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EVALUATION OF IRRIGATION DIVERSION RATE

WATER RIGHT NUMBERS: 36-04074, 36-04148A, AND 36-04148B

In Re SRBA

Twin Falls County Civil Case No. 39576

Sub-Case Nos.: 36-04074, 36-04148A, and 36-04148B

Report to the SRBA District Court

Prepared by the Idaho Department of Water Resources

Karl J. Dreher, Director

David R. Tuthill Jr., Acting Adjudication Bureau Chief

August 15, 1996

EVALUATION OF IRRIGATION DIVERSION RATE

WATER RIGHT NUMBERS: 36-04074, 36-04148A and 36-04148B

INTRODUCTION

These water rights were recommended by the Idaho Department of Water Resources (IDWR) in the Director's Report with a diversion rate of 0.82 cfs for right number 36-04074 and 0.46 cfs for right number 36-04148B. Right number 36-04148A was recommended to be disallowed. The total amounts for right numbers 36-04074 and 36-04148B were recognized as the on-farm irrigation requirement. Conveyance loss was not necessary because the water is piped from the source to the irrigation system. IDWR's recommendation for right number 36-04074 was based on 0.02 cfs per acre for 41 acres¹, and the recommendation for right number 36-04148B was based on 0.02 cfs for 23 acres.

Because IDWR has received new information and has refined the methodology since the time of the original analysis of irrigation diversion requirement, a revised analysis has been completed. The revised analysis is based upon information already contained in the claim file and the new information detailed in this report. The revised analysis is based entirely on the existing irrigation systems. Information regarding the historical irrigation methods and practices are not available to IDWR at this time.

An expanded explanation of the methodology used is contained in the report entitled, "Report Regarding Evaluation of Irrigation Diversion Rates", dated August, 1996. A copy of that report is included with this report for reference. Hereinafter, that report will be referred to as IDWR's Methodology Report.

Several factors must be considered when determining the necessity of an irrigation diversion rate greater than 0.02 cfs per acre. Those factors are crop types, irrigated acres, types of irrigation systems used, evapotranspiration estimates, field application efficiencies, operation time limitations, and conveyance loss. These items are discussed in the following paragraphs, along with the results of the analysis.

IRRIGATED ACRES/CROPS

The property described on the claims as the place of use was found to have 69.6 acres of irrigated land under these rights. Of that total acreage, 5.6 acres are

¹This right includes an expansion of 5.6 acres for a total of 46.6 acres.

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irrigated under an expansion of right number 36-04074. For this reason, the irrigation diversion rate for these rights was based on a total of 64 irrigated acres.

Right numbers 36-04074 and 36-04148B are served by a common irrigation system. The place of use irrigated under these two rights is turf grass for a golf course which is sprinkler irrigated using a fixed sprinkler system.² Right number 36-04148A claims irrigation use for a subdivision (turf grass) using a fixed sprinkler system.³

EVAPOTRANSPIRATION

Evapotranspiration (ET) is the amount of water evaporated from the soil plus the amount used by a crop during crop growth. The nearest location where representative ET estimates are available is the Hagerman area. IDWR's estimates for ET for the Hagerman area have been refined since the original recommendations were completed. Originally, the monthly consumptive irrigation requirements for the Bliss weather station were used, based on consumptive irrigation requirements estimated by Allen and Brockway (Allen and Brockway, 1983, Appendix E). IDWR has since obtained information allowing adjustments to the values that more accurately represent conditions in the Hagerman area. This process is outlined in the section of IDWR's Methodology Report titled EVAPOTRANSPIRATION (CROP CONSUMPTIVE USE) and the resulting ET values are summarized in Attachment 1.

ET values for turf grass are not shown in Attachment 1 because turf grass estimates were not developed by Allen and Brockway. Peak ET for turf grass can be estimated as 87% of the alfalfa reference ET (shown as ETR in Attachment 1).⁴ The monthly average value for the alfalfa reference ET for the month of July (peak water-use month) was multiplied by 0.87 to determine the monthly average for turf grass. The 80th percentile value was calculated from the monthly average using the standard deviation for the reference ET from Attachment 1 and assuming a normal distribution of data (see Attachment 2 for calculations). The resulting 80th percentile monthly value of ET for turf grass in July is 8.32 mm per day.

²Information as to crop types and irrigation method was verbally provided by IDWR Senior Agent Steve Clelland, July 19, 1996.

³Information as to crop types and irrigation method was based on communication with David Brush of Clear Lakes Ranch, August 5, 1996.

⁴Based on communication with James L. Wright of the USDA Agricultural Research Service, July 12, 1996.

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To determine the peak period ET from the 80th percentile monthly value a procedure developed by the Food and Agricultural Organization (FAO) of the United Nations was used. The 80th percentile monthly value is multiplied by a ratio which represents the peak period ET divided by the monthly ET. The appropriate ratio is dependent on the net irrigation application. The net irrigation application represents the portion of the total amount of water applied during an irrigation that is available to satisfy the ET requirements of the crop. The net irrigation application is equivalent to the management allowed deficit (MAD) in this analysis. Refer to the "Soil Information" section of this report for specific soils information used in this analysis.

