

Non-Treaty Storage Agreement

Technical Report: Appendices A - L

Appendix C

Part 2

50-Year Hydro Regulation Study

Summary of Assumptions and Study Results

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Part 2
50-Year Hydro Regulation Study
Summary of Assumptions and Study Results

The following tables are based on the hydroregulator study for the 1996 operating year in the 1988 Pacific Northwest Loads and Resources. This study operates the hydrosystem to produce the maximum amount of hydro Firm Energy Load Carrying Capability (FELCC) possible within the current operating limits as well as to produce nonfirm energy up to a "market limit" when available. The "market limit" in this study is the Southwest (SW) Intertie size (minus loop flow and firm contracts) plus the amount of displaceable thermal plants plus the Direct Service Industries (DSI) top quartile. This totals approximately 12,000 megawatts (MW) depending on the month. Water is not drafted from reservoirs to produce nonfirm energy in excess of this amount, except as needed to meet flood control requirements. There is no economic dispatch of resources as in the System Analysis Model (SAM) studies. All firm thermal resources are assumed to be running including Combustion Turbines.

DETERMINATION OF MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

Because of concern expressed regarding the potential effects of storing in non-Treaty space on spring and summer flows, the maximum potential storage amounts were calculated for the period April through August. Estimates of potential storage were made subject to the following assumptions:

- The maximum amount of storage was limited by the difference between Treaty discharges in the hydroregulation study and the minimum discharge requirements at Mica and Arrow;
- The minimum flow requirement at Mica was assumed to be 0 kcfs;
- The minimum flow requirement at Arrow was assumed to be 5 kcfs;
- The amount of storage is limited to the total nonfirm available.
- An estimated downstream conversion factor of 160 MW/kcfs was used;
- It was assumed that space was available each period in non-Treaty space for storage;
- Pacific Northwest high-cost thermal resources were displaced prior to storing in NTS;
- Potential displacement of other thermal plants (such as Centralia) was not considered;
- Assumed storage into non-Treaty would occur prior to any SW nonfirm sales; and
- Transmission line limitations between BC Hydro and the U.S. were not considered.

TABLE FORMAT
Maximum Potential Storage

MONTH - Month of the year

YEAR - Water year (July-June) based on historical water records

MICA Q0 KCFS - Mica discharge in kcfs

ARROW Q0 KCFS - Arrow discharge in kcfs

MAX STOR - Maximum amount that could be stored based on Mica/Arrow flow limitations. The lesser of Mica DOP discharge minus minimum discharge (0 kcfs) and Arrow DOP discharge minus minimum discharge (5 kcfs).

PRD Q0 KCFS - Priest Rapids discharge (kcfs) from the hydroregulation study

U.S. NF MW - U.S. nonfirm (MW) from the hydroregulation study

U.S. ADJ NONFIRM - U.S. nonfirm (MW) adjusted for DSI top quartile service and high cost thermal displacement

BC NF - BC Hydro nonfirm (MW) from 1986 full coordination study. Data based on 40-year study. Nonfirm for 1969-1978 estimated based on 40-year record.

MAX STOR INCL NF - The maximum amount that could be stored based on Mica/Arrow requirements and nonfirm availability. (The lesser of the total nonfirm/160 or MAX STOR)

