

# DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE

1 AUGUST 1993  
THROUGH 31 JULY 1994

## Errata:

- Page 10, paragraphs 7c and 7c(2)  
References to 6c(3) and 6c(9) should be 7c(3) and 7c(9)
- Page 12, paragraph (9)  
References to 6c(2) and 6c(8) should be 7c(2) and 7c(8)



COLUMBIA RIVER TREATY OPERATING COMMITTEE

SEPTEMBER 1993

## **Table of Contents**

1. REFERENCES AND INTERPRETATION.....	1
2. PREPARATION AND SCOPE.....	2
3. OPERATING RULE CURVE .....	3
4. OPERATIONS .....	4
5. SCHEDULING STORAGE REGULATION.....	5
6. PROVISIONAL DRAFT.....	8
7. OPERATING LIMITS.....	9
a. Duncan Project.....	9
b. Arrow Project.....	10
c. Mica Project.....	10
d. Libby Project.....	13
Exhibit 1 - Assured Refill Curve.....	14
Exhibit 2 - First Year Critical Rule Curve for 1993-94.....	15
Exhibit 3 - Second Year Critical Rule Curve for 1993-94.....	16
Exhibit 4 - Third Year Critical Rule Curve for 1993-94 .....	17
Exhibit 5 - Fourth Year Critical Rule Curve for 1993-94 .....	18
Exhibit 6 - Lower Limit for Operating Rule Curve.....	19
Exhibit 7 - 1993-94-Variable Refill Curve Procedures.....	20
Exhibit 8 - Critical Rule Curves and Assured Refill Curves for Libby Reservoir for 1993-94.....	21
Exhibit 9 - Coordinated System Loads and Resources.....	22
Exhibit 10 - Second Year Critical Rule Curve for 1994-95.....	23
Exhibit 11 - Third Year Critical Rule Curve for 1995-96 .....	24
Exhibit 12 - Fourth Year Critical Rule Curve for 1996-97.....	25
Exhibit 13 - Duncan Reservoir Capacity Table.....	26
Exhibit 14 - Arrow Lakes Reservoir Capacity Table.....	30
Exhibit 15 - Mica Reservoir Capacity Table.....	33
Exhibit 16 - Libby Reservoir Capacity Table.....	37



# **DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE 1 AUGUST 1993 THROUGH 31 JULY 1994**

## **1. REFERENCES AND INTERPRETATION**

In this document:

- a. "Principles and Procedures" means the document "Principles and Procedures for the Preparation and Use of Hydroelectric Operating Plans," dated December 1991.
- b. "Assured Operating Plan" (AOP) means the document "Columbia River Treaty Hydroelectric Operating Plan-Assured Operating Plan for Operating Year 1993-1994," dated July 1989.
- c. "Alternative Operating Plan" (AltOP) means the document "Columbia River Treaty Hydroelectric Operating Plan-Alternative Operating Plan for Operating Year 1993-1994," dated July 1989.
- d. "Flood Control Plan" means the document "Columbia River Treaty Flood Control Operating Plan," October 1972.
- e. "Operating Year" means the period from 1 August 1993 through 31 July 1994.
- f. "Operating Committee" means the Columbia River Treaty Operating Committee.
- g. "Detailed Operating Plan" (DOP) means a detailed operating plan prepared for the Operating Year by the Operating Committee pursuant to the Principles and Procedures and consisting of the contents of this document.
- h. "Runoff Volume Forecast Program for Canadian Columbia River Treaty Reservoirs" means the document of that title dated 15 August 1969, with subsequent modifications as agreed by the Operating Committee.
- i. "Actual Energy Regulation" (AER) means the simulated hydroregulation study required by the Pacific Northwest Coordination Agreement (PNCA), which is performed by the Pacific Northwest Coordinating Group (PNCG), and reflects actual streamflow conditions.
- j. "Refill Studies" means multi-water-year hydroregulations that determine the Power Discharge Requirements used in the calculation of the Assured Refill Curves and the Variable Refill Curves.

**2. PREPARATION AND SCOPE**

This Detailed Operating Plan has been developed from the Northwest Power Pool PNCA Final Regulation for the 1993-94 Operating Year. System load and resource estimates, duration of critical period, flood control and other criteria have been reviewed and revised in accordance with the Principles and Procedures as necessary. The Critical Period duration is 42 months extending from 1 September 1993 through 28 February 1997 with hydro capability based on the 1928-29 through 1931-32 water years.

The data, criteria, and procedures presented herein will be used as described for the formation and use of Operating Rule Curves for each of the Canadian storage reservoirs, Duncan, Arrow, and Kinbasket Lake (Mica), and for the whole of Canadian storage as well as Lake Koocanusa (Libby).

The Entity agreement on the Determination of Downstream Power Benefits for Operating Year 1993-94 indicated that the U.S. Entity is entitled to receive 2.3 MW of dependable capacity but not entitled to receive any energy from B.C. Hydro and Power Authority during the period 1 August 1993 through 31 March 1994, in accordance with Sections 7 and 10 of the Canadian Entitlement Purchase Agreement dated 10 August 1964. The Entity agreement on the Determination of Downstream Power Benefits for Operating Year 1994-95 indicated that the U.S. Entity is entitled to receive from B.C. Hydro and Power Authority during the period 1 April 1994 through 31 July 1994, no capacity and 2 MW of energy in accordance with Sections 7 and 10 of the Canadian Entitlement Purchase Agreement dated 10 August 1964. Suitable arrangements for delivery of this capacity and energy will be made between the Bonneville Power Administration and B.C. Hydro.

The usable Columbia River Treaty storage space available for power purposes during the Operating Year is 15.5 million acre-feet in Canada and 4.9795 million acre-feet at Libby in the United States, distributed as follows:

**Duncan Reservoir**

1.4 million acre-feet (705.8 thousand second-foot-days) between elevations 1892.0 feet and 1794.2 feet measured at Duncan forebay. (Based on B.C. Hydro table dated 21 February 1973.)

**Arrow Reservoir**

7.1 million acre-feet (3579.6 thousand second-foot-days) between elevations 1444.0 feet and 1377.9 feet measured at Fauquier, B.C. (Based on B.C. Hydro table dated 28 February 1974.)

**Kinbasket Lake (Mica)**

7.0 million acre-feet (3529.2 thousand second-foot-days) measured at Mica forebay. (Based on B.C. Hydro table dated 25 March 1974.)

**Lake Koocanusa (Libby)**

4.9795 million acre-feet (2510.5 thousand second-foot-days) between elevation 2459.0 feet and 2287.0 feet measured at Libby forebay.

The usable Canadian storage available for normal flood-control purposes for the Operating Year is 1.27 million acre-feet in Duncan Reservoir below elevation 1892.0 feet; 5.1 million acre-feet in Arrow Reservoir below elevation 1444.0 feet; and 2.08 million acre-feet in Kinbasket Lake (Mica Reservoir) except that additional storage may also be operated for flood control purposes under special circumstances, as described in the Flood Control Plan. The foregoing assumes a 2.0 million acre-feet transfer of flood-control storage from Arrow Reservoir to Kinbasket Lake as detailed in the Flood Control Plan.

### **3. OPERATING RULE CURVE**

The Operating Rule Curve for the whole of Canadian Storage shall be the sum of the Operating Rule Curves for each of Duncan, Arrow, and Mica. The Operating Rule Curve for each of the Duncan, Arrow, and Mica Reservoirs during the period 1 August 1993 through 31 July 1994 is determined in accordance with the reference documents of Section 1, and is defined as follows:

- a. During the period 1 August 1993 through 31 December 1993, it is the higher of the First Critical Rule Curve or the Assured Refill Curve.
- b. During the period 1 January 1994 through 31 July 1994 it is the higher of the First Critical Rule Curve or the Assured Refill Curve, unless the Variable Refill Curve is below the higher of the above two curves; then it is defined by the Variable Refill Curve.
- c. During the period 1 January 1994 through 31 March 1994 it will not be lower than a Limiting Rule Curve designed to protect firm loads with recurrence of 1936-37 hydro conditions unless a lower reservoir elevation is required for flood control (Exhibit 6).
- d. During any period in the 1993-94 Operating Year, it will not be higher than the Upper 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.
- e. Operation of Mica will be in accordance with the monthly average outflows tabulated with specified qualifications under Operating Limits. The obligation to operate Mica to produce optimum benefits in Canada and downstream in the United States will be deemed to have been fulfilled by operating to these criteria.
- f. The Variable Refill Curves for Duncan and Mica shall be constructed based on the power discharge requirement specified in Exhibit 7.
- g. The Variable Refill Curve for Arrow shall be constructed as specified below:
  - (1) If the projected live Mica storage content at the end of the current month using most likely Mica inflow and target outflows (expected live Mica storage content) is less than that computed for the Variable Refill

## **Detailed Operating Plan for 1993-94**

Curve for Mica, the Variable Refill Curve for Arrow will be calculated using the Arrow Local Inflow Method as follows.

