

# DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE

1 AUGUST 1991  
THROUGH 31 JULY 1992



COLUMBIA RIVER TREATY OPERATING COMMITTEE

NOVEMBER 1991

**COLUMBIA RIVER ENTITY AGREEMENT ON THE  
DETAILED OPERATING PLAN FOR  
COLUMBIA RIVER TREATY STORAGE**

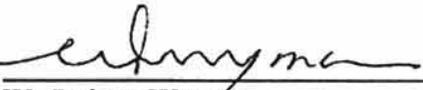
**1 AUGUST 1991 THROUGH 31 JULY 1992**

Article XIV 2. (k) of the Columbia River Treaty between the United States of America and Canada provides that the Entities develop a Detailed Operating Plan for each year's actual operation.

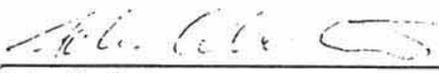
The Entities agree that Treaty storage will be operated in accordance with the attached "Detailed Operating Plan for Columbia River Treaty Storage - 1 August 1991 through 31 July 1992," dated November 1991.

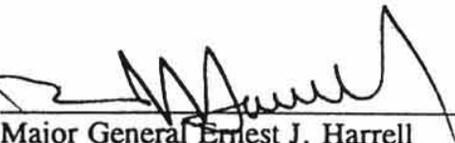
In witness thereof, the Entities have caused this agreement to be executed.

Executed for the Canadian Entity this 20 day of Nov. 1991.

By   
W. Robert Wyman  
Chairman

Executed for the United States Entity this 20 day of Nov. 1991.

By   
John S. Robertson  
Chairman

By   
Major General Ernest J. Harrell  
Member,  
United States Entity

**DETAILED OPERATING PLAN  
FOR COLUMBIA RIVER TREATY STORAGE  
1 AUGUST 1991 THROUGH 31 JULY 1992**

**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 November 1990.
- b. "Assured Operating Plan" means the document "Columbia River Treaty Hydroelectric Operating Plan-Assured Operating Plan for Operating Year 1991-1992," dated November 1986.
- c. "Flood Control Plan" means the document "Columbia River Treaty Flood Control Operating Plan," October 1972.
- d. "Operating Year" means the period from 1 August 1991 through 31 July 1992.
- e. "Operating Committee" means the Columbia River Treaty Operating Committee.
- f. "Detailed Operating Plan" 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.
- g. "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.
- h. "Actual Energy Regulation" means the simulated hydroregulation study performed by the Coordinating Group that reflects actual streamflow conditions.
- i. "Refill Studies" means multi-water-year hydroregulations that determines 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 1991-92 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 1991 through 28 February 1995 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 Kocanusa (Libby).

The Entity agreements on the downstream benefit computations for the 1991-92 Operating Year indicated that the U.S. Entity is entitled to receive from B.C. Hydro and Power Authority 3.5 average megawatts during the period 1 August 1991 through 31 March 1992, and 0.0 average megawatts during the period 1 April through 31 July 1992. Suitable arrangements for delivery of this energy have been 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 Kocanusa (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 1991 through 31 July 1992 is determined in accordance with the reference documents of Section 1, and is defined as follows:

- a. During the period 1 August 1991 through 31 December 1991, it is the higher of the First Critical Rule Curve or the Assured Refill Curve.
- b. During the period 1 January 1992 through 31 July 1992 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 1992 through 31 March 1992 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 1991-92 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 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 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 1991 through 31 July 1992 will be in accordance with the reference documents of Section 1, and the following operating guides:
  - (1) Assured Refill Curve for Duncan, Arrow, and Mica and the whole of Canadian storage. Exhibit 1
  - (2) First Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage. Exhibit 2
  - (3) Second Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage. Exhibit 3
  - (4) Third Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage. Exhibit 4
  - (5) Fourth Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage. Exhibit 5
  - (6) Limiting 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
- b. The following tables, including adjustments, have been agreed to by the Entities:
- (1) Second Critical Rule Curves for Duncan, Arrow, and Mica and the whole of Canadian storage for Operating Year 1992-93. Exhibit 9
- (2) Third Critical Rule Curves for Duncan, Arrow, and Mica and the whole of Canadian storage for Operating Year 1993-94. Exhibit 10
- (3) Fourth Critical Rule Curves for Duncan, Arrow, and Mica and the whole of Canadian storage for Operating Year 1994-95. Exhibit 11
- 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 12
- (2) Arrow Reservoir Capacity Table (based on B.C. Hydro Combined Storage Table dated 28 February 1974). Exhibit 13
- (3) Mica Reservoir Capacity Table (based on B.C. Hydro table dated 25 March 1974). Exhibit 14
- (4) Libby Storage Above Elevation 2287 feet. Exhibit 15