The net irrigation application is used in a computer spreadsheet described later in this report to calculate the peak period ET and the on-farm irrigation requirement. Refer to the EVAPOTRANSPIRATION section of IDWR's Methodology Report for a more detailed explanation of evapotranspiration estimates.

Soil Information

The management allowed deficit (MAD) is required for each soil type within the irrigated area for this analysis. The MAD is based on the maximum soil moisture deficit which will not cause the crop to exceed its stress point. The Natural Resources Conservation Service (NCRS), formerly Soil Conservation Service (SCS), compiles soil surveys describing the various soil types within the state and the locations where those soils may be found. The procedure to determine the value of MAD using SCS data is described in the sections of IDWR's Methodology Report titled NET IRRIGATION APPLICATION. In order to use correct values for MAD, it is necessary to determine the worst-case significant soil if more than one soil type is present in the irrigated area.

There are four significant soil types on the place of use for these water rights. These soil types are Vining-Kecko-Starbuck complex (373), Fathom loamy fine sand (FAC), Fluvaquents-Histic Endoaquolls complex (CHB), and Bahem very fine sandy loam (DEB). The MAD values for grass are provided in Attachment 3. These tables were created using a computer spreadsheet developed by IDWR to simplify calculations. The worst-case significant soil is soil type 373 with a MAD value of 1.27 inches.

FIELD APPLICATION EFFICIENCY

The field application efficiency was determined for the sprinkler irrigation systems based on typical or expected values found in existing literature. Sprinkler systems are flexible in their ability to apply water at the necessary rates and time

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periods for various crops and soil conditions. Properly designed and managed systems will achieve these expected efficiencies under normal conditions. An average value of 72.5 percent was used for this analysis based on the range given for solid set laterals in the section of IDWR's Methodology Report titled FIELD APPLICATION EFFICIENCY.

ON-FARM IRRIGATION REQUIREMENT

The on-farm irrigation requirement is the amount of water needed on the farm itself to provide adequate water to the crop(s) being grown. The procedure used to determine that amount is described in detail in the section of IDWR's Methodology Report titled ON-FARM IRRIGATION REQUIREMENT. The results of that procedure are provided in Attachment 4. Attachment 4 was created using a computer spreadsheet developed by IDWR which utilizes the information detailed above and calculates the on-farm irrigation requirement. The resulting on-farm irrigation requirement for right numbers 36-04074, 36-04148A, and 36-04148B was determined to be 1.37 cfs, or approximately 0.021 cfs per acre for 64 acres. This amount is based on continuous use of the water.

Golf course irrigation systems typically apply water during the night and early morning hours. These systems require a diversion rate high enough to apply the total water requirement in the limited time available (Pair, et al., 1983, p. 358). For this analysis, the diversion rate for 36-04074 and 36-04148B was calculated based on the procedure outlined in an IDWR Administrators's Memorandum entitled "Irrigation Diversion Rate for Turf Grass in Public Areas" (see Attachment 5). This procedure requires that the on-farm irrigation requirement based on continuous use be divided by the ratio of actual system operating hours to 24 hours. The ratio used in this analysis was 1/3 (8 divided by 24).⁵ The resulting on-farm irrigation requirement was calculated to be approximately 0.063 cfs per acre.

IRRIGATION DIVERSION REQUIREMENT

The total irrigation diversion requirement is the sum of the on-farm irrigation diversion requirement and the conveyance loss. Since there is no conveyance loss for these rights, the irrigation diversion requirement is 0.021 cfs per acre for right number 36-04148A and 0.063 cfs per acre for right numbers 36-04074 and 36-04148B. These irrigation diversion requirements are based on the existing irrigation systems.

⁵System operation information was based on data provided by the claimant on July 30, 1996 (see attachment 6).

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REFERENCES

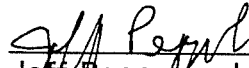
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- Pair, C.H., et al., eds., 1983, *Irrigation*, fifth edition, Virginia: The Irrigation Association, 1986.

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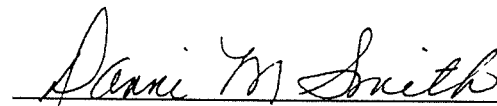
State of Idaho)
) ss.
County of Ada)

Jeff Peppersack, being first duly sworn, upon oath, deposes and says:

That I am an Engineer for the Adjudication Bureau of IDWR, that I have prepared the foregoing report, know its contents, and that the statements contained therein are true to the best of my knowledge and belief.


Jeff Peppersack

Subscribed and sworn to before me this 15th day of August, 1996.

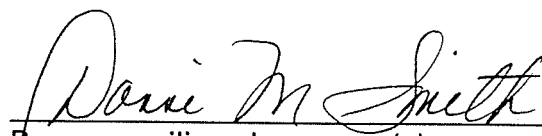

Notary Public for Idaho
Residing at: Bouse ID
My commission expires: 12/5/2000

CERTIFICATE OF SERVICE

I certify that I served true and correct copies of the foregoing document to each person at the address listed below by mailing in the U.S. Mail with the correct postage affixed thereto on the 16th day of August, 1996.