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcfs	kcfs	ksfd/day	kcfs	MW	NONFIRM	MW	INCL NF	
APRIL 1-15	1929	18.0	59.9	18.0	91.9	0	0	0	0.0	NONFIRM ADJUSTED FOR:
	1930	18.0	35.2	18.0	78.5	0	0	0	0.0	
	1931	18.0	24.2	18.0	66.4	0	0	0	0.0	BOARDMAN 0 MW
	1932	18.0	33.5	18.0	119.3	6251	5169	0	18.0	VALMY 180 MW
	1933	18.0	25.5	18.0	84.6	1	0	0	0.0	CTs 221 MW
	1934	18.0	34.7	18.0	180.3	9303	8221	437	18.0	MISC THERMAL 81 MW
	1935	18.0	19.7	14.7	75.2	0	0	0	0.0	DSI TOP Q 600 MW
	1936	18.0	5.0	0.0	70.1	164	0	0	0.0	TOTAL 1082 MW
	1937	18.0	44.8	18.0	86.0	0	0	0	0.0	
	1938	18.0	5.0	0.0	72.3	1331	249	0	0.0	
	1939	18.0	12.3	7.3	92.2	1615	533	0	3.3	
	1940	18.0	15.6	10.6	105.0	2761	1679	0	10.5	
	1941	18.0	52.8	18.0	105.2	0	0	0	0.0	
	1942	18.0	5.0	0.0	99.8	1908	826	0	0.0	
	1943	18.0	11.2	6.2	114.5	9046	7964	0	6.2	
	1944	18.0	51.9	18.0	86.6	0	0	0	0.0	
	1945	18.0	36.6	18.0	84.5	0	0	0	0.0	
	1946	18.0	24.7	18.0	98.5	5961	4879	0	18.0	
	1947	18.0	28.2	18.0	116.3	4733	3651	0	18.0	
	1948	18.0	22.5	17.5	84.0	1534	452	0	2.8	
	1949	18.0	17.9	12.9	103.3	3844	2762	0	12.9	
	1950	18.0	24.5	18.0	111.6	6664	5582	0	18.0	
	1951	18.0	27.7	18.0	141.9	9657	8575	0	18.0	
	1952	18.0	5.5	0.5	87.0	5304	4222	0	0.5	
	1953	18.0	9.5	4.5	61.2	0	0	0	0.0	
	1954	18.0	23.8	18.0	94.8	3739	2657	941	18.0	
	1955	18.0	17.8	12.8	73.1	498	0	0	0.0	
	1956	18.0	25.9	18.0	134.8	8242	7160	0	18.0	
	1957	18.0	26.4	18.0	95.9	4986	3904	838	18.0	
	1958	18.0	30.0	18.0	101.6	2449	1367	0	8.5	
	1959	18.0	28.3	18.0	119.3	5403	4321	0	18.0	
	1960	18.0	35.4	18.0	171.7	10477	9395	246	18.0	
	1961	18.0	30.3	18.0	124.8	3946	2864	0	17.9	
	1962	18.0	6.7	1.7	76.2	4486	3404	0	1.7	
	1963	18.0	5.0	0.0	87.1	1023	0	0	0.0	
	1964	18.0	25.3	18.0	77.9	1661	579	777	8.5	
	1965	18.0	28.6	18.0	106.9	4248	3166	0	18.0	
	1966	18.0	10.1	5.1	134.5	6622	5540	0	5.1	
	1967	18.0	25.3	18.0	90.4	1469	387	0	2.4	
	1968	18.0	29.8	18.0	83.5	0	0	0	0.0	
	1969	18.0	33.5	18.0	155.3	11055	9973	0	18.0	
	1970	18.0	5.0	0.0	90.5	0	0	0	0.0	
	1971	18.0	25.0	18.0	102.9	6033	4951	0	18.0	
	1972	18.0	39.8	18.0	175.2	11058	9976	0	18.0	
	1973	18.0	50.4	18.0	97.0	0	0	0	0.0	
	1974	18.0	44.4	18.0	159.7	11668	10586	0	18.0	
	1975	18.0	5.0	0.0	67.5	0	0	0	0.0	
	1976	18.0	29.8	18.0	133.6	8548	7466	0	18.0	
	1977	18.0	63.2	18.0	98.5	0	0	0	0.0	
	1978	18.0	27.8	18.0	134.7	7463	6381	0	18.0	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcf/s	kcf/s	ksfd/day	kcf/s	MW	NONFIRM	MW	INCL NF	
APRIL 16-30	1929	10.0	58.7	10.0	85.7	0	0	0	0.0	NONFIRM ADJUSTED FOR:
	1930	10.0	6.2	1.2	77.2	0	0	0	0.0	
	1931	10.0	58.8	10.0	91.6	0	0	0	0.0	BOARDMAN 454 MW
	1932	10.0	36.7	10.0	143.0	6914	5378	0	10.0	VALMY 180 MW
	1933	10.0	22.6	10.0	103.7	2586	1050	0	6.6	CTS 221 MW
	1934	10.0	44.3	10.0	225.5	9928	8392	730	10.0	MISC THERMAL 81 MW
	1935	10.0	5.0	0.0	83.4	664	0	0	0.0	DSI TOP Q 600 MW
	1936	10.0	5.0	0.0	130.6	7812	6276	0	0.0	TOTAL 1536 MW
	1937	10.0	24.5	10.0	85.6	0	0	0	0.0	
	1938	10.0	5.0	0.0	121.0	7294	5758	0	0.0	
	1939	10.0	22.2	10.0	149.4	6456	4920	0	10.0	
	1940	10.0	20.6	10.0	150.0	6187	4651	0	10.0	
	1941	10.0	52.8	10.0	108.1	0	0	0	0.0	
	1942	10.0	5.0	0.0	100.4	2814	1278	0	0.0	
	1943	10.0	9.3	4.3	164.0	10949	9413	0	4.3	
	1944	10.0	69.7	10.0	98.1	0	0	0	0.0	
	1945	10.0	22.5	10.0	78.8	0	0	0	0.0	
	1946	10.0	28.5	10.0	140.7	8819	7283	0	10.0	
	1947	10.0	13.2	8.2	111.8	3586	2050	0	8.2	
	1948	10.0	22.0	10.0	124.6	6241	4705	0	10.0	
	1949	10.0	5.0	0.0	128.3	7267	5731	0	0.0	
	1950	10.0	5.0	0.0	98.1	4941	3405	0	0.0	
	1951	10.0	5.0	0.0	128.7	6073	4537	0	0.0	
	1952	10.0	5.0	0.0	156.7	10816	9280	0	0.0	
	1953	10.0	5.0	0.0	78.8	261	0	0	0.0	
	1954	10.0	19.5	10.0	95.2	3756	2220	766	10.0	
	1955	10.0	26.8	10.0	90.4	0	0	0	0.0	
	1956	10.0	8.5	3.5	172.7	11529	9993	0	3.5	
	1957	10.0	5.4	0.4	81.0	1609	73	104	0.4	
	1958	10.0	15.0	10.0	100.9	4016	2480	0	10.0	
	1959	10.0	30.3	10.0	133.7	3848	2312	0	10.0	
	1960	10.0	5.0	0.0	114.6	2874	1338	0	0.0	
	1961	10.0	21.8	10.0	93.0	0	0	0	0.0	
	1962	10.0	5.0	0.0	125.1	6555	5019	0	0.0	
	1963	10.0	5.0	0.0	95.8	748	0	0	0.0	
	1964	10.0	14.2	9.2	75.8	0	0	644	4.0	
	1965	10.0	5.0	0.0	135.8	9555	8019	0	0.0	
	1966	10.0	5.0	0.0	88.1	0	0	0	0.0	
	1967	10.0	19.3	10.0	83.6	0	0	0	0.0	
	1968	10.0	19.5	10.0	90.8	0	0	0	0.0	
	1969	10.0	31.5	10.0	185.2	10603	9067	0	10.0	
	1970	10.0	61.5	10.0	99.5	0	0	0	0.0	
	1971	10.0	5.0	0.0	104.1	5440	3904	0	0.0	
	1972	10.0	64.1	10.0	164.8	9602	8066	0	10.0	
	1973	10.0	38.6	10.0	101.1	0	0	0	0.0	
	1974	10.0	35.2	10.0	173.4	12139	10603	0	10.0	
	1975	10.0	18.2	10.0	76.5	0	0	0	0.0	
	1976	10.0	29.2	10.0	127.1	6342	4806	0	10.0	
	1977	10.0	73.8	10.0	106.9	0	0	0	0.0	
	1978	10.0	25.4	10.0	117.3	4443	2907	0	10.0	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcf/s	kcf/s	ksfd/day	kcf/s	MW	NONFIRM	MW	INCL NF	
MAY	1929	10.0	24.3	10.0	134.0	0	0	0	0.0	NONFIRM ADJUSTED FOR:
	1930	10.0	42.5	10.0	134.0	0	0	0	0.0	
