REBUTTAL REPORT
OF DIRECT TESTIMONY BY RON CARLSON FOR IGWA

In The Matter of Distribution of Various Water Rights Held by or for the Benefit of A&B, AFRD2, BID, MID, MIL, MID, NSCC and TFCC

November 7, 2007

INTRODUCTION

This is a rebuttal of the Direct Testimony by Ronald Carlson for Idaho Ground Water Appropriators, Inc. (IGWA). This rebuttal report was prepared by John Koreny and Charles Brockway of Brockway Engineering, Inc at the request of the Surface Water Coalition (SWC). The following opinions by Mr. Carlson are addressed in this report.

OPINIONS AND REBUTTAL

Opinion 1

Mr. Carlson theorizes that the Eastern Snake Plain Aquifer (ESPA) aquifer is similar to a large reservoir and ground water pumping only decreases the amount of water in the reservoir and does not affect the flow in the river. "*This aquifer storage became a more effective means of retaining water in the system for later use because there was no evaporation, unlike the surface storage reservoirs*" (pg. 8). "*This flood irrigation practice has caused water to be stored in the aquifer*" (pg. 9). "*Because this stored water can now be run through canals and applied to the land, a portion of it is diverted to storage in the Aquifer*" (pg. 15). "*The logic of the Model is this: whatever the flow of the river is it would have been greater but for the water consumed by the result of pumping for irrigated agriculture. . . . it is wrong as a general proposition*" (pg. 34).

Rebuttal

Mr. Carlson is correct in stating that a large quantity of water was stored in the aquifer from incidental recharge. However, he is incorrect in his opinion regarding the ground water hydraulics of the ESPA as it pertains to the effects of ground water pumping on river flow. It is a well-established scientific principle in the field of hydrology that pumping by wells first begins to draw water from storage. But at some point, in aquifers that are hydraulicly-connected to rivers, storage is no longer available (it has been used up) and ground water pumping then begins to capture the flow from hydraulicly-connected river reaches. At some point, all of the recharge for ground water pumping is derived from the natural flow in the river. The classic scientific papers that establish this principle are referenced in Appendix AR in the SWC Expert Report. We understand from the ESPAM ground model that at this point most of the recharge needed to supply ground water pumping wells is captured from the natural flow in the Snake River. There are literally hundreds of examples of this situation occurring throughout the Western US (Platte River, Republican

River, Pecos River, Edwards Aquifer, Oglala Aquifer, etc.). In the case of the ESPA, this situation is exacerbated by the fact that incidental recharge from surface water irrigation losses has declined by about 2 to 3 MAF, further decreasing the amount of water that can be discharged as reach gains to the river.

Opinion 2

"*Were water shortages a common event during the early years of flood irrigation? Yes. Most of the flood irrigated projects on the Eastern Snake River Plain faced frequent water shortages due to drought conditions, inefficient water delivery and distribution systems and fluctuations in flows. Even with the storage reservoirs to augment natural flow, shortages were common even to those holding the oldest water rights*" (pg. 13). "*Water shortages were historically experienced under these rights, it is a condition that has existed from the day the water right was recognized by the state. These rights have only been partially filled, if at all, every year since they were first established*" (pg 17).

Rebuttal

It is difficult to know exactly which years or which irrigation projects are referred to in these statements. No data or analysis is provided to support the opinion stated above. If Mr. Carlson is referring to the SWC irrigation projects, he is incorrect in his opinion that "*Even with the storage reservoirs to augment natural flow, shortages were common even to those holding the oldest water rights*". The Palisades Reservoir Project Planning Report projects that after the SWC members secured their American Falls Reservoir and Palisades Reservoir storage rights, their supply reliability (the percentage of time that supply could meet demand) was at a 96 percent reliability and there were only two years out of 47 when a shortage would have occurred during the droughts in 1934 and 1935.

