RECEIVED
JAN 10 2013
DEPARTMENT OF
WATER RESOURCES

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Hailey, ID 83333
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Attorneys for Rangen, Inc.

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO

IN THE MATTER OF THE PETITION FOR DELIVERY CALL OF RANGEN, INC.'S WATER RIGHT NOS. 36-02551 & 36-7694	Docket No. CM-DC-2011-004 **AFFIDAVIT OF FRITZ X. HAEMMERLE IN SUPPORT OF RANGEN, INC.'S MOTION FOR PARTIAL SUMMARY JUDGMENT RE: MATERIAL INJURY**

STATE OF IDAHO,)
) ss.
County of Blaine.)

FRITZ X. HAEMMERLE, being sworn upon oath, deposes and states as follows:

1. My name is Fritz X. Haemmerle. I am over the age of eighteen (18) years old, and I am of sound mind, capable of making this affidavit, and the matters contained in this affidavit are based on my personal knowledge.

2. I am one of the attorneys for Rangen, Inc. ("Rangen") in the aforementioned case. Several documents are cited in Rangen's Motion for Partial Summary Judgment. These documents were obtained by me from the official website for Idaho Department of Water Resources ("Department").

3. Attached hereto as Exhibit A are true and correct copies of Rangen's Partial Decrees for water rights nos. 36-02551 and 36-07694, along with General Provision 5 and the Director's Report for General Provision 5.

4. Attached hereto as Exhibit B is a true and correct copy of the water right "backfile" for water right 36-02551.

5. Attached hereto as Exhibit C is a true and correct copy of the water right "backfile" for water right 36-07694.

6. Attached hereto as Exhibit D is true and correct copy of the Order in the Matter of Distribution of Water to Water Rights Nos. 36-015501, *36-02551 and 36-07694 ("Order").*

7. Attached as Exhibit E is the Amended Order in the Matter of Distribution of Water to Water Rights Nos. 36-015501, 36-02551 and 36-07694 ("*Amended Order*").

8. Attached as Exhibit F is the Second Amended Order in the Matter of Distribution of Water to Water Rights Nos. 36-015501, 36-02551 and 36-07694 ("*Second Amended Order*").

9. Attached as Exhibit G are the *Memorandum Decision and Order on Petitions for Rehearing* (Nov. 2, 2010) and *Memorandum Decision and Order on Petition for Judicial Review* (May 4, 2010).

10. Attached as Exhibit H are true and correct copies of pages taken from the Deposition of Frank Irwin, pgs, 99-100, as cited in Rangen's Brief in Support of *Motion for Partial Summary Judgment.*

11. Attached as Exhibit I is a true and correct portion of the Department's Answer to Complaint in *Musser v. Higginson*, Gooding County Case No. 22481.

12. Attached as Exhibit J is a true and correct copy of the Brendecke Report, entitled "Hydrology Water Right and Groundwater Modeling Evaluation of Rangen Delivery Call" by Charles M. Brendecke, Ph.D., PE, of AMEC Environment & Infrastructures ("*Brendecke Report*"), filed by the Idaho Ground Water Association ("IGWA"). The *Brendecke Report* was provided to Rangen, Inc., in three (3) separate files identified as follows: (1) Report; (2) GIS; and (3) Model Files. Only the *Brendecke Report* is attached, and the other two (2) files are incorporated herein by reference.

13. Attached as Exhibit K is a true and correct copy of a report entitled "Rangen Groundwater Discharge and ESPAM2.1 Hydrogeologic Investigation" prepared by Bern Hinckley, P.G., Hinckley Consulting ("*Hinckley Report*"), also on behalf of IGWA. The *Hinckley Report* was filed with Rangen in three (3) sets including: (1) Report; (2) Documents; and (3) Data. Only the Report is attached, and the other two (2) sets of documents are incorporated herein by reference.

14. Attached as Exhibit L is a true and correct copy of the "Spronk Water Engineers, Inc. Expert Report Dated December 21, 2012" prepared for the City of Pocatello, by Gregory K. Sullivan, P.E.., ("*Sullivan Report*"). The *Sullivan Report* was filed with the Department containing three (3) separate files including: (1) SWE Expert Report; (2) GIS Files; and (3) Spreadsheets & Other Files. Only the *Sullivan Report* is attached to this Affidavit, and the other two (2) reports are incorporated herein by reference.

15. Attached as Exhibit M is a true and correct copy of two (2) reports filed by Rocky Mountain Environmental Associates, Inc., by Bryce A. Contor ("*Contor Report*") for the Fremont Madison Irrigation District ("FMID"). The *Contour Report* was filed with the Department with the following documents or data: (1) Contor Report; (2) "3-Model Comparison; (3) ESPAM Tech FMID Contor 20121001.pdf; (4) Modeling Egin Bench Curtail; (5) Monte Carlo; and (6) Predictive Uncertainty. Only the *Contor Report* is attached, and remaining documents and data are incorporated into this Affidavit by reference.

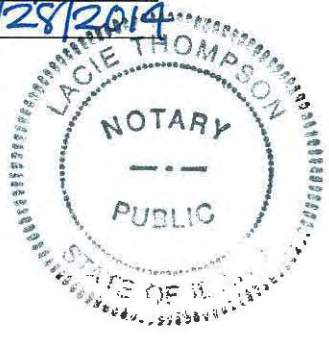
FURTHER YOUR AFFIANT SAYETH NOT.

DATED this 8 day of January 2013.

Fritz X. Haemmerle

SUBSCRIBED AND SWORN to before me this 8th day of January 2013.

Lacie Thompson
NOTARY PUBLIC FOR IDAHO
Residing at: Hailey, ID
Commission expires: 1/28/2014



CERTIFICATE OF SERVICE

The undersigned, a resident attorney of the State of Idaho, hereby certifies that on the 9 day of January, 2013 he caused a true and correct copy of the foregoing document to be served by email and first class U.S. Mail, postage prepaid upon the following:

Original: Director Gary Spackman Idaho Department of Water Resources P.O. Box 83720 Boise, ID 83720-0098 Deborah.Gibson@idwr.idaho.gov	Hand Delivery U.S. Mail Facsimile Federal Express E-Mail	□ □ □ X X
Garrick Baxter Chris Bromley Idaho Department of Water Resources P.O. Box 83720 Boise, Idaho 83720-0098 garrick.baxter@idwr.idaho.gov chris.bromley@idwr.idaho.gov	Hand Delivery U.S. Mail Facsimile Federal Express E-Mail	□ □ □ □ X
Randall C. Budge Candice M. McHugh Thomas J. Budge RACINE, OLSON, NYE, BUDGE & BAILEY, CHARTERED P.O. Box 1391 101 South Capitol Blvd, Ste 300 Boise, ID 83704-1391 Fax: 208-433-0167 rcb@racinelaw.net cmm@racinelaw.net tjb@racinelaw.net	Hand Delivery U.S. Mail Facsimile Federal Express E-Mail	□ □ □ □ X
Sarah Klahn Mitra Pemberton WHITE & JANKOWSKI Kittredge Building, 511 16th Street, Suite 500 Denver, CO 80202 sarahk@white-jankowski.com mitrap@white-jankowski.com	Hand Delivery U.S. Mail Facsimile Federal Express E-Mail	□ □ □ □ X

Dean Tranmer City of Pocatello P.O. Box 4169 Pocatello, ID 83201 dtranmer@pocatello.us	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☒
John K. Simpson Travis L. Thompson Paul L. Arrington Barker Rosholt & Simpson, L.L.P. 195 River Vista Place, Suite 204 Twin Falls, ID 83301-3029 Facsimile: (208) 735-2444 tlt@idahowaters.com jks@idahowaters.com	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☒
C. Thomas Arkoosh Arkoosh Eiguren P.O. Box 2900 Boise, ID 83702 Tom.arkoosh@aelawlobby.com	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☒
W. Kent Fletcher Fletcher Law Office P.O. Box 248 Burley, ID 83318 wkf@pmt.org	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☒
Jerry R. Rigby Hyrum Erickson Robert H. Wood Rigby, Andrus & Rigby, Chartered 25 North Second East Rexburg, ID 83440 jrigby@rex-law.com herickson@rex-law.com rwood@rex-law.com	Hand Delivery ☐ U.S. Mail ☐ Facsimile ☐ Federal Express ☐ E-Mail ☒

Fritz X. Haemmerle

EXHIBIT A

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	)	PARTIAL DECREE PURSUANT TO
	)	I.R.C.P. 54(b) FOR
Case No. 39576	)	
	)	Water Right 36-02551

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 48.54 CFS

THE QUANTITY OF WATER UNDER THIS RIGHT FOR DOMESTIC USE SHALL NOT EXCEED 13,000 GALLONS PER DAY.
THIS RIGHT AND RIGHT NO. 36-15501 ARE LIMITED TO A TOTAL COMBINED FACILITY VOLUME OF 123,272 CU. FT.

PRIORITY DATE: 07/13/1962

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
FISH PROPAGATION	01-01 12-31	48.54 CFS
DOMESTIC 3 HOMES AND 2 OFFICES	01-01 12-31	0.1 CFS

PLACE OF USE:

FISH PROPAGATION		Within GOODING County
T07S R14E	S31	SENE
	S32	SWNW
DOMESTIC		Within GOODING County
T07S R14E	S31	SENE
	S32	SWNW

OTHER PROVISIONS NECESSARY FOR DEFINITION OR ADMINISTRATION OF THIS WATER RIGHT:

THE QUANTITY OF WATER DECREED FOR THIS WATER RIGHT FOR DOMESTIC USE IS NOT A DETERMINATION OF HISTORICAL BENEFICIAL USE.

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, JR.
PRESIDING JUDGE
Snake River Basin Adjudication

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	)	PARTIAL DECREE PURSUANT TO I.R.C.P. 54(b) FOR
Case No. 39576	)	Water Right 36-07694

1997 DEC 30 AM 9:46
DISTRICT COURT - SRBA
TWIN FALLS CO., IDAHO
FILED

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 26.00 CFS

FACILITY VOLUME=287,640 CU. FT.

PRIORITY DATE: 04/12/1977

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
FISH PROPAGATION	01-01 12-31	26.00 CFS

PLACE OF USE:

FISH PROPAGATION	Within GOODING County
T07S R14E S31	SENE
S32	SWNW

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, JR.
PRESIDING JUDGE
Snake River Basin Adjudication

2012 FEB 27 PM 3:54
DISTRICT COURT-SRBA
TWIN FALLS CO., IDAHO
FILED

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	)	
	)	**PARTIAL DECREE FOR CONNECTED**
Case No. 39576	)	**SOURCES IN BASIN 36**
	)	**(Conjunctive Management General Provision)**

The following water rights from the following sources of water in Basin 36 shall be administered separately from all other water rights in Basin 36 in accordance with the prior appropriation doctrine as established by Idaho law:

Water Right No.	Source
NONE	NONE

The following water rights from the following sources of water in Basin 36 shall be administered separately from all other water rights in the Snake River Basin in accordance with the prior appropriate doctrine as established by Idaho law:

Water Right No.	Source
NONE	NONE

Except as otherwise specified above, all other water rights within Basin 36 will be administered as connected sources of water in the Snake River Basin in accordance with the prior appropriation doctrine as established by Idaho law.

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

Dated: February 27, 2002

R Burdick

ROGER BURDICK
Presiding Judge
Snake River Basin Adjudication

FEB 27 PM 3:54
SRBA
IDAHO

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	)	
	)	**ORDER OF PARTIAL DECREE FOR**
Case No. 39576	)	**CONNECTED SOURCES IN BASIN 36**
	)	**(Conjunctive Management General Provision)**

On August 2, 1999, IDWR filed a *Supplemental Director's Report, Reporting Area 3, IDWR Basin 36, Regarding Revision of Period of Use (For Irrigation Water Uses) and Conjunctive Management General Provisions*, in which the Director recommended no water rights be administered separately in Basin 36. All objections to the conjunctive management general provision were designated as Basin-Wide Issue 5 (subcase 91-00005). On February 27, 2002, this Court entered a ***Memorandum Decision and Order of Partial Decree*** in Basin-Wide Issue 5, which set forth the form of the conjunctive management general provision to be issued in each basin in the SRBA.

Therefore, IT IS ORDERED that the ***Conjunctive Management General Provision*** for Basin 36 is hereby **decreed** as set forth in the attached ***Partial Decree for Connected Sources in Basin 36 (Conjunctive Management General Provision)***.

Dated: February 27, 2002

ROGER BURDICK
Presiding Judge
Snake River Basin Adjudication

CERTIFICATE OF MAILING

I certify that a true and correct copy of the ORDER OR PARTIAL DECREE AND PARTIAL DECREE FOR CONNECTED SOURCES IN BASIN 36 was mailed on February 27, 2002, with sufficient first-class postage to the following:

MATT J. HOWARD
ATTORNEY AT LAW
PO BOX 190012
BOISE, ID 83719

NORMAN M. SEMANKO
ATTORNEY AT LAW
410 S ORCHARD, STE 144
BOISE, ID 83705

ALBERT P. BARKER
JOHN K. SIMPSON
TRAVIS L THOMPSON
BARKER, ROSHOLT & SIMPSON LLP
PO BOX 2139
BOISE, ID 83701-2139

JOSEPHINE P. BEEMAN
BEEMAN & ASSOCIATES, P.C.
409 WEST JEFFERSON STREET
BOISE, ID 83702

ROY E CRAWFORD
BROBECK PHLEGER & HARRISON LLP
ONE MARKET
SAN FRANCISCO, CA 94105

UNITED STATES DEPT OF JUSTICE
ENVIRONMENT & NATURAL RESOURCE
550 WEST FORT STREET, MSC 033
BOISE, ID 83724

JEFFREY C. FEREDAY
JOHN M. MARSHALL
MICHAEL C. CREAMER
GIVENS PURSLEY, LLC.
PO BOX 2720
BOISE, ID 83701-2720

BLAIR J. GROVER
GROVER & ARCHIBALD
215 FARNSWORTH WAY
PO BOX 36
RIGBY, ID 83442-0036

TED K. BLACKSTOCK
HC 79 BOX 119
MELBA, ID 83641

RUTH M & BOB D COLLETT
HC 79 BOX 2200
OREANA, ID 83650

JERRY HOAGLAND
HC 79 BOX 44
MELBA, ID 83641

RICHARD BRANDAU
HC 79 BOX 61
MELBA, ID 83641

JOHN ROMERO
HC 88 BOX 1045
MURPHY, ID 83650

THOMAS BENSON
HC 88 BOX 1050
MURPHY, ID 83650

CLAIMANT
TOM HOOK
HC 88 BOX 1095
MURPHY, ID 83650

WILLIAM R HOLLIFIELD
HOLLIFIELD AND BEVAN
249 THIRD AVENUE EAST (83301)
PO BOX 66
TWIN FALLS, ID 83303-0066

JAMES C. TUCKER
IDAHO POWER CO
PO BOX 70
BOISE, ID 83707

PAUL NETTLETON
JOYCE LIVESTOCK
MURPHY, ID 83650

(Certificate of mailing continued)

JOHN T. SCHROEDER
SCHROEDER & LEZAMIZ LAW OFFICE
PO BOX 267
BOISE, ID 83701-0267

WILEY F SMITH
STAR ROUTE
MACKAY, ID 83251

CLIFF S. BENTZ
YTURRI, ROSE, BURNHAM, EBERT & BENTZ
89 SW 3RD AVE
PO BOX S
ONTARIO, OR 97914

PATRICK D. BROWN
109 S ADAMS ST
JEROME, ID 83338

MATEA & JOHN MCCRAY
3470 COBBLESTONE LN
IDAHO FALLS, ID 83404

TRACY G & TERESA L SILVER
3954 TRACK RD
MELBA, ID 83641-4449

WILLIAM G NEIBAUR
495 W 1200 N
PAUL, ID 83347

MACK W NEIBAUR
511 W 1200 N
PAUL, ID 83347

DANA L. HOFSTETTER
608 WEST FRANKLIN STREET
BOISE, ID 83702

ELIAS & INEZ JACA
817 BLAINE AVE
NAMPA, ID 83651

/S/ DIANA DELANEY
Deputy Clerk

NOTICE OF FILING SUPPLEMENTAL REPORTS FOR REPORTING AREA 3 (IDWR BASIN 36) REGARDING REVISION OF THE FOLLOWING:

- **Period of Use (For Irrigation Water Uses)**
- **Conjunctive Management General Provision**

EXPLANATION

In response to the Idaho Supreme Court's decision in Basin-wide Issue 5, the Snake River Basin Adjudication (SRBA) District Court requested the Director of the Idaho Department of Water Resources (IDWR) to file supplemental reports for Basin 36 regarding the period of use for irrigation water uses and the conjunctive management general provision. This notice is to inform you that IDWR has filed those reports with the SRBA District Court.

Irrigation Season of Use

The supplemental report on irrigation season of use changes IDWR's recommendation for the irrigation season of use for irrigation water rights in Basin 36. Even water rights that have received partial decrees are receiving a new irrigation season recommendation because the Idaho Supreme Court determined that the use of the term "irrigation season" is not acceptable and specific dates must be set. The irrigation season of use recommendations only affect the season of use, and no other elements of the irrigation water rights.

If you claimed an irrigation water right a description of the Director's irrigation season of use recommendation for your claim is attached to this Notice. You need to carefully review the new season of use recommended for your irrigation right. The complete Irrigation Season of Use Supplemental Report for Basin 36 is available at the SRBA courthouse in Twin Falls and the locations listed on the third page of this notice. Copies of the report can be made, but you may be charged for copying and mailing.

Conjunctive Management General Provisions

Additionally, the Director of IDWR has filed with the SRBA District Court his supplemental report on conjunctive management for Basin 36. This Report is the Director's recommendation for the conjunctive management general provision that should be decreed for Basin 36. Attached to this Notice is a complete copy of the conjunctive management general provision the Director recommends for Basin 36.

INSTRUCTIONS FOR REVIEWING THESE REPORTS

You are free to agree or disagree with the Director's recommendations. If you agree with the Director's recommendations you do not need to do anything, pending further notice as described below. If you disagree with the Director's recommendations, you need to file an objection as described below. **You may only object to the Director's recommendations on irrigation season of use and conjunctive management.** You may not object to any other elements of your water right under this notice unless you have evidence that the irrigation season of use or conjunctive management recommendations affect other elements of your right.

INSTRUCTIONS FOR TAKING AN ISSUE TO COURT

What do I do if I disagree with a conjunctive management provision or a season of use recommendation?

If you disagree with a conjunctive management provision, or the season of use recommendation for your water right or anyone else's water right, and want to be heard in court, file an objection with the SRBA Court. Objections must be made on the standard objection form attached to this Notice. Copies are available from any IDWR office or from the SRBA Court. You may also download a copy of the objection form from the SRBA Web Site at www.srba.state.id.us.

Your objection to IDWR's conjunctive management provision, or the irrigation season of use for the rights listed above must be **received** by the SRBA Court on or before **September 10, 1999**.

What do I do if someone else objects to a conjunctive management provision or a season of use recommendation?

If someone files an objection to a conjunctive management provision, or the season of use recommendation for your water right or anyone else's water right, you may file a response to that objection. Responses to objections must be made on the standard response form available from any IDWR office or from the SRBA Court. Your response must be **received** by the SRBA Court on or before **November 12, 1999.**

What happens if there are no objections to a recommendation?

After the deadline for filing objections, the SRBA Court will hear the uncontested recommendations on **November 16, 1999**, at **1:30 P.M.** at the **SRBA Courthouse**. Any part of the report to which no objections are filed may be decreed by the district court.

How will I know about the proceedings on water right recommendations to which objections were filed?

A notice will be mailed to you for court dates on your water right or for those where you filed an objection or a response. You will not receive notice of court dates on any other water right recommendations. Additional information regarding the SRBA can be found on the SRBA Web Site at www.srba.state.id.us.

Note: The SRBA Court publishes a monthly Docket Sheet listing all objections and responses filed. It does not list court dates for individual water right cases, but provides general information helpful to all participants in the SRBA. The Docket Sheet is available at your county courthouse and all IDWR offices, or you may subscribe by contacting the SRBA Court or IDWR. The annual subscription fee is $7.50. The Docket Sheet is also available on the SRBA Web Site at www.srba.state.id.us.

ADDITIONAL INFORMATION

If you have questions about the SRBA, public information brochures are available at any IDWR office. You are also welcome to call IDWR at any of its offices or the SRBA Court. You may also want to consider contacting an attorney to assist you.

Snake River Basin Adjudication
District Court
253 Third Avenue North
P.O Box 2707
Twin Falls, Idaho 83303-2707
(208) 736-3011

Idaho Department of Water Resources
1301 North Orchard
Box 83720
Boise, Idaho 83720-0098
(208) 327-7906
(800) 451-4129

Idaho Department of Water Resources
Western Region
2735 Airport Way
Boise, Idaho 83705-5082
(208) 334-2190

Idaho Department of Water Resources
Northern Region
1910 Northwest Blvd., Suite 210
Coeur d'Alene, ID 83814-2615
(208) 769-1450

Idaho Department of Water Resources
Southern Region
1341 Fillmore, Suite 200
Twin Falls, Idaho 83301-3380
(208) 736-3033

Idaho Department of Water Resources
Eastern Region
900 North Skyline, Suite A
Idaho Falls, Idaho 83402-3653
(208) 525-7161

Blaine County Courthouse
1st and Croy St.
Hailey , ID 83333

Butte County Courthouse
248 W. Grand Ave.
Arco, ID 83213

Jerome County Courthouse
300 N. Lincoln, Rm. 301
Jerome, ID 83338

Lincoln County Courthouse
111 W. B St.
Shoshone, ID 83352

Minidoka County Courthouse
715 G St.
Rupert, ID 83350

Gooding County Courthouse
624 Main St.
Gooding, ID 83330

BASIN 36 GENERAL PROVISION

The director recommends that the following general provision be included in the decree determining rights to water from Basin 36:

The following water rights from the following sources of water in Basin 36 shall be administered separately from all other water rights in Basin 36:

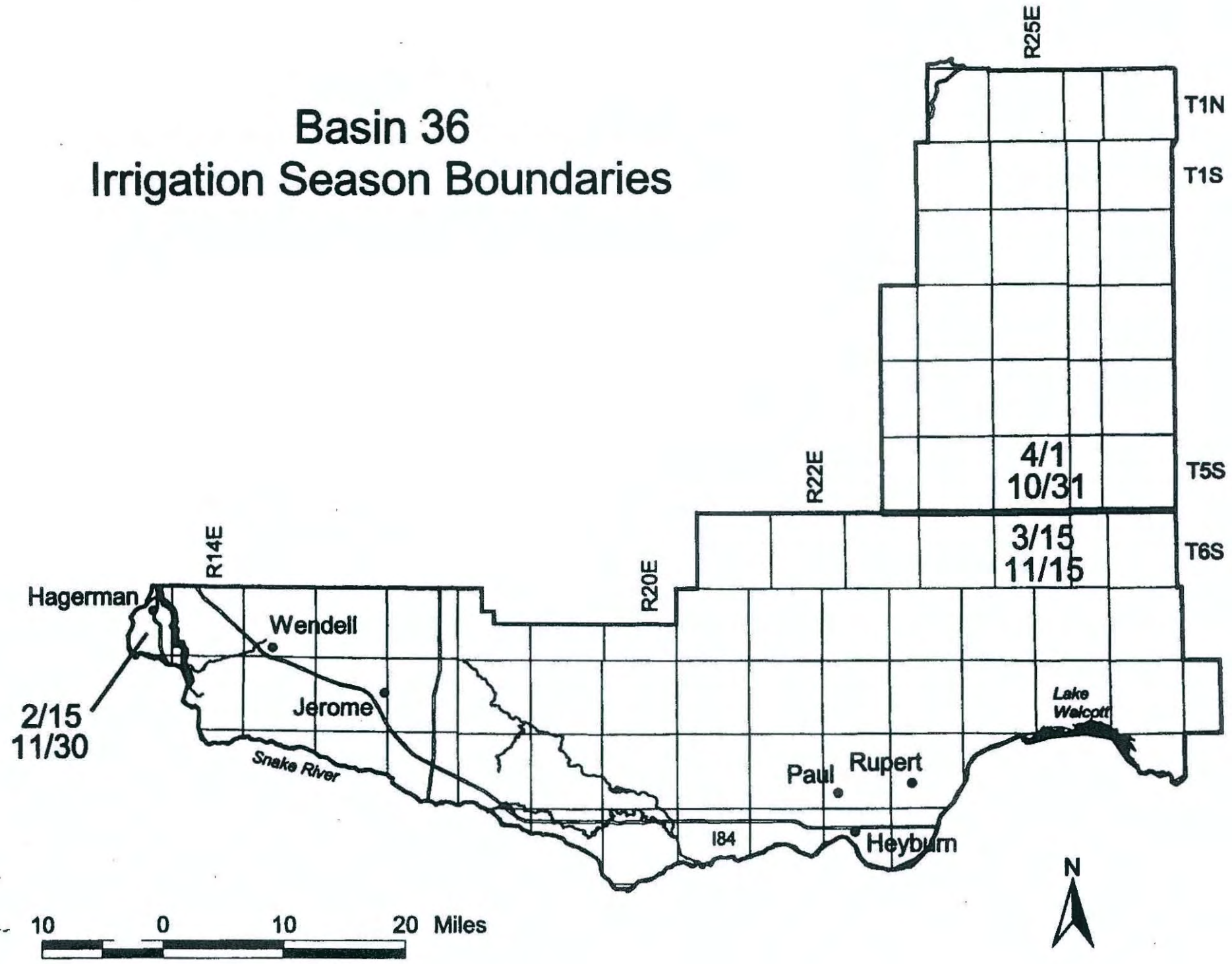
Water Right No.	Source
None	None

The following water rights from the following sources of water in Basin 36 shall be administered separately from all other water rights in the Snake River Basin:

Water Right No.	Source
None	None

All water rights within Basin 36 are from connected sources of water in the Snake River Basin and shall be administered conjunctively.

Basin 36
Irrigation Season Boundaries



INSTRUCTIONS FOR FILING OBJECTIONS TO WATER RIGHTS IN THE SNAKE RIVER BASIN ADJUDICATION BASED UPON THE SUPPLEMENTAL DIRECTOR'S REPORT

The attached form is for your use if you file an objection to irrigation season recommendations and/or general provisions, as recommended in the Supplemental Director's Report. You may copy or reproduce this blank form.

To object to more than one water right, you must use a **separate form for each objection** and there must be **only one objector** for each form.

Your objection must be **received and filed** by the court on or before the deadline specified in the notice that the Idaho Department of Water Resources mailed to you. If you are filing 25 or more objections you must contact the Clerk of the SRBA court at least 14 days before the filing deadline and arrange an appointment for filing.

You may attach any explanation or documentation that you feel is necessary to support your objection.

INSTRUCTIONS FOR COMPLETING THE OBJECTION FORM

A. **Subcase.** Fill in the water right number to which you are objecting at the top of the form in the blank following Subcase. The water right number will become the Subcase Number.

Name and Address of Person Objecting. Enter your name, address and daytime telephone in the blanks provided.

C. **Claimant of Water Right As Listed in Supplemental Director's Report.** Fill in the claimant/owner blank of the water right to which you are objecting as it is listed in the Supplemental Director's Report.

D. **Elements of the Water Right.** If you disagree with irrigation season or general provisions listed in the Supplemental Director's Report, check the appropriate box(es) and write in the space provided what you think the element should be. If objecting to a general provision, please indicate the number of the provision, and the basin it was reported in.

E. **Reasons supporting objection.** Attach to the objection form a separate sheet explaining why you are objecting. (this is optional)

F. **Verification.** You must sign the objection form in front of a notary. By filing this objection form, you are certifying that the objection is well-grounded in fact; that it is warranted by existing law or a good-faith argument for the extension, modification or reversal of existing law; and that it is not filed for any improper purpose, such as to harass, cause unnecessary delay or needlessly increase the cost of litigation.

G. **Certificate of Mailing.** Fill in the appropriate blanks for the date and the owner of the water right, and sign the form. Remember that the original objection form must be mailed to the Clerk of the SRBA District Court with copies mailed to the parties listed in this section.

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)
)
Case No. 39576)
)
)
_____)

A. Subcase _____

STANDARD FORM 1a

OBJECTION TO IRRIGATION SEASON AND/OR CONJUNCTIVE MANAGEMENT GENERAL PROVISIONS

B. NAME AND ADDRESS OF PERSON OBJECTING

Name: _____

_____

Address: _____

_____

Daytime Phone: (_____)_____

Name & address of attorney, if any:

_____

_____

_____

_____

C. CLAIMANT OF WATER RIGHT AS LISTED IN SUPPLEMENTAL DIRECTOR'S REPORT

Name: _____

_____

Address: _____

_____

_____

D. ELEMENTS OBJECTED TO:

8. **Period (Irrigation Season) of Use**

Should be: _____

12. **General Provision**

Number: _____ Reported in Basin: _____

Comments: _____

E. REASONS SUPPORTING OBJECTION: (if you have additional reasons, please attach to this form)

This standard form is for the sole purpose of objecting to the Director's supplemental recommendations on irrigation season of use and general provisions. This form may **not** be used to object to any other elements of your water right.

If you have evidence that the recommendations on irrigation season of use and/or conjunctive management adversely affect other elements of your water right, please contact the Snake River Basin Adjudication at 208-736-3011. A deputy clerk of the court will inform you of how to proceed.

F. VERIFICATION (Must be Completed)

State of _____)
)ss.
County of _____)

_____, duly sworn, upon oath, deposes and says:
(Name of person filing objection)

That I am the party/claimant filing this objection, as defined by I.C. §§ 42-1401A(1) and (6) or that I am the attorney for the party/claimant objecting and that I have read this objection, know its contents and believe that the statements are true to the best of my knowledge.

_____
(Signature of person filing objection)

_____
(Attorney signing in representative capacity)

Subscribed and sworn to before me on: _____

_____
Notary Public
for _____

Residing at: _____

My Commission Expires: _____

INSTRUCTIONS FOR MAILING

You must mail the objection to the Clerk of the Court. **FAX filings will not be accepted.** You must also send a copy to all the parties listed below in the Certificate of Mailing.

G. CERTIFICATE OF MAILING

I certify that on _____, 199__, I mailed the original and copies of this objection, including all attachments, to the following persons:

1. Original to:

Clerk of the District Court
Snake River Basin Adjudication
253 Third Avenue North
PO Box 2707
Twin Falls, ID 83303-2707

2. One copy to the claimant of the water right at the following address:

Name: _____

Address: _____

_____

3. Copies to:

IDWR Document Depository
PO Box 83720
Boise, ID 83720-0098

Chief, Natural Resources Division
Office of the Attorney General
State of Idaho
PO Box 44449
Boise, ID 83711-4449

United States Department of Justice
Environment and Natural Resource Division
550 West Fort Street, MSC 033
Boise, ID 83724

_____
Signature of Objector or attorney

AMENDED DIRECTOR'S REPORT FOR REPORTING AREA 3 (BASIN 36)

December 14, 1995

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areas north of the Snake River being favorite winter ranges for herds that were summered in the higher elevations north of Basin 36. The Oregon Short Line Railroad (now the Union Pacific) was built across Southern Idaho in 1882-1883, stimulating further settlement in those areas of Basin 36 near sources of surface water.

During the period 1904-1909, the U.S. Bureau of Reclamation built the Minidoka Project in what is now the eastern portion of Basin 36. The Minidoka Dam and related water conveyance facilities opened thousands of acres to irrigated settlement. During the same period the Milner Dam and adjunct Twin Falls North Side and South Side irrigation projects were constructed under the auspices of the federal Carey Act of 1894. The completion of the North Side Canal in 1909 opened large tracts of land in what are now Gooding and Jerome counties to irrigated farming.

Ground water development in Basin 36 also began early, in conjunction with development of surface water sources for farming and livestock. The early wells generally were shallow since they were normally dug by hand. They provided domestic and stock water where surface sources were unavailable, but they were unsuited to supply irrigation water; thus where surface irrigation water was not available, dryland farming was the only farming option available. However, beginning shortly after the end of World War II deep wells, equipped first with diesel and then with electric pumps, began to tap the Snake Plain Aquifer, supplying the water necessary to irrigate lands located far from surface water sources.

The development of surface water for hydroelectric power generation also began early in the history of Basin 36. During the period 1908-1909 the first federal hydropower generating plant in the Pacific Northwest was installed at Minidoka Dam. Private electric power development also began early in Basin 36. The Thousand Springs power plant, which taps the gravity potential of the springs, was constructed by an Arizona company in 1911. It was purchased by Idaho Power Company in 1917, and thereafter expanded. Additional hydropower development in Basin 36 has consisted of construction of small generation facilities on canals and other surface water sources within Basin 36.

The constant temperature of the water flowing out of the springs in the Hagerman Valley make the water an excellent medium for growing various species of cold water fish. The state fish hatchery near Hagerman produces about 1.7 million rainbow, steelhead, and Kamloops trout annually. The nearby Hagerman National Fish Hatchery, operated by the U.S. Fish and Wildlife Service since 1933, raises approximately three million rainbow trout annually. The first commercial trout farm in the Hagerman Valley began operation in 1928 on the north side of the Snake River

six miles north of Buhl. From this beginning, the aquaculture industry has grown tremendously; it now raises and processes approximately 25 million pounds of trout annually, making Idaho by far the nation's largest commercial trout producer.

GENERAL PROVISIONS

The Director recommends that the following general provisions be included in the decree determining rights to water from Basin 36.

GENERAL PROVISIONS 1 - 2 APPLY TO ALL WATER RIGHTS IN REPORTING AREA 3 (BASIN 36).

1. ADMINISTRATION OF BASIN 36 RELATIVE TO THE SNAKE RIVER. The Eastern Snake Plain Aquifer, the springs tributary to the Snake River or other surface tributaries, and surface tributaries to the Snake River in Basin 36 downstream from Milner Dam are hydrologically interconnected to varying degrees. The perched aquifer in the Rupert area is tributary both to the Snake River upstream from Milner Dam and to the Eastern Snake Plain Aquifer. Basin 36 water rights for surface and ground water, and Snake River water rights will be administered conjunctively, pursuant to law, with due consideration as to actual impacts of ground water diversions on senior water rights.

2. FIREFIGHTING PURPOSES.

a. Firefighting purposes is an alternate use for which any water right may be used, and firefighting is recognized as a lawful use of water with or without a water right.

b. Firefighting purposes means the use of water in times of emergency: to extinguish an existing fire on private or public lands, facilities, or equipment; to prevent an existing fire from spreading to private or public lands, facilities, or equipment within the vicinity of and endangered by an existing fire; and by firefighting personnel engaged in fighting an existing fire. Firefighting purposes does not include the use of water to prevent a fire from occurring in the future, the use of water for domestic purposes in regularly maintained firefighting stations, or the storage of water for fighting future fires.

GENERAL PROVISION 3 APPLIES TO ALL WATER RIGHTS IN REPORTING AREA 3 (BASIN 36) SHOWN WITH IRRIGATION AS A PURPOSE OF USE.

3. IRRIGATION USE. Water rights or portions of water rights shown with a purpose of use for irrigation include the following:

a. Incidental stock water. When stock water is not specifically included for a water right that includes irrigation, a portion of the quantity described for irrigation use can be diverted and used from the same point of diversion and at the same place of use as the irrigation use for purposes of maintaining a reasonable water supply for stock watering during the period of use for irrigation.

b. Early-season irrigation and late-season irrigation. The diversion of rights or portions of rights for irrigation use either before or after the period of use for irrigation described in the water right can occur so long as:

i. the water so diverted is applied to beneficial use for irrigation, including incidental stock watering,

ii. all water rights diverting from the same or a common source, regardless of priority (now existing or developed subsequent to this decree), existing at the time of diversion that are within their period of use can be satisfied,

iii. no element of the water right, other than the season of use, is exceeded or violated by the early-season or late-season use,

iv. the diversion and use of the water does not conflict with the local public interest, and

v. the irrigation water user utilizing this provision assumes all risk that the criteria of this general provision are satisfied.

c. Diversion of additional flows. A quantity of surface water in addition to the quantity of surface water described for irrigation use can be diverted for irrigation of the described place of use so long as:

i. the waters so diverted are applied to beneficial use for irrigation,

ii. all water rights diverting from the same or a common source, regardless of priority (now existing or developed subsequent to this decree), existing at the time of diversion that are within their period of use can be satisfied,

iii. no element of the water right, other than quantity, is exceeded or violated by the diversion of additional flows,

iv. the diversion and use of the water does not conflict with the local public interest,

v. the irrigation water user utilizing this general provision assumes all risk that the criteria of this general provision are satisfied.

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having been developed for hydropower generation early in the century. Aquaculture is a development of a more recent nature; various springs in the Hagerman Valley now provide water used for the commercial propagation of trout and other fish.

The rich bottom lands along the Snake River in the Hagerman Valley began attracting settlers in the 1860's. The establishment of sheep and cattle ranches near surface water sources also began well before the turn of the century, the protected areas north of the Snake River being favorite winter ranges for herds that were summered in the higher elevations north of Basin 36. The Oregon Short Line Railroad (now the Union Pacific) was built across Southern Idaho in 1882-1883, stimulating further settlement in those areas of Basin 36 near sources of surface water.

During the period 1904-1909, the U.S. Bureau of Reclamation built the Minidoka Project in what is now the eastern portion of Basin 36. The Minidoka Dam and related water conveyance facilities opened thousands of acres to irrigated settlement. During the same period the Milner Dam and adjunct Twin Falls North Side and South Side irrigation projects were constructed under the auspices of the federal Carey Act of 1894. The completion of the North Side Canal in 1909 opened large tracts of land in what are now Gooding and Jerome counties to irrigated farming.

Ground water development in Basin 36 also began early, in conjunction with development of surface water sources for farming and livestock. The early wells generally were shallow since they were normally dug by hand. They provided domestic and stock water where surface sources were unavailable, but they were unsuited to supply irrigation water; thus where surface irrigation water was not available, dryland farming was the only farming option available. However, beginning shortly after the end of World War II deep wells, equipped first with diesel and then with electric pumps, began to tap the Snake Plain Aquifer, supplying the water necessary to irrigate lands located far from surface water sources.

The development of surface water for hydroelectric power generation also began early in the history of Basin 36. During the period 1908-1909 the first federal hydropower generating plant in the Pacific Northwest was installed at Minidoka Dam. Private electric power development also began early in Basin 36. The Thousand Springs power plant, which taps the gravity potential of the springs, was constructed by an Arizona company in 1911. It was purchased by Idaho Power Company in 1917, and thereafter expanded. Additional hydropower development in Basin 36 has consisted of construction of small generation facilities on canals and other surface water sources within Basin 36.

The constant temperature of the water flowing out of the springs in the Hagerman Valley make the water an excellent medium for growing various species of cold water fish. The state fish hatchery near Hagerman produces about 1.7 million rainbow, steelhead, and Kamloops trout annually. The nearby Hagerman National Fish Hatchery, operated by the U.S. Fish and Wildlife Service since 1933, raises approximately three million rainbow trout annually. The first commercial trout farm in the Hagerman Valley began operation in 1928 on the north side of the Snake River six miles north of Buhl. From this beginning, the aquaculture industry has grown tremendously; it now raises and processes approximately 25 million pounds of trout annually, making Idaho by far the nation's largest commercial trout producer.

GENERAL PROVISIONS

The director recommends that the following general provisions be included in the decree determining rights to water from Basin 36.

GENERAL PROVISIONS 1 - 8 APPLY TO ALL WATER RIGHTS IN BASIN 36.

1. EFFECT OF ADJUDICATION.

a. The decree determining rights to water from Basin 36 supersedes all prior decrees determining rights to water from Basin 36, including all provisions for administration of such rights. Upon entry of the decree determining rights to water from this sub-basin, any right which was required to be claimed in this adjudication and which was not claimed will no longer exist.

b. Nothing herein shall be deemed to diminish the director's authority to administer water rights of Basin 36 pursuant to applicable law. Determinations vested in the director herein are subject to state laws limiting the exercise of administrative discretion.

2. GENERAL ADMINISTRATION PROVISIONS.

a. "AFY" when used in this report means acre foot per calendar year, and "CFS" means cubic foot per second.

b. References to the "director" in these general provisions refer to the director of the Idaho Department of Water Resources (IDWR) or the director's duly authorized designee, including the watermaster.

3. CONJUNCTIVE ADMINISTRATION. Where these general provisions provide for two or more water sources to be administered as a single water system, diversion pursuant to junior rights from one water source may be curtailed when necessary to provide water to senior rights from the other water source. Where these general provisions provide that a water source is to be administered separately from another water source, then diversion pursuant to junior rights from the first water source is not subject to curtailment to provide water to senior rights from the other water source.

4. ADMINISTRATION OF GROUND WATER RIGHTS. Ground water appropriators, including geothermal and non-geothermal ground water appropriators, shall not be entitled to maintenance of historic pumping levels.

5. ADMINISTRATION OF BASIN 36 RELATIVE TO THE SNAKE RIVER. The Snake Plain Aquifer, the springs tributary to the Snake River or other surface tributaries, and surface tributaries to the Snake River in Basin 36 downstream from Milner Dam are hydrologically interconnected. Information presently available to the director does not establish the effect of diversions under water rights from the Snake Plain Aquifer in Basin 36 on the water supply available to senior water rights from the springs, the spring-fed tributaries, or the Snake River downstream from Milner Dam. When the director determines the scientific and technical information available is sufficient to establish the nature and degree of impact, if any, that one or more ground water diversions are having upon water rights from the springs, the spring-fed tributaries, or the Snake River downstream from Milner Dam, then the Snake Plain Aquifer within Basin 36, the springs, the spring-fed tributaries, and the Snake River downstream from Milner Dam, will be administered conjunctively.

The perched aquifer in the Rupert area will be administered as being tributary both to the Snake River upstream from Milner Dam and to the Snake Plain Aquifer. Conjunctive administration of this perched aquifer will give due consideration to actual impacts of ground water diversions on senior water rights from the Snake River upstream from Milner Dam and on the Snake Plain Aquifer.

6. ADMINISTRATION OF SMALL DOMESTIC AND STOCK WATER RIGHTS.

a. Small domestic and stock water rights from surface water are subject to administration to provide water to senior water rights from the water system. See general provisions 10.b., 10.c., and 11.b. below as to the definition of small domestic and stockwater rights.

b. Small domestic and stock water rights from ground water are not subject to administration at this time. However, these rights may be made subject to administration to provide water to senior water rights from the water system if the director determines that administration is necessary.

c. An appropriator who has elected to defer adjudication of a deferrable small domestic and stock water right must have the right adjudicated before water will be distributed pursuant to the right by the director. The director may, however, curtail the delivery of water to an unadjudicated deferred domestic and/or stock water right if the director determines such curtailment is necessary to protect senior water rights. See general provisions 10.b. and 11.b. below as to the definition of deferrable small domestic and stockwater rights.