	1931	10.0	5.0	0.0	134.3	0	0	0	0.0	BOARDMAN 454 MW
	1932	10.0	50.5	10.0	185.2	6363	4951	0	10.0	VALMY 129 MW
	1933	10.0	38.6	10.0	150.6	10839	9427	0	10.0	CTs 191 MW
	1934	10.0	59.5	10.0	250.3	0	0	1290	8.1	MISC THERMAL 38 MW
	1935	10.0	27.6	10.0	134.0	4997	3585	0	10.0	DSI TOP Q 600 MW
	1936	10.0	67.1	10.0	188.2	612	0	1107	6.9	TOTAL 1412 MW
	1937	10.0	34.9	10.0	134.0	951	0	0	0.0	
	1938	10.0	27.8	10.0	188.2	7078	5666	0	10.0	
	1939	10.0	48.2	10.0	152.1	0	0	0	0.0	
	1940	10.0	39.7	10.0	137.9	0	-0	0	0.0	
	1941	10.0	31.6	10.0	134.0	0	0	0	0.0	
	1942	10.0	37.0	10.0	134.0	2557	1145	0	7.2	
	1943	10.0	11.0	6.0	143.4	9958	8546	0	6.0	
	1944	10.0	21.4	10.0	134.0	0	0	0	0.0	
	1945	10.0	5.0	0.0	134.0	4739	3327	0	0.0	
	1946	10.0	64.1	10.0	240.6	6085	4673	175	10.0	
	1947	10.0	51.6	10.0	215.7	4254	2842	0	10.0	
	1948	10.0	15.8	10.0	203.9	12143	10731	2091	10.0	
	1949	10.0	33.8	10.0	207.5	4399	2987	1550	10.0	
	1950	10.0	17.6	10.0	171.7	12015	10603	0	10.0	
	1951	10.0	30.2	10.0	236.8	6770	5358	1686	10.0	
	1952	10.0	24.8	10.0	199.6	5502	4090	0	10.0	
	1953	10.0	31.0	10.0	138.6	10839	9427	0	10.0	
	1954	10.0	40.5	10.0	234.4	10839	9427	971	10.0	
	1955	10.0	34.9	10.0	134.0	8531	7119	0	10.0	
	1956	10.0	13.1	8.1	227.9	12143	10731	0	8.1	
	1957	10.0	29.1	10.0	194.8	10839	9427	2091	10.0	
	1958	10.0	30.7	10.0	190.7	7686	6274	255	10.0	
	1959	10.0	44.3	10.0	192.1	10839	9427	101	10.0	
	1960	10.0	20.2	10.0	134.0	6461	5049	0	10.0	
	1961	10.0	47.5	10.0	202.5	10839	9427	2066	10.0	
	1962	10.0	22.7	10.0	137.1	5372	3960	0	10.0	
	1963	10.0	40.0	10.0	134.0	3437	2025	0	10.0	
	1964	10.0	32.1	10.0	134.0	10839	9427	1720	10.0	
	1965	10.0	22.1	10.0	169.5	10580	9168	0	10.0	
	1966	10.0	42.3	10.0	143.4	2282	870	0	5.4	
	1967	10.0	40.7	10.0	153.7	10839	9427	0	10.0	
	1968	10.0	45.0	10.0	134.0	4948	3536	1058	10.0	
	1969	10.0	21.3	10.0	220.8	9200	7788	0	10.0	
	1970	10.0	20.2	10.0	134.0	8183	6771	0	10.0	
	1971	10.0	31.1	10.0	210.5	12143	10731	2091	10.0	
	1972	10.0	30.3	10.0	218.0	12143	10731	0	10.0	
	1973	10.0	26.8	10.0	134.0	0	0	0	0.0	
	1974	10.0	27.9	10.0	210.1	12143	10731	0	10.0	
	1975	10.0	5.0	0.0	145.3	10839	9427	0	0.0	
	1976	10.0	30.2	10.0	198.5	7378	5966	0	10.0	
	1977	10.0	49.3	10.0	134.0	0	0	0	0.0	
	1978	10.0	27.3	10.0	152.9	5591	4179	255	10.0	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcf/s	kcf/s	ksfd/day	kcf/s	MW	NONFIRM	MW	INCL NF	
JUNE	1929	10.0	5.0	0.0	70.3	0	0	0	0.0	NONFIRM ADJUSTED FOR:
	1930	10.0	42.3	10.0	87.6	0	0	0	0.0	
	1931	10.0	74.1	10.0	94.9	0	0	0	0.0	BOARDMAN 454 MW
	1932	10.0	25.1	10.0	126.1	6363	4791	0	10.0	VALMY 206 MW
	1933	10.0	5.0	0.0	172.5	10839	9267	629	0.0	CTs 231 MW
	1934	31.2	44.2	31.2	107.0	0	0	1850	11.6	MISC THERMAL 81 MW
	1935	10.0	21.4	10.0	133.0	4997	3425	0	10.0	DSI TOP Q 600 MW
	1936	10.0	17.1	10.0	77.5	612	0	0	0.0	TOTAL 1572 MW
	1937	10.0	5.0	0.0	93.6	951	0	0	0.0	
	1938	10.0	23.0	10.0	120.5	7078	5506	0	10.0	
	1939	10.0	14.1	9.1	85.1	0	0	0	0.0	
	1940	10.0	33.6	10.0	92.2	0	-0	0	0.0	
	1941	10.0	47.9	10.0	88.3	0	0	0	0.0	
	1942	10.0	5.0	0.0	82.4	2557	985	112	0.0	
	1943	10.0	31.3	10.0	175.6	9958	8386	0	10.0	
	1944	10.0	40.8	10.0	79.5	0	0	0	0.0	
	1945	10.0	15.2	10.0	114.6	4739	3167	0	10.0	
	1946	10.0	8.4	3.4	128.4	6085	4513	278	3.4	
	1947	10.0	8.5	3.5	114.2	4254	2682	0	3.5	
	1948	12.3	16.9	11.9	265.5	12143	10571	873	11.9	
	1949	10.0	18.2	10.0	121.8	4399	2827	0	10.0	
	1950	10.0	33.8	10.0	220.8	12015	10443	806	10.0	
	1951	10.0	8.9	3.9	148.6	6770	5198	0	3.9	
	1952	10.0	22.0	10.0	111.5	5502	3930	0	10.0	
	1953	10.0	16.2	10.0	164.6	10839	9267	0	10.0	
	1954	10.0	23.1	10.0	226.3	10839	9267	1155	10.0	
	1955	10.0	5.0	0.0	157.5	8531	6959	0	0.0	
	1956	10.0	39.0	10.0	250.6	12143	10571	0	10.0	
	1957	10.0	30.3	10.0	174.9	10839	9267	0	10.0	
	1958	10.0	59.7	10.0	143.5	7686	6114	0	10.0	
	1959	10.0	14.0	9.0	200.4	10839	9267	1635	9.0	
	1960	10.0	18.2	10.0	135.7	6461	4889	0	10.0	
	1961	15.4	15.7	10.7	211.5	10839	9267	.538	10.7	
	1962	10.0	24.8	10.0	118.4	5372	3800	0	10.0	
	1963	10.0	14.6	9.6	88.1	3437	1865	0	9.6	
	1964	10.0	5.0	0.0	171.1	10839	9267	2093	0.0	
	1965	10.0	22.3	10.0	164.5	10580	9008	0	10.0	
	1966	10.0	24.8	10.0	114.5	2282	710	0	4.4	
	1967	10.0	7.8	2.8	196.4	10839	9267	2093	2.8	
	1968	10.0	29.5	10.0	132.3	4948	3376	8	10.0	
	1969	10.0	59.4	10.0	185.8	9200	7628	0	10.0	
	1970	10.0	5.0	0.0	127.9	8183	6611	0	0.0	
	1971	10.0	17.1	10.0	207.6	12143	10571	873	10.0	
	1972	14.3	44.1	14.3	280.4	12143	10571	0	14.3	
	1973	10.0	17.2	10.0	86.9	0	0	0	0.0	
	1974	10.0	10.3	5.3	273.4	12143	10571	0	5.3	
	1975	10.0	11.5	6.5	164.4	10839	9267	629	6.5	
	1976	10.0	13.1	8.1	145.5	7378	5806	0	8.1	
	1977	10.0	32.6	10.0	90.4	0	0	0	0.0	
	1978	10.0	5.2	0.2	112.9	5591	4019	0	0.2	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcf/s	kcf/s	ksfd/day	kcf/s	MW	NONFIRM	MW	INCL NF	
JULY	1929	34.0	70.7	34.0	182.1	9479	7959	3502	34.0	NONFIRM ADJUSTED FOR:
