105.1	1110.2	5.15
1400.	1012.8	1017.9	1023.0	1028.1	1033.2	1038.3	1043.5	1048.6	1053.7	1058.8	5.11
1399.	962.5	967.5	972.6	977.6	982.6	987.6	992.7	997.7	1002.7	1007.8	5.03
1398.	912.7	917.7	922.7	927.6	932.6	937.6	942.6	947.6	952.5	957.5	4.98
1397.	863.2	868.1	873.1	878.0	883.0	887.9	892.9	897.8	902.8	907.7	4.95
1396.	814.1	819.0	823.9	828.8	833.7	838.6	843.6	848.5	853.4	858.3	4.91
1395.	765.2	770.1	775.0	779.9	784.8	789.6	794.5	799.4	804.3	809.2	4.89
1394.	716.2	721.1	726.0	730.9	735.8	740.7	745.6	750.5	755.4	760.3	4.90
1393.	667.5	672.4	677.2	682.1	687.0	691.8	696.7	701.6	706.5	711.3	4.87
1392.	619.3	624.1	628.9	633.8	638.6	643.4	648.2	653.0	657.9	662.7	4.82
1391.	571.5	576.3	581.1	585.8	590.6	595.4	600.2	605.0	609.7	614.5	4.78
1390.	524.2	528.9	533.7	538.4	543.1	547.8	552.6	557.3	562.0	566.8	4.73
1389.	477.9	482.5	487.2	491.8	496.4	501.0	505.7	510.3	514.9	519.6	4.63
1388.	432.3	436.9	441.4	446.0	450.5	455.1	459.7	464.2	468.8	473.3	4.56
1387.	387.2	391.7	396.2	400.7	405.2	409.7	414.3	418.8	423.3	427.8	4.51
1386.	342.6	347.1	351.5	356.0	360.4	364.9	369.4	373.8	378.3	382.7	4.46
1385.	298.5	302.9	307.3	311.7	316.1	320.5	325.0	329.4	333.8	338.2	4.41
1384.	254.6	259.0	263.4	267.8	272.2	276.5	280.9	285.3	289.7	294.1	4.39
1383.	211.2	215.5	219.9	224.2	228.6	232.9	237.2	241.6	245.9	250.3	4.34
1382.	168.4	172.7	177.0	181.2	185.5	189.8	194.1	198.4	202.6	206.9	4.28
1381.	126.1	130.3	134.6	138.8	143.0	147.2	151.5	155.7	159.9	164.2	4.23
1380.	84.3	88.5	92.7	96.8	101.0	105.2	109.4	113.6	117.7	121.9	4.18
1379.	43.2	47.3	51.4	55.5	59.6	63.7	67.9	72.0	76.1	80.2	4.11
1378.	2.7	6.7	10.8	14.8	18.9	22.9	27.0	31.0	35.1	39.1	4.05
1377.										0.0	2.70

**Exhibit 14M – Arrow Reservoir Capacity Table, dated 28 Feb. 1974**SI Units -  $\text{hm}^3$ 

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
440.13	8757.8										
439.83	8597.6	8613.5	8629.6	8645.6	8661.7	8677.6	8693.7	8709.7	8725.8	8741.7	16.03
439.52	8438.1	8454.0	8469.9	8486.0	8501.9	8517.8	8533.7	8549.6	8565.8	8581.7	15.95
439.22	8279.3	8295.2	8311.1	8327.0	8342.9	8358.6	8374.5	8390.4	8406.3	8422.2	15.88
438.91	8121.5	8137.1	8153.0	8168.7	8184.6	8200.3	8216.2	8231.8	8247.7	8263.4	15.78
438.61	7964.2	7979.8	7995.7	8011.4	8027.0	8042.7	8058.6	8074.3	8089.9	8105.8	15.73
438.30	7808.1	7823.7	7839.4	7854.8	7870.5	7886.1	7901.8	7917.4	7932.9	7948.5	15.61
438.00	7652.5	7668.1	7683.5	7699.2	7714.6	7730.3	7745.9	7761.3	7777.0	7792.4	15.56
437.69	7497.9	7513.3	7528.7	7544.3	7559.7	7575.2	7590.6	7606.0	7621.6	7637.1	15.46
437.39	7344.0	7359.4	7374.8	7390.2	7405.6	7420.8	7436.2	7451.6	7467.0	7482.4	15.39
437.08	7191.0	7206.2	7221.6	7236.8	7252.2	7267.4	7282.8	7298.0	7313.4	7328.5	15.29
436.78	7038.9	7054.0	7069.2	7084.6	7099.8	7115.0	7130.1	7145.3	7160.7	7175.9	15.22
436.47	6887.4	6902.6	6917.8	6932.9	6948.1	6963.0	6978.2	6993.4	7008.5	7023.7	15.14
436.17	6736.7	6751.9	6766.8	6782.0	6796.9	6812.1	6827.2	6842.2	6857.3	6872.3	15.07
435.86	6587.0	6601.9	6616.8	6632.0	6646.9	6661.8	6676.8	6691.7	6706.9	6721.8	14.97
435.56	6438.2	6453.2	6468.1	6482.8	6497.7	6512.6	6527.5	6542.5	6557.1	6572.1	14.88
435.26	6290.0	6304.9	6319.6	6334.5	6349.2	6364.1	6379.0	6393.7	6408.6	6423.3	14.83
434.95	6142.7	6157.4	6172.0	6187.0	6201.6	6216.3	6231.0	6245.7	6260.6	6275.3	14.73
434.65	5996.1	6010.8	6025.5	6040.2	6054.8	6069.3	6084.0	6098.6	6113.3	6128.0	14.66
434.34	5850.3	5865.0	5879.4	5894.1	5908.5	5923.2	5937.9	5952.3	5967.0	5981.4	14.58
434.04	5705.2	5719.7	5734.3	5748.8	5763.2	5777.6	5792.3	5806.8	5821.2	5835.9	14.51
433.73	5560.6	5575.1	5589.5	5603.9	5618.4	5632.8	5647.5	5661.9	5676.4	5690.8	14.46
433.43	5417.0	5431.5	5445.6	5460.1	5474.5	5488.7	5503.1	5517.6	5532.0	5546.2	14.36
433.12	5274.1	5288.3	5302.8	5317.0	5331.4	5345.6	5359.8	5374.2	5388.4	5402.8	14.29
432.82	5132.2	5146.4	5160.6	5174.8	5189.0	5203.2	5217.4	5231.6	5245.8	5259.9	14.19
432.51	4991.3	5005.5	5019.4	5033.6	5047.6	5061.8	5076.0	5089.9	5104.1	5118.0	14.09
432.21	4851.4	4865.3	4879.3	4893.4	4907.4	4921.3	4935.3	4949.2	4963.4	4977.4	13.99
431.90	4712.4	4726.3	4740.3	4754.0	4767.9	4781.9	4795.8	4809.8	4823.5	4837.4	13.90
431.60	4574.2	4587.9	4601.8	4615.5	4629.5	4643.2	4657.1	4670.8	4684.7	4698.5	13.82
431.29	4436.9	4450.6	4464.3	4478.0	4491.7	4505.4	4519.4	4533.1	4546.8	4560.5	13.73
430.99	4300.6	4314.3	4327.8	4341.5	4355.2	4368.6	4382.3	4396.1	4409.8	4423.2	13.63
430.68	4165.1	4178.5	4192.2	4205.7	4219.4	4232.9	4246.3	4260.0	4273.5	4287.2	13.55
430.38	4030.5	4044.0	4057.4	4070.9	4084.4	4097.8	4111.3	4124.7	4138.2	4151.6	13.46
430.07	3896.7	3910.2	3923.4	3936.8	3950.3	3963.5	3976.9	3990.4	4003.9	4017.1	13.38
429.77	3763.8	3777.1	3790.5	3803.7	3816.9	3830.2	3843.6	3856.8	3870.0	3883.5	13.29
429.46	3632.0	3645.2	3658.4	3671.6	3684.8	3697.8	3711.0	3724.2	3737.4	3750.6	13.19
429.16	3500.8	3514.1	3527.0	3540.2	3553.2	3566.4	3579.6	3592.6	3605.8	3618.8	13.11
428.85	3370.7	3383.6	3396.6	3409.8	3422.8	3435.8	3448.7	3461.7	3474.9	3487.9	13.02
428.55	3241.0	3254.0	3266.9	3279.9	3292.9	3305.8	3318.8	3331.8	3344.7	3357.7	12.97
428.24	3112.3	3125.3	3138.0	3151.0	3163.7	3176.7	3189.6	3202.4	3215.3	3228.0	12.87

