DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE

1 AUGUST 1984

THROUGH 31 JULY 1985

COLUMBIA RIVER TREATY OPERATING COMMITTEE

SEPTEMBER 1984

DETAILED OPERATING PLAN
FOR COLUMBIA RIVER TREATY STORAGE
1 AUGUST 1984 THROUGH 31 JULY 1985

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 May 1983;

(b) "Assured Operating Plan" means the document "Columbia River Treaty Hydroelectric Operating Plan-Assured Operating Plan for Operating Year 1984-1985," dated September 1979;

(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 1984 through 31 July 1985;

(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.

2. PREPARATION AND SCOPE

This Detailed Operating Plan has been developed from the Coordinated System's final regulation for the 1984-85 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 1984 through 28 February 1988 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 downstream benefit computation for the 1984-85 Operating Year indicated that the U.S. Entity is entitled to receive from B.C. Hydro and Power Authority 5.5 average megawatts during the period 1 August 1984 through 31 March 1985 and 3.5 average megawatts during the period 1 April through 31 July 1985. 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 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 Operating 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 Operating 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 1984 through 31 July 1985 to be determined in accordance with the reference documents of Section 1, is defined as follows:

a. During the period 1 August 1984 through 31 December 1984, it is the higher of the First Critical Rule Curve and the Assured Refill Curve.

b. During the period 1 January 1985 through 1 July 1985 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 1985 through 31 March 1985 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 5).

d. During any period in the 1984-85 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 6.

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:

(A) The forecast volume of inflow for Arrow excluding 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 equalled or exceeded.

(B) The total Mica target outflow as specified in 6(c) 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 6 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 total Arrow 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 b. and c. of this section.

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

4. OPERATIONS

The operation of Treaty storage by the Columbia River Treaty Operating Committee during the period 1 August 1984 through 31 July 1985 will be in accordance with the reference documents of Section 1, and the following operating guides:

a.	1984-85 First Critical Rule Curve and Assured Refill Curve for Duncan, Arrow, and Mica and the whole of Canadian storage.	Exhibit 1
b.	1984-85 Second Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage.	Exhibit 2
c.	1984-85 Third Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage.	Exhibit 3

d.	1984-85 Fourth Critical Rule Curve for Duncan, Arrow, and Mica and the whole of Canadian storage.	Exhibit 4
e.	1984-85 Limiting Rule Curve based on 1936-37 Hydro Conditions.	Exhibit 5
f.	1984-85 Flood Control Refill Curve and Variable Refill Curve Procedures.	Exhibit 6
g.	The First, Second, Third, and Fourth Critical Rule Curves and Energy Content Curve for Libby.	Exhibit 7
h.	Duncan Reservoir Capacity Table. (Based on B.C. Hydro table dated 21 February 1973.)	Exhibit 8
i.	Arrow Lakes, Reservoir Capacity Table. (Based on B.C. Hydro Combined Storage Table dated 28 February 1974.)	Exhibit 9
j.	Mica Reservoir Capacity Table. (Based on B.C. Hydro table dated 25 March 1974.)	Exhibit 10
k.	Libby Storage Above Elevation 2287 feet.	Exhibit 11

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. 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 of the Operating Committee 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. Written confirmation of the request will be dispatched 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 6.b.(6).

(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 8), Arrow (Exhibit 9), and Mica (Exhibit 10). 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 the 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 documented by message dispatched on the Columbia Basin Teletype Circuit from the Corps of Engineers, in Portland, Oregon. Acknowledgment of the teletype request will be made by the Canadian authority by teletype message. The project outflows from Canadian projects will be determined by methods as agreed upon for the Hydrometeorological Reporting Network. Any modification of the documented daily request shall be agreed by the Operating Committee before being put into effect, and shall be documented by teletype immediately thereafter.

(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.

6. OPERATING LIMITS

a. Duncan Project

(1) Maximum outflow - 20,000 cfs through outlets
(2) Minimum average weekly outflow - 100 cfs

(3) Maximum rate of change in outflow - 4,000 cfs per day
(4) Normal full pool elevation 1,892.0 feet
(5) Normal minimum pool elevation - 1,794.2 feet.

b. Arrow Project

(1) Maximum outflow - Physical limits only
(2) Minimum average weekly outflow - 5,000 cfs
(3) Maximum rate of change in outflow - 25,000 cfs per day
(4) Normal full pool elevation - 1,444.0 feet
(5) Normal minimum pool elevation - 1,377.9 feet
(6) Advance notice for changes in outflow for:

(a) Drop in downstream level of:

1/2 foot	None
1 foot	1 hour
2 feet	2 hours
3 feet	24 hours

(b) Rise in downstream level of:

1/2 foot	None	
1 foot	1 hour	
2 feet	2 hours	
3 feet	7 hours	only if notice is received early (before 1000 hours) in the day, otherwise 24-hour notice is required.

c. Mica Project

In accordance with the 1984-85 Assured Operating Plan, the Mica Project will be operated to the following monthly average target outflows specified in (2) below except as qualified in (3) - (5) below:

(1) Variable Refill Curves

Variable Refill Curves (VRCs) shall be constructed based on a power discharge requirement as indicated in Exhibit 6 with a target 31 July Treaty storage content of 3,529.2 KSFD.

(2) Mica Project Operating Criteria

Month	Target End-of-Period Treaty Storage Content (KSFD)	Target Average Outflow (CFS)	Minimum Outflow (CFS)	Maximum Outflow (CFS)
August	3,529.2	-	10,000	--
September	3,529.2	--	10,000	--
October	--	10,000	10,000	34,000
November	--	15,000	10,000	34,000
December	--	25,000	15,000	34,000
January	--	25,000	15,000	34,000
February	--	25,000	15,000	34,000
March	--	15,000	15,000	34,000
April 1-15	--	15,000	15,000	34,000
April 16-30	--	10,000	10,000	34,000
May	--	10,000	10,000	34,000
June	--	10,000	10,000	34,000
July	3,529.2	--	10,000	--

(3) Mica monthly outflows will be increased in the months from October to June if required to avoid violation of the Flood Control Storage Reservation Curve.

(4) Mica monthly average outflows will be increased in all periods if the Arrow Reservoir storage in the previous period is within the following limits unless the Variable Refill Curve for Arrow at any time during the period January through July is calculated according to the criteria specified in Subsection (3)(g)(1):

Period	Arrow Reservoir End of Previous Period Content (KSFD)	Mica Outflow (CFS)
August 1-15	3400 - 3500	15,000
	0 - 3400	20,000
August 16-31	3300 - 3400	15,000
	0 - 3300	20,000
September	3000 - 3200	15,000
	0 - 3000	20,000
October	2700 - 3000	15,000
	0 - 2700	20,000
November	2200 - 3200	20,000
	0 - 2200	25,000
December	2300 - 2800	30,000
	0 - 2300	35,000
January	100 - 2500	30,000
	0 - 100	35,000
February	0 - 1000	30,000
March	100 - 200	20,000
	0 - 100	25,000
April 1-15	0 - 100	25,000
April 16-30	0 - 300	20,000
May	100 - 200	15,000
	0 - 100	20,000
June	1100 - 1400	15,000
	0 - 1100	20,000
July	2700 - 3000	15,000
	0 - 2700	20,000

(5) Storage releases from Mica in excess of 7 million acre-feet that result from operating Mica under the criteria described in (2) to (4) above will be retained in the Arrow reservoir, subject to flood control criteria at Arrow, and Mica will be reduced to minimum discharge. 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.

Forebay Elevation	One Sluice	Three Sluices
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, 2,000 cfs; for refill in critical years minimum daily outflow, 3,000 cfs; desirable minimum daily outflow, 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 1/2 hour
6 ft. per 24 hours

(4) Maximum pool elevation - 2459.0 feet

(5) Minimum pool elevation - 2287.0 feet

DETAILED OPERATING PLAN FOR CANADIAN TREATY STORAGE
FIRST CRITICAL RULE CURVE AND ASSURED REFILL CURVE FOR 1984-85
End-of-Month Usable Storage Content in 1000 SFD

	Critical Rule Curve (1)				Assured Refill Curve (2)		
Month	Duncan	Arrow	Mica	Total	Duncan	Arrow	Mica
August	705.8	3579.6	3529.2	7814.6	98.4	0.0	1896.4
September	705.8	3571.2	3529.2	7806.2	165.3	0.0	2290.6
October	705.8	3453.6	3428.4	7587.8	196.0	0.0	2244.1
November	511.5	3453.6	3121.0	7086.1	213.5	0.0	2092.0
December	268.7	3075.4	2473.1	5817.2	224.7	0.0	1725.9
January	102.9	2074.5	1828.0	4005.4	234.8	521.0	1345.5
February	85.4	937.2	1207.7	2230.3	244.0	1162.6	997.7
March	85.4	888.5	838.7	1812.6	258.1	1615.0	630.1
April	39.3	965.5	547.8	1552.6	236.5	1707.9	401.8
May	156.5	1801.9	781.0	2739.4	343.8	2455.3	935.6
June	430.4	3523.8	2145.9	6100.1	532.8	3554.8	2317.1
July	616.0	3579.6	3143.0	7338.6	705.8	3579.6	3529.2

(1) Source: Pacific Northwest Coordination Agreement 1984-85 Final Regulation (dated September 26, 1984).

(2) 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 volume of inflow for the whole or remaining portion of the refill period. The year 1931 represents the second lowest historical January-July volume inflow for the Columbia River as measured at The Dalles, Oregon. The natural volume of inflow at each reservoir is reduced by deducting the Power Discharge Requirement, nonpower requirements at site and upstream, and water required for refill at upstream reservoirs.