Patrick D. Brown
P.O. Box 389
Twin Falls, ID 83303-0389

Norman M. Semanko
P.O. Box 389
Twin Falls, ID 83303-1906


Person mailing document(s)

ATTACHMENT 1

80th Percentile values of monthly ET estimated for
the Hagerman Valley adjusted from the Bliss Station
(mm/day)

	MO	ETR	ALFH.	BEANS	F.CRN	SILGE	S.CRN	PEAS	POTAT	SBEET	SGRAN	WGRAN	PAST.	VEGES
AVE ET	4	5.28	3.30					1.60	1.58	1.58	1.65	4.82	3.27	
TMP ADJ	4	5.68	3.55					1.72	1.70	1.70	1.77	5.18	3.52	
ALT ADJ	4	5.75	3.59					1.74	1.72	1.72	1.80	5.25	3.56	
STDD ET	4	0.47	0.29					0.14	0.14	0.14	0.15	0.43	0.29	
ADJ STDD	4	0.80	0.49					0.24	0.24	0.24	0.26	0.73	0.49	
80PCT ET	4	6.42	4.01					1.94	1.92	1.92	2.01	5.86	3.97	
AVE ET	5	6.79	6.29	2.04	2.04	2.04	2.04	3.85	2.19	2.04	5.11	6.79	5.23	2.07
TMP ADJ	5	7.18	6.65	2.16	2.16	2.16	2.16	4.07	2.31	2.16	5.40	7.18	5.53	2.19
ALT ADJ	5	7.27	6.73	2.18	2.18	2.18	2.18	4.12	2.34	2.18	5.47	7.27	5.60	2.21
STDD ET	5	0.49	0.46	0.15	0.15	0.15	0.15	0.28	0.16	0.15	0.37	0.49	0.38	0.15
ADJ STDD	5	0.80	0.75	0.25	0.25	0.25	0.25	0.46	0.26	0.25	0.61	0.80	0.62	0.25
80PCT ET	5	7.94	7.37	2.39	2.39	2.39	2.39	4.51	2.56	2.39	5.98	7.94	6.12	2.42
AVE ET	6	8.41	7.32	3.26	3.66	3.66	3.53	6.82	5.77	3.91	8.39	8.41	6.47	4.40
TMP ADJ	6	8.82	7.68	3.42	3.84	3.84	3.70	7.15	6.05	4.10	8.80	8.82	6.79	4.62
ALT ADJ	6	8.93	7.77	3.46	3.89	3.89	3.75	7.24	6.13	4.15	8.91	8.93	6.87	4.67
STDD ET	6	0.47	0.41	0.18	0.21	0.21	0.20	0.38	0.32	0.22	0.47	0.47	0.36	0.25
ADJ STDD	6	1.27	1.11	0.49	0.57	0.57	0.54	1.03	0.86	0.59	1.27	1.27	0.97	0.68
80PCT ET	6	10.00	8.71	3.87	4.36	4.36	4.20	8.11	6.85	4.65	9.98	10.00	7.69	5.24
AVE ET	7	8.54	6.94	7.37	7.68	7.68	7.47	2.99	7.17	8.14	7.05	6.80	6.57	6.57
TMP ADJ	7	8.89	7.22	7.67	7.99	7.99	7.78	3.11	7.46	8.47	7.34	7.08	6.84	6.84
ALT ADJ	7	9.00	7.31	7.77	8.09	8.09	7.87	3.15	7.56	8.58	7.43	7.17	6.92	6.92
STDD ET	7	0.26	0.21	0.23	0.24	0.24	0.23	0.09	0.22	0.25	0.22	0.21	0.20	0.20
ADJ STDD	7	0.58	0.47	0.51	0.53	0.53	0.51	0.20	0.49	0.56	0.49	0.47	0.44	0.44
80PCT ET	7	9.49	7.71	8.20	8.54	8.54	8.30	3.32	7.97	9.05	7.84	7.56	7.30	7.30
AVE ET	8	7.18	5.41	4.97	6.63	6.63	6.38		5.57	7.06	1.47	1.32	5.53	5.72
TMP ADJ	8	7.50	5.65	5.19	6.92	6.92	6.66		5.82	7.37	1.53	1.38	5.77	5.97
ALT ADJ	8	7.59	5.72	5.25	7.01	7.01	6.74		5.89	7.46	1.55	1.40	5.84	6.05
STDD ET	8	0.33	0.25	0.23	0.30	0.30	0.29		0.26	0.32	0.07	0.06	0.25	0.26
ADJ STDD	8	0.70	0.53	0.49	0.64	0.64	0.62		0.55	0.68	0.15	0.13	0.53	0.55
80PCT ET	8	8.18	6.17	5.66	7.54	7.54	7.26		6.35	8.04	1.68	1.50	6.29	6.51
AVE ET	9	5.60	3.67	0.77	4.19	4.19			3.29	4.86			4.32	3.83
TMP ADJ	9	5.90	3.87	0.81	4.42	4.42			3.47	5.12			4.55	4.04
ALT ADJ	9	5.97	3.92	0.82	4.47	4.47			3.51	5.19			4.61	4.09
STDD ET	9	0.41	0.27	0.06	0.31	0.31			0.24	0.36			0.32	0.28
ADJ STDD	9	0.66	0.43	0.10	0.50	0.50			0.39	0.58			0.52	0.45
80PCT ET	9	6.53	4.28	0.90	4.89	4.89			3.84	5.67			5.04	4.47
AVE ET	10	3.73	1.26		1.04					2.48			2.88	
TMP ADJ	10	4.02	1.36		1.12					2.67			3.10	
ALT ADJ	10	4.07	1.37		1.13					2.70			3.14	
STDD ET	10	0.35	0.12		0.10					0.24			0.27	
ADJ STDD	10	0.47	0.16		0.14					0.32			0.36	
80PCT ET	10	4.46	1.51		1.25					2.98			3.45	

