

MEMORANDUM

TO: FILE NO. D65-2149

FROM: MIKE STUBBLEFIELD

RE: STORAGE CAPACITY OF PADDOCK VALLEY RESERVOIR

DATE: June 8, 2005

In researching the files for Paddock Valley Dam and Reservoir, I found several discrepancies in the storage capacity of the reservoir. The following is a chronological history of events relating to the reservoir storage capacity:

- 1906: Reservoir contour map approved by State Engineer on May 9, 1906. The map does not include a capacity curve of table, but indicates the reservoir capacity is 46,700 ac-ft at elevation 3410 ft.
- 1912: A general plan for construction of a dam in Paddock Valley dated December 16, 1912, contained the following reservoir capacity table:

<u>Contour</u>	<u>Feet</u>	<u>Acres</u>	<u>Ac-ft</u>	<u>Total Ac-ft</u>
3350	0	0	0	0
3360	10	30	0	0
3370	20	790	4100	4100
3380	30	990	8900	13000
3390	40	1150	10700	23700
3400	50	1390	12700	36400
3410	60	1440	14150	50550

- 1917: Plans for dam submitted in December 1917 and approved by the state engineer for constructing a concrete arch dam with a crest elevation at 3392 ft and a spillway elevation at 3389 ft.
- 1918: Letter dated August 30, 1918, states that because of fractured rock, the dam will be constructed to elevation 3989 ft and the spillway to elevation 3985.5 feet, with provisions for flashboarding the spillway to elevation 3989 ft, where storage is 30,000 ac-ft.
- 1928: Memo dated April 1928 indicates that a reservoir capacity curve exhibited by Jasper Roe, President of the Irrigation District, showed that at the reservoir's present level, elevation 3379.5 ft, the storage in the reservoir was approximately 18,000 ac-ft, and that the total capacity of the reservoir at the dam crest, elevation 3389 ft was 30,000 ac-ft.
Letter dated October 29, 1928, contains a plan for lowering spillway crest to elevation 3379.0 ft because of leakage through the dam abutments, and the letter states that at this elevation the reservoir capacity is approximately 19,000 ac-ft.
- 1933: Inspection report dated June 7, 1933 indicates the spillway was completed in the fall of 1932 and that the reservoir capacity is 14,500 ac-ft; however, the elevation is unknown. Note: the 1949 storage capacity curve indicates a capacity of approx. 14,800 ac-ft at elevation 3377.0 ft, which is the actual spillway crest for the old dam, using old dam datum.

1940: A reservoir capacity table attached to a May 16, 1940 letter indicates the reservoir volume as follows:

<u>Assumed Elevation</u>	<u>Water level below dam crest</u>	<u>Water in reservoir</u>	<u>Water delivered</u>
3377 ft	12	18,132 af	14,300 af
3375 ft	14	15,850 af	12,000 af
3373 ft	16	13,600 af	9,900 af
3371 ft	18	11,400 af	8,000 af
3369 ft	20	9,140 af	6,200 af
3367 ft	22	6,950 af	4,600 af
3365 ft	24	5,260 af	3,250 af
3363 ft	26	3,950 af	2,000 af
3361 ft	28	2,750 af	1,000 af
3359 ft	30	1,660 af	0 af
3354 ft	35	460 af	
3349 ft	40	130 af	
3347 ft	42	0 af	

1948: Because of excess leakage through the concrete dam abutments, plans were formulated and approved in September 1948 for constructing a new earth dam approximately 540 feet upstream of concrete dam. The dam was to be constructed with the crest at elevation 3400 ft and the spillway crest at elevation 3393 ft.

1949: A Storage capacity curve constructed by Virgil Johnson, dated 2/18/49, indicates that the storage capacity of the reservoir at elevation 3380 ft is 18,132 ac-ft, at elevation 3389 ft is 30,800 ac-ft, and at elevation 3393 ft, the spillway crest of the new dam, is 36,400 ac-ft. A note on the plan indicates that the capacity curve was obtained from records in the State Reclamation Engineer's Office and that no new capacity surveys were made.

1950: A letter dated November 17, 1950 indicates the net gain in elevation between the new dam and the old dam is 13 feet, which correlates into an increase in storage capacity at the new dam of 1123 times 13, or 14,600 ac-ft.

2005: A survey of the old and new dams was conducted and the elevations are as follows:

	<u>IDWR assumed Elevation (ft)</u>	<u>Using Old Dam Elev. Datum (ft)</u>	<u>Using New Dam Elev. Datum (ft)</u>
Crest of new dam	97.0	3390.0	3400.0
New spillway crest	90.0	3383.0	3393.0
Crest of old dam	96.0	3389.0	3399.0
Old Spillway Crest	84.0	3377.0	3387.0

Conclusions: Based on the 2005 survey, there appears to be a 10 ft bust between the old dam elevation datum and the new dam elevation datum. Using the old dam elevation datum, it appears the spillway crest at the new dam is actually at elevation 3383.0 ft. Old records indicate

Memo
RE: D65-2149
Page 3 of 3

that 18,000 to 19,000 ac-ft of storage is somewhere between elevation 3377 and 3380 ft, disregarding old documents before 1917. Several different documents indicate that at elevation 3389.0 ft, the storage capacity is approximately 30,000 ac-ft. The 1949 reservoir capacity curve indicates that at elevation 3380 ft, the reservoir capacity is 18,132 ac-ft, and at elevation 3389 ft, the reservoir capacity is approximately 30,800 ac-ft, which appears to be in the ball park. Assuming the crest elevation of the new spillway is 3383.0 feet, gives a reservoir capacity at full pool of 22,300 ac-ft, based on the 1949 capacity chart. By the 2005 survey, the actual net gain from the old dam to the new dam is 6 feet, from elevation 3377 ft to elevation 3383 ft and not 13 feet as stated in 1950.

The other discrepancy that I cannot account for is what is the actual elevation at which 18,132 ac-ft storage capacity occurs, which appears to be the capacity of the old dam at the old spillway crest? The following discrepancies occur in the history log:

<u>Date</u>	<u>Elevation Stated</u>	<u>Storage Capacity Stated</u>
April 1928	3379.5 ft	±18,000 ac-ft
October 1928	3379.0 ft	±19,000 ac-ft
1940	3377.0 ft	18,132 ac-ft
1949	3380.0 ft	18,132 ac-ft

My conclusion from the data that I have found in our files is that the actual storage capacity of Paddock Valley Reservoir is 22,300 ac-ft, based on the 1949 reservoir capacity chart, with the new spillway crest at elevation 3383.0 ft.