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Department of Water Resources

North Snake Ground Water District

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Attorneys for North Snake Ground Water District

IN THE DISTRICT COURT OF THE FIFTH JUDICIAL DISTRICT

OF THE STATE OF IDAHO, IN AND FOR TWIN FALLS COUNTY

In Re SRBA

) Subcase Nos. 36-00029B
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Case No. 39576

) **AFFIDAVIT OF JEFF PEPPERSACK**
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)

Jeff Peppersack, being first duly sworn, deposes and states as follows:

1. My name is Jeff Peppersack. I am an engineer employed by the Idaho Department of Water Resources.
2. My work address is Idaho Department of Water Resources, 1301 North Orchard, Boise, Idaho 83706. I reside in Boise, Idaho.
3. I make the following statements based upon my own personal knowledge of the facts related therein.

4. My educational background includes a Bachelor of Science in civil engineering from the University of Idaho in 1983. My course work included fluid mechanics, hydrology, hydraulics, statics and dynamics, thermodynamics, soil mechanics, chemistry, mathematics, materials, structures, sanitary engineering, electrical circuits, physics, engineering measurement, computer programming, and statistics.

5. I have been registered as a professional engineer in Idaho since 1989, practicing in the field of civil engineering. To become registered, I spent four years as an engineer-in-training and passed an exam on engineering fundamentals.

6. After graduating from college, I worked from 1983 to 1984 for the U.S. Geological Survey, Water Resources Division in Boise, Idaho. My duties there included working on regional irrigation pumpage estimates which incorporated field measurements and estimates based on crop water use and power consumption. I also worked for the Idaho Department of Water Resources Energy Bureau as an engineering specialist from 1984 to 1987.

7. From 1987 to the present I have worked for the Idaho Department of Water Resources (IDWR) Adjudication Bureau as an engineer. I have knowledge and experience in evaluating water quantity requirements based on different types of irrigation systems, different crop types, and different climatic and soil conditions:

(a) I have worked closely with consultants to develop guidelines — commonly referred to as the Hubble methodology — for determining irrigation diversion rate requirements based on generally recognized and accepted scientific and engineering principles;

(b) I have provided training and technical assistance to IDWR staff on the correct use of the Hubble methodology for use in the Snake River Basin Adjudication (SRBA);

(c) I have refined the Hubble methodology to evaluate irrigation diversion rates as better data has become available. For instance, I implemented methods to estimate peak period evapotranspiration rates to more accurately define crop water requirements. I have also investigated alternative irrigation practices to determine reasonably necessary irrigation diversion rates; and

(d) I routinely evaluate existing irrigation systems to determine diversion rates and volumes for developing IDWR recommendations contained in the Director's Reports to the SRBA. This includes gathering information on soils, cropping patterns, climate, and data on the physical aspects of the claimant's irrigation system(s) for the place of use in question to determine on-farm irrigation requirements. An irrigation system which uses furrows or corrugates is referred to as a surface irrigation system and is commonly called "gravity" irrigation. The term surface or "gravity" irrigation does not refer to sprinkler irrigation.

8. I have reviewed the Special Master's Recommendation and Standard Form 5 for subcase number 36-00029B. The Special Master recommends a quantity of 1.0 cubic feet per second (cfs). This quantity is the same quantity as indicated on the Standard Form 5 signed by the claimant and concurred in by IDWR and approved as to form by the Attorney General's office.

9. On October 22, 1997, I performed a surface irrigation diversion rate analysis for subcase number 36-00029B based almost exclusively on "gravity" irrigation practices which use furrows or corrugates. Based on my analysis, I determined that a 1.25 cfs diversion rate would be a reasonable diversion rate for the surface or "gravity" irrigation of the 35 acres involved in the subcase based on the crop types grown and soil characteristics. Attached hereto as Exhibit A is a true and correct certified copy of my Surface Irrigation Analysis Worksheet prepared for

Subcase number 36-00029B. Attached hereto as Exhibit B is a true and correct certified copy of the Idaho Department of Water Resources Surface Irrigation Analysis Worksheet signed by IDWR and the claimant on which I based my analysis for Subcase No. 36-00029B.

10. The surface or "gravity" irrigation diversion rate analysis, referenced in Paragraph 9 above, is based upon a two-step analysis. The first step requires determining the management allowable deficit (MAD). "MAD" refers to the amount of water depleted from the soil due to crop growth. When water is depleted from the soil beyond a certain level, crops begin to stress. For maximum crop growth water must be replaced to the soil before stress occurs. MAD is determined by crop type and soil characteristics. For example, a bean crop, which has a short root depth, in sandy soil would have a relatively low MAD.

11. Under the second step of the surface or "gravity" irrigation diversion analysis, the MAD is applied to a regression analysis which I developed for the Hagerman area. The regression analysis is a prediction of what a reasonable surface irrigation diversion rate, or "gravity" irrigation rate, would be for a given field based on its MAD. The regression analysis was determined almost exclusively from "gravity" irrigation diversion rate evaluations for thirty-seven fields in the Hagerman Valley. These evaluations revealed a correlation between the field irrigation requirement and MAD. For example, fields with low MAD values had high field irrigation requirements and vice versa. For subcase number 36-00029B, I applied the MAD that I calculated under step one to the regression analysis to derive the 1.25 cfs surface or "gravity" irrigation diversion rate shown on Exhibit A.