ET and standard deviation data (AVE ET and STDD ET) for Bliss weather station taken from Appendix E (unpublished) of Brockway, C.E., and R.G. Allen, 1983, Estimating Consumptive Irrigation Requirements for Crops in Idaho, Idaho Water and Energy Resources Research Institute.

Adjustments to standard deviation (ADJ STDD) based on Allen & Brockway Report, pp. 18, and Allen, R.G., and J.L. Wright, 1983, Variation Within Measured and Estimated Consumptive Use Requirements, Proceedings of the Irrigation and Drainage Specialty Conference of the American Society of Agricultural Engineers, Jackson Hole, Wyoming, July 20-22, 1983, pp. 1-12.

Temperature adjustment (TMP ADJ) based on temperature differences between Bliss and Hagerman and temperature sensitivity of ET estimates given in Brockway, C.E., G.S. Johnson, J.L. Wright, and A.L. Coiner, 1985, Remote Sensing for Irrigated Crop Water Use - Phase 1, Water Resources Research Institute, pp. 101-107.

Altitude adjustment (ALT ADJ) based on Doorenbos, J., and W.O. Pruitt, 1977, Crop Water Requirements, Food and Agriculture Organization of the United Nations, p. 59.

80th percentile ET values (80PCT ET) calculated based on Walpole, R.E., and R.H. Meyers, 1985, third edition, PROBABILITY AND STATISTICS FOR ENGINEERS AND SCIENTISTS, New York: Macmillan Publishing Company, pp. 132-144 and 574.

ATTACHMENT 2

80th PERCENTILE ET ESTIMATE FOR TURF GRASS (PEAK MONTH)

ALFALFA REFERENCE ET FOR HAGERMAN = 9.00 mm/day
(JULY MONTHLY AVERAGE) (SEE ATTACHMENT 1)

USE 87% OF ALFALFA REFERENCE ET FOR TURF GRASS DURING PEAK PERIOD
 $9.00 \text{ mm/day} \times 0.87 = 7.83 \text{ mm/day} = \text{AVERAGE TURF GRASS ET (PEAK MONTH)}$

80th PERCENTILE VALUE (PEAK MONTH)

$\text{AVE. ET} + (\text{STDD} \times 0.842) = 80\text{th PCT ET FOR TURF GRASS (PEAK MONTH)}$
 $7.83 + (0.58 \times 0.842) = 8.32 \text{ mm/day}$

NOTE: STDD = ADJUSTED STANDARD DEVIATION FOR ALFALFA REFERENCE ET
(SEE ATTACHMENT 1)

ATTACHMENT 3

SOIL CHARACTERISTICS initials: JP date: 07/18/96

Soil Type = Vining-Kecko-Starbuck complex (#3 - Starbuck very fine sandy loam)
 Source of Soils Data = NRCS - Gooding office

373

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	4	0.1	0.16	6.6	7.3	0.7	1	1	1.76	1.5	0.5
4	17	0.13	0.18					2	2.53		
17	21							3	2.53		
								4	2.53	alternate	
								5	2.53	method	
										1.5	0.5

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	1.27
corn (field or silage)	4	0.5	1.27
grain (winter or spring)	4	0.5	1.27
pasture (or grass hay)	3	0.5	1.27 ✓
other (enter below)			

For definition of terms, refer to the sections called NET IRRIGATION APPLICATION and IRRIGATION APPLICATION SYSTEMS of the IDWR report titled Report Regarding Evaluation of Irrigation Diversion Rates, dated July, 1996.