7. MEASURING DEVICES AND CONTROL WORKS. If the director should determine it necessary for the proper administration of the use of water, the director may require any appropriator, at the appropriator's expense, to install and maintain measuring devices and control works of a type acceptable to the director, at all points of diversion and any other points. The director may prohibit or prevent the diversion of water by an appropriator who refuses or fails to comply with this provision.

8. FIREFIGHTING PURPOSES.

a. Firefighting purposes is an alternate use to which any water right may be put, and firefighting is recognized as a lawful use of water with or without a water right.

b. Firefighting purposes means the use of water in times of emergency: to extinguish an existing fire on private or public lands, facilities, or equipment; to prevent an existing fire from spreading to private or public lands, facilities, or equipment within the vicinity of and endangered by an existing fire; and by firefighting personnel engaged in fighting an existing fire. Firefighting purposes does not include the use of water to prevent a fire from occurring in

the future, the use of water for domestic purposes in regularly maintained firefighting stations, or the storage of water for fighting future fires.

9. CONSUMPTIVE USE. Where consumptive use is not stated for a right or a portion of a right, the consumptive use for that right or that portion of the right is so small that it is deemed de minimus.

GENERAL PROVISION 10 APPLIES TO ALL WATER RIGHTS IN BASIN 36 SHOWN WITH DOMESTIC USE AS A PURPOSE OF USE.

10. DOMESTIC USE. Domestic use, when shown as the purpose of use for a right or a portion of a right, is:

a. the use of water in a home or homes, and for other purposes in connection therewith, including up to one-half acre total of irrigation per water right, or

b. the use of water for homes, organization camps, public campgrounds, livestock, and for any other purpose in connection therewith, including irrigation of up to one-half acre of land, if the total use is not in excess of 13,000 gallons per day, but not including water for multiple ownership subdivisions, mobile home parks, commercial or business establishments, or

c. the use of water for any beneficial uses, if the total use of the right does not exceed a diversion rate of 0.04 cfs and a diversion volume of 2500 gallons per day.

For rights or portions of rights that meet the definition of paragraph b, the annual volume of diversion is the volume actually diverted and beneficially used, subject to a maximum of 13,000 gallons per day. For rights or portions of rights that meet the definition of paragraph c, the annual volume of diversion is the volume actually diverted and beneficially used, subject to a maximum of 2500 gallons per day.

GENERAL PROVISION 11 APPLIES TO ALL WATER RIGHTS IN BASIN 36 SHOWN WITH STOCK WATER USE AS A PURPOSE OF USE.

11. STOCK WATER USE. Stock water use, when shown as the purpose of use for a right or a portion of a right, is:

a. the use of water for care and/or watering of livestock, or

b. the diversion and use of water for care and/or watering of livestock and/or wildlife where the total use of the right does not exceed a diversion volume of 13,000 gallons per day. Other uses of water for wildlife are shown with a purpose of use of wildlife.

For rights or portions of rights that meet the definition in paragraph b, the annual volume of diversion is the volume actually diverted and beneficially used, subject to a maximum of 13,000 gallons per day.

GENERAL PROVISIONS 12 - 16 APPLY TO ALL WATER RIGHTS IN BASIN 36 SHOWN WITH IRRIGATION AS A PURPOSE OF USE.

12. IRRIGATION USE. Water rights or portions of water rights shown with a purpose of use for irrigation include the following:

a. Incidental stock water. When stock water is not specifically included for a water right that includes irrigation, a portion of the quantity described for irrigation use may be diverted and used, from the same point of diversion and at the same place of use as the irrigation use, for purposes of maintaining a reasonable water supply for stock watering use during the period of use for irrigation described in the water right.

b. Early-season irrigation and late-season irrigation. The director may allow the diversion of rights or portions of rights for irrigation use either before or after the period of use for irrigation described in the water right where:

i. the water so diverted is applied to a beneficial use, as determined by the director,

ii. all water rights, regardless of priority (now existing or developed subsequent to this decree), existing at the time of diversion that are within their period of use can be satisfied, and

iii. the diversion and use of the water does not conflict with the public interest as determined by the director.

c. Diversion of additional flows. The director may allow a quantity of surface water in addition to the quantity of surface water described for irrigation use to be diverted for irrigation of the described place of use where:

i. the waters so diverted are applied to a beneficial use, as determined by the director,

ii. all water rights, regardless of priority (now existing or developed subsequent to this decree), existing at the time of diversion that are within their period of use can be satisfied, and

iii. the diversion and use of the water does not conflict with the public interest as determined by the director.

13. DIVERSION VOLUME FOR IRRIGATION. The maximum annual volume of water reasonably required at the field headgate for irrigation of lands in Basin 36 is shown in Figure 1. The lands shown in Figure 1 that are located in the northern portion of Basin 36 require a maximum annual volume of 3.5 AFY per acre, while the lands that are located in the southern portion of Basin 36 require a maximum of 4.0 AFY per acre. Where diversion volume is not stated for water rights or portions of water rights for irrigation purposes, either 3.5 AFY per acre or 4.0 AFY per acre, depending on location, is the diversion volume measured at the point of diversion from the water source that is reasonably required for irrigation unless a higher annual diversion volume is reasonably required due to conveyance losses, method of irrigation, or field conditions, as determined by the director.

14. CONSUMPTIVE USE FOR IRRIGATION. Where the purpose of use for a portion of a right is shown as irrigation, and the remainder of the right is for other purposes, the consumptive use shown is the consumptive use for the irrigation portion of the right only, unless otherwise stated in remarks. The maximum annual volume of consumptive use reasonably required for irrigation of lands in Basin 36 varies with location, in the same manner as does diversion volume, addressed in General Provision 13, above. Figure 1 shows the maximum annual volume of consumptive use

in Basin 36. In general, the northern portion of the basin requires a maximum of 2.5 AFY per acre, while the southern portion of the basin requires a maximum of 3.0 AFY per acre.

15. AMOUNT OF COMBINED WATER RIGHTS FOR IRRIGATION. Unless specifically stated otherwise in the recommended water right, the combined use of more than one right for irrigation purposes is limited to:

a. a combined total rate of diversion of .02 CFS per acre.

b. a combined total annual diversion volume of either 3.5 AFY per acre or 4.0 AFY per acre as stated in general provision 13 above, and

c. a combined total annual consumptive use volume of either 2.5 AFY per acre or 3.0 AFY per acre as stated in general provision 14 above.

16. DIVERSION RATES IN EXCESS OF .02 CFS PER ACRE.

a. The rate of flow generally required at the field headgate in Basin 36 is .02 cfs per acre. For purposes of determining the water rights in this report, .02 cfs per acre was deemed to be the rate of diversion, measured at the point of diversion from the water source, reasonably required for the irrigation of lands, unless the claimant demonstrated that a higher diversion rate is reasonably required due to actual, reasonable conveyance losses, irrigation methods, or field conditions.

b. The total per acre rate of diversion measured at the point of diversion from a surface water source, shown for some rights, is greater than .02 CFS per acre. Where a rate of diversion in excess of .02 cfs per acre is required due to conveyance losses, then the right contains a remark limiting a portion of the right to use for conveyance losses. Where a rate of diversion in excess of .02 cfs per acre is required due to irrigation methods and/or field conditions, then the right includes a remark stating the diversion rate required at the field headgate. However, for small acreages of 5 acres or less a diversion rate of up to .03 CFS per acre is recommended without a remark stating the diversion rate at the field headgate.

c. In those cases in which the water right(s) includes an amount limited to use for conveyance losses, the total amount shown for the right(s) includes:

i. the standard amount generally required for the purpose of use of the right, which includes reasonable conveyance losses associated with such uses, plus

ii. an additional amount required for conveyance losses in the particular distribution system determined to be reasonable under currently existing conditions.

d. The diversion of amounts described in the water right that are in excess of .02 CFS per acre may continue so long as:

i. the use does not constitute unreasonable waste, as determined by the director, and

ii. the use does not conflict with the public interest, as determined by the director.

Signed this 26TH day of October, 1992.

R. KEITH HIGGINSON
Director
Idaho Department of Water Resources

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

A. LYNNE KROGH-HAMPE
Deputy Attorney General
Idaho Department of Water Resources

NICHOLAS B. SPENCER
Deputy Attorney General
Idaho Department of Water Resources

EXHIBIT B

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

Check

Nº 33753

Boise, Idaho, April 26, 1962

RECEIVED FROM Rangen Inc. of Buhl, Idaho

Twenty Two and No/100 DOLLARS

FOR

Carey Act Trust Fund	$	
Application for Permit No.	$	
Proofs 30654	$	20 00
Certified Copy	$	
Recording Deed	$	
Certificate	$	
TOTAL	$	22 00

A. Reid Hyde
State Reclamation Engineer

By Mary Louise

Re: Permit No. 30654

Rangen, Inc.
Buhl, Idaho

Gentlemen:

Our field examiner's report on his inspection of proof of completion of works and application of water to beneficial use under the terms of Permit No. 30654 shows the pipeline and ponds are capable of conveying 2500 miner's inches, or 50 c.f.s.

Upon receipt of the statutory fees, totaling $22.00, we will issue the Certificate of Completion of Works for 50 c.f.s. and the License and Certificate of Water Right for 50 c.f.s. confirming the right, with priority of July 31, 1962, to the use of surface water from an underground spring of Billingsley Creek with the point of diversion in SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M. for fish culture and domestic use in SE¼NE¼, Sec. 31, T. 7 S, R. 14 E, B.M.

Very truly yours,

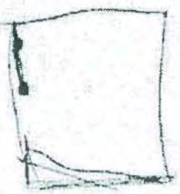
Donald W. McEldowney
Water Rights Clerk

DWM:nw

30654

needs correction
of legal notice
at Gooding Leader
expense

received
4-20-17



30654

AFFIDAVIT OF PUBLICATION

RECEIVED
APR 20 1967
Department of Reclamation

NOTICE OF CORRECTION OF LEGAL NOTICE PUBLISHED UNDER THE PROVISIONS OF SECTIONS 42-214, 42-217, IDAHO CODE NW

Notice is hereby given that the legal notice printed in the Gooding Leader on July 30, August 6, 13, and 20, 1964, showing that Rangen, Inc. was to make proof of beneficial use of water on September 2, 1964, on Permit No. 30654 was in error and the point of diversion was given as S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.; whereas the actual point of diversion is S. 10° 28½' East 2392.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 8 S, R. 14 E, B.M.

That any protests against the approval of the depositions made September 2, 1964 must be filed in the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protests shall state the name and address of the protestant, all shall clearly set forth his objection to the approval of said proof of beneficial use of water.

Dated this 28th day of March 1967.

S/ Jack A. Barnett
Deputy State Reclamation Engineer

23-24

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Thomas D. Miller*, do solemnly swear that I am the printer and publisher of THE GOODING COUNTY LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper 2 consecutive weeks, the first publication having been made on the 29th day of March, 1967, and the last publication having been made on the 6th day of April, 1967, that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Thomas D. Miller

Subscribed and sworn to before me this

17th *day of* April, 1967

L. Rae Hardy

Notary Public

30654

SPEED LETTER ®

FROM Jack A. Barnett — TO Gooding Leader

Deputy State Reclamation Engineer — By: Mrs. Frank Stone

SUBJECT Legal Notice - Notice of correction- Permit No. 30654, Rangen Inc.

FOLD

MESSAGE

DATE April 18 19 67

Enclosed is copy of legal and affidavit as requested. After 6 mos. try we hope this will complete your file. Untrained help and three new bookkeepers in as many months created some problems. Please direct correspondence regarding legals and insertion orders in the future to my attention. Please return attached reply so that I may know you received the papers requested.

Thank you!

SIGNED Mrs. Frank Stone

REPLY

DATE 19

Your request has been recorded in our records.
Thank you for your cooperation.

Very truly yours

SIGNED

GreyLine SNAP-A-WAY FORM 44-902 3-PARTS
WILSON JONES COMPANY • © 1961 • PRINTED IN U.S.A.

RETAIN WHITE COPY, RETURN PINK COPY, TURN OVER FOR USE WITH WINDOW ENVELOPE

30654

George Lemon W M
has monthly flow
measurements

INSTRUCTIONS TO EXAMINERS

1. Always carefully note the location of the point of diversion and accurately plat same.
2. When proof is for beneficial use, carefully check up the number of acres actually irrigated in each forty and accurately plat same.
3. Make a map showing the correct location of streams and ditches, and the irrigated lands, and any adjacent permanent landmarks, such as towns, lakes, large streams and public roads.
4. If any unusual conditions are discovered, make plain statement of them under remarks.
5. Always see the holder, if possible, and go over the whole ground with him and make your report only upon actual existing facts and conditions.
6. Give general characteristics of soils, topography, and crops raised.

Theodor Rangen, President
Rangen, Inc.,
Buhl, Idaho Rt. #4
Permit No. 30654

Examination for Completion of Works

County Gooding

Sec. 32 T. 7S R. 14 E B M

Quantity: 50 cfs

Source:

P.D.:

Use:

Filed:

Due:

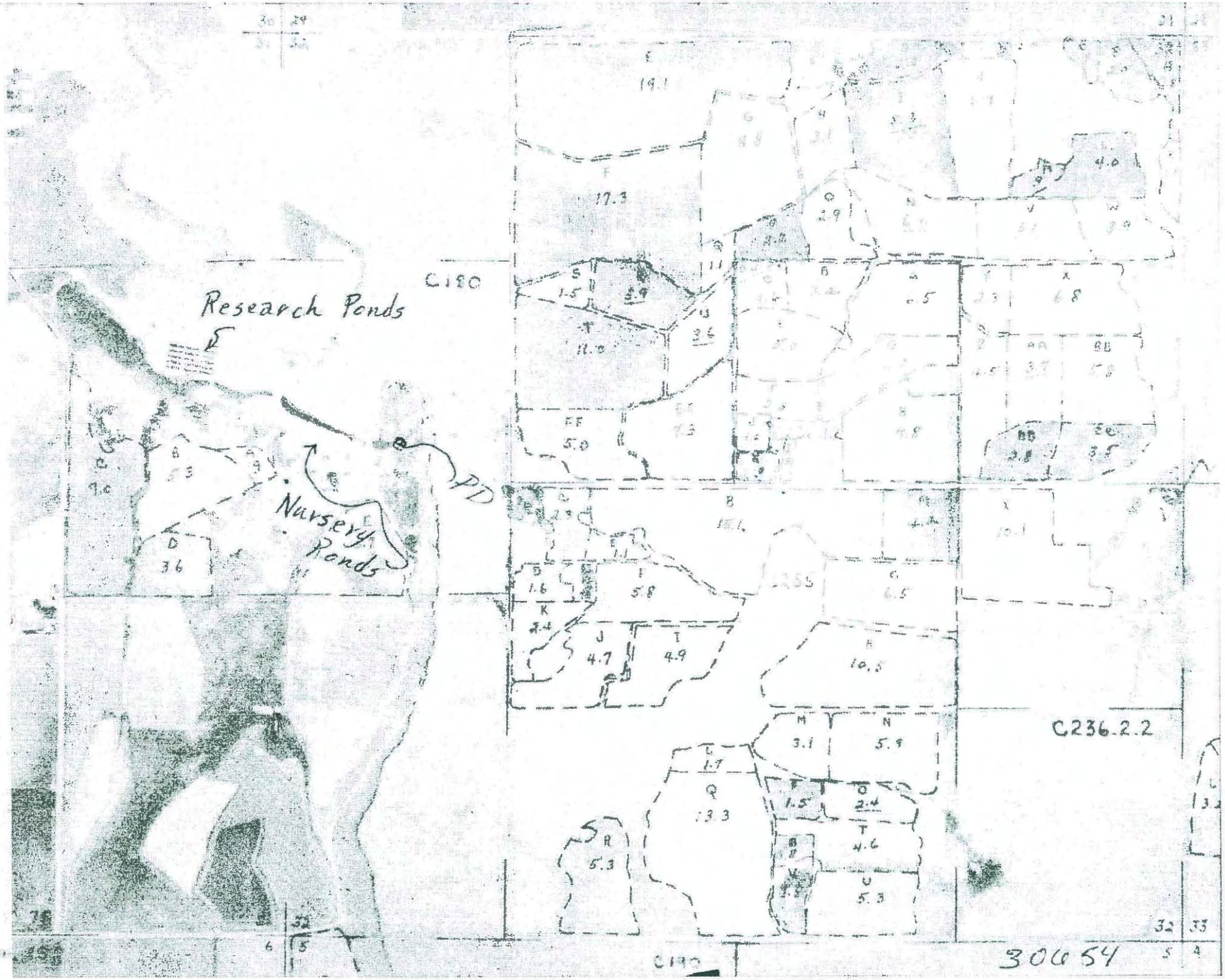
Extension:

Mod. July 17, 1962
Permit July 31, 1962

Completion of Works:

Other Rights:

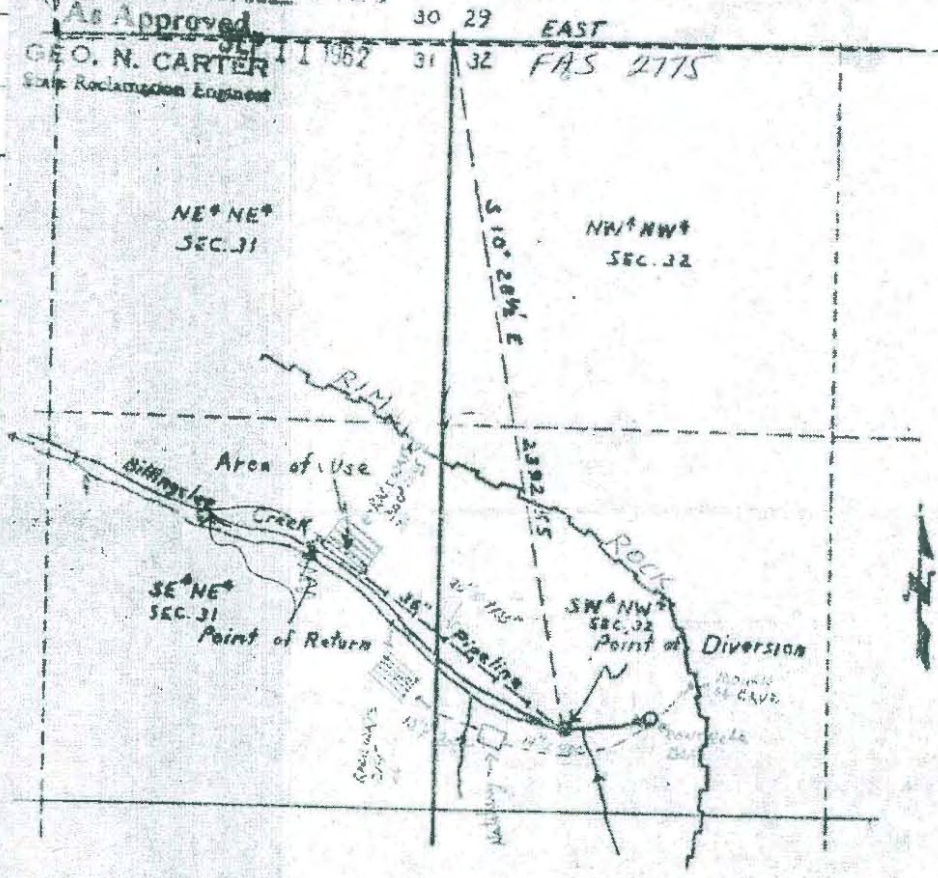
30654


Research Ponds
Nursery Ponds
C150
C236.2.2
30054

FAS 2774

RANGEN, INC., SURVEY T. 7S., R. 14E., BM.

Permit Map No. 30651
As Approved
SEP 11 1962
GEO. N. CARTER
State Reclamation Engineer



I, Philip F. Puchner, of Ketchum, Idaho, an engineer licensed by the State of Idaho, do hereby certify that this map was made from notes taken during actual surveys made by me on May 20 and 21, and June 20, 1962, and that it correctly represents the works described.

Allow Q = 50 cfs

Scale: 2 Inches Equals 1 Mile. Draw Map In Ink.

30C.54

Rangen Incorporated
Buhl, Idaho
Theodore Rangen, Pres.

Permit No. 30654

Examination for ~~Comp. of Works~~ & Bene. Use

County Gooding

Sec. 32 T. 7S R. 14E

Quantity: 50

Source:

P. D.:

Use:

Filed:

Due:

Extension:

Protest:

Completion of Works:

Other Rights:

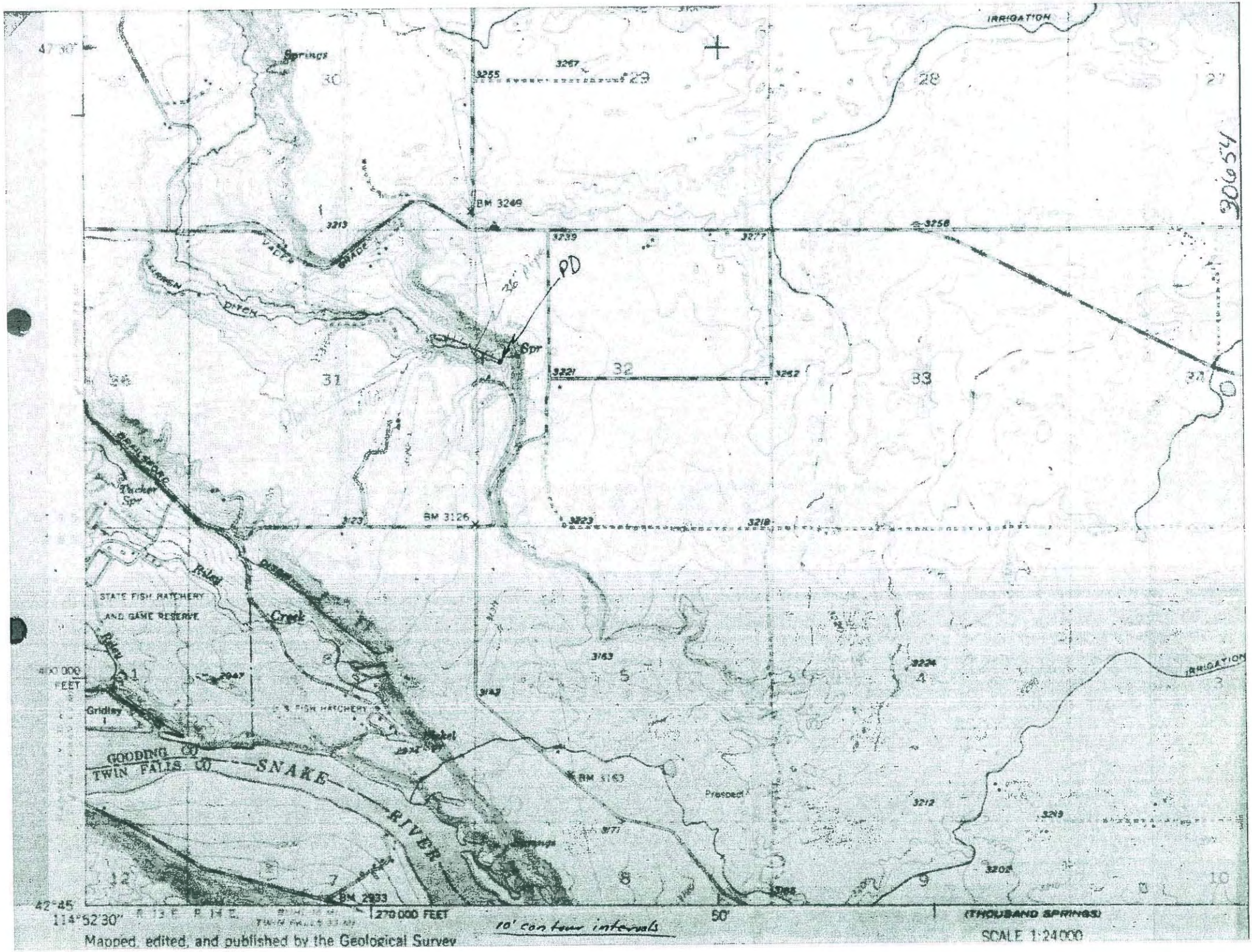
Made Sept 2, 1964

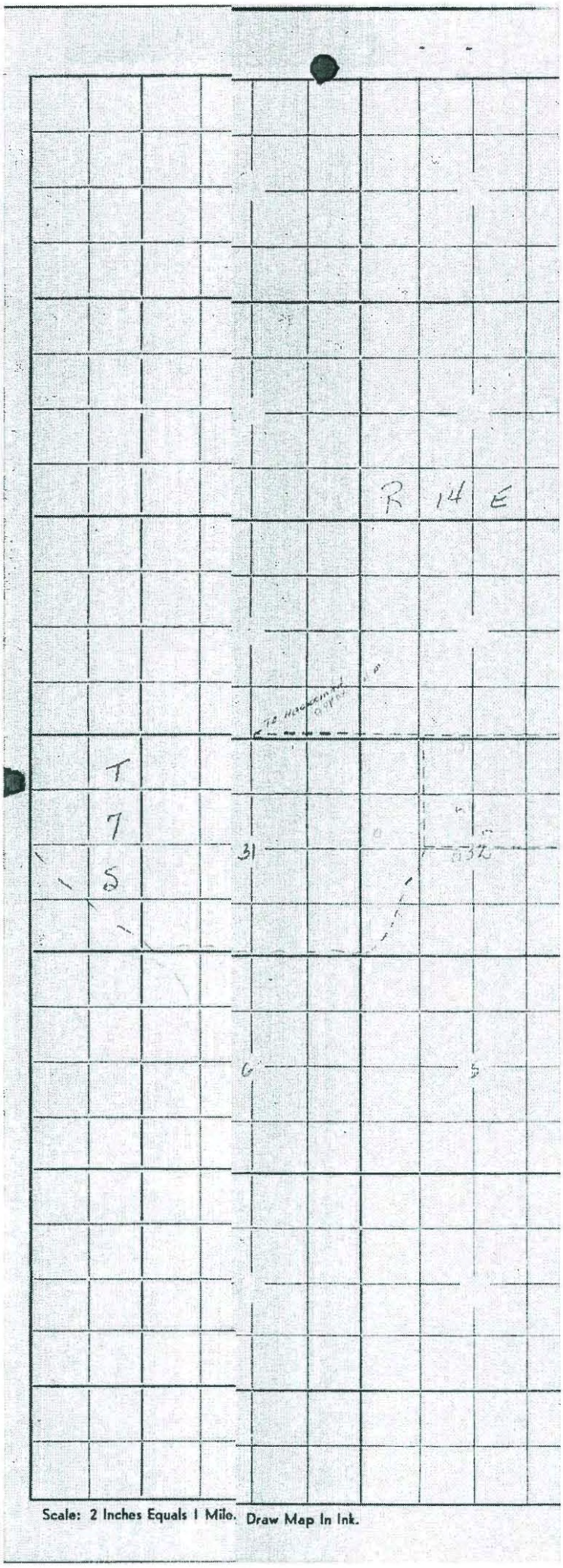
Printed July 31, 1962

INSTRUCTIONS TO EXAMINERS

1. Always carefully note the location of the point of diversion and accurately plat same.
2. When proof is for beneficial use, carefully check up the number of acres actually irrigated in each forty and accurately plat same.
3. Make a map showing the correct location of streams and ditches, and the irrigated lands, and any adjacent permanent landmarks, such as towns, lakes, large streams and public roads.
4. If any unusual conditions are discovered, make plain statement of them under remarks.
5. Always see the holder, if possible, and go over the whole ground with him and make your report only upon actual existing facts and conditions.
6. Give general characteristics of soils, topography, and crops raised.

30654


IRRIGATION
Springs
BM 3249
PD
Spr
Tucker Spr
BM 3126
STATE FISH HATCHERY
AND GAME RESERVE
Creek
Gridley
U S FISH HATCHERY
GOODING
TWIN FALLS
SNAKE
RIVER
BM 2933
BM 3163
Prospect
IRRIGATION
270 000 FEET
50'
(THOUSAND SPRINGS)
10' contour intervals
SCALE 1:24000
Mapped, edited, and published by the Geological Survey


R 14 E
T
7
S
31
32
5
Scale: 2 Inches Equals 1 Mile.
Draw Map In Ink.

Ques. 7. If for power or other purposes than irrigation, state how water has been applied and to what extent.

Ans. Does not apply

Ques. 8. If for irrigation, state character of land that has been reclaimed, and give your estimate of the amount of water required for its profitable cultivation.

Ans. Does not apply

Ques. 9. Have you any interest in the works, water or lands above mentioned? If so, in what way and to what extent?

Ans. No.

Ques. 10. State when, how, in what amount and to what extent you have witnessed the application to beneficial use of water diverted under said permit.

Ans. July, 1963 and on at least five occasions since that time have observed water going through the works and personally observed the rearing of fish in the use area.

Adrian I. Bernier

(Signed)

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me in Buhl, County of Twin Falls, State of Idaho, on this 8th day of September, A. D. 19 64.

Eugene H. Christoffersen

Notary Public. for the state of Idaho residing at Buhl, Idaho

My commission expires Feb, 1968

Replace witness E. A. Bean who holds contract of sale

30654

AFFIDAVIT OF PUBLICATION

RECEIVED
SEP 4 1964
Department of Reclamation

NOTICE FOR PUBLICATION
NOTICE OF PROOF
APPLICATION OF WATER TO BENEFICIAL USE

Notice is hereby given that at 10:00 a.m. on the 2nd day of September, 1964, at Buhl, Idaho, County of Twin Falls, State of Idaho, before Eugene H. Christofferson, proof will be submitted of the application to beneficial use of 50 cubic feet per second of the waters of Billingsley Creek in accordance with the terms and conditions of Permit No. 30654 heretofore issued by the Department of Reclamation of the State of Idaho.

The name and post office address of the person or corporation holding said permit Rangen, Inc., Box 706, Buhl, Idaho.

The use to which water has been applied is Fish culture and propagation.

The amount applied to beneficial use is 50 cubic feet.

The point of diversion of said water is S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Section 32, Twp. 7 S., R. 14 E.B.M. ← #

The place where said water is used (LEGAL DESCRIPTION) from said point of diversion to the point where Billingsley Creek intersects the County road which said point of intersection is in the SE corner of the NW¼NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. being in the SW¼NW¼ of Section 32 and the S½NE¼ and NW¼NE¼ of Section 31, all in Twp. 7 S. R. 14 E.B.M.

The date of priority which said user is prepared to establish is July 31, 1962.

Carl E. Tappan,
State Reclamation Engineer

40-43

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 30th day of July, 1964, and the last publication having been made on the 20th day of August, 1964 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

20th *day of* August, *19*64

Ruth Burress

Notary Public

TWO SEPARATE REQUESTS WERE SENT REQUESTING CORRECTION. NO RESPONSE. NO CORRECTING ACTION TAKEN —

30654

Re: Permit No. 30654
Rangen, Inc.

July 28, 1964

Bird & Hobdey,
Attorneys at Law,
Box 386,
Gooding, Idaho.

Gentlemen:

This acknowledges the Notice of Proof of ~~Completion of Works and~~ Application of Water to Beneficial Use under Permit No. 30654, in the name of Rangen, Inc. Final Proof is to be made before ~~xxxx~~ Eugene H. Christoffer-son as Notary on the 2nd day of September, 1964, at 10:00 o'clock A.M., at Buhl, Idaho.

As of this date, we have mailed the Notice to the Gooding Leader Gooding, Idaho, with instructions to publish it once a week for four consecutive weeks prior to the date set for final proof and then mail the Affidavit of Publication and statement of costs to you.

It is important that the enclosed depositions be executed by the permit holder and two disinterested witnesses who are familiar with the terms of the permit and the work done thereunder, at the time, on the date and before you, as Notary, as stated in the publication notice. It is very important and necessary that each question be answered in detail.

In returning the depositions to this office, be sure that all copies have been signed, that your Notary's seal has been placed on each and that all depositions, (holder and two witnesses) are being returned. Also be sure to enclose the AFFIDAVIT OF PUBLICATION.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer
By

(MRS.) EDNA P. RULE
Chief Clerk

Encl.
EPR:pmk
cc: Applicant
cc: Notary

30654

Application for Amendment
PLACE OF USE
~~XXXXXXXXX~~

JUL 27 1964
Department of Reclamation

Permit No. 30654

Comes now Rangen, Inc., and represents to the STATE RECLAMATION ENGINEER of the State of Idaho:

That he is the owner and holder of Permit to Appropriate the Public Waters of the State of Idaho, No. 30654, and requests that the ~~point of diversion to be changed~~ place of use as described in said permit, be changed to read as follows:

from the point of diversion to the point where Billingsley Creek intersects the County Road which said point of intersection is in the SE corner of the NW¼ NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. and said place of use being in the SW¼ NW¼ Section 32, S½ NE¼ and NW¼ NE¼, Section 31, all in Twp. 7 S. R. 14 E.B.M.

, making a total of 35 acres.

That an additional amount of water is not asked for, and that the rights of others will not be adversely affected by such change.

Signed at Buhl, Idaho this 23rdday of July, 1964

RANGEN, INC.

By: Forrest Rangen

Date of receipt at office of Department of Reclamation July 27, 1964

APPROVAL OF STATE RECLAMATION ENGINEER

I, Ralph W. Thomas, Deputy ~~GEO. B. CARTER~~, State Reclamation Engineer of the State of Idaho, hereby approve the above and foregoing application for amendment to Permit to Appropriate the Public Waters of the State of Idaho, No. 30654. This approval constitutes a new permit and is issued as an amendment to the original permit, to which it refers, and of which it becomes a part, and said application is approved only insofar as the rights of others will not be adversely affected thereby.

Recorded in Book 107 of Permits Page 30654
July 28, 1964

Ralph W. Thomas
Deputy State Reclamation Engineer

30654

Application for Amendment

P[illegible] OF [illegible] RETURN

Permit No. [illegible]

Comes now [illegible] and represent__ to the State Reclamation Engineer of the State of Idaho:

That he is (are) the owner__ and holder__ of Permit to Appropriate the Public Waters of the State of Idaho, No. [illegible]

That the point__ of diversion is described in said Permit as being located:

[illegible]

That __ desire__ to change the point__ of diversion [illegible] to be located: [illegible]

That the reason for desiring to make such change is as follows:

[illegible]

That no one will be injured by such change, and that such change will be made as Permit holder's [illegible]

[illegible], this [illegible] day of [illegible], [illegible]

[illegible]

[illegible]

[illegible] Reclamation March 5, 1964

APPROVAL OF STATE RECLAMATION ENGINEER

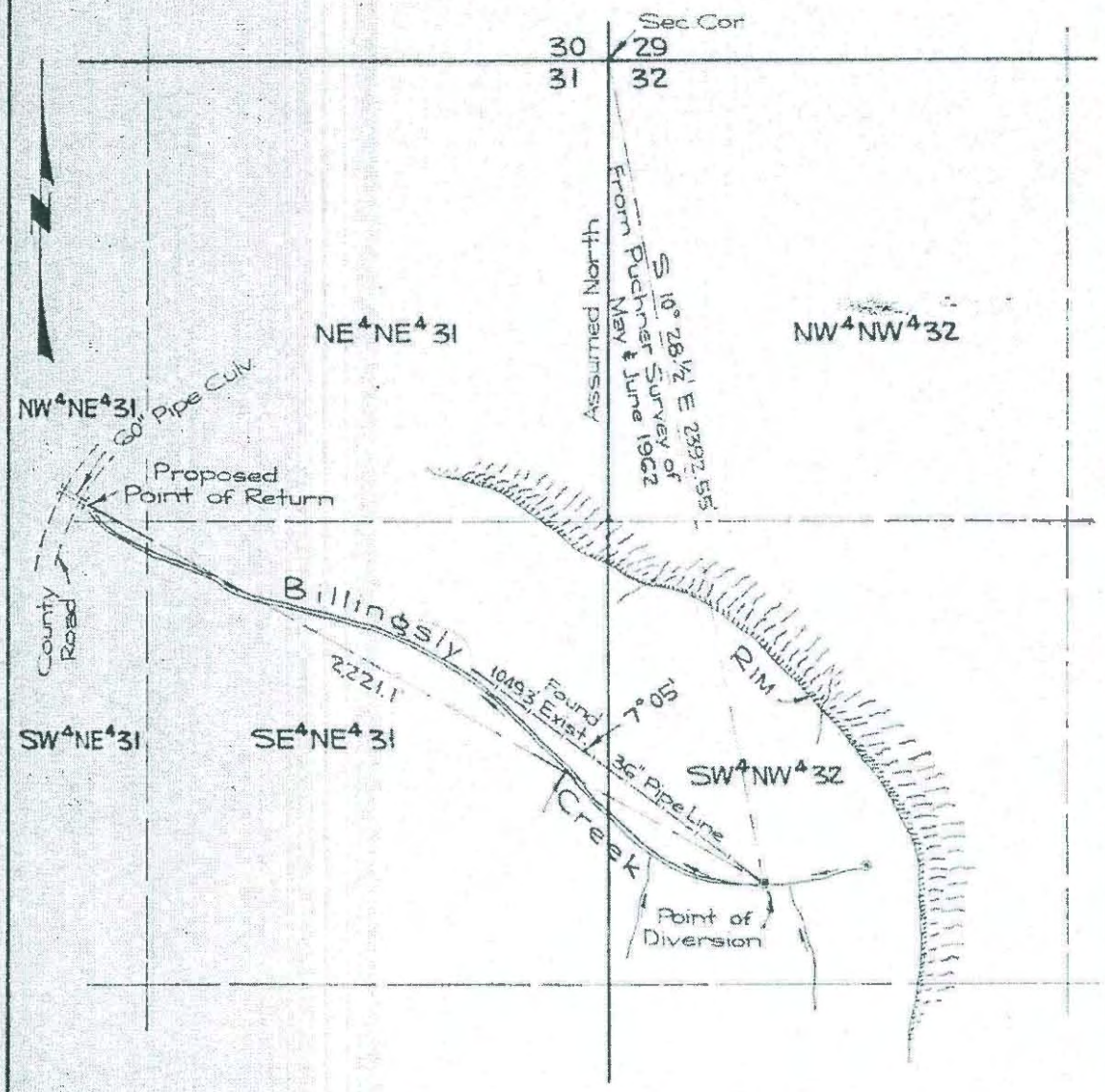
I, [illegible] Reclamation Engineer of the State of Idaho, HEREBY APPROVE the above [illegible] Amendment to Permit to Appropriate the Public Waters of the [illegible]. This approval constitutes a new permit [illegible] original permit, to which it refers and of which [illegible] is approved only insofar as the rights of others will not be adversely affected [illegible].

[illegible]
Deputy
State Reclamation Engineer

Recorded in [illegible]
Permits, at Page [illegible]
[illegible]

30654

APPLICATION EXHIBIT FOR WATER DIVERSION PERMIT
RANGEN INC. BUHL, IDAHO
Sections 31 & 32 T. 7S, R. 14E, B.M.
GOODING COUNTY, IDAHO
Scale: 1" = 400'



This is to certify that the above property has been surveyed under my direction and supervision as shown on this plat.

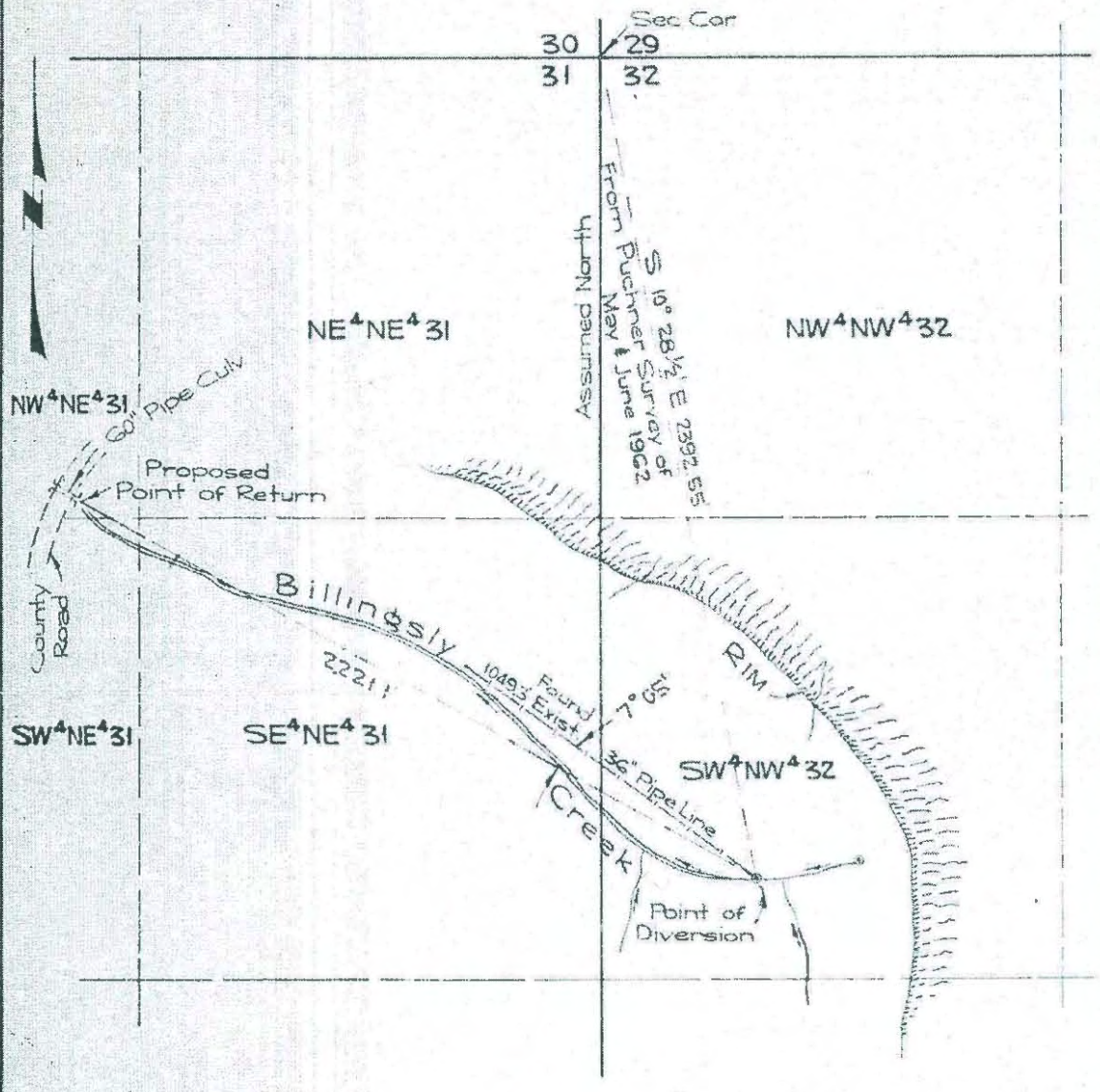
CHARLES W. GLASBY
CONSULTING ENGINEER
925 SHOSHONE ST. N.
TWIN FALLS, IDAHO

Drawn By: mennig
Date: 3/4/62

Charles W. Glasby
3/4/62

30654

APPLICATION EXHIBIT FOR WATER DIVERSION PERMIT
RANGEN INC. BUHL, IDAHO
Sections 31 & 32 T. 7S., R.14E., B.M.
GOODING COUNTY, IDAHO
Scale: 1" = 400'



This is to certify that the above property has been surveyed under my direction and supervision as shown on this plat.