## **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 \_\_\_ ksfd (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 6b(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 12), Arrow (Exhibit 13), and Mica (Exhibit 14). 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. Acknowledgement 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 Pacific Northwest Coordinating Group's Actual Energy Regulation (AER). The AER shall include the operating and critical rule curves and operating criteria and limits contained in this document.

## 6. 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 25,000 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

½ foot	-	None,
1 foot	-	1 hour,
2 feet	-	2 hours,
3 feet	-	24 hours, and

(b) Rise in downstream level of

½ foot	-	None,
1 foot	-	1 hour,
2 feet	-	2 hours,
3 feet	-	7 hours, only if notice is received before 10:00 hours that day, otherwise 24-hour notice is required.

c. Mica Project

In accordance with the 1991-92 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	3,200 - Full	---	3,529.2	10,000	0.0
	2,200 - 3,200 0 - 2,200	27,000 32,000			
August 16-31	3,200 - Full	---	3,529.2	10,000	0.0
	2,400 - 3,200 0 - 2,400	27,000 32,000			
September	3,200 - Full	---	3,529.2	10,000	0.0
	2,400 - 3,200 0 - 2,400	27,000 32,000			
October	3,200 - Full	---	3,529.2	10,000	0.0
	2,400 - 3,200 0 - 2,400	28,000 32,000			
November	3,100 - Full	---	3,122.2	10,000	0.0
	2,500 - 3,100 0 - 2,500	28,000 32,000			
December	2,700 - Full	23,000	---	20,000	0.0
	0 - 2,700	32,000			
January	1,800 - Full	23,000	---	20,000	1,356.2
	0 - 1,800	32,000			
February	700 - Full	23,000	---	15,000	756.2
	0 - 700	27,000			
March	700 - Full	18,000	---	15,000	156.2
	0 - 700	23,000			
April 1-15	0 - Full	18,000	---	15,000	0.0
April 16-31	0 - Full	18,000	---	10,000	0.0
May	0 - Full	10,000	---	10,000	0.0
June	500 - Full	10,000	---	10,000	0.0
	0 - 500	25,000			
July	1,500 - Full	---	3,456.2	10,000	0.0
	0 - 1,500	32,000			

- (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 3456.2 ksf.
- (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.

<u>Forebay Elevation</u>	<u>One Sluice</u>	<u>Three Sluices</u>
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 ½ hour  
6 ft. per 24 hours
- (4) Maximum pool elevation - 2459.0 feet
- (5) Minimum pool elevation - 2363.0 feet in December only  
2287.0 feet in all other months

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
ASSURED REFILL CURVE CALCULATIONS  
1991-92

