

ASPINALL UNIT OPERATIONS ASSESSMENT

=== Part 1 --- NOTATIONS AND CONSTANTS

Notations -- acre-feet or ac-ft expressed as whole number - 8,679
 -- cubic feet per second or cfs expressed with tenths - 567.8

Constants: 1 cfs for a month equals 60.18 acre-feet

=== Part 2 --- WATER RECEIVED INTO ASPINALL UNIT -- DRY YEAR - 1989

Actual for 1989	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTALS in acre-feet
Monthly Inflows in average cfs for month - USDOE (1994) SLCA Electric Power Marketing, DEIS, pp. C-36 - C-37													
into Blue Mesa	492.0	448.0	385.0	439.0	431.0	729.0	1,622.0	2,033.0	2,077.0	968.0	915.0	469.0	662,461
into Morrow Point	38.0	37.0	37.0	-15.0	24.0	66.0	207.0	192.0	102.0	37.0	88.0	63.0	52,718
into Crystal	186.0	98.0	92.0	73.0	46.0	99.0	224.0	244.0	183.0	64.0	43.0	66.0	85,335
average total cfs inflow to Aspinall Unit for month	716.0	583.0	514.0	497.0	501.0	894.0	2,053.0	2,469.0	2,362.0	1,069.0	1,046.0	598.0	800,514
inflows in acre-feet	43,089	35,085	30,933	29,909	30,150	53,801	123,550	148,584	142,145	64,332	62,948	35,988	
cumulative inflow in ac-ft	43,089	78,174	109,106	139,016	169,166	222,967	346,516	495,101	637,246	701,578	764,527	800,514	

=== Part 3 -- WATER RELEASES FROM ASPINALL UNIT -- DRY YEAR - 1989

Evaporation in cfs - USBR (1994) SLCA Electric Power Marketing - DEIS; pp. C-34 - C-35.													
from Blue Mesa	6.4	3.2	2.0	2.0	2.8	6.2	10.8	16.0	21.4	22.2	17.2	13.6	
from Morrow Point								2.1	14.3	13.8	1.4		
from Crystal													
Total evaporation in ac-ft	385	193	120	120	169	373	650	1,089	2,148	2,166	1,119	818	9,352
Released in cfs from Crystal - USDOE (1994) SLCA Electric Power Marketing, p. C-35.													
for power	960.0	303.0	293.0	293.0	306.0	293.0	1,193.0	1,334.0	1,412.0	1,415.0	1,464.0	1,395.0	
for other purposes													
total released in cfs	960.0	303.0	293.0	293.0	306.0	293.0	1,193.0	1,334.0	1,412.0	1,415.0	1,464.0	1,395.0	
total in acre-feet	57,773	18,235	17,633	17,633	18,415	17,633	71,795	80,280	84,974	85,155	88,104	83,951	641,579
cumulative releases in ac-ft	57,773	76,007	93,640	111,273	129,688	147,321	219,115	299,396	384,370	469,524	557,628	641,579	

=== Part 4 -- ENDANGERED SPECIES FLOWS

Whitewater Gage for designated DRY year of 1989 - USBS Water Resource Data Report													
Monthly average flow in cfs	1,143.0	944.0	854.0	870.0	989.0	1,356.0	2,542.0	1,878.0	1,392.0	824.0	1,005.0	1,207.0	902,941
Projected habitat requirement at Whitewater Gage for endangered fish - USFWS (April 1992) Gunnison River Study Flows.													
For dry year in cfs	700.0	700.0	700.0	700.0	700.0	700.0	900.0	3,000.0	2,000.0	1,000.0	1,000.0	1,000.0	788,358
dif. from Whitewater in cfs	443.0	244.0	154.0	170.0	289.0	656.0	1,642.0	-1,122.0	-608.0	-176.0	5.0	207.0	
cumulative difference in ac-ft	26,660	41,344	50,611	60,842	78,234	117,712	216,528	149,006	112,416	101,825	102,125	114,583	
Projected requirement at Redlands Power Canal Diversion - 750 cfs for Redlands plus 300 cfs for fish bypass.													
Required in cfs	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	1,050.0	758,268
dif. from Whitewater in cfs	93.0	-106.0	-196.0	-180.0	-61.0	306.0	1,492.0	828.0	342.0	-226.0	-45.0	157.0	
cumulative difference in ac-ft	5,597	-782	-12,578	-23,410	-27,081	-8,664	81,123	130,952	151,533	137,933	135,224	144,673	