SOIL CHARACTERISTICS initials: JP date: 07/18/96

Soil Type = Vining-Kecko-Starbuck complex (#1 - Vining fine sandy loam)
 Source of Soils Data = NRCS - Gooding office

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soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (inches) (ft)	AWC (inches)	intake family
lower	upper	lower	upper	lower	upper	lower	upper			flood furrow
0	3	0.1	0.14	6.6	7.8	0.7	1	1	1.31	2 0.55
3	24	0.09	0.12					2	2.57	
24	28							3	2.57	
								4	2.57	alternate
								5	2.57	method
										2 0.55

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	1.28
corn (field or silage)	4	0.5	1.28
grain (winter or spring)	4	0.5	1.28
pasture (or grass hay)	3	0.5	1.28 ✓
other (enter below)			

SOIL CHARACTERISTICS initials: JP date: 07/18/96

Soil Type = Fathom loamy fine sand

Source of Soils Data = NRCS - Gooding office

FAC

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	7	0.09	0.1	6.6	8.4	0.6	0.9	1	1.14	3	0.7
7	61	0.09	0.1					2	2.28		
								3	3.42		
								4	4.56	alternate	
								5	5.70	method	
										3	0.7

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	2.85
corn (field or silage)	4	0.5	2.28
grain (winter or spring)	4	0.5	2.28
pasture (or grass hay)	3	0.5	1.71 ✓
other (enter below)			

SOIL CHARACTERISTICS initials: JP date: 07/18/96

Soil Type = Vining-Kecko-Starbuck complex (#2 - Kecko loamy fine sand)
 Source of Soils Data = NRCS - Gooding office

373

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (inches)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	6	0.08	0.1	6.6	8.4	0.5	1	1	1.32	3	0.7
6	19	0.12	0.14					2	2.76		
19	51	0.08	0.13					3	4.02		
51	66	0.12	0.17					4	5.28	alternate	
								5	6.90	method	
										3	0.7

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	3.45
corn (field or silage)	4	0.5	2.64
grain (winter or spring)	4	0.5	2.64
pasture (or grass hay)	3	0.5	2.01 ✓
other (enter below)			

SOIL CHARACTERISTICS initials: JP date: 08/05/96

Soil Type = Fluvaquents-Histic Endoaquolls complex (#1 - Fluvaquents fine sandy loam)
 Source of Soils Data = NRCS - Gooding office

CHB

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	7	0.14	0.16	6.6	7.3	1	4	1	1.73	3	0.7
7	60	0.1	0.17					2	3.35		
								3	4.97		
								4	6.59	alternate	
								5	8.21	method	
										3	0.7

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	4.10
corn (field or silage)	4	0.5	3.29
grain (winter or spring)	4	0.5	3.29
pasture (or grass hay)	3	0.5	2.48 ✓
other (enter below)			

SOIL CHARACTERISTICS initials: JP date: 07/18/96

Soil Type = Bahem very fine sandy loam (DEB)
Source of Soils Data = NRCS - Gooding office

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	11	0.13	0.17	7.4	7.8	1	2	1	1.82	1.5	0.5
11	41	0.14	0.19					2	3.79		
41	60	0.09	0.12					3	5.78		
								4	7.33	alternate	
								5	8.59	method	
										2	0.55

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	4.30
corn (field or silage)	4	0.5	3.67
grain (winter or spring)	4	0.5	3.67
pasture (or grass hay)	3	0.5	2.89 ✓
other (enter below)			

SOIL CHARACTERISTICS initials: JP date: 08/05/96

Soil Type = Fluvaquents-Histic Endoaquolls complex (#2 - Histic Endoaquolls - mucky-peat) CHB
 Source of Soils Data = NRCS - Gooding office

soil depth (inches)		AWC (in/in)		PH		organic (%)		soil depth (ft)	AWC (inches)	intake family	
lower	upper	lower	upper	lower	upper	lower	upper			flood	furrow
0	11	0.22	0.25	6.6	7.3	60	85	1	2.73	0.5	0.35
11	60	0.12	0.16					2	4.41		
								3	6.08	NA	
								4	7.76	alternate	
								5	9.45	method	
										NA	NA

Management Allowed Deficit (MAD)

crop	root depth (ft)	stress point	MAD (inches)
alfalfa (hay or seed)	5	0.5	4.72
corn (field or silage)	4	0.5	3.88
grain (winter or spring)	4	0.5	3.88
pasture (or grass hay)	3	0.5	3.04 ✓
other (enter below)			

ATTACHMENT 4

FIELD IRRIGATION REQUIREMENT

initials: JP Claimant = 36-04074, 36-04148A, 36-04148B
date: 08/05/95 Weather Station = Bliss/Hagerman

[illegible]

Summary

12.97

Peak Gross Irrigation Application (mm/day)	=	12.97
On-farm Irrigation Requirement (cfs/acre)	=	0.021
Total On-farm Irrigation Requirement (cfs)	=	1.37
Irrigation Diversion Volume (ft ³ /yr)	=	0.00
Total Irrigation Diversion Volume (ac-ft/yr)	=	0

ATTACHMENT 5

ADMINISTRATOR'S MEMORANDUM

Application Processing Memo # 60
Adjudication Memo # 44

To: Water Management Division
Adjudication Bureau

From: Norman C. Young *NCF*

Re: Irrigation Diversion Rate for Turf Grass in Public Areas

Date: August 15, 1996

Irrigation of turf grass in public areas such as golf courses, parks, schools, and cemeteries often requires that the irrigation occur during the night or early morning hours. Since water cannot be applied continuously over a 24-hour period, the irrigation diversion rate is often higher than the statutory standard of 0.02 cfs per acre.