- (a) The forecast volume of inflow for Arrow will exclude the volume of inflow above the Mica project (Arrow local inflow). This volume will be reduced by a forecast error such that there is a 95 percent probability that the reduced forecast is equaled or exceeded.
  - (b) The total Mica target outflow as specified in 6c will be added to the forecast volume described in (a) above.
  - (c) 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 (b).
  - (d) For the purpose of calculating the rule curve for the whole of Canadian storage, the Variable Refill Curve for Mica will be set equal to the expected live Mica Treaty storage content.

(2) If the expected live Mica storage content is greater than that computed for the Variable Refill Curve for Mica, the Variable Refill Curve for Arrow will be computed using the Arrow Total Inflow Method, i.e., the forecast volume of inflow above the Mica project will be included. The space in Mica to be deducted from the Arrow total inflow will be equal to the amount of storage draft determined by the Operating Rule Curve for Mica as defined in paragraphs 3b and 3c.

The Operating Rule Curve for Libby Reservoir is defined in a manner similar to that for Canadian storage.

#### **4. OPERATIONS**

- a. The operation of Treaty storage by the Columbia River Treaty Operating Committee during the period 1 August 1993 through 31 July 1994 will be in accordance with the reference documents of Section 1, and the following operating guides:
    - (1) Assured Refill Curve for Duncan, Arrow, Mica, and the whole of Canadian storage 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

## Detailed Operating Plan for 1993-94

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- (5) Fourth Critical Rule Curve for Duncan, Arrow, Mica, and the whole of Canadian storage. Exhibit 5
  - (6) Lower Limit for Operating Rule Curve based on 1936-37 Hydro Conditions. Exhibit 6
  - (7) Variable Refill Curve Procedures. Exhibit 7
  - (8) The First, Second, Third, and Fourth Critical Rule Curves and Assured Refill Curve for Libby. Exhibit 8
  - (9) Coordinated System Loads and Resources Exhibit 9
- b. The following tables, including adjustments, have been agreed to by the Entities:
- (1) Second Critical Rule Curves for Duncan, Arrow, Mica, and the whole of Canadian storage for Operating Year 1994-95. Exhibit 10
  - (2) Third Critical Rule Curves for Duncan, Arrow, Mica, and the whole of Canadian storage for Operating Year 1995-96. Exhibit 11
  - (3) Fourth Critical Rule Curves for Duncan, Arrow, Mica, and the whole Canadian storage for Operating Year 1996-97. Exhibit 12
- c. 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
  - (4) Libby Storage above elevation 2287 feet. Exhibit 16

### **5. SCHEDULING STORAGE REGULATION**

- a. 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. Seasonal runoff volume forecasts for Canadian Treaty Projects shall be made available by the Canadian Section no later than the seventh of each month, as required. Forecasts of seasonal runoff volume at periods other than those representing month-end conditions may be requested by the Operating Committee if hydrologic conditions warrant. Preliminary seasonal runoff volume forecasts for the Columbia River at The Dalles, Oregon, shall be made available by the U.S. Section on the second working day of each month as required.
- c. 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) Weekly Requests for Storage Regulation During the Storage Drawdown Season
    - (a) Timing of Requests. A preliminary request will be made not later than noon each Thursday, followed by a final request by noon Friday, if necessary.
    - (b) Confirmation of Requests. Confirmation of the request will be transmitted via the hydromet reporting network or fax on Friday in accordance with the following format unless otherwise agreed:

This message will confirm our verbal request of this date for the (storing/drafting) of \_\_\_\_ ksf<sup>d</sup> (in/from) the whole of Canadian storage for the period \_\_\_\_ through \_\_\_\_\_. This request is based on an estimated average regulated inflow of \_\_\_\_ kcfs to Arrow Reservoir, \_\_\_\_ kcfs to Duncan Reservoir, \_\_\_\_ kcfs to Mica Reservoir, and \_\_\_\_ kcfs to Libby Reservoir during the above mentioned period, and an average discharge of \_\_\_\_ kcfs from the Arrow Project, \_\_\_\_ kcfs from the Duncan Project, \_\_\_\_ kcfs from the Mica Project, and \_\_\_\_ kcfs from the Libby Project.
    - (c) Period Covered by Request. The period covered by the request shall be from 0800 hours on the Saturday following the date of weekly request to 0800 hours on the Saturday a week later. Changes from the previous week's request shall commence at 0800 hours on Saturday, or as soon thereafter as permitted by the limits of 7b(7).
    - (d) Release Determination. The amount of water released or stored during the period of the request will be determined by the changes in reservoir contents based on the recorded lake stage and storage capacity tables for Duncan (Exhibit 13), Arrow (Exhibit 14), and Mica (Exhibit 15). The change in Arrow storage

content will be determined using the recorded lake stage at the gauge near Fauquier, B.C.

- (e) **Delivery.** Requested storage releases will be made effective at the Canadian-United States border. The request will be deemed to have been fulfilled if the total amount of storage water requested is released from Duncan, Arrow, and Mica reservoirs, provided an amount equal to or greater than the storage water release from Duncan reservoir is concurrently discharged from Kootenay Lake.
  - (f) **Modification.** If any modification to a written request is agreed by the Operating Committee, a further written request superseding the original written request will be dispatched immediately by the U.S. Section of the Operating Committee to the Canadian Section of the Operating Committee.
  - (g) **Nonroutine Operation.** Any special operation which is agreed by the Operating Committee will be suitably documented.
- (2) **Daily Request for Storage Regulation During Flood Control Season**
- (a) **Forecasts.** Day-to-day streamflow forecasts will be accomplished by use of computer simulation by the Columbia River Forecasting Service. The regulation center required by the Flood Control Plan for the flood regulation will be located in the North Pacific Division Office, Corps of Engineers, Portland, Oregon.
  - (b) **Daily Requests for Project Outflows.** Pursuant to the operating rules in the Flood Control Plan, the outflows from individual Canadian storage projects are specified on a day-to-day basis. 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. Daily requests for project outflows will be determined by methods as agreed upon, and documented by a message transmitted via the hydromet reporting network or fax from the Corps of Engineers, in Portland, Oregon. Acknowledgment of this request will be made by the Canadian Section of the Operating Committee or their representative via the hydromet reporting network 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.
- (3) **Regulation During Winter Floods.** Daily requests for project outflows from Canadian projects are normally confined to the flood control refill

period. During 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, the outflows from Arrow will be regulated on a day-to-day basis in accordance with the requests of the U.S. Section of the Operating Committee. The requests for such regulation will be in accordance with procedures described above.

- d. The weekly storage requests shall be based on operating Treaty projects to an end-of-month point between an upper limit of the Upper Rule Curve and a lower limit of the elevations contained in the PNCG's AER. The AER shall include the operating and critical rule curves and operating criteria and limits contained in this document. The Coordinated System loads and resources contained in the AER are based on the results of the PNCG reregulation of the 1991-92 Final Regulation for the third year (shown in Exhibit 9). Without further agreement, storage operation above the AER elevations shall be consistent with the 1993-94 Alternative Operating Plan.

## **6. PROVISIONAL DRAFT**

- a. The 1991 Columbia River Treaty Entity Agreement on Implementation of the Assured Operating Plan for the Operating Year 1993-94 (Implementation Agreement) allows the U.S. Entity to provisionally draft Treaty storage below rule curves established in the 1993-94 Alternative Operating Plan provided that the Entities agree on mutually acceptable criteria that will result in the restoration of Canadian Treaty storage similar to that which would have occurred under the 1993-94 Assured Operating Plan. The following procedures accomplish that requirement.
- b. The U.S. Entity may provisionally draft Canadian Treaty Storage below the elevations established in the AER by up to the Maximum Amount of Provisional Draft. The Maximum Amount of Provisional Draft available during any month is a function of the proportional draft point (PDP) from the AER and the following table.

**Maximum Amount of Provisional Draft in Ksfd**

	Aug15	Aug31	Sep	Oct	Nov	Dec	Jan	Feb	March	Apr15	Apr30	May	June	July
Flood =	0	0	-100	-150	-200	-250	-100	0	0	0	0	0	0	0
ECC =	0	0	-100	-150	-200	-250	-100	0	0	0	0	0	0	0
CRC1 =	0	0	-100	-150	-200	-250	-200	-200	-200	-200	-200	-200	-200	0
CRC2 =	-100	-100	-150	-200	-250	-250	-200	-200	-200	-200	-200	-200	-200	0
CRC3 =	-100	-100	-150	-200	-250	-250	-150	-100	-100	-50	-100	-100	-100	0
CRC4 =	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empty=	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- c. Provisional draft may be requested or returned weekly at the same time as requests for Treaty storage in an amount not to exceed 35 ksfd per week. The procedure for determining the weekly provisional storage transaction

amount and making the request for provisional storage transactions shall parallel the method for Treaty storage requests. The provisional storage transaction shall be accounted as having occurred 50 percent at Mica and 50 percent at Arrow. Any provisional draft outstanding on July 31, 1994 shall be subject to the provisional draft procedures in the 1994-95 DOP.