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTALS in acre-feet
=== Part 5 -- COMMITMENTS BELOW CRYSTAL													
Commitments through Gunnison Tunnel - USBR (1990) AB Lateral WEIS p. 99.													
average for irrigation - cfs	464.0	56.0	8.0	11.0	8.0	66.0	624.0	875.0	795.0	914.0	944.0	803.0	
in acre-feet	27,924	3,370	481	662	481	3,972	37,552	52,658	47,843	55,005	56,810	48,325	
cumulative in acre-feet	27,924	31,294	31,775	32,437	32,918	36,890	74,443	127,100	174,943	229,948	286,758	335,082	
hydropower flows in cfs	none												
Total through Tunnel - ac-ft	27,924	31,294	31,775	32,437	32,918	36,890	74,443	127,100	174,943	229,948	286,758	335,082	
Commitments down Black Canyon as represented by actual releases in 1992 as DRY year - USBR (1993) Summary of actual releases for 1992.													
to rights below Canyon	0	0	8,000	19,400	21,200	6,800	0	0	0	0	0	0	55,400
to NPS/Endangered Species	18,400	17,900	18,400	18,400	17,300	18,400	17,800	33,100	17,800	18,400	18,400	17,900	232,200
to State of Colorado	11,300	9,500	200	24,900	3,600	19,400	13,200	42,500	37,100	32,100	27,600	10,600	232,000
Total down Canyon in acre-feet	29,700	27,400	26,600	62,700	42,100	44,600	31,000	75,600	54,900	50,500	46,000	28,500	519,600
av. cfs	493.5	455.3	442.0	1,041.9	699.6	741.1	515.1	1,256.2	912.3	839.1	764.4	473.6	
cumulative in acre-feet	29,700	57,100	83,700	146,400	188,500	233,100	264,100	339,700	394,600	445,100	491,100	519,600	
Total committed for uses below Crystal													
Sum of releases in ac-ft	57,624	30,770	27,081	63,362	42,581	48,572	68,552	128,258	102,743	105,505	102,810	76,825	854,682
cumulative releases in ac-ft	57,624	88,394	115,475	178,837	221,418	269,990	338,543	466,800	569,543	675,048	777,858	854,682	
average over month in cfs	957.5	511.3	450.0	1,052.9	707.6	807.1	1,139.1	2,131.2	1,707.3	1,753.1	1,708.4	1,276.6	
Difference between commitments below Crystal and releases - if commitment is greater than release, figure is negative.													
Net difference in cfs	2.5	-208.3	-157.0	-759.9	-401.6	-514.1	53.9	-797.2	-295.3	-338.1	-244.4	118.4	
Cumulative difference - ac-ft	149	-12,386	-21,835	-67,564	-91,731	-122,670	-119,427	-167,405	-185,174	-205,523	-220,230	-213,103	

>> Note 1

=== Part 6 --- BLUE MESA RESERVOIR OPERATIONS

For DRY YEAR 1989 -- Releases in cfs from Blue Mesa - USDDE (1994) SLCA Electric Power Marketing, p. C-36.

for power	650.0	180.0	150.0	200.0	250.0	200.0	760.0	900.0	1,150.0	1,300.0	1,300.0	1,300.0	
for other purposes													
Total in cfs from Blue Mesa	650.0	180.0	150.0	200.0	250.0	200.0	760.0	900.0	1,150.0	1,300.0	1,300.0	1,300.0	
total in acre-feet	39,117	10,832	9,027	12,036	15,045	12,036	45,737	54,162	69,207	78,234	78,234	78,234	
cumulative releases in ac-ft	39,117	49,949	58,976	71,012	86,057	98,093	143,830	197,992	267,199	345,433	423,667	501,901	

Blue Mesa Reservoirs's capacity is 940,700 acre-feet, of which live storage is 829,500 acre-feet and dead storage is 111,200 acre-feet.

Management targets are 581,000 acre-feet of live storage by December 31 and to fill by July 31.

USBR (1992) Information Packet distributed for Black Canyon Contract, p. 9.

assuming 111,200 acre-feet of dead storage plus

a live storage target of	700,000	650,000	581,000	829,000	829,000	829,000	829,000	829,000	829,000	829,000	800,000	750,000	
gives management for													
acre-feet in reservoir	811,200	761,200	692,200	940,200	940,200	940,200	940,200	940,200	940,200	940,200	911,200	861,200	

Starting with 449,000 acre-feet of live storage in reservoir:

Inflow-Evap.-Releases in cfs	-164.4	264.8	233.0	237.0	178.2	522.8	851.2	1,117.0	905.6	-354.2	-402.2	-844.6	
net change in acre-feet	-9,894	15,936	14,022	14,263	10,724	31,462	51,225	67,221	54,499	-21,316	-24,204	-50,828	
Storage+Net Change in acre-feet	439,106	455,042	469,064	483,327	494,051	525,513	576,738	643,959	698,458	677,142	652,938	602,110	
Releases to meet target	0	0	0	0	0	0	0	0	0	0	0	0	
Leaving live storage of - ac-ft	439,106	455,042	469,064	483,327	494,051	525,513	576,738	643,959	698,458	677,142	652,938	602,110	
and Total storage of - ac-ft	530,306	566,242	580,264	594,527	605,251	636,713	687,938	755,159	809,658	788,342	764,138	713,310	

>> Note 1 --- More water than necessary appears to have been released for endangered fish and Redlands requirements.