In some cases, a holding pond or regulation pond may eliminate the necessity of diverting a higher rate from the source. A holding pond is used to store the daily requirements of the irrigation system. The diversion rate from the source to the holding pond is based on the continuous-use irrigation requirement and the diversion rate from the pond to the irrigation system is based on the actual hours of operation of the system.

In situations where a holding pond is not practical, a higher rate is considered reasonable and necessary. The diversion rate for a new water right should be based on the requirements of a modern irrigation system with proper management. In an adjudication of water rights, the diversion rate recommended cannot exceed the historical diversion rate nor the amount determined to be reasonably necessary using acceptable irrigation practices. In both cases, a condition is required that limits the daily volume of water diverted.

To calculate the irrigation diversion rate for turf grass for irrigation systems that can not apply water continuously, divide the diversion rate based on continuous operation by the ratio of actual hours of operation per day to 24 hours per day.

Example: A golf course irrigates every day from 10 p.m. to 6 a.m. (eight hours per day). Based on an analysis of the irrigation diversion requirements, the irrigation diversion rate is calculated to be 0.02 cfs per acre under continuous operation. The diversion rate based on the reduced operation time would be 0.06 cfs per acre (0.02 divided by 8/24). The diversion rate of 0.06 cfs per acre is considered reasonable and necessary due to the operation time limitations of the system. This water right must include a condition which limits the daily volume of water diverted.

ATTACHMENT 6

Run Time 10 PM to 6 AM

Heads ^{no. of heads} (395) X (55 GPM) X 20 min

per night } average times

24 sets 20 min 480 min
95 PSI 434,500 Gal per Night + 55 GPM
85 PSI 395,000 " " " 50 GPM

(189) X 34 GPM X 20 Min

24 sets 20 min 480 min
95 PSI 128,520 Gal per Night + 34 GPM
85 PSI 113,400 " " " 30 GPM

16 sets 30 min 480 min Total

(198) X 34 GPM X 30 min

1 AF =
325850 gal

95 PSI 201,960 Gal per Night + 34 GPM
85 PSI 178,200 " " " 30 GPM

95 PSI 764,980 Gal per Night
85 PSI 686,600 " " "

716600 gal =
day

2.2 AF/day

26.4 AC-IN/day

7-22 to 7-23 (716,600) Total meter reading per Night
8" stream 463,000 meter readings per Night
8" Lake 212,000 85 PSI
4" Lake (41,600) 97,100 X (3) ÷ 7 = per day

OR

0.29 IN.
day

over 90 acres

times
a week

Gross applic.
< 1 in.

Net applic.
< 1 in.

② no discharge at end

③ no. of acres = ~90 ac.

716600 gal in 8 hrs = 3.33 CFS

COPY

**REPORT REGARDING CLAIM TO WATER RIGHT
NOS. 36-04148A, 36-04148B, and 36-04074 (2ND)**

In Re SRBA

Twin Falls County Civil Case No. 39576
Sub-Case Nos. 36-04148A, 36-04148B, 36-04074

Report to the SRBA District Court

Prepared by the Idaho Department of Water Resources
Karl J. Dreher, Director
David R. Tuthill Jr., Acting Adjudication Bureau Chief

August 15, 1996

REPORT REGARDING CLAIM TO WATER RIGHT NOS. 36-04148A, 36-04148B and 36-04074 (2nd)

The Director of the Idaho Department of Water Resources (IDWR) submits this second report regarding claim to water right nos. 36-04148A, 36-04148B and 36-04074 in response to the request of Special Master Haemmerle, pursuant to Idaho Code §42-1412(4) and the court's Order Consolidating Subcases and Requiring IRE 706 Affidavit. This report was prepared under the supervision of Karl J. Dreher, Director, and David R. Tuthill Jr., Acting Adjudication Bureau Chief for IDWR.

David R. Tuthill, Acting Adjudication Bureau Chief, reviewed and verified this report. The Affidavit of David R. Tuthill Jr. describes Mr. Tuthill's education and work experience, and is incorporated by reference herein. Mr. Tuthill also reviewed the two reports prepared by Jeff Peppersack, described below.

Jeff Peppersack, Adjudication Engineer, prepared and verified IDWR's Report Regarding Evaluation of Irrigation Diversion Rates and IDWR's report entitled Evaluation of Irrigation Diversion Rate Water Right Nos. 36-04074, 36-04148A and 36-04148B. Both of these reports are incorporated by reference herein. The Affidavit of Jeff Peppersack describes Mr. Peppersack's education and work experience, and is incorporated by reference herein.

IRRIGATION DIVERSION RATE

The special master requested information regarding the duty of water and excess flow irrigation requirements for water right nos. 36-04148A, 36-04148B and 36-04074. As noted in IDWR's first Report Regarding Claims to Water Right Nos. 36-04148A, 36-04148B and 36-04074 (IDWR's First Report), IDWR found a total of 64 acres to have been historically irrigated pursuant to these rights. The 64 acres includes 23 acres in the "east end property" historically irrigated from Clear Spring by means of gravity and ditches from Clear Spring, and recommended as right no. 36-04148B. It also includes 41 acres in the "west end property" historically irrigated from Clear Lake stream by gravity and flood systems, and recommended as right no. 36-04074. (36-04148A was recommended for disallowal as described in IDWR's First Report.) By the time of IDWR's field exam, the historical diversion systems had been replaced with sprinkler irrigation systems, some "rearrangement" of the irrigated acres had occurred within those quarter-quarter sections within the historical place of use, and the irrigation use changed from agricultural irrigation to irrigation for a golf course.