## Exhibit 14M – Arrow Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
427.94	2983.6	2996.6	3009.3	3022.3	3035.0	3048.0	3060.9	3073.7	3086.6	3099.4	12.87
427.64	2855.9	2868.6	2881.4	2894.3	2907.1	2919.8	2932.5	2945.2	2958.2	2970.9	12.77
427.33	2728.9	2741.7	2754.4	2767.1	2779.8	2792.3	2805.0	2817.7	2830.5	2843.2	12.70
427.03	2602.9	2615.4	2628.1	2640.6	2653.3	2665.8	2678.5	2691.0	2703.7	2716.2	12.60
426.72	2477.9	2490.4	2502.9	2515.3	2527.8	2540.3	2553.0	2565.5	2578.0	2590.5	12.50
426.42	2354.9	2367.1	2379.6	2391.8	2404.0	2416.3	2428.7	2441.0	2453.2	2465.7	12.31
426.11	2233.0	2245.2	2257.5	2269.5	2281.7	2293.9	2306.2	2318.4	2330.4	2342.6	12.18
425.81	2111.9	2123.9	2136.1	2148.1	2160.3	2172.3	2184.6	2196.6	2208.8	2220.8	12.11
425.50	1991.8	2003.8	2015.8	2027.7	2039.7	2051.7	2064.0	2075.9	2087.9	2099.9	12.01
425.20	1872.1	1884.1	1896.1	1908.1	1920.1	1931.8	1943.8	1955.8	1967.8	1979.8	11.96
424.89	1752.3	1764.2	1776.2	1788.2	1800.2	1812.2	1824.2	1836.2	1848.2	1860.1	11.99
424.59	1633.1	1645.1	1656.8	1668.8	1680.8	1692.6	1704.5	1716.5	1728.5	1740.3	11.91
424.28	1515.2	1526.9	1538.7	1550.7	1562.4	1574.1	1585.9	1597.6	1609.6	1621.4	11.79
423.98	1398.2	1410.0	1421.7	1433.2	1445.0	1456.7	1468.4	1480.2	1491.7	1503.4	11.69
423.67	1282.5	1294.0	1305.8	1317.2	1328.7	1340.2	1352.0	1363.5	1375.0	1386.7	11.57
423.37	1169.2	1180.5	1192.0	1203.2	1214.5	1225.7	1237.2	1248.5	1259.8	1271.3	11.33
423.06	1057.7	1068.9	1079.9	1091.2	1102.2	1113.4	1124.7	1135.7	1147.0	1158.0	11.16
422.76	947.3	958.3	969.3	980.4	991.4	1002.4	1013.6	1024.6	1035.6	1046.7	11.03
422.45	838.2	849.2	860.0	871.0	881.8	892.8	903.8	914.5	925.5	936.3	10.91
422.15	730.3	741.1	751.8	762.6	773.4	784.1	795.1	805.9	816.7	827.4	10.79
421.84	622.9	633.7	644.4	655.2	666.0	676.5	687.2	698.0	708.8	719.5	10.74
421.54	516.7	527.2	538.0	548.5	559.3	569.8	580.3	591.1	601.6	612.4	10.62
421.23	412.0	422.5	433.0	443.3	453.8	464.4	474.9	485.4	495.7	506.2	10.47
420.93	308.5	318.8	329.3	339.6	349.9	360.1	370.7	380.9	391.2	401.7	10.35
420.62	206.2	216.5	226.8	236.8	247.1	257.4	267.7	277.9	288.0	298.2	10.23
420.32	105.7	115.7	125.8	135.8	145.8	155.8	166.1	176.2	186.2	196.2	10.06
420.02	6.6	16.4	26.4	36.2	46.2	56.0	66.1	75.8	85.9	95.7	9.91
419.71										0.0	6.61