	1930	10.0	19.5	10.0	68.4	0	0	0	0.0	
	1931	26.2	24.7	19.7	76.1	0	0	0	0.0	BOARDMAN 454 MW
	1932	18.7	30.4	18.7	72.5	0	0	0	0.0	VALMY 206 MW
	1933	23.0	23.8	18.8	80.6	2054	534	0	3.3	CTS 186 MW
	1934	34.0	53.2	34.0	208.3	11624	10104	1608	34.0	MISC THERMAL 74 MW
	1935	44.0	36.1	31.1	78.5	0	0	1671	10.4	DSI TOP Q 600 MW
	1936	33.9	66.1	33.9	153.7	7445	5925	760	33.9	TOTAL 1520 MW
	1937	34.0	49.3	34.0	83.5	591	0	91	0.6	
	1938	10.0	11.2	6.2	65.6	0	0	0	0.0	
	1939	11.8	30.8	11.8	88.7	2820	1300	124	8.9	
	1940	24.4	47.9	24.4	101.8	2212	692	115	5.0	
	1941	34.0	51.7	34.0	81.2	0	0	569	3.6	
	1942	27.0	26.5	21.5	67.1	0	0	0	0.0	
	1943	20.2	37.9	20.2	110.5	4912	3392	1385	20.2	
	1944	10.0	32.7	10.0	155.6	10128	8608	474	10.0	
	1945	27.0	16.8	11.8	71.7	0	0	0	0.0	
	1946	10.0	32.4	10.0	88.2	2027	507	0	3.2	
	1947	28.5	30.6	25.6	104.0	3905	2385	1193	22.4	
	1948	34.0	28.1	23.1	81.4	1093	0	1964	12.3	
	1949	34.5	63.8	34.5	183.0	9952	8432	2252	34.5	
	1950	10.0	40.0	10.0	83.9	660	0	0	0.0	
	1951	32.1	49.4	32.1	197.0	12187	10667	1993	32.1	
	1952	34.0	50.3	34.0	146.3	7457	5937	1953	34.0	
	1953	18.1	37.9	18.1	98.9	3183	1663	86	10.9	
	1954	10.0	31.5	10.0	142.0	7950	6430	0	10.0	
	1955	41.3	52.6	41.3	160.5	9286	7766	2091	41.3	
	1956	26.6	43.1	26.6	192.4	10281	8761	932	26.6	
	1957	34.0	56.0	34.0	177.3	10003	8483	855	34.0	
	1958	30.7	46.3	30.7	89.9	1566	46	0	0.3	
	1959	34.0	20.6	15.6	68.4	0	0	446	2.8	
	1960	34.0	52.7	34.0	170.8	8681	7161	1324	34.0	
	1961	20.7	51.0	20.7	134.1	4988	3468	1056	20.7	
	1962	37.7	35.8	30.8	94.6	1651	131	1562	10.6	
	1963	15.0	41.2	15.0	90.1	1892	372	0	2.3	
	1964	26.8	48.5	26.8	108.1	3505	1985	774	17.2	
	1965	24.0	75.1	24.0	204.7	12328	10808	2091	24.0	
	1966	24.7	38.7	24.7	112.7	5157	3637	690	24.7	
	1967	34.0	57.4	34.0	121.0	4088	2568	2052	28.9	
	1968	59.8	95.1	59.8	219.9	12004	10484	2009	59.8	
	1969	34.0	50.3	34.0	127.5	4008	2488	1953	27.8	
	1970	34.0	13.6	8.6	81.9	1656	136	1671	8.6	
	1971	10.0	33.0	10.0	71.3	930	0	1964	10.0	
	1972	20.3	49.8	20.3	167.2	11275	9755	932	20.3	
	1973	48.7	96.9	48.7	245.3	13732	12212	569	48.7	
	1974	10.0	38.7	10.0	75.2	0	0	932	5.8	
	1975	34.0	72.6	34.0	240.3	13732	12212	0	34.0	
	1976	10.0	60.5	10.0	177.7	12336	10816	2091	10.0	
	1977	34.0	60.1	34.0	162.8	8678	7158	474	34.0	
	1978	27.0	36.8	27.0	77.4	0	0	0	0.0	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcfs	kcf/s	ksfd/day	kcf/s	MW	NONFIRM	MW	INCL NF	
AUGUST 1-15	1929	38.3	69.5	38.3	119.0	3451.0	1924	2255	26.1	NONFIRM ADJUSTED FOR:
	1930	27.0	45.7	27.0	67.5	0.0	0	0	0.0	
	1931	33.8	50.2	33.8	80.9	0.0	0	1597	10.0	BOARDMAN 454 MW
	1932	27.0	38.9	27.0	78.1	0.0	0	1390	8.7	VALMY 206 MW
	1933	30.2	59.7	30.2	89.4	1281.0	0	0	0.0	CTS 186 MW
	1934	48.1	80.9	48.1	145.6	6646.0	5119	1689	42.6	MISC THERMAL 81 MW
	1935	43.0	38.8	33.8	73.4	0.0	0	1212	7.6	DSI TOP Q 600 MW
	1936	32.8	65.2	32.8	114.8	3041.0	1514	1542	19.1	TOTAL 1527 MW
	1937	30.6	54.4	30.6	76.9	0.0	0	1019	6.4	
	1938	27.0	36.6	27.0	70.0	0.0	0	0	0.0	
	1939	19.3	32.7	19.3	70.3	0.0	0	153	1.0	
	1940	32.4	53.8	32.4	87.2	807.0	-0-	1227	7.7	
	1941	27.7	49.0	27.7	77.8	0.0	0	877	5.5	
	1942	27.0	33.8	27.0	69.2	0.0	0	612	3.8	
	1943	32.2	54.7	32.2	100.6	2145.0	618	2015	16.5	
	1944	30.7	49.8	30.7	122.8	4648.0	3121	1828	30.7	
	1945	27.0	34.4	27.0	73.8	0.0	0	0	0.0	
	1946	10.0	27.4	10.0	62.3	0.0	0	0	0.0	
	1947	29.0	50.2	29.0	91.2	1326.0	0	1848	11.6	
	1948	34.9	55.4	34.9	94.1	1442.0	0	1259	7.9	
	1949	42.7	65.2	42.7	135.3	5673.0	4146	2363	40.7	
	1950	10.0	36.8	10.0	73.7	0.0	0	0	0.0	
	1951	26.7	53.8	26.7	126.2	5263.0	3736	1844	26.7	
	1952	34.0	52.3	34.0	129.1	4624.0	3097	1796	30.6	
	1953	33.6	59.3	33.6	100.4	2259.0	732	1380	13.2	
	1954	17.3	40.8	17.3	96.2	2308.0	781	820	10.0	
	1955	52.2	85.3	52.2	181.1	8904.0	7377	2091	52.2	
	1956	30.6	58.4	30.6	132.5	4917.0	3390	1386	29.9	
	1957	26.5	43.2	26.5	105.4	3101.0	1574	1291	17.9	
	1958	16.9	39.6	16.9	73.1	0.0	0	50	0.3	
	1959	28.2	41.6	28.2	71.5	0.0	0	825	5.2	
	1960	34.0	63.3	34.0	117.0	3393.0	1866	1557	21.4	
	1961	32.4	64.2	32.4	109.4	2859.0	1332	1492	17.7	
	1962	41.7	67.3	41.7	93.9	970.0	0	1126	7.0	
	1963	32.4	68.5	32.4	109.2	2949.0	1422	1228	16.6	
	1964	31.9	60.6	31.9	88.7	1422.0	0	1306	8.2	
	1965	27.1	68.8	27.1	126.8	4931.0	3404	1970	27.1	
	1966	36.7	74.1	36.7	118.0	4696.0	3169	1489	29.1	
	1967	46.8	83.0	46.8	118.2	3331.0	1804	1554	21.0	
	1968	51.7	81.5	51.7	129.7	4495.0	2968	1894	30.4	
	1969	34.0	68.5	34.0	106.0	2568.0	1041	1796	17.7	
	1970	32.3	55.7	32.3	84.7	508.0	0	1212	7.6	
	1971	25.3	47.3	25.3	72.8	0.0	0	1259	7.9	
	1972	40.2	80.9	40.2	144.6	6419.0	4892	1386	39.2	
	1973	54.4	95.0	54.4	173.0	8458.0	6931	877	48.8	
	1974	27.0	40.2	27.0	72.5	0.0	0	1386	8.7	
	1975	43.7	80.6	43.7	146.0	6747.0	5220	0	32.6	
	1976	10.0	32.4	10.0	76.0	518.0	0	1970	10.0	
	1977	59.6	111.2	59.6	190.1	9904.0	8377	1828	59.6	
	1978	27.0	45.4	27.0	77.4	0.0	0	50	0.3	