MONTH	DUNCAN					MICA					ARROW					
	1931 Inflow CFS	PDR CFS	Water Available for Refill		ARC KSF	1931 Inflow CFS	PDR CFS	Water Available for Refill		ARC KSF	1931 Inflow CFS	PDR CFS	Water Available for Refill		MICA Fill 1/ KSF	ARC KSF
			CFS	KSF				CFS	KSF				CFS	KSF		
			(1)	(2)	(3)			(4)	(5)	(3)			(4)	(5)	(3)	(4)
July	7320	1700	5620	174.2	705.8	56490	10000	46490	1441.2	3529.2	88790	44000	44790	1388.5	1365.4	3579.6
June	8030	1700	6330	189.9	531.6	60210	10000	50210	1506.3	2088.0	114820	31000	83820	2514.6	1432.4	3556.5
May	5170	1700	3470	107.6	341.7	28080	10000	18080	560.5	581.7	68060	31000	37060	1148.9	241.5	2474.3
Apr2	981	1700	-720	-10.8	234.1	7230	10000	-2770	-41.6	21.2	20510	25500	-4990	-74.9	-213.3	1567.0
Apr1	981	1700	-720	-10.8	244.9	4676	15000	-10320	-154.8	62.8	10700	22000	-11300	-169.5	-236.7	1428.5
Mar	555	100	460	14.3	255.7	3219	15000	-11780	-365.2	217.6	7694	23000	-15310	-474.6	-459.7	1361.3
Feb	428	100	330	9.2	241.5	2592	15000	-12410	-347.5	582.8	5865	5000	870	24.4	-553.5	1376.2
Jan	428	100	330	10.2	232.2	2833	20000	-17170	-532.3	930.2	6476	5000	1480	45.9	-592.9	798.4
Dec	461	100	360	11.2	222.0	3531	20000	-16470	-510.6	1462.5	6707	5000	1710	53.0	-576.2	159.6
Nov	684	100	580	17.4	210.8	5174	10000	-4830	-144.9	1973.1	9509	5000	4510	135.3	-306.2	0.0
Oct	1090	100	990	30.7	193.4	8750	10000	-1250	-38.8	2118.0	14720	5000	9720	301.3	-100.8	0.0
Sep	2310	100	2210	66.3	162.7	23100	10000	13100	393.0	2156.7	39730	5000	34730	1041.9	0.0	0.0
Aug2	4530	100	4430	70.9	96.4	39460	10000	29460	471.4	1763.7	62620	5000	57620	921.9	0.0	0.0
Aug1	4530	100	4430	66.5	25.5	52240	10000	42240	633.6	1292.4	82270	5000	77270	1159.1	0.0	0.0

-13-

1/ Higher of Mica's ARC or CRC1 shown in Exhibit 2.

Note: 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 PDR's are from the 1991-92 Assured Refill Studies.

Calculation of ARC:

(3) = (1) - (2)

(4) = (3) x (days in the period)

(5) = (Full) - [ΣWater available for refill in later months(4)]

Exhibit 1

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
FIRST CRITICAL RULE CURVE  
1991-92

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	705.8	3579.6	3529.2	7814.6
August 31	705.8	3579.6	3529.2	7814.6
September	705.6	3577.7	3529.2	7812.5
October	683.9	3338.0	3428.4	7450.3
November	705.8	3308.9	3122.2	7136.9
December	471.1	3075.5	2547.5	6094.1
January	232.4	2320.8	1953.1	4506.3
February	113.7	1311.4	1399.6	2824.7
March	63.6	593.2	939.9	1596.7
April 15	45.1	382.3	703.2	1130.6
April 30	1.9	369.6	489.9	861.4
May	119.3	1307.8	731.4	2158.5
June	365.8	3042.3	2163.8	5571.9
July	519.8	3345.4	3242.3	7107.5

Source: First-year critical rule curves from the 1991-92 Final Regulation.

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
SECOND CRITICAL RULE CURVE  
1991-92

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	572.8	3439.3	3465.2	7477.3
August 31	626.3	3476.0	3529.2	7631.5
September	596.2	3343.5	3529.2	7468.9
October	469.7	3079.6	3428.4	6977.7
November	247.3	3106.9	2710.5	6064.7
December	60.9	2777.3	2109.5	4947.7
January	0.0	1596.4	1477.1	3073.5
February	0.1	1053.8	910.5	1964.4
March	2.5	246.8	477.3	726.6
April 15	0.8	297.4	342.4	640.6
April 30	1.9	369.6	338.5	710.0
May	115.8	879.8	731.4	1727.0
June	255.2	2198.4	2163.8	4617.4
July	463.9	3003.1	3242.3	6709.3

Source: Second-year critical rule curves from the 1990-91 Final Regulation unless higher than the first-year critical rule curve.