**Exhibit 15 – Mica Reservoir Capacity Table, dated 25 Mar. 1974**

English Units - ksf

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2475.	10121.1										5.38
2474.	10067.5	10072.9	10078.2	10083.6	10088.9	10094.3	10099.7	10105.0	10110.4	10115.7	5.36
2473.	10014.1	10019.4	10024.8	10030.1	10035.5	10040.8	10046.1	10051.5	10056.8	10062.2	5.34
2472.	9960.8	9966.1	9971.5	9976.8	9982.1	9987.4	9992.8	9998.1	10003.4	10008.8	5.33
2471.	9907.8	9913.1	9918.4	9923.7	9929.0	9934.3	9939.6	9944.9	9950.2	9955.5	5.30
2470.	9854.8	9860.1	9865.4	9870.7	9876.0	9881.3	9886.6	9891.9	9897.2	9902.5	5.30
2469.	9802.1	9807.4	9812.6	9817.9	9823.2	9828.5	9833.7	9839.0	9844.3	9849.5	5.27
2468.	9749.5	9754.8	9760.0	9765.3	9770.5	9775.8	9781.1	9786.3	9791.6	9796.8	5.26
2467.	9697.1	9702.3	9707.6	9712.8	9718.1	9723.3	9728.5	9733.8	9739.0	9744.3	5.24
2466.	9644.8	9650.0	9655.3	9660.5	9665.7	9671.0	9676.2	9681.4	9686.6	9691.9	5.23
2465.	9592.7	9597.9	9603.1	9608.3	9613.5	9618.8	9624.0	9629.2	9634.4	9639.6	5.21
2464.	9540.8	9546.0	9551.2	9556.4	9561.6	9566.8	9571.9	9577.1	9582.3	9587.5	5.19
2463.	9489.0	9494.2	9499.4	9504.5	9509.7	9514.9	9520.1	9525.3	9530.4	9535.6	5.18
2462.	9437.4	9442.6	9447.7	9452.9	9458.0	9463.2	9468.4	9473.5	9478.7	9483.8	5.16
2461.	9386.0	9391.1	9396.3	9401.4	9406.6	9411.7	9416.8	9422.0	9427.1	9432.3	5.14
2460.	9334.8	9339.9	9345.0	9350.2	9355.3	9360.4	9365.5	9370.6	9375.8	9380.9	5.12
2459.	9283.7	9288.8	9293.9	9299.0	9304.1	9309.3	9314.4	9319.5	9324.6	9329.7	5.11
2458.	9232.8	9237.9	9243.0	9248.1	9253.2	9258.3	9263.3	9268.4	9273.5	9278.6	5.09
2457.	9182.0	9187.1	9192.2	9197.2	9202.3	9207.4	9212.5	9217.6	9222.6	9227.7	5.08
2456.	9131.4	9136.5	9141.5	9146.6	9151.6	9156.7	9161.8	9166.8	9171.9	9176.9	5.06
2455.	9081.0	9086.0	9091.1	9096.1	9101.2	9106.2	9111.2	9116.3	9121.3	9126.4	5.04
2454.	9030.8	9035.8	9040.8	9045.9	9050.9	9055.9	9060.9	9065.9	9071.0	9076.0	5.02
2453.	8980.7	8985.7	8990.7	8995.7	9000.7	9005.8	9010.8	9015.8	9020.8	9025.8	5.01
2452.	8930.8	8935.8	8940.8	8945.8	8950.8	8955.8	8960.7	8965.7	8970.7	8975.7	4.99
2451.	8881.0	8886.0	8891.0	8895.9	8900.9	8905.9	8910.9	8915.9	8920.8	8925.8	4.98
2450.	8831.4	8836.4	8841.3	8846.3	8851.2	8856.2	8861.2	8866.1	8871.1	8876.0	4.96
2449.	8782.0	8786.9	8791.9	8796.8	8801.8	8806.7	8811.6	8816.6	8821.5	8826.5	4.94
2448.	8732.8	8737.7	8742.6	8747.6	8752.5	8757.4	8762.3	8767.2	8772.2	8777.1	4.92
2447.	8683.7	8688.6	8693.5	8698.4	8703.3	8708.3	8713.2	8718.1	8723.0	8727.9	4.91
2446.	8634.8	8639.7	8644.6	8649.5	8654.4	8659.3	8664.1	8669.0	8673.9	8678.8	4.89
2445.	8586.0	8590.9	8595.8	8600.6	8605.5	8610.4	8615.3	8620.2	8625.0	8629.9	4.88
2444.	8537.5	8542.4	8547.2	8552.1	8556.9	8561.8	8566.6	8571.5	8576.3	8581.2	4.85
2443.	8489.1	8493.9	8498.8	8503.6	8508.5	8513.3	8518.1	8523.0	8527.8	8532.7	4.84
2442.	8440.8	8445.6	8450.5	8455.3	8460.1	8465.0	8469.8	8474.6	8479.4	8484.3	4.83
2441.	8392.7	8397.5	8402.3	8407.1	8411.9	8416.8	8421.6	8426.4	8431.2	8436.0	4.81
2440.	8344.8	8349.6	8354.4	8359.2	8364.0	8368.8	8373.5	8378.3	8383.1	8387.9	4.79
2439.	8297.1	8301.9	8306.6	8311.4	8316.2	8321.0	8325.7	8330.5	8335.3	8340.0	4.77
2438.	8249.5	8254.3	8259.0	8263.8	8268.5	8273.3	8278.1	8282.8	8287.6	8292.3	4.76
2437.	8202.1	8206.8	8211.6	8216.3	8221.1	8225.8	8230.5	8235.3	8240.0	8244.8	4.74
2436.	8154.8	8159.5	8164.3	8169.0	8173.7	8178.5	8183.2	8187.9	8192.6	8197.4	4.73
2435.	8107.8	8112.5	8117.2	8121.9	8126.6	8131.3	8136.0	8140.7	8145.4	8150.1	4.70

## Exhibit 15 – Mica Reservoir Capacity Table (English) Continued

ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2434.	8060.9	8065.6	8070.3	8075.0	8079.7	8084.4	8089.0	8093.7	8098.4	8103.1	4.69
2433.	8014.1	8018.8	8023.5	8028.1	8032.8	8037.5	8042.2	8046.9	8051.5	8056.2	4.68
2432.	7967.5	7972.2	7976.8	7981.5	7986.1	7990.8	7995.5	8000.1	8004.8	8009.4	4.66
2431.	7921.1	7925.7	7930.4	7935.0	7939.7	7944.3	7948.9	7953.6	7958.2	7962.9	4.64
2430.	7874.9	7879.5	7884.1	7888.8	7893.4	7898.0	7902.6	7907.2	7911.9	7916.5	4.62
2429.	7828.8	7833.4	7838.0	7842.6	7847.2	7851.9	7856.5	7861.1	7865.7	7870.3	4.61
2428.	7782.9	7787.5	7792.1	7796.7	7801.3	7805.9	7810.4	7815.0	7819.6	7824.2	4.59
2427.	7737.2	7741.8	7746.3	7750.9	7755.5	7760.1	7764.6	7769.2	7773.8	7778.3	4.57
2426.	7691.6	7696.2	7700.7	7705.3	7709.8	7714.4	7719.0	7723.5	7728.1	7732.6	4.56
2425.	7646.2	7650.7	7655.3	7659.8	7664.4	7668.9	7673.4	7678.0	7682.5	7687.1	4.54
2424.	7600.9	7605.4	7610.0	7614.5	7619.0	7623.6	7628.1	7632.6	7637.1	7641.7	4.53
2423.	7555.9	7560.4	7564.9	7569.4	7573.9	7578.4	7582.9	7587.4	7591.9	7596.4	4.50
2422.	7511.0	7515.5	7520.0	7524.5	7529.0	7533.5	7537.9	7542.4	7546.9	7551.4	4.49
2421.	7466.2	7470.7	7475.2	7479.6	7484.1	7488.6	7493.1	7497.6	7502.0	7506.5	4.48
2420.	7421.6	7426.1	7430.5	7435.0	7439.4	7443.9	7448.4	7452.8	7457.3	7461.7	4.46
2419.	7377.2	7381.6	7386.1	7390.5	7395.0	7399.4	7403.8	7408.3	7412.7	7417.2	4.44
2418.	7333.0	7337.4	7341.8	7346.3	7350.7	7355.1	7359.5	7363.9	7368.4	7372.8	4.42
2417.	7288.9	7293.3	7297.7	7302.1	7306.5	7311.0	7315.4	7319.8	7324.2	7328.6	4.41
2416.	7245.0	7249.4	7253.8	7258.2	7262.6	7267.0	7271.3	7275.7	7280.1	7284.5	4.39
2415.	7201.3	7205.7	7210.0	7214.4	7218.8	7223.2	7227.5	7231.9	7236.3	7240.6	4.37
2414.	7157.7	7162.1	7166.4	7170.8	7175.1	7179.5	7183.9	7188.2	7192.6	7196.9	4.36
2413.	7114.3	7118.6	7123.0	7127.3	7131.7	7136.0	7140.3	7144.7	7149.0	7153.4	4.34
2412.	7071.0	7075.3	7079.7	7084.0	7088.3	7092.7	7097.0	7101.3	7105.6	7110.0	4.33
2411.	7028.0	7032.3	7036.6	7040.9	7045.2	7049.5	7053.8	7058.1	7062.4	7066.7	4.30
2410.	6985.1	6989.4	6993.7	6998.0	7002.3	7006.6	7010.8	7015.1	7019.4	7023.7	4.29
2409.	6942.3	6946.6	6950.9	6955.1	6959.4	6963.7	6968.0	6972.3	6976.5	6980.8	4.28
2408.	6899.7	6904.0	6908.2	6912.5	6916.7	6921.0	6925.3	6929.5	6933.8	6938.0	4.26
2407.	6857.3	6861.5	6865.8	6870.0	6874.3	6878.5	6882.7	6887.0	6891.2	6895.5	4.24
2406.	6815.1	6819.3	6823.5	6827.8	6832.0	6836.2	6840.4	6844.6	6848.9	6853.1	4.22
2405.	6773.0	6777.2	6781.4	6785.6	6789.8	6794.1	6798.3	6802.5	6806.7	6810.9	4.21
2404.	6731.2	6735.3	6739.5	6743.7	6747.9	6752.1	6756.3	6760.5	6764.7	6768.9	4.20
2403.	6689.5	6693.7	6697.9	6702.0	6706.2	6710.4	6714.5	6718.7	6722.9	6727.1	4.17
2402.	6648.0	6652.2	6656.3	6660.5	6664.7	6668.8	6673.0	6677.1	6681.3	6685.5	4.16
2401.	6606.7	6610.9	6615.0	6619.2	6623.3	6627.4	6631.6	6635.7	6639.9	6644.0	4.14
2400.	6565.5	6569.7	6573.8	6577.9	6582.1	6586.2	6590.3	6594.5	6598.6	6602.7	4.13
2399.	6524.6	6528.7	6532.8	6536.9	6541.0	6545.1	6549.2	6553.3	6557.4	6561.5	4.11
2398.	6483.9	6487.9	6492.0	6496.1	6500.1	6504.2	6508.3	6512.4	6516.4	6520.5	4.07
2397.	6443.5	6447.6	6451.6	6455.6	6459.6	6463.7	6467.7	6471.8	6475.8	6479.8	4.03
2396.	6403.5	6407.5	6411.5	6415.5	6419.5	6423.5	6427.5	6431.5	6435.5	6439.5	4.00
2395.	6363.9	6367.8	6371.8	6375.7	6379.7	6383.7	6387.6	6391.6	6395.6	6399.5	3.96