12. Thirty-six of the thirty-seven fields which serve as the basis for the regression analysis did not utilize sprinkler systems. The thirty-six fields all utilized surface or "gravity" irrigation systems. The one four-acre field which used sprinkler irrigation had an insignificant

effect on the outcome of the regression analysis which was based on a total of approximately 350 acres. Therefore, the results of the regression analysis were used to represent the field irrigation requirements for surface or "gravity" irrigation systems. Based on my experience, generally surface or "gravity" irrigation systems, such as corrugates and furrows, in the Hagerman Valley require a higher diversion rate than sprinkler systems because of the soil conditions and crop types grown in that valley.

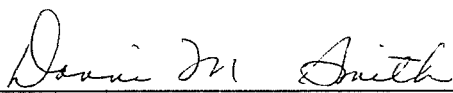
FURTHER YOUR AFFLIANT SAYETH NAUGHT.

DATED this 28 day of November, 1997.



JEFF PEPPERSACK

SUBSCRIBED AND SWORN to before me this 28th day of November, 1997.



Notary Public in and for the State of Idaho
Residing at: 15015c ID
My Commission Expires: 12/5/2000



CERTIFICATE OF SERVICE

I hereby certify that on the 28th day of November, 1997, I caused to be served copies of the foregoing **Affidavit of Jeff Peppersack** by depositing a copy thereof in the U.S. mail, postage prepaid, upon:

1. Original via fax:

Clerk of the District Court
Snake River Basin Adjudication
P. O. Box 2707
Twin Falls, ID 83303-2707

2. Copy to claimants:

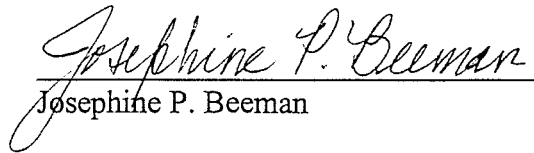
Danny and Brian Petersen (36-00029B)
Evelyn Petersen
745 North Hagerman Street
Wendell, Idaho 83355

3. Copies to:

Idaho Department of Water Resources
Document Depository
P. O. Box 83720
Boise, Idaho 83720-0098

Chief, Natural Resources Division
Office of the Attorney General
P.O. Box 44449
Boise, ID 83711-4449

U.S. Dept. of Justice
Environment & Natural Resources
550 W. Fort St., MSC 033
Boise, ID 83724



Josephine P. Beeman

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HAGERMAN

Surface Irrigation Diversion Rate Analysis Sheet

WR#'s 36-00029B

SOIL	SOIL AC.	% ROW	ROW AC.	FIR ROW	CFS ROW	% FOR.	FOR. AC.	FIR FOR.	CFS FOR.
FKE	15.00	60	9	0.046	0.414	40	6	0.030	0.180
KOB	6.66	60	4	0.037	0.148	40	2.66	0.027	0.072
KOC	13.39	60	8.03	0.037	0.297	40	5.36	0.027	0.145
TOTALS	35.05		21.03		0.859		14.02		0.397

REC. AC.	35
GIS AC.	35.05

REC. FIR 1.25* = CFS 1.256 X CFS 35
 SUM

DATE 10/22/97
 INT. JK

EXHIBIT A
 to Affidavit of Jeff Peppersack
 Subcase No. 36-00029B

The foregoing is a true and certified copy of the document on file at the department of Water Resources.
 Signed this 25th day of Nov 1997
David R. Tuttle

*ADD CONVEYANCE LOSS (IF APPLICABLE) FOR
 TOTAL IRRIGATION DIVERSION REQUIREMENT
 DIVERSION CAPACITY OR LIC./DEC. AMOUNT MAY LIMIT

**IDAHO DEPARTMENT OF WATER RESOURCES
SURFACE IRRIGATION ANALYSIS WORKSHEET**

WATER RIGHT NOS.

No 36-00029B

The following information is submitted to the Idaho Department of Water Resources to allow it to form an opinion regarding the amount of water needed to irrigate my fields using a surface water irrigation system.

My fields were historically irrigated using a surface water system: ☒ Yes ☐ No

My typical cropping pattern, based upon the percentage of my total acreage, is as follows:

FORAGE/GRAIN/OTHER (hay, pasture, grain, mint)

40 %

ROW CROPS (beans, potatoes, sugar beets, corn)

60 %

My total acreage is 35 acres.

Danny J. Peterson
Signature of Claimant

10-22-97
Date

Signature of Claimant

Date

Joseph Jones
Signature of DWR agent

10/22/97
Date

The foregoing is a true and certified copy of the document on file at the department of Water Resources.

Signed this 25th day of Nov, 1997

D. R. Tuttle