- d. As full compensation for the 1993-94 provisional draft operation, including the potential delayed refill in a subsequent year, the U.S. Entity shall deliver to the Canadian Entity the shift payment identified in the Implementation Agreement which is 16.6 MW-years of energy and no capacity, minus three (3) percent transmission losses. The energy shall be delivered in equal monthly amounts from August 1, 1993 to July 31, 1994 at the U.S./Canadian border near Blaine Washington. Unless otherwise agreed, the U.S. Entity shall pre-schedule the energy deliveries each week in a shape it desires, subject to a maximum rate of delivery of no greater than twice an amount equal to uniform monthly delivery over the eight (8) light load hours per week day (except U.S. federal holidays) and flat on weekends and U.S. federal holidays. Interruptions for transmission maintenance or outages will be made up at a rate up to two times the above maximum rate. The U.S. Entity shall finalize and inform the Canadian Entity of next week's schedule of energy delivery by Friday 11:00 a.m. each week. The weekly schedule shall not be changed during the week except for unexpected outages or system emergencies. The Entities may agree to other forms of compensation for the provisional draft.
- e. The U.S. Entity grants the right to determine the timing and amount of Canadian Provisional Draft storage and return, consistent with paragraphs a through c above, to Bonneville Power Administration (BPA), in return for BPA accepting the responsibility for making the entire payment required by paragraph d above.

## **7. OPERATING LIMITS**

- a. Duncan Project
  - (1) Maximum outflow is 20,000 cfs through outlets.
  - (2) Minimum average weekly outflow is 100 cfs.
  - (3) Maximum rate of change in outflow is normally 4,000 cfs per day unless a larger change is necessary to accomplish the objectives of the Flood Control Plan.
  - (4) Normal full pool elevation is 1,892.0 feet.
  - (5) Normal minimum pool elevation is 1,794.2 feet.
  - (6) Normal maximum reservoir change in elevation during any month is limited to the equivalent of 1 foot per day.

b. Arrow Project

- (1) Maximum outflow is physical limits only.
- (2) Minimum average weekly outflow is 5,000 cfs.
- (3) Maximum rate of change in outflow is normally 15,000 cfs per day unless a larger change is necessary to accomplish the objectives of the Flood Control Plan.
- (4) Normal full pool elevation is 1,444.0 feet
- (5) Normal minimum pool elevation is 1,377.9 feet
- (6) Normal maximum reservoir monthly change in elevation limited to the equivalent of 1 foot per day
- (7) Advance notice for changes in outflow for:
  - (a) Drop in downstream level of  
   $\frac{1}{4}$  foot - None,  
    1 foot - 1 hour,  
    2 feet - 2 hours,  
    3 feet - 24 hours, and
  - (b) Rise in downstream level of  
   $\frac{1}{4}$  foot - None,  
    1 foot - 1 hour,  
    2 feet - 2 hours,  
    3 feet - 7 hours, only if notice is received before 10:00 a.m. that day, otherwise 24-hour notice is required.

c. Mica Project

In accordance with the 1993-94 Assured Operating Plan, the Mica Project will be operated to the following monthly average target outflows specified in (2) below except as qualified in paragraphs 6c(3) through 6c(9).

- (1) Variable Refill Curves. Variable Refill Curves (VRC) shall be constructed based on a power discharge requirement as indicated in Exhibit 7 with a target 31 July Treaty storage content of 3,529.2 KSFD.
- (2) Mica Project Operating Criteria. Mica project operation will be determined by the End of Previous Period Arrow Storage Content as shown in the following table, except for the limitations or changes required by subsection 6c(3) through 6c(9). The End of Previous Period Arrow Storage Content will be determined from the current AER. Mica's operation will be defined either by a Target End of Period Storage Content or a Target Period Average Outflow.

**Mica Project Operating Criteria**

Month	End of Previous Period Arrow Storage Content (KSFD)	Target Operation		Minimum Outflow (CFS)	Minimum Target Treaty Content at Mica (KSFD)
		Period Average Outflow (CFS)	End of Period Storage Content (KSFD)		
August 1-15	3,300 - Full 0 - 3,300	---	3,456.2	10,000	0.0
August 16-31	2,400 - Full 0 - 2,400	27,000	3,529.2	10,000	0.0
September	2,500 - Full 0 - 2,500	---	3,529.2	10,000	0.0
October	2,900 - Full 0 - 2,900	---	3,529.2	10,000	0.0
November	3,400 - Full 3,000 - 3,400 0 - 3,000	14,000 23,000 27,000		10,000	0.0
December	3,200 - Full 2,200 - 3,200 0 - 2,200	22,000 27,000 34,000	---	15,000	756.2
January	1,700 - Full 0 - 1,700	27,000 34,000	---	15,000	356.2
February	700 - Full 0 - 700	25,000 27,000	---	15,000	0.0
March	500 - Full 0 - 500	24,000 27,000	---	15,000	0.0
April 1-15	0 - Full	22,000	---	15,000	0.0
April 16-31	0 - Full	15,000	---	10,000	0.0
May	200 - Full 0 - 200	12,000 20,000	---	10,000	0.0
June	500 - Full 0 - 500	10,000 20,000	---	10,000	0.0
July	2,300 - Full 0 - 2,300	---	3,256.2	10,000	0.0

## **Detailed Operating Plan for 1993-94**

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- (3) Mica operation to the Target End-of-Period Treaty Storage Contents shall be limited by the Minimum Outflows shown in the table above, and a maximum outflow of 34,000 cfs when the Target End-of-Period Storage Content is below 3529.2 ksfd unless needed to accomplish the objectives of the Flood Control Plan.
- (4) Mica operation to the Target Period Average Outflow shall be limited by the Minimum Target Treaty Content shown in the table above. Mica outflows shall be reduced as required down to a lower limit of the Minimum Outflow shown in the table above, 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) During July, the Mica operation to the Target Period Average Outflow shall not be less than the outflow necessary to meet the Target End-of-Period Storage Content of 3256.2 ksfd.
- (6) Mica outflows will be increased during the months October through June as required to avoid violation of the Upper Rule Curve.
- (7) During the period January through July, if in any month the Arrow Local Inflow Method is used to compute the Variable Refill Curve as defined in Section 3g(1), a Parallel AER using only Variable Refill Curves based on the Arrow Total Inflow Method continuously from January on will be used instead of the official AER to determine if the Arrow contents are within the limits shown above.
- (8) Each month, within two working days of determination of the final AER, normally available within the first ten days of the month, one correction to the adjusted Mica outflow may be made, consistent with (3) above.
- (9) Storage releases from Mica in excess of 7 million acre-feet (MAF) that result from operating Mica under the criteria described in 6c(2) through 6c(8) above will be retained in the Arrow reservoir, subject to flood control criteria at Arrow, and Mica will be reduced to Minimum Outflow as required to minimize releases in excess of 7 MAF. The total combined storage draft from Mica and Arrow will not exceed 14.1 million acre-feet unless flood control criteria will not permit the additional Mica storage releases for minimum flow purposes to be retained at Arrow.

d. Libby Project

- (1) Maximum Outflow - When the spillway capacity is insufficient to pass the required flow, the regulating outlets may be used.