The Power Discharge Requirement for each reservoir for the period January-July is defined in Exhibit 6.

Exhibit 2

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE
SECOND CRITICAL RULE CURVE FOR
1984-85
End-of-Month Usable Storage Content in 1000 SFD

Month	Duncan	Arrow	Mica	Total
August	705.8	3531.9	3529.2	7766.9
September	588.2	3452.0	3529.2	7569.4
October	440.1	3116.8	3428.4	6985.3
November	212.8	2917.8	2945.2	6075.8
December	63.5	2410.5	2259.4	4733.4
January	11.5	1040.1	1398.6	2450.2
February	7.4	503.7	773.6	1284.7
March	3.1	755.1	425.3	1183.5
April	36.4	420.9	426.9	884.2
May	151.1	1234.7	781.0	2166.8
June	265.7	2643.2	2055.0	4963.9
July	462.4	3306.2	3303.2	7071.8

Source: 1984-85 AOP Studies

Exhibit 3

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE
THIRD CRITICAL RULE CURVE
1984-85
End-of-Month Usable Storage Content in 1000 SFD

Month	Duncan	Arrow	Mica	Total
August	567.0	3531.9	3529.2	7628.1
September	584.6	3447.1	3529.2	7560.9
October	440.1	3057.2	3428.4	6925.7
November	212.8	2885.8	2945.2	6043.8
December	27.2	2167.8	2259.4	4454.4
January	11.5	979.8	1398.6	2389.9
February	0.0	306.7	694.0	1000.7
March	0.0	521.3	327.5	848.8
April	0.0	119.9	0.0	119.9
May	151.0	1032.3	375.8	1559.1
June	155.8	2566.8	1449.7	4172.3
July	71.5	3306.2	2341.4	5719.1

Source: 1984-85 AOP Studies

Exhibit 4

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE
FOURTH CRITICAL RULE CURVE
1984-85
End-of-Month Usable Storage Content in 1000 SFD

Month	Duncan	Arrow	Mica	Total
August	0.8	2878.5	2902.8	5782.1
September	0.8	2555.7	3081.8	5638.3
October	0.0	2108.0	2784.0	4892.0
November	0.0	1264.9	2263.9	3528.8
December	0.0	71.1	1320.3	1391.4
January	0.0	199.9	323.0	522.9
February	0.0	0.0	0.0	0.0

Source: 1984-85 AOP Studies

Exhibit 5

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

Month	Duncan	Arrow	Mica	Total	Libby
January	13.9	272.2	732.9	1019.0	392.5
February	19.8	88.5	309.3	417.6	169.4
March	1.1	22.9	0.0	24.0	14.8

Source: Pacific Northwest Coordinating Group.

Exhibit 6

DETAILED OPERATING PLAN FOR COLUMBIA RIVER TREATY STORAGE
1984-85 FLOOD CONTROL REFILL CURVE
AND VARIABLE REFILL CURVE PROCEDURES

The Flood Control and Variable Refill Curves 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, project discharge requirement, nonpower requirements upstream, and water required for refill at upstream reservoirs. Studies made for the U.S. Coordinated System Operation for 1984-85 indicate that the Power Discharge Requirement 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 Power Discharge Requirements will apply for 1984-85 when computing the Variable Refill Curves 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. 1-15	Apr. 16-30	May	June	July
				80 MAF				
Mica	15,000	15,000	15,000	15,000	10,000	10,000	10,000	10,000
Arrow	5,000	5,000	5,000	22,000	22,000	31,000	31,000	48,000
Duncan	100	100	100	1,700	1,700	1,700	1,700	1,700
Libby	3,000	3,000	3,000	4,200	4,200	4,200	4,200	6,000
				90 MAF				
Mica	Same as 80 MAF							
Arrow	5,000	5,000	5,000	9,600	9,600	9,600	26,500	29,000
Duncan	100	100	100	900	900	900	900	900
Libby	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
				95 MAF and Higher				
Mica	Same as 80 MAF							
Arrow	5,000	5,000	5,000	5,000	5,000	5,000	14,000	14,000
Duncan	100	100	100	100	100	100	100	100
Libby	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

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.

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 refill curve for Total Canadian storage.

CRITICAL RULE CURVES AND ENERGY CONTENT CURVE
LIBBY RESERVOIR
1984-85
End-of-Month Usable Storage Content in 1000 SFD

Month	Critical Rule Curve 1st	2nd	3rd	4th	Energy Content Curve
August	2510.5	2486.8	2446.9	1488.1	2510.5
September	2312.8	2312.8	2312.8	1266.5	2312.8
October	2030.5	1695.4	1695.4	818.8	2030.5
November	1485.9	1087.7	1017.3	554.1	1485.9
December	853.9	853.9	853.9	853.9	1463.1
January	771.7	771.7	771.7	185.8	1443.7
February	755.3	646.4	530.7	0.0	1419.8
March	559.1	559.1	512.4	0.0	1398.7
April	419.4	419.4	419.4	0.0	1374.4
May	931.8	931.8	931.8	0.0	1823.9
June	1933.3	1933.3	1532.8	0.0	2363.6
July	2151.1	2151.1	1547.9	0.0	2510.5

Source: First critical rule curve from Pacific Northwest Coordination Agreement 1984-85 final regulation. Second, third, and fourth critical rule curves from 1984-85 AOP Studies.

PSP-0096M

DUNCAN RESERVOIR CAPACITY TABLE

FIGURES IN 1000'S
OF SECOND FOOT DAYS

TOP ELEVATION 1892.0 FT.
BOTTOM ELEVATION 1794.2 FT.
USABLE STORAGE 705.8 KSFD

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1892.0	705.8										
1891.0	696.9	697.8	698.7	699.6	700.5	701.3	702.2	703.1	704.0	704.9	.89
1890.0	688.0	688.9	689.8	690.7	691.6	692.4	693.3	694.2	695.1	696.0	.89
1889.0	679.2	680.1	681.0	681.8	682.7	683.6	684.5	685.4	686.2	687.1	.88
1888.0	670.4	671.3	672.2	673.0	673.9	674.8	675.7	676.6	677.4	678.3	.88
1887.0	661.5	662.4	663.3	664.2	665.1	665.9	666.8	667.7	668.6	669.5	.89
1886.0	652.8	653.7	654.5	655.4	656.3	657.1	658.0	658.9	659.8	660.6	.87
1885.0	644.0	644.9	645.8	646.6	647.5	648.4	649.3	650.2	651.0	651.9	.88
1884.0	635.3	636.2	637.0	637.9	638.8	639.6	640.5	641.4	642.3	643.1	.87
1883.0	626.6	627.5	628.3	629.2	630.1	630.9	631.8	632.7	633.6	634.4	.87
1882.0	617.9	618.8	619.6	620.5	621.4	622.2	623.1	624.0	624.9	625.7	.87
1881.0	609.2	610.1	610.9	611.8	612.7	613.5	614.4	615.3	616.2	617.0	.87
1880.0	600.6	601.5	602.3	603.2	604.0	604.9	605.8	606.6	607.5	608.3	.86
1879.0	592.0	592.9	593.7	594.6	595.4	596.3	597.2	598.0	598.9	599.7	.86
1878.0	583.4	584.3	585.1	586.0	586.8	587.7	588.6	589.4	590.3	591.1	.86
1877.0	574.8	575.7	576.5	577.4	578.2	579.1	580.0	580.8	581.7	582.5	.86
1876.0	566.3	567.1	568.0	568.8	569.7	570.5	571.4	572.2	573.1	573.9	.85
1875.0	557.8	558.6	559.5	560.3	561.2	562.0	562.9	563.7	564.6	565.4	.85
1874.0	549.3	550.1	551.0	551.8	552.7	553.5	554.4	555.2	556.1	556.9	.85
1873.0	540.9	541.7	542.6	543.4	544.3	545.1	545.9	546.8	547.6	548.5	.84
1872.0	532.4	533.2	534.1	534.9	535.8	536.6	537.5	538.3	539.2	540.0	.85
1871.0	524.0	524.8	525.7	526.5	527.4	528.2	529.0	529.9	530.7	531.6	.84