### Exhibit 15 – Mica Reservoir Capacity Table (English) Continued ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2394.	6324.5	6328.5	6332.4	6336.3	6340.2	6344.2	6348.1	6352.0	6356.0	6359.9	3.93
2393.	6285.6	6289.5	6293.4	6297.2	6301.1	6305.0	6308.9	6312.8	6316.7	6320.6	3.90
2392.	6246.9	6250.8	6254.6	6258.5	6262.4	6266.2	6270.1	6274.0	6277.8	6281.7	3.87
2391.	6208.6	6212.4	6216.2	6220.0	6223.9	6227.7	6231.5	6235.4	6239.2	6243.1	3.83
2390.	6170.6	6174.4	6178.2	6181.9	6185.7	6189.5	6193.3	6197.2	6201.0	6204.8	3.80
2389.	6132.9	6136.7	6140.4	6144.2	6147.9	6151.7	6155.5	6159.2	6163.0	6166.8	3.77
2388.	6095.5	6099.2	6103.0	6106.7	6110.4	6114.2	6117.9	6121.7	6125.4	6129.2	3.74
2387.	6058.4	6062.1	6065.8	6069.5	6073.2	6076.9	6080.6	6084.3	6088.1	6091.8	3.71
2386.	6021.7	6025.3	6029.0	6032.7	6036.3	6040.0	6043.7	6047.4	6051.0	6054.7	3.68
2385.	5985.2	5988.8	5992.5	5996.1	5999.7	6003.4	6007.0	6010.7	6014.3	6018.0	3.65
2384.	5949.0	5952.6	5956.2	5959.8	5963.4	5967.0	5970.7	5974.3	5977.9	5981.6	3.62
2383.	5913.0	5916.6	5920.2	5923.8	5927.4	5931.0	5934.6	5938.2	5941.8	5945.4	3.59
2382.	5877.4	5881.0	5884.5	5888.1	5891.7	5895.2	5898.8	5902.3	5905.9	5909.5	3.56
2381.	5842.1	5845.6	5849.2	5852.7	5856.2	5859.7	5863.3	5866.8	5870.3	5873.9	3.53
2380.	5807.0	5810.5	5814.0	5817.5	5821.0	5824.5	5828.0	5831.6	5835.1	5838.6	3.51
2379.	5772.2	5775.7	5779.1	5782.6	5786.1	5789.6	5793.0	5796.5	5800.0	5803.5	3.48
2378.	5737.6	5741.1	5744.5	5748.0	5751.4	5754.9	5758.3	5761.8	5765.3	5768.7	3.45
2377.	5703.4	5706.8	5710.2	5713.6	5717.1	5720.5	5723.9	5727.3	5730.8	5734.2	3.43
2376.	5669.3	5672.7	5676.1	5679.5	5682.9	5686.3	5689.7	5693.1	5696.5	5700.0	3.41
2375.	5635.5	5638.9	5642.3	5645.6	5649.0	5652.4	5655.8	5659.2	5662.5	5665.9	3.38
2374.	5602.0	5605.3	5608.7	5612.0	5615.4	5618.7	5622.1	5625.5	5628.8	5632.2	3.35
2373.	5568.7	5572.0	5575.4	5578.7	5582.0	5585.3	5588.7	5592.0	5595.3	5598.7	3.33
2372.	5535.6	5538.9	5542.2	5545.5	5548.8	5552.1	5555.4	5558.7	5562.1	5565.4	3.31
2371.	5502.8	5506.1	5509.3	5512.6	5515.9	5519.2	5522.5	5525.7	5529.0	5532.3	3.28
2370.	5470.2	5473.4	5476.7	5479.9	5483.2	5486.5	5489.7	5493.0	5496.3	5499.5	3.26
2369.	5437.8	5441.0	5444.3	5447.5	5450.7	5453.9	5457.2	5460.4	5463.7	5466.9	3.24
2368.	5405.6	5408.9	5412.1	5415.3	5418.5	5421.7	5424.9	5428.1	5431.4	5434.6	3.22
2367.	5373.7	5376.9	5380.1	5383.3	5386.5	5389.7	5392.9	5396.1	5399.3	5402.4	3.19
2366.	5342.0	5345.2	5348.3	5351.5	5354.7	5357.8	5361.0	5364.2	5367.4	5370.5	3.17
2365.	5310.5	5313.6	5316.8	5319.9	5323.0	5326.2	5329.3	5332.5	5335.7	5338.8	3.15
2364.	5279.1	5282.3	5285.4	5288.5	5291.6	5294.8	5297.9	5301.0	5304.2	5307.3	3.13
2363.	5248.0	5251.1	5254.2	5257.4	5260.5	5263.6	5266.7	5269.8	5272.9	5276.0	3.11
2362.	5217.1	5220.2	5223.3	5226.4	5229.5	5232.6	5235.7	5238.7	5241.8	5244.9	3.09
2361.	5186.4	5189.4	5192.5	5195.6	5198.7	5201.7	5204.8	5207.9	5211.0	5214.0	3.07
2360.	5155.9	5158.9	5162.0	5165.0	5168.0	5171.1	5174.2	5177.2	5180.3	5183.3	3.05
2359.	5125.5	5128.5	5131.6	5134.6	5137.6	5140.7	5143.7	5146.7	5149.8	5152.8	3.03
2358.	5095.4	5098.4	5101.4	5104.4	5107.4	5110.4	5113.4	5116.5	5119.5	5122.5	3.02
2357.	5065.4	5068.4	5071.4	5074.4	5077.4	5080.4	5083.4	5086.4	5089.4	5092.4	3.00
2356.	5035.6	5038.5	5041.5	5044.5	5047.5	5050.4	5053.4	5056.4	5059.4	5062.4	2.98
2355.	5005.9	5008.9	5011.9	5014.8	5017.8	5020.7	5023.7	5026.7	5029.6	5032.6	2.96