CHARLES W. GLASBY
CONSULTING ENGINEER
925 SHOSHONE ST. N.
TWIN FALLS, IDAHO

Drawn By manning

Date 3/4/64

Charles W. Glasby 3/4/64

30054

AFFIDAVIT OF PUBLICATION

NOTICE OF PUBLICATION

Notice is hereby given that at 10:00 a.m., on the 5th day of September, 1963, at Buhl, County of Twin Falls, State of Idaho, before Eugene H. Christofferson proof will be submitted of the completion of works for the diversion of 50 cubic feet per second of the waters of the headwaters of Billingsley Creek in accordance with the terms and conditions of a certain permit heretofore issued by the State Reclamation Engineer of the State of Idaho.

1. The name of the person or corporation holding said permit is Rangen, Inc., Box 706, Buhl, Idaho.

2. The postoffice address of such person or principal place of business of such corporation is Buhl, County of Twin Falls, State of Idaho.

3. The number of such permit is 30654, and the date set for the completion of such work is September 11, 1963.

4. Said water is to be used for fish cultural and domestic use purposes.

5. Said works of diversion will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 50 cubic feet per second.

Carl E. Tappan, Acting
State Reclamation Engineer

39-42

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 25th day of July, 1963, and the last publication having been made on the 15th day of August, 1963 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

15th *day of* August, 1963

Ruth Rogers

Notary Public

30654

AFFIDAVIT OF PUBLICATION

NOTICE FOR PUBLICATION
NOTICE OF PROOF
APPLICATION OF WATER TO BENEFICIAL USE

Notice is hereby given that at 10:00 a.m. on the 2nd day of September, 1964, at Buhl, Idaho, County of Twin Falls, State of Idaho, before Eugene H. Christofferson, proof will be submitted of the application to beneficial use of 50 cubic feet per second of the waters of Billingsley Creek, in accordance with the terms and conditions of Permit No. 30654 heretofore issued by the Department of Reclamation of the State of Idaho.

The name and address of the person or association holding said permit is Gen. Del. Box 709 Buhl, Idaho.

The use to which water has been applied is Fish culture and propagation.

The amount applied to beneficial use is 50 cubic feet.

The point of diversion of said water is S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Section 32, Twp. 7 S., R. 14 E.B.M.

The place where said water is used (LEGAL DESCRIPTION) from said point of diversion to the point where Billingsley Creek intersects the County road which said point of intersection is in the SE corner of the NW¼NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. being in the SW¼NW¼ of Section 32 and the S½NE¼ and NW¼NE¼ of Section 31, all in Twp. 7 S. R. 14 E.B.M.

The date of priority which said user is prepared to establish is July 31, 1962.

Carl E. Tappan,
State Reclamation Engineer

40-43

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Leland G. Burress*, do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 24th day of July, 1964, and the last publication having been made on the 14th day of August, 1964, that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

14th *day of* August, *1964*

Lucile Burress

Notary Public

30654

AFFIDAVIT OF PUBLICATION

NOTICE OF PUBLICATION

Notice is hereby given that at 10:00 a.m., on the 5th day of September, 1963, at Buhl, County of Twin Falls, State of Idaho, before Eugene H. Christofferson proof will be submitted of the completion of works for the diversion of 50 cubic feet per second of the waters of the headwaters of Billingsley Creek in accordance with the terms and conditions of a certain permit heretofore issued by the State Reclamation Engineer of the State of Idaho.

1. The name of the person or corporation holding said permit is Rangen, Inc., Box 706, Buhl, Idaho.
2. The postoffice address of such person or principal place of business of such corporation is Buhl, County of Twin Falls, State of Idaho.
3. The number of such permit is 30654, and the date set for the completion of such work is September 11, 1963.
4. Said water is to be used for fish cultural and domestic use purposes.
5. Said works of diversion will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 50 cubic feet per second.

Carl E. Tappan, Acting
State Reclamation Engineer

39-42

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Leland G. Burress*, do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 25th day of July, 1963 and the last publication having been made on the 15th day of August, 1963 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

15th *day of* August, 1963

Ruth Burress

Notary Public

30654

HIGH & FRITCHMAN COMPANY

It is hereby ordered, adjudged and decreed, and this does order, adjudge and decree, that the defendant and intervenor High & Fritchman Company, a corporation, is the owner of, and entitled to the use of, and the right to use for irrigation and domestic purposes the following amounts of water, to-wit:

Three and 2 tenths (3.2) second feet of water, with a priority of October 9, 1884, developed and diverted from the waters, seeps, springs and rivulets in the rim rock above the head waters of Billingsley Creek, by means of a tunnel commonly known as the Curran Tunnel, or Curran Spring, situate in the SW¼ NW¼, Sec. 33, Twp. 7 North, Range 14 East, B. M., Gooding County, Idaho, and 4.8 second feet of the waters of said seeps, springs, and rivulets diverted and developed by the same tunnel, with a priority of April 1, 1908, taken from said tunnel by a pipe line and ditch into and upon the lands of the said defendant hereinafter described and used on said lands for irrigating and raising crops thereon and for watering stock and other domestic puposes during the non irrigation season.

Said water rights are appurtenant to and to be used upon and in the irrigation of the following described lands, situate in Gooding County, Idaho, of the said defendant and intervenor High & Fritchman Company, a corporation, to-wit:

The Southeast Quarter (SE¼) of the Northeast Quarter (NE¼); the East Half (E½) of the Southeast Quarter (SE¼) of Section Thirty-one (31); the Southwest Quarter (SW¼) of the Northwest Quarter (NW¼); the West Half (W½) of the Southwest Quarter (SW¼) of Section Thirty-two (32), all in Township Seven (7) South, Range Fourteen (14) East, B.M., and Lots Three (3) and Four (4) of Section Five (5), Township Eight (8) South, Range Fourteen (14) East, B.M., together with all water rights, ditches and ditch rights of way appurtenant thereto.

Permit Map No. ____
As Approved
GEO. N. CARTER
State Reclamation Engineer

30654

AFFIDAVIT OF PUBLICATION

RECEIVED
AUG 5 19
Department of Reclamation

NOTICE OF APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF IDAHO IN ACCORDANCE WITH THE PROVISIONS OF SECTION 42-203, IDAHO CODE

NOTICE IS HEREBY GIVEN, That RANGEN, Inc., of Buhl, Idaho, has made application No. 38670, on the 31st day of July, 1962, to appropriate fifty (50) cubic feet per second of the waters of the head waters of Billingsley Creek, for fish cultural and domestic use.

That the point of diversion is located in the SW¼NW¼, Sec. 32, T. 7 S., R. 14 E., B.M.; and that the place of use is in the SE¼-NE¼, Sec. 31, T. 7 S., R. 14 E., B.M.

That any protests against the approval of this application must be filed with the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protest shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said application.

Dated this 1st day of August, 1962.

Ralph W. Thomas, Deputy State Reclamation Engineer

Service of the foregoing, by copy, is hereby acknowledged this 2nd day of August, 1962. 41-43

STATE OF IDAHO, }
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper ...one... consecutive weeks. The first publication having been made on the 2nd day of August, 196 2, and the last publication having been made on the 9 35 day of August, 196 2 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper; has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this 9 35 *day of* August, 196 2

Ruth Burress

Notary Public

30054

NOTICE OF APPLICATION TO APPROPRIATE THE PUBLIC WATERS OF

THE STATE OF IDAHO IN ACCORDANCE WITH THE PROVISIONS OF

SECTION 42-203, IDAHO CODE

NOTICE IS HEREBY GIVEN, that [redacted], Inc., of Hazelton, Idaho, has made application No. 30670, on the 21st day of July, 1978, to appropriate Forty (40) cubic feet per second of the waters of the head waters of Billingsley Creek, for irrigation and domestic use.

That the point of diversion is located in the [redacted], sec. 32, T. 7 S., R. 24 E., B. M.; and that the place of use is in the [redacted], sec. 31, T. 7 S., R. 24 E., B. M.

That any protests against the approval of this application must be filed with the Department of Reclamation, at Boise, Idaho, within Forty (40) days from the date of this notice, and each protest shall state the name and address of the protestant, and shall clearly set forth the objections to the approval of said application.

Dated this 31st day of August, 1978.

Deputy State Reclamation Engineer

Date of First Publication: _____

Date of Last Publication: _____

Last date for Protest: September 30, 1978

RECEIPT OF THE APPLICANT, by copy, is hereby acknowledged this _____ day of _____, 1978.

[redacted], Inc.

By _____

30654

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	)	**ORDER OF PARTIAL DECREE**
	)	
Case No. 39576	)	**For Water Right 36-02551**
	)	

On October 10, 1997, a ***Special Master's Report and Recommendation*** was filed for the above water right. No Challenges were filed to the ***Special Master's Report and Recommendation*** and the time for filing Challenges has now expired.

Pursuant to I.R.C.P. 53(e)(2) and ***SRBA Administrative Order 1***, Section 13f, this court has reviewed the Findings of Fact and Conclusions of Law contained in the ***Special Master's Report*** and wholly adopts them as its own.

Therefore, IT IS ORDERED that water right 36-02551 is hereby **decreed** as set forth in the attached ***Partial Decree Pursuant to I.R.C.P. 54(b)***.

DATED December 29, 1997.

DANIEL C. HURLBUTT, JR.
Presiding Judge
Snake River Basin Adjudication

JAN 12 2004

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	)	PARTIAL DECREE PURSUANT TO
	)	I.R.C.P. 54(b) FOR
Case No. 39576	)	
	)	Water Right 36-02551

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 48.54 CFS

THE QUANTITY OF WATER UNDER THIS RIGHT FOR DOMESTIC USE SHALL NOT EXCEED 13,000 GALLONS PER DAY.
THIS RIGHT AND RIGHT NO. 36-15501 ARE LIMITED TO A TOTAL COMBINED FACILITY VOLUME OF 123,272 CU. FT.

PRIORITY DATE: 07/13/1962

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE		QUANTITY	
FISH PROPAGATION	01-01	12-31	48.54	CFS
DOMESTIC 3 HOMES AND 2 OFFICES	01-01	12-31	0.1	CFS

PLACE OF USE:

FISH PROPAGATION	Within GOODING County	
T07S R14E S31	SENE	
S32	SWNW	
DOMESTIC	Within GOODING County	
T07S R14E S31	SENE	
S32	SWNW	

OTHER PROVISIONS NECESSARY FOR DEFINITION OR ADMINISTRATION OF THIS WATER RIGHT:

THE QUANTITY OF WATER DECREED FOR THIS WATER RIGHT FOR DOMESTIC USE IS NOT A DETERMINATION OF HISTORICAL BENEFICIAL USE.

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, JR.
PRESIDING JUDGE
Snake River Basin Adjudication

JAN 12 2004

1997 DEC 29 PM 02:00
DISTRICT COURT - SRBA
TWIN FALLS CO., IDAHO
FILED _____

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)	CERTIFICATE OF MAILING
)	
Case No. 39576)	
)	Water Right(s): 36-02551

CERTIFICATE OF MAILING

I certify that a true and correct copy of the PARTIAL DECREE PURSUANT TO I.R.C.P. 54(b) for WATER RIGHT 36-02551 was mailed on December 29, 1997, with sufficient first-class postage prepaid to the following:

DIRECTOR OF IDWR
PO BOX 83720
BOISE, ID 83720-0098

RANGEN INC
Represented by:
J DEE MAY
PO BOX 1846
TWIN FALLS, ID 83303
Phone: 208-733-7180

DIANA DELANEY
Chief Deputy Clerk

MICROFILMED

JAN 1 2 2004

This Right has been Decreed in the SRBA.

MICRO
JAN 1 2 20

8803+
nw

State of Idaho
License and Certificate of Water Right

Water License No. G-29733 Amount 1.7 c.f.s.

Water District No. Priority May 19, 1961

THIS IS TO CERTIFY that WILLIAM J. POWELL

of Clifton, Idaho, made application for a permit to appropriate the public waters of the State of Idaho, dated May 19, 19 61; that Permit No. G-29733 was issued under said application; that Certificate of Completion of works, with a carrying capacity of 1.7 second feet, was issued thereunder on April 25, 19 67, showing that said works were completed on the 2nd day of May, 19 66; and that on the 2nd day of May, 19 66, WILLIAM J. POWELL

of Clifton, State of Idaho, made proof to the satisfaction of the State Reclamation Engineer of Idaho, of the right to use the waters of a well, , a tributary of subterranean flow, for the purpose of irrigation, , under Use Permit No. G-29733 of the Department of Reclamation, and that said right to the use of said waters has been perfected in accordance with the laws of Idaho, and is hereby confirmed by the State Reclamation Engineer of Idaho and entered of record in Volume 14 of Licenses at page 8803, on the 25 day of April, 1967;

The right hereby confirmed dates from May 19, 19 61;

The Point of Diversion is located

in the SW ¼ SW ¼, Sec. 23, Tp. 14 S., R. 38 E., B. M., County of Franklin.

That the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually needed and beneficially used for said purposes, and shall not exceed 1.7 cubic feet per second.

Description and location of use:

Twp.	Range	Sec.	Forty-acre Tract	No. Acres Described in Permit	No. Acres Actually Irrigated
14 S	38 E	23	SW¼ SW¼	40	39
			SE¼ SW¼	40	40
			SW¼ SE¼	8	6
			Total number of acres to be irrigated:		85

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, as provided by the laws of Idaho.

WITNESS the seal and signature of the State Reclamation Engineer, affixed at Boise, Idaho, this 25th day of April, 19 67.

s/ R. Keith Higginson
State Reclamation Engineer.

(SEAL)

+8804
DJ

State of Idaho
License and Certificate of Water Right

Water License No. 30654 Amount 50.0 c.f.s.

Water District No. Priority July 31, 1962

THIS IS TO CERTIFY that RANGEN, INC.

of Buhl, Idaho, made application for a permit to appropriate the public waters of the State of Idaho, dated July 31, 19 62; that Permit No. 30654 was issued under said application; that Certificate of Completion of works, with a carrying capacity of 50.0 second feet, was issued thereunder on April 26, 1967, showing that said works were completed on the 27th day of July, 1963; and that on the 2nd day of September, 19 64, RANGEN, INC.

of Buhl, State of Idaho, made proof to the satisfaction of the State Reclamation Engineer of Idaho, of the right to use the waters of underground springs, a tributary of Billingsley Creek, for the purpose of fish cultural and domestic use under Use Permit No. 30654 of the Department of Reclamation, and that said right to the use of said waters has been perfected in accordance with the laws of Idaho, and is hereby confirmed by the State Reclamation Engineer of Idaho and entered of record in Volume 14 of Licenses at page 8804, on the 26 day of April, 19 67;

The right hereby confirmed dates from July 31, 19 62;

The Point of Diversion is located

In the SW ¼ NW ¼, Sec. 32, Tp. 7 S, R. 14 E, B. M., County of Gooding.

That the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually needed and beneficially used for said purposes, and shall not exceed 50.0 cubic feet per second.

Description and location of use:

Twp.	Range	Sec.	Forty-acre Tract	No. Acres Described in Permit	No. Acres Actually Irrigated
7 S	14 E	31	SE¼ NE¼	None	None
		32	SW¼ NW¼	None	None
		For fish culture and domestic use.			

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, as provided by the laws of Idaho.

WITNESS the seal and signature of the State Reclamation Engineer, affixed at Boise, Idaho, this 26th day of April, 19 67.

s/ R. Keith Higginson
State Reclamation Engineer.

(SEAL)

36 2551

IM 3-1-59

State of Idaho

License and Certificate of Water Right

Water License No. 30654 Priority July 31, 1962 Amount 50.0 c.f.s.

THIS IS TO CERTIFY that RANGEN, INC.

of Buhl, Idaho, made application for a permit to appropriate the public waters of the State of Idaho, dated July 31, 1962; that Permit No. 30654 was issued under said application; that Certificate of Completion of Works, with a carrying capacity of 50.0 second feet, was issued thereunder on April 26, 1967, showing that said works were completed on the 27th day of July, 1963; and that on the 2nd day of September, 19 64, RANGEN, INC.

of Buhl, State of Idaho, made proof to the satisfaction of the State Reclamation Engineer of Idaho, of a right to the use of the waters of underground springs,

a tributary of Billingsley Creek, for the purpose of fish cultural and domestic use, under Use Permit No. 30654 of the Department of Reclamation, and that said right to the use of said waters has been perfected in accordance with the laws of Idaho, and is hereby confirmed by the State Reclamation Engineer of Idaho and entered of record in Volume 14 of Licenses, at Page 8804, on the 26th day of April, 19 67.

The right hereby confirmed dates from July 31, 1962.

The Point of Diversion is located in the SW ¼ NW ¼, Sec. 32, Twp. 7 S, R. 14 E., B.M., Gooding County.

That the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually needed and beneficially used for said purposes, and shall not exceed 50.0 cubic feet per second.

Description and location of use:

Twp.	Range	Section	Forty-Acre Tract	No. Acres Described in Permit	No. Acres Actually Irrigated
7 S	14 E	31	SE¼ NE¼	None	None
		32	SW¼ NW¼	None	None

For fish culture and domestic use.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, as provided by the laws of Idaho.

WITNESS the seal and signature of the State Reclamation Engineer, affixed at Boise, Idaho, this 26th day of April, 19 67.

R. Keith Higginson
State Reclamation Engineer.

30654

State of Idaho

LICENSE AND CERTIFICATE OF WATER RIGHT

Water License No. 30654

To Rangen, Inc.

Buhl, Idaho

Source of Supply Underground springs, tributary of Billingsley Creek

Gooding County

Amount 50.0 Sec. Ft.

Point of Diversion SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.

Place of Use SE¼NE¼, Sec. 31; SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.

Purpose Fish cultural and domestic

Date of Priority July 31, 1962

Recorded April 26, 1967

in Book 14 of Licenses, Page 8804

30654

30654

Application For Permit
To Appropriate the Public Waters of the State of Idaho

36- 2551

APPLICATION No. 38670
PERMIT No. 30654
DISTRICT No.

1. Name of Applicant: Rangen, Inc.

Postoffice address: Buhl County: Twin Falls State: Idaho

I. If applicant is a corporation, give:
(a) Date and place of incorporation: Jan. 1, 1960 - Buhl, Idaho
(b) Amount of capital stock: $300.000.
(c) Amount paid in: $90,000
(d) Names and addresses of directors: Theo Rangen, Buhl, Idaho; Thorleif Rangen, Buhl, Idaho; Maria Rangen, Buhl, Idaho

II. The financial resources of the applicant are:
(a) Cash on hand: $26,764.45
(b) Treasury stock: None
(c) Bond to be issued: none
(d) Other resources: Sale of merchandise

2. Quantity of water claimed: Fifty (50) cubic feet per second.

3. Source of water supply: The headwaters of Billingsley Creek which is ~~a tributary of~~ derived from underground springs.

4. Location of point of diversion: South 10° 28½' East 2342.55 ft. ~~from~~ distant from the North common corner between Sections 30 & 31 T. 7 S. , R. 14 E., B.M., and is in the SW¼NW¼ of section 32 , T. 7 S , R. 14 E. , B. M., County of Gooding

5. Water is to be used for Fish cultural & domestic use; non consumptive

6. If for mining, milling, power or manufacturing purposes, give:

(a) Point of use of water: 1700. feet distant from NW¼ corner of Section 32 T. 7 S , R. 14 E , B.M., in the SE¼NE¼ of Section ~~at~~ 31 , T. 7 S , R. 14 E. , B.M.

(b) Amount of power generated: H.P., under feet head.

(c) Water is to be returned to Billingsley Cr. at a point 1900 feet distant from the NE corner of Section 31 , T. 7 S , R. 14 E , B.M., in the SE¼NE¼ of Section 31 , T.7 S , R. 14 E. , B.M.

7. Estimated cost of works: $15,000.

8. Kind of works: Concrete dam - iron pipeline

9. Height of dam feet; length of dam at top feet; length of dam at bottom feet; material used in dam:

10. Size of headgate: Width feet; height feet.

11. Ditch: Width at bottom fee; width at water line feet; depth of water feet; dimensions of flume:

Diameter of pipe inches; length of conduit miles.

Average grade per mile feet.

12. The time required for the completion of such work is 1 years

13. The time required for the complete application of the water to the proposed use is 1 additional years.

14. The land to be irrigated is described in the following tabulation: See remarks.

15. Existing water rights and/or valid permits appurtenant to the lands to be irrigated are:
73 inches 1885 decree & 8 inches 1908 Decree (High & Fritchman)

16. (a) Is reservoir to be used? No If so, fill in (b) and (c) below:
(b) Name of Reservoir and number of Storage Permit:
(c) Date of filing of Application for Storage Permit and Name of Applicant:

BE IT KNOWN THAT The undersigned hereby makes application for permit to appropriate the public water of the State of Idaho as herein set forth.

Rangen's, Inc. *Applicant.*

By s/ H. F. LeMOYNE *Agent.*

Date of first receipt at Department of Reclamation: 8:30 A.M. July 31, 1962

Returned to applicant for correction:

Corrected application received:

Approval of State Reclamation Engineer

The number of this permit is 30654
Recorded in Book 107 Page 30654 Approved September 11, 1962
This is to certify that I have examined the within application for a permit to appropriate the public waters of the State of Idaho, and hereby approve the same, subject to the following limitations and conditions:
Bond in the sum of $ to be filed on or before
Work to begin on or before November 11, 1962 and to continue diligently and uninterruptedly to completion, unless temporarily interrupted by circumstances over which permit holder has no control.
One-fifth of the work above specified to be completed on or before March 11, 1963
The whole of said work to be completed on or before September 11, 1963
Beneficial use of water appropriated in accordance herewith, to be made on or before September 11, 1964

WITNESS My hand this 11th *day of* September, 1962

s/ CARL E. TAPPAN, Assistant
State Reclamation Engineer.

IN TESTIMONY WHEREOF, We, ROBERT E. SMYLIE, Governor of the State of Idaho, and ARNOLD WILLIAMS, Secretary of State of the State of Idaho, have caused this instrument to be executed in the name of the State of Idaho, and caused the Great Seal of the State of Idaho to be hereunto affixed, this 11th day of September, 1962

Countersigned:

(SEAL)

By s/ ARNOLD WILLIAMS
Secretary of State.

STATE OF IDAHO

By s/ ROBERT E. SMYLIE
Governor.

REMARKS: The 50 ft. of water is supplemental and to be used for fish culture and propagation, then to be returned to the stream for downstream users. The 81 inches of prior decree will be used to guarantee evaporation & other losses so no loss of water will be suffered by downstream users.

14.

Twp.	Range	Sec.	NE¼	NW¼	SW¼	SE¼	Totals
			NE¼ NW¼ SW¼ SE¼	NE¼ NW¼ SW¼ SE¼	NE¼ NW¼ SW¼ SE¼	NE¼ NW¼ SW¼ SE¼	

Application for Amendment
Point of Return
Permit No. 30654

Comes now RANGEN, INC. and represents to the State Reclamation Engineer of the State of Idaho:

That he is the owner and holder of Permit to Appropriate the Public Waters of the State of Idaho, No. 30654.

That the point of return of water is described in said Permit as being located: SE¼NE¼, Sec. 31, T. 7 S., R. 14 E.

That he now requests that the point of return of water be changed to a point located: in SE corner of NW¼NE¼, Sec. 31, T. 7 S., R. 14 E.

That the reason for desiring to make such change is as follows: Operations extended beyond original plans. There are no other diversions of waterfrom Billingsley Creek between the two points, described above

That no one will be injured by such change, and that such change will be made at Permit Holder's own risk.

Signed at Boise, Idaho, this 5th day of March, 1964.

RANGEN, INC.

By: H. F. LeMoyne

Date of Receipt at Department of Reclamation: March 6, 1964

APPROVAL OF STATE RECLAMATION ENGINEER

I, RALPH W. THOMAS, Deputy State Reclamation Engineer of the State of Idaho, hereby approve the above and foregoing application for amendment to Permit to Appropriate the Public Waters of the State of Idaho, No. 30654. This approval constitutes a new permit and is issued as an amendment to the original permit, to which it refers and of which it becomes a part, and said application is approved only insofar as the rights of others will not be adversely affected thereby.

s/ RALPH W. THOMAS,
Deputy State Reclamation Engineer

Recorded: March 6, 1964

Application for Amendment
PLACE OF USE

Permit No. 30654

Comes now RANGEN, INC., and represents to the STATE RECLAMATION ENGINEER of the State of Idaho:

That he is the owner and holder of Permit to Appropriate the Public Waters of the State of Idaho, No. 30654, and requests that the place of use as described in said permit, be changed to read as follows:

from the point of diversion to the point where Billingsley Creek intersects the County Road which said point of interesection is in the SE corner of the NW¼ NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. and said place of use being in the SW¼ NW¼ Section 32, S½ NE¼ and NW¼ NE¼, Section 31, all in Twp. 7 S. R. 14 E.B.M. making a total of 35 acres.

That an additional amount of water is not asked for, and that the rights of others will not be adversely affected by such change.

Signed at Buhl, Idaho this 23rd day of July, 1964.

RANGEN, INC.

By: Theodor Rangen

Date of receipt at office of Department of Reclamation July 27, 1964

APPROVAL OF STATE RECLAMATION ENGINEER

I, Ralph W. Thomas, Deputy State Reclamation Engineer of the State of Idaho, hereby approve the above and foregoing application for amendment to Permit to Appropriate the Public Waters of the State of Idaho, No. 30654. This approval constitutes a new permit and is issued as an amendment to the original permit, to which to refers, and of which it becomes a part, and said application is approved only insofar as the rights of others will not be adversely affected thereby.

s/ RALPH W. THOMAS,
Deputy State Reclamation Engineer

Recorded: July 28, 1964

Permit No. 30654
CERTIFICATE OF COMPLETION OF WORKS

TO ALL WHOM IT MAY CONCERN:

This is to certify that RANGEN, INC. of Buhl, County of Twin Falls, and State of Idaho, the holder of Permit No. 30654, issued upon Application No. 38670 bearing date of priority of July 31, 1962, authorizing the diversion of 50.0 second feet of waters of underground springs, tributary of Billingsley Creek; County of Gooding, State of Idaho, for fish cultural and domestic purposes, has fully complied with the provisions of the laws of the State of Idaho relating to the proof of completion of the works of diversion set out and described in said Permit; that said works are adequate for diverting and conveying to the place of intended use 50.0 second feet of the waters of underground springs, tributary of Billingsley Creek; that the point of diversion of said waters is in the SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M. and that the lands proposed to be irrigated by the use or place of use of said water are described as follows, to-wit: for fish culture and domestic purposes in the SW¼NW¼, Sec. 32, and SE¼NE¼, Sec. 31, T. 7 S, R. 14 E, B.M.

Proof of Completion of Works made: July 27, 1963.

Witness my hand this 26th day of April, A.D. 1967.

S/ R. KEITH HIGGINSON
State Reclamation Engineer

LICENSE ISSUED FOR 500 SEC. FT.
LICENSE PAGE NO. 8804

This Right has been Decreed in the SRBA.

MICROFILMED
JAN 1 2 2004

FORM 22 Permit No. 30654

Certificate of Completion of Works

TO ALL WHOM IT MAY CONCERN:

This is to certify that RANGEN, INC. of Buhl, County of Twin Falls, and State of Idaho, the holder of Permit No. 30654, issued upon Application No. 38670 bearing date of priority of July 31, 1962, authorizing the diversion of 50.0 second feet of waters of underground springs, tributary of Billingsley Creek;

County of Gooding, State of Idaho, for fish cultural and domestic purposes, has fully complied with the provisions of the laws of the State of Idaho relating to the proof of completion of the works of diversion set out and described in said Permit; that said works are adequate for diverting and conveying to the place of intended use 50.0 second feet of the waters of underground springs, tributary of Billingsley Creek;

that the point of diversion of said waters is in the SW¼NW¼, Sec. 32, T. 7 S., R. 14 E., B.M.

and that the lands proposed to be irrigated by the use or place of use of said water are described as follows, to-wit: For fish culture and domestic purposes in the SW¼NW¼, Sec. 32 and SE¼NE¼, Sec. 31, T. 7 S., R. 14 E., B.M.

Proof of Completion of Works Made: July 27, 1963.

Witness my hand this 26th day of April, A. D. 19 67

R. Keith Higginson
State Reclamation Engineer

30654

Permit No. 30654

Certificate of Completion of Works

Dated April 26, 1967

Stream Underground springs

County Gooding

Amount 50.0 c.f.s.

Date of Priority July 31, 1962

Recorded in Book 107

of Permits, page 30654

30654

April 26, 1967

Re: Permit No. 30654

Theodore Rangen, Pres.
Rangen, Inc.
Buhl, Idaho 83316

Dear Mr. Rangen:

Enclosed are your Certificate of Completion of Works and License and Certificate of Water Right on the above numbered permit.

Also enclosed is departmental receipt No. 33753 in the amount of $22.00 covering the fees.

Thank you.

Very truly yours,

Donald W. McEldowney
Water Rights Clerk

DWM:dj

Enclosures: Certificates
Receipt

3-6-3

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

Check

No. 33753

Boise, Idaho, April 26, 1967

RECEIVED FROM Rangen, Inc. of Buhl, Idaho $ 22.00

Twenty Two Dollars and no/100 DOLLARS

FOR

Carey Act Trust Fund	$	
Application for Permit No.	$	
Proofs 30654	$	22 00
Certified Copy	$	
Recording Deed	$	
Certificate	$	
TOTAL	$	22 00

R. Keith Higginson
State Reclamation Engineer

By Mary Lou Allen

Re: Permit No. 30654

Rangen, Inc.
Buhl, Idaho

Gentlemen:

Our field examiner's report on his inspection of proof of completion of works and application of water to beneficial use under the terms of Permit No. 30654 shows the pipeline and ponds are capable of conveying 2500 miner's inches, or 50 c.f.s.

Upon receipt of the statutory fees, totaling $22.00, we will issue the Certificate of Completion of Works for 50 c.f.s. and the License and Certificate of Water Right for 50 c.f.s. confirming the right, with priority of July 31, 1962, to the use of surface water from an underground spring of Billingsley Creek with the point of diversion in SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M. for fish culture and domestic use in SE¼NE¼, Sec. 31, T. 7 S, R. 14 E, B.M.

Very truly yours,

Donald W. McEldowney
Water Rights Clerk

DWM:nw

30654

THEODOR RANGEN, PRES. THORLEIF RANGEN, SEC.-TREAS.

RANGEN, INC.
BEANS · GRAINS · SEEDS · FEEDS
TELEPHONE 543-4338 · P. O. Box 706
BUHL, IDAHO

April 25, 1967

RECEIVED
APR 26 1967
Department of Reclamation

Re: Permit No. 30654

Mr. Donald W. McEldowney, Water Rights Clerk
State of Idaho, Dept. of Reclamation
107 State House
Boise, Idaho 83701

Dear Mr. McEldowney:

Enclosed please find our check for $22.00 in payment of your field examiner's inspection for Completion of Works and the issuing of License and Certificate of Water Right regarding the use of surface water from an underground spring of Billingsley Creek.

Very truly yours,

RANGEN, INC.

Theodor Rangen

Theodor Rangen

TR/vm

Enclosure

30654

[redacted]

Received
4-20-67

30654

April 24, 1967

Re: Permit No. 30654

Rangen, Inc.
Buhl, Idaho

Gentlemen:

Our field examiner's report on his inspection of proof of completion of works and application of water to beneficial use under the terms of Permit No. 30654 shows the pipeline and ponds are capable of conveying 2500 miner's inches, or 50 c.f.s.

Upon receipt of the statutory fees, totaling $22.00, we will issue the Certificate of Completion of Works for 50 c.f.s. and the License and Certificate of Water Right for 50 c.f.s. confirming the right, with priority of July 31, 1962, to the use of surface water from an underground spring of Billingsley Creek with the point of diversion in SW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M. for fish culture and domestic use in SE¼NE¼, Sec. 31, T. 7 S, R. 14 E, B.M.

Very truly yours,

Donald W. McEldowney
Water Rights Clerk

DWM:nw

30654

AFFIDAVIT OF PUBLICATION

RECEIVED
APR 20 1967
Department of Reclamation

STATE OF IDAHO, }
COUNTY OF GOODING } ss.

I, *Thomas D. Miller,* do solemnly swear that I am the printer and publisher of THE GOODING COUNTY LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper 2 consecutive weeks, the first publication having been made on the 29th day of March, 1967, and the last publication having been made on the 6th day of April, 1967 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Thomas D. Miller

Subscribed and sworn to before me this

13th day of April, 1967

La Rose Harding

Notary Public

30654

NOTICE OF CORRECTION OF LEGAL NOTICE PUBLISHED UNDER THE PROVISIONS OF SECTIONS 42-214, 42-217, IDAHO CODE

Notice is hereby given that the legal notice printed in the Gooding Leader on July 30, August 6, 13, and 20, 1964, showing that Rangen, Inc. was to make proof of beneficial use of water on September 2, 1964, on Permit No. 30654 was in error and the point of diversion was given as S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.; whereas the actual point of diversion is S. 10° 28½' East 2392.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.

That any protests against the approval of the depositions made September 2, 1964 must be filed in the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protests shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said proof of beneficial use of water.

Dated this 28th day of March 1967.

Jack A. Barnett
Deputy State Reclamation Engineer

Date of First Publication March 29, 1967

Date of Last Publication April 6, 1967

Last Date for Protests May 8, 1967

RECEIVED
SEP
Idaho State Reclamation

30654

SPEED LETTER ®

FROM Jack A. Barnett — TO Gooding Leader

Deputy State Reclamation Engineer — By: Mrs. Frank Stone

SUBJECT Legal Notice - Notice of correction- Permit No. 30654, Rangen Inc.

FOLD

MESSAGE

DATE April 18 19 67

Enclosed is copy of legal and affidavit as requested. After 6 mos. try we hope this will complete your file. Untrained help and three new bookkeepers in as many months created some problems. Please direct correspondence regarding legals and insertion orders in the future to my attention. Please return attached reply so that I may know you received the papers requested.

Thank you!

SIGNED Mrs. Frank Stone

REPLY

DATE 19

Your request has been recorded in our records.
Thank you for your assistance.

VERY Truly Yours

SIGNED

FOLD

Greyline "SNAP-A-WAY" FORM 44-902 3-PARTS
WILSON JONES COMPANY • © 1961 • PRINTED IN U.S.A.

RETAIN WHITE COPY, RETURN PINK COPY. TURN OVER FOR USE WITH WINDOW ENVELOPE.

30654

FILL IN NAME 'D ADDRESS HERE
FOR RETURN IN WINDOW ENVELOPE

Gooding Leader

Box 56, Gooding, Idaho

Attn. Mrs. Frank Stone

FOLD

FOLD

Mrs Frank Stowe
will forward affidavit
4-1-67 Dean

934-4449

March 28, 1967

Re: Permit No. 30654
Rangen, Inc.

Gooding County Leader
Gooding, Idaho

Gentlemen:

On February 9, 1967, we sent you a notice of correction of a legal notice to be published for two weeks. The last date for protests was March 19, 1967.

In checking our files, we find you never acknowledged receiving this notice, nor have we seen it published.

This notice was to be published at your expense because it was originally published incorrectly after two requests to have it corrected.

Enclosed are two copies of the legal notice which is to be published once a week for two consecutive weeks. Complete one copy showing the dates of first and last publication and return to this office, furnishing us with an affidavit of publication after the advertising has been completed.

Very truly yours,

Jack A. Barnett, Deputy
State Reclamation Engineer

JAB:nw

Enclosures: legal notice (2)

30654

NOTICE OF CORRECTION OF LEGAL NOTICE PUBLISHED UNDER THE PROVISIONS OF SECTIONS 42-214, 42-217, IDAHO CODE

Notice is hereby given that the legal notice printed in the Gooding Leader on July 30, August 6, 13, and 20, 1964, showing that Rangen, Inc. was to make proof of beneficial use of water on September 2, 1964, on Permit No. 30654 was in error and the point of diversion was given as S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.; whereas the actual point of diversion is S. 10° 28½' East 3392.55 feet from the NW corner of the NW¼NW¼, Sec. 32, T. 7 S, R. 14 E, B.M.

That any protests against the approval of the depositions made September 2, 1964 must be filed in the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protests shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said proof of beneficial use of water.

Dated this 28th day of March 1967.

Jack A. Barnett
Deputy State Reclamation Engineer

Date of First Publication _____

Date of Last Publication _____

Last Date for Protests May 8, 1967

NOTICE OF CORRECTION OF LEGAL NOTICE PUBLISHED UNDER THE PROVISIONS OF SECTIONS 42-214, 42-217, IDAHO CODE

Notice is hereby given that the legal notice printed in the Gooding Leader on July 30, August 6, 13, 20, 1964, showing that Rangen Inc. was to make proof of beneficial use of water on September 2, 1964, on Permit No. 30654 was in error and the point of diversion was given as S. 10° 28½' East 239.55 feet from ;the NW corner of the NW¼NW¼, Section 32, Twp. 7 S., R. 14 E.B.M. whereas the actual point of diversion is S. 10° 28½' East 2392.55 feet from the NW corner of the NW¼NW¼, Section 32, Twp. 7 S., R. 14 E.,B.M.

That any protests against the approval of the depositions made September 2, 1964 must be filed in the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protest shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said proof of beneficial use of water.

Dated this 9th day of February, 1967.

Jack A. Barnett
Deputy State Reclamation Engineer

Date of First Publication _____

Date of Last Publication _____

Last Date for Protest March 19, 1967

30654

February 9, 1967

RE: Permit No. 30654
Rangen, Inc.

Gooding Leader
Gooding, Idaho 83330

Gentlemen:

Enclosed you will find two copies of a legal notice to be published once a week for two consecutive weeks. Complete one copy showing the dates of first and last publication and return to this office, and furnish us with an affidavit of publication as soon as the advertising has been completed.

The Attorney General has ruled that the point of diversion and place of use must be published correctly before the final water license can be issued. Since this error was made by the paper, and since this department requested twice that the publication be corrected, this corrective notice will be published at your expense. See the enclosed copies of the legal notice which was mailed to the paper, and our letters to you dated August 6, 1964 and August 14, 1964.

Very truly yours,

Jack A. Barnett
Deputy State Reclamation Engineer

JAB:mr

Enc. legal notice
copies of legal notice, 2 letters

cc: Bird & Hobdey, Attorneys

30654

JAN 20 1967
Department of Reclamation

Hagerman Idaho
January 19, 1967

Dep. of Reclamation,
107 - State House
Boise, Idaho 83701

Dear Mr. Watts: re. yours Jan. 17, '67.

The measurements & haul made on the head of Billingsley creek, Curran Tunnell and Random hatchery are as follows.

Dec. 11, 1965. Creek.
22 - raceway averages' 64.66 cuft.
Not averageing gives accurate measurement.
Jan. 9, 1966 - 22 openings 52.15 "
Feb. 11, 1966 " 48.23 "
March 11, 1966 " 44.99 "
April and May was not made because of irrigation water being taken thru 3 pipelines. & bought a pito-velocity meter.

		Curran tunnel.	3 pipes.	creek.
June. 22, 1966		45.41 cuft.	8.10	37.31
July	27, 1966	51.30	8.45	42.85
No august measurement. Sep.	21, "	62.42	3.22	59.20
Oct.	21, "	69.89	0.82	69.07
Nov.	21 "	58.38		
Dec	27, "	49.23	0.46	48.83 -

Note. all the water in the creek was put thru the fish facilities.

30654 cGeo. H. Hemmon

Form 23

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

BOISE, IDAHO

REPORT OF ENGINEER

Permit No. 30654

This proof is for Completion of Works In Water District No.

1. Name of applicant Rangen, Inc.,
2. Source of water supply: The headwaters of Billingsley Creek
3. Location of point of diversion: Is in the SW¼NW¼ of Section 32
   T. 7 S. R. 14 E.B.M. County of Gooding
4. Describe works as they exist, giving dimensions and capacities of same: Water comes from side of hill at mouth of Cave ditch is 9' wide 30" deep and velocity of water is 30' in 12 seconds. Water runs 100' down hill into a concrete check box 23'X 8'X 7' into 14"x 400' pipe line to hatchery excess water at concrete box spills back into Creek
5. Water is used for: Fish cultural & domestic use; non consumptive
6. State whether or not water has been turned into works of diversion: yes
7. List legal subdivisions of lands to be irrigated. If proof is for beneficial use, give exact number of acres under cultivation in each forty-acre tract. (Describe manner and place of use if other than irrigation):

PLACE OF USE: SE¼NE¼ Sec. 31., Twp. 7 S., Rge. 14 E.B.M.

(Submit map on attached plat, showing location and details of above description.)

8. What large stream would the water here appropriated finally reach?

Remarks: Regular checks are made of waters flow through the facilities by George Lemon - Watermaster.

This examination was made on the 15th day of September 19 CC

(Signed) Don Matter
Examiner.

30654 Plat - DW

George Lemon w.m.
has monthly flow
measurements

INSTRUCTIONS TO EXAMINERS

1. Always carefully note the location of the point of diversion and accurately plat same.
2. When proof is for beneficial use, carefully check up the number of acres actually irrigated in each forty and accurately plat same.
3. Make a map showing the correct location of streams and ditches, and the irrigated lands, and any adjacent permanent landmarks, such as towns, lakes, large streams and public roads.
4. If any unusual conditions are discovered, make plain statement of them under remarks.
5. Always see the holder, if possible, and go over the whole ground with him and make your report only upon actual existing facts and conditions.
6. Give general characteristics of soils, topography, and crops raised.