It is incorrect to conclude that there always have been shortages for the SWC projects so the shortages today that are caused by ground water pumping are not important. The information in the SWC Expert Report shows that, 1) the current natural flow supply is much less than during the early 1900s and during the 1930s drought and throughout the entire period before ground water pumping began depleting the natural flow in the river in the 1960s, 2) the amount of shortages experienced by the SWC today is much greater and more frequent than the anticipated shortages in the SWC planning reports, 3) ground water pumping is reducing the SWC's natural flow and storage supply causing increased shortages and decreasing supply reliability. The fact that there may have been shortages during other periods prior to ground water pumping does not remove the fact that ground water pumping is impacting the SWC supply and causing shortages and decreasing the reliability of the supply. A rebuttal to Mr. Carlson's opinion is presented in greater detail in our rebuttal to Mr. Brendecke's Expert Report and Direct Testimony (see Opinions 3, 4 and 5).

Opinion 3

"*Because AFRD2's water rights are supplied entirely from spring runoff, it's water rights are not injured by ground water pumping*".

Rebuttal

This opinion is incorrect. AFRD2's water supply is based on a 1921 natural flow right and a 1921 storage right for American Falls Reservoir. These rights are senior to junior ground water rights. AFRD2's 1921 natural flow right is impacted by pumping under junior-priority ground water rights. Ground water pumping decreases the amount of water that emanates as reach gains, thereby lowering the amount of natural flow in the river. During dry years or average years when there is a shortage, this reduces the amount of water that can fill the natural flow right. If other users' natural flow is decreased by ground water pumping, then they use more natural flow and pass natural flow less down for AFRD2 to divert under the 1921 natural flow right. The fill of American Falls reservoir is also impacted by ground water pumping. Ground water pumping reduces the reach gains accruing in all of the reaches above Neeley, and so reduces the amount of water available to fill the reservoir. During years when the reservoir does not fill, the impacts of ground water pumping reduce the amount of water that would have accrued in the reservoir. American Falls reservoir did not fill from 2001 to 2004, causing shortages for AFRD2 and the other SWC members that are dependent on the American Falls Reservoir storage.

Opinion 4

"*The Director's Order incorrectly determined that there was material injury to North Side Canal Company*" (pg 26).

Rebuttal

Facts are presented regarding NSCC water supply, but a supporting justification is not provided for the opinion that NSCC was not materially injured. The facts in this matter show that ground water pumping has impacted the NSCC water supply. NSCC obtains a water supply from a 1900, 1905 and later-priority natural flow rights and a storage supply. Ground water pumping reduces the amount of water that is available to fill these rights. NSCC supply is much less than it was before the impacts of ground water pumping. NSCC has experienced shortages and curtailed deliveries during the years of calculated shortage. These facts are all supported by the information in Chapters 7 to 10 of the SWC Expert Report.

Opinion 5

"the Director clearly erred in concluding that Twin Falls Canal Company minimum full supply was 3/4 of an inch or 1,075,000 AF instead of 5/8 of an inch per acre" (pg. 27). "*In most years TFCC would need roughly 950,000 AF . . .*" (pg. 27). ". . . *a full supply of water was 5/8 inch per acre . . .* " (pg. 30).

Rebuttal

This opinion is rebutted in the our rebuttal to Mr. Brendecke's Expert Report and Direct Testimony (see Opinion 10 in our Rebuttal Report). The information in Chapter 7 and 8 of the SWC Expert Report shows that TFCC natural flow supply is greatly reduced by

ground water pumping and the information in Chapters 9 and 10 show that TFCC is experiencing shortages. Our calculation show that TFCC's irrigation diversion requirements vary between years and range up to 1,159,000 AF and their current annual supply deficit is up to about 227,000 AF (see Table 10-2 in the SWC Expert Report). These calculations are based on a methodology that calculates crop requirements, field application methods and conveyance losses and compares available supply to the irrigation diversion requirements.

Opinion 6

"*I believe that the Director's 2005 Order misapplied the futile call in this case because the source of supply for the SWC and especially TFCC and NSCC is not being affected by ground water pumping*" (pg. 29).