## Exhibit 15 – Mica Reservoir Capacity Table (English) Continued

ksfd

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2354.	4976.5	4979.4	4982.4	4985.3	4988.3	4991.2	4994.1	4997.1	5000.0	5003.0	2.94
2353.	4947.2	4950.1	4953.0	4956.0	4958.9	4961.8	4964.8	4967.7	4970.6	4973.6	2.93
2352.	4918.0	4920.9	4923.9	4926.8	4929.7	4932.6	4935.5	4938.4	4941.3	4944.3	2.91
2351.	4889.1	4892.0	4894.9	4897.8	4900.6	4903.5	4906.4	4909.3	4912.2	4915.1	2.90
2350.	4860.3	4863.1	4866.0	4868.9	4871.8	4874.6	4877.5	4880.4	4883.3	4886.2	2.88
2349.	4831.6	4834.4	4837.3	4840.2	4843.1	4845.9	4848.8	4851.7	4854.5	4857.4	2.87
2348.	4803.1	4805.9	4808.8	4811.6	4814.5	4817.3	4820.2	4823.0	4825.9	4828.7	2.85
2347.	4774.7	4777.5	4780.4	4783.2	4786.0	4788.9	4791.7	4794.6	4797.4	4800.2	2.84
2346.	4746.5	4749.3	4752.1	4755.0	4757.8	4760.6	4763.4	4766.2	4769.1	4771.9	2.82
2345.	4718.4	4721.2	4724.0	4726.8	4729.6	4732.4	4735.3	4738.1	4740.9	4743.7	2.81
2344.	4690.5	4693.3	4696.1	4698.8	4701.6	4704.4	4707.2	4710.0	4712.8	4715.6	2.79
2343.	4662.7	4665.4	4668.2	4671.0	4673.8	4676.5	4679.3	4682.1	4684.9	4687.7	2.78
2342.	4635.0	4637.8	4640.5	4643.3	4646.1	4648.8	4651.6	4654.4	4657.1	4659.9	2.77
2341.	4607.4	4610.2	4613.0	4615.7	4618.5	4621.2	4624.0	4626.7	4629.5	4632.2	2.76
2340.	4580.0	4582.8	4585.5	4588.2	4591.0	4593.7	4596.5	4599.2	4602.0	4604.7	2.74
2339.	4552.7	4555.4	4558.2	4560.9	4563.6	4566.4	4569.1	4571.8	4574.6	4577.3	2.73
2338.	4525.5	4528.2	4530.9	4533.6	4536.4	4539.1	4541.8	4544.5	4547.3	4550.0	2.72
2337.	4498.3	4501.0	4503.7	4506.5	4509.2	4511.9	4514.6	4517.3	4520.0	4522.8	2.72
2336.	4471.2	4473.9	4476.6	4479.3	4482.0	4484.7	4487.5	4490.2	4492.9	4495.6	2.71
2335.	4444.2	4446.9	4449.6	4452.3	4455.0	4457.7	4460.4	4463.1	4465.8	4468.5	2.70
2334.	4417.3	4420.0	4422.6	4425.3	4428.0	4430.7	4433.4	4436.1	4438.8	4441.5	2.69
2333.	4390.4	4393.1	4395.8	4398.4	4401.1	4403.8	4406.5	4409.2	4411.9	4414.6	2.69
2332.	4363.6	4366.3	4368.9	4371.6	4374.3	4377.0	4379.7	4382.3	4385.0	4387.7	2.68
2331.	4336.9	4339.6	4342.2	4344.9	4347.6	4350.2	4352.9	4355.6	4358.2	4360.9	2.67
2330.	4310.2	4312.9	4315.6	4318.2	4320.9	4323.6	4326.2	4328.9	4331.6	4334.2	2.66
2329.	4283.7	4286.3	4289.0	4291.6	4294.3	4296.9	4299.6	4302.3	4304.9	4307.6	2.66
2328.	4257.2	4259.8	4262.5	4265.1	4267.8	4270.4	4273.1	4275.7	4278.4	4281.0	2.65
2327.	4230.8	4233.4	4236.1	4238.7	4241.3	4244.0	4246.6	4249.3	4251.9	4254.5	2.64
2326.	4204.5	4207.1	4209.7	4212.3	4215.0	4217.6	4220.2	4222.9	4225.5	4228.1	2.63
2325.	4178.2	4180.8	4183.4	4186.1	4188.7	4191.3	4193.9	4196.6	4199.2	4201.8	2.63
2324.	4152.0	4154.6	4157.2	4159.9	4162.5	4165.1	4167.7	4170.3	4173.0	4175.6	2.62
2323.	4125.9	4128.5	4131.2	4133.8	4136.4	4139.0	4141.6	4144.2	4146.8	4149.4	2.61
2322.	4099.9	4102.5	4105.1	4107.7	4110.3	4112.9	4115.5	4118.1	4120.7	4123.3	2.61
2321.	4074.0	4076.6	4079.1	4081.7	4084.3	4086.9	4089.5	4092.1	4094.7	4097.3	2.59
2320.	4048.1	4050.7	4053.3	4055.9	4058.4	4061.0	4063.6	4066.2	4068.8	4071.4	2.59
2319.	4022.3	4024.9	4027.5	4030.0	4032.6	4035.2	4037.8	4040.4	4042.9	4045.5	2.58