Theodor Rangen, President
Rangen, Inc.,
Buhl, Idaho Rt. #4 543-5536
Permit No. 30654 543-4388

Examination for Completion of Works

County Gooding

Sec. 32 T. 7S R. 14 E B M

Quantity: 50.0 acres

Source: Unnamed spring tributary to

P.D.: SW. NW., Sec. 32 T7S- R 14 EBM

Use: Fish culture and domestic

Filed: I.C. 31, 62

Due: Sept 1963

Extension: ---

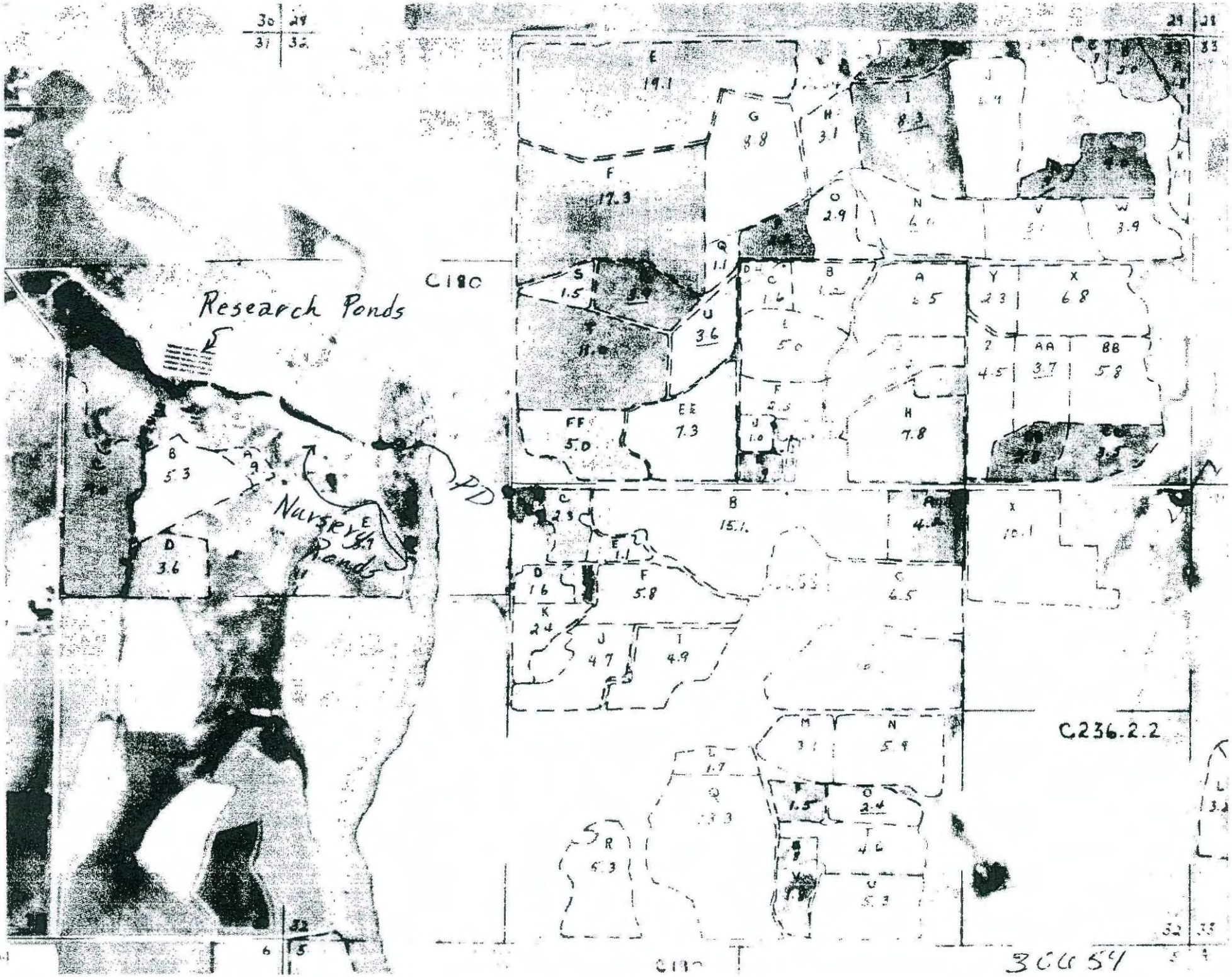
Made: July 27, 1963

Printed: July 31, 1962

Completion of Works:

Other Rights: 7.5 cfs 85 ac. 55.

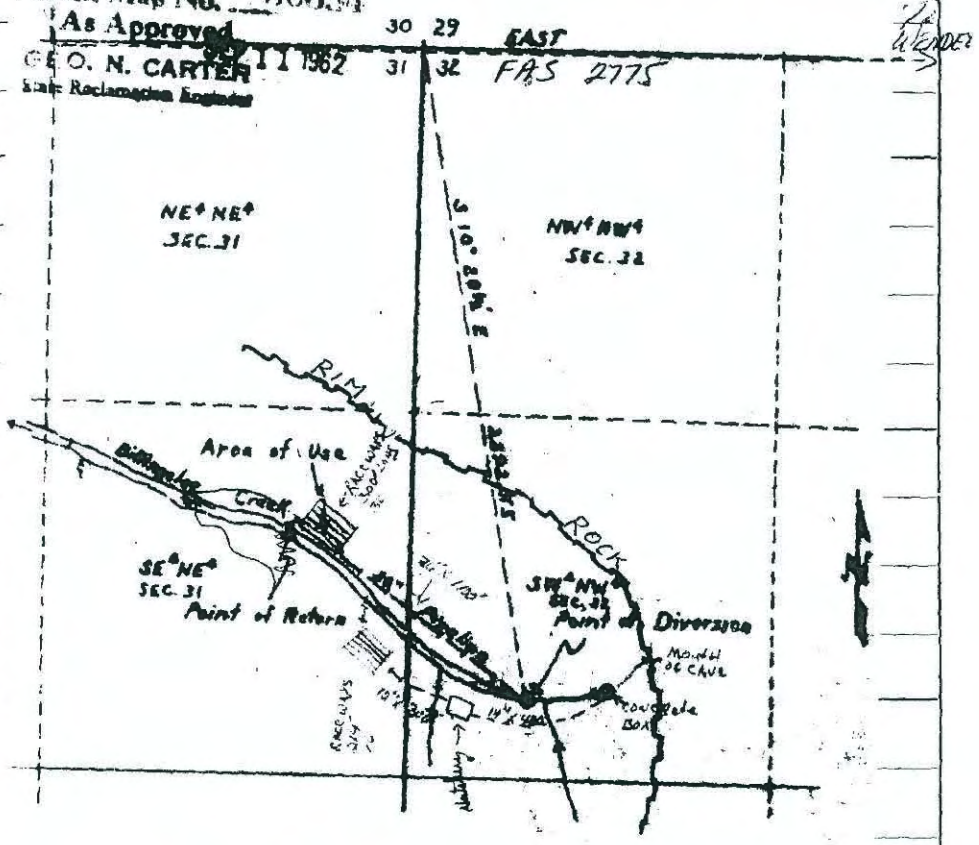
30654


Research Ponds
C180
C236.2.2
30
29
31
32
29
28
33
6
5
E 19.1
G 8.8
H 3.1
F 17.3
I 8.3
J 4.9
O 2.9
N 4.0
V 5.1
W 3.9
Q 1.1
S 1.5
U 3.6
11.0
D
C 1.6
B 1.2
A 6.5
L 5.0
Y 2.3
X 6.8
Z 4.5
AA 3.7
BB 5.8
F 2.5
J 1.0
H 7.8
FF 5.0
EE 7.3
B 5.3
A 9.2
PD
Nursery Lands
E 5.7
D 3.6
C 2.3
B 15.1
A 4.2
X 10.1
E 1.1
D 1.6
F 5.8
C 6.5
K 2.4
J 4.7
I 4.9
M 3.1
N 5.9
L 1.7
Q 3.3
O 2.4
T 4.6
R 5.3
U 5.3
3.2
C180
3CC54

FAS 2776

RANGEN, INC., SURVEY T. 7S, R.14E., B.M.

Permit Map No. 30654
As Approved
GEO. N. CARTER
State Reclamation Engineer



I, Philip F. Puchner, of Ketchum, Idaho, an engineer licensed by the State of Idaho, do hereby certify that this map was made from notes taken during actual surveys made by me on May 20 and 21, and June 20, 1962, and that it correctly represents the works described

Allow R = 50 ft.

Scale: 2 Inches Equals 1 Mile. Draw Map In Ink.

30654

Form 23

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

BOISE

REPORT OF ENGINEER

PERMIT NO. 30654

REPORT ON PROOF OF Completion of Works

Theodore Rangen, Pres., Rangen, Inc. Buhl, Idaho

Form 23

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

BOISE, IDAHO

REPORT OF ENGINEER

Permit No. 30654

This proof is for Beneficial Use In Water District No.

1. Name of applicant Rangen Incorporated
2. Source of water supply: Headwaters of Billingsley Creek
3. Location of point of diversion: Is in the SW¼NW¼ of Section 32
   T. 7S R. 14E County of Gooding
4. Describe works as they exist, giving dimensions and capacities of same:
   water for ponds comes from a spring which is source of Billingsley creek. a 14" x 400' pipe feeds water from high on the rimrock where the spring emerges to the nursery ponds. a 36" x 1100' pipeline feeds the research ponds from a lower pond.
5. Water is used for: Fish cultural & domestic use; non consumptive
6. State whether or not water has been turned into works of diversion: yes
7. List legal subdivisions of lands to be irrigated. If proof is for beneficial use, give exact number of acres under cultivation in each forty-acre tract. (Describe manner and place of use if other than irrigation):
   Fish culture in SE¼ NE¼ sec 31 - T 7S - R 14E

(Submit map on attached plat, showing location and details of above description.)

8. What large stream would the water here appropriated finally reach? Snake River

Remarks: Water flow through the Rangen facility is checked by George Lemon, Watermaster

Vol = ~~xx.xx~~ ~~x.xx~~ 4 x 2.5 x 2.4

This examination was made on the 1st day of September, 19 66

(Signed) Don Mattson
Examiner.

30654 Plat —

Rangen, Incorporated
Buhl, Idaho
Theodore Rangen, Pres.
Permit No. 30654

Examination for ~~Comp. of Works~~ & Bene. Use

County Gooding

Sec. SE T. 7S R. 14E

Quantity: 50

Source: [illegible]

P. D.: SW NW Sec 32 T 7S - R 14E

Use: Fish Culture + Domestic

Filed: 31 July 62

Due: 11 Sept 6[illegible]

Extension:

Protest:

Completion of Works: [illegible]

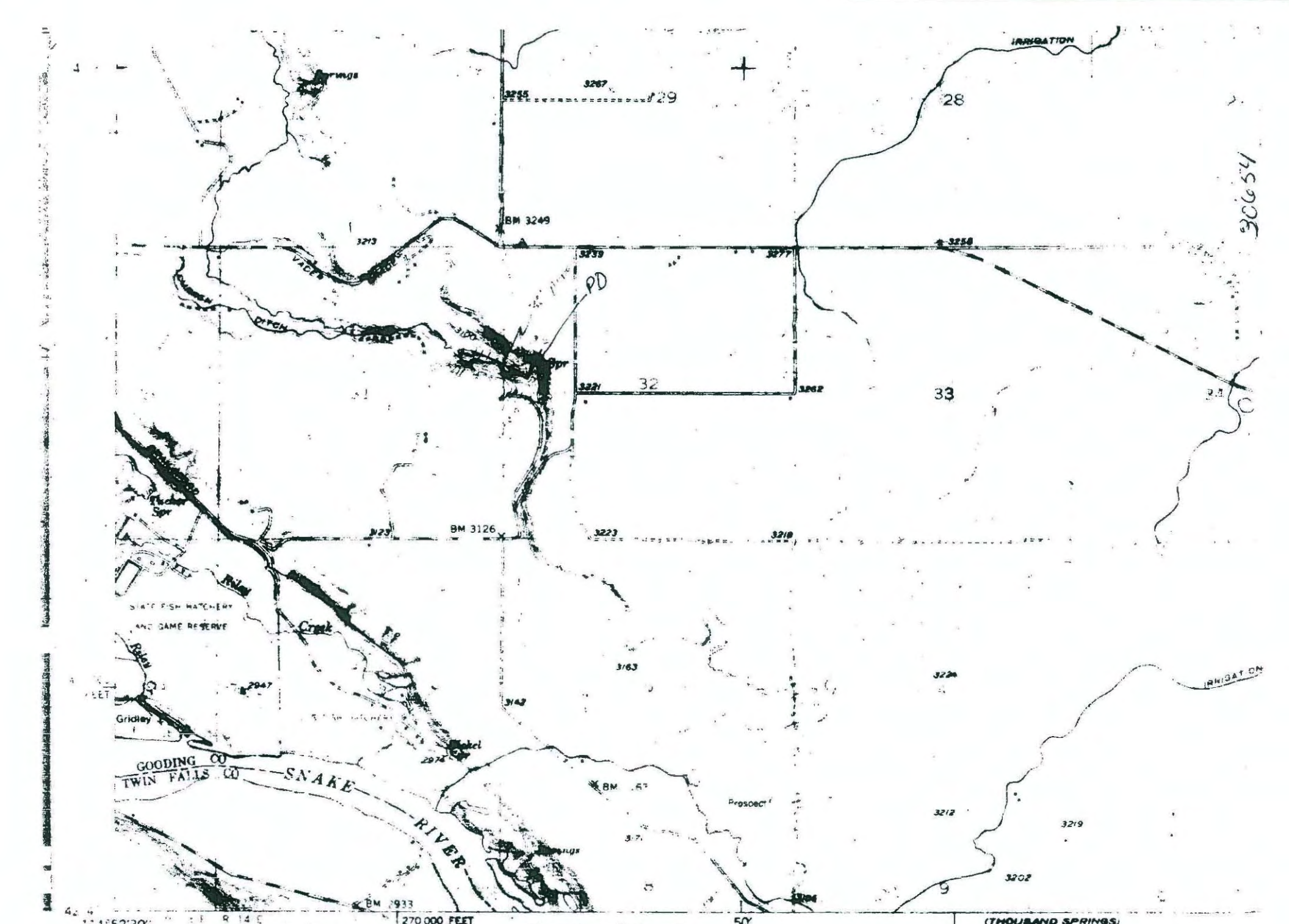
Other Rights: 51 [illegible]

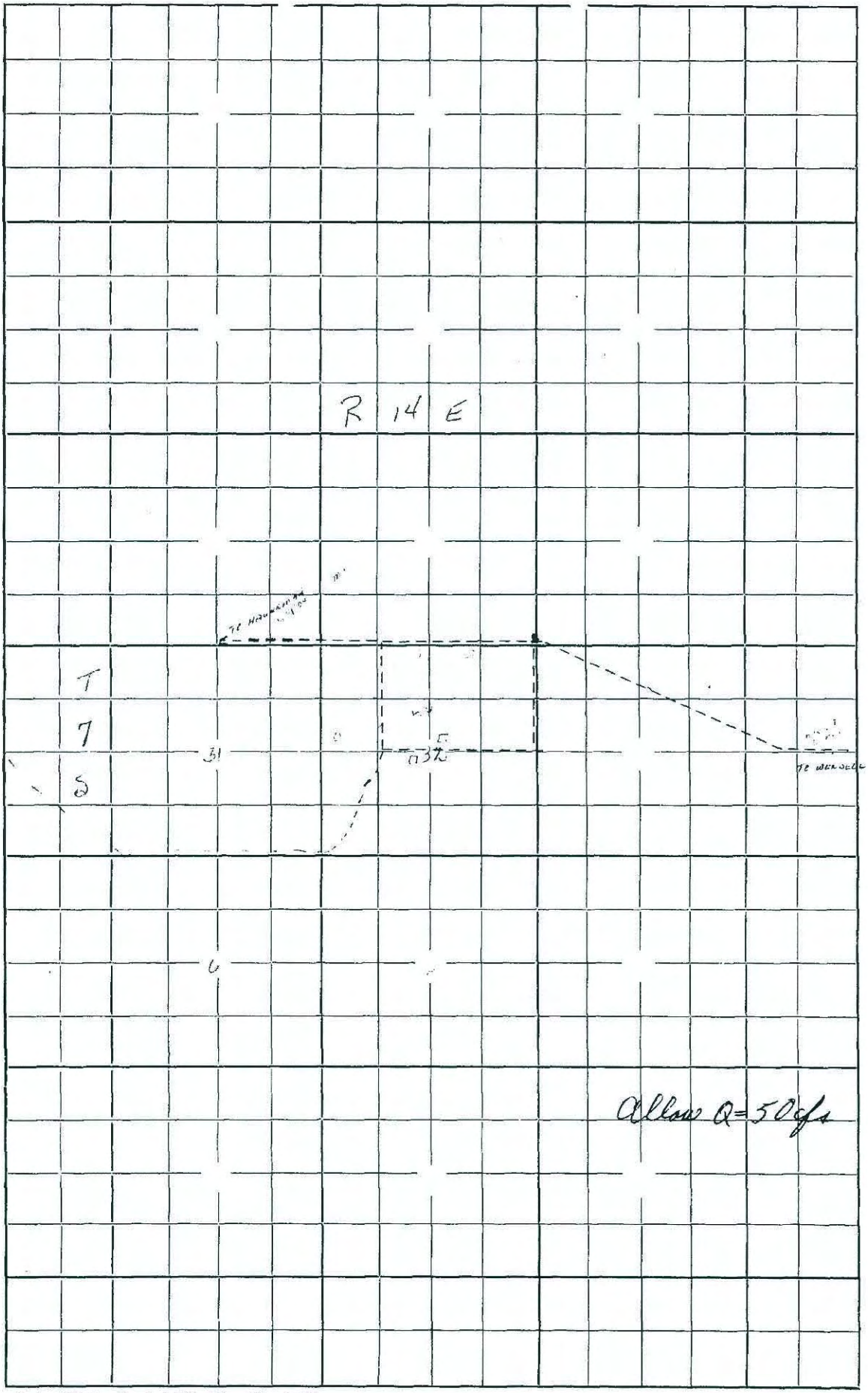
Made Sept 2, 1964
Private; July 31, 1962

INSTRUCTIONS TO EXAMINERS

1. Always carefully note the location of the point of diversion and accurately plat same.
2. When proof is for beneficial use, carefully check up the number of acres actually irrigated in each forty and accurately plat same.
3. Make a map showing the correct location of streams and ditches, and the irrigated lands, and any adjacent permanent landmarks, such as towns, lakes, large streams and public roads.
4. If any unusual conditions are discovered, make plain statement of them under remarks.
5. Always see the holder, if possible, and go over the whole ground with him and make your report only upon actual existing facts and conditions.
6. Give general characteristics of soils, topography, and crops raised.

30654


IRRIGATION
28
29
32
33
BM 3249
BM 3126
PD
VALLEY
DITCH
Gridley
GOODING CO
TWIN FALLS CO
SNAKE
RIVER
Prosect
BM 3933
IRRIGATION
270 000 FEET
50'
(THOUSAND SPRINGS)
10' contour intervals
SCALE 1:24000
Mapped, edited, and published by the Geological Survey



Scale: 2 Inches Equals 1 Mile. Draw Map In Ink.

30654

Form 23

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

BOISE

REPORT OF ENGINEER

PERMIT NO. 30654

REPORT ON PROOF OF Water to Beneficial Use

Rangen Incorporated
Buhl,
Idaho

1M April 1962

September 10, 1964

Re: Permit No. 30654
Rangen Inc.

Theodore Rangen, President
Rangen Incorporated
Buhl, Idaho

Dear Mr. Rangen:

We acknowledge receipt of the depositions of holder and two witnesses, also affidavit of publication in the GOODING LEADER _____, all submitted in proof of completion of works and beneficial use on Permit No 30654

Before final action is taken in the matter, the law requires that a field examination be made by an engineer from this department.

We cannot tell just when this examination will be made, but our field engineer will try and contact you at the time he makes the examination so that arrangements may be made to show him over the grounds.

Very truly yours,

GEO. N. CARTER
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

ct
EPR:

30654

September 4, 1964

RE: Permit 30654
Theodore Rangen, President

Theodore Rangen, President
Rangen Incorporated
Buhl, Idaho

Dear Mr. Rangen:

Your Proof of Application of Water to Beneficial Use has been received. However, the deposition of Mr. E. H. Bean of Hagerman is not acceptable. The law states the witnesses must be disinterested persons.

A new form 17 is being forwarded for completion by a new qualified witness. The deposition of Harry F. LeMoyne is being returned for completion of Question 6 (witnesses must state place of use, i. e. SE¼NE¼, Section 31, T7S-R14EBM---if this is correct). No further processing can be accomplished until receipt of the depositions by this office. Please reply promptly.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

H. PETRI
State Water Rights Clerk

HP:ct

Enc. Form 17
Witness deposition of Mr. H. F. LeMoyne

30054

Form 16
1.5 M - 7-31-62

RECEIVED
SEP 4 1964
Department of Reclamation

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

BOISE, IDAHO

Permit No. 30654

* * * *

PROOF OF APPLICATION OF WATER TO BENEFICIAL USE

* * * * * *

DEPOSITION OF HOLDER

Ques. 1. State your name, residence, occupation and postoffice address:

Theodor Rangen, Buhl, Idaho, president and general manager of Rangen, Inc.
P. O. address; Route 1, Buhl, Idaho

Ques. 2. If acting in behalf of corporation, state its name, principal place of business (if a foreign corporation, give name of postoffice of statutory agent), your position with reference to same, and your authority for appearing in its behalf:

Rangen, Inc., Buhl, Idaho; President; President

Ques. 3. State number, approval date of permit, and date of priority you propose to establish under the permit; 30654 -- Sept. 11, 1962 -- July 31, 1962

Ques. 4. State source of water supply: Underground springs, headwaters of Billingsley Creek
Give location of point of diversion, showing subdivision, section, township and range:
South 10° 28-1/2' E - 2392.55 ft. from N. Common Corner between sections 30 & 31, Twp. 7S, Rge 14 E in SW 1/4, NW 1/4 of Sec. 32 Twp. 7S Rge 14E, Gooding County.

Ques. 5. Describe your works of diversion: Concrete dam -- 36" Concrete Pipeline ~~50 second ft. xxxx steel pipeline~~; state amount of water they are capable of conveying from point of diversion to place of use 50 sec.ft.; Give name of canal or ditch or other works by which water is conducted to such place of use: XXX steel pipeline; if a well, state depth of well N/A; depth and size of casing:; depth to water; if pump is used, state discharge of pump:; tell how it was measured or determined:; if sprinkler irrigation, give number and size of nozzles and operating pressure:

Ques. 6. State for what purpose water is used: Fish cultural and domestic use.
If for irrigation, name each subdivision in which used and number of acres in each subdivision that have actually been irrigated with said water : Not for irrigation

State nature of all improvements which have been made as a direct result of said use:

Thirty (30) concrete raceways 100' x 6' x 4'; Sixteen (16) concrete raceways 107' x 43" x 3'. Two (2) concrete dams -- concrete pipeline and steel pipeline; Hatchery Building

30654

Ques. 6-a: If this is a ground water permit, give name and address of person that drilled the well: N/A

Ques. 7. If for other than irrigation purposes, state purpose and how used:

Fish cultural and domestic use

Ques. 8. What is the minimum amount of water required for the purpose specified above:

50 second feet

Ques. 9. If you are not the person or representative of the corporation to whom above mentioned permit was originally issued, please state how ownership was acquired by present holder:

Originally issued

Ques. 10. State when and in what amount the water diverted under above mentioned permit has been first used: 1 Nov, 1962 -- 50 sec. feet Time used since first use:

continuously

Ques. 11. Describe all other water rights appurtenant to same place of use:

73 inches -- 1885 decree; 8 inches -- 1908 decree; for irrigation

(sign) Theodor Ranger

I hereby certify that the foregoing testimony was read to the above subscribed, before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me, at my office in Buhl, County of Twin Falls, State of Idaho, on this 2nd day of September, A.D. 19 64.

Eugene H. Christofferson
Notary Public for the State of Idaho
residing at Buhl, Idaho

My Commission expires: February, 1968

30654

Form 17

STATE OF IDAHO
DEPARTMENT OF RECLAMATION
BOISE, IDAHO

RECEIVED
Department of Reclamation

PERMIT NO. 30654

Proof of Application of Water to Beneficial Use

Deposition of Witness

The deposition of two witnesses, on this form, taken separately, required in each case.

Ques. 1. State your name, age, residence, occupation and postoffice address.

Ans. Adrien F. Bernier, 53, National Fish Hatchery, Hagerman, Idaho
Manager National Fish Hatchery; National Fish Hatchery, Hagerman, Idaho.

Ques. 2. Are you acquainted with Rangen, Inc., the holder of Permit No. 30654? How long have you known him and where does he reside?

Ans. 5 years, Buhl, Idaho

Ques. 3. Have you read or heard read said Permit No. 30654, and are you familiar with its provisions and conditions?

Ans. Yes

Ques. 4. State source of water supply, place of diversion, and describe works for conveying water from point of diversion to place of use.

Ans. Underground Springs, headwaters of Billingsley Creek
Point of diversion; South 10° 28-1/2' E-2392.55 ft. from the N. Common corner between sections 30 & 31, Twp. 7 S, Range 14, E in SW-1/4, NW-1/4 of Sec. 32, Twp. 7S, Rge 14, E, Gooding County. Water conveyed through 36 inch concrete pipeline.

Ques. 5. How many second feet of water do you estimate said works will safely conduct to place of use, and how much water have you seen being so conveyed?

Ans. Works will convey approximately 60 second feet of water. Have observed 40 to 50 second feet through the works.

Ques. 6. State for what purpose water is used and at what place. (If for irrigation, give each subdivision in which water has been used and number of acres irrigated in each subdivision.) State whether cultivated or natural meadow land and the nature of all improvements which have been made as a direct result of said use.

Ans. Fish cultural and domestic use. Area of use lies in
SE 1/4 NE -1/4 Section 31; SW 1/4 NW-1/4 Section 32; NW-1/4 NE-1/4 SW-1/4 NE-1/4 Section 31 all in Ts 7, R14, EBM

30654

Ques. 7. If for power or other purposes than irrigation, state how water has been applied and to what extent.

Ans. Does not apply

Ques. 8. If for irrigation, state character of land that has been reclaimed, and give your estimate of the amount of water required for its profitable cultivation.

Ans. Does not apply

Ques. 9. Have you any interest in the works, water or lands above mentioned? If so, in what way and to what extent?

Ans. No.

Ques. 10. State when, how, in what amount and to what extent you have witnessed the application to beneficial use of water diverted under said permit.

Ans. July, 1963 and on at least five occasions since that time have observed water going through the works and personally observed the rearing of fish in the use area.

Adrian E. Bevnier

(Signed)

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me in Buhl, County of Twin Falls, State of Idaho, on this 8th day of September, A. D. 19 64.

Eugene H Christoffersen

Notary Public. for the state of Idaho residing at Buhl, Idaho

My commission expires Feb, 1968

Reason witness E. A. Bev... [illegible] contract of sale

30654

Form 17

STATE OF IDAHO
DEPARTMENT OF RECLAMATION
BOISE, IDAHO

RECEIVED
SEP 9 1964
Department of Reclamation

PERMIT NO. 30654

Proof of Application of Water to Beneficial Use

Deposition of Witness

The deposition of two witnesses, on this form, taken separately, required in each case.

Ques. 1. State your name, age, residence, occupation and postoffice address.

Ans. Harry F. LeMoyne, 46 yrs, Blue Lakes Blvd, Twin Falls, real estate broker; Twin Falls, Idaho

Ques. 2. Are you acquainted with RANGEN, INC., the holder of Permit No. 30654? How long have you known him and where does he reside?

Ans. 15 years, Buhl, Idaho

Ques. 3. Have you read or heard read said Permit No. 30654, and are you familiar with its provisions and conditions?

Ans. Yes

Ques. 4. State source of water supply, place of diversion, and describe works for conveying water from point of diversion to place of use.

Ans. Underground Springs, headwaters of Billingsley Creek
Point of diversion - South 10° 28-1/2' E - 2392.55 ft. from the N. Common corner between sections 30 & 31, Twp. 7S, Rge 14 E in SW 1/4, NW 1/4 of Sec. 32, Twp. 7S, Rge 14E, Gooding County. Water conveyed through 36 inch concrete pipeline.

Ques. 5. How many second feet of water do you estimate said works will safely conduct to place of use, and how much water have you seen being so conveyed?

Ans. Works will convey approximately 60 second feet of water. Have observed 40 to 50 second feet through the works.

Ques. 6. State for what purpose water is used and at what place. (If for irrigation, give each subdivision in which water has been used and number of acres irrigated in each subdivision.) State whether cultivated or natural meadow land and the nature of all improvements which have been made as a direct result of said use.

Ans. Fish cultural and domestic use. Area of use lies in SE-1/4 NE-1/4 Section 31; SW-1/4 NW-1/4 Section 32; NW-1/4 NE-1/4 SW-1/4 NE-1/4 Section 31 all in TS 7, R 14, EBM.

30654

Ques. 7. If for power or other purposes than irrigation, state how water has been applied and to what extent.

Ans. Does not apply.

Ques. 8. If for irrigation, state character of land that has been reclaimed, and give your estimate of the amount of water required for its profitable cultivation.

Ans. Does not apply.

Ques. 9. Have you any interest in the works, water or lands above mentioned? If so, in what way and to what extent?

Ans. [redacted] No.

Ques. 10. State when, how, in what amount and to what extent you have witnessed the application to beneficial use of water diverted under said permit.

Ans. July, 1963 and on at least five occasions since that time have observed water going through the works and personally observed the rearing of fish in the use area.

Harry F. LeMoyne

(Signed)

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me in Buhl, County of Twin Falls, State of Idaho, on this 2nd day of September, A. D. 19 64.

Eugene H Christoffersen

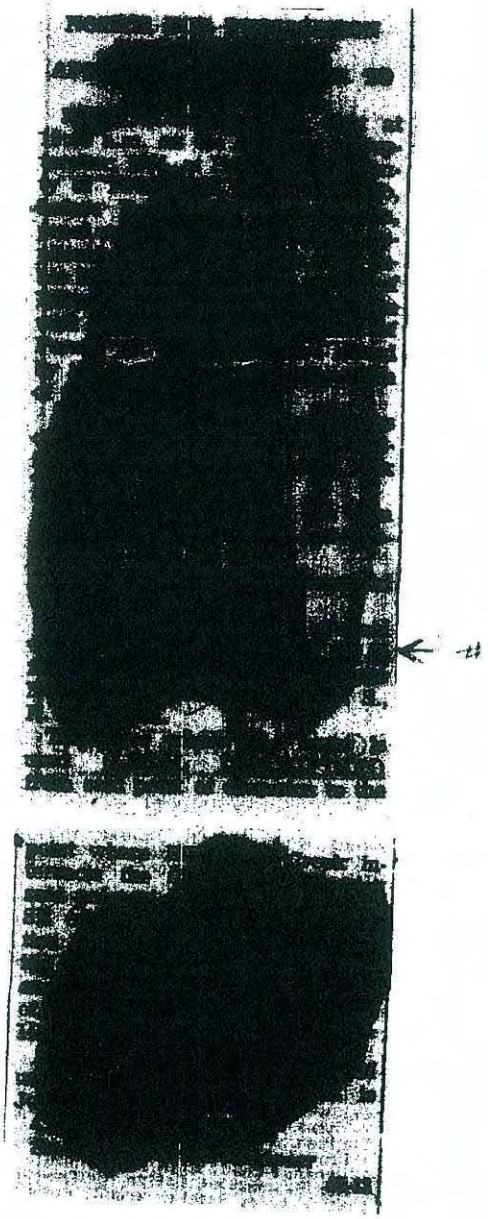
Notary Public.

My commission expires February, 1968 for the State of Idaho, residing at Buhl, Idaho

30054

AFFIDAVIT OF PUBLICATION

RECEIVED
SEP 4 1964
Department of Reclamation



STATE OF IDAHO,
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 30th day of July, 1964, and the last publication having been made on the 20th day of August, 1964 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

20th *day of* August, *1964*

Ruth Burress

Notary Public

30654

August 14, 1964

RE: Permit No. 30654
Rangen, Inc.

Gooding Leader
Gooding, Idaho

Gentlemen:

We are returning the second tear sheet of the legal notice on the above numbered permit. The error has not been corrected. You will find the error circled in red pencil.

Please correct Paragraph 5 to read: "The point of diversion of said water is S 10° 28½' East 2392.55 feet from the NW corner of the NW¼ NW¼, Section 32, Twp. 7 S., R. 14 E.,B.M.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer
By

H. Petri
State Water Rights Clerk

HP:mr

Enc. tear sheet

30654

August 6, 1964

Re: Permit No. 30654
Rangen, Inc.

Gooding Leader
Gooding, Idaho

Gentlemen:

Received the tear sheet on the above numbered permit and find the following correction:

In Paragraph 5, Line 2, there is an error in the feet shown. This should read East 2392.55.

We would appreciate this correction being made and another tear sheet mailed to us for our files.

Thank you.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

EPR:ew

30654

August 4, 1964

Re: Permit No. 30654
Rangen, Inc.

Gooding Leader
Gooding, Idaho

Gentlemen:

On July 28th we mailed you a Notice of Publication on the above numbered permit, requesting a tear sheet or copy as soon as possible on the advertising.

We would appreciate receiving such copy as soon as first publication has been made.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

H. PETRI
State Water Rights Clerk

HP:ew

30654

30654. July 28, 1964

RE: Amendment to place of use

Rangen, Inc.
Buhl,
Idaho

Gentlemen:

Enclosed is your application for amendment to place of use which has been checked and recorded by this office.

Also enclosed is departmental receipt No. 32357 covering the $1.00 recording fee.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer
By

(Mrs.) Edna P. Rule
Chief Clerk

EPR: ct

Enc. Application for amendment to place of use
Receipt No. 32357

30654

Re: Permit No. 30654
Rangen, Inc.

July 28, 1964

Bird & Hobdey,
Attorneys at Law,
Box 386,
Gooding, Idaho.

Gentlemen:

This acknowledges the Notice of Proof of ~~Completion of Works and~~ Application of Water to Beneficial Use under Permit No. 30654, in the name of Eugene H. Rangen, Inc. Final Proof is to be made before ~~you~~ Christofferson as Notary on the 2nd day of September, 1964, at 10:00 o'clock A.M., at Buhl, Idaho.

As of this date, we have mailed the Notice to the Gooding Leader Gooding, Idaho, with instructions to publish it once a week for four consecutive weeks prior to the date set for final proof and then mail the Affidavit of Publication and statement of costs to you.

It is important that the enclosed depositions be executed by the permit holder and two disinterested witnesses who are familiar with the terms of the permit and the work done thereunder, at the time, on the date and before you, as Notary, as stated in the publication notice. It is very important and necessary that each question be answered in detail.

In returning the depositions to this office, be sure that all copies have been signed, that your Notary's seal has been placed on each and that all depositions, (holder and two witnesses) are being returned. Also be sure to enclose the AFFIDAVIT OF PUBLICATION.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer
By

(MRS.) EDNA P. RULE
Chief Clerk

Encl.
ELR:pnk
cc: Applicant
cc: Notary

30654

Re: Permit No. 30654
Rangen, Inc.

Date: July 28, 1964

Gooding Leader,
Gooding, Idaho.

Gentlemen:

Enclosed you will find Notice for Publication, once a week for four consecutive weeks prior to September 2, 1964 the date set for proof; the expense of the publication is to be paid by the applicant 's attorney, Bird & Hobdey of Box 386, Gooding, Idaho to whom you should furnish proof of publication on or prior to the date set for proof.

Please acknowledge receipt of this notice and furnish this office with a copy or tear sheet of the first publication. **

Very truly yours,

Carl E Tappan

CARL E. TAPPAN
State Reclamation Engineer

** If the first copy is not received in this office for checking purposes and errors appear in subsequent issues, it is possible that re-publication of corrected copy will be at your own expense

30654

Application for Amendment
PLACE OF USE
~~XXXXXXXXX~~

JUL 27 1964

Department of Reclamation

Permit No. 30654

Comes now Rangen, Inc., and represents to the STATE RECLAMATION ENGINEER of the State of Idaho:

That he is the owner and holder of Permit to Appropriate the Public Waters of the State of Idaho, No. 30654, and requests that the place of use as described in said permit, be changed to read as follows:

from the point of diversion to the point where Billingsley Creek intersects the County Road which said point of intersection is in the SE corner of the NW¼ NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. and said place of use being in the SW¼ NW¼ Section 32, S½ NE¼ and NW¼ NE¼, Section 31, all in Twp. 7 S. R. 14 E.B.M.

, making a total of 35 acres.

That an additional amount of water is not asked for, and that the rights of others will not be adversely affected by such change.

Signed at Buhl, Idaho this 23rd day of July, 1964

RANGEN, INC.

By: Forrest Rangen

Date of receipt at office of Department of Reclamation July 27, 1964

APPROVAL OF STATE RECLAMATION ENGINEER

I, ~~GEO. N. CARTER~~ Ralph W. Thomas, Deputy, State Reclamation Engineer of the State of Idaho, hereby approve the above and foregoing application for amendment to Permit to Appropriate the Public Waters of the State of Idaho, No. 30654. This approval constitutes a new permit and is issued as an amendment to the original permit, to which it refers, and of which it becomes a part, the said application is approved only insofar as the rights of others will not be adversely affected thereby.

Recorded in Book 107 of Permits Page 30654
July 28, 1964

Ralph W. Thomas
Deputy
State Reclamation Engineer

30654

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD (RETIRED)
CECIL D. HOBDEY

PHONE 934-4271
P. O. BOX 386

July 24, 1964

JUL 27 1964
Department of Reclamation

Department of Reclamation
State of Idaho
Boise, Idaho

Gentlemen:

We inclose herewith application for amendment of place of use and our check in the amount of $1.00.

Also inclosed is the authorization for publication of notice of proof together with two copies of the notice of proof all in connection with the application of Rangen, Inc.

If anything further is needed please advise.

Sincerely yours,

BIRD & HOBDEY

By: Cecil D. Hobdey

CDH:fm
Encls.

30654

Form No. 11
2M 2/63

RECEIVED
JUL 13 1964
Department of Reclamation

NOTICE TO ACCOMPANY THIS LETTER MUST BE MADE IN DUPLICATE

(Date) July 10, 1964

(P. O.) Gooding, Idaho

TO THE STATE RECLAMATION ENGINEER

Boise, Idaho

Dear Sir:

You are hereby authorized to have the attached notice published at my expense in the Gooding Leader of Gooding, Idaho published in the county in which the works are situated.

RANGEN, INC, BUHL, IDAHO
By: Theodor Rangen
PRESIDENT

(In case of canals or other works designed to divert and carry more than 50 cubic feet of water per second, the following certificate must be signed by a well known and competent engineer.)

I hereby certify that the facts set forth in the attached notice are true.

Engineer

30654

July 21, 1964

Re: Permit No. 30654
Rangen, Inc.

Bird & Hobdey
Attorneys at Law
Gooding, Idaho

Attn: Cecil D. Hobdey

Dear Mr. Hobdey:

Returned herewith are form to amend place of use, Forms 11 and 10, with attached check for $1.00, recording fee, for the amendment. Also enclosed is application for amendment.

The form to amend place of use of the water would have been sufficient if you had used legal description of the land as provided under No. 6a of the permit and the statutes.

Kindly complete the enclosed blank form, showing subdivisions, sections, etc., where the water is actually being used. The Form 10 can be amended by inserting " being in _____" after the present description of place of use.

If the forms are returned promptly, the date for making the proofs will not need to be changed.

Very truly yours,

RALPH W. THOMAS, Deputy
State Reclamation Engineer

RT:ew

Enc. amendment, Form 11 & 10
check - amendment blank

30654

Form 10

JUL 13 1964

Department of Reclamation

NOTICE FOR PUBLICATION

NOTICE OF PROOF APPLICATION OF WATER

TO BENEFICIAL USE

Notice is hereby given that at **10:00** A.M. on the **2nd** day of **September**, 19**64** at **Buhl, Idaho**, County of **Twin Falls**, State of Idaho, before **Eugene H. Christofferson**, proof will be submitted of the application to beneficial use of **50** cubic feet per second of the waters of **Billingsley Creek** in accordance with the terms and conditions of Permit No. **30654** heretofore issued by the Department of Reclamation of the State of Idaho.

The name and post office address of the person or corporation holding said permit **Rangen, Inc., Box 706, Buhl, Idaho**

The use to which said water has been applied is **Fish culture & propagation.**

The amount applied to beneficial use is **50 cubic feet**

The point of diversion of said water is **S 10° 28½' East 2392.55 feet from the NW corner of the NW¼ NW¼, Section 32, Twp. 7 S., R. 14 E.B.M.**

The place where said water is used (LEGAL DESCRIPTION) **from said point of diversion to the point where Billingsley Creek intersects the County road which said point of intersection is in the SE corner of the NW¼NE¼ Section 31, Twp. 7 S. R. 14 E.B.M.** being in the **SW¼ NW¼ of Section 32 and the S½ NE¼ and NW¼ NE¼ of Section 31, all in Twp. 7 S. R. 14 E.B.M.**

The date of priority which said user is prepared to establish is **September 11, 1962**

CARL E. TAPPAN
State Reclamation Engineer

30054

July 15, 1964

Re: Permit No. 30654
Rangen, Inc.

Cecil D. Hobdey
Attorney at Law
Gooding, Idaho

Dear Mr. Hobdey:

We do not have a form for amending the point of use. It was our intention that you use the form for amending the point of diversion, changing the wording such as we have done on the enclosed form.

Please complete this form and send it in and we will record the change in point of use.

There is a fee of $1.00 for recording an amendment.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

D. L. RHODES, Assistant
State Water Rights Clerk

DLR:ew

Enc. amendment form

30654

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD (RETIRED)
CECIL D. HOBDEY

PHONE 934-4271
P. O. BOX 386

July 14, 1964

RECEIVED
JUL 15 1964
Department of Reclamation

Department of Reclamation
State of Idaho
Boise, Idaho

Re: Permit 30654
Rangen, Inc.

Gentlemen:

Thank you for your letter of July 13th relative to the above permit.

In your letter you indicate that our notice varies in referring to the point of use and suggest that we either correct it or submit an application for amendment. The form of application which you sent is for an amendment for the point of diversion.

Perhaps we are confusing this matter somewhat but what we are intending to submit proof on is not a change in the point of diversion (which has remained unchanged) but the fact that a larger area of use is involved. Do you have a specific form for amendment in this respect?

Sincerely yours,

BIRD & HOBDEY

By: Cecil D. Hobdey

CDH:fm

30654

July 13, 1964

Re: Permit No. 30654
Rangen, Inc.

Cecil D. Hobdey
Attorney at Law
P. O. Box 386
Gooding, Idaho

Dear Sir:

Returned herewith is notice of proof for above noted permit for correction.

According to our records the point of use of the water is in the SE¼NE¼, Sec. 31, T. 7 S., R. 14 E. This does not correspond to the description shown on the notice. Please correct it or submit an application for amendment to point of use.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

D. L. RHODES, Assistant
State Water Rights Clerk

DLR:ew

Enc. notice of proof

30654

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD (RETIRED)
CECIL D. HOBDEY

PHONE 934-4271
P. O. BOX 386

July 10, 1964

JUL 13 1964
Department of Reclamation

Department of Reclamation
State of Idaho
Boise, Idaho

Gentlemen:

On behalf of Rangen, Inc. we inclose herewith notice of proof of application of water to beneficial use together with a signed authorization for publication of the notice.