Rebuttal

It is hard to understand the rationale for this opinion. On the same page as this opinion he states that, "*TFCC is the only SWC member that is even remotely susceptible to having their natural flow supply reduced by ground water pumping. This is because the TFCC 3,000 cfs October 1900 water right exceeds the gain between Blackfoot and Milner. . .*" (pg. 29). In fact, both TFCC's and NSCC's 1900 natural flow water right is usually supplied by reach gains that emanate below Blackfoot. Reach gains are water that seeps out of the ESPA and into the river. Ground water pumping reduces the amount of the reach gains that are the source of supply for TFCC and NSCC. Clearly, ground water pumping reduces the amount of reach gains available for diversion by TFCC and NSCC and so therefore affects their source of supply. If Mr. Carlson recognizes that there is some interference by reach gains from ground water pumping, then he should also recognize that there are impacts to the SWC natural flow rights and reservoir storage that are supplied by reach gains.

Opinion 7

"*The model essentially computes a very sophisticated mass balance for the aquifer. Furthermore, the Department does not even know how much of the Eastern Snake Plain is irrigated from ground water so impact numbers are significantly disconnected from actual use.*" "*As I understand the model, surface water consumption is not even a factor. . .* " "*While I believe the model can be used for basin planning purposes, it is not a good fit for administering water rights. I believe a Mass Balance Analysis would be better*" (pg. 34). "*The model assumes that the water consumed just from ground water is about 1.5 MAF/yr.*" "*One must also remember from a basin standpoint it makes no difference if water is consumed from ground water or surface water*" (pg. 35).

Rebuttal

"*The model essentially computes a very sophisticated mass balance for the aquifer. Furthermore, the Department does not even know how much of the Eastern Snake Plain is*

irrigated from ground water so impact numbers are significantly disconnected from actual use." This is not correct. The model is more than a "*sophisticated mass balance for the aquifer*" because it includes a numerical representation of the aquifer hydraulics necessary to determine the spatial and temporal effects of changes in incidental recharge and ground water pumping stresses in the aquifer and the resulting effects on reach gains in the river. The model development included a very detailed computation of consumptive use on ground water irrigated acres using remote sensing data, aerial photography and mapping. A procedure was developed to correlate the water rights data to the actual location and area where irrigation is occurring under the right. It is our experience in conducting many similar consumptive use evaluations that the analysis completed by IDWR in this regard is very well done and is adequate for water rights administration. "*While I believe the model can be used for basin planning purposes, it is not a good fit for administering water rights. I believe a Mass Balance Analysis would be better.*" No supporting data or information is presented to support the opinion that the ground water model is not adequate for administration. The ESPAM ground water model was developed by qualified professionals at IDWR and IWRRI using accepted methods. The model meets the professional standards for ground water model development and calibration, as explained in our rebuttal to Mr. Brendecke's Expert Report and Direct Testimony (see Opinions 6 and 7 in our Rebuttal Report). Supporting information or data or analysis for the Mass Balance Analysis is not presented to show that the analysis is appropriate and correct and to justify the conclusions and opinions presented. A Mass Balance Anlaysis is not an appropriate method to evaluate the effects of pumping by wells for hydraulicly-connected ground water and surface water because it does not account for the spatial and temporal (timing) effects of ground water pumping on river reach gains. "*The model assumes that the water consumed just from ground water is about 1.5 MAF/yr.*" This is incorrect. The data used to develop the model shows that the water consumed just from ground water ranges from between 1.5 to 3.0 MAF/yr with an average consumptive use of 2.2 MAF/yr. "*As I understand the model, surface water consumption is not even a factor. . .* " This is incorrect. Surface water consumption is calculated in the model recharge input on a cell-by-cell basis and averages about 2.3 MAF/yr (see page 7-10 of SWC Expert Report). "*One must also remember from a basin standpoint it makes no difference if water is consumed from ground water or surface water*" (pg. 35). This opinion seems to be advocating that it makes no difference if water is consumed from ground water or surface water. For purposes of a technical evaluation of the impacts from ground water pumping on surface water supplies and for administration of water rights in order of priority and by source of supply, it is important to know whether water is consumed from ground water or surface water supplies.