**Exhibit 15M – Mica Reservoir Capacity Table, dated 25 Mar. 1974**SI Units - hm<sup>3</sup>

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
754.38	24762.3										13.16
754.08	24631.1	24644.4	24657.3	24670.5	24683.5	24696.7	24709.9	24722.9	24736.1	24749.1	13.11
753.77	24500.5	24513.5	24526.7	24539.6	24552.9	24565.8	24578.8	24592.0	24605.0	24618.2	13.06
753.47	24370.1	24383.1	24396.3	24409.2	24422.2	24435.2	24448.4	24461.4	24474.3	24487.5	13.04
753.16	24240.4	24253.4	24266.4	24279.3	24292.3	24305.3	24318.2	24331.2	24344.2	24357.1	12.97
752.86	24110.8	24123.7	24136.7	24149.7	24162.6	24175.6	24188.6	24201.5	24214.5	24227.5	12.97
752.55	23981.8	23994.8	24007.5	24020.5	24033.4	24046.4	24059.1	24072.1	24085.1	24097.8	12.89
752.25	23853.1	23866.1	23878.8	23891.8	23904.5	23917.5	23930.4	23943.2	23956.1	23968.9	12.87
751.94	23724.9	23737.6	23750.6	23763.3	23776.3	23789.0	23801.7	23814.7	23827.4	23840.4	12.82
751.64	23597.0	23609.7	23622.7	23635.4	23648.1	23661.1	23673.8	23686.5	23699.2	23712.2	12.80
751.33	23469.5	23482.2	23494.9	23507.7	23520.4	23533.4	23546.1	23558.8	23571.5	23584.2	12.75
751.03	23342.5	23355.2	23368.0	23380.7	23393.4	23406.1	23418.6	23431.3	23444.1	23456.8	12.70
750.72	23215.8	23228.5	23241.2	23253.7	23266.4	23279.2	23291.9	23304.6	23317.1	23329.8	12.67
750.42	23089.5	23102.3	23114.7	23127.5	23139.9	23152.7	23165.4	23177.9	23190.6	23203.1	12.62
750.11	22963.8	22976.3	22989.0	23001.5	23014.2	23026.7	23039.1	23051.9	23064.3	23077.1	12.58
749.81	22838.5	22851.0	22863.5	22876.2	22888.7	22901.2	22913.6	22926.1	22938.8	22951.3	12.53
749.50	22713.5	22726.0	22738.5	22750.9	22763.4	22776.1	22788.6	22801.1	22813.6	22826.0	12.50
749.20	22589.0	22601.4	22613.9	22626.4	22638.9	22651.4	22663.6	22676.1	22688.5	22701.0	12.45
748.90	22464.7	22477.2	22489.6	22501.9	22514.3	22526.8	22539.3	22551.8	22564.0	22576.5	12.43
748.59	22340.9	22353.4	22365.6	22378.1	22390.3	22402.8	22415.3	22427.5	22440.0	22452.2	12.38
748.29	22217.6	22229.8	22242.3	22254.5	22267.0	22279.2	22291.5	22303.9	22316.2	22328.7	12.33
747.98	22094.8	22107.0	22119.2	22131.7	22143.9	22156.2	22168.4	22180.6	22193.1	22205.3	12.28
747.68	21972.2	21984.4	21996.6	22008.9	22021.1	22033.6	22045.8	22058.1	22070.3	22082.5	12.26
747.37	21850.1	21862.3	21874.6	21886.8	21899.0	21911.3	21923.2	21935.5	21947.7	21959.9	12.21
747.07	21728.3	21740.5	21752.7	21764.7	21776.9	21789.2	21801.4	21813.6	21825.6	21837.9	12.18
746.76	21606.9	21619.1	21631.1	21643.4	21655.3	21667.6	21679.8	21691.8	21704.0	21716.0	12.14
746.46	21486.0	21498.0	21510.3	21522.3	21534.5	21546.5	21558.5	21570.7	21582.7	21594.9	12.09
746.15	21365.7	21377.7	21389.6	21401.9	21413.9	21425.9	21437.8	21449.8	21462.1	21474.1	12.04
745.85	21245.5	21257.5	21269.5	21281.5	21293.5	21305.7	21317.7	21329.7	21341.7	21353.7	12.01
745.54	21125.9	21137.9	21149.9	21161.9	21173.9	21185.8	21197.6	21209.6	21221.6	21233.6	11.96
745.24	21006.5	21018.5	21030.5	21042.2	21054.2	21066.2	21078.2	21090.2	21101.9	21113.9	11.94
744.93	20887.8	20899.8	20911.6	20923.6	20935.3	20947.3	20959.0	20971.0	20982.8	20994.8	11.87
744.63	20769.4	20781.2	20793.2	20804.9	20816.9	20828.6	20840.4	20852.4	20864.1	20876.1	11.84
744.32	20651.3	20663.0	20675.0	20686.7	20698.5	20710.5	20722.2	20734.0	20745.7	20757.7	11.82
744.02	20533.6	20545.3	20557.1	20568.8	20580.6	20592.5	20604.3	20616.0	20627.8	20639.5	11.77
743.71	20416.4	20428.1	20439.9	20451.6	20463.4	20475.1	20486.6	20498.3	20510.1	20521.8	11.72
743.41	20299.7	20311.4	20322.9	20334.7	20346.4	20358.2	20369.7	20381.4	20393.1	20404.6	11.67
743.10	20183.2	20195.0	20206.5	20218.2	20229.7	20241.5	20253.2	20264.7	20276.4	20287.9	11.65
742.80	20067.3	20078.8	20090.5	20102.0	20113.7	20125.2	20136.7	20148.5	20160.0	20171.7	11.60
742.49	19951.5	19963.0	19974.8	19986.3	19997.8	20009.5	20021.0	20032.5	20044.0	20055.8	11.57
742.19	19836.5	19848.0	19859.5	19871.0	19882.5	19894.0	19905.5	19917.0	19928.5	19940.0	11.50