Exhibit 8

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1870.0	515.7	516.5	517.4	518.2	519.0	519.8	520.7	521.5	522.3	523.2	.83
1869.0	507.3	508.1	509.0	509.8	510.7	511.5	512.3	513.2	514.0	514.9	.84
1868.0	499.0	499.8	500.7	501.5	502.3	503.1	504.0	504.8	505.6	506.5	.83
1867.0	490.7	491.5	492.4	493.2	494.0	494.8	495.7	496.5	497.3	498.2	.83
1866.0	482.4	483.2	484.1	484.9	485.7	486.5	487.4	488.2	489.0	489.9	.83
1865.0	474.2	475.0	475.8	476.7	477.5	478.3	479.1	479.9	480.8	481.6	.82
1864.0	466.0	466.8	467.6	468.5	469.3	470.1	470.9	471.7	472.6	473.4	.82
1863.0	457.8	458.6	459.4	460.3	461.1	461.9	462.7	463.5	464.4	465.2	.82
1862.0	449.7	450.5	451.3	452.1	452.9	453.7	454.6	455.4	456.2	457.0	.81
1861.0	441.6	442.4	443.2	444.0	444.8	445.6	446.5	447.3	448.1	448.9	.81
1860.0	433.5	434.3	435.1	435.9	436.7	437.5	438.4	439.2	440.0	440.8	.81
1859.0	425.4	426.2	427.0	427.8	428.6	429.4	430.3	431.1	431.9	432.7	.81
1858.0	417.4	418.2	419.0	419.8	420.6	421.4	422.2	423.0	423.8	424.6	.80
1857.0	409.4	410.2	411.0	411.8	412.6	413.4	414.2	415.0	415.8	416.6	.80
1856.0	401.4	402.2	403.0	403.8	404.6	405.4	406.2	407.0	407.8	408.6	.80
1855.0	393.5	394.3	395.1	395.9	396.7	397.4	398.2	399.0	399.8	400.6	.79
1854.0	385.6	386.4	387.2	388.0	388.8	389.5	390.3	391.1	391.9	392.7	.79
1853.0	377.7	378.5	379.3	380.1	380.9	381.6	382.4	383.2	384.0	384.8	.79
1852.0	369.9	370.7	371.5	372.2	373.0	373.8	374.6	375.4	376.1	376.9	.78
1851.0	362.1	362.9	363.7	364.4	365.2	366.0	366.8	367.6	368.3	369.1	.78
1850.0	354.3	355.1	355.9	356.6	357.4	358.2	359.0	359.8	360.5	361.3	.78
1849.0	346.6	347.4	348.1	348.9	349.7	350.4	351.2	352.0	352.8	353.5	.77
1848.0	338.9	339.7	340.4	341.2	342.0	342.7	343.5	344.3	345.1	345.8	.77
1847.0	331.2	332.0	332.7	333.5	334.3	335.0	335.8	336.6	337.4	338.1	.77
1846.0	323.6	324.4	325.1	325.9	326.6	327.4	328.2	328.9	329.7	330.4	.76

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1845.0	316.0	316.8	317.5	318.3	319.0	319.8	320.6	321.3	322.1	322.8	.76
1844.0	308.5	309.2	310.0	310.7	311.5	312.2	313.0	313.7	314.5	315.2	.75
1843.0	300.9	301.7	302.4	303.2	303.9	304.7	305.5	306.2	307.0	307.7	.76
1842.0	293.5	294.2	295.0	295.7	296.5	297.2	297.9	298.7	299.4	300.2	.74
1841.0	286.0	286.7	287.5	288.2	289.0	289.7	290.5	291.2	292.0	292.7	.75
1840.0	278.6	279.3	280.1	280.8	281.6	282.3	283.0	283.8	284.5	285.3	.74
1839.0	271.2	271.9	272.7	273.4	274.2	274.9	275.6	276.4	277.1	277.9	.74
1838.0	263.9	264.6	265.4	266.1	266.8	267.5	268.3	269.0	269.7	270.5	.73
1837.0	256.6	257.3	258.1	258.8	259.5	260.2	261.0	261.7	262.4	263.2	.73
1836.0	249.4	250.1	250.8	251.6	252.3	253.0	253.7	254.4	255.2	255.9	.72
1835.0	242.2	242.9	243.6	244.4	245.1	245.8	246.5	247.2	248.0	248.7	.72
1834.0	235.0	235.7	236.4	237.2	237.9	238.6	239.3	240.0	240.8	241.5	.72
1833.0	227.9	228.6	229.3	230.0	230.7	231.4	232.2	232.9	233.6	234.3	.71
1832.0	220.8	221.5	222.2	222.9	223.6	224.3	225.1	225.8	226.5	227.2	.71
1831.0	213.8	214.5	215.2	215.9	216.6	217.3	218.0	218.7	219.4	220.1	.70
1830.0	206.8	207.5	208.2	208.9	209.6	210.3	211.0	211.7	212.4	213.1	.70
1829.0	199.9	200.6	201.3	202.0	202.7	203.3	204.0	204.7	205.4	206.1	.69
1828.0	193.0	193.7	194.4	195.1	195.8	196.4	197.1	197.8	198.5	199.2	.69
1827.0	186.1	186.8	187.5	188.2	188.9	189.5	190.2	190.9	191.6	192.3	.69
1826.0	179.3	180.0	180.7	181.3	182.0	182.7	183.4	184.1	184.7	185.4	.68
1825.0	172.6	173.3	173.9	174.6	175.3	175.9	176.6	177.3	178.0	178.6	.67
1824.0	165.9	166.6	167.2	167.9	168.6	169.2	169.9	170.6	171.3	171.9	.67
1823.0	159.2	159.9	160.5	161.2	161.9	162.5	163.2	163.9	164.6	165.2	.67
1822.0	152.6	153.3	153.9	154.6	155.2	155.9	156.6	157.2	157.9	158.5	.66
1821.0	146.1	146.7	147.4	148.0	148.7	149.3	150.0	150.6	151.3	151.9	.65

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1820.0	139.6	140.2	140.9	141.5	142.2	142.8	143.5	144.1	144.8	145.4	.65
1819.0	133.2	133.8	134.5	135.1	135.8	136.4	137.0	137.7	138.3	139.0	.64
1818.0	126.8	127.4	128.1	128.7	129.4	130.0	130.6	131.3	131.9	132.6	.64
1817.0	120.5	121.1	121.8	122.4	123.0	123.6	124.3	124.9	125.5	126.2	.63
1816.0	114.3	114.9	115.5	116.2	116.8	117.4	118.0	118.6	119.3	119.9	.62
1815.0	108.1	108.7	109.3	110.0	110.6	111.2	111.8	112.4	113.1	113.7	.62
1814.0	102.0	102.6	103.2	103.8	104.4	105.0	105.7	106.3	106.9	107.5	.61
1813.0	96.0	96.6	97.2	97.8	98.4	99.0	99.6	100.2	100.8	101.4	.60
1812.0	90.0	90.6	91.2	91.8	92.4	93.0	93.6	94.2	94.8	95.4	.60
1811.0	84.1	84.7	85.3	85.9	86.5	87.0	87.6	88.2	88.8	89.4	.59
1810.0	78.3	78.9	79.5	80.0	80.6	81.2	81.8	82.4	82.9	83.5	.58
1809.0	72.5	73.1	73.7	74.2	74.8	75.4	76.0	76.6	77.1	77.7	.58
1808.0	66.9	67.5	68.0	68.6	69.1	69.7	70.3	70.8	71.4	71.9	.56
1807.0	61.3	61.9	62.4	63.0	63.5	64.1	64.7	65.2	65.8	66.3	.56
1806.0	55.8	56.3	56.9	57.4	58.0	58.5	59.1	59.6	60.2	60.7	.55
1805.0	50.4	50.9	51.5	52.0	52.6	53.1	53.6	54.2	54.7	55.3	.54
1804.0	45.1	45.6	46.2	46.7	47.2	47.7	48.3	48.8	49.3	49.9	.53
1803.0	39.9	40.4	40.9	41.5	42.0	42.5	43.0	43.5	44.1	44.6	.52
1802.0	34.8	35.3	35.8	36.3	36.8	37.3	37.9	38.4	38.9	39.4	.51
1801.0	29.8	30.3	30.8	31.3	31.8	32.3	32.8	33.3	33.8	34.3	.50
1800.0	25.0	25.5	26.0	26.4	26.9	27.4	27.9	28.4	28.8	29.3	.48
1799.0	20.3	20.8	21.2	21.7	22.2	22.6	23.1	23.6	24.1	24.5	.47
1798.0	15.7	16.2	16.6	17.1	17.5	18.0	18.5	18.9	19.4	19.8	.46
1797.0	11.3	11.7	12.2	12.6	13.1	13.5	13.9	14.4	14.8	15.3	.44
1796.0	7.1	7.5	7.9	8.4	8.8	9.2	9.6	10.0	10.5	10.9	.42

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1795.0	3.0	3.4	3.8	4.2	4.6	5.0	5.5	5.9	6.3	6.7	.41
1794.0			.0	.4	.8	1.1	1.5	1.9	2.3	2.6	.37

