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Water Resources

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**DEPARTMENT OF
WATER RESOURCES**

January 7, 2008

Mr. Jeff Peppersack
Idaho Department of Water Resources
322 E. Front Street
PO Box 83720
Boise, Idaho 83720-0098

Re: Fish Creek Reservoir Company – Aquifer Recharge Plan
Project No. 052-05-2005

Dear Jeff:

I have reviewed the information provided under a cover letter from David Tuthill dated October 3, 2007. The information included staff review notes, a memorandum by Tim Luke describing available records for Fish Creek reservoir and water deliveries, and correspondence from 1960 containing some additional reservoir fill data. This letter contains my comments and thoughts regarding the issues identified in the staff review notes. At some time in the near future, I would like to have another meeting or conference call with you and Mr. Tuthill to discuss all of these issues and see if we can arrive at a consensus so the plan can be finalized.

First, one clarification regarding the use of reservoir water: While almost all water users within the Fish Creek Reservoir Company service area have natural flow rights, most have late-priority rights circa 1905, and rely almost exclusively on the water stored in the reservoir.

Additional data incorporation

Based on Tim Luke's memo, it appears that much information regarding storage deliveries is available, but fill data was limited to 1954-1959 and 1985-1987, in addition to the years covered in the preliminary report. Please let me know if you have any additional data on peak reservoir content. The above data was incorporated into the analysis, resulting in a total of 33 years of data for 1954-2006. This resulted in slightly different statistics for reservoir fill. The percentage of years the reservoir fills and spill is 54.5%. The relationship between Little Wood runoff and Fish Creek peak reservoir content is unchanged, but the period of record for the simulated runoff is longer, resulting in the following estimated statistics for potential recharge:

Mean [ac-ft]	5780
Median	7685
Maximum	8896
Minimum	0
% zero years	8.5%
% maximum years	44.7%
Upper quartile	8896
Lower quartile	2460

These are essentially the same as those presented in the report – certainly within the margin of error of estimation.

Mechanism for recharge

As noted in the preliminary report, water will be directed to the lava fields east of Carey, where it will spread and infiltrate. A similar phenomenon was observed during the runoff of 2005 and 2006, when a significant amount of water naturally reached the lava fields. It appears that water can efficiently be recharged without constructing defined infiltration basins.

Recharge area evaporation

The proposed recharge area is within the basalt flows east of Carey into which Fish Creek discharges. It is difficult to estimate a precise water surface area since the recharge may not occur within a well-defined ponded area. An assumed average area of 80 acres over the period of recharge should be conservative. Evaporation data from Allen & Robison (2007) for shallow ponds was used to estimate cumulative evaporation depth over the period April through June. The Picabo NWS station and the Arco station both yield nearly identical results: 1.00 feet and 1.02 feet, respectively. Using an average of 1.01 feet yields 80.8 acre feet for an 80-acre recharge area. A more accurate value could be calculated based on observed water extent when water is actually discharged to the site.

Location and timing of recharge benefit

The attached plots show the predicted increase in Snake River reach gain in terms of percent of water recharged. The “new model” was used to make these runs, with a 1,000 ac-ft recharge occurring every year in the spring

trimester (April – June). Due to the proximity of the recharge, short-term benefits will likely be small except near the recharge area. For example, after 10 years only 20% of the total increase in Snake River reach gain is predicted to be realized. However, the value as long-term mitigation could be significant, depending on the location of the water usage to be mitigated. The model predicts, at steady state, that 69% of the total benefit will occur in three reaches: 39% in Near Blackfoot to Neeley, 18% in Devils Washbowl to Buhl, and 12% in Shelley to Near Blackfoot. The benefit to all other reaches is less than 10%. These results indicate that the recharge may be useful in mitigating for groundwater pumping depletions affecting the natural flow water supply for the Surface Water Coalition members and the spring outflows at Blue Lakes Spring, Crystal Springs, and others in the vicinity.

The magnitude and timing of benefits will be analyzed for individual proposals to lease or otherwise utilize the recharge for mitigation. It does not appear that these factors should carry much weight in terms of IDWR evaluating and approving the overall plan as a general mechanism.

More detail on measuring plan

Section J of the preliminary report describes the proposed measuring plan. What additional information is required for IDWR to complete the review?