<b>Forebay Elevation</b>	<b>One Sluice</b>	<b>Three Sluices</b>
2459 ft.	20,300 cfs	61,000 cfs
2425 ft.	19,000 cfs	57,000 cfs
2405 ft.	18,200 cfs	54,600 cfs
2350 ft.	15,500 cfs	46,500 cfs
2287 ft.	11,700 cfs	35,000 cfs

- (2) Minimum instantaneous outflow is 2,000 cfs and the normal minimum daily outflow is 4,000 cfs.
- (3) Maximum rate of tailwater change
- (a) May - September -      1 ft. per hour  
                                4 ft. per 24 hours
- (b) October - April -      1 ft. per  $\frac{1}{2}$  hour  
                                6 ft. per 24 hours
- (4) Maximum CRC elevation - 2459.0 feet
- (5) Minimum CRC elevation - 2363.0 feet in December only  
                                2287.0 feet in all other months

**ASSURED REFILL CURVE**  
1/

Month	DUNCAN					MICA					ARROW					
	1931 Inflow CFS	PDR CFS	Water Available for Refill		ARC KSFD	1931 Inflow CFS	PDR CFS	Water Available or Refill		ARC KSFD	1931 Inflow CFS	PDR CFS	Water Available for Refill		MICA 2/ Fill KSFD	ARC KSFD
	CFS	CFS	CFS	KSFD		CFS	CFS	CFS	KSFD		CFS	CFS	CFS	KSFD		
July	7320	2000	5320	164.9	705.8	56490	28000	28490	883.2	3529.2	88790	45000	43790	1357.5	883.2	3579.6
June	8030	2000	6030	180.9	540.9	60210	28000	32210	966.3	2646.0	114820	45000	69820	2094.6	966.3	3105.3
May	5170	2000	3170	98.3	360.0	28080	25000	3080	95.5	1679.7	68060	40000	28060	869.9	95.5	1977.0
Apr2	981	2000	-1020	-15.3	261.7	7230	22000	-14770	-221.6	1584.2	20510	25000	-4490	-67.4	-221.6	1202.6
Apr1	981	400	580	8.7	277.0	4676	22000	-17320	-259.8	1805.8	10700	25000	-14300	-214.5	-259.8	1048.4
Mar	555	400	160	5.0	268.3	3219	20000	-16780	-520.2	2065.6	7694	5000	2690	83.4	-520.2	1003.1
Feb	428	400	30	0.8	263.4	2592	20000	-17410	-487.5	2585.8	5865	5000	870	24.4	-487.5	399.6
Jan	428	100	330	10.2	262.5	2833	3000	-170	-5.3	3073.2	6476	5000	1480	45.9	-5.3	0.0
Dec	461	100	360	11.2	252.3	3531	3000	530	16.4	3078.5	6707	5000	1710	53.0	-79.0	0.0
Nov	684	100	580	17.4	241.1	5174	3000	2170	65.1	3062.1	9509	5000	4510	135.3	-270.9	0.0
Oct	1090	100	990	30.7	223.7	8750	3000	5750	178.3	2997.0	14720	5000	9720	301.3	-100.8	0.0
Sep	2310	100	2210	66.3	193.0	23100	3000	20100	603.0	2818.7	39730	5000	34730	1041.9	0.0	0.0
Aug2	4530	100	4430	70.9	126.7	39460	3000	36460	583.4	2215.7	62620	5000	57620	921.9	0.0	0.0
Aug1	4530	100	4430	66.5	55.9	52240	3000	49240	738.6	1632.4	82270	5000	77270	1159.1	0.0	0.0

**Notes:**

1. The Assured Refill Curve 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 and water required for refill, if any, at upstream reservoirs. The Entities may agree to revise the data upon the completion of the Refill Studies by the U.S. Entity.
2. Higher of Mica's ARC or CRC1 shown in Exhibit 2.

**FIRST CRITICAL RULE CURVE  
FOR 1993-94**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	705.8	3579.6	3529.2	7814.6
August 31	705.8	3579.6	3529.2	7814.6
September	705.8	3575.1	3529.2	7810.1
October	705.8	3446.6	3428.4	7580.8
November	705.8	3367.6	3157.5	7230.9
December	504.1	3056.4	2614.0	6174.5
January	260.9	1975.6	2210.3	4446.8
February	128.7	1148.3	1532.9	2809.9
March	59.5	1010.7	1149.3	2219.5
April 15	37.9	869.0	344.4	1251.3
April 30	1.1	604.6	176.1	781.8
May	118.6	1478.7	355.1	1952.4
June	392.7	3107.7	1907.1	5407.5
July	563.9	3345.6	2863.5	6773.0

Source: First-year critical rule curves are from the 1993-94 Final Regulation (same as 1993-94 AltOP) except rule curve for Arrow on April 30 is higher than the AltOP.

**SECOND CRITICAL RULE CURVE  
FOR 1993-94**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	479.1	3332.7	3389.2	7201.0
August 31	492.6	3087.9	3529.2	7109.7
September	430.5	3036.0	3529.2	6995.7
October	202.6	2544.0	3428.4	6175.0
November	23.6	2315.8	2740.8	5080.2
December	0.0	2383.1	2016.1	4399.2
January	0.0	1216.9	1259.9	2476.8
February	0.1	624.8	637.5	1262.4
March	0.0	443.9	18.4	462.3
April 15	0.0	413.9	0	413.9
April 30	1.1	520.9	0.0	522.0
May	72.6	249.7	355.1	677.4
June	100.3	1505.3	1502.5	3108.1
July	145.6	2961.0	2624.2	5730.8

**Source:** Second-year critical rule curves from the 1992-93 Final Regulation (same as 1993-94 AltAOP) unless higher than the first year critical rule curve.

**Note:** Rule curves for Arrow in October and November were adjusted from the AltOP.

**THIRD CRITICAL RULE CURVE  
FOR 1993-94**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	158.1	3037.3	3361.9	6557.3
August 31	218.6	3065.6	3529.2	6813.4
September	262.8	3036.0	3529.2	6828.0
October	115.3	2544.0	3428.4	6087.7
November	2.6	2315.8	2740.8	5059.2
December	0.0	2036.2	2016.1	4052.3
January	0.0	1210.9	1259.9	2470.8
February	0.1	213.1	637.5	850.7
March	0.0	339.6	0.0	339.6
April 15	0.0	55.6	0.0	55.6
April 30	0.0	114.3	0.0	114.3
May	66.0	249.7	355.1	670.8
June	44.6	713.7	1502.5	2260.8
July	41.6	1341.6	2624.2	4007.4

Source: Third-year critical rule curves from the 1991-92 Final Regulation (same as 1993-94 AOP) unless higher than the first or second year critical rule curve.

**FOURTH CRITICAL RULE CURVE  
FOR 1993-94**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	4.1	1641.0	2807.6	4452.7
August 31	2.7	1019.7	3139.2	4161.6
September	3.3	1139.4	3097.7	4240.4
October	4.2	1248.7	2607.6	3860.5
November	0.4	614.4	2042.8	2657.6
December	0.0	7.6	1306.2	1313.8
January	0.0	25.0	456.2	481.2
February	0.0	0.0	0.0	0.0

Source: Fourth-year critical rule curves from the 1990-91 Final Regulation (same as 1993-94 AOP) except Mica and Arrow rule curves are changed on August 15 from the Final Regulation due to minimum flow and avoiding overgeneration respectively, and unless higher than the first, second, or third year critical rule curves.

**LOWER LIMIT  
FOR OPERATING RULE CURVE**

(End-of-Month Usable Storage Contents in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Libby</b>
January	0.0	962.5	968.4	133.7
February	0.0	59.6	583.2	31.8
March	0.0	43.2	61.8	0.0

The Entities may agree to revise the data upon the completion of the ECC Lower Limit Study by the PNCG.

**1993-94 Variable Refill Curve Procedures**

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. The 1992-93 AOP studies made for the U.S. Coordinated System operation indicate that the PDR's for all cyclic reservoirs must be greater than project minimum release to allow filling in accordance with the Principles and Procedures coincident with carrying system firm load when the Columbia River at The Dalles natural January-July runoff volume is lower than 95 million acre-feet. The following schedule for PDR's will apply when computing the VRC's during the period January 1 through June 1, unless the Entities agree to updated study results.

**POWER DISCHARGE REQUIREMENT, IN CFS  
FOR JANUARY-JULY VOLUME RUNOFF  
OF THE COLUMBIA RIVER AT THE DALLES, OREGON**

<u>Project</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr 1-15</u>	<u>Apr 16-30</u>	<u>May</u>	<u>June</u>	<u>July</u>
<b>ARC</b>								
<b>Mica</b>	3000	20000	20000	22000	22000	25000	28000	28000
<b>Arrow</b>	5000	5000	5000	25000	25000	40000	45000	45000
<b>Duncan</b>	100	400	400	400	2000	2000	2000	2000
<b>Libby</b>	4000	4000	4000	4000	4000	4000	6000	9000
<b>80 MAF</b>								
<b>Mica</b>	3000	20000	20000	22000	22000	25000	28000	28000
<b>Arrow</b>	5000	5000	5000	25000	25000	40000	45000	45000
<b>Duncan</b>	100	400	400	400	2000	2000	2000	2000
<b>Libby</b>	4000	4000	4000	4000	4000	4000	4000	4000
<b>90 MAF</b>								
<b>Mica</b>	3000	3000	3000	3000	3000	3000	3000	3000
<b>Arrow</b>	5000	5000	5000	5000	5000	5000	5000	5000
<b>Duncan</b>	100	100	100	100	100	100	100	100
<b>Libby</b>	5500	5500	5500	5500	5500	5500	5500	5500
<b>95 MAF and Higher</b>								
<b>Mica</b>	3000	3000	3000	3000	10000	10000	20000	25000
<b>Arrow</b>	5000	5000	5000	5000	5000	10000	35000	35000
<b>Duncan</b>	100	100	100	100	100	100	100	100
<b>Libby</b>	4000	4000	4000	4000	4000	4000	4000	4000

**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) Data is from 1993-94 AltOP. Data may be revised upon completion of the U.S. Entity Refill Studies. The Canadian Entity reserves the right to request changes to the revised data.

