

Weaver, Mathew

From: Charles G. Brockway [charles.g.brockway@brockwayeng.com]
Sent: Wednesday, December 02, 2009 2:44 PM
To: Weaver, Mathew
Cc: Peppersack, Jeff; Spackman, Gary
Subject: RE: Fish Creek Reservoir Recharge Plan Review
Attachments: Memo 120109CGB.pdf

Hi Mat,

I was finally able to review your memo regarding the Fish Creek recharge plan. I want to thank you for a thorough and insightful review. I believe you have identified several germane hydrologic issues that need to be discussed and resolved, and also caught my typos in equations (3)-(5)! Attached are my comments on each of your items.

My sense is that we are not too far from reaching a consensus. As is usually the case, we will never have as much data as we might wish, but I hope we can arrive at an approach that is reasonable and supported by the science. What I would suggest is a conference call with you, Jeff, and perhaps Gary Spackman since he has been involved in the meetings on this from the beginning. Could we look at doing this next week? Tuesday, Thursday, and Friday are best for me.

Thanks,
Chuck

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From: Weaver, Mathew [mailto:Mathew.Weaver@idwr.idaho.gov]
Sent: Friday, August 21, 2009 10:16 AM
To: Charles G. Brockway
Subject: Fish Creek Reservoir Recharge Plan Review

Dr. Brockway,

I was asked by Jeff Peppersack to review the Aquifer Recharge Plan for Fish Creek Reservoir Company that you prepared and submitted to the Department on June 15, 2009. Please find attached the review memo I prepared for Jeff detailing my questions, comments, and concerns. He asked that I pass the memo on to you and work with you in the completion of developing a final plan. Overall I think it is a commendable report, but at the same time, I feel there are additional considerations that are warranted for incorporation into the plan. Please feel free to contact me to discuss the matter at your convenience.

Kind regards,

Mat Weaver, PE
Staff Engineer
Idaho Department of Water Resources
(208) 287-4914

<<Fish Cr Res Dept Review Memo 8-21-09.pdf>>



Memo

To: Mat Weaver, Jeff Peppersack
From: Charles G. Brockway
Cc: Doug Surerus
Date: December 2, 2009
Re: Fish Creek Reservoir Co. – Response to IDWR Comments

Following are my comments on the issues and questions raised in Mat Weaver's memo dated August 21, 2009. Each number corresponds to the number in the memo.

1. I think this is a good summary of the factors that need to be considered. The recharge plan was an attempt to address all of these factors.
2. A portion of the foregone storage spilled early in the season will be lost to seepage. The question is, would the same fraction of that water be lost to seepage if it had been released for normal irrigation operations when flow was already in the creek? If so, then it is correct to say that no credit for additional seepage would be warranted. Typically, seepage loss in a channel is a smaller percentage of the total as the flow increases. However, the data on Fish Creek does suggest that the seepage loss is nearly a constant percentage of the flow in the stream at the dam over a range of flow, at least up to 73 cfs. If the percentage loss were exactly constant for all flows, then it would not matter when the block of foregone storage was released.
3. The irrigated area delineation reflects only land downstream of the reservoir, whereas the delivery records used for the recharge estimate include all users, including those upstream of the reservoir. So, there is an inconsistency in that respect. If the upstream land were included, the recharge estimate would be even lower.
4. The fact that total annual deliveries never exceed the annual crop consumptive use does suggest that irrigation recharge is minimal, but does not necessarily quantify it for the reasons you have identified. This is why the monthly water balance analysis was performed. The typical efficiency ranges you suggest are based on the assumption that a full water supply is available. By definition, if the application efficiency is less than 100%, the water supply exceeds the amount needed to meet the crop consumptive use: either there is runoff, deep percolation, or both. When the water supply is short, the application efficiency will be higher than the typical values. When the water supply is extremely short, the application efficiency can theoretically approach 100%. With this in mind, it is not surprising that the calculated recharge value for the Fish Creek lands is very low. In this case, since we have actual delivery data, I believe the monthly water balance may be a better approach than attempting to estimate the irrigation efficiency.
5. Seepage losses in the on-project ditches were not included. It was assumed that ditch seepage losses will not be appreciably different before and after the proposed recharge project.

6. Equations (3) and (4) should contain a V_m term that was inadvertently omitted.

7. The value of the R_i term should be 312 ac-ft, not 271 ac-ft.

8. In Equation (5), R_{credit} should be the minimum of the two values, not the maximum. With the correction of these typos, Equations (3), (4), and (5) would read

$$R_{adj} = V_m + \left(\frac{s}{1-s} \right) V_m r - R_i - E_{new} \quad (3)$$

$$R_{adj} = V_m + 0.227 V_m r - 332 \quad (4)$$

$$R_{credit} = \min \left\{ \begin{array}{l} \sum R_{adj} \\ 9,167 \end{array} \right. \quad (5)$$

9. For the reasons outlined above, I do not believe using typical irrigation efficiencies is appropriate in this case. However, the idea of arriving at a fixed factor to apply to the measured recharge volume is certainly attractive. As a possible example: say the foregone storage for a particular year was equal to the median of 7759 ac-ft and there is no credit for additional seepage. With an actual seepage loss of 18.5%, the recharge measured at the weir would be 6324 ac-ft. With $R_i = 312$ and $E_{new} = 20$, R_{credit} would be 5992 ac-ft. In this case, the fixed factor to apply to V_m would be 0.95.

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