

May 05, 2023

DEPARTMENT OF
WATER RESOURCES

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STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

IN THE MATTER OF THE DISTRIBUTION
OF WATER TO VARIOUS WATER RIGHTS
HELD BY AND FOR THE BENEFIT OF
A&B IRRIGATION DISTRICT, AMERICAN
FALLS RESERVOIR DISTRICT #2,
BURLEY IRRIGATION DISTRICT, MILNER
IRRIGATION DISTRICT, MINIDOKA
IRRIGATION DISTRICT, NORTH SIDE
CANAL COMPANY, AND TWIN FALLS
CANAL COMPANY

Docket No. CM-DC-2010-001

Declaration of Sophia Sigstedt

I, Sophia Sigstedt, declare the following:

1. I am over the age of 18 and competent to testify. If called upon to testify, I could testify to the following, all of which are within my own personal knowledge or based upon my professional judgment.
2. I am an American Institute of Hydrology Professionally Certified (No. 7015) Hydrogeologist with a specialization in groundwater. I have a master's degree in hydrology from the New Mexico Institute of Mining and Technology. My work includes hydrogeology, water resources engineering, and water resources planning and management. I have directed or contributed to several river-basin-scale water management studies that involved analysis of basin hydrology and water uses and the development of computer models to investigate implications of changes in hydrology, system operations, and water uses. My experience includes historical consumptive use analysis, evaluation of surface and ground water interactions, development of

protective terms and conditions for water users, settlement negotiations and expert witness testimony. I am employed by Lynker Technology, 5445 Conestoga Court, Suite 100, Boulder, Colorado.

3. For several years I have worked as a technical consultant for Idaho Ground Water Appropriators, Inc. ("IGWA"). In that capacity I participate on the Eastern Snake Plain Hydrologic Modeling Committee, the Big Lost Modeling Technical Advisory Committee, and the Swan Falls Technical Working Group, and have testified as an expert witness in cases before the Idaho Department of Water Resources ("IDWR" or "Department"). I further provide IGWA with technical assistance on a variety of matters, including the Surface Water Coalition ("SWC") delivery call.

4. From November 16 to December 21, 2022, I participated in several virtual meetings held by Department staff regarding the *Fourth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover* ("Fourth Methodology Order") issued in the SWC delivery call case. Department staff had been reviewing the components of the methodology used to determine material injury to the SWC and related matters. The data shared during these meetings were highly technical, complex and voluminous.

5. On December 23, 2022, I received from Department staff a one-page summary of their "preliminary recommendations on potential technical changes to the methodology." This document requested written comments be submitted by January 16, 2023.

6. I drafted and submitted to Department staff my preliminary comments to the preliminary recommendations, and comments addressing the other material covered during the November and December Technical Working Group meetings, on January 16, 2023.

7. On April 21, 2023, the Director issued the *Fifth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover* ("Fifth Methodology Order"). Based on my review of the Fifth Methodology Order, it does not appear that the Director took into consideration my written comments submitted on January 16, 2023.

8. Step 1 of the Fifth Methodology Order is the analysis of SWC's total anticipated irrigated acres for the upcoming year. As with prior versions, the Fifth Methodology Order requires the SWC to annually submit either an electronic shapefile delineating total irrigated

acres within their delivery system, or confirm in writing that the acreage submitted previously has not varied by more than five percent. During the technical meetings, Department staff reported that they examined the number of acres irrigated within Twin Falls Canal Company (TFCC) as a check against the acres reported by TFCC. The Department found 179,456 irrigated acres, whereas TFCC reported 194,732 irrigated acres. This is a more than 9% difference, and it exceeds the 5% standard set in the Fifth Methodology Order. A proper evaluation of the Fifth Methodology Order requires consideration of the accuracy of SWC's reported irrigation acreage, which has not been addressed by the Department. In order to properly analyze Step 1 of the Fifth Methodology Order, I want to analyze the most up-to-date real-time METRIC data to audit the number of acres of acres actually irrigated within TFCC and other members of the SWC. The June 6, 2023, hearing date does not allow me sufficient time to perform this analysis.

9. Step 2 of the Fifth Methodology Order requires the Director to compare the April Forecast Supply (FS) to the Baseline Demand (BD) for each SWC entity to determine if an in-season demand shortfall (IDS) is predicted for the upcoming irrigation season. To calculate FS, the Fourth Methodology Order used the Heise natural flow data and in some cases Box Canyon spring discharge from years 1990-2022. IDWR staff reported in a presentation on November 17, 2022, that the R^2 value for the TFCC FS model has degraded continually since the Fourth Methodology Order was issued, which creates significant problems with the reliability of the method used to predict FS. It is also significant that the R^2 value for TFCC, which is often the only SWC entity with a predicted DS, is the lowest R^2 value among the SWC members. In order to properly analyze Step 2 of the Fifth Methodology Order, I want to analyze previously tested FS predictors over the new period of record (POR) 1990-2022, as well as cast a new net of predictor variables that may have higher explanatory power than the current model. The June 6, 2023, hearing date does not allow me sufficient time to properly evaluate and analyze the data.