**CRITICAL RULE CURVES AND ASSURED REFILL CURVES  
FOR LIBBY RESERVOIR  
FOR 1993-94**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Critical Rule Curves (1)</b>				<b>Assured Refill Curve (2)</b>
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>	<b>4th</b>	
August 15	2510.5	2246.7	2246.7	789.4	1679.1
August 31	2510.5	2258.4	2256.8	803.4	1728.7
September	2510.5	1948.9	1948.9	208.9	1763.8
October	2470.9	1934.4	1934.4	184.4	1760.4
November	2204.6	1616.3	1566.9	144.7	1731.9
December	1502.4	850.2	805.2	97.5	1681.0
January	1355.9	753.4	313.8	34.2	1630.2
February	1311.4	717.7	261.8	0	1578.1
March	1266.1	671.2	209.3	0	1525.7
April 15	1243.9	711.9	194.3	0	1510.7
April 30	1252.0	841.5	192.2	0	1508.8
May	1733.4	1320.9	648.9	0	1965.4
June	2510.3	1906.5	1197.8	0	2454.4
July	2510.5	2346.1	1302.7	756.8	2510.5

**Notes:**

- (1) From Pacific Northwest Coordination Agreement Final Regulations for 1993-94 CRC1, Final Regulation for 1992-93 CRC2, 1991-92 CRC3, and 1990-91 CRC4, unless CRC2 higher than CRC1, CRC3 higher than CRC2, or CRC4 higher than CRC3.
- (2) The Assured Refill Curve was calculated using PDR's from the 1992-93 PNCA Refill Studies and may be changed as a result of the 1993-94 PNCA Refill Studies.

**COORDINATED SYSTEM LOADS AND RESOURCES  
(ENERGY IN AVERAGE MW)**

<u>Month</u>	<u>Hydro Resources</u>	<u>Thermal Resources</u>	<u>Misc. Resources</u>	<u>Maintenance &amp; Reserves</u>	<u>Adjusted Loads</u>	<u>Imports &amp; Exports</u>
August 15	9335.4	3309.4	3941.2	1.2	16585.2	-0.4
August 31	9782.4	3309.4	3941.2	1.2	17032.3	-0.5
September	10463.5	3357.2	4237.1	32.2	18025.6	0.0
October	10597.0	3459.6	4101.3	37.9	18120.0	0.0
November	12172.1	3528.9	4489.8	0	20190.8	0.0
December	13479.5	3531.8	5174.5	0	22185.9	-0.1
January	13599.2	3539.3	5143.5	0	22282.7	-0.7
February	12853.6	3539.8	5112.4	0	21506.3	-0.5
March	11774.3	3532.3	4497.2	71.4	19715.3	17.1
April 15	11724.2	3431.1	4126.8	360.9	18922.5	-1.3
April 30	12983.3	2506.1	3715.7	636.2	18570.2	-1.3
May	15383.8	2408.7	2916.4	959.5	19750.1	-0.7
June	10807.7	2445.2	3961.7	483.6	16732.2	-1.2
July	9371.9	3196.4	4253.4	36.6	16786.7	-1.6

Source: Thermal, miscellaneous resources, and maintenance/reserves are from the 1993-94 Final Regulation. The loads and hydro resources (firm load carrying capability) is from the PNCG reregulation of the 1991-92 Final Regulation for the 1993-94 Operating Year.

Exhibit 10

**SECOND CRITICAL RULE CURVE  
For 1994-95**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	552.3	3432.7	3292.9	7277.9
August 31	493.1	3399.9	3338.9	7231.9
September	383.2	3342.1	3164.6	6889.9
October	182.1	3050.2	2916.1	6148.4
November	19.9	2506.7	2446	4972.6
December	18.6	1766.3	1928.4	3713.3
January	9.8	789.3	874.3	1673.4
February	14.1	186.4	384.8	585.3
March	4.8	197.4	140.8	343.0
April 15	16.3	91.5	27.2	135.0
April 30	0.8	349.4	51.4	401.6
May	0	658.3	32.4	690.7
June	219.6	2035.6	1236.9	3492.1
July	166.6	3041.9	2618.2	5826.7

Source: These rule curves are from 1994-95 AltOP except Arrow was changed in June in PNCG 1993-94 Final Regulation to avoid a surplus.

**THIRD CRITICAL RULE CURVE  
For 1995-96**

(End-of-Month Usable Storage Content in 1000 SFD)

<b>Month</b>	<b>Duncan</b>	<b>Arrow</b>	<b>Mica</b>	<b>Total</b>
August 15	114.7	3282.9	2955.9	6353.5
August 31	160.8	3232.0	3134.5	6527.3
September	167.2	3256.0	3099.3	6522.5
October	11.0	2982.3	2856.8	5850.1
November	10.6	2436.8	2394.6	4842.0
December	8.9	1648.0	1885.2	3542.1
January	10.5	898.9	864.0	1773.4
February	9.8	96.5	147.1	253.4
March	7.2	158.1	68.6	233.9
April 15	12.5	128.4	93.3	234.2
April 30	4.0	95.0	26.0	125.0
May	62.3	665.1	12.8	740.2
June	208.1	1226.2	847.4	2281.7
July	134.0	1840.7	1579.5	3554.2

Source: PNCG Final Regulation study for 1993-94 (same as 1995-96 AltOP).

Exhibit 12

**FOURTH CRITICAL RULE CURVE  
For 1996-97**

(End-of-Month Usable Storage Content in 1000 SFD)

<b><u>Month</u></b>	<b><u>Duncan</u></b>	<b><u>Arrow</u></b>	<b><u>Mica</u></b>	<b><u>Total</u></b>
August 15	470.0	1716.7	1645.9	3832.6
August 31	500.0	1500.0	1613.3	3613.3
September	403.0	1587.3	1149.0	3139.3
October	325.0	1278.8	720.2	2324.0
November	180.0	1152.3	75.6	1407.9
December	20.0	466.6	0.0	486.6
January	0.0	161.0	0.0	161.0
February	0.0	0.0	0.0	0.0
March	0.0	0.0	0.0	0.0
April 15	0.0	0.0	0.0	0.0
April 30	0.0	0.0	0.0	0.0
May	0.0	0.0	0.0	0.0
June	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0

Source: 1996-97 AOP

## DUNCAN RESERVOIR CAPACITY TABLE

PAGE # 1

FIGURES IN 1000'S  
OF SECOND FOOT DAYS

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

Exhibit 13

DUNCAN  
RESERVOIR CAPACITY TABLE

PAGE # 2

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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
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

Exhibit 13

## DUNCAN RESERVOIR CAPACITY TABLE

PAGE # 3

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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

DUNCAN  
RESERVOIR CAPACITY TABLE

PAGE # 4

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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
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 13

## ARROW LAKES RESERVOIR CAPACITY TABLE

PAGE # 1

FIGURES IN 1000'S  
OF SECOND FOOT DAYS

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

Exhibit 14

## ARROW LAKES RESERVOIR CAPACITY TABLE

PAGE # 2

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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
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

## ARROW LAKES RESERVOIR CAPACITY TABLE

PAGE # 3

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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

MICA

## RESERVOIR CAPACITY TABLE

PAGE # 1

FIGURES IN 1000'S  
OF SECOND FOOT DAYS

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	9828.4	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	9670.9	9676.2	9681.4	9686.6	9691.9	5.23
2465.	9592.7	9597.9	9603.1	9608.3	9613.5	9618.7	9624.0	9629.2	9634.4	9639.6	5.21
2464.	9540.8	9546.0	9551.2	9556.4	9561.6	9566.7	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	9309.2	9314.4	9319.5	9324.6	9329.7	5.11
2458.	9232.8	9237.9	9243.0	9248.1	9253.2	9258.2	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

## MICA

## RESERVOIR CAPACITY TABLE

PAGE # 2

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
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	9005.7	9010.8	9015.8	9020.8	9025.8	5.01
2452.	8930.8	8935.8	8940.8	8945.8	8950.8	8955.7	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	8708.2	8713.2	8718.1	8723.0	8727.9	4.91
2446.	8634.8	8639.7	8644.6	8649.5	8654.4	8659.2	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	8542.3	8547.2	8552.0	8556.9	8561.7	8566.6	8571.4	8576.3	8581.1	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	8464.9	8469.8	8474.6	8479.4	8484.3	4.83
2441.	8392.7	8397.5	8402.3	8407.1	8411.9	8416.7	8421.6	8426.4	8431.2	8436.0	4.81
2440.	8344.8	8349.6	8354.4	8359.2	8364.0	8368.7	8373.5	8378.3	8383.1	8387.9	4.79
2439.	8297.1	8301.9	8306.6	8311.4	8316.2	8320.9	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	8178.4	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
2434.	8060.9	8065.6	8070.3	8075.0	8079.7	8084.3	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