Analysis of change from irrigation storage to groundwater recharge

Mitigation credit should be limited to the volume available and actually delivered to the recharge site. This will be up to 8,896 ac-ft per year.

Whether the mitigation credit should be limited in some way according to historical consumptive use is an important question that should be resolved. The question has been discussed with the current and former Directors of IDWR, but no definite resolution has been reached. A comparison might be made to the recent ESPA water calls and the various water replacement plans that have been approved. For example, the recharge activity that occurred last October-November within the Northside Canal Company system utilized storage water from the Upper Snake system. IGWA and the Idaho Dairyman's Association provided 27,500 ac-ft of recharge, and it is my understanding that IDWR allowed 1-for-1 mitigation credit without an analysis of the historical consumptive use of this water. Similarly, storage volume approved for direct replacement water has been allowed at face value,

e.g. 1,000 ac-ft in Palisades Reservoir equals 1,000 ac-ft of mitigation. Perhaps the implied assumption throughout the various water call evaluations is that the consumptive use fraction (irrigation efficiency) of the water use of the entity benefited by the replacement water is roughly equivalent to the historical consumptive use fraction of the mitigation water? Further discussions with the Director are warranted.

Seepage losses proposed to be credited toward recharge are outlined in Section J.2. of the preliminary report. It seems clear that seepage occurring in the late winter or spring prior to the commencement of irrigation deliveries (either natural flow or storage) should be credited toward recharge, because no water would otherwise have been in the creek. The exception to this would be during a time when the reservoir would have filled and spilled with the spillway at its original height – in that case, water would have been in the creek anyway and therefore a recharge credit may not be appropriate. Measured releases can be used to determine whether the reservoir would have filled and the date at which the spill would have commenced. Seepage credit calculation is more problematic after delivery of irrigation water commences. Section J.2. outlines a possible approach. I believe the guiding principal should be that the credit is equal to the seepage in a given year that occurs due to the recharge releases that would not have occurred had the spillway been at the original height. This is, of course, easier stated than calculated. Further discussions are warranted.

It would be preferable to specify recharge in terms of a volume, rather than a diversion rate.

Mechanism for water right change

Option 1 – Transfer to recharge use. A volume of 8,896 ac-ft could be changed from irrigation storage to recharge storage, so the water right might possibly look like:

Irrigation Storage	1/1-12/31	5,515 ac-ft
Irrigation From Storage	4/15-10/31	5,515 ac-ft
Recharge Storage	1/1-12/31	8,896 ac-ft
Recharge From Storage	3/1-7/31	<u>8,896 ac-ft</u>
TOTAL		14,411 ac-ft

This would only be acceptable if the change to recharge were not permanent. The company would need to reserve the ability to convert the recharge portion

back to irrigation at such time as the dam is reconstructed. Alternatively, a structure like the following might be appropriate, or would this run afoul of enlargement restrictions?

Irrigation Storage	1/1-12/31	14,411 ac-ft
Irrigation From Storage	4/15-10/31	14,411 ac-ft
Recharge Storage	1/1-12/31	8,896 ac-ft
Recharge From Storage	3/1-7/31	<u>8,896 ac-ft</u>
TOTAL		14,411 ac-ft

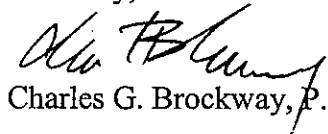
If allowed, the above structure would enable the company to reconstruct the dam but still utilize a portion of the storage for recharge if it is economically worthwhile.

Option 2 – Water bank lease-back. This option appears to be feasible from the company's standpoint. The company would use the water bank as a means of changing the nature of use and point of diversion, and would negotiate lease contracts outside of the water bank with users desiring mitigation water. Is there a limit on how long the water bank contract can be, or whether it could be a shorter-term lease that could be renewed indefinitely?

Option 3 – Water bank direct lease. This option also appears to be feasible. The company would want the ability to negotiate "side contracts" with lessees for a different lease rate. Is there any prohibition against this? The fact that recharge could not occur unless rented may be problematic. However, the company could perhaps lease the un-allocated water back to itself in any given year and recharge it for a potential credit in future years.

Thank you for your initial evaluation of the report and I look forward to further discussions with you and Mr. Tuthill.