Sincerely yours,

BIRD & HOBDEY

By: Cecil D. Hobdey

CDH:fm

30654

Form 10A

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

Re: Permit No. 30654

Date:

July 1, 1964

Rangen's, Inc.
Buhl, Idaho

Dear Sir:

The date for proof of application of water to beneficial use, as set out under the terms of Permit No. 30654 is due not later than Sept. 11, 1964 . If by this date you are not prepared to make this proof, you may make it at a later date, however, your priority will be advanced the same length of time for which the proof is late.

Before this proof can be made, the statutory requirement is that a notice of your intention of proof be published once a week for four consecutive weeks in a newspaper within the county.

We enclose Form 10, in duplicate, which is to be filled in and returned to this department at least forty (40) days before the above mentioned date and/or before the time you intend to make proof. This form, in duplicate, is to include the time of day, the date, the name of the town, the address of the Notary Public before whom you will appear to make the depositions of proof (this may be at any place that is convenient for you and two witnesses), the quantity of water, for what purpose it is used, the point or points of diversion and the location of use, or lands which are irrigated -- by legal land description. Descriptions should be taken from your Permit, including any amendments thereto, as recorded in this department. If changes have been made and no amendments are on record, we advise that you request a form for this purpose before your notice is published, or you may have to readvertise and complete another set of proof forms.

Also enclosed is Form 11, which is authorization for us to have the notice published in the designated county newspaper, at your expense. This is to be returned with Forms 10.

At the time we send the notice to the newspaper we will send to you the forms for the depositions of holder and two disinterested witnesses. It is important that the depositions be executed at the time, on the date set, and at the place named, before the Notary Public, as advertised in the publication notice.

The amount of water allowed in a license cannot be more than is actually produced and measured and put to beneficial use, and cannot be more than the statutory amount allowable per acre of land actually found by field inspection to have been irrigated at the time of proof.

Very truly yours,

Carl E Tappan

CARL E. TAPPAN
State Reclamation Engineer

Enc. Form 10 and 11

30654

THEODOR RANGEN, PRES. THORLEIF RANGEN, SEC.-TREAS.

RANGEN, INC.
BEANS · GRAINS · SEEDS · FEEDS
TELEPHONE 543-4338 · P. O. BOX 706
BUHL, IDAHO

RECEIVED
APR 8 1964
Department of Reclamation

April 7, 1964

State of Idaho
Department of Reclamation
107 State House
Boise, Idaho 83701

Gentlemen:

As requested in your letter of March 30, I am enclosing two forms of affidavits which have been executed by Mr. Theodor Rangen and Mr. Gene Christofferson and properly notorized.

I hope these will be sufficient to comply with your request in connection with the discrepancy in the date of submitting proofs of completion of works.

If we can be of further assistance, please let us know.

Very truly yours,

RANGEN, INC.

Theodor Rangen

Theodor Rangen

TR/vj
enclosures

30054

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

RECEIVED
APR 8 1964
Department of Reclamation

STATE OF IDAHO)
) ss.
County of Twin Falls)

Theodore Rangen being first duly sworn upon his oath deposes and says:

That he is the President of Rangen, Inc., a corporation, Buhl, Idaho and that he makes this affidavit on behalf of said corporation in connection with Permit No. 30654 issued by the Department of Reclamation;

That as President of the said Corporation your affiant is required to be absent from the State of Idaho on numerous occasions on behalf of the business of the Corporation and further is obliged to travel a considerable portion of the time;

That the proofs of completion of works made in connection with the said Permit No. 30654 were made by the various witnesses at the request of the holder at a date when said works were in fact completed and your affiant did not appreciate the significance or importance of having the proofs actually made on the date specified in the notice. The reason that the date specified in the notice did not impress your affiant as being significant is because the works were in fact completed and your affiant saw no reason why such witnesses could not bear testimony to the fact of completion at such time as such witnesses had inspected said works and were in a position to make proof of such completion;

That as previously set forth your affiant is in and out

 30654

of the State on numerous occasions and in the interests of efficiency and precaution because of the considerable amount of expenditure that had been made in connection with the completion of the works simply wanted to assure himself that all of the required forms and paperwork be accomplished at such a time that the same would be in the hands of the Department and in no manner jeopardize the investment of the Corporation;

That the purpose for requesting the proofs of the witnesses to be made was solely for the purpose of convenience and efficiency and was in no manner or intent a device or plan to in any manner deprive any individual or corporation from in any manner asserting the full legal rights accorded them by statute;

Theodor Ringen

Subscribed and sworn to before me this 6th day of April, 1964.

Mabel Sandgren
Notary Public for the State of Idaho

SEAL)

30654

RECEIVED
APR 8 1964
Department of Reclamation

STATE OF IDAHO

DEPARTMENT OF RECLAMATION

State of Idaho)
) ss.
County of Twin Falls)

Eugene H. Christofferson being first duly sworn upon his oath deposes and says:

That your affiant is a duly appointed notary public for the State of Idaho and is the person designated as the notary public before whom proof of completion of works on behalf of Rangen, Inc. in connection with Permit No. 30654 was named and designated in the notice of intention to make proof of completion of works;

That the office of your affiant was open on September 5, 1963 from the hour of 8:00 o'clock A.M. to the hour of 6:00 o'clock P.M. and that your affiant was personally presend during such hours except for a brief period during the lunch hour and that at no time did anyone either individually or on behalf of any other person or corporation appear and in any manner protest the proof of completion of works of the above designated permit.

Eugene H Christofferson

Subscribed and sworn to before me this 6th day of April, 1964.

Frank T. Green

Notary Public for the State of Idaho.

SEAL)

30654

April 3, 1964

Re: Permit No. 30654
Rangen, Inc.

Andrew F. James
Prosecuting Attorney
P. O. Box 176
Gooding, Idaho

Dear Mr. James:

Enclosed is departmental receipt 32161, in the amount of $2.75 covering the fee for a certified copy of the above receipt, mailed to you on March 30th.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

EPR:ew

Enc. receipt

30654

March 30, 1964

Re: Permit No. 30654
Rangen, Inc.

Andrew F. James
Prosecuting Attorney
P. O. Box 176
Gooding, Idaho

Dear Mr. James:

Enclosed is certified copy of Permit No. 30654 as requested by letter dated March 27th.

Proof of Completion of Works has been made. The field inspection has not been completed by this office.

There is a fee of $2.75 for the certified copy of the permit which should be remitted to this office.

Very truly yours,

RALPH W. THOMAS, Deputy
State Reclamation Engineer

RT:ew

Enc. certified copy

30654

March 30, 1964

Re: Permit No. 30654

Theodor Rangen, President
Rangen, Incorporated
Route #4
Buhl, Idaho

Dear Mr. Rangen

In checking the file, we find that the legal notice of your intention to make proof of completion of works under the above noted permit shows that the proofs were to have been made September 5, 1963, at Buhl, before Eugene H. Christofferson. The Deppsitions of Holder and Witnesses all bear the date of July 27, 1963.

We must have an affidavit from Eugene H. Christofferson, signed before another Notary Public, that his office was open September 5, 1963, and that no one appeared to protest these proofs. Also an affidavit by you as holder, before a Notary Public, showing why you did not make the proofs on the date specified in the legal notice.

Re-publication of a legal notice will be necessary if we do not receive the affidavits.

Very truly yours,

RALPH W. THOMAS, Deputy
State Reclamation Engineer

RT:ew

30054

OFFICE OF PROSECUTING ATTORNEY
GOODING COUNTY
GOODING, IDAHO

ANDREW F. JAMES
PROSECUTING ATTORNEY

CHAS. C. SHAW
DEPUTY PROSECUTING ATTORNEY

P. O. BOX 176
TELEPHONE WEST 4-4021

March 27, 1964

RECEIVED
MAR 30 1964
Department of Reclamation

State Director of Reclamation
Boise
Idaho

Dear Sir:

In connection with the possible prosecution against Mr. Thorleif Rangen of Buhl, Idaho, it is requested that you provide us a certified copy of Application and Permit together with change of point of return, all under No. 30654. We are particularly concerned whether there are more than one permit and where the specific points of diversion are and, of course, the amount of the water right and whether or not proof has been made.

Very truly yours,

Andrew F. James
Prosecuting Attorney

AFJ:sh

30654

March 9, 1964

Re: Permit No. 30654

Rangen, Inc.
Buhl, Idaho

Attn: H. F. LeMoyne

Dear Mr. LeMoyne:

Enclosed is the Application for Amendment to the point of diversion (or return) which has been recorded in this office.

Departmental receipt No. 32118 was given to you when you were in the office for the $1.00 recording fee.

Very truly yours,

CARL E. TAPPAN
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

EPR:ew

Enc. application
permit

30654

Application for Amendment

POINT OF [redacted] RETURN

Permit No. 30654

Comes now [illegible] and represent__ to the State Reclamation Engineer of the State of Idaho:

That he is (are) the owner__ and holder__ of Permit to Appropriate the Public Waters of the State of Idaho, No. 30654.

That the point__ of ~~diversion~~ return water is described in said Permit as being located:

[illegible]

That he__ [illegible] the point__ of ~~diversion~~ return water [illegible] to a point__ located: [illegible]

That the [illegible] for desiring to make such change is as follows:

[illegible] original plans. There are no other [illegible] between the points

That no one will be injured by such change, and that such change will be made at Permit holder's own risk.

[illegible] at [illegible] Idaho, this [illegible] day of [illegible], 19[illegible]

[illegible signature]

by [illegible signature]

[illegible] of Reclamation March 5, 1964

APPROVAL [illegible] STATE RECLAMATION ENGINEER

I, ~~xxxxxxxxxx~~, [illegible] Reclamation Engineer of the State of Idaho, HEREBY APPROVE the above and foregoing [illegible] Amendment to Permit to Appropriate the Public Waters of the State [illegible]. This approval constitutes a new permit [illegible] original permit, to which it refers and of which it becomes a part, [illegible] application is approved only insofar as the rights of others will not be adversely affected thereby.

[signature]

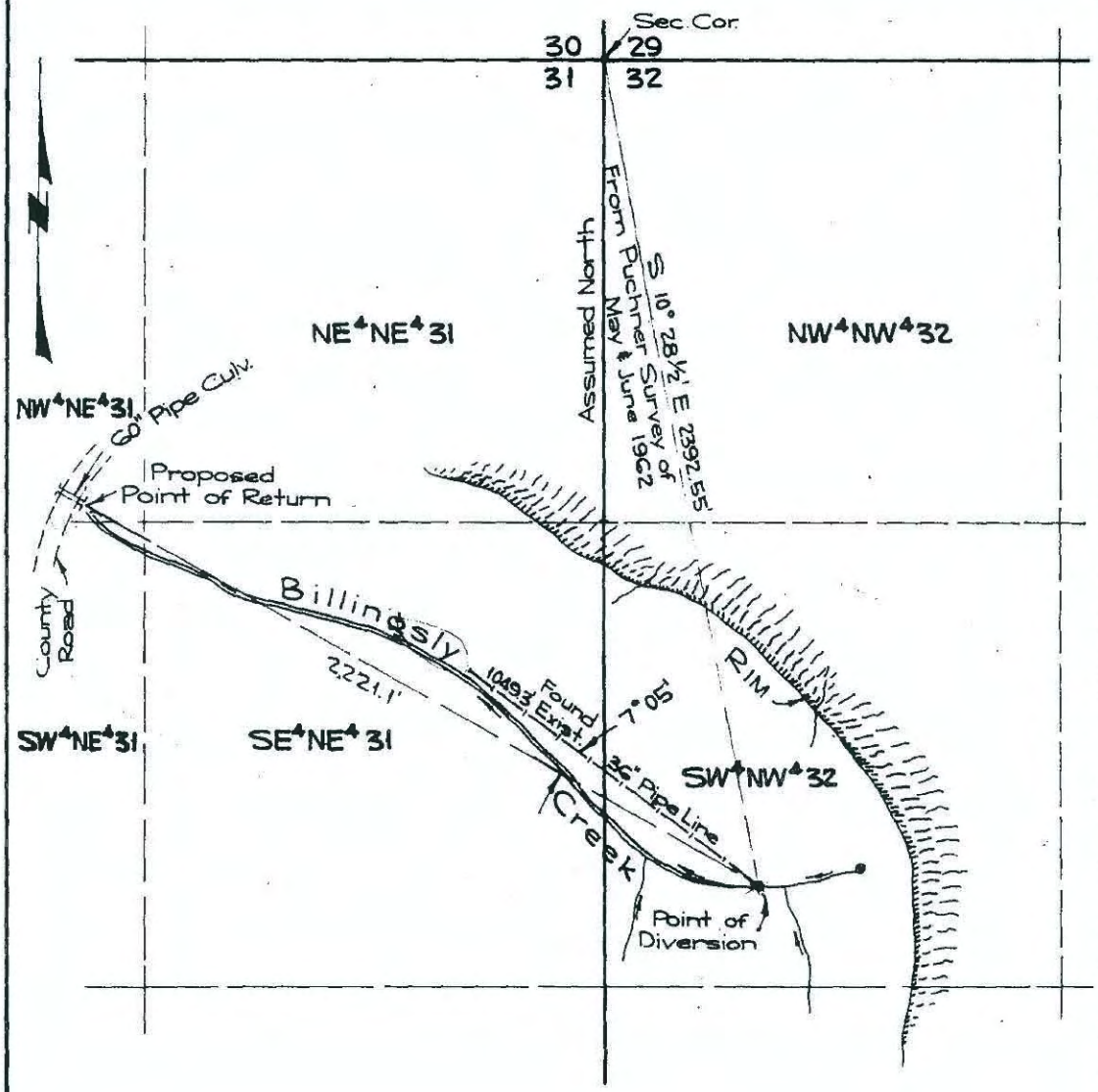
Deputy

State Reclamation Engineer

Recorded in Book [illegible] Permits, at Page [illegible]

30654

APPLICATION EXHIBIT FOR WATER DIVERSION PERMIT
RANGEN INC. BUHL, IDAHO
Sections 31 & 32 T. 7S., R.14E., B.M.
GOODING COUNTY, IDAHO
Scale: 1" = 400'



This is to certify that the above property has been surveyed under my direction and supervision as shown on this plat.

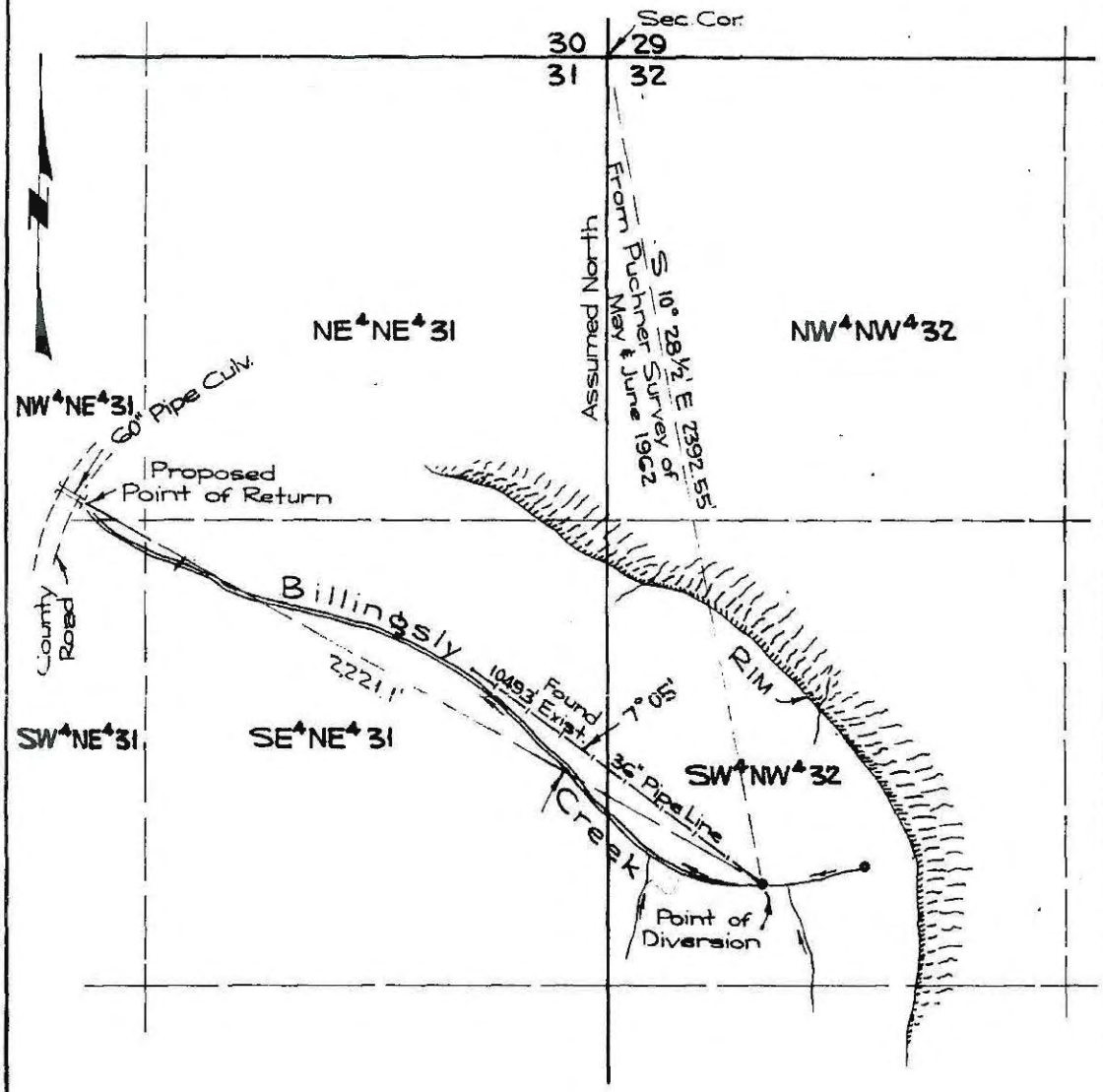
CHARLES W. GLASBY
CONSULTING ENGINEER
925 SHOSHONE ST. N.
TWIN FALLS, IDAHO

Drawn By: manning
Date: 3/4/64

Charles W. Glasby 3/4/64

30654

APPLICATION EXHIBIT FOR WATER DIVERSION PERMIT
RANGEN INC. BUHL, IDAHO.
Sections 31 & 32 T. 7S., R.14E., B.M.
GOODING COUNTY, IDAHO
Scale: 1" = 400'



This is to certify that the above property has been surveyed under my direction and supervision as shown on this plat.

CHARLES W. GLASBY
CONSULTING ENGINEER
925 SHOSHONE ST. N.
TWIN FALLS, IDAHO

Drawn By: manning

Date: 3/4/64

Charles W. Glasby
3/4/64

30654

1M April 1962

[redacted]

August 23, 1963

Re: Permit No.
30654

Theodor Rangen, President
Rangen, Inc.,
Route #4, Buhl, Idaho

Dear Mr. Rangen:

We acknowledge receipt of the depositions of holder and two witnesses, also affidavit of publication in the Gooding Leader [redacted], all submitted in proof of completion of works [redacted] on Permit No. 30654.

Before final action is taken in the matter, the law requires that a field examination be made by an engineer from this department.

We cannot tell just when this examination will be made, but our field engineer will try and contact you at the time he makes the examination so that arrangements may be made to show him over the grounds.

Very truly yours,

[redacted]
GEO. N. CARTER
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

EPR:

30654

Form 15

PERMIT NO. 30654

Proof of Completion of Works

DEPOSITION OF HOLDER

Ques. 1. State your name, residence, occupation and postoffice address.

Ans. Theodor Rangen, Route 4, Buhl, Idaho

Ques. 2. If acting in behalf of a corporation, state its name, principal place of business, your position with reference to same, and your authority for appearing in its behalf.

Ans. Rangen, Inc. Buhl, Idaho President

Ques. 3. State number and date of permit, amount of water you are authorized to divert, source, and point of diversion.

Ans. 30654 - September 11, 1962 - 50 second-feet. Underground springs headwaters Billingsley Creek. Point of diversion - South 10° 28-1/2' E-2392.55 ft from the N. Common corner between sections 30 & 31, Twp. 7S, Rge. 14E in SW 1/4 NW 1/4 of Sec 32 Twp. 7S, Rge 14E Gooding County.

Ques 4. State purpose for which water is to be used, and, if for irrigation, state the number of acres and give description of the land you intend to reclaim.

Ans. Fish Cultural and domestic use; non-consumptive

Ques. 5. State whether or not the water has been turned into your works of diversion, and, if so, when and to what extent.

Ans. Yes, 1 Nov. 1962. Approximately 50 second-feet

Ques. 6. State whether or not the works of diversion are fully completed, and whether or not they comply in all respects with the terms of the permit.

Ans. Yes

Ques. 7. If the works of diversion do not comply with all the terms of your permit, state fully those particulars in which there is any variance.

Ans. No variance

Ques. 8. Give description of works, state dimensions and capacity of each part, and give cost of same.

Ans. Concrete structure 12' x 10' x 25' and 36" inside concrete pipeline 1000' $15,000.

(Sign here.) Theodor Rangen

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me, in Buhl, County of Twin Falls, State of Idaho, on this 27th day of July A.D. 1963

Eugene H. Christofferson
Notary Public.

My Commission expires February 1964

30654

Form 14

The Depositions of two Witnesses, in this form, taken separately, required in each case.

Permit No. 30654

Proof of Completion of Works

DEPOSITION OF WITNESS

Ques. 1. State your name, residence, occupation and postoffice address.

Ans. E. H. Bean, Hagerman, Idaho, Farmer

Ques. 2. Are you acquainted with Rangen, Inc., Buhl, Idaho, the holder of Permit No. 30654, authorizing the diversion of 50 second-feet of the waters of Headwaters of Billingsley Creek at Hagerman, at Hagerman, Idaho for fish cultural purposes? How long have you known him, and where does he reside?

Ans. 15 years - at Buhl, Idaho

Ques. 3. Have you read or heard read said Permit No. 30654, and are you familiar with its terms and conditions?

Ans. Yes

Ques. 4. (If for irrigation purposes). Are you acquainted with the land proposed to be irrigated under said permit? If so, describe same, state its character, and give your estimate of the amount of water required for its profitable cultivation.

Ans. Fish culture and domestic use

Ques. 5. Are the works of diversion fully completed and of sufficient capacity to convey the entire amount of water set out in the permit from point of diversion to place of use?

Ans. Yes

Ques. 6. Describe the works of diversion as they now exist, and give your estimate of their capacity.

Ans. Concrete dam with 3 ft. diameter concrete pipe to raceways. Capacity approximately 50 second-feet of water

(Sign here.) E H Bean

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me, at my office in 27th County of July State of Idaho, on this day of ..., A. D. 19... Eugene H. Christofferson
Eugene H. Christofferson

30654

Form 14

The Depositions of two Witnesses, in this form, taken separately, required in each case.

Permit No. 30654

Proof of Completion of Works

DEPOSITION OF WITNESS

Ques. 1. State your name, residence, occupation and postoffice address.

Ans. Harry F. LeMoyne, Hagerman, Idaho, Real Estate Broker

Ques. 2. Are you acquainted with Rangen, Inc., Buhl, Idaho, the holder of Permit No. 30654, authorizing the diversion of 50 second-feet of the head waters of Billingsley Creek, at Hagerman, Idaho for fish cultural purposes? How long have you known him, and where does he reside?

Ans. 15 years - Buhl, Idaho

Ques. 3. Have you read or heard read said Permit No. 30654, and are you familiar with its terms and conditions?

Ans. Yes

Ques. 4. (If for irrigation purposes). Are you acquainted with the land proposed to be irrigated under said permit? If so, describe same, state its character, and give your estimate of the amount of water required for its profitable cultivation.

Ans. Fish culture and domestic use

Ques. 5. Are the works of diversion fully completed and of sufficient capacity to convey the entire amount of water set out in the permit from point of diversion to place of use?

Ans. Yes

Ques. 6. Describe the works of diversion as they now exist, and give your estimate of their capacity.

Ans. Concrete structure with spillway and 3 ft. diameter concrete pipe to raceways-capacity approximately 50 second-feet.

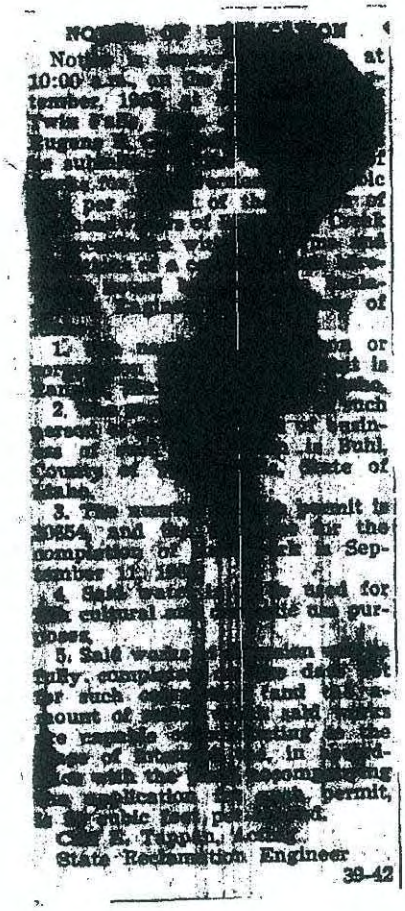
(Sign here.) Harry F. LeMoyne

I hereby certify that the foregoing testimony was read to the above subscriber before its signing, that I believe him to be the person he represents himself to be, and that said testimony was subscribed and sworn to before me, at my office in 27th County of July State of Idaho, on this day of , A. D. Eugene H. Christofferson

Eugene H. Christofferson

30654

AFFIDAVIT OF PUBLICATION



State Reclamation Engineer
39-42

STATE OF IDAHO,
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper ONE consecutive weeks, the first publication having been made on the 25th day of July, 1963, and the last publication having been made on the 15th day of August, 1963 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

15th *day of* August, 1963

Ruth Orpen

Notary Public

30054

/IT OF PUBLICATION

NOT[redacted]ATION

TO

[redacted]at at
[redacted]f Sep-
[redacted], Coun-
[redacted] Idaho,
[redacted]offerson,
[redacted] the ap-

[redacted]eneficial use of 50 cu-
[redacted]ec[redacted]aters of
Billingsley C[redacted]nce
with the ter[redacted]of
Permit No[redacted]d
by th[redacted]
of [redacted]

[redacted]
[redacted]
[redacted]
[redacted]

us[redacted]feet
div[redacted]d
wa[redacted]5
fee[redacted]e
NW[redacted]S.,
R.

[redacted]ar is
us[redacted]RON)
fr[redacted]to the
po[redacted]Creek in-
ters[redacted]which
said [redacted]in the
SE [redacted]of the NW¼NE¼ Sec-
tion [redacted]Wp. 7 S. R. 14 E.B.M. be-
ing in SW¼NW¼ of Section 32
and [redacted]½NE¼ and NW¼NE¼
of Sec[redacted]31, all in Twp. 7 S. R.
14 E.B.

The [redacted]of priority which said
user is [redacted]ared to establish is
July 31, 1963.

Carl [redacted] Tapp[redacted]
State Reclam[redacted]Engineer

40-43

STATE OF IDAHO,
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 30th day of July, 1964, and the last publication having been made on the 20th day of August, 1964 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

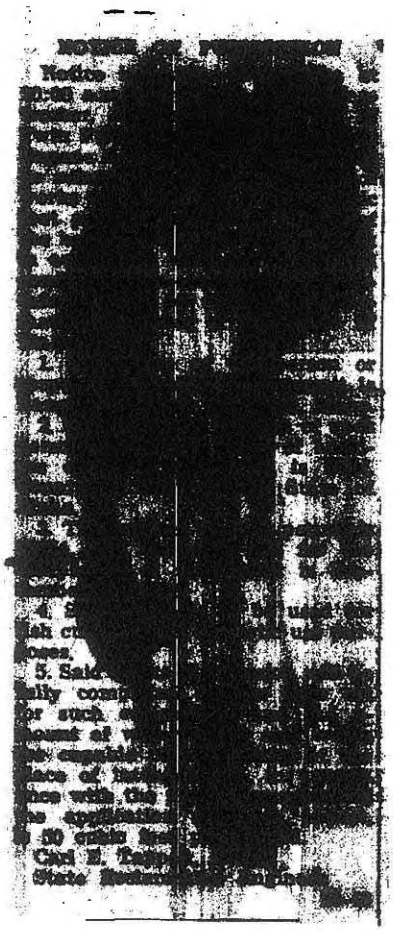
20th *day of* August, 1964

Ruth Burress

Notary Public

30654

AFFIDAVIT OF PUBLICATION



STATE OF IDAHO,
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks, the first publication having been made on the 25th day of July, 1963, and the last publication having been made on the 15th day of August, 1963 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this

15th *day of* August, 1963

Ruth Burress

Notary Public

30654

Form 7

Notice for Publication

Notice is hereby given that at 10:00A. M., on the 5th day of September 19 63, at Buhl, County of Twin Falls, State of Idaho, before Eugene H. Christofferson proof will be submitted of the completion of works for the diversion of 50 cubic feet per second of the waters of the headwaters of Billingsley Creek in accordance with the terms and conditions of a certain permit heretofore issued by the State Reclamation Engineer of the State of Idaho.

1. The name of the person or corporation holding said permit is Rangen, Inc., Box 706, Buhl, Idaho

2. The postoffice address of such person or principal place of business of such corporation is Buhl, County of Twin Falls, State of Idaho.

3. The number of such permit is 30654, and the date set for the completion of such work is September 11, 1963.

4. Said water is to be used for fish cultural and domestic use purposes.

5. Said works of diversion will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 50 cubic feet per second.

~~6. The amount of lands for which said water is available is _____ acres, particularly described as follows:~~

CARL E. TA PAN, Acting
Commissioner of Reclamation.

30654

July 18, 1963

Re: Permit No. 30654

Rangen, Inc.,
Box 706,
Buhl, Idaho.

Gentlemen:

This acknowledges the Notice of Proof of Completion of Works [redacted] under Permit No. 30654. The proofs are to be made at 10:00 o'clock A.M., on the 5th day of September, 1963, before Eugene H. Christofferson, Buhl, Idaho, Notary Public.

As of this date we have mailed the Notice to the Gooding Leader Gooding, Idaho, with instructions to publish it once a week for four consecutive weeks prior to the date set for final proof then mail the affidavit of publication and statement of costs to you.

It is important that the enclosed depositions be executed by you and two disinterested witnesses who are familiar with the terms of the permit and the work done thereunder, at the place, on the date, and at the time and before the Notary, as advertised. It is very important and necessary that each question be answered in detail.

In returning the depositions to this office, be sure that all copies have been signed, the Notary's seal has been placed on each and that all depositions, (holder and two witnesses) are being returned. Also be sure to enclose the Affidavit of Publication.

Very truly yours,

[redacted]
State Reclamation Engineer

By:

(Mrs.) Edna P. Rule
Chief Clerk

Enc.
EPR:pmk
cc: Notary

30654

July 18, 1963

Re: Permit No. 30654
Rangen, Inc.

Gooding Leader,
Gooding, Idaho.

Gentlemen:

Enclosed you will find notice for publication, once a week for four consecutive weeks prior to September 5, 1963, the date set for proof; the expense of the publication is to be paid by the applicant, Rangen, Inc., Box 706, Buhl, Idaho, to whom you should furnish proof of publication on or prior to the date set for proof.

Please acknowledge receipt of this notice and furnish this office with a copy or tear sheet of the first publication.**

Very truly yours,

CARL E. TAPPAN, Acting
State Reclamation Engineer

** If the first copy is not received in this office for checking purposes and errors appear in subsequent issues, it is possible that re-publicat on of corrected copy will be at your own expense.

Encl.
CET:pmk

3-C-54

Form No. 11
2M - 10/60

RECEIVED
Department of Reclamation

NOTICE TO ACCOMPANY THIS LETTER MUST BE MADE IN DUPLICATE

(Date) June 11, 1963

(P. O.) Box 706 , Buhl, Idaho

TO THE STATE RECLAMATION ENGINEER:

Boise, Idaho

Dear Sir:

You are hereby authorized to have the attached notice published at my expense in the Gooding Leader of Gooding , Idaho published in the county in which the works are situated. Gooding Co.

Charles Ramsey
Secretary

(In case of canals or other works designed to divert and carry more than 50 cubic feet of water per second, the following certificate must be signed by a well known and competent engineer.)

I hereby certify that the facts set forth in the attached notice are true.

Engineer.

30054

THEODOR RANGEN, PRES. THORLEIF RANGEN, SEC.-TREAS.

RANGEN, INC.
BEANS · GRAINS · SEEDS · FEEDS
TELEPHONE 543-4338 · P. O. BOX 706
BUHL, IDAHO

July 17, 1963
"Our 38th Year"

State of Idaho
Chief Reclamation Engineer
State House
Boise, Idaho

Dear Sir:

Enclosed you will legal forms which must be signed by your organization so that final notice can be made regarding the completion of a water impoundment at our Research Trout Hatchery in Hagerman, Idaho.

Mr. Philip F. Puchner was the surveying engineer, and has since accepted an engineering position in Bankok, Thialand, and is unable at this time to assist us further in the completion of these forms, and suggests that your office complete them.

Would you please sign the forms and return them to us in the enclosed envelope. Your assistance and cooperation in this matter will be greatly appreciated.

Very truely yours,

RANGEN, INC.

Gene Christofferson

Gene Christofferson
Office Manager

Encl

30054

Form No. 7

State of Idaho

DEPARTMENT OF RECLAMATION

BOISE

Re: Permit No. 30654

INSTRUCTIONS

PROOF OF COMPLETION OF WORKS

Bird [illegible]
Attorneys at Law
[illegible], Idaho

Boise, Idaho,

June 3, 1963

Dear Sir:—

I enclose herewith blank form upon which to give notice that you are prepared and desire to submit proof of completion of works under your permit No. 30654.

This form should be filled out and mailed to the Department of Reclamation, at least 60 days before the date upon which proof is to be submitted, which proof MUST be on or before Sept. 11, 1963. Upon receipt of the blank properly filled out, notice of publication will be sent to the paper direct from this office, which notice must be published a period of four weeks prior to the date of proof.

The proof may be submitted at any place convenient to you and two witnesses, where there is a notary public or other officer authorized to administer oaths.

The certificate that shall be issued under this proof does not give you a perpetual right to the use of the water for which application is made, as it only confirms the completion of the works of a capacity to divert and convey to the place of intended use a certain amount of water. The law requires that another proof be submitted when the water has been fully applied to a beneficial use, at which time license is issued for the amount of water actually in use. Information in regard to this last proof will be furnished on request.

Very truly yours,

CARL [illegible] TAPTA
Assistant State Reclamation Engineer

Form 8 - 11

cc: Rangen, Inc.
Buhl, Idaho

30654

September 19, 1962

Re: Permit No. 30654
Rangen, Inc.

Bird & Hobdey,
Attorneys at Law,
P. O. Box 386,
Gooding, Idaho.

Attention: Cecil D. Hobdey

Gentlemen:

We enclose Permit No. 30654 in which we direct your attention to the limitations and conditions as given on the fourth page under approval of the State Reclamation Engineer.

We also enclose Departmental Receipt No. 31166 which was issued covering payment in the amount of $17.25 for the filing fee of the above mentioned permit.

Very truly yours,

GEO. N. CARTER
State Reclamation Engineer
By

(Mrs.) Edna P. Rule
Chief Clerk

EPR:pmk
Encl.
cc: Rangen, Inc.
Buhl, Idaho

30654

HIGH & FRITCHMAN COMPANY

It is hereby ordered, adjudged and decreed, and this does order, adjudge and decree, that the defendant and intervenor High & Fritchman Compa a corporation, is the owner of, and entitled to the use of, and the right to use for irrigation and domestic purposes the following amounts of water, to-wit:

Three and 2 tenths (3.2) second feet of water, with a priority of October 1, 1884, developed and diverted from the waters, seeps, springs and rivulets in the rim rock above the head waters of Billingsley Creek, by means of a tunnel commonly known as the Curran Tunnel, or Curran Spring, situace in the SW¼ NW¼, Sec. 32, Twp. 7 North, Range 14 East, B. M., Gooding County, Idaho, and 4.8 second feet of the waters of said seeps, springs, and rivulets diverted and developed by the same tunnel, with a priority of April 1, 1908, taken from said tunnel by a pipe line and ditch into and upon the lands of the said defendant hereinafter described and used on said lands for irrigating and raising crops thereon and for watering stock and other domestic puposes during the non irrigation season.

Said water rights are appurtenant to and to be used upon and in the irrigation of the following described lands, situate in Gooding County, Idaho, of the said defendant and intervenor High & Fritchman Company, a corporation, to-wit:

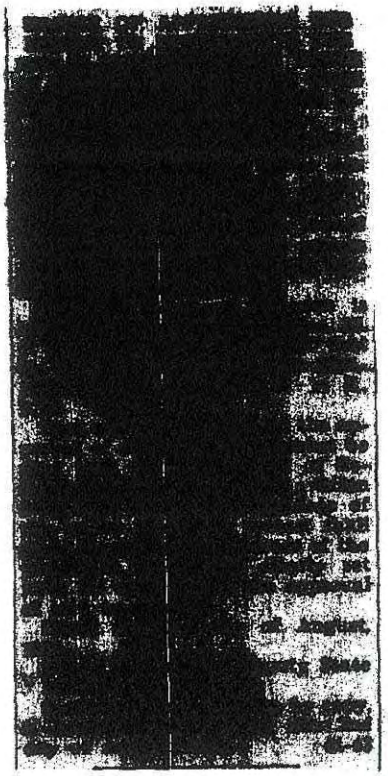
The Southeast Quarter (SE¼) of the Northeast Quarter (NE¼); the East Half (E½) of the Southeast Quarter (SE¼) of Section Thirty-one (31); the Southwest Quarter (SW¼) of the Northwest Quarter (NW¼); the West Half (W½) of the Southwest Quarter (SW¼) of Section Thirty-two (32), all in Township Seven (7) South, Range Fourteen (14) East, B.M., and Lots Three (3) and Four (4) of Section Five (5), Township Eight (8) South, Range Fourteen (14) East, B.M., together with all water rights, ditches and d[illegible] rights of way appurtenant thereto.

Permit Map No. ____
As Approved
GEO. N. CARTER
State Reclamation Engineer

30654

AFFIDAVIT OF PUBLICATION

RECEIVED
SEP 5 19
Department of Reclamation



STATE OF IDAHO,
COUNTY OF GOODING } SS.

I, *Leland G. Burress,* do solemnly swear that I am the printer and publisher of THE GOODING LEADER, a weekly newspaper of general circulation, published once each week at Gooding, Idaho; that the notice attached hereto was published in said newspaper four consecutive weeks. The first publication having been made on the 2nd day of August 196 2, and the last publication having been made on the 23rd day of August, 196 2 that said notice was published in the regular and entire issue of every number of the paper during that period and time of publication, and that the said notice was published in the newspaper proper, and not in the supplement thereof.

That said newspaper; has been printed and published continuously in *Gooding, Gooding County, Idaho,* for a period of more than 78 weeks prior to the first publication of the attached notice.

Leland G. Burress

Subscribed and sworn to before me this 23rd day of August, 196 2

Ruth Burress

Notary Public

30054

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD
CECIL D. HOBDEY

PHONE
P. O. BOX 386

SEP 5
Department of Reclamation

September 4, 1962

Department of Reclamation
107 State House
Boise, Idaho

Gentlemen:

We inclose herewith affidavit of the publisher, The Gooding Leader, showing publication of the notice of application of Rangen, Inc. to appropriate water from Billingsley Creek for fish culture.

Sincerely yours,

BIRD & HOBDEY

By: Cecil D. Hobdey

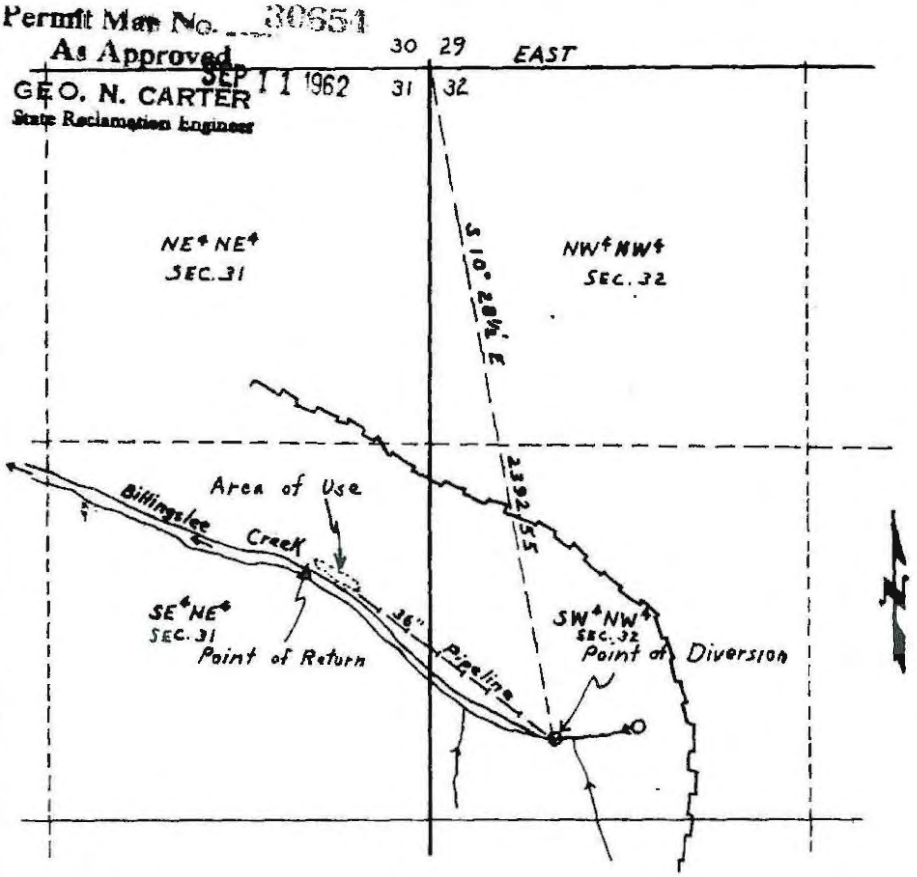
CDH:fm
Encls.

30654

CERTIFICATE OF SURVEY

RANGEN, INC., SURVEY T. 7S., R.14E., B.M.

Permit Map No. 30651
As Approved
SEP 11 1962
GEO. N. CARTER
State Reclamation Engineer



I, Philip F. Puchner, of Ketchum, Idaho, an engineer licensed by the State of Idaho, do hereby certify that this map was made from notes taken during actual surveys made by me on May 20 and 21, and June 20, 1962, and that it correctly represents the works described in the accompanying application.