Exhibit 15

## MICA

## RESERVOIR CAPACITY TABLE

PAGE # 3

ELLEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2429.	7828.8	7833.4	7838.0	7842.6	7847.2	7851.8	7856.5	7861.1	7865.7	7870.3	4.61
2428.	7782.9	7787.5	7792.1	7796.7	7801.3	7805.8	7810.4	7815.0	7819.6	7824.2	4.59
2427.	7737.2	7741.8	7746.3	7750.9	7755.5	7760.0	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	7623.5	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	7533.4	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	7310.9	7315.4	7319.8	7324.2	7328.6	4.41
2416.	7245.0	7249.4	7253.8	7258.2	7262.6	7266.9	7271.3	7275.7	7280.1	7284.5	4.39
2415.	7201.3	7205.7	7210.0	7214.4	7218.8	7223.1	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	7092.6	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	7006.5	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	6794.0	6798.3	6802.5	6806.7	6810.9	4.21

Exhibit 15

## MICA RESERVOIR CAPACITY TABLE PAGE # 4

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2404.	6731.1	6735.3	6739.5	6743.7	6747.9	6752.0	6756.2	6760.4	6764.6	6768.8	4.19
2403.	6689.4	6693.6	6697.7	6701.9	6706.1	6710.2	6714.4	6718.6	6722.8	6726.9	4.17
2402.	6647.8	6652.0	6656.1	6660.3	6664.4	6668.6	6672.8	6676.9	6681.1	6685.2	4.16
2401.	6606.4	6610.5	6614.7	6618.8	6623.0	6627.1	6631.2	6635.4	6639.5	6643.7	4.14
2400.	6565.1	6569.2	6573.4	6577.5	6581.6	6585.7	6589.9	6594.0	6598.1	6602.3	4.13
2399.	6524.1	6528.2	6532.3	6536.4	6540.5	6544.6	6548.7	6552.8	6556.9	6561.0	4.10
2398.	6483.4	6487.5	6491.5	6495.6	6499.7	6503.7	6507.8	6511.9	6516.0	6520.0	4.07
2397.	6443.0	6447.0	6451.1	6455.1	6459.2	6463.2	6467.2	6471.3	6475.3	6479.4	4.04
2396.	6403.0	6407.0	6411.0	6415.0	6419.0	6423.0	6427.0	6431.0	6435.0	6439.0	4.00
2395.	6363.4	6367.4	6371.3	6375.3	6379.2	6383.2	6387.2	6391.1	6395.1	6399.0	3.95
2394.	6324.1	6328.0	6332.0	6335.9	6339.8	6345.7	6347.7	6351.6	6355.5	6359.5	3.93
2393.	6285.1	6289.0	6292.9	6295.8	6300.7	6304.6	6308.5	6312.4	6316.3	6320.2	3.90
2392.	6240.4	6250.3	6254.1	6258.0	6261.9	6265.7	6269.6	6273.5	6277.4	6281.2	3.87
2391.	6208.1	6211.9	6215.8	6219.6	6223.4	6227.2	6231.1	6234.9	6238.7	6242.6	3.83
2390.	6170.1	6173.9	6177.7	6181.5	6185.3	6189.1	6192.9	6196.7	6200.5	6204.3	3.80

## LIBBY

## RESERVOIR CAPACITY TABLE

PAGE # 1

FIGURES IN 1000'S  
OF SECOND FOOT DAYS

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2459.	2510.5										
2458.	2487.1	2489.4	2491.8	2494.1	2496.5	2498.8	2501.1	2503.5	2505.8	2508.2	2.34
2457.	2463.8	2466.1	2468.5	2470.8	2473.1	2475.4	2477.8	2480.1	2482.4	2484.8	2.33
2456.	2440.6	2442.9	2445.2	2447.6	2449.9	2452.2	2454.5	2456.8	2459.2	2461.5	2.32
2455.	2417.5	2419.8	2422.1	2424.4	2426.7	2429.0	2431.4	2433.7	2436.0	2438.3	2.31
2454.	2394.5	2396.8	2399.1	2401.4	2403.7	2406.0	2408.3	2410.6	2412.9	2415.2	2.30
2453.	2371.6	2373.9	2376.2	2378.5	2380.8	2383.0	2385.3	2387.6	2389.9	2392.2	2.29
2452.	2348.8	2351.1	2353.4	2355.6	2357.9	2360.2	2362.5	2364.8	2367.0	2369.3	2.28
2451.	2326.1	2328.4	2330.6	2332.9	2335.2	2337.4	2339.7	2342.0	2344.3	2346.5	2.27
2450.	2303.4	2305.7	2307.9	2310.2	2312.5	2314.7	2317.0	2319.3	2321.6	2323.8	2.27
2449.	2280.9	2283.1	2285.4	2287.6	2289.9	2292.1	2294.4	2296.6	2298.9	2301.1	2.25
2448.	2258.4	2260.6	2262.9	2265.1	2267.4	2269.6	2271.9	2274.1	2276.4	2278.6	2.25
2447.	2236.1	2238.3	2240.6	2242.8	2245.0	2247.2	2249.5	2251.7	2253.9	2256.2	2.23
2446.	2213.8	2216.0	2218.3	2220.5	2222.7	2224.9	2227.2	2229.4	2231.6	2233.9	2.23
2445.	2191.7	2193.9	2196.1	2198.3	2200.5	2202.7	2205.0	2207.2	2209.4	2211.6	2.21
2444.	2170.0	2172.2	2174.3	2176.5	2178.7	2180.8	2183.0	2185.2	2187.4	2189.5	2.17
2443.	2147.7	2149.9	2152.2	2154.4	2156.6	2158.8	2161.1	2163.3	2165.5	2167.8	2.23
2442.	2125.9	2128.1	2130.3	2132.4	2134.6	2136.8	2139.0	2141.2	2143.3	2145.5	2.18
2441.	2104.1	2106.3	2108.5	2110.6	2112.8	2115.0	2117.2	2119.4	2121.5	2123.7	2.18
2440.	2082.5	2084.7	2086.8	2089.0	2091.1	2093.3	2095.5	2097.6	2099.8	2101.9	2.16
2439.	2061.0	2063.1	2065.3	2067.4	2069.6	2071.7	2073.9	2076.0	2078.2	2080.3	2.15
2438.	2039.5	2041.6	2043.8	2045.9	2048.1	2050.2	2052.4	2054.5	2056.7	2058.8	2.15
2437.	2018.2	2020.3	2022.5	2024.6	2026.7	2028.8	2031.0	2033.1	2035.2	2037.4	2.13
2436.	1997.0	1999.1	2001.2	2003.4	2005.5	2007.6	2009.7	2011.8	2014.0	2016.1	2.12
2435.	1975.9	1978.0	1980.1	1982.2	1984.3	1986.4	1988.6	1990.7	1992.8	1994.9	2.11

Exhibit 16

## LIBBY RESERVOIR CAPACITY TABLE

PAGE # 2

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2434.	1954.9	1957.0	1959.1	1961.2	1963.3	1965.4	1967.5	1969.6	1971.7	1973.8	2.10
2433.	1934.0	1936.1	1938.2	1940.3	1942.4	1944.4	1946.5	1948.6	1950.7	1952.8	2.09
2432.	1913.2	1915.3	1917.4	1919.4	1921.5	1923.6	1925.7	1927.8	1929.8	1931.9	2.08
2431.	1892.5	1894.6	1896.6	1898.7	1900.8	1902.8	1904.9	1907.0	1909.1	1911.1	2.07
2430.	1871.9	1874.0	1876.0	1878.1	1880.1	1882.2	1884.3	1886.3	1888.4	1890.4	2.06
2429.	1851.4	1853.4	1855.5	1857.5	1859.6	1861.6	1863.7	1865.7	1867.8	1869.8	2.05
2428.	1831.0	1833.0	1835.1	1837.1	1839.2	1841.2	1843.2	1845.3	1847.3	1849.4	2.04
2427.	1810.7	1812.7	1814.8	1816.8	1818.8	1820.8	1822.9	1824.9	1826.9	1829.0	2.03
2426.	1790.6	1792.6	1794.6	1796.6	1798.6	1800.6	1802.7	1804.7	1806.7	1808.7	2.01
2425.	1770.5	1772.5	1774.5	1776.5	1778.5	1780.5	1782.6	1784.6	1786.6	1788.6	2.01
2424.	1750.6	1752.6	1754.6	1756.6	1758.6	1760.5	1762.5	1764.5	1766.5	1768.5	1.99
2423.	1730.8	1732.8	1734.8	1736.7	1738.7	1740.7	1742.7	1744.7	1746.6	1748.6	1.98
2422.	1711.1	1713.1	1715.0	1717.0	1719.0	1720.9	1722.9	1724.9	1726.9	1728.8	1.97
2421.	1691.5	1693.5	1695.4	1697.4	1699.3	1701.3	1703.3	1705.2	1707.2	1709.1	1.96
2420.	1672.0	1673.9	1675.9	1677.8	1679.8	1681.7	1683.7	1685.6	1687.6	1689.5	1.95
2419.	1652.6	1654.5	1656.5	1658.4	1660.4	1662.3	1664.2	1666.2	1668.1	1670.1	1.94
2418.	1633.3	1635.2	1637.2	1639.1	1641.0	1642.9	1644.9	1646.8	1648.7	1650.7	1.93
2417.	1614.2	1616.1	1618.0	1619.9	1621.8	1623.7	1625.7	1627.6	1629.5	1631.4	1.91
2416.	1595.2	1597.1	1599.0	1600.9	1602.8	1604.7	1606.6	1608.5	1610.4	1612.3	1.90
2415.	1576.3	1578.2	1580.1	1582.0	1583.9	1585.7	1587.6	1589.5	1591.4	1593.3	1.89
2414.	1557.5	1559.4	1561.3	1563.1	1565.0	1566.9	1568.8	1570.7	1572.5	1574.4	1.88
2413.	1538.9	1540.8	1542.6	1544.5	1546.3	1548.2	1550.1	1551.9	1553.8	1555.6	1.86
2412.	1520.3	1522.2	1524.0	1525.9	1527.7	1529.6	1531.5	1533.3	1535.2	1537.0	1.86
2411.	1501.9	1503.7	1505.6	1507.4	1509.3	1511.1	1512.9	1514.8	1516.6	1518.5	1.84
2410.	1483.6	1485.4	1487.3	1489.1	1490.9	1492.7	1494.6	1496.4	1498.2	1500.1	1.83