ARROW LAKE RESERVOIR CAPACITY TABLE

FIGURES IN 1000'S
OF SECOND FOOT DAYS

TOP ELEVATION 1444.0 FT.
BOTTOM ELEVATION 1377.9 FT.
USABLE STORAGE 3579.6 KSFD

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1444.0	3579.6										
1443.0	3514.1	3520.6	3527.2	3533.7	3540.3	3546.8	3553.4	3559.9	3566.5	3573.0	6.55
1442.0	3448.9	3455.4	3461.9	3468.5	3475.0	3481.5	3488.0	3494.5	3501.1	3507.6	6.52
1441.0	3384.0	3390.5	3397.0	3403.5	3410.0	3416.4	3422.9	3429.4	3435.9	3442.4	6.49
1440.0	3319.5	3325.9	3332.4	3338.8	3345.3	3351.7	3358.2	3364.6	3371.1	3377.5	6.45
1439.0	3255.2	3261.6	3268.1	3274.5	3280.9	3287.3	3293.8	3300.2	3306.6	3313.1	6.43
1438.0	3191.4	3197.8	3204.2	3210.5	3216.9	3223.3	3229.7	3236.1	3242.4	3248.8	6.38
1437.0	3127.8	3134.2	3140.5	3146.9	3153.2	3159.6	3166.0	3172.3	3178.7	3185.0	6.36
1436.0	3064.6	3070.9	3077.2	3083.6	3089.9	3096.2	3102.5	3108.8	3115.2	3121.5	6.32
1435.0	3001.7	3008.0	3014.3	3020.6	3026.9	3033.1	3039.4	3045.7	3052.0	3058.3	6.29
1434.0	2939.2	2945.4	2951.7	2957.9	2964.2	2970.4	2976.7	2982.9	2989.2	2995.4	6.25
1433.0	2877.0	2883.2	2889.4	2895.7	2901.9	2908.1	2914.3	2920.5	2926.8	2933.0	6.22
1432.0	2815.1	2821.3	2827.5	2833.7	2839.9	2846.0	2852.2	2858.4	2864.6	2870.8	6.19
1431.0	2753.5	2759.7	2765.8	2772.0	2778.1	2784.3	2790.5	2796.6	2802.8	2808.9	6.16
1430.0	2692.3	2698.4	2704.5	2710.7	2716.8	2722.9	2729.0	2735.1	2741.3	2747.4	6.12
1429.0	2631.5	2637.6	2643.7	2649.7	2655.8	2661.9	2668.0	2674.1	2680.1	2686.2	6.08
1428.0	2570.9	2577.0	2583.0	2589.1	2595.1	2601.2	2607.3	2613.3	2619.4	2625.4	6.06
1427.0	2510.7	2516.7	2522.7	2528.8	2534.8	2540.8	2546.8	2552.8	2558.9	2564.9	6.02
1426.0	2450.8	2456.8	2462.8	2468.8	2474.8	2480.7	2486.7	2492.7	2498.7	2504.7	5.99
1425.0	2391.2	2397.2	2403.1	2409.1	2415.0	2421.0	2427.0	2432.9	2438.9	2444.8	5.96
1424.0	2331.9	2337.8	2343.8	2349.7	2355.6	2361.5	2367.5	2373.4	2379.3	2385.3	5.93
1423.0	2272.8	2278.7	2284.6	2290.5	2296.4	2302.3	2308.3	2314.2	2320.1	2326.0	5.91
1422.0	2214.1	2220.0	2225.8	2231.7	2237.6	2243.4	2249.3	2255.2	2261.1	2266.9	5.87
1421.0	2155.7	2161.5	2167.4	2173.2	2179.1	2184.9	2190.7	2196.6	2202.4	2208.3	5.84

Exhibit 9

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1420.0	2097.7	2103.5	2109.3	2115.1	2120.9	2126.7	2132.5	2138.3	2144.1	2149.9	5.80
1419.0	2040.1	2045.9	2051.6	2057.4	2063.1	2068.9	2074.7	2080.4	2086.2	2091.9	5.76
1418.0	1982.9	1988.6	1994.3	2000.1	2005.8	2011.5	2017.2	2022.9	2028.7	2034.4	5.72
1417.0	1926.1	1931.8	1937.5	1943.1	1948.8	1954.5	1960.2	1965.9	1971.5	1977.2	5.68
1416.0	1869.6	1875.2	1880.9	1886.5	1892.2	1897.8	1903.5	1909.1	1914.8	1920.4	5.65
1415.0	1813.5	1819.1	1824.7	1830.3	1835.9	1841.5	1847.2	1852.8	1858.4	1864.0	5.61
1414.0	1757.8	1763.4	1768.9	1774.5	1780.1	1785.6	1791.2	1796.8	1802.4	1807.9	5.57
1413.0	1702.4	1707.9	1713.5	1719.0	1724.6	1730.1	1735.6	1741.2	1746.7	1752.3	5.54
1412.0	1647.4	1652.9	1658.4	1663.9	1669.4	1674.9	1680.4	1685.9	1691.4	1696.9	5.50
1411.0	1592.7	1598.2	1603.6	1609.1	1614.6	1620.0	1625.5	1631.0	1636.5	1641.9	5.47
1410.0	1538.4	1543.8	1549.3	1554.7	1560.1	1565.5	1571.0	1576.4	1581.8	1587.3	5.43
1409.0	1484.5	1489.9	1495.3	1500.7	1506.1	1511.4	1516.8	1522.2	1527.6	1533.0	5.39
1408.0	1430.9	1436.3	1441.6	1447.0	1452.3	1457.7	1463.1	1468.4	1473.8	1479.1	5.36
1407.0	1377.7	1383.0	1388.3	1393.7	1399.0	1404.3	1409.6	1414.9	1420.3	1425.6	5.32
1406.0	1324.7	1330.0	1335.3	1340.6	1345.9	1351.2	1356.5	1361.8	1367.1	1372.4	5.30
1405.0	1272.1	1277.4	1282.6	1287.9	1293.1	1298.4	1303.7	1308.9	1314.2	1319.4	5.26
1404.0	1219.5	1224.8	1230.0	1235.3	1240.5	1245.8	1251.1	1256.3	1261.6	1266.8	5.26
1403.0	1167.3	1172.5	1177.7	1183.0	1188.2	1193.4	1198.6	1203.8	1209.1	1214.3	5.22
1402.0	1115.4	1120.6	1125.8	1131.0	1136.2	1141.3	1146.5	1151.7	1156.9	1162.1	5.19
1401.0	1063.9	1069.0	1074.2	1079.3	1084.5	1089.6	1094.8	1099.9	1105.1	1110.2	5.15
1400.0	1012.8	1017.9	1023.0	1028.1	1033.2	1038.3	1043.5	1048.6	1053.7	1058.8	5.11
1399.0	962.5	967.5	972.6	977.6	982.6	987.6	992.7	997.7	1002.7	1007.8	5.03
1398.0	912.7	917.7	922.7	927.6	932.6	937.6	942.6	947.6	952.5	957.5	4.98
1397.0	863.2	868.1	873.1	878.0	883.0	887.9	892.9	897.8	902.8	907.7	4.95
1396.0	814.1	819.0	823.9	828.8	833.7	838.6	843.6	848.5	853.4	858.3	4.91

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
1395.0	765.2	770.1	775.0	779.9	784.8	789.6	794.5	799.4	804.3	809.2	4.89
1394.0	716.2	721.1	726.0	730.9	735.8	740.7	745.6	750.5	755.4	760.3	4.90
1393.0	667.5	672.4	677.2	682.1	687.0	691.8	696.7	701.6	706.5	711.3	4.87
1392.0	619.3	624.1	628.9	633.8	638.6	643.4	648.2	653.0	657.9	662.7	4.82
1391.0	571.5	576.3	581.1	585.8	590.6	595.4	600.2	605.0	609.7	614.5	4.78
1390.0	524.2	528.9	533.7	538.4	543.1	547.8	552.6	557.3	562.0	566.8	4.73
1389.0	477.9	482.5	487.2	491.8	496.4	501.0	505.7	510.3	514.9	519.6	4.63
1388.0	432.3	436.9	441.4	446.0	450.5	455.1	459.7	464.2	468.8	473.3	4.56
1387.0	387.2	391.7	396.2	400.7	405.2	409.7	414.3	418.8	423.3	427.8	4.51
1386.0	342.6	347.1	351.5	356.0	360.4	364.9	369.4	373.8	378.3	382.7	4.46
1385.0	298.5	302.9	307.3	311.7	316.1	320.5	325.0	329.4	333.8	338.2	4.41
1384.0	254.6	259.0	263.4	267.8	272.2	276.5	280.9	285.3	289.7	294.1	4.39
1383.0	211.2	215.5	219.9	224.2	228.6	232.9	237.2	241.6	245.9	250.3	4.34
1382.0	168.4	172.7	177.0	181.2	185.5	189.8	194.1	198.4	202.6	206.9	4.28
1381.0	126.1	130.3	134.6	138.8	143.0	147.2	151.5	155.7	159.9	164.2	4.23
1380.0	84.3	88.5	92.7	96.8	101.0	105.2	109.4	113.6	117.7	121.9	4.18
1379.0	43.2	47.3	51.4	55.5	59.6	63.7	67.9	72.0	76.1	80.2	4.11
1378.0	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

USABLE STORAGE 3529.2 KSFD

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2475.0	10121.1										
2474.0	10067.5	10072.9	10078.2	10083.6	10088.9	10094.3	10099.7	10105.0	10110.4	10115.7	5.36
2473.0	10014.1	10019.4	10024.8	10080.1	10035.5	10040.8	10046.1	10051.5	10056.8	10062.2	5.34
2472.0	9960.8	9966.1	9971.5	9976.8	9982.1	9987.4	9992.8	9998.1	10003.4	10008.8	5.33
2471.0	9907.8	9913.1	9918.4	9923.7	9929.0	9934.3	9939.6	9944.9	9950.2	9955.5	5.30
2470.0	9854.8	9860.1	9865.4	9870.7	9878.0	9881.3	9886.6	9891.9	9897.2	9902.5	5.30
2469.0	9802.1	9807.4	9812.6	9817.9	9823.2	9828.4	9833.7	9839.0	9844.3	9849.5	5.27
2468.0	9749.5	9754.8	9760.0	9765.3	9770.5	9775.8	9781.1	9786.3	9791.6	9796.8	5.26
2467.0	9697.1	9702.3	9707.6	9712.8	9718.1	9723.3	9728.5	9733.8	9739.0	9744.3	5.24
2466.0	9644.8	9650.0	9655.3	9660.5	9665.7	9670.9	9676.2	9681.4	9686.6	9691.9	5.23
2465.0	9592.7	9597.9	9603.1	9608.3	9613.5	9618.7	9624.0	9629.2	9634.4	9639.6	5.21
2464.0	9540.8	9546.0	9551.2	9556.4	9561.6	9566.7	9571.9	9577.1	9582.3	9587.5	5.19
2463.0	9489.0	9494.2	9499.4	9504.5	9509.7	9514.9	9520.1	9525.3	9530.4	9535.6	5.18
2462.0	9437.4	9442.6	9447.7	9452.9	9458.0	9463.2	9468.4	9473.5	9478.7	9483.8	5.16
2461.0	9386.0	9391.1	9396.3	9401.4	9406.6	9411.7	9416.8	9422.0	9427.1	9432.3	5.14
2460.0	9334.8	9339.9	9345.0	9350.2	9355.3	9360.4	9365.5	9370.6	9375.8	9380.9	5.12
2459.0	9283.7	9288.8	9293.9	9299.0	9304.1	9309.2	9314.4	9319.5	9324.6	9329.7	5.11
2458.0	9232.8	9237.9	9243.0	9248.1	9253.2	9258.2	9263.3	9268.4	9273.5	9278.6	5.09
2457.0	9182.0	9187.1	9192.2	9197.2	9202.3	9207.4	9212.5	9217.6	9222.6	9227.7	5.08
2456.0	9131.4	9136.5	9141.5	9146.6	9151.6	9156.7	9161.8	9166.8	9171.9	9176.9	5.06
2455.0	9081.0	9086.0	9091.1	9096.1	9101.2	9108.2	9111.2	9116.3	9121.3	9126.4	5.04