IDWR's methodology for investigating and recommending claims to water for irrigation in excess of 0.02 cfs per acre is described in IDWR's Report Regarding

Evaluation of Irrigation Diversion Rates.¹ The application of that methodology to these claims is described in IDWR's report entitled Evaluation of Irrigation Diversion Rate Water Right Numbers: 36-04074, 36-04148A and 36-04148B. This report evaluated the **current** irrigation system and **current** irrigation use. IDWR found 0.021 cfs per acre to be reasonably required for irrigation of the 64 acres based on the current irrigation system; based on the current irrigation use (for a golf course where irrigation is limited to night-time and early-morning hours), IDWR found 0.063 cfs per acre to be reasonably required for irrigation of the 64 acres.

However, neither the claimant nor IDWR's investigation has yielded information which would confirm beneficial use of an amount greater than 0.02 cfs per acre based upon the historical diversion system and the historical irrigation use. Therefore, director has not changed the recommendation as to these three rights based on the information set forth in IDWR's report entitled Evaluation of Irrigation Diversion Rate Water Right Numbers: 36-04074, 36-04148A and 36-04148B.² IDWR is prepared to conduct further evaluation of the irrigation requirement based on the historical irrigation system and the historical irrigation use when and if this information is made available to IDWR.

¹ IDWR relied upon the following in reaching its conclusions: Idaho Code §42-220 (which provides that no license or decree will be issued confirming a right to more than 0.02 cfs per acre for irrigation unless it can be shown that more is reasonably necessary) and Idaho Code §42-1402 (which limits the amount of water allotted by a decree to the amount of water beneficially used).

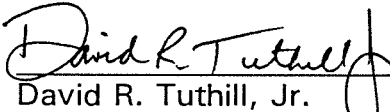
² IDWR relied upon the following in reaching its conclusions: the decision by Judge Hurlbutt that Idaho Code §42-1427 cannot be used to to change or exceed the previously established element of a water right, Revised Memorandum Decision and Order on Basin-Wide Issue 4, dated May 17, 1995, at page 9, and Idaho Code §42-1426 (allowing enlargements in violation of the mandatory permit statute to be claimed in the SRBA with a priority as of the date of the enlargement, but not allowing an increase in diversion rate).

REPORT REGARDING CLAIM TO WATER RIGHT NOS. 36-04148A, 36-04148B and 36-04074 (2nd)

State of Idaho)
) ss.
County of Ada)

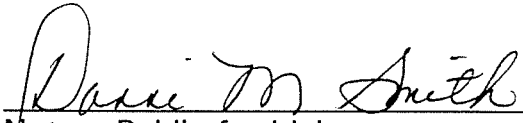
David R. Tuthill, Jr., being first duly sworn, upon oath, deposes and says:

That I am the Acting Adjudication Bureau Chief for IDWR, that I have read the foregoing report, know its contents, and that the statements contained therein are true to the best of my knowledge and belief.



David R. Tuthill, Jr.

Subscribed and sworn to before me this 15th day of August, 1996.



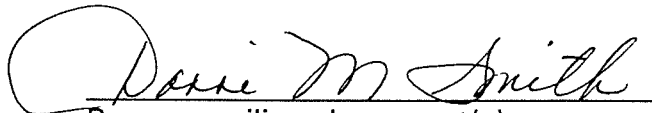
Notary Public for Idaho
Residing at: BOISE ID
My commission expires: 12/5/2000

Certificate of Service

I certify that I served true and accurate copies of the foregoing document to each person at the address listed below by mailing in the U.S. Mail with the correct postage affixed thereto on the 15th day of August, 1996.

Patrick D. Brown
P.O. Box 389
Twin Falls, ID 83303-0389

Norman M. Semanko
P.O. Box 1906
Twin Falls, ID 83303-1906



Person mailing document(s)

ALAN G. LANCE
Attorney General
State of Idaho

CLIVE J. STRONG
Deputy Attorney General
Chief, Natural Resources Division

CHARLES L. HONSINGER
Deputy Attorney General
Idaho Department of Water Resources
P.O. Box 83720
Boise, Idaho 83720-0098
Telephone: (208) 327-7900
FAX: (208) 327-7866

Attorney for IDWR

IN THE DISTRICT COURT OF THE FIFTH JUDICIAL DISTRICT
OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF TWIN FALLS

In Re SRBA	)	Subcase Nos. 36-04148A, 36-04148B,
	)	36-04074
	)	AFFIDAVIT OF
Case No. 39576	)	DAVID R. TUTHILL, JR.
_____	)	

STATE OF IDAHO	)
	) ss.
County of Ada	)

David R. Tuthill, Jr., being first duly sworn, deposes and states as follows:

1. My name is David R. Tuthill, Jr.. I am the acting Adjudication Bureau Chief for the Idaho Department of Water Resources (IDWR).
2. My work address is Idaho Department of Water Resources (IDWR), 1301 North Orchard, Boise, Idaho 83706. I reside in Boise, Idaho.