LIBBY  
RESERVOIR CAPACITY TABLE

PAGE # 3

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2409.	1465.5	1467.3	1469.1	1470.9	1472.7	1474.5	1476.4	1478.2	1480.0	1481.8	1.81
2408.	1447.6	1449.4	1451.2	1453.0	1454.8	1456.5	1458.3	1460.1	1461.9	1463.7	1.79
2407.	1429.7	1431.5	1433.3	1435.1	1436.9	1438.6	1440.4	1442.2	1444.0	1445.8	1.79
2406.	1412.1	1413.9	1415.6	1417.4	1419.1	1420.9	1422.7	1424.4	1426.2	1427.9	1.76
2405.	1394.6	1396.3	1398.1	1399.8	1401.6	1403.3	1405.1	1406.8	1408.6	1410.3	1.75
2404.	1377.4	1379.1	1380.8	1382.6	1384.3	1386.0	1387.7	1389.4	1391.2	1392.9	1.72
2403.	1360.3	1362.0	1363.7	1365.4	1367.1	1368.8	1370.6	1372.3	1374.0	1375.7	1.71
2402.	1343.3	1345.0	1346.7	1348.4	1350.1	1351.8	1353.5	1355.2	1356.9	1358.6	1.70
2401.	1326.6	1328.3	1329.9	1331.6	1333.3	1334.9	1336.6	1338.3	1340.0	1341.6	1.67
2400.	1310.0	1311.7	1313.3	1315.0	1316.6	1318.3	1320.0	1321.6	1323.3	1324.9	1.66
2399.	1293.6	1295.2	1296.9	1298.5	1300.2	1301.8	1303.4	1305.1	1306.7	1308.4	1.64
2398.	1277.3	1278.9	1280.6	1282.2	1283.8	1285.4	1287.1	1288.7	1290.3	1292.0	1.63
2397.	1261.2	1262.8	1264.4	1266.0	1267.6	1269.2	1270.9	1272.5	1274.1	1275.7	1.61
2396.	1245.2	1246.8	1248.4	1250.0	1251.6	1253.2	1254.8	1256.4	1258.0	1259.6	1.60
2395.	1229.4	1231.0	1232.6	1234.1	1235.7	1237.3	1238.9	1240.5	1242.0	1243.6	1.58
2394.	1213.7	1215.3	1216.8	1218.4	1220.0	1221.5	1223.1	1224.7	1226.3	1227.8	1.57
2393.	1198.1	1199.7	1201.2	1202.8	1204.3	1205.9	1207.5	1209.0	1210.6	1212.1	1.56
2392.	1182.8	1184.3	1185.9	1187.4	1188.9	1190.4	1192.0	1193.5	1195.0	1196.6	1.53
2391.	1167.5	1169.0	1170.6	1172.1	1173.6	1175.1	1176.7	1178.2	1179.7	1181.3	1.53
2390.	1152.4	1153.9	1155.4	1156.9	1158.4	1159.9	1161.5	1163.0	1164.5	1166.0	1.51
2389.	1137.4	1138.9	1140.4	1141.9	1143.4	1144.9	1146.4	1147.9	1149.4	1150.9	1.50
2388.	1122.5	1124.0	1125.5	1127.0	1128.5	1129.9	1131.4	1132.9	1134.4	1135.9	1.49
2387.	1107.7	1109.2	1110.7	1112.1	1113.6	1115.1	1116.6	1118.1	1119.5	1121.0	1.48
2386.	1093.0	1094.5	1095.9	1097.4	1098.9	1100.3	1101.8	1103.3	1104.8	1106.2	1.47
2385.	1078.4	1079.9	1081.3	1082.8	1084.2	1085.7	1087.2	1088.6	1090.1	1091.5	1.46

Exhibit 16

## LIBBY RESERVOIR CAPACITY TABLE

PAGE # 4

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2384.	1063.8	1065.3	1066.7	1068.2	1069.6	1071.1	1072.6	1074.0	1075.5	1076.9	1.46
2383.	1049.3	1050.7	1052.2	1053.6	1055.1	1056.5	1058.0	1059.4	1060.9	1062.3	1.45
2382.	1034.9	1036.3	1037.8	1039.2	1040.7	1042.1	1043.5	1045.0	1046.4	1047.9	1.44
2381.	1020.6	1022.0	1023.5	1024.9	1026.3	1027.7	1029.2	1030.6	1032.0	1033.5	1.43
2380.	1006.3	1007.7	1009.2	1010.6	1012.0	1013.4	1014.9	1016.3	1017.7	1019.2	1.43
2379.	992.2	993.6	995.0	996.4	997.8	999.2	1000.7	1002.1	1003.5	1004.9	1.41
2378.	978.1	979.5	980.9	982.3	983.7	985.1	986.6	988.0	989.4	990.8	1.41
2377.	964.1	965.5	966.9	968.3	969.7	971.1	972.5	973.9	975.3	976.7	1.40
2376.	950.2	951.6	953.0	954.4	955.8	957.1	958.5	959.9	961.3	962.7	1.39
2375.	936.3	937.7	939.1	940.5	941.9	943.2	944.6	946.0	947.4	948.8	1.39
2374.	922.5	923.9	925.3	926.6	928.0	929.4	930.8	932.2	933.5	934.9	1.38
2373.	908.8	910.2	911.5	912.9	914.3	915.6	917.0	918.4	919.8	921.1	1.37
2372.	895.2	896.6	897.9	899.3	900.6	902.0	903.4	904.7	906.1	907.4	1.36
2371.	881.6	883.0	884.3	885.7	887.0	888.4	889.8	891.1	892.5	893.8	1.36
2370.	868.1	869.4	870.8	872.1	873.5	874.8	876.2	877.5	878.9	880.2	1.35
2369.	854.7	856.0	857.4	858.7	860.1	861.4	862.7	864.1	865.4	866.8	1.34
2368.	841.3	842.6	844.0	845.3	846.7	848.0	849.3	850.7	852.0	853.4	1.34
2367.	828.1	829.4	830.7	832.1	833.4	834.7	836.0	837.3	838.7	840.0	1.32
2366.	815.0	816.3	817.6	818.9	820.2	821.5	822.9	824.2	825.5	826.8	1.31
2365.	801.9	803.2	804.5	805.8	807.1	808.4	809.8	811.1	812.4	813.7	1.31
2364.	788.9	790.2	791.5	792.8	794.1	795.4	796.7	798.0	799.3	800.6	1.30
2363.	776.0	777.3	778.6	779.9	781.2	782.4	783.7	785.0	786.3	787.6	1.29
2362.	763.2	764.5	765.8	767.0	768.3	769.6	770.9	772.2	773.4	774.7	1.28
2361.	750.5	751.8	753.0	754.3	755.6	756.8	758.1	759.4	760.7	761.9	1.27
2360.	737.9	739.2	740.4	741.7	742.9	744.2	745.5	746.7	748.0	749.2	1.26