MAXIMUM POTENTIAL STORAGE IN NON-TREATY SPACE

MONTH	YEAR	MICA QO	ARROW QO	MAX STOR	PRD QO	US NF	US ADJ	BC NF	MAX STOR	NOTES
		kcfs	kcfs	ksfd/day	kcfs	MW	NONFIRM	MW	INCL NF	
AUGUST	16-31	32.3	54.4	32.3	87.4	616.0	0	982	6.1	NONFIRM ADJUSTED FOR:
	1929	21.8	50.4	21.8	70.0	0.0	0	14	0.1	
	1930	39.2	61.8	39.2	84.0	0.0	0	1292	8.1	BOARDMAN 454 MW
	1931	33.2	52.4	33.2	79.6	0.0	0	1056	6.6	VALMY 206 MW
	1932	41.5	69.7	41.5	95.3	1635.0	108	1175	8.0	CTS 186 MW
	1934	45.9	74.4	45.9	114.6	3720.0	2193	1271	21.7	MISC THERMAL 81 MW
	1935	38.5	56.9	38.5	81.9	0.0	0	947	5.9	DSI TOP Q 600 MW
	1936	28.6	46.7	28.6	81.3	0.0	0	269	1.7	TOTAL 1527 MW
	1937	34.4	54.3	34.4	75.2	0.0	0	658	4.1	
	1938	10.0	45.0	10.0	74.3	0.0	0	0	0.0	
	1939	26.8	45.1	26.8	71.7	0.0	0	0	0.0	
	1940	34.4	52.6	34.4	76.5	0.0	-0	798	5.0	
	1941	29.3	52.9	29.3	76.4	0.0	0	310	1.9	
	1942	18.7	48.0	18.7	75.1	0.0	0	685	4.3	
	1943	36.2	53.4	36.2	83.4	355.0	0	1539	9.6	
	1944	29.2	44.7	29.2	80.8	576.0	0	555	3.5	
	1945	10.0	35.2	10.0	74.8	0.0	0	652	4.1	
	1946	10.0	28.9	10.0	62.9	0.0	0	0	0.0	
	1947	31.7	47.8	31.7	80.4	155.0	0	1128	7.1	
	1948	27.3	44.8	27.3	76.3	0.0	0	212	1.3	
	1949	40.4	66.4	40.4	120.1	3923.0	2396	2096	28.1	
	1950	10.0	28.8	10.0	65.2	0.0	0	281	1.8	
	1951	34.4	60.5	34.4	107.3	3282.0	1755	1330	19.3	
	1952	26.5	41.8	26.5	82.3	598.0	0	136	0.9	
	1953	23.9	43.9	23.9	73.4	0.0	0	0	0.0	
	1954	32.7	53.5	32.7	92.1	1567.0	40	636	4.2	
	1955	46.1	75.2	46.1	150.0	7013.0	5486	2091	46.1	
	1956	28.4	47.4	28.4	87.1	525.0	0	117	0.7	
	1957	33.9	56.5	33.9	94.9	1872.0	345	967	8.2	
	1958	21.0	42.4	21.0	73.6	0.0	0	816	5.1	
	1959	33.1	56.3	33.1	77.7	0.0	0	640	4.0	
	1960	27.5	51.1	27.5	91.3	1149.0	0	385	2.4	
	1961	26.0	43.0	26.0	75.6	0.0	0	0	0.0	
	1962	39.9	63.2	39.9	90.7	849.0	0	1000	6.3	
	1963	33.6	60.3	33.6	85.3	832.0	0	558	3.5	
	1964	30.0	53.8	30.0	79.0	189.0	0	357	2.2	
	1965	25.9	53.9	25.9	91.9	1628.0	101	1608	10.7	
	1966	43.3	70.9	43.3	108.5	3642.0	2115	1228	20.9	
	1967	33.2	56.0	33.2	82.2	0.0	0	492	3.1	
	1968	44.1	66.6	44.1	95.0	1100.0	0	1379	8.6	
	1969	28.9	60.8	28.9	91.7	2042.0	515	136	4.1	
	1970	26.5	46.2	26.5	68.9	0.0	0	947	5.9	
	1971	27.8	46.9	27.8	71.5	0.0	0	212	1.3	
	1972	36.9	56.7	36.9	90.9	1310.0	0	117	0.7	
	1973	41.1	70.6	41.1	122.5	4333.0	2806	310	19.5	
	1974	17.9	56.7	17.9	70.6	0.0	0	117	0.7	
	1975	37.9	61.3	37.9	107.9	2925.0	1398	1175	16.1	
	1976	29.6	53.1	29.6	93.8	2724.0	1197	1608	17.5	
	1977	48.0	100.1	48.0	175.8	9309.0	7782	555	48.0	
	1978	27.0	52.3	27.0	82.7	0.0	0	816	5.1	