REGISTERED PROFESSIONAL ENGINEER 1028 STATE OF IDAHO PHILIP F. PUCHNER

HOFFMANN - FISKE & MILAR
BOISE TWIN FALLS

30054

MAP OF RANGEN, INC. TROUT POND DIVERSION
To Accompany Application for Permit
By RANGEN, INC. BUHL, IDAHO
JULY 24, 1962 SCALE 1" = 500'

NOTICE OF APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF IDAHO IN ACCORDANCE WITH THE PROVISIONS OF SECTION 42-203, IDAHO CODE

[illegible] HARDY RIVER, [illegible], Inc., of Paul, Idaho, has made application No. 30670, on the 31st day of July, 1962, to appropriate fifty (50) cubic feet per second of the waters of the head waters of Billingsley Creek, for fish cultural and domestic use.

That the point of diversion is located in the SE¼NW¼, sec. 32, T. 7 S., R. 14 E., B.M.; and that the place of use is in the SE¼SE¼, sec. 31, T. 7 S., R. 14 E., B.M.

That any protests against the approval of this application must be filed with the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protest shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said application.

Dated this 1st day of August, 1962.

Deputy State Reclamation Engineer

Date of first Publication: _____

Date of last Publication: _____

Last date for Protest: September 10, 1962

[illegible], by copy, is hereby acknowledged this _____ day of _____, 1962.

[illegible], Inc.

By _____

30654

NOTICE OF APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF IDAHO IN ACCORDANCE WITH THE PROVISIONS OF SECTION 42-203, IDAHO CODE

NOTICE IS HEREBY GIVEN, That RANGEN, Inc., of Buhl, Idaho, has made application No. 38670, on the 31st day of July, 1962, to appropriate fifty (50) cubic feet per second of the waters of the head waters of Billingsley Creek, for fish cultural and domestic use.

That the point of diversion is located in the SW¼NW¼, Sec. 32, T. 7 S., R. 14 E., B. M.; and that the place of use is in the SE¼NE¼, Sec. 31, T. 7 S., R. 14 E., B. M.

That any protests against the approval of this application must be filed with the Department of Reclamation, at Boise, Idaho, within forty (40) days from the date of this notice, and such protest shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said application.

Dated this 1st day of August, 1962.

Ralph W. Thomas

Deputy State Reclamation Engineer

Date of First Publication: August 9, 1962

Date of Last Publication: August 23, 1962

Last date for Protest: September 10, 1962

SERVICE OF THE FOREGOING, by copy, is hereby acknowledged this 2nd day of August, 1962.

RANGEN, Inc.

By: Ellis D. Hobbs

30054

BRANCH BIRD
CECIL D. HOBDEY

Law Offices
Bird and Hobdey
530 Main So.
~~First Security Bank Bldg.~~
Gooding, Idaho

PHONE WEst 4-4271
P. O. BOX 905

RECEIVED
AUG 2 1946
Department of Reclamation

8/2/46

Gentlemen:

We presume only so much of notice as appears above - red check we have made on enclosed copy should be published - and have so instructed publisher. If this not correct please advise.

Cecil D. Hobdey

30654

NOTICE OF PUBLICATION

Notice is hereby given that at 10:00 a.m., on the 5th day of September, 1963, at Buhl, County of Twin Falls, State of Idaho, before Eugene H. Christofferson proof will be submitted of the completion of works for the diversion of 50 cubic feet per second of the waters of the headwaters of Billingsley Creek in accordance with the terms and conditions of a certain permit heretofore issued by the State Reclamation Engineer of the State of Idaho.

1. The name of the person or corporation holding said permit is Rangen, Inc., Box 706, Buhl, Idaho.

2. The postoffice address of such person or principal place of business of such corporation is Buhl, County of Twin Falls, State of Idaho.

3. The number of such permit is 30654, and the date set for the completion of such work is September 11, 1963.

4. Said water is to be used for fish cultural and domestic use purposes.

5. Said works of diversion will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 50 cubic feet per second.

Carl E. Tappan, Acting
State Reclamation Engineer

39-42

NOTICE OF TRUSTEES' SALE

Legal Notice

NOTICE FOR PUBLICATION

NOTICE OF PROOF

APPLICATION OF WATER TO BENEFICIAL USE

Notice is hereby given that at 10:00 a.m. on the 2nd day of September, 1964, at Buhl, Idaho, County of Twin Falls, State of Idaho, before Eugene H. Christofferson, proof will be submitted of the application to beneficial use of 50 cubic feet per second of the waters of Billingsley Creek in accordance with the terms and conditions of Permit No. 30654 heretofore issued by the Department of Reclamation of the State of Idaho.

The name and post office address of the person or corporation holding said permit Rangen, Inc., Box 706, Buhl, Idaho.

The use to which water has been applied is Fish culture and propagation.

The amount applied to beneficial use is 50 cubic feet.

The point of diversion of said water is S. 10° 28½' East 239.55 feet from the NW corner of the NW¼NW¼, Section 32, Twp. 7 S., R. 14 E.B.M.

The place where said water is used (LEGAL DESCRIPTION) from said point of diversion to the point where Billingsley Creek intersects the County road which said point of intersection is in the SE corner of the NW¼NE¼ Section 31, Twp. 7 S. R. 14 E.B.M. being in the SW¼NW¼ of Section 32 and the S½NE¼ and NW¼NE¼ of Section 31, all in Twp. 7 S. R. 14 E.B.M.

The date of priority which said user is prepared to establish is July 31, 1962.

Carl E. Tappan,
State Reclamation Engineer

40-43

August 2, 1962

Re: Application No. 38670
Rangen, Inc.

Cecil D. Hobdey
Attorney at Law
P. O. Box 386
Gooding, Idaho

Dear Mr. Hobdey:

We received your letter of August 2nd with returned copy of the legal notice.

Elimination of the last part of the notice would appear to be satisfactory in this case as the first publication is within 10 days of date of notice. In cases where the notice is received with some delay, the last part would be necessary to show publication within the ten-day limit.

This is the first time this question has been raised.

Very truly yours,

GEO. N. CARTER
State Reclamation Engineer

By:

RALPH W. THOMAS, Deputy
State Reclamation Engineer

RT:ew

30054

August 1, 1962

Re: Application No. 38670
Rangen, Inc.

Bird & Hobdey
Attorneys at Law
Box 386
Gooding, Idaho

Attn: Cecil D. Hobdey

Dear Mr. Hobdey:

Enclosed are three copies of a legal notice. Kindly acknowledge receipt by dating and signing each copy.

Insert date of first and last publication in each copy. Give the original to the paper published in Gooding County for publication in three successive weekly issues, first publication to be not over ten (10) days from your receipt of the notice. Retain one copy for your file, and return one copy to this office.

Send the affidavit of Publication to this office prior to the last date for protest.

Very truly yours,

GEO. N. CARTER
State Reclamation Engineer

By:

RALPH W. TIEMAS, Deputy
State Reclamation Engineer

RT:ew

Enc. 3 copies

30654

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD
CECIL D. HOBDEY

PHONE WEST 4-4271
P. O. BOX 388

July 30,1962

JUL 31 19[illegible]
Department of Reclamation

Department of Reclamation
107 State House
Boise, Idaho

Gentlemen:

Thank you for your letter of July 27th relative to the application of Rangen, Inc.

The application has been changed to more closely conform to the facts. We direct your attention to No. 3 of the application.

If anything further is desired please advise.

Sincerely yours,

Bird & Hobdey

by Cecil D. Hobdey

cdh:s
enc.

3C 054

July 27, 1962

Re: Application for Permit
Rangen, Inc.

Bird and Hobdey
Attorneys at Law
Box 386, Gooding, Ida.

Attn: Cecil D. Hobdey

Dear Mr. Hobdey:

Returned herewith is the application for permit with attached check for $17.25 filing fee.

The source of water supply shown "Curran Tunnel" indicates that it is subterranean water, however the map shows the diversion is from the stream below the tunnel, assuming the circle with arrow of direction of flow is the mouth of the tunnel. Also the maps show another tributary above the point of diversion. In case this diversion is at the same point as mentioned in the decree, could the source of water supply be called Curran Tunnel Creek, tributary of Billingsley Creek? Or could it be called Billingsley Creek, if it is the main source of supply for that creek, as indicated by the map? The present answer to both parts of "3" does not appear to be correct, as the water is diverted from a stream which is Billingsley Creek, or a tributary.

Upon return of the application, we will prepare the legal notice and send it to you, with instructions.

Very truly yours,

GEO. N. CARTER
State Reclamation Engineer

By:

RALPH M. TIKKAS, Deputy
State Reclamation Engineer

RT:ew

Enc. application with attached
check

30654

LAW OFFICES
BIRD & HOBDEY
530 MAIN STREET
GOODING, IDAHO

BRANCH BIRD
CECIL D. HOBDEY

PHONE WEST 4-44
P. O. BOX 386

JUL 26 1962
Department of Reclamation

July 25, 1962

Department of Reclamation
State of Idaho
Boise, Idaho

Gentlemen:

We inclose application for permit together with blue-print and tracing map and also portion of decree referred to inthe application.

Also inclosed is our check in the amount of $17.25 filing fee.

This is the first occasion that the undersigned has had to submit an application where more than 25 cu. ft. are involved. We note from instruction #14 of the regulations and instructions that a notice of the application must be published in three issues in this County. Is there a regular form used for this purpose or should we draft our own?

Awaiting your further advice, we are.

Sincerely yours,

BIRD & HOBDEY

By: Cecil D. Hobdey

CDH:fm
Encl.

30054

EXHIBIT C

MICROFILMED

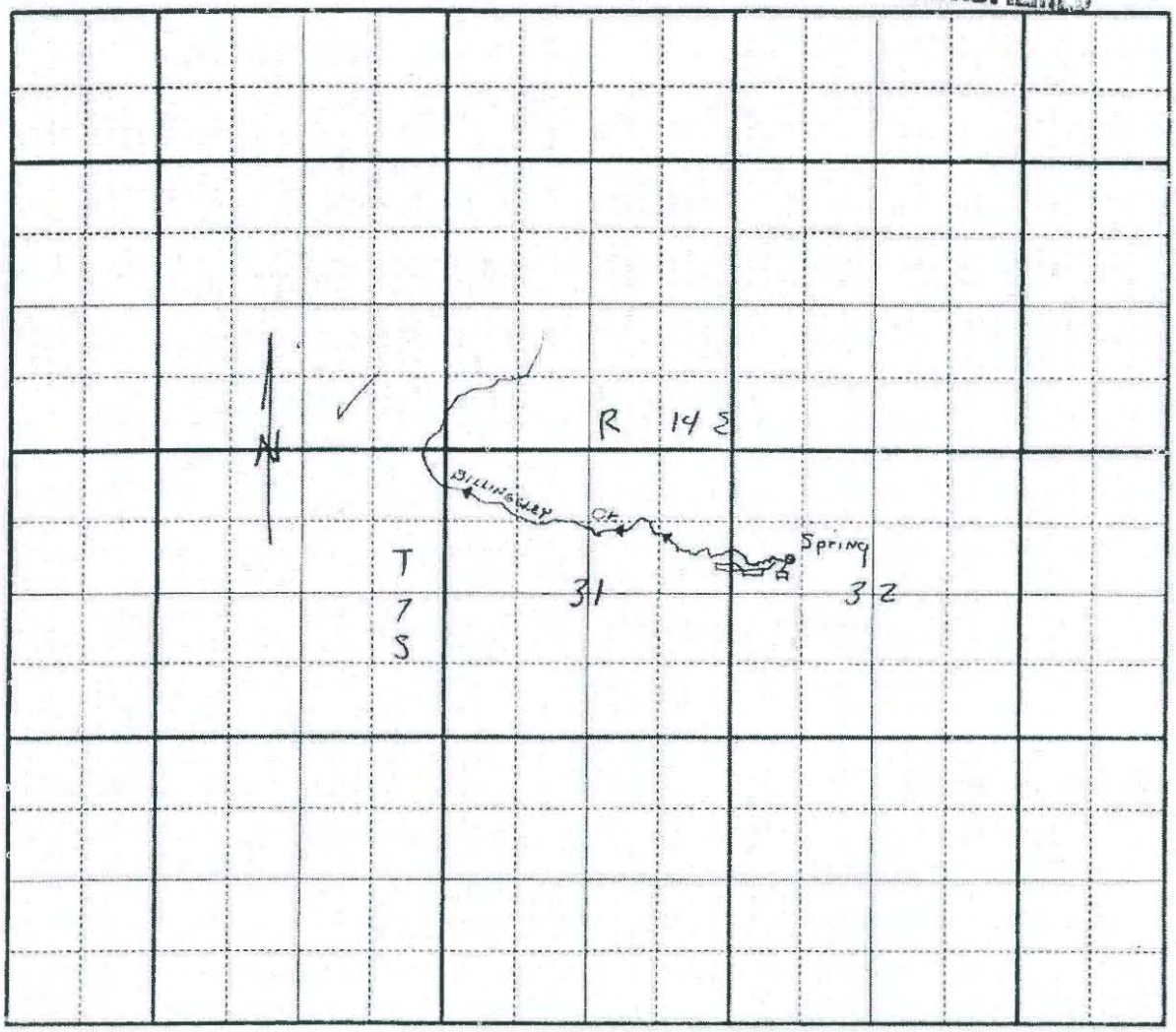


Diagram of System

Facility Volume = (# ponds) (width) (length) (Depth)

(20) 3.5'x105' x 4' = Sec. A

(30) 8'x105' x 4' = Sec. B

(12) 16'x205' x 4' = Sec. C

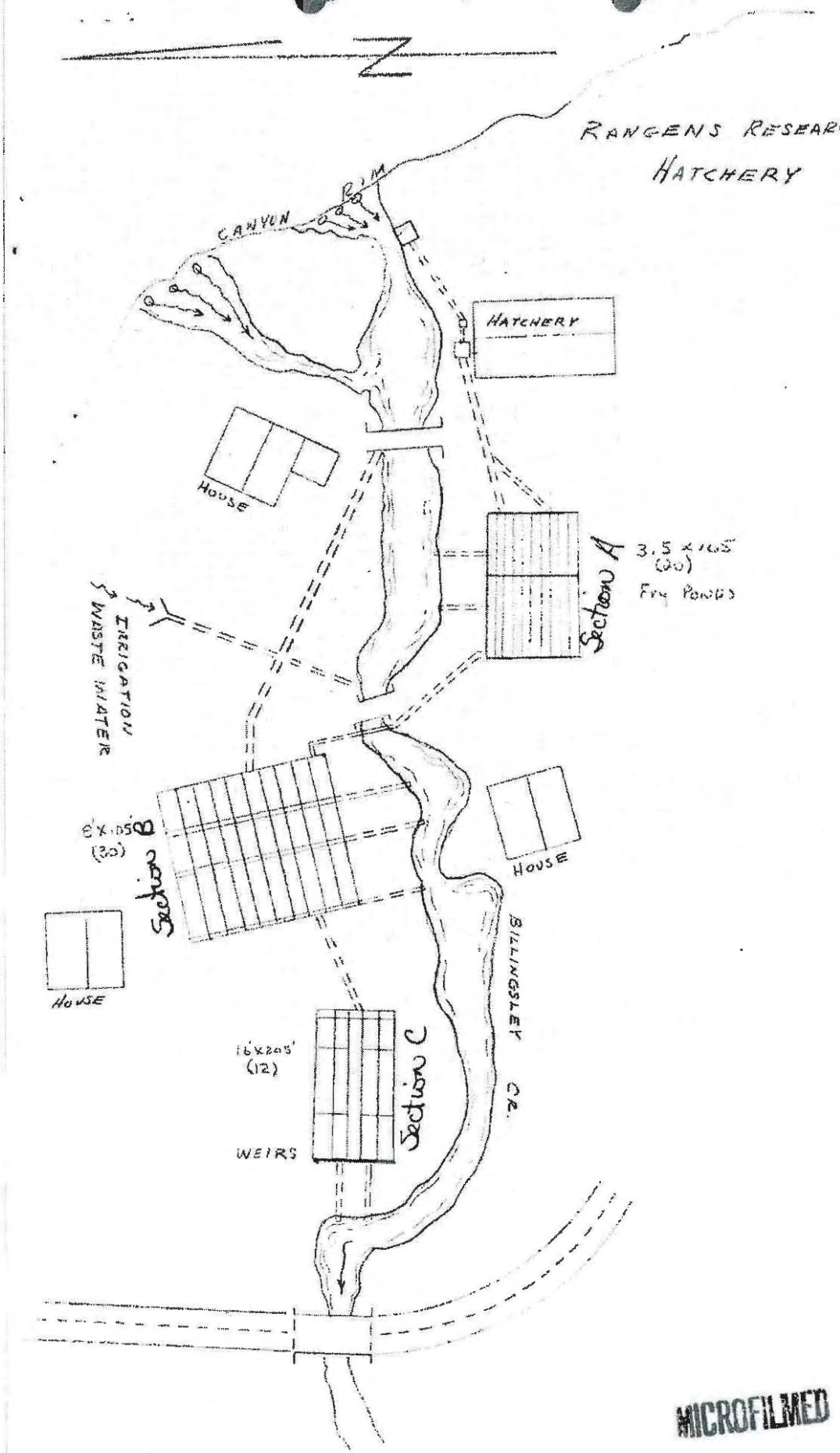
A = 1470' cubic ft. x 20 = 29400

B = 3360'" " x 30 = 100800

C = 13120'" " x 12 = 157440

Facility Volume = 287,640 cubic feet.

(per Jim allow 4' for ~~average~~ depth of ponds - average amt.)



MICROFILMED

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	)	PARTIAL DECREE PURSUANT TO I.R.C.P. 54(b) FOR
Case No. 39576	)	Water Right 36-07694

1997 DEC 30 AM 9:46
DISTRICT COURT - SRBA
TWIN FALLS CO., IDAHO
FILED ... -

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 26.00 CFS

FACILITY VOLUME=287,640 CU. FT.

PRIORITY DATE: 04/12/1977

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
FISH PROPAGATION	01-01 12-31	26.00 CFS

PLACE OF USE:

FISH PROPAGATION	Within GOODING County
T07S R14E S31	SENE
S32	SWNW

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, JR.
PRESIDING JUDGE
Snake River Basin Adjudication

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	)	**ORDER OF PARTIAL DECREE**
	)	
Case No. 39576	)	**For Water Right 36-15501**
	)	

On October 10, 1997, a ***Special Master's Report and Recommendation*** was filed for the above water right. No Challenges were filed to the ***Special Master's Report and Recommendation*** and the time for filing Challenges has now expired.

Pursuant to I.R.C.P. 53(e)(2) and ***SRBA Administrative Order 1***, Section 13f, this court has reviewed the Findings of Fact and Conclusions of Law contained in the ***Special Master's Report*** and wholly adopts them as its own.

Therefore, IT IS ORDERED that water right 36-15501 is hereby **decreed** as set forth in the attached ***Partial Decree Pursuant to I.R.C.P. 54(b)***.

DATED December 29, 1997.

DANIEL C. HURLBUTT, JR.
Presiding Judge
Snake River Basin Adjudication

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	)	PARTIAL DECREE PURSUANT TO
	)	I.R.C.P. 54(b) FOR
Case No. 39576	)	
	)	Water Right 36-15501

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 1.46 CFS

THIS RIGHT AND RIGHT NO. 36-02551 ARE LIMITED TO A TOTAL COMBINED FACILITY VOLUME OF 123,272 CU. FT.

PRIORITY DATE: 07/01/1957

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
FISH PROPAGATION	01-01 12-31	1.46 CFS

PLACE OF USE:

FISH PROPAGATION		Within GOODING County
T07S R14E	S31	SENE
	S32	SWNW

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, SR.
PRESIDING JUDGE
Snake River Basin Adjudication

1997 DEC 29 PM 02:00
DISTRICT COURT - SRBA
TWIN FALLS CO., IDAHO
FILED _____

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)	CERTIFICATE OF MAILING
)	
Case No. 39576)	
)	Water Right(s): 36-15501

CERTIFICATE OF MAILING

I certify that a true and correct copy of the PARTIAL DECREE PURSUANT TO I.R.C.P. 54(b) for WATER RIGHT 36-15501 was mailed on December 29, 1997, with sufficient first-class postage prepaid to the following:

DIRECTOR OF IDWR
PO BOX 83720
BOISE, ID 83720-0098

RANGEN INC
Represented by:
J DEE MAY
PO BOX 1846
TWIN FALLS, ID 83303
Phone: 208-733-7180

DIANA DELANEY
Chief Deputy Clerk

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Boise, ID 83706 - P.O. Box 83720, Boise, ID 83720-0098
Phone: (208) 327-7900 Fax: (208) 327-7866 Web Site: www.idwr.state.id.us

DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

October 31, 2003

J. Dee May
May, Sudweeks & Browning, LLP
516 Second Street East
P. O. Box 1846
Twin Falls, ID 83303

VIA FACSIMILE TO (208) 733-7967 AND FIRST CLASS MAIL

Re: Distribution of Water to Water Rights Nos. 36-02551, 36-07694, and 36-15501

Dear Mr. May:

After reading your letter yesterday, I want to clarify my request for information conveyed by my letter to you dated October 17, 2003. In my letter, I stated that I need additional information as follows:

(1) The amount of water available to supply the listed water rights from the surface water sources from which the right is diverted;

(2) The configuration of diversion works used to divert water under the listed water rights;

(3) The amounts of water being diverted at the present time as well as the amounts of water historically diverted under the listed water rights;

(4) The configuration of water measuring and recording devices used to measure the quantity of water diverted under the listed rights; and

(5) The potential for supplying water to the listed rights by implementing alternate reasonable means of diversion or alternate points of diversion.

It is the responsibility of the Department of Water Resources to gather this information, and I did not necessarily intend for Rangen, Inc. to develop this information. Of course any of this information that Rangen can provide will be helpful.

What I requested of Rangen, Inc. was to: (1) contact Cindy Yenter, the watermaster for Water District No. 130 to arrange for site visits; and (2) provide all historical records of the amounts of water diverted under the listed rights. The purpose of the site visits is to develop the five items of information listed on the previous page. The reason for my request for historical records is that the Department only has records of diversions under the Rangen rights from 1995 through 2002.

If further clarification is needed, please contact me at your earliest convenience.

Sincerely,

Karl J. Dreher
Director

c: Wayne Courtney – Rangen, Inc.
Cindy Yenter – Water District No. 130 Watermaster
Lewis Rounds – Water District No. 120 Watermaster
Frank Irwin – Water District No. 36A Watermaster
Tim Luke – IDWR

May, Sudweeks & Browning, LLP

Attorneys at Law

JAY D. SUDWEEKS, PC
J.DEE MAY, PC
BART D. BROWNING, CHTD.
J. JUSTIN MAY

jdmay@tflaw.com

Twin Falls, Idaho

516 Second Street East
P.O. Box 1846
83303
Telephone (208) 733-7180
Facsimile (208) 733-7967

Reply to Twin Falls Office

Boise, Idaho

1419 W. Washington
P.O. Box 6091
83707
Telephone (208) 429-0905
Facsimile (208) 342-7278

RECEIVED
NOV - 3 2003
Department of Water Resources

October 30, 2003

VIA FACSIMILE
208-327-7866

Mr. Karl Dreher, Director
Idaho Department of Water Resources
1301 North Orchard St.
Boise, ID 83706-2237

RE: Distribution of Water to Water Right Nos. 36-02551, 36-07694, and 36-15501, said Water Rights owned by Rangen, Inc.

Dear Mr. Dreher:

This letter is in response to your October 17, 2003 letter which was received in my office on October 20, 2003. In that letter you indicate that you are initiating a response to our delivery call. In that process you say that you must first make findings that material injury is occurring and also make a determination of reasonableness of water diversions under those listed water rights pursuant to Rule 42 of the Conjunctive Management Rules. You then indicate that you do not have sufficient information to make the findings required by the Conjunctive Management Rules and that you need additional information from us.

It is Rangen's position that the Conjunctive Management Rules were not promulgated with the requisite authority and therefore our call should not be administered under the jurisdiction of those Conjunctive Management Rules. We believe those Rules are unconstitutional both in their creation and in their application by the Department. We therefore believe that much of the information requested by you is irrelevant to administering our call under the constitutional and statutory directives given to you as the Director of the Department of Water Resources. As you know those Rules along with

their promulgation and application among other things are presently in litigation; a case in which we soon hope to be a party.

Be that as it may, on an administrative level (to preserve our rights in that venue) we wish to provide the requested information to you where we feel it is appropriate. You first of all asked for the amount of water available to supply the listed water rights from the surface water sources from which the right is diverted. We do not presently have that information nor do we believe it is the responsibility and burden of the senior water right holder (in this case Rangen, Inc.) to supply a list of the individual water rights that impact Rangen's above-referenced water rights. It is our understanding (based on what you said to me at our last meeting) that you already have compiled such a list and we believe that the burden is the Departments or at the very least would be the burden of the junior water right holder(s) who should be curtailed in order to supply our water rights as appropriated under the Prior Appropriation Doctrine.

You also asked for a configuration of the diversion works used to deliver water under the listed water rights. We are in the process of trying to put together such a configuration. You asked the amounts of water being diverted at the present time as well as amounts of water historically diverted under the water rights listed above. Those records have been kept by Rangen since approximately 1966. We have a summary that has been prepared and are at the present time going through numerous boxes to find the underlying documents (from which the summary was prepared) which we will provide. However, in furnishing those records, we believe that the past records are irrelevant to the present call; Rangen, Inc. is not receiving its full appropriated right as appropriated; the past records would seem inappropriate for any necessary administration based on a present call.

You also asked for a configuration of water measuring and recording devices. We are trying to get that configuration put together and will furnish it to you under the same protest set out in the preceding paragraph.

You have asked what the potential is for supplying water under an alternate reasonable means of diversion or alternate points of diversion. We do have some suggestions that we are compiling at the present which could be used by junior water right holders and when we have fleshed out those alternatives those also will be provided to you.

We would welcome the site visits you suggest which would involve the Department, District 130's Water Master, as well as representatives of Rangen. We will make those arrangements with Cindy Yenter (whom I have recently talked with), the Water Master for Water District 130, in the near future once we have determined our own

schedules. When it is determined when such a site visit could be set up between all participants my secretary, Marilyn, will try and coordinate such site visit(s).

Lastly, you ask that we provide you with historical records as to the amount of water diverted under the Rangen water rights as soon as practicable. Again, we will provide those records but are doing so under protest in that we do not feel that that historical recordation is relevant to the present call made by Rangen. The fact remains that presently Rangen is not receiving its appropriated water and what has happened in the past really has no relevancy or value. It is the present that we are dealing with now and under the present situation Rangen certainly is not receiving its full appropriation as outlined in previous correspondence.

We will try and get the requested information to you as set out above as quickly as possible and appreciate your courtesy in that regard realizing that there are several boxes of materials which must be perused, separated and correlated in order to provide the material in a form that would be understandable to all parties. We thank you for your patience in that regard and will be getting back to you very shortly.

Very truly yours,

MAY, SUDWEEKS & BROWNING, LLP

J. DEE MAY

JDM:mab
cc: Wayne Courtney
Dan Steenson
John Simpson
Jason Miciak

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Boise, ID 83706 - P.O. Box 83720, Boise, ID 83720-0098
Phone: (208) 327-7900 Fax: (208) 327-7866 Web Site: www.idwr.state.id.us

DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

October 17, 2003

J. Dee May
May, Sudweeks & Browning, LLP
516 Second Street East
P. O. Box 1846
Twin Falls, ID 83303

VIA FACSIMILE TO (208) 733-7967 AND FIRST CLASS MAIL

Re: Distribution of Water to Water Rights Nos. 36-02551, 36-07694, and 36-15501

Dear Mr. May:

This is in response to your letter dated October 6, 2003, which was received in my office on October 10, regarding the administration of water rights junior in priority to water rights no. 36-02551 for 48.54 cfs (priority date of July 7, 1962), no. 36-07694 for 26.0 cfs (priority date of April 12, 1977), and no. 36-15501 for 1.46 cfs (priority date of July 1, 1957), used by Rangen, Inc. at its fish propagation facilities. I have been out of town at various meetings and did not see your letter until yesterday, October 16.

The reason I sought additional clarification by my letter dated September 25, 2003, regarding your earlier letter dated September 21, was that in your letter you specifically asked to have "the diversion of water in District 36A" (emphasis added) administered such that Rangen, Inc. "receives its full appropriation of the above-referenced water rights." Because of the specific reference to Water District No. 36A, I did not understand your request to include the clarification provided in your October 6 letter that you had meant for your request to include administration of "all water right diversions junior to ours that are interfering with and impacting our water rights under the water right numbers referenced above."

The spring flow available for water rights nos. 36-02551, 36-07694, and 36-15501, is allocated to the rights in order of priority. To the extent that the more junior right(s) are not receiving the full quantity of water authorized under the right(s), and since there are no surface water rights that are junior in priority to the listed rights that divert from the same sources as the listed rights, your request for water rights administration will be treated as a call for water

delivery under the "Rules for Conjunctive Management of Surface and Ground Water Resources" (IDAPA 37.03.11) ("Conjunctive Management Rules"). The rules are available at the following website:

http://www2.state.id.us/adm/adminrules/rules/idapa37/0311.pdf

These rules prescribe how IDWR is to respond to a call for water delivery made by a holder of a senior priority surface or ground water right. Rules 40 and 30 of the Conjunctive Management Rules prescribe procedures for responding to delivery calls against junior priority ground water rights that are and are not within a water district where ground water regulation is included in the function of such districts, respectively.

With this letter, I am initiating a response to your delivery call as against junior priority ground water rights in Water Districts Nos. 120 and 130, the only water districts over the Eastern Snake River Plain Aquifer (ESPA) upgradient from the Thousand Springs area within which ground water regulation is included. If you wish to have your delivery call applied against junior priority water rights from the ESPA that are not in Water Districts Nos. 120 or 130, you will need to follow the process outlined in Rule 30 of the Conjunctive Management Rules.

In responding to your calls for water delivery under Rule 40 of the Conjunctive Management Rules, I must first make findings that material injury is occurring and determinations of reasonableness of water diversions under the listed water rights, as provided in Rule 42 of the Conjunctive Management Rules. I do not have sufficient information to make the findings required by Rules 40 and 42 of the Conjunctive Management Rules. Therefore, I will need certain additional information as follows:

(1) The amount of water available to supply the listed water rights from the surface water sources from which the right is diverted;

(2) The configuration of diversion works used to divert water under the listed water rights;

(3) The amounts of water being diverted at the present time as well as the amounts of water historically diverted under the listed water rights;

(4) The configuration of water measuring and recording devices used to measure the quantity of water diverted under the listed rights; and

(5) The potential for supplying water to the listed rights by implementing alternate reasonable means of diversion or alternate points of diversion.

Developing the above information will require site visits by the watermaster for Water District No. 36A, the watermaster for Water District No. 130, and at least one or two other employees of IDWR. Please have a representative of Rangen, Inc. contact Cindy Yenter, the

watermaster for Water District No. 130, at the Department's offices in Twin Falls (telephone no. 208-736-3033) as soon as possible to schedule site visits. In addition, please provide me with all historical records of the amounts of water diverted under the listed rights as soon as practicable.

Sincerely,

Karl J. Dreher
Director

c: Cindy Yenter – Water District No. 130 Watermaster
Lewis Rounds – Water District No. 120 Watermaster
Frank Irwin – Water District No. 36A Watermaster
Tim Luke – IDWR
North Snake Ground Water District
Magic Valley Ground Water District
Aberdeen-American Falls Ground Water District
Bingham Ground Water District
Bonneville-Jefferson Ground Water District

DEPARTMENT OF WATER RESOU[illegible]

FIELD REPORT

LYN BADING 837 6191

1. Name of permit holder Ranger, Inc.

Post office address Bucl, Box 706 Phone 543-6421

Person to contact _____ Phone _____

2. Source of water supply: Groundwater ☐ Surface water ☒ underground springs (name spring, stream, etc.)

Tributary to Billingsley Creek

3. Water will be used for the following purposes:

Amount 26.00 (permit) c.f.s. for fish propagation
_____ AF/Annum (nature of use)

Period of Use: from Jan. 1 to Dec. 31
(mo.-day) inclusive (mo.-day)

Amount 42.38 (proof) c.f.s. for _____
_____ AF/Annum (nature of use)

Period of Use: from _____ to _____
(mo.-day) inclusive (mo.-day)

Amount _____ c.f.s. for _____
_____ AF/Annum (nature of use)

Period of Use: from _____ to _____
(mo.-day) inclusive (mo.-day)

Other uses: _____

Permit No. 36-7694

Examination for b/u

4. Total amount to be appropriated:

Max Rate of Diversion 26 cubic feet per second and annual volume _____ AF/Annum.

5. Location of Point(s) of Diversion:

Township 2S N/S, Range 14E E/W, B.M., Section 32, Subdivision SW ¼ NW ¼ Gooding County

Township _____ N/S, Range _____ E/W, B.M., Section _____, Subdivision _____ ¼ _____ ¼, _____ County

Township _____ N/S, Range _____ E/W, B.M., Section _____, Subdivision _____ ¼ _____ ¼, _____ County

Other Points of Diversions: _____

Description of diverting works: Spring flowing out of Canyon wall thru fish hatchery into Billingsley Creek.

Measuring device required: yes ☒ no ☐

6. Lands to be irrigated or place of use.

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
2S	14E	31				X													
		32							X										

MICROFILMED

TOTAL ACREAGE _____

MICROFILMED

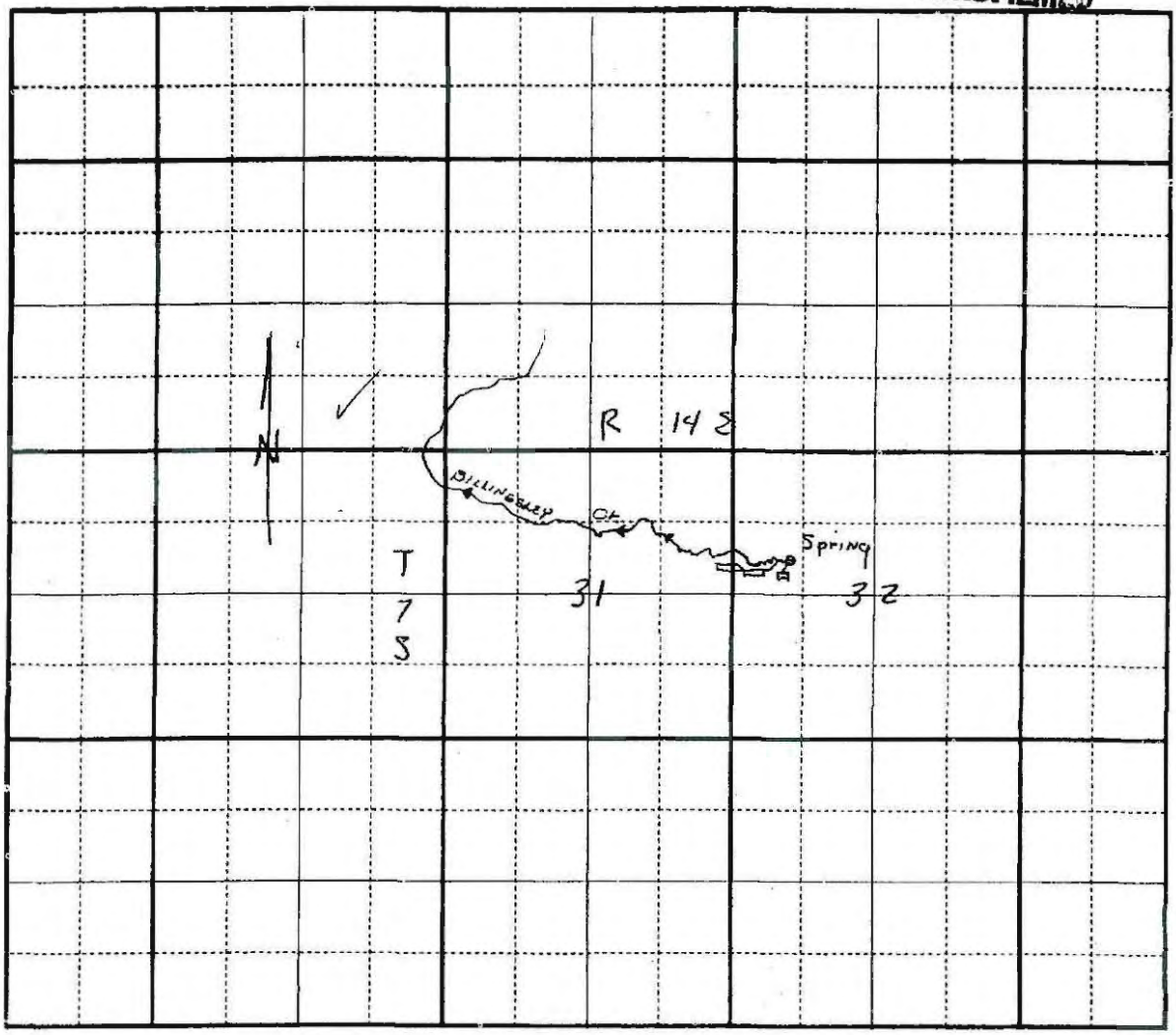


Diagram of System

Facility Volume = (# ponds) (width) (length) (Depth)

(20) 3.5' x 105' x 4' = Sec. A

(30) 8' x 105' x 4' = Sec. B

(12) 16' x 205' x 4' = Sec. C

A = 1470' cubic ft. x 20 = 29400

B = 3360' " " x 30 = 100800

C = 13120' " " x 12 = 157440

Facility Volume = 287,640 cubic feet

(per Jim allow 4' for ~~average~~ depth of ponds - average amt.)

DATE OF EXAM Jan 12, 1979

ACREAGE
Found ✓
Recommended ✓

Irrigation Requirement ✓ Ac Ft/Ac

USE
Irrigation Q=_____c.f.s. V=_____ AF/Ann. from _____ to _____
Domestic Q=_____c.f.s. V=_____ AF/Ann. from _____ to _____
Livestock Q=_____c.f.s. V=_____ AF/Ann. from _____ to _____
Fish Propagation Q= 26.0 CFS ✓ from Jan 1 ✓ to Dec 31 ✓
allow 26.0 cfs w/condition limiting capacity to 76.0 when combined w/36-2551.

Is water co-mingled? yes_____ no ✓

Name source: _____
twp._____N/S, Rge_____E/W, B.M., Sec._____, Sub._____¼_____¼_____ County

Exchange? yes_____ no ✓

Name source exchanged with: _____
twp._____N/S, Rge_____E/W, B.M., Sec._____, Sub._____¼_____¼_____ County

Point of injection:
twp._____N/S, Rge_____E/W, B.M., Sec._____, Sub._____¼_____¼_____ County

Point of exchange:
twp._____N/S, Rge_____E/W, B.M., Sec._____, Sub._____¼_____¼_____ County

Total Q measured See Remarks Method of measurement WEIRS

Total Q recommended 76.0 ~~50.22~~ 26.0 CFS Meter No. ✓ Type ✓ Condition ✓

Total V recommended N/A.

Recommend using capacity of 76.0 cfs as estimated by Watermas in 10/72 since flow of springs Fluctuates So much.

Recommended Amendments:

P.D. _____
Place of Use _____
Other _____
None ✓

remeasurement 10/12/79 - 50.22 cfs capacity

MEASUREMENT CALCULATION: see
MEASURED 24.95 CFS. of STANDARD CONTRACTS RECTANGULAR WEIR

ALLOWED 26.0 C.F.S. Records show water has been diverted in the Past For More ~~Than~~ Than Applyed For Max Meas - 73.73 CFS. WATERMASTER MEAS. See Discharge Notes

SYSTEM DESCRIPTION:
THE SPRING WATER IS collected IN STEEL COLVERTS AND CONVEYED TO THE CONCRETE RACE WAYS THEN DISCHARGED INTO BILLINGSLEY CR.

REMARKS:
MEASUREMENTS WERE MADE AT LOW FLOW OF THE YEAR FOR THE SPRING. ENCLOSED ARE COPYS OF SPRING FLOWS FOR SEVERAL PAST YEARS. From WATERMaster Geo. Lemon LYN BABINGTON WAS PRESENT DURING THE EXAM.

Examiner's Signature Gary Funderburg Date 2-15-79
Checked by Allen Merritt Date 2-23-79
Approved by Ray Walker Date 8-14-85

MICROFILMED

Overlap Review for 36-7694

per permit: 36-2551

per ~~te~~minal 8/14/85:

p/d - 36-2551 same system
36-0135 Curran Tunnel/Spring
36-0134 Curran Tunnel/Spring

p/u - (sec. 31) - ~~36-2551~~
~~36-0135~~
~~36-0134~~
(sec. 32) ~~36-2551~~
~~36-0135~~
~~36-0134~~
} all above

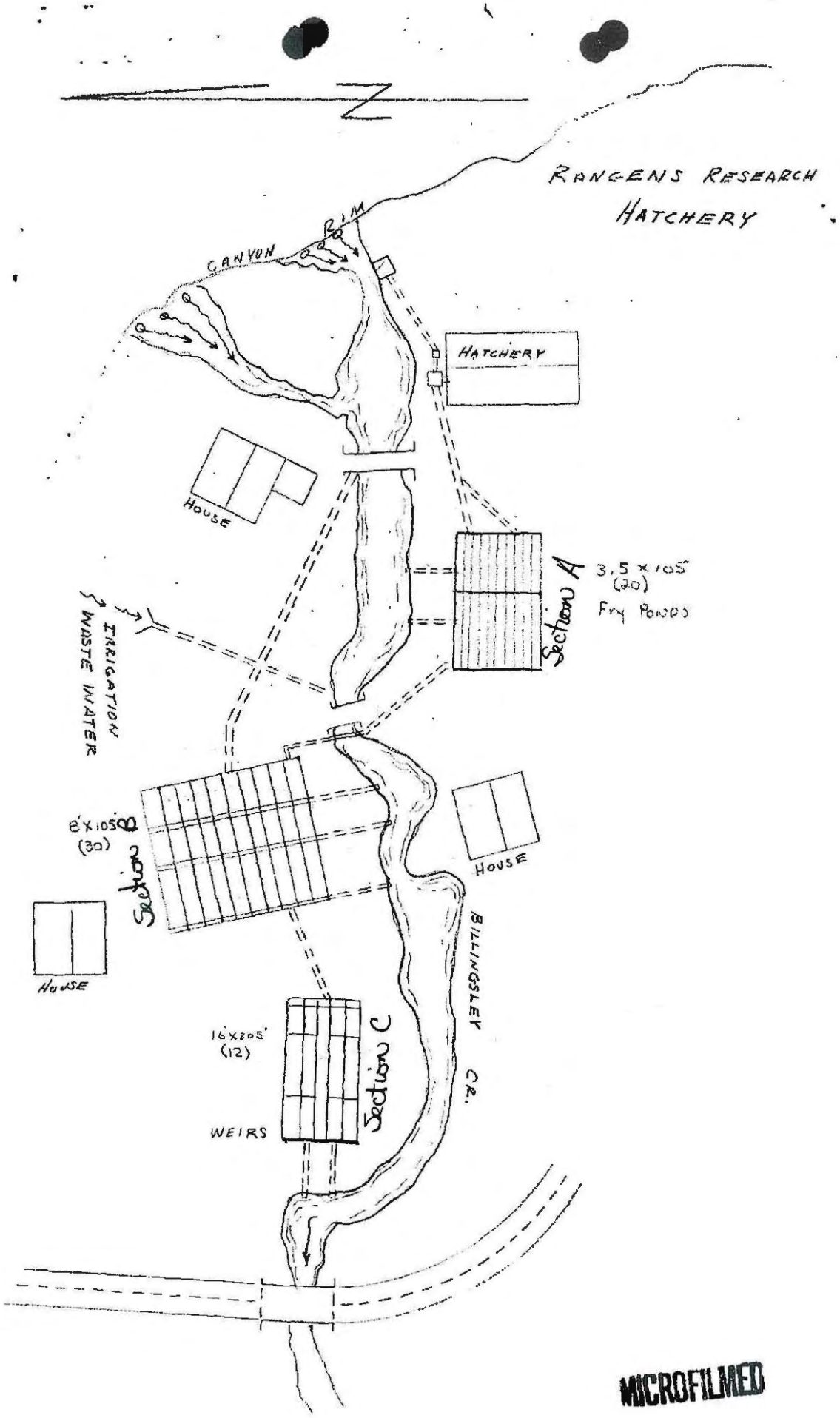
36-8048 - also being licensed for irrigation use only from g.w. source - no overlap.