Exhibit 10

FIGURES IN 1000'S
OF SECOND FOOT DAYS

USABLE STORAGE 3529.2 KSFD

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2454.0	9030.8	9035.8	9040.8	9045.9	9050.9	9055.9	9060.9	9065.9	9071.0	9078.0	5.02
2453.0	8980.7	8985.7	8990.7	8995.7	9000.7	9005.7	9010.8	9015.8	9020.8	9025.8	5.01
2452.0	8930.8	8935.8	8940.8	8945.8	8950.8	8955.7	8960.7	8965.7	8970.7	8975.7	4.99
2451.0	8881.0	8886.0	8891.0	8895.9	8900.9	8905.9	8910.9	8915.9	8920.8	8925.8	4.98
2450.0	8831.4	8836.4	8841.3	8848.3	8851.2	8856.2	8861.2	8866.1	8871.1	8876.0	4.96
2449.0	8782.0	8788.9	8791.9	8796.8	8801.8	8806.7	8811.6	8816.6	8821.5	8826.5	4.94
2448.0	8732.8	8737.7	8742.6	8747.6	8752.5	8757.4	8762.3	8767.2	8772.2	8777.1	4.92
2447.0	8683.7	8688.6	8693.5	8698.4	8703.3	8708.2	8713.2	8718.1	8723.0	8727.9	4.91
2446.0	8634.8	8639.7	8644.6	8649.5	8654.4	8659.2	8664.1	8669.0	8673.9	8678.8	4.89
2445.0	8586.0	8590.9	8595.8	8600.6	8605.5	8610.4	8615.3	8620.2	8625.0	8629.9	4.88
2444.0	8537.5	8542.3	8547.2	8552.0	8556.9	8561.7	8566.6	8571.4	8576.3	8581.1	4.85
2443.0	8489.1	8493.9	8498.8	8503.6	8508.5	8513.3	8518.1	8523.0	8527.8	8532.7	4.84
2442.0	8440.8	8445.6	8450.5	8455.3	8460.1	8464.9	8469.8	8474.6	8479.4	8484.3	4.83
2441.0	8392.7	8397.5	8402.3	8407.1	8411.9	8416.7	8421.6	8426.4	8431.2	8436.0	4.81
2440.0	8344.8	8349.6	8354.4	8359.2	8364.0	8368.7	8373.5	8378.3	8383.1	8387.9	4.79
2439.0	8297.1	8301.9	8306.6	8311.4	8316.2	8320.9	8325.7	8330.5	8335.3	8340.0	4.77
2438.0	8249.5	8254.3	8259.0	8263.8	8268.5	8273.3	8278.1	8282.8	8287.6	8292.3	4.76
2437.0	8202.1	8206.8	8211.6	8216.3	8221.1	8225.8	8230.5	8235.3	8240.0	8244.8	4.74
2436.0	8154.8	8159.5	8164.3	8169.0	8173.7	8178.4	8183.2	8187.9	8192.6	8197.4	4.73
2435.0	8107.8	8112.5	8117.2	8121.9	8126.6	8131.3	8136.0	8140.7	8145.4	8150.1	4.70
2434.0	8060.9	8065.6	8070.3	8075.0	8079.7	8084.3	8089.0	8093.7	8098.4	8103.1	4.69
2433.0	8014.1	8018.8	8023.5	8028.1	8032.8	8037.5	8042.2	8046.9	8051.5	8056.2	4.68
2432.0	7967.5	7972.2	7976.8	7981.5	7988.1	7990.8	7995.5	8000.1	8004.8	8009.4	4.66
2431.0	7921.1	7925.7	7930.4	7935.0	7939.7	7944.3	7948.9	7953.6	7958.2	7962.9	4.64
2430.0	7874.9	7879.5	7884.1	7888.8	7893.4	7898.0	7902.6	7907.2	7911.9	7916.5	4.62

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2429.0	7828.8	7833.4	7838.0	7842.6	7847.2	7851.8	7856.5	7861.1	7865.7	7870.3	4.61
2428.0	7782.9	7787.5	7792.1	7796.7	7801.3	7805.8	7810.4	7815.0	7819.6	7824.2	4.59
2427.0	7737.2	7741.8	7746.3	7750.9	7755.5	7760.0	7764.6	7769.2	7773.8	7778.3	4.57
2426.0	7691.6	7696.2	7700.7	7705.3	7709.8	7714.4	7719.0	7723.5	7728.1	7732.6	4.55
2425.0	7646.2	7650.7	7655.3	7659.8	7664.4	7668.9	7673.4	7678.0	7682.5	7687.1	4.54
2424.0	7600.9	7605.4	7610.0	7614.5	7619.0	7623.5	7628.1	7632.6	7637.1	7641.7	4.53
2423.0	7555.9	7560.4	7564.9	7569.4	7573.9	7578.4	7582.9	7587.4	7591.9	7596.4	4.50
2422.0	7511.0	7515.5	7520.0	7524.5	7529.0	7533.4	7537.9	7542.4	7546.9	7551.4	4.49
2421.0	7466.2	7470.7	7475.2	7479.6	7484.1	7488.6	7493.1	7497.6	7502.0	7506.5	4.48
2420.0	7421.6	7426.1	7430.5	7435.0	7439.4	7443.9	7448.4	7452.8	7457.3	7461.7	4.45
2419.0	7377.2	7381.6	7386.1	7390.5	7395.0	7399.4	7403.8	7408.3	7412.7	7417.2	4.44
2418.0	7333.0	7337.4	7341.8	7346.3	7350.7	7355.1	7359.5	7363.9	7368.4	7372.8	4.42
2417.0	7288.9	7293.3	7297.7	7302.1	7306.5	7310.9	7315.4	7319.8	7324.2	7328.6	4.41
2416.0	7245.0	7249.4	7253.8	7258.2	7262.6	7266.9	7271.3	7275.7	7280.1	7284.5	4.39
2415.0	7201.3	7205.7	7210.0	7214.4	7218.8	7223.1	7227.5	7231.9	7236.3	7240.6	4.37
2414.0	7157.7	7162.1	7166.4	7170.8	7175.1	7179.5	7183.9	7188.2	7192.6	7196.9	4.36
2413.0	7114.3	7118.6	7123.0	7127.3	7131.7	7136.0	7140.3	7144.7	7149.0	7153.4	4.34
2412.0	7071.0	7075.3	7079.7	7084.0	7088.3	7092.6	7097.0	7101.3	7105.6	7110.0	4.33
2411.0	7028.0	7032.3	7036.6	7040.9	7045.2	7049.5	7053.8	7058.1	7062.4	7066.7	4.30
2410.0	6985.1	6989.4	6993.7	6998.0	7002.3	7006.5	7010.8	7015.1	7019.4	7023.7	4.29
2409.0	6942.3	6946.6	6950.9	6955.1	6959.4	6963.7	6968.0	6972.3	6976.5	6980.8	4.23
2408.0	6899.7	6904.0	6908.2	6912.5	6916.7	6921.0	6925.3	6929.5	6933.8	6938.0	4.26
2407.0	6857.3	6861.5	6865.8	6870.0	6874.3	6878.5	6882.7	6887.0	6891.2	6895.5	4.24
2406.0	6815.1	6819.3	6823.5	6827.8	6832.0	6836.2	6840.4	6844.6	6848.9	6853.1	4.22
2405.0	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	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2404.0	6731.1	6735.3	6739.5	6743.7	6747.9	6752.0	6756.2	6760.4	6764.6	6768.8	4.19
2403.0	6689.4	6693.6	6697.7	6701.9	6706.1	6710.2	6714.4	6718.6	6722.8	6726.9	4.17
2402.0	6647.8	6652.0	6656.1	6660.3	6664.4	6668.6	6672.8	6676.9	6681.1	6685.2	4.16
2401.0	6606.4	6610.5	6614.7	6618.8	6623.0	6627.1	6631.2	6635.4	6639.5	6643.7	4.14
2400.0	6565.1	6569.2	6573.4	6577.5	6581.6	6585.7	6589.9	6594.0	6598.1	6602.3	4.13
2399.0	6524.1	6528.2	6532.3	6536.4	6540.5	6544.6	6548.7	6552.8	6556.9	6561.0	4.10
2398.0	6483.4	6487.5	6491.5	6495.6	6499.7	6503.7	6507.8	6511.9	6516.0	6520.0	4.07
2397.0	6443.0	6447.0	6451.1	6455.1	6459.2	6463.2	6467.2	6471.3	6475.3	6479.4	4.04
2396.0	6403.0	6407.0	6411.0	6415.0	6419.0	6423.0	6427.0	6431.0	6435.0	6439.0	4.00
2395.0	6363.4	6367.4	6371.3	6375.3	6379.2	6383.2	6387.2	6391.1	6395.1	6399.0	3.95
2394.0	6324.1	6328.0	6332.0	6335.9	6339.8	6343.7	6347.7	6351.6	6355.5	6359.5	3.93
2393.0	6286.1	6289.0	6292.9	6296.8	6300.7	6304.6	6308.5	6312.4	6316.3	6320.2	3.90
2392.0	6246.4	6250.3	6254.1	6258.0	6261.9	6265.7	6269.6	6273.5	6277.4	6281.2	3.87
2391.0	6208.1	6211.9	6215.8	6219.6	6223.4	6227.2	6231.1	6234.9	6238.7	6242.6	3.83
2390.0	6170.1	6173.9	6177.7	6181.5	6185.3	6189.1	6192.9	6196.7	6200.5	6204.3	3.80
2389.0	6132.4	6136.2	6139.9	6143.7	6147.5	6151.2	6155.0	6158.8	6162.6	6166.3	3.77
2388.0	6095.1	6098.8	6102.6	6106.3	6110.0	6113.7	6117.5	6121.2	6124.9	6128.7	3.73
2387.0	6058.0	6061.7	6065.4	6069.1	6072.8	6076.5	6080.3	6084.0	6087.7	6091.4	3.71
2386.0	6021.2	6024.9	6028.6	6032.2	6035.9	6039.6	6043.3	6047.0	6050.6	6054.3	3.68
2385.0	5984.8	5988.4	5992.1	5995.7	5999.4	6003.0	6006.6	6010.3	6013.9	6017.6	3.64
2384.0	5948.6	5952.2	5955.8	5959.5	5963.1	5966.7	5970.3	5973.9	5977.6	5981.2	3.62
2383.0	5912.7	5916.3	5919.9	5923.5	5927.1	5930.6	5934.2	5937.8	5941.4	5945.0	3.59
2382.0	5877.1	5880.7	5884.2	5887.8	5891.3	5894.9	5898.5	5902.0	5905.6	5909.1	3.56
2381.0	5841.7	5845.2	5848.8	5852.3	5855.9	5859.4	5862.9	5866.5	5870.0	5873.6	3.54
2380.0	5806.7	5810.2	5813.7	5817.2	5820.7	5824.2	5827.7	5831.2	5834.7	5838.2	3.50