YEAR	SUMMARY OF MAXIMUM POTENTIAL STORAGE IN NON-TREATY (ksfd/day)						TOTAL ksfd	TOTAL MAF	
	APRIL 1	APRIL 2	MAY	JUNE	JULY	AUGUST 1	AUGUST 2		
1928/29	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4	0.0
1929/30	0.0	0.0	0.0	0.0	0.0	10.0	8.1	278.9	0.6
1930/31	0.0	0.0	0.0	0.0	0.0	8.7	6.6	235.9	0.5
1931/32	18.0	10.0	10.0	10.0	3.3	0.0	8.0	1261.8	2.5
1932/33	0.0	6.6	10.0	0.0	34.0	42.6	21.7	2447.1	4.9
1933/34	18.0	10.0	8.1	11.6	10.4	7.6	5.9	1548.9	3.1
1934/35	0.0	0.0	10.0	10.0	33.9	19.1	1.7	1974.3	3.9
1935/36	0.0	0.0	6.9	0.0	0.6	6.4	4.1	393.4	0.8
1936/37	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1937/38	0.0	0.0	10.0	10.0	8.9	1.0	0.0	900.2	1.8
1938/39	3.3	10.0	0.0	0.0	5.0	7.7	5.0	551.2	1.1
1939/40	10.5	10.0	0.0	0.0	3.6	5.5	1.9	530.9	1.1
1940/41	0.0	0.0	0.0	0.0	0.0	3.8	4.3	125.9	0.2
1941/42	0.0	0.0	7.2	0.0	20.2	16.5	9.6	1248.8	2.5
1942/43	6.2	4.3	6.0	10.0	10.0	30.7	3.5	1469.5	2.9
1943/44	0.0	0.0	0.0	0.0	0.0	0.0	4.1	65.2	0.1
1944/45	0.0	0.0	0.0	10.0	3.2	0.0	0.0	398.2	0.8
1945/46	18.0	10.0	10.0	3.4	22.4	11.6	7.1	1811.3	3.6
1946/47	18.0	8.2	10.0	3.5	12.3	7.9	1.3	1327.8	2.6
1947/48	2.8	10.0	10.0	11.9	34.5	40.7	28.1	2988.3	5.9
1948/49	12.9	0.0	10.0	10.0	0.0	0.0	1.8	831.6	1.7
1949/50	18.0	0.0	10.0	10.0	32.1	26.7	19.3	2584.1	5.1
1950/51	18.0	0.0	10.0	3.9	34.0	30.6	0.9	2223.3	4.4
1951/52	0.5	0.0	10.0	10.0	10.9	13.2	0.0	1154.4	2.3
1952/53	0.0	0.0	10.0	10.0	10.0	10.0	4.2	1137.7	2.3
1953/54	18.0	10.0	10.0	10.0	41.3	52.2	46.1	3830.9	7.6
1954/55	0.0	0.0	10.0	0.0	26.6	29.9	0.7	1594.1	3.2
1955/56	18.0	3.5	8.1	10.0	34.0	17.9	8.2	2327.4	4.6
1956/57	18.0	0.4	10.0	10.0	0.3	0.3	5.1	981.2	1.9
1957/58	8.5	10.0	10.0	10.0	2.8	5.2	4.0	1115.9	2.2
1958/59	18.0	10.0	10.0	9.0	34.0	21.4	2.4	2413.4	4.8
1959/60	18.0	0.0	10.0	10.0	20.7	17.7	0.0	1786.5	3.5
1960/61	17.9	0.0	10.0	10.7	10.6	7.0	6.3	1433.1	2.8
1961/62	1.7	0.0	10.0	10.0	2.3	16.6	3.5	1011.8	2.0
1962/63	0.0	0.0	10.0	9.6	17.2	8.2	2.2	1290.7	2.6
1963/64	8.5	4.0	10.0	0.0	24.0	27.1	10.7	1818.9	3.6
1964/65	18.0	0.0	10.0	10.0	24.7	29.1	20.9	2416.7	4.8
1965/66	5.1	0.0	5.4	4.4	28.9	21.0	3.1	1637.3	3.2
1966/67	2.4	0.0	10.0	2.8	59.8	30.4	8.6	2877.8	5.7
1967/68	0.0	0.0	10.0	10.0	27.8	17.7	4.1	1801.5	3.6
1968/69	18.0	10.0	10.0	10.0	8.6	7.6	5.9	1504.9	3.0
1969/70	0.0	0.0	10.0	0.0	10.0	7.9	1.3	759.2	1.5
1970/71	18.0	0.0	10.0	10.0	20.3	39.2	0.7	2109.6	4.2
1971/72	18.0	10.0	10.0	14.3	48.7	48.8	19.5	3712.3	7.4
1972/73	0.0	0.0	0.0	0.0	5.8	8.7	0.7	322.2	0.6
1973/74	18.0	10.0	10.0	5.3	34.0	32.6	16.1	2689.7	5.3
1974/75	0.0	0.0	0.0	6.5	10.0	10.0	17.5	935.5	1.9
1975/76	18.0	10.0	10.0	8.1	34.0	59.6	48.0	3689.0	7.3
1976/77	0.0	0.0	0.0	0.0	0.0	0.3	5.1	86.3	0.2
1977/78	18.0	10.0	10.0	0.2	-	-	-	736.0	1.5

Part 3

SAM Modeling Results

Operation of Non-Treaty Storage

U.S. Operation of Non-Treaty Storage
Proposed Agreement-Opportunity Storage Use
Base Case

 MICA Summary
 Incr Study: AMXA1ARO : NTS : TE3AC : 2.5 MAF : ALT RESOURCE ORDER Date: 13-MAR-89 15:51:49
 Number of Games: 200
 Average over Typical Water Years (Mid 80 Percent)

US Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 153	-116	-131	-89	-190	-292	-663	-9	-95	-89	-60	-143	-213	242	252	-146
1990 154	366	565	561	225	-293	-473	-36	-91	-74	-73	-157	-260	144	145	41
1991 154	701	410	432	55	-6	-527	-201	-152	-136	-105	-113	-265	249	237	40
1992 160	838	513	382	-10	-53	-255	-203	-245	-256	-143	-238	-355	121	129	29
1993 155	802	593	494	124	-15	-144	-342	-240	-218	-222	-299	-333	325	342	64
1994 155	845	595	308	14	15	-118	-293	-283	-229	-224	-237	-272	345	363	61
1995 154	622	222	244	33	-1	-75	-344	-263	-199	-234	-307	-343	363	378	-4
1996 148	657	245	245	41	-20	-176	-302	-270	-208	-206	-293	-354	374	377	-2
1997 155	625	237	142	-34	-184	-231	-379	-308	-260	-162	-296	-381	276	304	-55
1998 155	508	136	170	-155	-117	-160	-386	-285	-264	-204	-282	-366	273	300	-70
1999 149	555	219	127	-218	-262	-191	-370	-184	-170	-98	-227	-296	240	254	-58
2000 151	722	239	183	-223	-183	-154	-432	-221	-190	-131	-157	-324	207	226	-37
2001 152	758	224	306	-158	-125	-78	-361	-285	-229	-176	-227	-308	349	355	-4
2002 157	624	216	255	-119	-41	25	-303	-271	-248	-108	-153	-362	372	390	13
2003 163	631	171	175	-265	-224	-252	-524	-254	-201	-148	-188	-157	275	298	-60
2004 146	791	288	344	-59	-166	-170	-411	-282	-223	-142	-176	-210	306	323	13
2005 151	698	319	377	59	-221	-123	-443	-318	-265	-164	-141	-178	259	270	13
2006 145	780	223	300	-78	-131	-108	-417	-324	-266	-173	-150	-216	205	220	-4
2007 155	683	240	270	24	-221	-118	-343	-214	-158	-144	-222	-342	260	276	-8
2008 159	731	216	289	-60	-236	-110	-438	-211	-179	-119	-104	-333	161	162	-16
AVERAGE	641	288	276	-50	-139	-205	-327	-239	-203	-152	-205	-294	267	280	-10

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BC Hydro Operation of Non-Treaty Storage
Proposed Agreement-Opportunity Storage Use
Base Case

 MICA Summary
 Incr Study: AMXA1ARO : NTS : TE3AC : 2.5 MAF : ALT RESOURCE ORDER
 Date: 13-MAR-89 15:51:49
 Number of Games: 200
 Average over Typical Water Years (Mid 80 Percent)

BC Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 153	-36	12	-74	-190	-694	-600	134	-10	-8	-84	-17	-42	59	71	-128
1990 154	263	583	385	239	-193	-377	20	-68	-51	-127	-46	-128	124	116	57
1991 154	608	352	217	68	-380	-443	-55	-58	-36	-103	34	-86	140	123	25
1992 160	590	341	262	179	-111	-513	-15	-50	-47	-84	19	-139	-10	-42	38
1993 155	578	343	332	304	-25	-368	-262	-61	-44	-154	-12	-61	235	259	73
1994 155	567	282	289	210	-17	-189	-216	-77	-57	-182	58	-94	199	215	71
1995 154	373	171	145	102	-133	-291	-353	-192	-134	-204	-26	-145	150	171	-30
1996 148	482	167	211	219	-176	-385	-212	-141	-92	-152	24	-90	194	202	14
1997 155	456	135	156	127	-276	-482	-235	-126	-100	-143	-38	-137	238	264	-25
1998 155	519	184	109	-75	-121	-332	-253	-115	-96	-152	-5	-140	263	285	-8
1999 149	549	220	108	-33	-142	-391	-163	-86	-50	-180	-35	-212	129	147	-17
2000 151	564	272	101	-46	-218	-540	-292	-158	-126	-171	-1	-191	104	119	-46
2001 152	651	360	262	-29	-90	-347	-165	-103	-84	-161	-28	-73	309	319	50
2002 157	685	313	239	-19	25	-205	-104	-77	-73	-149	48	-78	222	233	76
2003 163	581	182	56	-78	-313	-571	-289	-123	-85	-210	-32	-156	189	207	-61
2004 146	646	185	134	-77	-248	-514	-337	-135	-109	-179	13	-131	272	286	-29
2005 151	705	330	228	130	-150	-351	-252	-112	-90	-166	13	-85	243	244	45
2006 145	696	260	119	115	-158	-408	-251	-137	-88	-190	52	-83	185	195	19
2007 155	486	146	148	123	-152	-413	-208	-77	-50	-140	28	-200	246	259	1
2008 159	656	224	151	115	-243	-455	-238	-93	-80	-143	48	-243	105	89	-10
AVERAGE	531	253	179	69	-191	-409	-187	-100	-75	-153	5	-126	179	187	6