Opinion 8

"*The construction of reservoirs coupled with mandatory winter water storage after Palisades Reservoir was constructed in 1960 reduced aquifer storage while allowing additional surface storage in the reservoirs*" (pg. 38).

Rebuttal

It is incorrect to conclude that, "*The construction of reservoirs coupled with mandatory winter water storage after Palisades Reservoir was constructed in 1960 reduced aquifer storage while allowing additional surface storage in the reservoirs.*" Water that was formerly diverted for winter water savings was stored and then used for irrigation by surface water users. The WD 01 diversion records show that from 1960 to about 1975 surface water diversions actually increased as a result of construction of Palisades Reservoir, so net aquifer storage would have actually increased as a result of the winter water savings program (see Figure 5-18, page 5-31 of SWC Expert Report).

Opinion 9

"*Generally, carryover reflects a surplus water supply. Its existence indicates there was more water available for water users to use than was needed for irrigation purposes. While there may be a right to carry-over water in storage, its existence indicates there was no material shortage in water needed to grow crops in the preceding irrigation season*" (pg. 31). "*The Director's Findings of Fact No. 119 and 120 establishing an entitlement to carryover storage is clearly erroneous. Carryover storage reflects a surplus water supply and should not be properly included as a part of any material injury analysis. As long as the water user has a full supply water in the current irrigation season, there can be no material injury in that year. Carryover storage indicates there was no material shortage in water needed to grow crops in the preceding irrigation season. Carryover storage can and often is lost and wasted if the reservoir system fills and spills. While the decision to carry over storage may be a proper business decision for Surface Water Coalition members, the risk of storage water being spilled and lost should be borne by the right holder who wishes to speculate, not ground water users*" (pg. 39).

Rebuttal

This opinion is not correct and reflects a fundamental mis-understanding of the role of reservoir storage, the purpose of a reservoir storage right and the application of the CMRs under the process described in Rules 40 and Rule 42. One of the purposes of reservoir storage is to hold water for future dry periods. This is how the reservoir storage projects that the SWC relies upon for a secure water supply were planned, permitted, constructed and operated for over 100 years. The opinion above now suggests that the SWC should use all reservoir storage without the ability to save any for future dry periods before any impacts from junior ground water users can occur. This opinion is not in accordance with the priority doctrine or Rule 42 of the CMRs which establish that a holder or user of a reservoir storage right is to be provided "reasonable carryover" based on "prior comparable" water conditions.

Mr. Carlson's opinions fail to recognize the importance of storage in providing water supplies over long-term periods. The Palisades Reservoir Project Planning Report dated 1946 shows that carryover storage available in 1929 to 1930 and carryover storage used during the next five years of drought through the early 1930s provided much of the water needed during the next five years and helped to reduce shortages. In more recent times, the carryover storage that was available in 2000 and coming into 2001 and carryover storage

used during 2001 to 2004 helped to reduce the shortages that occurred in 2001 to 2004. An irrigation entity may choose to hold water during one year and endure a shortage so that some storage water is available should a drought occur during the next year. This is especially the case now when natural flow supplies have become unreliable for the SWC member that rely on natural flow to meet irrigation demands. Such actions are not "speculation", rather, they reflect prudent water management of a senior-priority water storage right as allowed under the priority doctrine and Rule 40 and 42 of the CMRs. The analysis presented in the SWC Expert Report in Chapters 9 and 10 show that there were significant shortages during 7 of the last 17 years for the SWC members, even if all storage was used to meet irrigation demands within a specific year. This information shows that the SWC members have not been able to meet irrigation demands and their water supply has been made more unreliable by ground water pumping depletions on reach gains.

Water management in systems with reservoirs that fill, store and use water over a multi-year period requires storing water for use during the years it is needed. Without administration to correct the impacts on the natural flow and storage system caused by junior-priority ground water users, the risk of shortage caused by those impacts is borne by the holders of the natural flow and storage rights.