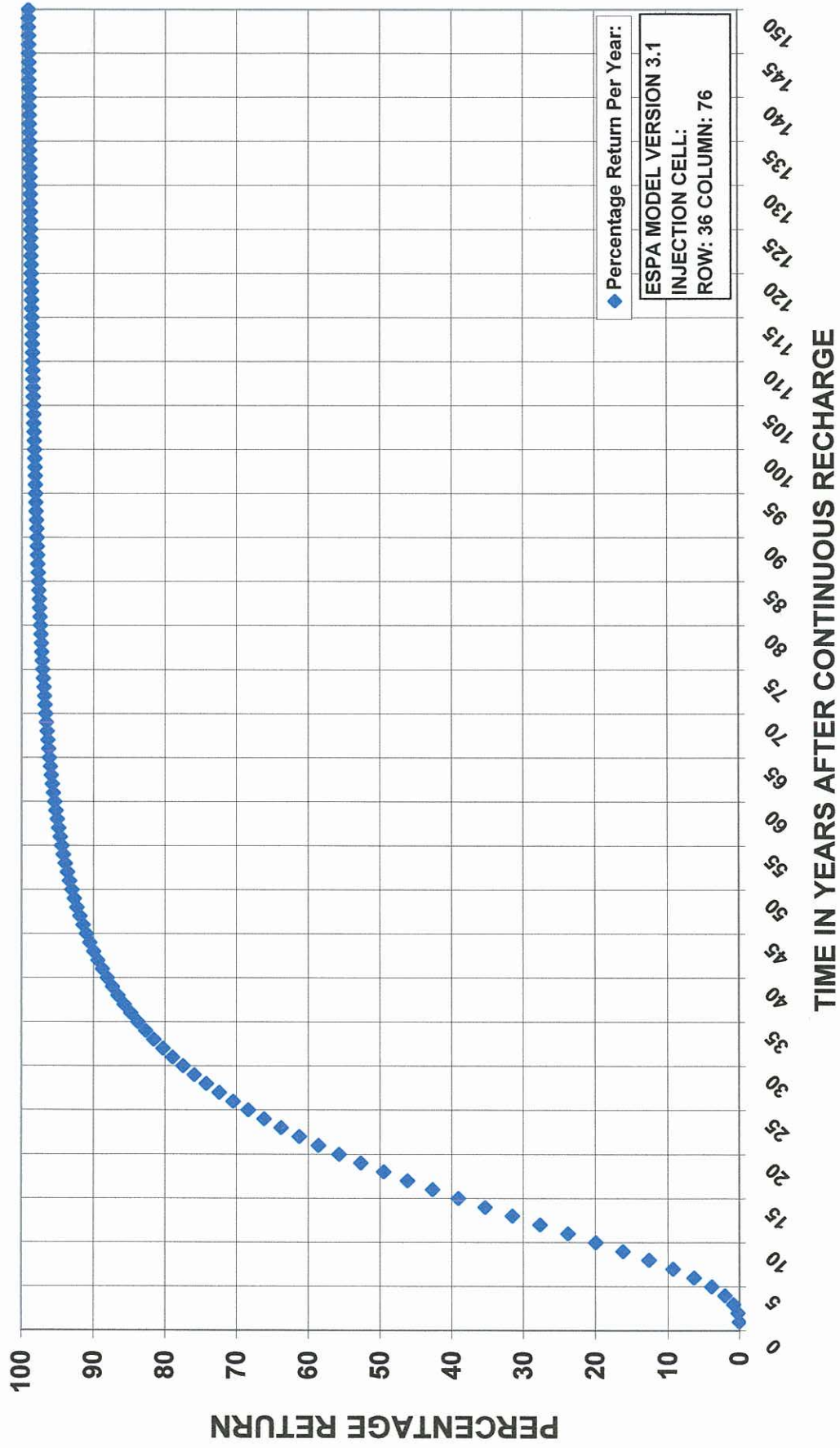
Cordially,



Charles G. Brockway, P.E.

Enc. Plots of model runs
Cc: Doug Surerus, President, Fish Creek Reservoir Co.
David Tuthill, Director, IDWR

INDIVIDUAL YEARLY RETURNS FROM REPEATED RECHARGE VOLUMES RETURNING TO THE SNAKE RIVER FROM FISH CREEK RECHARGE SITE



PERCENTAGE OF RECHARGED VOLUME RETURNING TO THE SNAKE RIVER FROM FISH CREEK RECHARGE SITE