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
 THIRD CRITICAL RULE CURVE  
 1991-92

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	406.4	3357.7	3465.2	7229.3
August 31	477.2	3476.0	3529.2	7482.4
September	542.1	3343.5	3529.2	7414.8
October	443.5	3055.0	3428.4	6926.9
November	247.3	3106.9	2710.5	6064.7
December	59.9	2489.0	2109.5	4658.4
January	0.0	1596.4	1477.1	3073.5
February	0.1	612.4	910.5	1523.0
March	0.0	0.0	336.7	336.7
April 15	0.8	140.0	137.4	278.2
April 30	1.9	369.6	0.0	371.5
May	115.8	597.3	558.0	1271.1
June	100.8	1349.4	2058.3	3508.5
July	18.6	2095.8	2809.1	4923.5

Source: Third-year critical rule curves from the 1989-90 Final Regulation unless higher than the first or second-year critical rule curves.

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
FOURTH CRITICAL RULE CURVE  
1991-92

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	8.9	2334.7	2879.0	5222.6
August 31	0.2	2269.5	3028.1	5297.8
September	58.9	2314.4	2836.2	5209.5
October	58.4	2425.8	2190.6	4674.8
November	40.7	2149.9	1475.6	3666.2
December	29.6	759.3	631.6	1420.5
January	0.0	514.2	112.2	626.4
February	0.0	0.0	0.0	0.0

Source: Fourth-year critical rule curves from the 1988-89 Final Regulation unless higher than the first, second or third year critical rule curves.

**DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
LIMITING RULE CURVE BASED ON 1936-37 HYDRO CONDITIONS**

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Libby</u>
January	1.1	1533.0	953.6	11.8
February	0.0	711.3	333.5	0.0
March	0.0	63.7	0.0	0.0

Source: Pacific Northwest Coordinating Group's ECC Lower Limits Study dated November 20, 1990.

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
1991-92 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. 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 110 million acre-feet. The following schedule for PDR's will apply when computing the VRC's during the period January 1 through June 1.

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

Project	Jan.	Feb.	Mar.	Apr.		May	June	July
				1-15	16-30			
80 MAF								
Mica	20,000	15,000	15,000	15,000	11,600	11,600	11,600	14,600
Arrow	5,000	5,000	5,000	22,000	22,000	31,000	31,000	48,000
Duncan	100	100	100	1700	1700	1700	1700	1700
Libby	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
95 MAF								
Mica	20,000	15,000	15,000	15,000	10,000	10,000	10,000	10,000
Arrow	5,000	5,000	5,000	5,000	5,000	10,000	19,000	19,000
Duncan	100	100	100	100	100	500	500	500
Libby	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
110 MAF and Higher								
Mica	Same as 95 MAF							
Arrow	5,000	5,000	5,000	5,000	5,000	5,000	15,000	16,600
Duncan	100	100	100	100	100	100	500	500
Libby	4,000	4,000	4,000	4,000	4,000	4,000	10,000	10,000

## 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) It is recognized that the Canadian Section has the right to make changes to the refill curves for individual projects provided the effect of these changes is consistent with the composite Operating Rule curve for Total Canadian storage.

CRITICAL RULE CURVES AND ASSURED REFILL CURVE FOR  
LIBBY RESERVOIR  
1991-92

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

<u>Month</u>	<u>Critical Rule Curve (1)</u>				<u>Assured Refill Curve</u>
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>	<u>      </u>
August 15	2510.5	2080.1	2080.1	868.7	1927.5
August 31	2510.5	1970.0	1970.0	768.1	1977.1
September	2298.9	1753.9	1753.9	316.8	2012.2
October	2039.8	1409.3	1409.3	284.0	2008.8
November	1683.4	833.6	833.6	45.5	1980.3
December	1066.8	775.9	729.0	27.7	1929.4
January	676.5	224.6	49.9	0.0	1878.6
February	603.6	46.6	21.4	0.0	1826.5
March	510.5	0.0	0.0	0.0	1671.8
April 15	379.2	40.7	0.0	0.0	1656.8
April 30	387.3	194.5	0.0	0.0	1654.9
May	868.7	673.9	487.7	0.0	2111.5
June	1840.1	1564.2	1048.2	0.0	2510.5
July	2148.6	1866.2	1290.2	0.0	2510.5