36-2551 - same right holder, same source, same system - 50.0 cfs - see copy attached - same p/u

36-0134 & 36-0135 - Curran Tunnel or Curran Spring - irrig. uses - no overlap

kw

MICROFILMED



MICROFILMED

STANDARD CONTRACTED RECTANGULAR WEIR.

COMPUTED FROM FORMULA $Q = 3.33(L - 0.2H)H^{3/2}$.

SIZE OF CONCRETE RACEWAYS

(20) 3.5' x 105' ←
(30) 8' x 105'
(12) 16' x 205'

WEIRS are located AT THE END OF THE LOWER RACEWAYS

1. - 0.16	4.833'	RECT. WEIR	CONTRACTED	= 1.02
2. - 0.16	4.833'	RECT. WEIR	CONTRACTED	= 1.02
3. - 0.16	4.833'	RECT. WEIR	CONTRACTED	= 1.02
4. - 0.21	4.833	RECT. WEIR	CONTRACTED	= 1.54
5. - 0.21	4.833	RECT. WEIR	CONTRACTED	= 1.54
6. - 0.20	4.833	RECT. WEIR	CONTRACTED	= 1.43
7. - 0.36	"	RECT. WEIR	"	= 3.42
8. - 0.36	"	RECT. WEIR	"	= 3.42
9. - 0.32	"	RECT. WEIR	"	= 2.87
10. - 0.16	"	RECT. WEIR	"	= 1.02
11. - 0.16	"	RECT. WEIR	"	= 1.02
12. - 0.17	"	RECT. WEIR	"	= 1.12
13. - 0.21	"	RECT. WEIR	"	= 1.54
14. - 0.21	"	RECT. WEIR	"	= 1.54
15. - .20	"	RECT. WEIR	"	= 1.43
			TOTAL	24.95 C.F.S.

MEAS: JAN 12, 1979

RACEWAYS ARE VACUUMED OUT AT TIMES

see remeasurement of 10/12/79 -

MICROFILMED

START 1:00 P.M. 1:290 63

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

10-12, 1979 DISCHARGE MEASUREMENT NOTES

Billingsley Cr. River at RANGEN HATCHERY

Station	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
EW 0.0		.25									
0.5		.5	1.8		52	55			2.08	0.9	1.87 ✓
1.0	T	.75	3.1		69	40			3.27	2.32	
	B		3.1		46	40		3.15	2.53	2.35	7.33 ✓
2.0	T	1.0	3.3		62	40			3.39	—	
	B		3.3		60	40		3.34	3.29	3.3	11.02 ✓
3.0	T	1.0	3.2		60	40			3.29		
	B		3.2		53	40		3.10	2.91	3.2	9.92 ✓
4.0	T	1.0	2.9		57	40			3.12		
	B		2.9		54	40		3.04	2.96	2.9	8.82 ✓
5.0	T	1.0	2.6		57	40			3.12		
	B		2.6		46	40		2.83	2.53	2.9	7.36 ✓
6.0		.625	2.0		57	40			3.12	1.25	3.90 ✓
EW 6.25		.125									
											✓
											50.22
Stop				1:33 PM.						Total	

$\left(\frac{R}{T} \times 2.170 + .030 = FPS\right)$

LOREN Holmes - MEASURED

Gary Funderburg - Kept Notes

MICROFILMED

of Sheets. Comp. by Chk by ADM

YEAR	Jan.	Feb.	Mar.	APR.	May	June	July	Aug	Sep.	Oct.	Nov.	Dec.	
1966	52.15	45.23	44.94	(38.47)	(34.20)	45.41	51.30	(53.20)	62.42	69.69	58.58	49.23	Lemmons C.F.S. measurem
1967	43.93	39.25	33.36	36.60	37.61	47.40	(49.00)	52.91	58.93	69.39	67.35	64.31	Reagan Watchman
1968	52.81	45.78	41.22	35.47	36.83	45.04	50.47	52.96	68.22	68.24	65.46	(63.17)	
1969	50.77	43.38	38.19	33.42	34.32	45.52	49.55	58.54	65.87	66.90	64.72	57.19	
1970	49.75	42.71	41.95	34.73	34.51	42.53	50.27	59.43	65.99	(69.27)	(63.32)	(60.00)	Circled Numbers are est.
1971	(50.21)	(41.17)	(39.06)	37.16	40.51	43.41	(51.01)	60.46	64.81	73.73	70.22	63.36	
1972	55.08	48.10	42.75	40.57	45.93	58.10	60.98	67.31	73.91	(76.12)	68.18	66.71	
1973	57.87	49.12	46.24	37.55	39.58	(42.07)	53.08	(55.07)	57.75	(65.76)	(61.60)	(53.27)	
1974	44.09	46.47	(41.07)	35.77	34.39	(43.44)	47.06	55.01	(59.16)	69.64	(62.76)	(57.96)	
1975	(42.97)	(39.87)	(32.76)	(33.47)	37.33	39.49	45.23	51.87	(55.56)	57.85	(56.20)	58.34	
1976	49.97	(44.27)	41.13	(33.11)	35.86	(38.02)	39.53	(47.24)	56.37	61.58	(58.74)	52.99	
1977	47.09	39.51	37.70	35.22	32.61	36.96	34.89	33.97	37.85	38.66	42.38	37.55	
1978	32.13 1/15 34.14	29.42 1/15	30.08	28.33	27.59	27.34 1/15	27.85 1/25	33.59 1/01	49.86 10/25	42.82 10/25	40.27 12/19	36.5	
1979	34.36 1/15	29.26 1/15											

measurements by George Lemmons (watermaster)

Gary: Hope this will help you. The circled Figures are estimates and not actual measurements

Jim

MICROFILMED

Rangen Inc.
P.O. BOX 706 • 115 13 AVE. SO. • BUHL, IDAHO 83316 • (208) 543-6421

RANGEN RESEARCH STATION
TROUT AND SALMON DIETS • LIVE TROUT • FISH PATHOLOGY •
DISEASE CERTIFICATION • CONTRACT RESEARCH AND DEVELOPMENT
TELEPHONE (208) 837-6192 LABORATORY
(208) 837-6191 HATCHERY

RECEIVED
DEC 18 1978
Department of Water Resources

December 14, 1978

Re: Permit No. 36-7694

State of Idaho
Department of Water Resources
Statehouse Boise, Idaho

Gentlemen:

Recently Gary Funderburg, senior water resource agent southern region, made a field examination of our water system so that our license could be issued. At this time he noted that we did not have a measuring device at the inlet. With the terrain and collection system of the water it is not feasible to have a measuring device at the inlet.

All the water is run thru asteel or concrete pipes and concrete ponds and thru a measuring device at the outlet. I would like to request that the measuring device at the inlet be waivered. If this is possible please contact me, and Gary in the Twin Falls office.

Sincerely

Lynn Babington, Manager
Rangen research hatchery

I. COMMODITIES DIVISION: GRAINS • SEEDS • BEANS II. FERTILIZER DIVISION: CHEMICALS • CUSTOM APPLICATION • SPRAYING • SOIL TESTING • MICRONUTRIENTS • FLUID FEED • LIQUID & DRY FERTILIZERS • AERIAL APPLICATION III. FISHERIES DIVISION: TROUT FEED • LIVE TROUT • FISH DISEASE RESEARCH AND PATHOLOGY LABORATORY IV. GENERAL FEEDS DIVISION: CUSTOM STEAM ROLLING • GRINDING • MOLASSIFYING • PELLETING • BLOCKING • BULK FEED DELIVERY V. TRUCK BROKERAGE & COMMODITY TRADING DIVISION VI. TRUCK & EQUIPMENT DIVISION: RANGEN GMC TRUCKS, INC. • PARTS & SERVICE • COMPLETE DIESEL & AUTOMOTIVE REPAIR • CUMMINS • CATERPILLAR • DETROIT DIESEL • ALLISON • TRUCK BODIES & EQUIPMENT VII. TRUCKING DIVISION: RANGEN TRANSPORTATION, INC.

MICROFILMED

Form No. 42-217
1-18-1978

Rita

Identification No. _____

Permit No. _____

RECEIVED
JUN 7 1978
Department of Water Resources

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

PROOF OF APPLICATION OF WATER TO BENEFICIAL USE

1. a) Name of Permit Holder Rangen Inc.

   b) Post Office Address P.O. Box 706 Buhl Idaho

2. Permit Number 36-7694

3. Date of Priority that you are prepared to establish ~~XXXXXXXXXXX~~ April 12, 1977

4. a) Source from which water was appropriated Billingsley Creek (head) Curran Tunnel

   b) Location of the point of diversion: Sw ¼ Nw ¼, Section 32

   Township 7 S, Range 14 E Boise Meridian, Other points of diversion: _____

5. a) The amount of water and use to which the water has been applied:

   Amount 42.38 Total spring flow (cfs and/or acre-feet per annum) for fish propagation purposes from Jan. 1 (Month-Day) to Dec.31 (Month-Day) incl.

   Amount _____ (cfs and/or acre-feet per annum) for _____ purposes from _____ (Month-Day) to _____ (Month-Day) incl.

   Amount _____ (cfs and/or acre-feet per annum) for _____ purposes from _____ (Month-Day) to _____ (Month-Day) incl.

   b) Total amount appropriated 42.38 (total spring flow) cfs and/or acre-feet per annum

   c) Describe how and by whom measurement of rate of flow or amount of storage was made and the qualifications of the person making the measurement: Monthly flow measurements by George Lemmon water master (Hagerman)

6. If the means of diversion and conveyance are owned by someone other than the Permit Holder:

   a) Give the name or description of the canal, ditch or other works by which the water is conducted to the place of use:

   b) Describe the agreement or understanding by which you take water from the works:

7. a) Briefly describe the works for diverting and conveying the water to the place of use, (if from a subterranean source, give the pump size, motor size, size of well casing, depth of well; if from surface water, give brief description of diversion structure and/or canal or ditch) Spring flowing out of canyon wall thru fish hatchery into Billingsley Creek

   b) Describe the type and size of measuring device which you have installed at your point of diversion: Twelve (12) cement and wood structures with 58 inch wide openings

   c) Give well driller's name and address and the date the well was completed:

8. If for other than irrigation, describe the beneficial use to which you have applied the water and the place of use: Beneficial use of water for the propagation of fish

   SE ¼ SW of NE ¼ NW of Section 31 32 Township 7S Range 14E B.M.

Exam typed 8/4/78

MICROFILMED

9. *Irrigation uses:* describe the lands irrigated by giving the acreages irrigated within each 40 acre subdivision: _____

T	R	SEC.	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Total number of acres irrigated _____

10. Remarks: Supplement to water permit No. 30654, Dated July 31, 1962 to include total spring flow for beneficial use of fish propagation.

The above information is a true statement of the extent to which the above numbered permit has been developed.

6-6-78
(Date)

Ranson Inc
Shirley Ranson
(Signature)

State of Idaho)
) ss.
County of Twin Falls)

On this 6th day of June, 19 78, personally appeared before me the signer(s) of the above instrument, who duly acknowledged to me that he ~~(she)~~ ~~(they)~~ executed the same.

Notary Public residing at Buhl, Idaho

My commission expires Lifetime

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	)	PARTIAL DECREE PURSUANT TO I.R.C.P. 54(b) FOR
Case No. 39576	)	Water Right 36-07694
	)	

1997 DEC 30 AM 9:46
DISTRICT COURT - SRBA
TWIN FALLS CO., IDAHO
FILED

NAME & ADDRESS: RANGEN INC
PO BOX 706
BUHL ID 83316

SOURCE: MARTIN-CURREN TUNNEL TRIBUTARY: BILLINGSLEY CREEK

QUANTITY: 26.00 CFS

FACILITY VOLUME=287,640 CU. FT.

PRIORITY DATE: 04/12/1977

POINT OF DIVERSION: T07S R14E S32 SESWNW Within GOODING County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
FISH PROPAGATION	01-01 12-31	26.00 CFS

PLACE OF USE:

FISH PROPAGATION	Within GOODING County
T07S R14E S31	SENE
S32	SWNW

RULE 54(b) CERTIFICATE

With respect to the issues determined by the above judgment or order, it is hereby CERTIFIED, in accordance with Rule 54(b), I.R.C.P., that the court has determined that there is no just reason for delay of the entry of a final judgment and that the court has and does hereby direct that the above judgment or order shall be a final judgment upon which execution may issue and an appeal may be taken as provided by the Idaho Appellate Rules.

DANIEL C. HURLBUTT, JR.
PRESIDING JUDGE
Snake River Basin Adjudication

MICROFILMED DEC-17-1997
JAN 12 2004

This Right has been Decreed in the SRBA.

State of Idaho

Department of Water Resources

WATER RIGHT LICENSE

License of Water Right No. 36-7694 Priority April 12, 1977 Amount 26.0 cfs

THIS IS TO CERTIFY, that Rangen, Inc.

of Buhl, Idaho, has complied with the terms and conditions of Permit No. 36-7694 issued pursuant to Application for Permit dated April 12, 1977, and has submitted proof to the Department of Water Resources on June 7, 1978, that he has applied water to a beneficial use; an examination by the Department indicates that the works have a capacity for the diversion of 76.0 cfs of water from springs, tributary to Billingsley Creek, and that the permit holder has applied to a beneficial use and established a right to use water as follows:

Beneficial Use	Period of Use		Rate of Diversion	Annual Volume
Fish Propagation	from January 1	to December 31	at 26.0 cfs	and N/A
	from	to	at cfs	and
	from	to	at cfs	and

(both dates inclusive)

Subject, however, to the condition that no more than 26.0 cfs of water be diverted at any one time, and that the amount of water so diverted and to which such right is entitled and confirmed is for the purpose aforementioned and is limited to the amount which can actually be beneficially used and shall not exceed N/A acre feet per year, said waters to be diverted within the SW¼NW¼ Section 32, Twp 7S, Rge 14E in the County of Gooding

Description and location of place of use:

Twp.	Range	Sec.	NE¼				NW¼				SW¼				SE¼				Totals
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
7S	14E	31				X													
		32							X										

Total number of acres irrigated _____

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CONDITIONS OF APPROVAL

a. Modifications to or variance from this license must be made within the limits of Section 42-222, **Idaho Code,** or the applicable Idaho Law. This right may be forfeited by five years of non-use.

b. The right to the use of the water hereby confirmed is restricted and appurtenant to lands or place of use herein described, and is subject to all prior water rights, as provided by the laws of Idaho.

c. Any water right confirmed in this license for hydropower purposes shall be junior and subordinate to all rights to the use of water, other than hydropower, within the State of Idaho that are initiated later in time than the priority of this license and shall not give rise to any right or claim against any future rights to the use of water other than hydropower, within the State of Idaho initiated later in time than the priority of this license.

Facility Volume = 287,640 cubic feet

A measuring device of a type approved by this Department shall be maintained on the outlet works.

This right when combined with Rt. 36-2551 shall not exceed 76.0 cfs.

Source known locally as Curran Tunnel.

Use of water under this right is subject to policies set forth in the State of Idaho Water Plan, including Policy No. 32F.

Witness the seal and signature of the Director, affixed at Boise, Idaho, this 19TH day of September, 19 85.

Acting for the Director

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE

STATE OF IDAHO

IN THE MATTER OF REMOVAL OF THE MEASURING DEVICE REQUIREMENT FOR PERMIT NO. 36-7694 IN THE NAME OF RANGEN, INC.	ORDER

WHEREAS, on April 12, 1977, Rangen, Inc. applied to the Department of Water Resources for a permit to appropriate 26.00 cubic feet per second from underground springs to be diverted within the SW¼NW¼, Sec. 32, Twp. 7S, Rge. 14E, B.M., Gooding County, to be used for fish propagation; and,

WHEREAS, on June 29, 1977, the Department approved said application and issued Permit No. 36-7694 with the condition that proof of construction of works and application of water to beneficial use be submitted to the Department on or before July 1, 1978, and that a measuring device of a type approved by the Department be permanently installed and maintained as part of the diverting works; and,

WHEREAS, on June 7, 1978, the Department received proof of beneficial use; and,

WHEREAS, on December 18, 1978, the Department received a request from the permit holder for the removal of the measuring device requirement at the inlet works; and,

WHEREAS, it has been determined by the Department that the permit holder has shown just cause to remove the measuring device requirement at the inlet works;

IT IS, THEREFORE, HEREBY ORDERED that the condition of approval of Permit No. 36-7694 that a measuring device be installed at the inlet works is REMOVED. The permit holder should be aware, however, that the Department will require a measuring device to be installed and maintained at the outlet works.

Dated this 4th day of January, 1979.

L. Glen Saxton

L. GLEN SAXTON

Chief, Operations Bureau

MICROFILMED

Identification No. _____

Application No. 36-7694

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT APPROVED

To Appropriate the Public Waters of the State of Idaho

(TYPE OR PRINT IN INK)

1. Name of applicant Rangen, Inc. Phone: 543-6421

   post office address Buhl, ID

2. Source of water supply underground springs (CURRAN TUNNEL) which is a tributary of Billingsley Creek

3. a. Location of point of diversion is SW ¼ of NW ¼ of Section 32 Township 7S

   Range 14E B.M. Gooding County; additional points of diversion if any: _____

   b. If water is not consumed, it will be discharged into _____ at a point in _____ ¼

   of _____ ¼ of Section _____ Township _____ Range _____ B.M. _____

4. Water will be used for the following purposes:

   Amount 26.00 (cfs or acre-feet per annum) for fish propagation purpose from Jan. 1 to Dec. 31 (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purpose from _____ to _____ (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purpose from _____ to _____ (both dates inclusive)

5. Total quantity to be appropriated:

   a. 26.00 cubic feet per second and/or

   b. _____ acre feet per annum.

6. Proposed diverting works:

   a. Description of ditches, flumes, pumps, headgates, etc. Spring flowing out of Canyon wall thru fish hatchery into Billingsley Creek.

   b. Height of storage dam _____ feet, active reservoir capacity _____ acre feet; total reservoir capacity _____ acre feet, materials used in storage dam: _____

   Period of year during which storage will occur _____ (Mo. Day) to _____ (Mo. Day) inclusive.

   c. Proposed well diameter is _____ inches; proposed depth of well is _____ feet.

7. a. Time required for the completion of the works and application of the water to the proposed beneficial use is 1 years.

   b. Estimated construction cost is $ _____.

8. Description of proposed uses:

   a. If water is **not** for irrigation:

   (1) Give the place of use of water: SE/SW ¼ of NE/NW ¼ of Section 31/32 Township 7S

   Range 14E B.M.

   (2) Amount of power to be generated: _____ hp under _____ feet of head.

   (3) List number of each kind of livestock to be watered _____

   (4) Name of municipality to be served _____, or number of families to be supplied with domestic water _____.

   (5) If water is to be used for other purposes describe: _____

b. If water is for irrigation, indicate acreage in each subdivision in the tabulation below:

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Total number of acres to be irrigated _____

c. Describe any other water rights used for the same purposes as described above.

Supplemental water to License No. 30654/36-2551

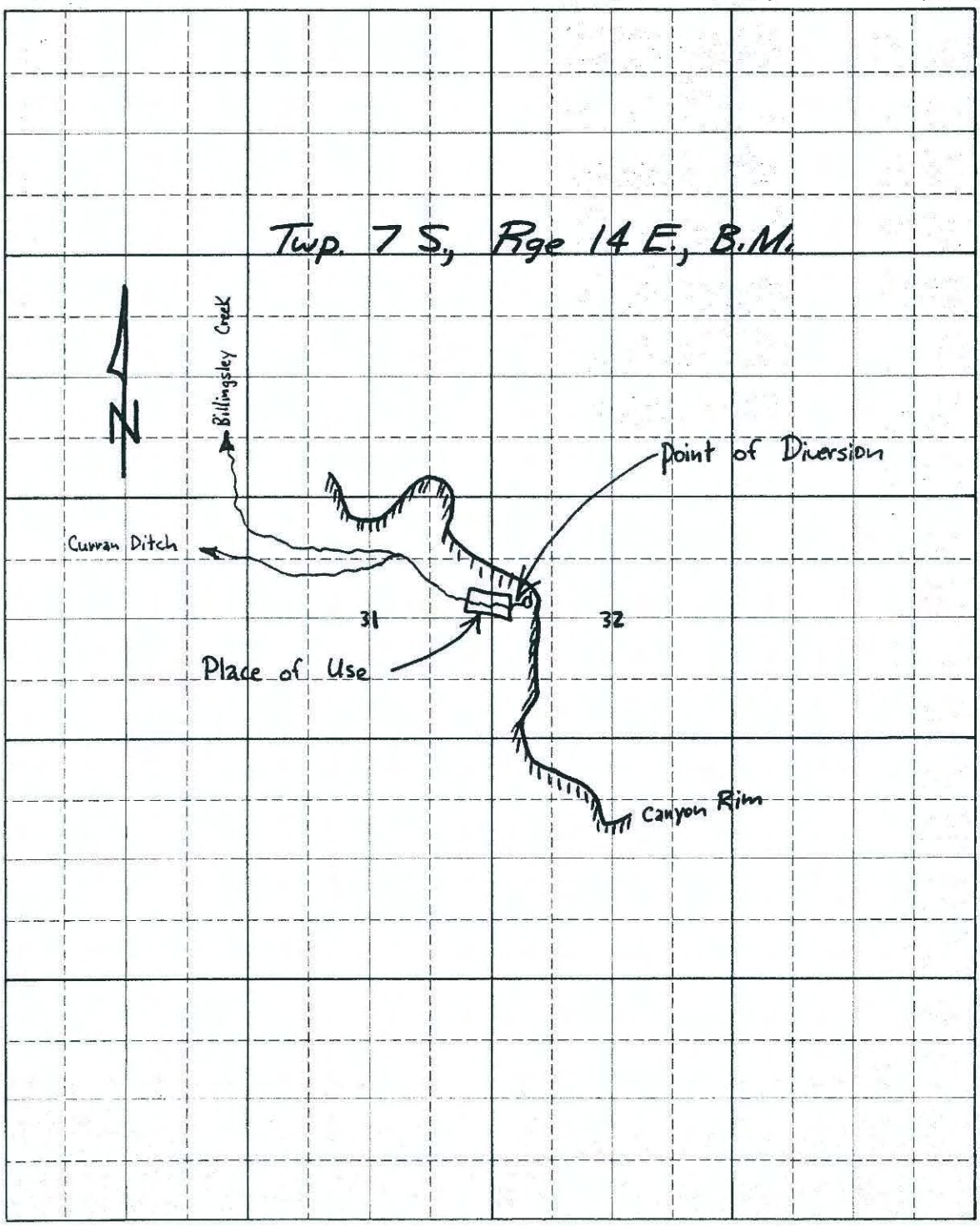
9. a. Who owns the property at the point of diversion Applicant

b. Who owns the land to be irrigated or place of use Applicant

c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing

10. Remarks

11. Map of proposed project: show clearly the proposed point of diversion, place of use, section number, township and range number.



Scale: 2 inches equal 1 mile

BE IT KNOWN that the undersigned hereby makes application for permit to appropriate the public waters of the State of Idaho as herein set forth.

(Applicant)

Proposed Priority 4/12/77

Received by MS Date 4-12-77 Time 8:00 A.M.

Preliminary check by ADM Fee $ 245.00 Rec'd. # 3427

Receipted by AB Date 4/12/77

Publication prepared by AB Date 4/12/77

Published in Gooding City Ltr

Publication dates 4/21 & 4/28/77

Publication approved _____ Date _____

Priority reduced to _____ Reason _____

Protests filed by: _____

Copies of protests forwarded by _____

Hearing held by _____ Date _____

Recommended for (approval) denial by MS

ACTION OF THE DIRECTOR, DEPARTMENT OF WATER RESOURCES

This is to certify that I have examined Application for Permit to appropriate the public waters of the State of Idaho No. 36-7694, and said application is hereby APPROVED.

1. Approval of said application is subject to the following limitations and conditions:

   a. SUBJECT TO ALL PRIOR WATER RIGHTS.

   b. Proof of construction of works and application of water to beneficial use shall be submitted on or before July 1, 1978.

   c. Other: A measuring device of a type approved by the Director shall be permanently installed and maintained as part of the diverting works.

   That should the use of the water on this permit reduce the quality of water available to prior water rights and make it unusable to satisfy the prior appropriations, then the diversion under this permit must cease.

   Return water shall be treated to insure that the effluent meets intrastate stream water quality standards.

Witness my hand this 29 day of June 1977.

Deputy Director

AFFIDAVIT of PUBLICATION

te of Idaho, }
inty of Gooding } SS.

Kim R. Crompton, being first duly sworn, oses and says that he is the printer (publisher) of the Gooding inty Leader, a newspaper published every week in Gooding, County Gooding, State of Idaho, that said newspaper has been continuous- and uninterruptedly published for a period of seventy-eight consecu- weeks prior to the first publication of the annexed notice, and is ewspaper qualified to publish legal notices as provided by act of 1919 session of the legislature of the State of Idaho, known as ise Bill 145; that the annexed advertisement was published once h week for 2 consecutive issues in said newspaper per and not in a supplement; that the date of the first publication said advertisement was on the 21 day of April 77, and the date of the last publication was on the 28 of April, 19 77.

Kim R. Crompton

Subscribed and sworn to before me this 28 of April, 1977.

EAL)

Carmen Ulrich
NOTARY PUBLIC

GOODING COUNTY LEADER
Gooding, Idaho

COST OF PUBLICATION

iber of Lines in Notice	36	36
nber of Insertions	2	2
Lines tabular at 315c		
36 Lines straight at 36 21c		7.56
36 Subsequent lines at 36 15c		5.40
TOTAL COST		12.96

COPY OF NOTICE

(Paste Here)

NOTICE OF APPLICATION FOR WATER PERMIT

Notice is hereby given that Rangen, Inc. Buhl, Id., 83316 has on 4/12/77 submitted Application No. 36-7694 for a permit to appropriate 26.00 cubic feet per second of water from Curran Tunnel, tributary of Billingsley Creek by means of spring flowing out of Canyon wall thru fish hatchery into Billingsley Cr. within the SW¼NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M., Gooding County to be used from Jan. 1 to Dec. 31 for fish propagation within the SE¼NE¼, Sec. 31; SW¼NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M.

If issued, this permit will be subject to all prior water rights. Protests against the granting of the permit must be filed with the Idaho Department of Water Resources, 1041 Blue Lakes Blvd., North, Twin Falls, Idaho, 83301 on or before May 9, 1977.

Director
Pub: 4-21, 28

OK/SB 5/4/77

RECEIVED
MAY 3 1977
Department of Water Resources
Southern District Office

PUBLICATION RATES
(Idaho Code, Rev. Statutes 1971)

7 pt. per line, straight	21c
7 pt. per line, tabular	315c
7 pt. per line, successive insertions	15c

19475

No. 1195

This Right has been Decreed in the SRBA.

MICROFILMED
JAN 12 2004

State of Idaho
DEPARTMENT OF WATER RESOURCES
STATE OFFICE, 450 W. State Street, Boise, Idaho

JOHN V. EVANS
Governor

A. KENNETH DUNN
Director

Mailing address:
Statehouse
Boise, Idaho 83720
(208) 334-4440

September 20, 1985

RE: Permit No. 36-7694

Rangeg, Inc.
Box 706
Buhl, ID 83316

Gentlemen:

Enclosed herewith is a copy of the Water Right License issued on the above referenced Permit.

Sincerely,

JIM JOHNSON
Water Distribution Supervisor

JJ:sc

Enclosure

MICROFILMED

DEPARTMENT OF WATER RESOU[illegible]ES
FIELD REPORT

HW BADING 837 4191

1. Name of permit holder Ranger, Inc.

Post office address Budd, Box 706 Phone 543-6421

Person to contact _____ Phone _____

2. Source of water supply: Groundwater ☐ Surface water ☒ underground springs
(name spring, stream, etc.)

Tributary to Billingsley Creek

3. Water will be used for the following purposes:

Amount 26.00 (permit) c.f.s. for fish propagation
_____ AF/Annum (nature of use)

Period of Use: from Jan. 1 to Dec. 31
(mo.-day) inclusive (mo.-day)

Amount 42.38 (proof) c.f.s. for _____
_____ AF/Annum (nature of use)

Period of Use: from _____ to _____
(mo.-day) inclusive (mo.-day)

Amount _____ c.f.s. for _____
_____ AF/Annum (nature of use)

Period of Use: from _____ to _____
(mo.-day) inclusive (mo.-day)

Other uses: _____

Permit No. 36-7694
Examination for D/C

4. Total amount to be appropriated:

Max Rate of Diversion 26 cubic feet per second and annual volume _____ AF/Annum.

5. Location of Point(s) of Diversion:

Township 25 N/S, Range 14E E/W, B.M., Section 32, Subdivision SW ¼ NW ¼, Goodine County

Township _____ N/S, Range _____ E/W, B.M., Section _____, Subdivision _____ ¼ _____ ¼, _____ County

Township _____ N/S, Range _____ E/W, B.M., Section _____, Subdivision _____ ¼ _____ ¼, _____ County

Other Points of Diversions: _____

Description of diverting works: Spring flowing out of Canyon wall thru fish hatchery into Billingsley Creek.

Measuring device required: yes ☒ no ☐

6. Lands to be irrigated or place of use.

TWP.	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
25	14E	31				X													
		32							X										

MICROFILMED

TOTAL ACREAGE _____

MICROFILMED

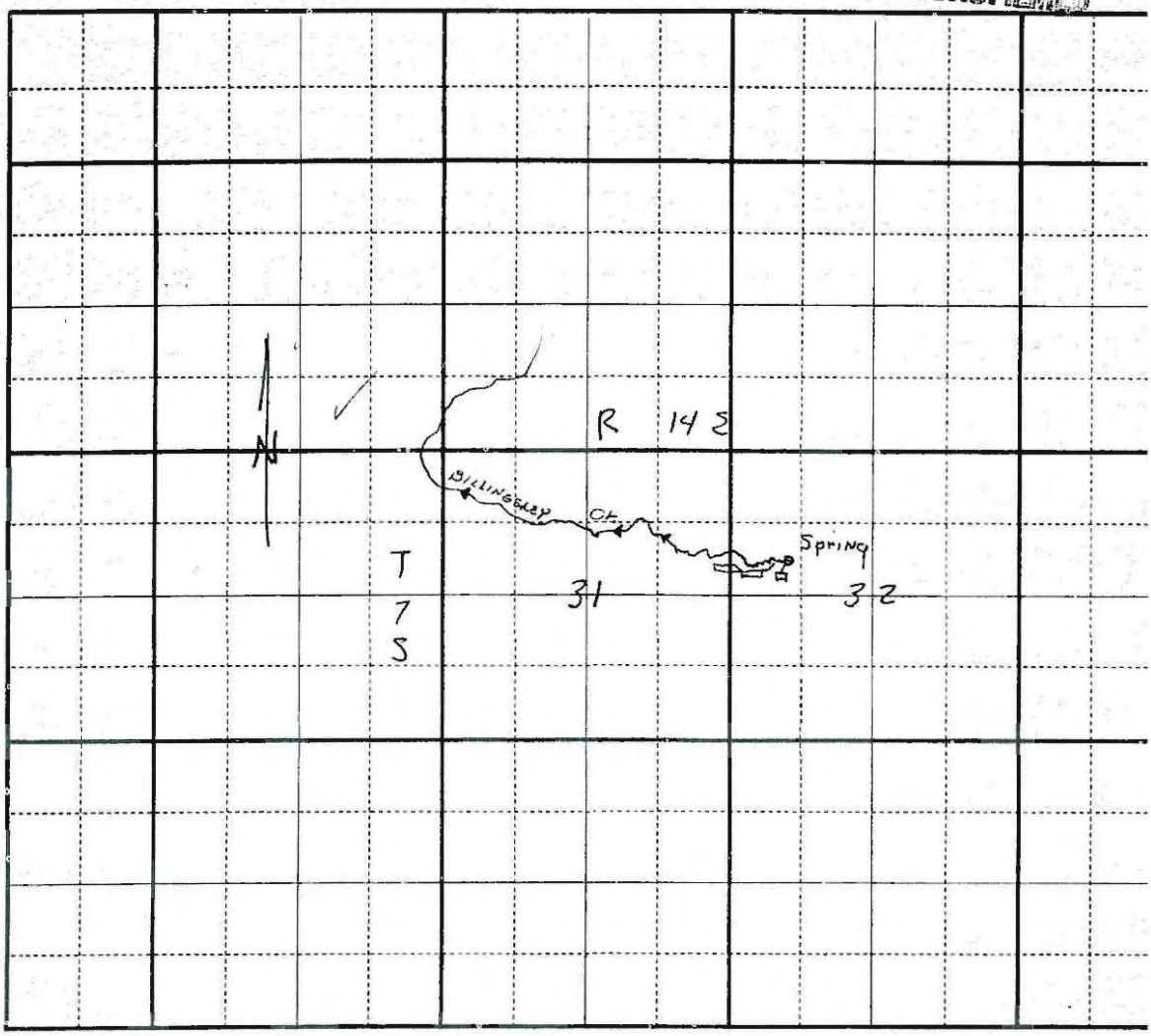


Diagram of System

Facility Volume = (# ponds) (width) (length) (Depth)

(20) 3.5'x105' x 4' = Sec. A
(30) 8'x105' x 4' = Sec. B
(12) 16'x205' x 4' = Sec. C

A = 1470' cubic ft. x 20 = 29,4
B = 3360'" " x 30 = 100,8
C = 13120'" " x 12 = 157,4

Facility Volume = 287,6 cubic feet

(per Jim allow 4' for ~~average~~ depth of ponds - average amt.)

DATE OF EXAM Jan 12, 1979

ACREAGE
Found ✓
Recommended ✓

Irrigation Requirement ✓ Ac Ft/Ac

USE
Irrigation Q=____ c.f.s. V=____ AF/Ann. from ____ to ____
Domestic Q=____ c.f.s. V=____ AF/Ann. from ____ to ____
Livestock Q=____ c.f.s. V=____ AF/Ann. from ____ to ____
FISH Propagation Q= 26.0 C.F.S. ✓ from JAN 1 ✓ to Dec 31 ✓
allow 26.0 cfs w/condition limiting capacity to 76.0 when combined w/36-2551.

Is water co-mingled? yes____ no ✓

Name source: ____
twp.____ N/S, Rge____ E/W, B.M., Sec.____, Sub.____ ¼____ ¼____ County

Exchange? yes____ no ✓

Name source exchanged with: ____
twp.____ N/S, Rge____ E/W, B.M., Sec.____, Sub.____ ¼____ ¼____ County

Point of injection:
twp.____ N/S, Rge____ E/W, B.M., Sec.____, Sub.____ ¼____ ¼____ County

Point of exchange:
twp.____ N/S, Rge____ E/W, B.M., Sec.____, Sub.____ ¼____ ¼____ County

Total Q measured See Remarks Method of measurement WEIRS
76.0 ~~50.22~~
Total Q recommended 26.0 C.F.S. Meter No. ✓ Type ✓ Condition ✓
Total V recommended N/A.

Recommended Amendments:
Recommend using capacity of 76.0 cfs as estimated by Waterma in 10/72 since flow of springs Fluctuate So much.
P.D. ____
Place of Use ____
Other remeasurement of 10/12/79 - 50.22 cfs capacity
None ✓

MEASUREMENT CALCULATION: see
MEASURED 24.95 C.F.S. STANDARD CONTRACTS Rectangular Weir
ALLOWED 26.0 C.F.S. Records show Water has been diverted in the Past For More ~~Mone~~ Than Applyed For
Max Meas - 73.73 C.F.S. WATERMASTER MEAS. See Discharge Notes

SYSTEM DESCRIPTION:
THE SPRING WATER IS collected IN STEEL COLVERTS AND CONVEYED TO THE CONCRETE RACE WAYS THEN DISCHARGED INTO BILLINGSLEY CR.

REMARKS:
MEASUREMENTS WERE MADE AT LOW FLOW OF THE YEAR FOR THE SPRING. ENCLOSED ARE COPYS OF SPRING FLOWS FOR SEVERAL PAST YEARS. From WATERMaster Geo. Lemon LYN BABINGTON WAS PRESENT DURING THE EXAM.

Examiner's Signature Gary Funderburg Date 2-15-79
Checked by Allen Merritt Date 2-23-79
Approved by Ray Walker Date 8-14-85

MICROFILMED ✓

1966		52.15		44.74	(38.47)	(34.20)	45.41	51.30	(53.20)	52.42	64.64	58.36	49.23
1967		43.73		43.38				(49.00)					64.31
1968		52.51		41.32									(63.12)
1969													
1970		47.15		41.75							(69.27)	(63.32)	(60.00)
1971		(50.21)	(41.17)	(39.06)				(51.01)					
1972											(76.12)		
1973							(42.07)		(55.07)				(55.27)
1974				(41.07)			(43.44)			(59.16)		(62.76)	(57.96)
1975		(42.97)	(39.87)	(32.76)	(33.47)					(55.56)		(56.20)	
1976			(44.27)		(33.11)		(38.02)		(47.24)			(56.74)	
1977													
1978													
1979													

measurements by George Lemmons (Watermaster)

Gary: Hope this will help you. The circled Figures are estimates and not actual Measurements Tom

10 20 .30 .40 .50 .60 .70 .75

STAR 1-290 63
1:00 PM.

STATE OF IDAHO
DEPARTMENT OF RECLAMATION

10-12, 19 77 DISCHARGE MEASUREMENT NOTES

Billingsley Cr. River at RANGER HATCHERY

	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
EW	0.0	.25									
	0.5	.5	1.8		52	55			2.08	0.9	1.87 ✓
	1.0 T	.75	3.1		69	40			3.77	2.32	
	B		3.1		46	40		3.15	2.53	2.32	7.33 ✓
	2.0 T	1.0	3.3		62	40			3.39	—	
	B		3.3		60	40		3.34	3.29	3.3	11.02 ✓
	3.0 T	1.0	3.2		60	40			3.29		
	B		3.2		53	40		3.10	2.91	3.2	9.92 ✓
	4.0 T	1.0	2.9		57	40			3.12		
	B		2.9		54	40		3.04	2.96	2.9	8.82 ✓
	5.0 T	1.0	2.6		57	40			3.12		
	B		2.6		46	40		2.83	2.53	2.9	7.36 ✓
	6.0	.625	2.0		57	40			3.12	1.25	3.90 ✓
EW	6.25	.125									
											✓
											50.22
	Stop			1:33	P.M.					Total	

$\left(\frac{R}{T} \times 2.170 + .030 = FPS\right)$

LOREN Holmes - MEASURED
Cary Funderburg - Kept Notes

MICROFILMED

___ of ___ Sheets. Comp. by ___ Chk by ADM

.10 .20 .30 .40 .50 .60 .70 ✓

STANDARD CONTRACTED RECTANGULAR WEIR

COMPUTED FROM FORMULA $Q = 3.33(L - 0.2H)H^{3/2}$

SIZE OF CONCRETE RACEWAYS

(20) 3.5' x 105'

(30) 8' x 105'

(12) 16' x 205'

WEIRS ARE LOCATED AT THE END OF THE LOWER RACEWAYS

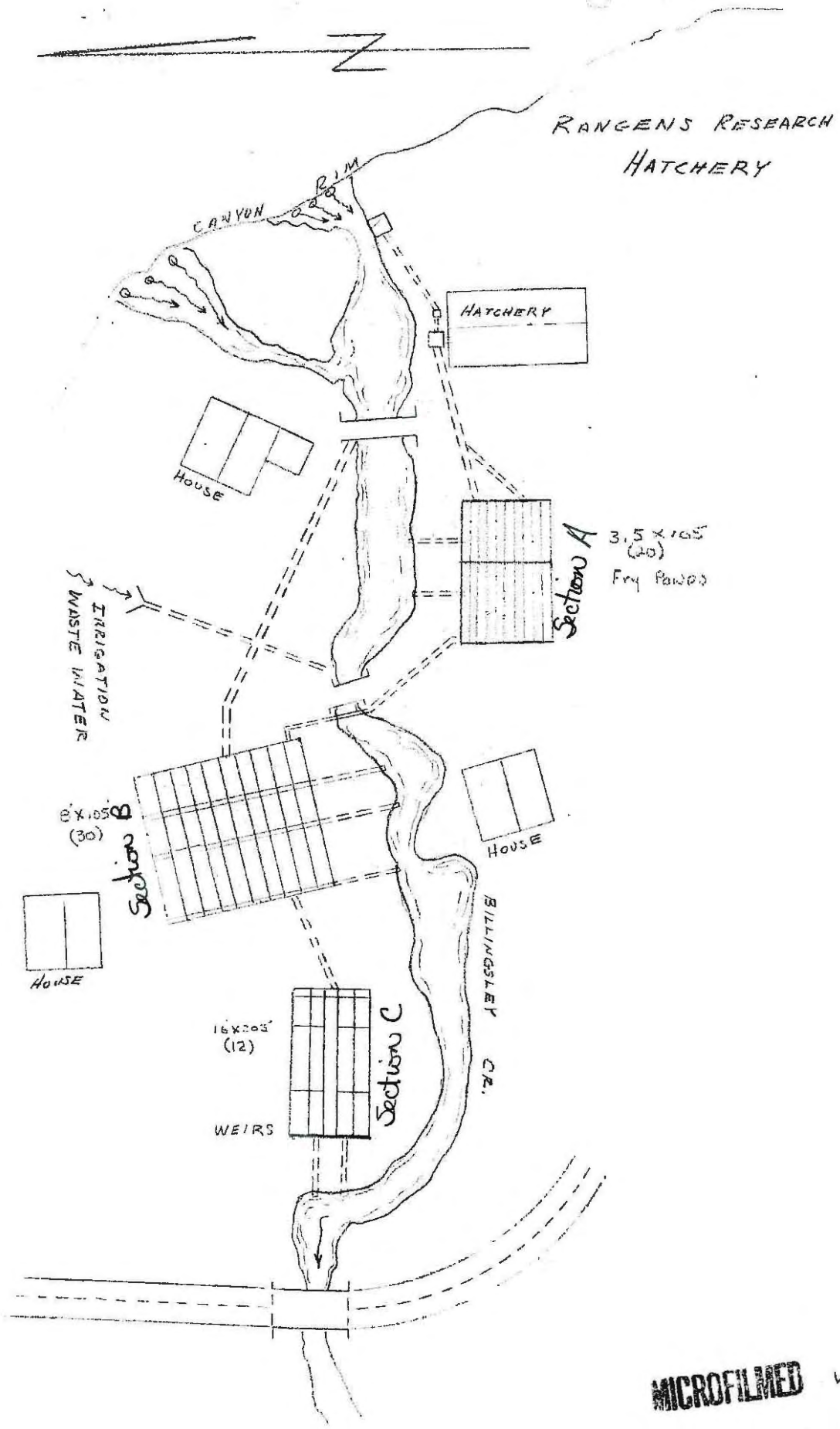
1. - 0.16	4.833'	RECT. WEIR	CONTRACTED = 1.02
2. - 0.16	4.833'	RECT. WEIR	CONTRACTED = 1.02
3. - 0.16	4.833'	RECT. WEIR	CONTRACTED = 1.02
4. - 0.21	4.833	RECT. WEIR	CONTRACTED = 1,54
5. - 0.21	4.833	RECT. WEIR	CONTRACTED = 1,54
6. - 0.20	9.833	RECT. WEIR	CONTRACTED = 1.43
7 - 0.36	"	RECT. WEIR	" = 3.42
8. - 0.36	"	RECT. WEIR	" = 3.42
9 - 0.32	"	RECT. WEIR	" = 2.87
10 - 0.16	"	RECT. WEIR	" = 1.02
11 - 0.16	"	RECT. WEIR	" = 1.02
12 - 0.17	"	RECT. WEIR	" = 1.12
13. - 0.21	"	RECT. WEIR	" = 1,54
14. - 0.21	"	RECT. WEIR	" = 1,54
15 - .20	"	RECT. WEIR	" = 1,43
		TOTAL	24.95 C.F.S.