U.S. Operation of Non-Treaty Storage
Proposed Agreement-Opportunity Storage Use
Base Case

 MICA Summary
 Incr Study: AMXA1ARO : NTS : TE3AC : 2.5 MAF : ALT RESOURCE ORDER Date: 13-MAR-89 15:51:49
 Number of Games: 200
 Average over Low Water Years (Bottom 10 Percent)

US Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1989 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990 27	639	823	807	506	1009	998	619	191	189	0	125	44	26	26	482
1991 26	653	421	496	271	586	500	328	92	91	0	111	19	0	0	290
1992 18	966	714	691	550	824	752	250	175	174	0	41	0	0	0	414
1993 21	813	658	715	378	632	616	46	53	53	0	192	16	0	0	343
1994 30	991	812	704	248	347	321	52	36	36	0	71	0	0	0	298
1995 31	859	457	465	276	370	315	142	45	46	0	84	12	0	0	252
1996 29	814	475	540	302	393	502	220	65	65	0	175	60	0	0	295
1997 29	900	383	451	318	404	346	306	86	86	0	153	45	0	0	283
1998 23	775	315	371	292	445	366	261	30	30	0	101	30	0	0	249
1999 33	725	314	395	-19	529	603	0	0	0	0	450	549	323	279	321
2000 27	1059	378	575	0	828	777	0	0	0	0	525	467	210	186	401
2001 31	897	438	580	0	829	848	0	0	0	0	589	693	107	106	415
2002 25	1026	477	543	-85	863	908	0	0	0	0	576	469	138	137	410
2003 23	805	390	609	-32	796	675	-14	83	83	0	375	269	116	116	339
2004 24	931	467	540	249	821	824	64	193	193	0	476	304	44	44	409
2005 30	982	430	669	426	691	746	486	137	137	0	253	136	1	1	413
2006 32	823	437	627	472	591	624	306	168	169	0	350	198	1	1	383
2007 23	968	458	559	486	550	648	451	185	186	0	321	130	8	8	397
2008 26	763	238	378	262	452	614	308	108	108	0	171	21	57	56	281
AVERAGE	821	451	534	239	591	595	191	80	80	0	263	183	55	51	333

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BC Hydro Operation of Non-Treaty Storage
Proposed Agreement-Opportunity Storage Use
Base Case

 MICA Summary
 Incr Study: AMXALARO : NTS : TE3AC : 2.5 MAF : ALT RESOURCE ORDER Date: 13-MAR-89 15:51:49
 Number of Games: 200
 Average over Low Water Years (Bottom 10 Percent)

BC Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
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1989 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990 27	422	684	621	549	953	945	658	294	291	0	403	28	0	0	463
1991 26	640	334	244	212	623	482	468	110	109	0	97	27	0	0	270
1992 18	780	603	597	679	879	754	531	234	231	0	112	0	0	0	431
1993 21	685	456	501	476	687	697	286	54	54	0	135	0	0	0	331
1994 30	746	506	293	505	517	365	172	29	28	0	104	0	0	0	270
1995 31	525	366	359	414	509	354	69	46	46	0	206	10	0	0	238
1996 29	631	442	413	424	470	475	239	120	120	0	337	24	0	0	298
1997 29	573	175	383	295	560	486	129	24	24	0	293	39	0	0	246
1998 23	568	392	249	27	437	375	0	0	0	0	422	56	0	0	211
1999 33	661	227	336	-24	636	16	0	0	0	0	563	336	214	185	246
2000 27	704	446	414	0	541	0	0	0	0	0	555	402	203	179	271
2001 31	929	652	426	0	739	266	0	0	0	0	755	396	120	120	357
2002 25	817	376	439	0	471	466	0	0	0	0	397	150	13	13	261
2003 23	652	404	144	-27	295	307	0	0	0	0	296	153	32	31	188
2004 24	676	252	234	-60	583	582	0	0	0	0	453	216	10	10	245
2005 30	858	501	533	512	641	561	0	89	90	0	466	9	0	0	348
2006 32	749	397	280	419	374	380	0	89	90	0	316	45	0	0	254
2007 23	823	364	399	433	457	480	86	99	99	0	291	0	0	0	286
2008 26	789	414	266	348	231	130	0	43	43	0	99	9	0	0	194
AVERAGE	663	398	356	257	529	393	123	59	59	0	326	100	33	30	270

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U.S. Operation of Non-Treaty Storage
Proposed Agreement-Firm Use
Base Case

 MICA Summary
 Incr Study: IMXA2ARO : NTS : TE3AC : 2.5 MAF : FIRM USE : Date: 18-OCT-89 16:35:50
 Number of Games: 200
 Average over Typical Water Years (Mid 80 Percent)

US Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 153	-1153	-531	-465	51	-358	-53	-34	1	0	-3	29	-11	59	46	-206
1990 154	19	341	-177	10	-269	-83	-28	16	23	-5	-11	-42	54	59	-14
1991 154	226	203	-220	-29	-254	-94	-32	7	16	-16	0	-39	110	120	-11
1992 160	188	149	-208	13	-246	-124	-50	17	-22	-11	-45	-68	62	101	-27
1993 155	297	169	-274	-113	-211	-84	-8	29	73	-18	-56	-61	187	211	-9
1994 155	189	154	-275	-89	-264	-82	-37	38	79	-15	-44	-47	270	276	-15
1995 154	203	60	-315	-40	-327	-159	-54	25	60	-19	-67	-83	245	246	-43
1996 148	202	72	-314	-126	-335	-135	-47	78	86	-15	-92	-59	217	220	-46
1997 155	136	92	-266	-28	-259	-124	-41	57	103	-8	-116	-84	153	171	-38
1998 155	175	58	-301	-56	-228	-111	-4	13	65	-29	-49	-61	184	190	-32
1999 149	140	92	-253	-116	-197	-116	-34	28	46	-4	-47	-70	93	107	-39
2000 151	38	31	-215	-104	-235	-66	-73	2	22	-11	-28	-43	160	157	-45
2001 152	168	29	-219	-82	-283	-105	-55	43	49	-11	-25	-22	191	180	-31
2002 157	103	123	-180	-16	-323	-101	-87	25	71	-19	-42	-83	167	173	-34
2003 163	46	65	-212	-136	-212	-66	-19	4	44	-6	-20	-36	175	163	-34
2004 146	158	83	-198	-67	-231	-85	-18	13	40	-22	-31	-18	171	164	-20
2005 151	94	79	-210	-97	-202	-42	-52	20	47	-6	1	-48	155	149	-25
2006 145	98	21	-169	-57	-244	-80	-52	13	39	-21	-30	-59	112	132	-37
2007 155	136	15	-230	-75	-250	-96	-15	41	94	-17	-31	-32	141	130	-33
2008 159	99	81	-215	-111	-200	-40	-68	18	66	-7	-2	-35	89	92	-30
AVERAGE	78	70	-246	-63	-256	-92	-40	24	50	-13	-35	-50	150	154	-38

