REDRAFT:RJS:mb
January 23, 1981

MEMO

TO: Robert J. Sutter

FROM: Mr. Bob Sutter

SUBJECT: BOISE RIVER RESERVOIR FILL AND STORED WATER USE

Preparatory to drafting the reservoir fill section for the new Boise River Reservoir Operations Manual, I have examined previous watermaster reports and talked with the watermaster concerning the fill. The main question is whether or not the present fill criteria is consistent with volumes, rates, and priority dates of existing water rights. The remainder of this memo explains the current methods and then discusses the validity of these methods and possible changes.

Reservoir fill is computed each spring when the three main river reservoirs (Anderson, Arrowrock, Lucky Peak) reach their maximum combined contents. The logic in this is that at this time, the natural flow has diminished and/or irrigation demand has increased such that there is no excess water for storage and, therefore, the reservoirs can accrue no more. This would normally occur at or after the beginning of the irrigation season (April 1). It is possible that maximum main river storage could occur prior to April 1 if releases to Lake Lowell exceeded the natural flow. It is unclear whether such releases would, in some situations, affect the computation of reservoir fill.

In average to above average water years, the fill computation is relatively simple with Arrowrock receiving the first 286,600

acre-feet of new fill, Anderson Ranch the next 423,200 acre-feet (or an amount necessary to reach 423,200 considering previously unused storage), and the remainder is credited to Lucky Peak. Previously unused storage (carryover) in Arrowrock is treated as new fill while carryover in Anderson Ranch and Lucky Peak is retained in each user's storage account. It appears that the above procedure is followed whenever runoff is sufficient to fill Arrowrock and at least partially fill Anderson Ranch. It also appears that carryover and actual contents of Lake Lowell do not enter into the fill computations of the main river reservoirs in these years. To include Lake Lowell in such a computation would in fact be difficult since storage is normally being used from Lake Lowell several days before the main river reservoirs.

In a below average year when runoff is so low that Lake Lowell and Arrowrock cannot both be filled, there appears to be no set procedure for allocating the new fill between Lake Lowell and Arrowrock. When such a condition occurs (as did in 1977), apparently the Boise Project may wish to classify a portion of storage in Lake Lowell as Anderson Ranch storage to reduce the fill of Arrowrock Reservoir by making more space in Lowell and allowing more storage there. It should be noted here that this in no way affects the physical location of the water at the beginning of the season, but it does affect somewhat the later distribution of the water. The amount transferred is apparently based on records kept by the Boise Project Board of Control.

There is no evidence that this allocation of fill would occur differently should another water short year such as 1977 take place. Because of the Anderson water accounting transfer, Lake Lowell was allowed to accrue storage water in a main river reservoir without actually diverting the water through the New York Canal.

In 1977, the Water and Power Resources Service developed a procedure to include Lake Lowell in the fill allocation. This was done because the old method which did not include Lake Lowell did not "fairly account for carryover in Lake Lowell." The total fill is computed as the sum of the maximum storage in the three main river reservoirs, the maximum storage in Lake Lowell, and Lake Lowell "feed water". The new fill is then distributed first to Lake Lowell and Arrowrock proportionally to their capacities, then to Anderson Ranch and, finally, to Lucky Peak.

In order to assess the above fill techniques, it is necessary to identify the water rights for the four reservoirs involved. From a search of licenses, permits, and decrees, the following rights were found:

Priority	Rate (cfs)	Volume (a-f)	Remarks*/
September 1, 1864	20.0	-	New York Canal (SD)
May 1, 1866	15.1	-	New York Canal (SD)
June 1, 1869	0.34	-	New York Canal (SD)
August 20, 1888	8.9	-	New York Canal (SD)
October 1, 1887	1.2	-	New York Canal (SD)
March 23, 1900	219.10	-	New York Canal (SD)
March 23, 1900	58.86	-	New York Canal (BD)
December 14, 1903	1354.58	-	New York Canal (BD)
April 1, 1909	292.5	-	New York Canal (BD)
June 16, 1909	634	-	New York Canal (BD)
January 13, 1911	8000		Arrowrock (BD)
August 18, 1924	300		New York Canal (L)
June 25, 1938		15,000	Arrowrock (L)
December 9, 1940		493,161	Anderson (L)
April 12, 1963		307,000	Lucky Peak (P)

*/ SD - Stewart Decree
BD - Bryan Decree
L - License
P - Permit

The New York Canal rights total 2904.58 cfs and are all prior to the other reservoirs except for the 1924 right which is junior to Arrowrock Reservoir's 1911 right. Only the 1903 right specifically mentions storage in Lake Lowell as a purpose, and all rights of the New York Canal prior to the 1903 right are held by individuals or irrigation districts. The 1903 and subsequent rights are held by the federal government.

There are a number of questions that must be answered by our Department to determine if we should recommend the adoption of a specific fill procedure and, if so, what that procedure should be. Major questions are as follows:

a) Must the New York Canal physically divert flow in the non-irrigation season in order to use its right, or can

Lake Lowell store its water in a main river reservoir? In other words, because of its offstream nature, should it be treated like other canals, or simply as a main river reservoir?

b) Are the reservoirs on the Boise River limited to complete fill only once from November 1 to November 1, and if so, does this apply to Lake Lowell?

c) Can stored water from Anderson Ranch or Arrowrock that is diverted to Lake Lowell via the New York Canal be "moved" back to Anderson Ranch so that it can be rediverted in a low water year?

d) In the event that answers to the above questions indicate that Lake Lowell should be accounted for in a manner parallel to the three main river reservoirs, should the watermaster treat the New York Canal as a branch of the main river and account for stored water use above and below Lake Lowell?

e) Can all of the New York Canal rights listed earlier be used to accumulate storage in Lake Lowell in the non-irrigation season?

f) When both Arrowrock and Lake Lowell have filled, can inflow below Arrowrock be credited to Anderson Ranch Reservoir?