## LIBBY RESERVOIR CAPACITY TABLE

PAGE # 5

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2359.	725.3	726.6	727.8	729.1	730.3	731.6	732.9	734.1	735.4	736.6	1.26
2358.	712.8	714.0	715.3	716.5	717.8	719.0	720.3	721.5	722.8	724.0	1.25
2357.	700.4	701.6	702.9	704.1	705.4	706.6	707.8	709.1	710.3	711.6	1.24
2356.	688.0	689.2	690.5	691.7	693.0	694.2	695.4	696.7	697.9	699.2	1.24
2355.	675.7	676.9	678.2	679.4	680.6	681.8	683.1	684.3	685.5	686.8	1.23
2354.	663.5	664.7	665.9	667.2	668.4	669.6	670.8	672.0	673.3	674.5	1.22
2353.	651.4	652.6	653.8	655.0	656.2	657.4	658.7	659.9	661.1	662.3	1.21
2352.	639.3	640.5	641.7	642.9	644.1	645.3	646.6	647.8	649.0	650.2	1.21
2351.	627.3	628.5	629.7	630.9	632.1	633.3	634.5	635.7	636.9	638.1	1.20
2350.	615.3	616.5	617.7	618.9	620.1	621.3	622.5	623.7	624.9	626.1	1.20
2349.	603.4	604.6	605.8	607.0	608.2	609.3	610.5	611.7	612.9	614.1	1.19
2348.	591.6	592.8	594.0	595.1	596.3	597.5	598.7	599.9	601.0	602.2	1.18
2347.	579.8	581.0	582.2	583.3	584.5	585.7	586.9	588.1	589.2	590.4	1.18
2346.	568.1	569.3	570.4	571.6	572.8	573.9	575.1	576.3	577.5	578.6	1.17
2345.	556.5	557.7	558.8	560.0	561.1	562.3	563.5	564.6	565.8	566.9	1.16
2344.	544.9	546.1	547.2	548.4	549.5	550.7	551.9	553.0	554.2	555.3	1.16
2343.	533.4	534.5	535.7	536.8	538.0	539.1	540.3	541.4	542.6	543.7	1.15
2342.	521.9	523.0	524.2	525.3	526.5	527.6	528.8	529.9	531.1	532.2	1.15
2341.	510.5	511.6	512.8	513.9	515.1	516.2	517.3	518.5	519.6	520.8	1.14
2340.	499.2	500.3	501.5	502.6	503.7	504.8	506.0	507.1	508.2	509.4	1.13
2339.	488.0	489.1	490.2	491.4	492.5	493.6	494.7	495.8	497.0	498.1	1.12
2338.	476.7	477.8	479.0	480.1	481.2	482.3	483.5	484.6	485.7	486.9	1.13
2337.	465.6	466.7	467.8	468.9	470.0	471.1	472.3	473.4	474.5	475.6	1.11
2336.	454.5	455.6	456.7	457.8	458.9	460.0	461.2	462.3	463.4	464.5	1.11
2335.	443.5	444.6	445.7	446.8	447.9	449.0	450.1	451.2	452.3	453.4	1.10

LIBBY  
RESERVOIR CAPACITY TABLE

PAGE # 6

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2334.	432.6	433.7	434.8	435.9	437.0	438.0	439.1	440.2	441.3	442.4	1.09
2333.	421.7	422.8	423.9	425.0	426.1	427.1	428.2	429.3	430.4	431.5	1.09
2332.	410.8	411.9	413.0	414.1	415.2	416.2	417.3	418.4	419.5	420.6	1.09
2331.	400.1	401.2	402.2	403.3	404.4	405.4	406.5	407.6	408.7	409.7	1.07
2330.	389.3	390.4	391.5	392.5	393.6	394.7	395.8	396.9	397.9	399.0	1.08
2329.	378.7	379.8	380.8	381.9	382.9	384.0	385.1	386.1	387.2	388.2	1.06
2328.	368.2	369.2	370.3	371.3	372.4	373.4	374.5	375.5	376.6	377.6	1.05
2327.	357.8	358.8	359.9	360.9	362.0	363.0	364.0	365.1	366.1	367.2	1.04
2326.	347.4	348.4	349.5	350.5	351.6	352.6	353.6	354.7	355.7	356.8	1.04
2325.	337.1	338.1	339.2	340.2	341.2	342.2	343.3	344.3	345.3	346.4	1.03
2324.	327.0	328.0	329.0	330.0	331.0	332.0	333.1	334.1	335.1	336.1	1.01
2323.	316.9	317.9	318.9	319.9	320.9	321.9	323.0	324.0	325.0	326.0	1.01
2322.	306.9	307.9	308.9	309.9	310.9	311.9	312.9	313.9	314.9	315.9	1.00
2321.	297.0	298.0	299.0	300.0	301.0	301.9	302.9	303.9	304.9	305.9	0.99
2320.	287.2	288.2	289.2	290.1	291.1	292.1	293.1	294.1	295.0	296.0	0.98
2319.	277.5	278.5	279.4	280.4	281.4	282.3	283.3	284.3	285.3	286.2	0.97
2318.	267.8	268.8	269.7	270.7	271.7	272.6	273.6	274.6	275.6	276.5	0.97
2317.	258.2	259.2	260.1	261.1	262.0	263.0	264.0	264.9	265.9	266.8	0.96
2316.	248.7	249.6	250.6	251.5	252.5	253.4	254.4	255.3	256.3	257.2	0.95
2315.	239.1	240.1	241.0	242.0	242.9	243.9	244.9	245.8	246.8	247.7	0.96
2314.	229.7	230.6	231.6	232.5	233.5	234.4	235.3	236.3	237.2	238.2	0.94
2313.	220.3	221.2	222.2	223.1	224.1	225.0	225.9	226.9	227.8	228.8	0.94
2312.	210.9	211.8	212.8	213.7	214.7	215.6	216.5	217.5	218.4	219.4	0.94
2311.	201.6	202.5	203.5	204.4	205.3	206.2	207.2	208.1	209.0	210.0	0.93
2310.	192.3	193.2	194.2	195.1	196.0	196.9	197.9	198.8	199.7	200.7	0.93

Exhibit 16

LIBBY  
RESERVOIR CAPACITY TABLE

PAGE # 7

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2309.	183.1	184.0	184.9	185.9	186.8	187.7	188.6	189.5	190.5	191.4	0.92
2308.	174.0	174.9	175.8	176.7	177.6	178.5	179.5	180.4	181.3	182.2	0.91
2307.	164.9	165.8	166.7	167.6	168.5	169.4	170.4	171.3	172.2	173.1	0.91
2306.	155.9	156.8	157.7	158.6	159.5	160.4	161.3	162.2	163.1	164.0	0.90
2305.	146.9	147.8	148.7	149.6	150.5	151.4	152.3	153.2	154.1	155.0	0.90
2304.	138.1	139.0	139.9	140.7	141.6	142.5	143.4	144.3	145.1	146.0	0.88
2303.	129.3	130.2	131.1	131.9	132.8	133.7	134.6	135.5	136.3	137.2	0.88
2302.	120.5	121.4	122.3	123.1	124.0	124.9	125.8	126.7	127.5	128.4	0.88
2301.	111.8	112.7	113.5	114.4	115.3	116.1	117.0	117.9	118.8	119.6	0.87
2300.	103.2	104.1	104.9	105.8	106.6	107.5	108.4	109.2	110.1	110.9	0.86
2299.	99.2	99.6	100.0	100.4	100.8	101.2	101.6	102.0	102.4	102.8	0.40
2298.	86.2	87.5	88.8	90.1	91.4	92.7	94.0	95.3	96.6	97.9	1.30
2297.	81.6	82.1	82.5	83.0	83.4	83.9	84.4	84.8	85.3	85.7	0.46
2296.	69.7	70.9	72.1	73.3	74.5	75.6	76.8	78.0	79.2	80.4	1.19
2295.	61.5	62.3	63.1	64.0	64.8	65.6	66.4	67.2	68.1	68.9	0.82
2294.	53.5	54.3	55.1	55.9	56.7	57.5	58.3	59.1	59.9	60.7	0.80
2293.	45.6	46.4	47.2	48.0	48.8	49.5	50.3	51.1	51.9	52.7	0.79
2292.	39.2	39.8	40.5	41.1	41.8	42.4	43.0	43.7	44.3	45.0	0.64
2291.	30.0	30.9	31.8	32.8	33.7	34.6	35.5	36.4	37.4	38.3	0.92
2290.	22.4	23.2	23.9	24.7	25.4	26.2	27.0	27.7	28.5	29.2	0.76
2289.	14.8	15.6	16.3	17.1	17.8	18.6	19.4	20.1	20.9	21.6	0.76
2288.	7.4	8.1	8.9	9.6	10.4	11.1	11.8	12.6	13.3	14.1	0.74
2287.	0.0	0.7	1.5	2.2	3.0	3.7	4.4	5.2	5.9	6.7	0.74

Exhibit 16