3. I make the following statements based upon my personal knowledge of the facts related therein.

4. My educational background includes a Bachelor of Science degree in agricultural engineering from Colorado State University at Fort Collins, Colorado, in 1974, and a Master of Science degree in civil engineering from the University of Colorado at Boulder, Colorado, in 1975. My course work included, but was not limited to: fluid mechanics, hydrology, hydraulics, statics and dynamics, thermodynamics, soil mechanics, chemistry, mathematics, materials, structures, sanitary engineering, electrical circuits, physics, computer programming, statistics, writing and report preparation.

5. I have been registered as a professional engineer in Idaho since 1979. To become registered, I spent four years as an engineer-in-training and passed an eight hour exam on engineering fundamentals.

6. After graduating from college, I worked from 1/1976 to 9/1976 for IDWR as the Adjudication Section Supervisor. My duties included, but were not limited to: review of applications for water permits; analysis of proposed transfers of water with beneficial use calculations; analysis of decreed rights as to location and amount; supervision of six people in the drafting and report writing sections; supervision of water distribution statewide and responding to watermaster/water district problems of water delivery; and supervision and monitoring of three ongoing water adjudications.

7. I worked for IDWR as the Payette Adjudication Supervisor from 9/1976 to 12/1978. My duties included, but were not limited to: responsibility for the Payette River Basin adjudication which was a 10 year water rights adjudication involving some 10,000 water rights

covering an area of 3,200 square miles; supervision of three professionals, a secretary, and two data entry staff; analysis of methods of computation of water rights to include comingling of rights, ditch losses, and exchanges; preparation of water rights reports; arrangement for public meetings, use of radio, newspapers, posters, and television to provide public information about the adjudication; and responsibility for the preparation of recommendations of state and federal water rights including federal reserved water rights.

8. From 12/1978 to 5/1985 I worked as the IDWR Water Allocation Section Supervisor. My duties included, but were not limited to: supervision of four state office subsections; custodianship of a central filing system for all Idaho water rights including claims, permits, licenses, and decrees, including cross-referencing systems for water rights research; responsibility for water right processing including state office review for approval of water right permits, amendments, assignments, licenses, and transfers; central processing and guidance for water right adjudications which were handled in the regional offices; oversight of the state office drafting department; and responsibility for implementation of a state-wide mandatory water right claim filing program which included preparation of posters and brochures, radio and television advertisements, and public education programs.

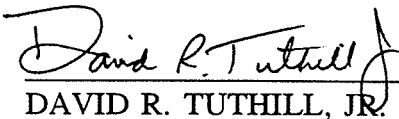
9. From 6/1985 to 6/1996, I worked as the Regional Office Manager of IDWR's Western Regional Office. As engineer in charge of IDWR's Western Region, my duties included, but were not limited to: oversight of all aspects of Western Regional Office activities, including personnel and salary; oversight of water right application processing and beneficial use examinations; general oversight of the Western Regional Office's adjudication unit; oversight of dam safety and stream channel alteration programs; implementation of IDWR policy and

procedure; implementation and maintenance of IDWR data-bases and files used at the Western Regional Office; coordination of the various section activities in the Western Regional Office; water distribution and administration; serving as chairman of the GIS Utilization Task Force; supervision of the creation of the Southeast Boise Ground Water Management Area (SEBGWMA); and formation, operation, and technical liaison of the SEBGWMA Advisory Committee.

11. My additional education/training since college has included, but is not limited to participation in various seminars and symposia, and completion of various courses related to water management, such as open channel hydraulics and geohydrology.

12. Planimeters are a generally accepted tool of measurement in the field of civil engineering, and the measurements recorded by planimeters are relied upon by engineers and others who use maps. Planimeters are a common tool used in mapping and are used by many private and government entities. For instance, planimeters are taught as part of course-work in most civil engineering curriculums. My first experience with planimeters was as part of an undergraduate surveying course I took in the late 1960's. The planimeter works by relating the area under an arc to a scaled unit of distance.

13. I reviewed IDWR's Report Regarding Claim to Water Right Nos. 36-04148A, 36-04148B and 36-04074 (2nd), and the statements contained therein are true and correct to the best of my knowledge and belief. IDWR's Report Regarding Claim to Water Right Nos. 36-04148A, 36-04148B and 36-04074 (2nd) is incorporated herein by reference.



DAVID R. TUTHILL, JR.

SUBSCRIBED AND SWORN to before me this 15th day of August, 1996.

Danni M Smith
Notary Public for the State of Idaho
Residing at: BOISE ID
My commission expires: 12/5/2000

CERTIFICATE OF SERVICE

I certify that I served true and correct copie of the foregoing document to each person at the address listed below by mailing in the U.S. Mail with the correct postage affixed thereto on the 15th day of August, 1996.

Patrick D. Brown
P.O. Box 389
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Norman M. Semanko
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Person mailing document(s)