10. One of the most significant changes to the Fifth Methodology Order is the transition from a three-year composite Base Line Year (BLY) to a single-year BLY. The methodology uses the BLY to calculate Reasonable In-Season Demand (RISD) for each SWC entity in Steps 2, 6, 7 for Demand Shortfall and Step 9 Reasonable Carryover. The Fourth Methodology Order used average diversion volumes in 2006, 2008, and 2012 as the BLY. The Fifth Methodology Order uses only 2018 diversions as the BLY. Average diversions in 2006/2008/2012 (06/08/12) ranked between 7th and 8th highest for diversions, or about the 55th percentile (based on a normal

distribution), for the period of record (POR) 2000-2015. For the POR 2000-2021 the diversion demand for 2018 ranks 3rd, or about the 90th percentile (based on a normal distribution) for the POR. When I compared the distribution of SWC total diversion demands for the POR 2000-2015 compared to 2000-2021, it is apparent that they are very similar with mean diversions of 3.16 million acre-feet and 3.2 million acre-feet, respectively. The standard deviation is also very similar for the POR 2000-2015 compared to 2000-2021 at 178,089 acre-feet and 178,587 acre-feet, respectively. Without evidence that the previous BLY created unmitigated shortages to the SWC, there is not an adequate technical basis to support 2018 as an appropriate BLY. In order to properly evaluate the Fifth Methodology Order, I would need to analyze if there are more appropriate BLY alternatives, and further evaluate the unique hydrologic circumstances in 2018 (i.e. precipitation and water operations) to better establish an appropriate BLY recommendation. I am unable to properly evaluate and analyze this data by the June 6, 2023, hearing date.

11. The RISD calculation applied in Steps 6 and 7 is a function of Crop Water Need (CWN) and Project Efficiency (PE). The inaccuracy of reported irrigated acres for TFCC of more than 15,000 acres will result in an inaccurate determination of CWN. I would want to further analyze and quantify the impact the error of including non-irrigated acres in the calculation of CWN has on the RISD calculation. The June 6, 2023, hearing date does not allow me to properly evaluate and analyze this data.

12. In the Fifth Methodology Order, the Director now finds that averaging over a rolling period of 15 years results in project efficiency that is more appropriate than the previous eight-year average. Project efficiency is a complex component of the Fifth Methodology Order to evaluate as it is a function of seepage or conveyance loss, on-farm application losses (deep percolation, field runoff), and system operational losses (return flows). Information reported by Department staff indicated that there is higher uncertainty in the April and October efficiency values which would result in errors in the determination of RISD. Data also showed the project efficiency among SWC entities are almost all flat or declining (6 out of 7 entities), which is contrary to what would be expected with technology advancements and constrained water supplies. Data presented to the TWG also included scatter plots by SWC entity comparing Annual Crop Water Need to Annual Diversions that show Crop Water Need is limited as a predictor given the low explanatory power indicated by the low R^2 values in the analysis. I want

evaluate and analyze these apparent contradictions and uncertainties. The June 6, 2023 hearing date does not allow me to properly evaluate and analyze this data.

13. Step 3 of the Fifth Methodology Order uses the Eastern Snake Plain Aquifer Model (ESPAM) to predict the junior priority water rights that must be curtailed to produce the volume of water equal to the predicted April DS in the Blackfoot to Minidoka reach. In the Fifth Methodology Order, the Director now finds that transient simulations are necessary to evaluate the impacts of aquifer stresses. The November 28, 2022, presentation by IDWR staff showed a huge difference in resulting determination of the curtailment priority date if a steady state vs. transient model is applied. Under a transient model application, any DS above ~100,000 acre-feet would result in essentially aquifer-wide curtailment. IDWR staff have understood the difference between a transient model and steady state model at least since my involvement began in this case in 2015, so it is difficult to understand what caused the Director to make this change to methodology at this time, especially given the Department staff did not make a recommendation on this topic. During the technical presentations by IDWR staff in November/December 2022, IDWR staff were unable to explain why the change was being evaluated at this time. In order to properly evaluate this change to the methodology, I want to conduct a hindcast analysis using the transient application of ESPAM over all the preceding years to 2023 the Methodology Order has been applied. The June 6, 2023 hearing date does not allow me to properly evaluate and analyze this data.

14. I am unable to perform all of the work required to properly analyze the Fifth Methodology Order before the hearing scheduled for June 6-10, 2023. I estimated that I would need until October to complete this work.

15. I presently have a medical condition that leaves me unable to leave my home state of Colorado, until July 10, 2022. Therefore, I am not able to travel to Idaho for a hearing June 6-10, 2023. My condition further limits the amount of work I am able to perform during this time.

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I declare under the penalty of perjury pursuant to the law of the State of Idaho that the foregoing is true and correct.


DATED this 4th day of May, 2023.



Sophia C. Sigstedt

CERTIFICATE OF SERVICE

I hereby certify that on this 5th day of May, 2023, I served the foregoing document on the persons below via email or as otherwise indicated:


Thomas J. Budge

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