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2379.0	5771.9	5775.4	5778.9	5782.3	5785.8	5789.3	5792.8	5796.3	5799.7	5803.2	3.48
2378.0	5737.3	5740.8	5744.2	5747.7	5751.1	5754.6	5758.1	5761.5	5765.0	5768.4	3.46
2377.0	5703.0	5706.4	5709.9	5713.3	5716.7	5720.1	5723.6	5727.0	5730.4	5733.9	3.43
2376.0	5669.0	5672.4	5675.8	5679.2	5682.6	5686.0	5689.4	5692.8	5696.2	5699.6	3.40
2375.0	5635.2	5638.6	5642.0	5645.3	5648.7	5652.1	5655.5	5658.9	5662.2	5665.6	3.38
2374.0	5601.7	5605.0	5608.4	5611.7	5615.1	5618.4	5621.8	5625.1	5628.5	5631.8	3.35
2373.0	5568.4	5571.7	5575.1	5578.4	5581.7	5585.0	5588.4	5591.7	5595.0	5598.4	3.33
2372.0	5535.3	5538.6	5541.9	5545.2	5548.5	5551.8	5555.2	5558.5	5561.8	5565.1	3.31
2371.0	5502.5	5505.8	5509.1	5512.3	5515.6	5518.9	5522.2	5525.5	5528.7	5532.0	3.28
2370.0	5469.9	5473.2	5476.4	5479.7	5482.9	5486.2	5489.5	5492.7	5496.0	5499.2	3.26
2369.0	5437.6	5440.8	5444.1	5447.3	5450.5	5453.7	5457.0	5460.2	5463.4	5466.7	3.23
2368.0	5405.4	5408.6	5411.8	5415.1	5418.3	5421.5	5424.7	5427.9	5431.2	5434.4	3.22
2367.0	5373.5	5376.7	5379.9	5383.1	5386.3	5389.4	5392.6	5395.8	5399.0	5402.2	3.19
2366.0	5341.7	5344.9	5348.1	5351.2	5354.4	5357.6	5360.8	5364.0	5367.1	5370.3	3.18
2365.0	5310.2	5313.3	5316.5	5319.6	5322.8	5325.9	5329.1	5332.2	5335.4	5338.5	3.15
2364.0	5278.9	5282.0	5285.2	5288.3	5291.4	5294.5	5297.7	5300.8	5303.9	5307.1	3.13
2363.0	5247.8	5250.9	5254.0	5257.1	5260.2	5263.3	5266.5	5269.6	5272.7	5275.8	3.11
2362.0	5216.9	5220.0	5223.1	5226.2	5229.3	5232.3	5235.4	5238.5	5241.6	5244.7	3.09
2361.0	5186.2	5189.3	5192.3	5195.4	5198.5	5201.5	5204.6	5207.7	5210.8	5213.8	3.07
2360.0	5155.7	5158.7	5161.8	5164.8	5167.9	5170.9	5174.0	5177.0	5180.1	5183.1	3.05

LIBBY RESERVOIR CAPACITY TABLE

FIGURES IN 1000'S
OF SECOND FOOT DAYS

TOP ELEVATION 2459.0 FT.
BOTTOM ELEVATION 2287.0 FT.
USABLE STORAGE 2510.5 KSFD

H/K = 107.80
FED H/K = 81.00

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2459.0	2510.5										
2458.0	2487.1	2489.4	2491.8	2494.1	2496.5	2498.8	2501.1	2503.5	2505.8	2508.2	2.34
2457.0	2463.8	2466.1	2468.5	2470.8	2473.1	2475.4	2477.8	2480.1	2482.4	2484.8	2.33
2456.0	2440.6	2442.9	2445.2	2447.6	2449.9	2452.2	2454.5	2456.8	2459.2	2461.5	2.32
2455.0	2417.5	2419.8	2422.1	2424.4	2426.7	2429.0	2431.4	2433.7	2436.0	2438.3	2.31
2454.0	2394.5	2396.8	2399.1	2401.4	2403.7	2406.0	2408.3	2410.6	2412.9	2415.2	2.30
2453.0	2371.6	2373.9	2376.2	2378.5	2380.8	2383.0	2385.3	2387.6	2389.9	2392.2	2.29
2452.0	2348.8	2351.1	2353.4	2355.6	2357.9	2360.2	2362.5	2364.8	2367.0	2369.3	2.28
2451.0	2326.1	2328.4	2330.6	2332.9	2335.2	2337.4	2339.7	2342.0	2344.3	2346.5	2.27
2450.0	2303.4	2305.7	2307.9	2310.2	2312.5	2314.7	2317.0	2319.3	2321.6	2323.8	2.27
2449.0	2280.9	2283.1	2285.4	2287.6	2289.9	2292.1	2294.4	2296.6	2298.9	2301.1	2.25
2448.0	2258.4	2260.6	2262.9	2265.1	2267.4	2269.6	2271.9	2274.1	2276.4	2278.6	2.25
2447.0	2236.1	2238.3	2240.6	2242.8	2245.0	2247.2	2249.5	2251.7	2253.9	2256.2	2.23
2446.0	2213.8	2216.0	2218.3	2220.5	2222.7	2224.9	2227.2	2229.4	2231.6	2233.9	2.23
2445.0	2191.7	2193.9	2196.1	2198.3	2200.5	2202.7	2205.0	2207.2	2209.4	2211.6	2.21
2444.0	2170.0	2172.2	2174.3	2176.5	2178.7	2180.8	2183.0	2185.2	2187.4	2189.5	2.17
2443.0	2147.7	2149.9	2152.2	2154.4	2156.6	2158.8	2161.1	2163.3	2165.5	2167.8	2.23
2442.0	2125.9	2128.1	2130.3	2132.4	2134.6	2136.8	2139.0	2141.2	2143.3	2145.5	2.18
2441.0	2104.1	2106.3	2108.5	2110.6	2112.8	2115.0	2117.2	2119.4	2121.5	2123.7	2.18
2440.0	2082.5	2084.7	2086.8	2089.0	2091.1	2093.3	2095.5	2097.6	2099.8	2101.9	2.16
2439.0	2061.0	2063.1	2065.3	2067.4	2069.6	2071.7	2073.9	2076.0	2078.2	2080.3	2.15
2438.0	2039.5	2041.6	2043.8	2045.9	2048.1	2050.2	2052.4	2054.5	2056.7	2058.8	2.15
2437.0	2018.2	2020.3	2022.5	2024.6	2026.7	2028.8	2031.0	2033.1	2035.2	2037.4	2.13
2436.0	1997.0	1999.1	2001.2	2003.4	2005.5	2007.6	2009.7	2011.8	2014.0	2016.1	2.12
2435.0	1975.9	1978.0	1980.1	1982.2	1984.3	1986.4	1988.6	1990.7	1992.8	1994.9	2.11