Note:

- (1) Source is Pacific Northwest Coordination Agreement Final Regulations for 91-92 CRC1, 90-91 CRC2, 89-90 CRC3, and 88-89 CRC4, unless CRC2 higher than CRC1, CRC3 higher than CRC2, or CRC4 higher than CRC3.

**DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
SECOND CRITICAL RULE CURVE  
1992-93**

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	484.6	3466.7	3370.8	7322.1
August 31	493.4	3373.2	3388.0	7254.6
September	487.7	3355.6	3302.8	7146.1
October	298.7	3125.1	3099.2	6523.0
November	94.6	2803.7	2856.0	5754.3
December	0.3	2332.2	2609.7	4942.3
January	0.6	1444.9	1765.1	3210.6
February	0.3	698.5	1213.3	1912.1
March	5.5	398.2	771.0	1174.7
April 15	0.0	173.8	507.5	681.3
April 30	0.0	233.2	478.5	711.7
May	94.0	495.8	427.5	1017.3
June	109.7	2036.5	1530.3	3676.5
July	153.7	3076.0	2762.8	5992.5

Note: Source is the second-year critical rule curves from the 1991-92 Final Regulation. There were no changes from the AOP Rule Curve.

**DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
THIRD CRITICAL RULE CURVE  
1993-94**

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	158.1	3037.3	3361.9	6557.3
August 31	218.6	3065.6	3529.2	6813.4
September	262.8	3129.7	3529.2	6921.7
October	115.3	2722.2	3428.4	6265.9
November	2.6	2655.6	2775.6	5433.8
December	0.9	2036.2	2049.8	4086.9
January	1.0	1210.9	1333.1	2545.0
February	3.4	213.1	707.0	923.5
March	0.0	339.6	0.0	339.6
April 15	0.2	55.6	0.0	55.8
April 30	0.0	114.3	0.0	114.3
May	66.0	307.7	362.3	736.0
June	44.6	713.7	1861.5	2619.8
July	41.6	1341.6	2765.9	4149.1

Note: Source is the third-year critical rule curves from the 1991-92 Final Regulation. There were no changes from the AOP Rule Curve.

**DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE  
FOURTH CRITICAL RULE CURVE  
1994-95**

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

<u>Month</u>	<u>Duncan</u>	<u>Arrow</u>	<u>Mica</u>	<u>Total</u>
August 15	0.9	1707.9	1515.1	3223.9
August 31	1.0	1482.3	1501.3	2984.6
September	2.1	1402.8	1273.8	2678.7
October	4.8	1210.6	886.8	2102.2
November	0.8	1296.8	215.5	1513.1
December	2.5	769.9	7.6	780.0
January	1.0	345.2	10.0	356.2
February	0.0	0.0	0.0	0.0

Note: Source is the fourth-year critical rule curves from the 1991-92 Final Regulation. There were no changes from the AOP Rule Curve.

## DUNCAN

## RESERVOIR CAPACITY TABLE

PAGE # 1

FIGURES IN 1000'S  
OF SECOND FOOT DAYS

ELEVATION IN FEET											AVERAGE DIFFERENCE PER TENTH FT	
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9		
1892.	705.8											0.89
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		
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

## DUNCAN

## RESERVOIR CAPACITY TABLE

PAGE # 2

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

## DUNCAN

## RESERVOIR CAPACITY TABLE

PAGE # 3

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

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

ARROW LAKES RESERVOIR CAPACITY TABLE

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

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

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

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

## MICA

## RESERVOIR CAPACITY TABLE

PAGE # 3

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

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

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

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

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

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

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## RESERVOIR CAPACITY TABLE

PAGE # 6

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

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## RESERVOIR CAPACITY TABLE

PAGE # 7

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