All of the above questions relate in some way to the off-stream storage in Lake Lowell. It is doubtful whether the usual

water right conventions can provide the necessary answers and, therefore, we possibly cannot provide a written fill procedure for the Boise. This may be particularly so since the federal government owns the rights for all of the reservoirs.

Concerning the new fill procedure developed by the Water and Power Resources Service, the information we have received would have to be explained in much greater detail to determine if it would work in all cases. It is also unknown whether or not the new procedure has been formally adopted and used in the years subsequent to 1977, or simply forgotten.

Regardless of the answers to the above questions, it is certain that the accounting of what water is going where and under what right on the Boise River is very confusing to the observer.

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Memorandum

To: RO 100, 700, 760
Project Superintendent, CSPO, Boise, Idaho

From: 761

Subject: New Method Adopted for Allocation of Boise System Storage

I. Introduction

The 1977 water year appears to be the driest of record for the Boise River. Insufficient water will accrue to Arrowrock Reservoir to fill its storage right. This is the primary factor which makes the allocation method currently used unreasonable and inadequate. A new method is proposed which calculates storage carryover and new accrual more strictly. This new method has been adopted after consultation with the Central Snake Project Office, the Boise River Watermaster, and the manager of the Boise Project Board of Control.

II. How the Old Method Works

As an example, the 1976 allocation was done as follows:

Reservoir	Content on day of maximum upper system storage (June 23, 1976) in A.F.
Arrowrock	266,557
Anderson	423,368
Lucky Peak	264,756
Total	954,681

Note: Lake Lowell has not entered into the total storage computation under the old method. On June 23, it contained 122,088 A.F. and maximum for the year was 167,789 on May 1. It has been assumed to fill if its maximum content plus subsequent feed water exceeds its 177,000 A.F. capacity.

The allocation proceeds as follows:

Total storage three reservoirs	954,681	
Accrued to Arrowrock	-286,600	(capacity)
	688,081	
Accrued to Anderson	-423,178	(capacity)
Balance accrued to Lucky Peak	244,903	(88% capacity)

NOTE: Lucky Peak carryover is erased if water is spilled for flood control and Lucky Peak is then reallocated with new accrual.

As will be shown, the old method does not fairly account for carryover in Lake Lowell.

III. The Proposed Allocation Method

We feel that the Lake Lowell storage right must be included in the allocation procedure. Lake Lowell is the first priority storage right. It is reasonable to assume, however, that Arrowrock Reservoir has essentially the same right and that Lake Lowell and Arrowrock accrue water simultaneously. Also, Anderson Ranch water which is diverted to Lake Lowell but not used, must be accounted for to fairly allocate the system.

The new method begins by establishing carryovers at the end of the irrigation season. The determination for carryover on October 18, 1976, would be as follows: (using round numbers)

Total storage 4 reservoirs 10/18 (all carryover)	591,000
Anderson carryover from District 63 watermaster report	-219,000
Unused Anderson water in Lake Lowell from Boise Project Board of Control records	- 78,000
Lucky Peak carryover 10/18 from CSPO	-242,000
Lake Lowell and Arrowrock carryover	52,000

The allocation proceeds as follows:

Maximum storage upper system for year (April 9)	665,000
Maximum storage Lake Lowell after October 18	124,000
Lake Lowell feed water (subsequent to October 18)	0
TOTAL	789,000
Less Anderson carryover	-297,000
Less Lucky Peak carryover 4/11 (after winter releases)	-182,000
Total Lake Lowell and Arrowrock water to distribute	310,000

The 310,000 is divided between Lake Lowell and Arrowrock according to their active storage capacities. Arrowrock has 61.82 percent of the total active capacities of 463,600 and Lake Lowell has 38.18 percent. This allocates 191,600 to Arrowrock and 118,400 to Lake Lowell. Arrowrock is further divided between Board of Control water (89.28%) and other users (10.72%). This gives the Board of Control about 171,060, and the others about 20,540 in Arrowrock.

IV. Ordinary Application of the New Method

It is useful to consider how the new method which includes Lake Lowell in the storage computations would work in a larger year. A rework of the 1976 allocation from Section II using the new method would look like this:

Total storage 4 reservoirs 10/15		606,089	
Anderson carryover from District 63 report		-301,594	
Unused Anderson water in Lake Lowell from Boise Project Board of Control records		0	
Lucky Peak carryover 10/15 from CSPO		-202,292	
Lake Lowell and Arrowrock carryover		102,203	
Maximum storage upper system (June 23)		954,681	
+ Maximum storage Lake Lowell (May 1)		167,789	
+ Lake Lowell feed water after 10/15		9,211	1/
	TOTAL	1,131,681	
Less Anderson carryover		-301,594	
Less Lucky Peak carryover (flood spills)		0	
	TOTAL TO ALLOCATE	830,087	
Accrued to Lake Lowell		-177,000	
		653,000	
Accrued to Arrowrock		-286,600	
		366,487	
Accrued to Anderson		-121,606	2/
Balance accrued to Lucky Peak		244,881	(88%)

1/ Maximum storage plus feed water not greater than 177,000 capacity.
2/ Total Anderson cannot exceed 423,200.

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