Exhibit 11

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH F
2434.0	1954.9	1957.0	1959.1	1961.2	1963.3	1965.4	1967.5	1969.6	1971.7	1973.8	2.10
2433.0	1934.0	1936.1	1938.2	1940.3	1942.4	1944.4	1946.5	1948.6	1950.7	1952.8	2.09
2432.0	1913.2	1915.3	1917.4	1919.4	1921.5	1923.6	1925.7	1927.8	1929.8	1931.9	2.08
2431.0	1892.5	1894.6	1896.6	1898.7	1900.8	1902.8	1904.9	1907.0	1909.1	1911.1	2.07
2430.0	1871.9	1874.0	1876.0	1878.1	1880.1	1882.2	1884.3	1886.3	1888.4	1890.4	2.06
2429.0	1851.4	1853.4	1855.5	1857.5	1859.6	1861.6	1863.7	1865.7	1867.8	1869.8	2.05
2428.0	1831.0	1833.0	1835.1	1837.1	1839.2	1841.2	1843.2	1845.3	1847.3	1849.4	2.04
2427.0	1810.7	1812.7	1814.8	1816.8	1818.8	1820.8	1822.9	1824.9	1826.9	1829.0	2.03
2426.0	1790.6	1792.6	1794.6	1796.6	1798.6	1800.6	1802.7	1804.7	1806.7	1808.7	2.01
2425.0	1770.5	1772.5	1774.5	1776.5	1778.5	1780.5	1782.6	1784.6	1786.6	1788.6	2.01
2424.0	1750.6	1752.6	1754.6	1756.6	1758.6	1760.5	1762.5	1764.5	1766.5	1768.5	1.99
2423.0	1730.8	1732.8	1734.8	1736.7	1738.7	1740.7	1742.7	1744.7	1746.6	1748.6	1.98
2422.0	1711.1	1713.1	1715.0	1717.0	1719.0	1720.9	1722.9	1724.9	1726.9	1728.8	1.97
2421.0	1691.5	1693.5	1695.4	1697.4	1699.3	1701.3	1703.3	1705.2	1707.2	1709.1	1.96
2420.0	1672.0	1673.9	1675.9	1677.8	1679.8	1681.7	1683.7	1685.6	1687.6	1689.5	1.95
2419.0	1652.6	1654.5	1656.5	1658.4	1660.4	1662.3	1664.2	1666.2	1668.1	1670.1	1.94
2418.0	1633.3	1635.2	1637.2	1639.1	1641.0	1642.9	1644.9	1646.8	1648.7	1650.7	1.93
2417.0	1614.2	1616.1	1618.0	1619.9	1621.8	1623.7	1625.7	1627.6	1629.5	1631.4	1.91
2416.0	1595.2	1597.1	1599.0	1600.9	1602.8	1604.7	1606.6	1608.5	1610.4	1612.3	1.90
2415.0	1576.3	1578.2	1580.1	1582.0	1583.9	1585.7	1587.6	1589.5	1591.4	1593.3	1.89
2414.0	1557.5	1559.4	1561.3	1563.1	1565.0	1566.9	1568.8	1570.7	1572.5	1574.4	1.88
2413.0	1538.9	1540.8	1542.6	1544.5	1546.3	1548.2	1550.1	1551.9	1553.8	1555.6	1.86
2412.0	1520.3	1522.2	1524.0	1525.9	1527.7	1529.6	1531.5	1533.3	1535.2	1537.0	1.86
2411.0	1501.9	1503.7	1505.6	1507.4	1509.3	1511.1	1512.9	1514.8	1516.6	1518.5	1.84
2410.0	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	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2409.0	1465.5	1467.3	1469.1	1470.9	1472.7	1474.5	1476.4	1478.2	1480.0	1481.8	1.81
2408.0	1447.6	1449.4	1451.2	1453.0	1454.8	1456.5	1458.3	1460.1	1461.9	1463.7	1.79
2407.0	1429.7	1431.5	1433.3	1435.1	1436.9	1438.6	1440.4	1442.2	1444.0	1445.8	1.79
2406.0	1412.1	1413.9	1415.6	1417.4	1419.1	1420.9	1422.7	1424.4	1426.2	1427.9	1.76
2405.0	1394.6	1396.3	1398.1	1399.8	1401.6	1403.3	1405.1	1406.8	1408.6	1410.3	1.75
2404.0	1377.4	1379.1	1380.8	1382.6	1384.3	1386.0	1387.7	1389.4	1391.2	1392.9	1.72
2403.0	1360.3	1362.0	1363.7	1365.4	1367.1	1368.8	1370.6	1372.3	1374.0	1375.7	1.71
2402.0	1343.3	1345.0	1346.7	1348.4	1350.1	1351.8	1353.5	1355.2	1356.9	1358.6	1.70
2401.0	1326.6	1328.3	1329.9	1331.6	1333.3	1334.9	1336.6	1338.3	1340.0	1341.6	1.67
2400.0	1310.0	1311.7	1313.3	1315.0	1316.6	1318.3	1320.0	1321.6	1323.3	1324.9	1.66
2399.0	1293.6	1295.2	1296.9	1298.5	1300.2	1301.8	1303.4	1305.1	1306.7	1308.4	1.64
2398.0	1277.3	1278.9	1280.6	1282.2	1283.8	1285.4	1287.1	1288.7	1290.3	1292.0	1.63
2397.0	1261.2	1262.8	1264.4	1266.0	1267.6	1269.2	1270.9	1272.5	1274.1	1275.7	1.61
2396.0	1245.2	1246.8	1248.4	1250.0	1251.6	1253.2	1254.8	1256.4	1258.0	1259.6	1.60
2395.0	1229.4	1231.0	1232.6	1234.1	1235.7	1237.3	1238.9	1240.5	1242.0	1243.6	1.58
2394.0	1213.7	1215.3	1216.8	1218.4	1220.0	1221.5	1223.1	1224.7	1226.3	1227.8	1.57
2393.0	1198.1	1199.7	1201.2	1202.8	1204.3	1205.9	1207.5	1209.0	1210.6	1212.1	1.56
2392.0	1182.8	1184.3	1185.9	1187.4	1188.9	1190.4	1192.0	1193.5	1195.0	1196.6	1.53
2391.0	1167.5	1169.0	1170.6	1172.1	1173.6	1175.1	1176.7	1178.2	1179.7	1181.3	1.53
2390.0	1152.4	1153.9	1155.4	1156.9	1158.4	1159.9	1161.5	1163.0	1164.5	1166.0	1.51
2389.0	1137.4	1138.9	1140.4	1141.9	1143.4	1144.9	1146.4	1147.9	1149.4	1150.9	1.50
2388.0	1122.5	1124.0	1125.5	1127.0	1128.5	1129.9	1131.4	1132.9	1134.4	1135.9	1.49
2387.0	1107.7	1109.2	1110.7	1112.1	1113.6	1115.1	1116.6	1118.1	1119.5	1121.0	1.48
2386.0	1093.0	1094.5	1095.9	1097.4	1098.9	1100.3	1101.8	1103.3	1104.8	1106.2	1.47
2385.0	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	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2384.0	1063.8	1065.3	1066.7	1068.2	1069.6	1071.1	1072.6	1074.0	1075.5	1076.9	1.46
2383.0	1049.3	1050.7	1052.2	1053.6	1055.1	1056.5	1058.0	1059.4	1060.9	1062.3	1.45
2382.0	1034.9	1036.3	1037.8	1039.2	1040.7	1042.1	1043.5	1045.0	1046.4	1047.9	1.44
2381.0	1020.6	1022.0	1023.5	1024.9	1026.3	1027.7	1029.2	1030.6	1032.0	1033.5	1.43
2380.0	1006.3	1007.7	1009.2	1010.6	1012.0	1013.4	1014.9	1016.3	1017.7	1019.2	1.43
2379.0	992.2	993.6	995.0	996.4	997.8	999.2	1000.7	1002.1	1003.5	1004.9	1.41
2378.0	978.1	979.5	980.9	982.3	983.7	985.1	986.6	988.0	989.4	990.8	1.41
2377.0	964.1	965.5	966.9	968.3	969.7	971.1	972.5	973.9	975.3	976.7	1.40
2376.0	950.2	951.6	953.0	954.4	955.8	957.1	958.5	959.9	961.3	962.7	1.39
2375.0	936.3	937.7	939.1	940.5	941.9	943.2	944.6	946.0	947.4	948.8	1.39
2374.0	922.5	923.9	925.3	926.6	928.0	929.4	930.8	932.2	933.5	934.9	1.38
2373.0	908.8	910.2	911.5	912.9	914.3	915.6	917.0	918.4	919.8	921.1	1.37
2372.0	895.2	896.6	897.9	899.3	900.6	902.0	903.4	904.7	906.1	907.4	1.36
2371.0	881.6	883.0	884.3	885.7	887.0	888.4	889.8	891.1	892.5	893.8	1.36
2370.0	868.1	869.4	870.8	872.1	873.5	874.8	876.2	877.5	878.9	880.2	1.35
2369.0	854.7	856.0	857.4	858.7	860.1	861.4	862.7	864.1	865.4	866.8	1.34
2368.0	841.3	842.6	844.0	845.3	846.7	848.0	849.3	850.7	852.0	853.4	1.34
2367.0	828.1	829.4	830.7	832.1	833.4	834.7	836.0	837.3	838.7	840.0	1.32
2366.0	815.0	816.3	817.6	818.9	820.2	821.5	822.9	824.2	825.5	826.8	1.31
2365.0	801.9	803.2	804.5	805.8	807.1	808.4	809.8	811.1	812.4	813.7	1.31
2364.0	788.9	790.2	791.5	792.8	794.1	795.4	796.7	798.0	799.3	800.6	1.30
2363.0	776.0	777.3	778.6	779.9	781.2	782.4	783.7	785.0	786.3	787.6	1.29
2362.0	763.2	764.5	765.8	767.0	768.3	769.6	770.9	772.2	773.4	774.7	1.28
2361.0	750.5	751.8	753.0	754.3	755.6	756.8	758.1	759.4	760.7	761.9	1.27
2360.0	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	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2359.0	725.3	726.6	727.8	729.1	730.3	731.6	732.9	734.1	735.4	736.6	1.26
2358.0	712.8	714.0	715.3	716.5	717.8	719.0	720.3	721.5	722.8	724.0	1.25
2357.0	700.4	701.6	702.9	704.1	705.4	706.6	707.8	709.1	710.3	711.6	1.24
2356.0	688.0	689.2	690.5	691.7	693.0	694.2	695.4	696.7	697.9	699.2	1.24
2355.0	675.7	676.9	678.2	679.4	680.6	681.8	683.1	684.3	685.5	686.8	1.23
2354.0	663.5	664.7	665.9	667.2	668.4	669.6	670.8	672.0	673.3	674.5	1.22
2353.0	651.4	652.6	653.8	655.0	656.2	657.4	658.7	659.9	661.1	662.3	1.21
2352.0	639.3	640.5	641.7	642.9	644.1	645.3	646.6	647.8	649.0	650.2	1.21
2351.0	627.3	628.5	629.7	630.9	632.1	633.3	634.5	635.7	636.9	638.1	1.20
2350.0	615.3	616.5	617.7	618.9	620.1	621.3	622.5	623.7	624.9	626.1	1.20
2349.0	603.4	604.6	605.8	607.0	608.2	609.3	610.5	611.7	612.9	614.1	1.19
2348.0	591.6	592.8	594.0	595.1	596.3	597.5	598.7	599.9	601.0	602.2	1.18
2347.0	579.8	581.0	582.2	583.3	584.5	585.7	586.9	588.1	589.2	590.4	1.18
2346.0	568.1	569.3	570.4	571.6	572.8	573.9	575.1	576.3	577.5	578.6	1.17
2345.0	556.5	557.7	558.8	560.0	561.1	562.3	563.5	564.6	565.8	566.9	1.16
2344.0	544.9	546.1	547.2	548.4	549.5	550.7	551.9	553.0	554.2	555.3	1.16
2343.0	533.4	534.5	535.7	536.8	538.0	539.1	540.3	541.4	542.6	543.7	1.15
2342.0	521.9	523.0	524.2	525.3	526.5	527.6	528.8	529.9	531.1	532.2	1.15
2341.0	510.5	511.6	512.8	513.9	515.1	516.2	517.3	518.5	519.6	520.8	1.14
2340.0	499.2	500.3	501.5	502.6	503.7	504.8	506.0	507.1	508.2	509.4	1.13
2339.0	488.0	489.1	490.2	491.4	492.5	493.6	494.7	495.8	497.0	498.1	1.12
2338.0	476.7	477.8	479.0	480.1	481.2	482.3	483.5	484.6	485.7	486.9	1.13
2337.0	465.6	466.7	467.8	468.9	470.0	471.1	472.3	473.4	474.5	475.6	1.11
2336.0	454.5	455.6	456.7	457.8	458.9	460.0	461.2	462.3	463.4	464.5	1.11
2335.0	443.5	444.6	445.7	446.8	447.9	449.0	450.1	451.2	452.3	453.4	1.10