BC Hydro Operation of Non-Treaty Storage
Proposed Agreement-Firm Use
Base Case

 MICA Summary
 Incr Study: IMXA2ARO : NTS : TE3AC : 2.5 MAF : FIRM USE : Date: 18-OCT-89 16:35:50
 Number of Games: 200
 Average over Typical Water Years (Mid 80 Percent)

BC Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 153	-30	6	-75	-201	-671	-655	160	-9	-6	-132	-2	-14	121	121	-125
1990 154	222	383	317	188	-76	-328	129	-31	-27	-171	-16	-139	103	99	48
1991 154	503	292	221	75	-208	-449	4	-30	-22	-151	34	-67	107	108	28
1992 160	491	273	226	266	3	-502	13	-2	-15	-160	-2	-188	-36	-29	32
1993 155	518	290	299	321	106	-287	-227	-48	-53	-242	-26	-142	205	199	64
1994 155	532	273	278	242	37	-157	-131	-96	-91	-302	65	-151	195	198	66
1995 154	396	129	137	92	-40	-189	-351	-173	-134	-305	-14	-223	107	94	-35
1996 148	486	189	233	267	-20	-358	-167	-97	-75	-232	34	-145	146	127	28
1997 155	471	129	177	134	-254	-471	-178	-157	-146	-206	-8	-202	223	220	-28
1998 155	552	240	147	-49	-117	-344	-226	-95	-86	-215	-30	-169	252	251	-4
1999 149	572	256	165	-34	-112	-365	-152	-87	-49	-237	-44	-242	172	178	-7
2000 151	596	277	159	-46	-209	-463	-301	-169	-148	-242	-24	-221	134	132	-42
2001 152	678	347	273	-29	-59	-263	-151	-89	-75	-246	-44	-75	323	324	56
2002 157	701	313	260	-21	37	-175	-102	-74	-80	-190	62	-117	280	278	81
2003 163	580	174	68	-76	-264	-590	-288	-157	-99	-285	-29	-148	230	238	-63
2004 146	653	208	136	-52	-218	-542	-320	-122	-101	-235	-8	-150	264	266	-31
2005 151	715	307	265	209	-124	-339	-219	-105	-101	-260	19	-135	262	258	50
2006 145	764	379	160	193	-79	-354	-166	-83	-64	-298	27	-102	216	219	56
2007 155	538	186	115	179	-86	-325	-147	-34	-44	-212	24	-307	274	270	17
2008 159	650	290	139	160	-145	-398	-141	-79	-84	-200	34	-348	98	73	4
AVERAGE	529	247	185	91	-125	-378	-147	-87	-75	-226	3	-165	183	181	10

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U.S. Operation of Non-Treaty Storage
Proposed Agreement-Firm Use
Base Case

MICHA Summary

Incr Study: IMXA2ARO : NTS : TE3AC : 2.5 MAF : FIRM USE :

Date: 18-OCT-89 16:35:50

Number of Games: 200

Average over Low Water Years (Bottom 10 Percent)

US Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 25	-1150	-362	-180	415	-376	-35	-210	147	-45	0	573	57	250	59	-89
1990 27	69	265	319	328	-46	-5	-138	150	13	0	911	539	409	453	230
1991 26	315	282	152	325	30	60	-43	257	56	0	648	403	454	202	221
1992 18	297	353	149	316	-59	258	45	106	-129	0	865	442	427	268	250
1993 21	401	131	7	167	-161	204	-152	262	190	0	980	779	893	530	275
1994 30	385	303	167	303	-169	241	16	345	61	0	624	347	753	360	248
1995 31	513	368	188	323	-210	135	-105	197	24	0	780	576	754	425	272
1996 29	407	364	91	240	-214	278	-92	142	32	0	886	558	775	460	269
1997 29	256	129	206	53	-56	183	-120	173	189	0	865	615	777	424	243
1998 23	399	191	6	355	-34	223	208	266	146	0	772	538	489	259	270
1999 33	231	129	126	49	-27	161	-48	109	8	0	900	569	618	348	219
2000 27	248	8	120	143	-137	240	-31	97	39	0	1062	832	901	545	273
2001 31	415	133	63	68	5	215	2	64	-1	0	904	586	841	512	258
2002 25	258	207	234	158	-23	301	-142	68	75	0	942	576	838	445	269
2003 23	206	156	145	148	-221	84	5	123	-58	0	884	455	767	551	213
2004 24	185	63	27	41	60	72	19	153	102	0	963	699	909	588	250
2005 30	281	42	83	119	-148	136	-35	82	67	0	988	733	849	524	247
2006 32	164	123	151	92	-66	174	16	104	62	0	800	483	762	392	216
2007 23	215	72	173	119	-173	208	-65	91	40	0	1008	688	907	559	253
2008 26	124	65	146	142	31	206	-113	143	111	0	713	346	640	333	189
AVERAGE	217	152	121	190	-99	167	-51	153	50	0	851	542	706	413	229

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Proposed Agreement-Firm Use
Base Case

MICA Summary

Incr Study: IMXA2ARO : NTS : TE3AC : 2.5 MAF : FIRM USE :

Date: 18-OCT-89 16:35:50

Number of Games: 200

Average over Low Water Years (Bottom 10 Percent)

BC Non-Treaty Operation (MW)

YEAR / NUM	SEP	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUN	JUL	AG1	AG2	ANN AVG
1989 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1990 27	310	404	727	374	1025	927	618	241	268	0	674	188	0	0	458
1991 26	595	284	314	236	573	472	271	211	173	0	192	35	0	0	264
1992 18	657	414	592	753	857	798	316	271	269	0	434	61	0	0	429
1993 21	573	360	489	569	653	639	268	32	22	0	551	42	0	0	348
1994 30	667	380	262	467	620	499	223	52	52	0	364	61	0	0	300
1995 31	595	225	312	418	538	449	268	57	57	0	367	127	0	0	280
1996 29	507	332	461	490	601	605	340	59	59	0	418	81	1	1	325
1997 29	582	162	380	394	528	483	225	16	16	0	350	58	9	8	265
1998 23	560	361	188	94	472	408	0	0	0	0	410	215	37	37	229
1999 33	738	290	457	-14	688	77	0	0	0	0	622	374	130	129	280
2000 27	699	381	340	0	546	43	0	0	0	0	582	395	197	195	265
2001 31	889	639	488	0	768	682	0	0	0	0	759	397	67	65	391
2002 25	813	390	467	0	522	542	0	0	0	0	513	282	24	24	296
2003 23	692	415	113	-7	337	319	0	0	0	0	347	181	27	27	202
2004 24	778	228	248	-21	629	655	0	1	1	0	441	267	4	4	269
2005 30	829	460	489	666	655	573	0	101	101	0	480	46	11	11	359
2006 32	788	390	329	488	374	352	0	71	71	0	316	43	10	9	263
2007 23	829	331	377	536	473	381	228	20	20	0	110	0	0	0	274
2008 26	732	408	176	319	255	125	3	9	9	0	19	0	0	0	170
AVERAGE	646	344	362	284	557	444	135	55	54	0	404	147	28	27	284

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