## Exhibit 15M – Mica Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
741.88	19721.8	19733.3	19744.8	19756.3	19767.8	19779.3	19790.5	19802.0	19813.5	19825.0	11.47
741.58	19607.3	19618.8	19630.3	19641.5	19653.0	19664.5	19676.0	19687.5	19698.8	19710.3	11.45
741.28	19493.3	19504.8	19516.0	19527.5	19538.8	19550.3	19561.8	19573.0	19584.5	19595.8	11.40
740.97	19379.8	19391.0	19402.5	19413.8	19425.3	19436.5	19447.8	19459.3	19470.5	19482.0	11.35
740.67	19266.7	19278.0	19289.2	19300.7	19312.0	19323.2	19334.5	19345.8	19357.3	19368.5	11.30
740.36	19153.9	19165.2	19176.5	19187.7	19199.0	19210.5	19221.7	19233.0	19244.2	19255.5	11.28
740.06	19041.6	19052.9	19064.2	19075.4	19086.7	19097.9	19108.9	19120.2	19131.4	19142.7	11.23
739.75	18929.8	18941.1	18952.1	18963.4	18974.6	18985.9	18996.9	19008.1	19019.4	19030.4	11.18
739.45	18818.3	18829.5	18840.5	18851.8	18862.8	18874.1	18885.3	18896.3	18907.6	18918.6	11.16
739.14	18707.2	18718.2	18729.5	18740.5	18751.7	18762.7	18773.7	18785.0	18796.0	18807.3	11.11
738.84	18596.4	18607.4	18618.6	18629.6	18640.6	18651.9	18662.9	18673.9	18684.9	18696.2	11.08
738.53	18486.3	18497.3	18508.3	18519.3	18530.3	18541.3	18552.3	18563.3	18574.3	18585.4	11.01
738.23	18376.4	18387.4	18398.4	18409.4	18420.5	18431.5	18442.2	18453.2	18464.2	18475.3	10.99
737.92	18266.8	18277.8	18288.8	18299.6	18310.6	18321.6	18332.6	18343.6	18354.4	18365.4	10.96
737.62	18157.7	18168.7	18179.5	18190.5	18201.2	18212.2	18223.3	18234.0	18245.0	18255.8	10.91
737.31	18049.1	18059.8	18070.8	18081.6	18092.6	18103.4	18114.1	18125.1	18135.9	18146.9	10.86
737.01	17940.9	17951.7	17962.4	17973.5	17984.2	17995.0	18005.8	18016.5	18027.5	18038.3	10.81
736.70	17833.0	17843.8	17854.6	17865.3	17876.1	17887.1	17897.9	17908.6	17919.4	17930.2	10.79
736.40	17725.6	17736.4	17747.1	17757.9	17768.7	17779.4	17790.0	17800.7	17811.5	17822.3	10.74
736.09	17618.7	17629.5	17640.0	17650.8	17661.5	17672.3	17682.8	17693.6	17704.3	17714.9	10.69
735.79	17512.0	17522.8	17533.3	17544.1	17554.6	17565.4	17576.1	17586.7	17597.4	17607.9	10.67
735.48	17405.8	17416.4	17427.1	17437.7	17448.4	17458.9	17469.5	17480.2	17490.7	17501.5	10.62
735.18	17299.9	17310.4	17321.2	17331.7	17342.2	17353.0	17363.5	17374.0	17384.6	17395.3	10.59
734.87	17194.7	17205.2	17215.7	17226.3	17236.8	17247.3	17257.8	17268.3	17278.9	17289.4	10.52
734.57	17089.7	17100.3	17110.8	17121.3	17131.8	17142.3	17152.6	17163.1	17173.7	17184.2	10.50
734.26	16985.0	16995.6	17006.1	17016.3	17026.9	17037.4	17047.9	17058.4	17068.7	17079.2	10.47
733.96	16880.8	16891.3	16901.6	16912.1	16922.4	16932.9	16943.4	16953.7	16964.2	16974.5	10.42
733.66	16777.1	16787.3	16797.9	16808.1	16818.7	16828.9	16839.2	16849.7	16860.0	16870.5	10.37
733.35	16673.8	16684.1	16694.4	16704.9	16715.2	16725.4	16735.7	16746.0	16756.5	16766.8	10.32
733.05	16570.8	16581.1	16591.4	16601.6	16611.9	16622.4	16632.7	16643.0	16653.3	16663.5	10.30
732.74	16468.4	16478.7	16489.0	16499.2	16509.5	16519.8	16530.0	16540.3	16550.6	16560.8	10.27
732.44	16366.6	16376.8	16387.0	16397.2	16407.4	16417.6	16427.8	16438.0	16448.2	16458.5	10.21
732.13	16265.1	16275.3	16285.4	16295.6	16305.7	16315.9	16326.1	16336.3	16346.4	16356.6	10.17
731.83	16164.1	16174.2	16184.3	16194.4	16204.5	16214.6	16224.8	16234.9	16245.1	16255.2	10.13
731.52	16063.3	16073.4	16083.5	16093.6	16103.7	16113.8	16123.9	16134.0	16144.1	16154.2	10.10
731.22	15963.0	15973.1	15983.1	15993.1	16003.2	16013.2	16023.3	16033.3	16043.4	16053.4	10.05
730.91	15863.5	15873.4	15883.3	15893.3	15903.2	15913.2	15923.1	15933.1	15943.1	15953.1	9.96
730.61	15764.8	15774.6	15784.5	15794.3	15804.2	15814.0	15823.9	15833.8	15843.7	15853.6	9.87
730.30	15666.8	15676.6	15686.4	15696.2	15706.0	15715.7	15725.5	15735.3	15745.1	15755.0	9.79
730.00	15569.8	15579.5	15589.2	15598.9	15608.6	15618.2	15628.0	15637.7	15647.4	15657.1	9.70

## Exhibit 15M – Mica Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
729.69	15473.6	15483.2	15492.8	15502.4	15512.0	15521.6	15531.3	15540.9	15550.6	15560.2	9.62
729.39	15378.3	15387.8	15397.3	15406.8	15416.4	15425.9	15435.4	15445.0	15454.5	15464.1	9.53
729.08	15283.7	15293.1	15302.6	15312.0	15321.5	15330.9	15340.4	15349.9	15359.3	15368.8	9.46
728.78	15189.9	15199.3	15208.6	15218.0	15227.3	15236.6	15246.0	15255.4	15264.8	15274.3	9.37
728.47	15096.9	15106.2	15115.5	15124.8	15134.0	15143.3	15152.6	15162.0	15171.3	15180.6	9.30
728.17	15004.7	15013.9	15023.1	15032.3	15041.5	15050.7	15060.0	15069.2	15078.5	15087.7	9.22
727.86	14913.2	14922.4	14931.5	14940.6	14949.8	14958.9	14968.1	14977.3	14986.4	14995.6	9.15
727.56	14822.5	14831.6	14840.6	14849.7	14858.7	14867.8	14876.8	14885.9	14895.0	14904.1	9.07
727.25	14732.6	14741.5	14750.5	14759.5	14768.5	14777.4	14786.5	14795.5	14804.5	14813.5	8.99
726.95	14643.4	14652.3	14661.2	14670.0	14678.9	14687.8	14696.8	14705.7	14714.7	14723.6	8.92
726.64	14554.7	14563.6	14572.4	14581.3	14590.1	14599.0	14607.8	14616.7	14625.6	14634.5	8.86
726.34	14466.8	14475.6	14484.4	14493.2	14502.0	14510.7	14519.5	14528.3	14537.1	14545.9	8.79
726.04	14379.7	14388.4	14397.1	14405.8	14414.5	14423.2	14431.9	14440.7	14449.4	14458.1	8.71
725.73	14293.3	14301.9	14310.6	14319.2	14327.8	14336.4	14345.1	14353.7	14362.4	14371.0	8.64
725.43	14207.4	14215.9	14224.5	14233.1	14241.7	14250.3	14258.9	14267.5	14276.1	14284.7	8.59
725.12	14122.2	14130.7	14139.2	14147.7	14156.2	14164.7	14173.3	14181.8	14190.3	14198.8	8.51
724.82	14037.7	14046.2	14054.6	14063.0	14071.5	14079.9	14088.4	14096.8	14105.3	14113.8	8.45
724.51	13953.8	13962.2	13970.6	13979.0	13987.4	13995.7	14004.1	14012.5	14020.9	14029.3	8.39
724.21	13870.5	13878.8	13887.2	13895.5	13903.8	13912.2	13920.5	13928.8	13937.2	13945.5	8.33
723.90	13787.9	13796.1	13804.4	13812.6	13820.9	13829.1	13837.4	13845.7	13854.0	13862.2	8.26
723.60	13705.8	13714.0	13722.2	13730.4	13738.6	13746.8	13755.0	13763.2	13771.4	13779.7	8.20
723.29	13624.4	13632.5	13640.7	13648.8	13656.9	13665.1	13673.2	13681.4	13689.5	13697.7	8.14
722.99	13543.4	13551.5	13559.6	13567.6	13575.7	13583.8	13591.9	13600.0	13608.1	13616.3	8.09
722.68	13463.1	13471.1	13479.2	13487.2	13495.2	13503.2	13511.3	13519.3	13527.3	13535.4	8.03
722.38	13383.4	13391.3	13399.3	13407.2	13415.2	13423.2	13431.2	13439.1	13447.1	13455.1	7.97
722.07	13304.2	13312.1	13319.9	13327.8	13335.7	13343.6	13351.5	13359.5	13367.5	13375.4	7.92
721.77	13225.5	13233.3	13241.2	13249.0	13256.8	13264.7	13272.6	13280.5	13288.4	13296.3	7.87
721.46	13147.3	13155.1	13162.9	13170.7	13178.5	13186.3	13194.2	13202.0	13209.8	13217.6	7.81
721.16	13069.7	13077.5	13085.2	13092.9	13100.7	13108.4	13116.2	13124.0	13131.8	13139.5	7.76
720.85	12992.6	13000.3	13008.0	13015.7	13023.3	13031.0	13038.8	13046.5	13054.2	13062.0	7.71
720.55	12915.9	12923.6	12931.2	12938.9	12946.5	12954.2	12961.9	12969.5	12977.2	12984.9	7.66
720.24	12839.9	12847.4	12855.0	12862.6	12870.2	12877.8	12885.4	12893.1	12900.7	12908.3	7.61
719.94	12764.2	12771.7	12779.3	12786.9	12794.4	12802.0	12809.5	12817.1	12824.7	12832.3	7.56
719.63	12689.0	12696.5	12704.0	12711.5	12719.1	12726.6	12734.1	12741.6	12749.1	12756.7	7.52
719.33	12614.3	12621.8	12629.2	12636.7	12644.2	12651.6	12659.1	12666.6	12674.0	12681.5	7.46
719.02	12540.1	12547.5	12554.9	12562.3	12569.7	12577.2	12584.6	12592.0	12599.5	12606.9	7.42
718.72	12466.3	12473.7	12481.0	12488.4	12495.8	12503.2	12510.5	12517.9	12525.3	12532.7	7.38
718.42	12392.9	12400.2	12407.6	12414.9	12422.3	12429.6	12436.9	12444.3	12451.6	12459.0	7.34
718.11	12320.0	12327.3	12334.6	12341.9	12349.1	12356.4	12363.7	12371.0	12378.3	12385.6	7.29
717.81	12247.5	12254.8	12262.0	12269.2	12276.5	12283.7	12291.0	12298.2	12305.5	12312.7	7.25