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2334.0	432.6	433.7	434.8	435.9	437.0	438.0	439.1	440.2	441.3	442.4	1.09
2333.0	421.7	422.8	423.9	425.0	426.1	427.1	428.2	429.3	430.4	431.5	1.09
2332.0	410.8	411.9	413.0	414.1	415.2	416.2	417.3	418.4	419.5	420.6	1.09
2331.0	400.1	401.2	402.2	403.3	404.4	405.4	406.5	407.6	408.7	409.7	1.07
2330.0	389.3	390.4	391.5	392.5	393.6	394.7	395.8	396.9	397.9	399.0	1.08
2329.0	378.7	379.8	380.8	381.9	382.9	384.0	385.1	386.1	387.2	388.2	1.06
2328.0	368.2	369.2	370.3	371.3	372.4	373.4	374.5	375.5	376.6	377.6	1.05
2327.0	357.8	358.8	359.9	360.9	362.0	363.0	364.0	365.1	366.1	367.2	1.04
2326.0	347.4	348.4	349.5	350.5	351.6	352.6	353.6	354.7	355.7	356.8	1.04
2325.0	337.1	338.1	339.2	340.2	341.2	342.2	343.3	344.3	345.3	346.4	1.03
2324.0	327.0	328.0	329.0	330.0	331.0	332.0	333.1	334.1	335.1	336.1	1.01
2323.0	316.9	317.9	318.9	319.9	320.9	321.9	323.0	324.0	325.0	326.0	1.01
2322.0	306.9	307.9	308.9	309.9	310.9	311.9	312.9	313.9	314.9	315.9	1.00
2321.0	297.0	298.0	299.0	300.0	301.0	301.9	302.9	303.9	304.9	305.9	.99
2320.0	287.2	288.2	289.2	290.1	291.1	292.1	293.1	294.1	295.0	296.0	.98
2319.0	277.5	278.5	279.4	280.4	281.4	282.3	283.3	284.3	285.3	286.2	.97
2318.0	267.8	268.8	269.7	270.7	271.7	272.6	273.6	274.6	275.6	276.5	.97
2317.0	258.2	259.2	260.1	261.1	262.0	263.0	264.0	264.9	265.9	266.8	.96
2316.0	248.7	249.6	250.6	251.5	252.5	253.4	254.4	255.3	256.3	257.2	.95
2315.0	239.1	240.1	241.0	242.0	242.9	243.9	244.9	245.8	246.8	247.7	.96
2314.0	229.7	230.6	231.6	232.5	233.5	234.4	235.3	236.3	237.2	238.2	.94
2313.0	220.3	221.2	222.2	223.1	224.1	225.0	225.9	226.9	227.8	228.8	.94
2312.0	210.9	211.8	212.8	213.7	214.7	215.6	216.5	217.5	218.4	219.4	.94
2311.0	201.6	202.5	203.5	204.4	205.3	206.2	207.2	208.1	209.0	210.0	.93
2310.0	192.3	193.2	194.2	195.1	196.0	196.9	197.9	198.8	199.7	200.7	.93

ELEVATION IN FEET	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	AVERAGE DIFFERENCE PER TENTH FT
2309.0	183.1	184.0	184.9	185.9	186.8	187.7	188.6	189.5	190.5	191.4	.92
2308.0	174.0	174.9	175.8	176.7	177.6	178.5	179.5	180.4	181.3	182.2	.91
2307.0	164.9	165.8	166.7	167.6	168.5	169.4	170.4	171.3	172.2	173.1	.91
2306.0	155.9	156.8	157.7	158.6	159.5	160.4	161.3	162.2	163.1	164.0	.90
2305.0	146.9	147.8	148.7	149.6	150.5	151.4	152.3	153.2	154.1	155.0	.90
2304.0	138.1	139.0	139.9	140.7	141.6	142.5	143.4	144.3	145.1	146.0	.88
2303.0	129.3	130.2	131.1	131.9	132.8	133.7	134.6	135.5	136.3	137.2	.88
2302.0	120.5	121.4	122.3	123.1	124.0	124.9	125.8	126.7	127.5	128.4	.88
2301.0	111.8	112.7	113.5	114.4	115.3	116.1	117.0	117.9	118.8	119.6	.87
2300.0	103.2	104.1	104.9	105.8	106.6	107.5	108.4	109.2	110.1	110.9	.86
2299.0	99.2	99.6	100.0	100.4	100.8	101.2	101.6	102.0	102.4	102.8	.40
2298.0	86.2	87.5	88.8	90.1	91.4	92.7	94.0	95.3	96.6	97.9	1.30
2297.0	81.6	82.1	82.5	83.0	83.4	83.9	84.4	84.8	85.3	85.7	.46
2296.0	69.7	70.9	72.1	73.3	74.5	75.6	76.8	78.0	79.2	80.4	1.19
2295.0	61.5	62.3	63.1	64.0	64.8	65.6	66.4	67.2	68.1	68.9	.82
2294.0	53.5	54.3	55.1	55.9	56.7	57.5	58.3	59.1	59.9	60.7	.80
2293.0	45.6	46.4	47.2	48.0	48.8	49.5	50.3	51.1	51.9	52.7	.79
2292.0	39.2	39.8	40.5	41.1	41.8	42.4	43.0	43.7	44.3	45.0	.64
2291.0	30.0	30.9	31.8	32.8	33.7	34.6	35.5	36.4	37.4	38.3	.92
2290.0	22.4	23.2	23.9	24.7	25.4	26.2	27.0	27.7	28.5	29.2	.76
2289.0	14.8	15.6	16.3	17.1	17.8	18.6	19.4	20.1	20.9	21.6	.76
2288.0	7.4	8.1	8.9	9.6	10.4	11.1	11.8	12.6	13.3	14.1	.74
2287.0	-.0	.7	1.5	2.2	3.0	3.7	4.4	5.2	5.9	6.7	.74