## Exhibit 15M – Mica Reservoir Capacity Table (SI) Continued

$\text{hm}^3$

ELEVATION IN METERS	.00	.03	.06	.09	.12	.15	.18	.21	.24	.27	AVERAGE DIFFERENCE PER 3/100 M
717.50	12175.5	12182.7	12189.9	12197.1	12204.3	12211.5	12218.7	12225.9	12233.1	12240.3	7.20
717.20	12103.7	12110.9	12118.1	12125.2	12132.4	12139.6	12146.8	12153.9	12161.1	12168.3	7.17
716.89	12032.5	12039.6	12046.7	12053.8	12061.0	12068.1	12075.2	12082.3	12089.5	12096.6	7.13
716.59	11961.6	11968.7	11975.8	11982.8	11989.9	11997.0	12004.1	12011.2	12018.3	12025.4	7.09
716.28	11891.1	11898.2	11905.2	11912.2	11919.3	11926.3	11933.4	11940.4	11947.5	11954.5	7.04
715.98	11820.9	11828.0	11835.0	11842.0	11849.0	11856.0	11863.1	11870.1	11877.1	11884.1	7.02
715.67	11751.2	11758.2	11765.1	11772.1	11779.1	11786.0	11793.0	11800.0	11807.0	11814.0	6.97
715.37	11681.8	11688.8	11695.7	11702.6	11709.5	11716.5	11723.4	11730.4	11737.3	11744.3	6.94
715.06	11612.8	11619.7	11626.6	11633.5	11640.4	11647.3	11654.2	11661.1	11668.0	11674.9	6.90
714.76	11544.0	11550.9	11557.8	11564.7	11571.5	11578.4	11585.3	11592.2	11599.0	11605.9	6.87
714.45	11475.7	11482.5	11489.4	11496.2	11503.0	11509.8	11516.7	11523.5	11530.4	11537.2	6.83
714.15	11407.7	11414.5	11421.3	11428.1	11434.9	11441.6	11448.5	11455.3	11462.1	11468.9	6.80
713.84	11340.0	11346.8	11353.5	11360.3	11367.1	11373.8	11380.6	11387.4	11394.1	11400.9	6.77
713.54	11272.6	11279.3	11286.0	11292.8	11299.5	11306.3	11313.0	11319.8	11326.5	11333.3	6.74
712.93	11138.7	11145.4	11152.0	11158.7	11165.4	11172.1	11178.8	11185.4	11192.1	11198.8	6.68
712.62	11072.0	11078.7	11085.4	11092.0	11098.7	11105.3	11112.0	11118.7	11125.3	11132.0	6.66
712.32	11005.5	11012.2	11018.8	11025.5	11032.1	11038.8	11045.4	11052.1	11058.7	11065.4	6.65
712.01	10939.3	10945.9	10952.5	10959.1	10965.8	10972.4	10979.0	10985.6	10992.3	10998.9	6.63
711.71	10873.2	10879.8	10886.4	10893.0	10899.6	10906.2	10912.8	10919.4	10926.0	10932.7	6.61
711.40	10807.3	10813.9	10820.5	10827.0	10833.6	10840.2	10846.8	10853.4	10860.0	10866.6	6.59
711.10	10741.5	10748.1	10754.7	10761.2	10767.8	10774.4	10781.0	10787.5	10794.1	10800.7	6.58
710.80	10676.0	10682.5	10689.1	10695.6	10702.2	10708.7	10715.3	10721.8	10728.4	10734.9	6.55
710.49	10610.6	10617.1	10623.7	10630.2	10636.7	10643.3	10649.8	10656.3	10662.9	10669.4	6.53
710.19	10545.4	10552.0	10558.5	10565.0	10571.5	10578.0	10584.5	10591.1	10597.6	10604.1	6.52
709.88	10480.4	10486.9	10493.4	10499.9	10506.4	10512.9	10519.4	10525.9	10532.4	10538.9	6.50
709.58	10415.6	10422.1	10428.6	10435.1	10441.5	10448.0	10454.5	10461.0	10467.5	10473.9	6.48
709.27	10351.0	10357.5	10363.9	10370.4	10376.8	10383.3	10389.8	10396.2	10402.7	10409.2	6.46
708.97	10286.6	10293.0	10299.5	10305.9	10312.3	10318.8	10325.2	10331.7	10338.1	10344.6	6.44
708.66	10222.4	10228.8	10235.2	10241.6	10248.0	10254.4	10260.9	10267.3	10273.7	10280.2	6.43
708.36	10158.3	10164.7	10171.1	10177.5	10183.9	10190.3	10196.7	10203.1	10209.5	10215.9	6.40
708.05	10094.5	10100.9	10107.3	10113.6	10120.0	10126.4	10132.8	10139.2	10145.5	10151.9	6.38
707.75	10030.8	10037.1	10043.5	10049.9	10056.2	10062.6	10069.0	10075.4	10081.8	10088.1	6.37
707.44	9967.4	9973.7	9980.0	9986.4	9992.7	9999.0	10005.4	10011.7	10018.1	10024.4	6.34
707.14	9904.1	9910.4	9916.7	9923.1	9929.4	9935.7	9942.0	9948.4	9954.7	9961.0	6.33
706.83	9841.0	9847.3	9853.7	9859.8	9866.2	9872.5	9878.8	9885.1	9891.5	9897.8	6.31