MEAS: JAN 12, 1979

RACEWAYS ARE VACUMED OUT AT TIMES

see remeasurement of 10/12/79 -

MICROFILMED



MICROFILMED

Overlap Review for 36-7694

per permit: 36-2551

per terminal 8/14/85:

p/d - 36-2551 same system)
36-0135 Curran Tunnel/Spring
36-0134 Curran Tunnel/Spring

p/u - (sec. 31) - ~~36-2551~~
~~36-0135~~
~~36-0134~~
(sec. 32) ~~36-2551~~
~~36-0135~~
~~36-0134~~
} all above

36-8048 - also being licensed for irrigation use only from g.w. source - no overlap.

36-2551 - same right holder, same source, same system) - 50.0 cfs - see copy attached - same p/u

36-0134 & 36-0135 - Curran Tunnel or Curran Spring - irrig. uses - no overlap.

kw

MICROFILMED

State of Idaho
License and Certificate of Water Right

Water License No. 30654 Amount 50.0 c.f.s.

Water District No. Priority July 31, 1962

THIS IS TO CERTIFY that RANGEN, INC.

of Buhl, Idaho, made application for a permit to appropriate the public waters of the State of Idaho, dated July 31, 19 62; that Permit No. 30654 was issued under said application; that Certificate of Completion of works, with a carrying capacity of 50.0 second feet, was issued thereunder on April 26, 1967, showing that said works were completed on the 27th day of July, 1963; and that on the 2nd day of September, 19 64, RANGEN, INC.

of Buhl, State of Idaho, made proof to the satisfaction of the State Reclamation Engineer of Idaho, of the right to use the waters of underground springs, a tributary of Billingsley Creek, for the purpose of fish cultural and domestic use under Use Permit No. 30654 of the Department of Reclamation, and that said right to the use of said waters has been perfected in accordance with the laws of Idaho, and is hereby confirmed by the State Reclamation Engineer of Idaho and entered of record in Volume 14 of Licenses at page 8804, on the 26 day of April, 19 67;

The right hereby confirmed dates from July 31, 19 62;

The Point of Diversion is located

in the SW ¼ NW ¼, Sec. 32, Tp. 7 S, R. 14 E, B. M., County of Gooding.

That the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually needed and beneficially used for said purposes, and shall not exceed 50.0 cubic feet per second.

Description and location of use:

Twp.	Range	Sec.	Forty-acre Tract	No. Acres Described in Permit	No. Acres Actually Irrigated
7 S	14 E	31	SE¼ NE¼	None	None
		32	SW¼ NW¼	None	None
			For fish culture and domestic use.		

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, as provided by the laws of Idaho.

WITNESS the seal and signature of the State Reclamation Engineer, affixed at Boise, Idaho, this 26th day of April, 19 67.

s/ R. Keith Higginson
State Reclamation Engineer.

(SEAL)

36 2551

MICROFILMED

HIGH & FRITCHMAN COMPANY

It is hereby ordered, adjudged and decreed, and this does order, adjudge and decree, that the defendant and intervenor High & Fritchman Company, a corporation, is the owner of, and entitled to the use of, and the right to use for irrigation and domestic purposes the following amounts of water, to-wit:

36-0134 Three and 2 tenths (3.2) second feet of water, with a priority of October 9, 1884, developed and diverted from the waters, seeps, springs and rivulets in the rim rock above the head waters of Billingsley Creek, by means of a tunnel commonly known as the Curran Tunnel, or Curran Spring, situate in the SW¼ NW¼, Sec. 32, Twp. ~~7 North,~~ 7 South Range 14 East, B. M., Gooding County,

36-0135 Idaho, and 4.8 second feet of the waters of said seeps, springs, and rivulets diverted and developed by the same tunnel, with a priority of April 1, 1908, taken from said tunnel by a pipe line and ditch into and upon the lands of the said defendant hereinafter described and used on said lands for irrigating and raising crops thereon and for watering stock and other domestic purposes during the non irrigation season.

Said water rights are appurtenant to and to be used upon and in the irrigation of the following described lands, situate in Gooding County, Idaho, of the said defendant and intervenor High & Fritchman Company, a corporation, to-wit:

> The Southeast Quarter (SE¼) of the Northeast Quarter (NE¼); the East Half (E½) of the Southeast Quarter (SE¼) of Section Thirty-one (31); the Southwest Quarter (SW¼) of the Northwest Quarter (NW¼); the West Half (W½) of the Southwest Quarter (SW¼) of Section Thirty-two (32), all in Township Seven (7) South, Range Fourteen (14) East, B.M., and Lots Three (3) and Four (4) of Section Five (5), Township Eight (8) South, Range Fourteen (14) East, B. M., together with all water rights, ditches and ditch rights of way appurtenant thereto.

MICROFILMED

VERIFIED RDH
3/7/85

WATER RIGHT NUMBER 36-7694

OWNER LAST NAME - RANGEN INC. FIRST NAME - ORIG OWNER -
ADDRESS LINE 1 - P.O. BOX 706 ADDRESS LINE 2 -
ADDRESS LINE 3 - CITY - BUHL STATE - ID ZIP CODE - 83316
SOURCE - SPRINGS TRIBUTARY OF - BILLINGSLEY CREEK
STAGE - PERMIT STATUS - PRIORITY - 04-12-1977 COUNTY - GOODING TOTAL DIV. RATE - 26.0000 -CFS
TOTAL DIV. VOLUME - .00 AFA TRFR/AMEND - WATER DIST. - OLE/CAREY ACT - RIGHT BASIS -
DIVERSION POINT - SWNW 32 07S 14E LOT REDIV - 272.0 389.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 5.3
FROM - 01-01 TO - 12-31 USE - FISH PROP. USE DIV. RATE - 26.0000 CFS USE DIV. VOLUME - .00 AFA
USE - FISH PROP. PLACE OF USE - TWN 07S RNG 14E SEC 31 TRACT SENE LOT AC
USE - FISH PROP. PLACE OF USE - TWN 07S RNG 14E SEC 32 TRACT SWNW LOT AC
DECREE NAME - DATE - TOTAL ACRES 0
REMARKS - MEASURING DEVICE AT OUTLET WORKS.
NON IRRIG USE -
OTHER RIGHTS FOR SAME USE - LIC. 36-2551.
PROOF DUE - 07-01-1978 PERMIT/DENIED - 06-29-1977 PROTESTED - HEARING - OLD NO. -
PROOF MADE - P FLD EXAM - F COND. OF APPROVAL - 13 16 09
DIVERSION MEANS - SPRING.

3/79

IDENT. NO. 36-7694

IDAHO DEPARTMENT OF WATER RESOURCES

WATER RIGHT DATA ENTRY LOG

Initials	Date	Item
		Original form entered
		Edit Report Correct
		Date Protested
		Date of Hearing
		Date Approved/Denied (Proof due date, stage and/or status, conditions of approval, water district)
		Record Verified
		Amendment Approved
		Extension Approved
		Partial Proof
		Proof Complete
		Field Exam Received
		Field Exam Accepted and changes entered
		License Signed
		Transfer Approved
CJA	5-2-79	Keypunched by State Office

January 4, 1979

Rangen, Inc.
Buhl,
Idaho 83316

Gentlemen:

Re: Permit No. 36-7694

Enclosed is a copy of Order removing the measuring device requirement at the inlet works. However, please note that requirement for the outlet works to have a measuring device is still required.

Sincerely,

JAN GROVER
Water Rights Supervisor

JG:rf

Enc: 1

MICROFILMED

CONVERSATION MEMORANDUM

DATE 1/2/79

FILE 36-7694

NAME OF PARTY Gary Funderburg

EMPLOYEE Don Grove

RE: In talking with Gary this date he stated that the P.D. for this permit came directly from springs flowing into Billingsley Creek and it was not economically feasible to try & put a measuring device at the inlet works especially as there are no users above him. However, he recommends the measuring device be removed at the inlet works but still required for the outlet works.

MICROFILMED

Rangen Inc.
P.O. BOX 706 • 115 13 AVE. SO. • BUHL, IDAHO 83316 • (208) 543-6421

RANGEN RESEARCH STATION
TROUT AND SALMON DIETS • LIVE TROUT • FISH PATHOLOGY •
DISEASE CERTIFICATION • CONTRACT RESEARCH AND DEVELOPMENT
TELEPHONE (208) 837-6192 LABORATORY
(208) 837-6191 HATCHERY

RECEIVED
DEC 18 1978
Department of Water Resources

December 14, 1978

Re: Permit No. 36-7694

State of Idaho
Department of Water Resources
Statehouse Boise, Idaho

Gentlemen:

Recently Gary Funderburg, senior water resource agent southern region, made a field examination of our water system so that our license could be issued. At this time he noted that we did not have a measuring device at the inlet. With the terrain and collection system of the water it is not feasible to have a measuring device at the inlet.

All the water is run thru asteel or concrete pipes and concrete ponds and thru a measuring device at the outlet. I would like to request that the measuring device at the inlet be waivered. If this is possible please contact me, and Gary in the Twin Falls office.

Sincerely

Lynn Babington, Manager
Rangen research hatchery

I. COMMODITIES DIVISION: GRAINS • SEEDS • BEANS II. FERTILIZER DIVISION: CHEMICALS • CUSTOM APPLICATION • SPRAYING • SOIL TESTING • MICRONUTRIENTS • FLUID FEED • LIQUID & DRY FERTILIZERS • AERIAL APPLICATION III. FISHERIES DIVISION: TROUT FEED • LIVE TROUT • FISH DISEASE RESEARCH AND PATHOLOGY LABORATORY IV. GENERAL FEEDS DIVISION: CUSTOM STEAM ROLLING • GRINDING • MOLASSIFYING • PELLETING • BLOCKING • BULK FEED DELIVERY V. TRUCK BROKERAGE & COMMODITY TRADING DIVISION VI. TRUCK & EQUIPMENT DIVISION: RANGEN GMC TRUCKS, INC. • PARTS & SERVICE • COMPLETE DIESEL & AUTOMOTIVE REPAIR • CUMMINS • CATERPILLAR • DETROIT DIESEL • ALLISON • TRUCK BODIES & EQUIPMENT VII. TRUCKING DIVISION: RANGEN TRANSPORTATION, INC.

MICROFILMED

August 4, 1978

Re: Permit No. 36-7694

Rangen, Inc.
P.O. Box 706
Buhl, ID 83316

Gentlemen:

We acknowledge receipt of the affidavit submitted as proof of beneficial use for the above referenced permit.

Before a license can be issued, a field examination must be made by a representative of this Department. We cannot tell just when this examination will be made, but our examiner will try to contact you at the time he makes the examination so that you may show him the system.

If you have any questions regarding the field examination, please contact our Regional Office in Twin Falls.

Sincerely,

JANICE RENK
Water Rights

Form No. 42-217
1-18-1978

Identification No. _____

Permit No. _____

RECEIVED
JUN 7 1978
Department of Water Resources

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

PROOF OF APPLICATION OF WATER TO BENEFICIAL USE

1. a) Name of Permit Holder Rangen Inc.

   b) Post Office Address P.O. Box 706 Buhl Idaho

2. Permit Number 36-7694

3. Date of Priority that you are prepared to establish ~~XXXXXXXXXX~~ April 12, 1977

4. a) Source from which water was appropriated Billingsley Creek (head) Curran Tunnel

   b) Location of the point of diversion: Sw ¼ Nw ¼, Section 32

   Township 7 S, Range 14 E Boise Meridian, Other points of diversion: _____

5. a) The amount of water and use to which the water has been applied:

   Amount 42.38 Total spring flow for fish propagation purposes from Jan. 1 to Dec. 31 incl.
   (cfs and/or acre-feet per annum) (Month-Day) (Month-Day)

   Amount _____ for _____ purposes from _____ to _____ incl.
   (cfs and/or acre-feet per annum) (Month-Day) (Month-Day)

   Amount _____ for _____ purposes from _____ to _____ incl.
   (cfs and/or acre-feet per annum) (Month-Day) (Month-Day)

   b) Total amount appropriated 42.38 (total spring flow) cfs and/or acre-feet per annum

   c) Describe how and by whom measurement of rate of flow or amount of storage was made and the qualifications of the person making the measurement: Monthly flow measurements by George Lemmon water master (Hagerman)

6. If the means of diversion and conveyance are owned by someone other than the Permit Holder:

   a) Give the name or description of the canal, ditch or other works by which the water is conducted to the place of use:

   b) Describe the agreement or understanding by which you take water from the works:

7. a) Briefly describe the works for diverting and conveying the water to the place of use, (if from a subterranean source, give the pump size, motor size, size of well casing, depth of well; if from surface water, give brief description of diversion structure and/or canal or ditch) Spring flowing out of canyon wall thru fish hatchery into Billingsley Creek

   b) Describe the type and size of measuring device which you have installed at your point of diversion: Twelve (12) cement and wood structures with 58 inch wide openings

   c) Give well driller's name and address and the date the well was completed:

8. If for other than irrigation, describe the beneficial use to which you have applied the water and the place of use: Beneficial use of water for the propagation of fish

   SE ¼ of NE ¼ of Section 31 Township 7S Range 14E B.M.
   ~~SW~~ ~~NW~~ 32

Exam typed 8/4/78

9. Irrigation uses: describe the lands irrigated by giving the acreages irrigated within each 40 acre subdivision: _____

T	R	SEC.	NE¼				NW¼				SW¼				SE¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	

Total number of acres irrigated _____

10. Remarks: Supplement to water permit No. 30654, Dated July 31, 1962 to include betal spring flow for beneficial use of fish propagation.

The above information is a true statement of the extent to which the above numbered permit has been developed.

6-6-78
(Date)

PANTEX INC
Shirley Rey
(Signature)

State of Idaho)
) ss.
County of Twin Falls)

On this 6th day of June, 19 78, personally appeared before me the signer(s) of the above instrument, who duly acknowledged to me that he ~~(she)~~ ~~(they)~~ executed the same.

Notary Public residing at Buhl Idaho

My commission expires Lifetime

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Cecil D. Andrus
Governor

R. Keith Higginson
Director

Statehouse
Boise, Idaho 83720
(208) 384-2215

April 28, 1978 CERTIFIED MAIL 139739

Re: Permit No. 36-7694

Rangen, Inc.
Buhl,
Idaho 83316

Gentlemen:

One of the conditions of approval of your water Permit No. 36-7694 (see last page of your approved permit) was that evidence of the extent of development be submitted as proof of application of water to beneficial use to this office on or before July 1, 1978. Enclosed is an affidavit form which must be used to submit the required proof of beneficial use.

If you have not fully completed your project, and you have not previously received an extension of time, you may request an extension of time provided the delay is for reasonable cause as indicated in Section 42-204, Idaho Code, amended. If you have been prevented from proceeding by a governmental agency or by litigation, more than one extension of time can be granted.

Either the beneficial use affidavit or a request for an extension of time must be received by this Department on or before the above mentioned date, otherwise the permit will lapse and be of no further force or effect.

Norman C. Young
NORMAN C. YOUNG
Administrator,
Resources Administration Division

NCY:jfr

Encl: Proof affidavit

MICROFILMED

July 13, 1977

Re: Permit No. 36-7694

Rangen, Inc.
Buhl, ID 83316

Dear Sirs:

Enclosed is a copy of your approved Application for Permit No. 36-7694 . We direct your attention to the conditions of approval as listed on the fourth page.

Be sure to note that a special condition requiring you to install and maintain a measuring device at your point of diversion has been placed upon your permit. We are enclosing a letter describing different types of measuring devices accepted by this office.

Sincerely,

BOBBY D. FLEENOR
Chief, Water Rights

Inclosure: Copy of permit

RECEIVED
JUL 15 1977

DEPARTMENT OF WATER RESOURCES
- STAFF ANALYSIS -

Item	Initial	Date	
			Application No. 36-7694 - Rangen, Inc.
			✓ Source ✓ Point of Diversion ✓ County ✓ Quantity of Water and Period of Use ✓ Description of Diverting Works ✓ Time required for B/U of water ✓ Place of Use or Acres Irrigated ✓ Map ✓ Signature ✓ Fee
(1)	ADM	4-14-77	In form to receipt
(2)	_____	_____	Send Copies to: _____ Idaho State Health Department _____ Idaho Fish and Game Department _____ Bureau of Land Management _____
(3)	_____	_____	_____ Request Special Use Permit from U.S.F.S. _____ Request Easement from B.L.M. _____ Request Information from Applicant
(4)	gs.	_____	In form for advertising
(5)	_____	_____	Platted on Map No._____
(6)	_____	_____	Located within Water District No._____
(7)	mls	5-10-77	Critical groundwater area: yes_____ no ✓
(8)	mls	5-10-77	Groundwater levels: _____ Declining, ✓ Stable, _____ Increasing (comment)_____
(9)	_____	_____	Other rights on the same place of use
(10)	_____	_____	Comments:_____
(11)	_____	_____	Affidavit of Publication received(date)_____
(12)	mls	5-10-77	Final date for protests 5/9/77 Protests received: yes_____ no_____
(13)	_____	_____	All requested information received from agencies or applicant: yes_____ no_____
(14)	mls	5-10-77	Action recommended: ✓ Approve _____ Deny _____ Proposed Priority _____ Reason for Reduction_____ ✓ Measuring device required _____ See attached sheet for other conditions of approval _____ No special conditions for approval
(15)	District Southern		By Michael Steele Date 5-10-77

cc Dist to Boise 4/14/77 mr

NOTICE OF APPLICATION FOR WATER PERMIT

Notice is hereby given that Rangen, Inc.

Buhl, Id. 83316

has on 4/12/77 submitted Application No. 36-7694

for a permit to appropriate 26.00 cubic feet per second ~~acre feet per annum~~

of water from ~~Curran Tunnel, tributary of Billingsley Creek~~

by means of ~~spring flowing out of Canyon wall thru fish hatchery into Billingsley Cr.~~

within the ~~SW¼NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M., Gooding County~~

to be used from Jan. 1 to Dec. 31

for fish propagation

within the SE¼NE¼, Sec. 31; SW¼NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M.

If issued, this permit will be subject to all prior water rights. Protests against the granting of the permit must be filed with the Idaho Department of Water Resources, 1041 Blue Lakes Blvd., North, Twin Falls, Idaho, 83301 on or before May 9, 1977.

~~KEITH HIGGINSON~~

Director

Published in the Gooding County Leader

on April 21, and April 28, 1977

LEGAL — le OK/SB 4/19/77

NOTICE OF APPLICATION FOR WATER PERMIT

Notice is hereby given that Rangen, Inc. Buhl, Id., 83316 has on 4/12/77 submitted Application No. 36-7694 for a permit to appropriate 26.00 cubic feet per second of water from Curran Tunnel, tributary of Billingsley Creek by means of spring flowing out of Canyon wall thru fish hatchery into Billingsley Cr. within the SW¼-NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M., Gooding County to be used from Jan. 1 to Dec. 31 for fish propagation within the SE¼NE¼, Sec. 31; SW¼-NW¼, Sec. 32, Twp. 7S, Rge. 14E., B.M.

If issued this permit will be subject to all prior water rights. Protests against the granting of the permit must be filed with the Idaho Department of Water Resources, 1041 Blue Lakes Blvd., North, Twin Falls, Idaho, 83301 on or before May 9, 1977.

Director

Pub: 4-21, 28

April 14, 1977

Gooding County Leader
Box 56
Gooding, Id. 83330

RE: Application For Permit #36-7694-Rangen, Inc.

Gentlemen:

Enclosed you will find a legal notice which we wish to have published once a week for two consecutive weekly issues of your newspaper. We have inserted the publication dates allowing ample time for you to submit us a galley proof for review before publication.

After sending us a galley proof, proceed with the publication on the dates we have inserted, assuming the notice is correct. If we have any corrections, we will notify you before the first publication. If you cannot publish the notice on the proposed dates, please contact us immediately.

In order to receive payment, an affidavit of publication must be submitted to the Department along with the publication bill.

Sincerely,

Michael L. Steele
Southern Region Supervisor

MLS:sb

enclosure

Bill submitted: _____

EXHIBIT D

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF WATER TO WATER RIGHTS NOS. 36-15501, 36-02551, AND 36-07694	**ORDER**

This matter comes before the Director of the Department of Water Resources ("Director" or "Department") as a result of a letter dated September 23, 2003, and a subsequent letter dated October 6, 2003. Both letters were from J. Dee May ("May"), an attorney representing Rangen, Inc. The September 23 letter sought administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights" for use at hatchery facilities owned and operated by Rangen near Hagerman, Idaho. Because there are no water rights in Water District No. 36A that are junior in priority to the water rights listed above and divert from the same sources as the listed rights, the Director requested additional clarification concerning the nature of the administration of water rights sought by Rangen. In his October 6 letter, May described the administration sought by Rangen to be the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above." The Director enters the following Findings of Fact, Conclusions of Law, and Order in response to these two letters.

FINDINGS OF FACT

The Eastern Snake River Plain Aquifer and the Department's Ground Water Model

1. The Eastern Snake River Plain Aquifer ("ESPA") is defined as the aquifer underlying the Eastern Snake River Plain as delineated in the report "Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho," USGS Professional Paper 1408-F, 1992, excluding areas lying both south of the Snake River and west of the line separating Sections 34 and 35, Township 10 South, Range 20 East, Boise Meridian. The ESPA is also defined as an area having a common ground water supply. (See IDAPA 37.03.11.050).

2. The water supply in the ESPA is hydraulically connected to the Snake River and tributary surface water sources at various places and to varying degrees. One of the locations at which a direct hydraulic connection exists between the ESPA and surface water sources tributary to the Snake River is in the Thousand Springs area located at the western edge of the ESPA east and southeast of Hagerman, Idaho.

PLAINTIFF'S EXHIBIT 4
tabbies

3. Simulations using the Department's calibrated computer model of the ESPA show that ground water withdrawals from certain portions of the ESPA for irrigation and other consumptive purposes cause reductions in spring flows tributary to the Kimberly to King Hill (or Thousand Springs) reach of the Snake River, although the reductions in flows from individual springs caused by ground water withdrawals from individual wells or groups of wells cannot be determined using the Department's existing ground water model for the ESPA.

4. Surface and ground water studies for the Eastern Snake River Plain, funded in part by the Idaho Legislature, were recently completed by or on behalf of the Department, with the participation of other public and private entities. These studies provide additional data that is being used to reformulate and recalibrate the ground water model used by the Department to calculate the amount, location, and timing of surface water depletions caused by the withdrawal and use of ground water throughout the plain overlying the ESPA. The purpose for the additional data collection and model reformulation/calibration is to reduce uncertainty in modeled results. Although development of the reformulated and recalibrated ground water model is nearly complete, the model will not be ready for use in making water management determinations until the latter part of 2004. In the meantime, the results from simulations using the Department's existing ground water model provide the best available technical basis for making some water management decisions.

5. The Department is implementing full conjunctive administration of rights to the use of interconnected surface and ground waters within the Eastern Snake River Plain consistent with Idaho law and available information. The results of simulations from the Department's existing ground water model are suitable for determining the area containing those ground water diversions for which the depletion of water from the ESPA results in the most direct and significant reduction in the flow of water from springs tributary to the Snake River in the Thousand Springs reach.

The Thousand Springs Ground Water Management Area and Interim Stipulated Agreement

6. Discharges from springs in the Thousand Springs area have diminished and are expected to be further diminished primarily because of significant reductions in incidental recharge of the ESPA from surface water irrigation, resulting from changes in surface water irrigation systems and application practices (conversion from application by flood irrigation to application by sprinkler systems), and the last four consecutive years of drought. For example, decreases in the springs supplying the Rangen hatchery facilities can be correlated with repairs made to the facilities of the North Side Canal Company to reduce losses of surface water to ground water from the canal company's facilities above those springs in 1987, 1998, and 2000. Spring discharges are also reduced as a result of ground water withdrawals from the ESPA for irrigation and other consumptive purposes that are diverted in relatively close proximity to the area of the springs. When superimposed on diminished spring discharges resulting from changes in surface water irrigation and drought, reductions in spring discharges caused by ground water depletions under relatively junior priority water rights can potentially cause injury to senior priority water rights dependent on spring sources.

7. On August 3, 2001, the Director issued orders designating the Thousand Springs Ground Water Management Area and the American Falls Ground Water Management Area in exercise of his statutory authorities to administer rights to the use of ground water, in a manner that recognizes and protects senior priority surface water rights in accordance with the directives of Idaho law. In issuing these orders, the Director also announced his intent to issue additional orders prior to September 1, 2001, directing that holders of certain water rights for the use of ground water cease ground water withdrawals beginning March 15, 2002, pursuant to Idaho Code § 42-233b.

8. On August 31, 2001, the Director was advised by representatives of certain holders of senior priority surface water rights and certain holders of junior priority ground water rights that an agreement in principle had been reached under which the holders of junior priority ground water rights agreed to provide replacement surface water for the next two irrigation seasons in an amount equal to what the information then available to the Director indicated would have resulted from the curtailment of ground water diversions intended by the Director within the Thousand Springs Ground Water Management Area, or an appropriate reduction in ground water diversions to the extent that replacement water was not provided.

9. Based upon the representations that an agreement in principle had been reached, the Director announced on August 31, 2001, that no curtailment orders would be issued for the Thousand Springs or American Falls Ground Water Management Areas.

10. After August 31, 2001, representatives of holders of most of the affected ground water rights entered into a detailed, written, stipulated agreement with representatives of certain holders of senior priority surface water rights in the Thousand Springs area titled: "Interim Stipulated Agreement for Areas Within and Near IDWR Administrative Basin 36" (the "Stipulated Agreement"). The Director conditionally approved the Stipulated Agreement by interlocutory order on January 18, 2002. Rangen was not a signatory to the Stipulated Agreement.

11. Under the Stipulated Agreement, the represented holders of senior priority surface water rights agreed not to exercise their senior priorities against the represented holders of junior priority ground water rights in exchange for commitments by the ground water right holders to provide 40,000 acre feet of replacement water during each irrigation season of each year of the two-year term of the Stipulated Agreement as replacement for the estimated increase in the quantity of water that would have been discharged through springs in the Thousand Springs area as a result of curtailment of ground water diversions intended by the Director after six months, based on the Department's simulations of curtailment using the existing ground water model for the ESPA. The estimated increase in the amount of water that would have been discharged through springs in the Thousand Springs area after one full year of curtailment of the ground water diversions intended by the Director, based on the simulations of curtailment using the Department's existing ground water model for the ESPA, is 48,000 acre feet. The replacement water was to be used to enhance spring flows in the Thousand Springs reach. In the event the full amount of replacement water could not be provided, the Stipulated Agreement provided that the holders of ground water rights would reduce their diversion and use of ground water for

irrigation in proportion to the lack of replacement water provided up to a maximum reduction of 10 percent.

12. Under the Stipulated Agreement, the parties also agreed not to oppose the State of Idaho's motion to the District Court for the Snake River Basin Adjudication ("SRBA District Court") requesting authority for the Director to implement interim administration of water rights in Basin 36. Basin 36 is the administrative basin defined by the Department primarily for the purpose of managing surface water and for administering water rights for the use of surface water decreed in proceedings preceding the Snake River Basin Adjudication. Basin 36 includes most of the area in the Thousand Springs Ground Water Management Area. The remaining portion of the Thousand Springs Ground Water Management Area is within the Department's Administrative Basin 37.

13. The holders of ground water rights party to the Stipulated Agreement fully met their obligations under the Stipulated Agreement in 2002 and 2003.

14. On October 10, 2003, the Director issued *Order In the Matter of Distribution of Water to Water Rights Nos. 36-02659, 36-02680, 36-04032A, 36-04032B, 36-04032C, 36-04032D, 36-07004, 36-07080, 36-07167, 36-07176, 36-07725, 36-07731, and 36-08089* in which the Director determined that through his approval of the Stipulated Agreement, he approved the amount of replacement water as being adequate mitigation to the Thousand Springs reach for the depletionary effects of ground water withdrawals for the two-year term of the agreement. By offseting the depletionary effects, any material injury potentially caused by out-of-priority diversion of ground water was adequately mitigated during the term of the Stipulated Agreement.

15. The Stipulated Agreement expired on December 31, 2003, and is no longer in effect.

Creation and Operation of Water Districts No. 120 and No. 130,
And Status of Thousand Springs and American Falls Ground Water Management Areas

16. Consistent with the Stipulated Agreement, the State of Idaho filed a motion with the SRBA District Court on November 19, 2001, requesting an order authorizing the interim administration of water rights by the Director in all or parts of the Department's Administrative Basins 36 and 43 overlying the ESPA in the Thousand Springs area. The State of Idaho also sought authorization for the interim administration of water rights by the Director in all or parts of the Department's Administrative Basins 35 and 41 overlying the ESPA in the American Falls area. On January 8, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued two orders on February 19, 2002, creating Water District No. 120 and Water District No. 130 pursuant to the provisions of Idaho Code § 42-604.

17. On August 30, 2002, the State of Idaho filed a second motion with the SRBA District Court requesting an order authorizing the interim administration of water rights by the

Director in the portion of the Department's Administrative Basin 37 overlying the ESPA in the Thousand Springs area. On November 19, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 8, 2003, revising the boundaries of Water District No. 130 to include the portion of Administrative Basin 37 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604. The boundaries for Water District No. 130 encompass the North Snake Ground Water District and most of the Magic Valley Ground Water District.

18. On July 10, 2003, the State of Idaho filed a third motion with the SRBA District Court requesting an order authorizing the interim administration of water rights by the Director in the portion of the Department's Administrative Basin 29 overlying the ESPA in the American Falls area. On October 29, 2003, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 22, 2004, revising the boundaries of Water District No. 120 to include the portion of Administrative Basin 29 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604.

19. Water Districts No. 120 and No. 130 were created, and the respective boundaries revised, to provide for the administration of water rights, pursuant to chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights. As a result, the watermasters for Water Districts No. 120 and No. 130 were given the following duties to be performed in accordance with guidelines, direction, and supervision provided by the Director:

a. Curtail illegal diversions (i.e., any diversion without a water right or in excess of the elements or conditions of a water right);

b. Measure and report the diversions under water rights;

c. Enforce the provisions of any stipulated agreement; and

d. Curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

20. During 2002, in the course of carrying out the duties set forth in Finding19, the watermaster for Water District No. 130 identified five unauthorized diversions of ground water for uses that were in excess of the beneficial use authorized under a water right or for uses at unauthorized places of use. Pursuant to instructions from the Director, Notices of Violation were issued, Consent Orders entered, and penalties were assessed for each of these five illegal uses of ground water.

21. During 2003, in the course of carrying out the duties set forth in Finding 19, the watermaster for Water District No. 130 identified two additional unauthorized diversions of ground water; one for violation of a Consent Order entered in 2002, and another for a large expansion in use beyond the beneficial use authorized under a water right. A Notice of Violation has been issued for the former, and a Notice of Violation is pending for the latter.

22. The Director issued final orders on August 29, 2003, dissolving the Thousand Springs Ground Water Management Area and reducing the area of the American Falls Ground Water Management Area. Even though spring discharges in the Thousand Springs area have generally not improved since 2001 when the Thousand Springs Ground Water Management Area was designated, the Director determined that the Thousand Springs Ground Water Management Area was no longer necessary and preserving the original area of the American Falls Ground Water Management Area was no longer necessary to administer water rights for the protection of senior surface and ground water rights because administration of such rights is now accomplished through the operation of Water Districts No. 120 and No. 130.

The Conjunctive Management Rules

23. Idaho Code § 42-603 authorizes the Director "to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof." Promulgation of such rules and regulations must be in accordance with the procedures of chapter 52, title 67, Idaho Code.

24. On October 7, 1994, the Director issued *Order Adopting Final Rules*; the *Rules for Conjunctive Management of Surface and Ground Water Resources* (IDAPA 37.03.11) ("Conjunctive Management Rules"), promulgated pursuant to chapter 52, title 67, Idaho Code, and Idaho Code § 42-603.

25. The Conjunctive Management Rules "apply to all situations in the state where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply." IDAPA 37.03.11.020.01.

26. The Conjunctive Management Rules "acknowledge all elements of the prior appropriation doctrine as established by Idaho law." IDAPA 37.03.11.020.02.

27. The Conjunctive Management Rules "may require mitigation or staged or phased curtailment of a junior-priority use if diversion and use of water by the holder of the junior-priority water right causes material injury, even though not immediately measurable, to the holder of a senior-priority surface or ground water right ... ." IDAPA 37.03.11.020.04.

28. Pursuant to Idaho Code § 67-5291, the Conjunctive Management Rules were submitted to the 1st Regular Session of the 53rd Idaho Legislature (1995 session). During no legislative session, beginning with the 1st Regular Session of the 53rd Idaho Legislature, have the Conjunctive Management Rules been rejected, amended, or modified by the Idaho Legislature. Therefore, the Conjunctive Management Rules are final and effective.

The Letters Submitted on Behalf of Rangen Seeking Administration of Water Rights and Application of the Conjunctive Management Rules

29. On September 23, 2003, the Director received a letter from May representing Rangen, Inc. seeking the administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights."

30. On September 25, 2003, the Director responded to the letter of September 23, 2003, from May requesting "additional clarification concerning the nature of the administration of water rights in Water District 36A" being sought, since "there are no water rights in Water District No. 36A that are junior in priority to the listed rights and divert from the same sources as the listed rights."

31. On October 10, 2003, the Director received a second letter from May dated October 6, 2003. In that letter, May clarified that Rangen was seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above."

32. The water rights held by Rangen that Rangen sought to have protected by the administration of junior priority water rights are as follows pursuant to decrees issued by the SRBA District Court:

Water Right No.:	36-15501	36-02551	36-07694
Priority Date:	July 1, 1957	July 13, 1962	April 12, 1977
Beneficial Use:	Fish Propagation	Domestic (0.1 cfs) and Fish Propagation (48.54 cfs)	Fish Propagation
Diversion Rate:	1.46 cfs	48.54 cfs	26.00 cfs
Period of Use:	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31

33. Rule 10.04 of the Conjunctive Management Rules defines a "delivery call" as: "A request from the holder of a water right for administration of water rights under the prior appropriation doctrine." The two letters from May seeking administration of water rights interfering with and impacting Rangen's water rights described in Findings 29 and 31 come within the definition of a delivery call.

34. Water Districts No. 36A, No. 120, and No. 130 were created pursuant to Idaho Code § 42-604. Water District No. 36A contains water rights senior in priority to Rangen's water rights that divert from a portion of the same sources as Rangen's water rights as well as water rights that divert from other sources, most of which are hydraulically connected but some of which are not hydraulically connected to the sources for Rangen's water rights. Although

some of the other sources are hydraulically connected to the sources for Rangen's water rights, water rights diverted from those sources do not interfere with and impact Rangen's water rights. Therefore, there are no water rights in Water District No. 36A that can be administered to prevent injury to Rangen's rights.

35. Water District No. 120 contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the source for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

36. Water District No. 130 contains surface water rights that divert from sources that are hydraulically connected to the sources for Rangen's water rights but do not interfere with or impact Rangen's water rights. Water District No. 130 also contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the sources for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

37. Rule 40 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights from Areas Having a Common Ground Water Supply in an Organized Water District." Rule 40 applies to the delivery calls made by Rangen against the holders of junior priority ground water rights in both Water District No. 120 and Water District No. 130.

38. Some of the junior priority ground water rights that could potentially interfere with and potentially impact Rangen's water rights are not in a water district created pursuant to the provisions of Idaho Code § 42-604 because a final decree has not been issued by the SRBA District Court and the requirements for interim administration of these rights pursuant to Idaho Code § 42-1417 have not been met. Also, some of the junior priority ground water rights that could potentially interfere with and potentially impact Rangen's water rights are in the American Falls Ground Water Management Area described in Findings 7 and 22.

39. Rule 30 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights Within Areas of the State Not in Organized Water Districts or Within Water Districts Where Ground Water Regulation Has Not Been Included in the Function of Such Districts or Within Areas That Have Not Been Designated Ground Water Management Areas."

40. Rule 41 of the Conjunctive Management Rules is titled "Administration of Diversion and Use of Water Within a Ground Water Management Area."

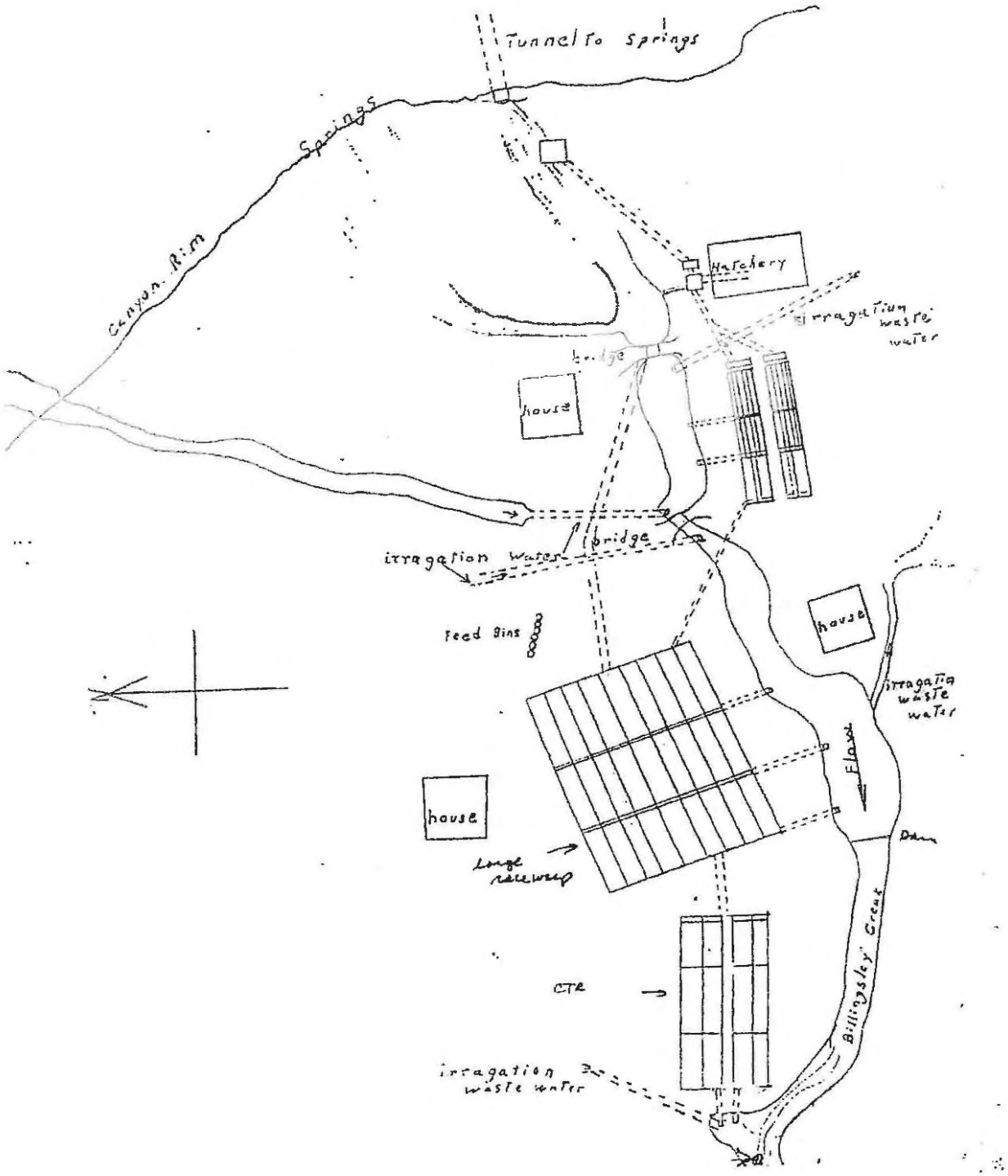
41. The two letters from May, described in Findings 29 and 31, seeking administration of water rights interfering with and impacting Rangen's water rights did not meet the requirements set forth in Rule 30 of the Conjunctive Management Rules. Also, the two

letters from May did not seek administration of junior priority ground water rights in the American Falls Ground Water Management Area as provided in Rule 41 of the Conjunctive Management Rules. Pursuant to Rule 41, such administration could not occur until the irrigation season of 2005, even if material injury to Rangen's rights was determined to be occurring as a result of diversion and use of ground water under junior priority rights in the American Falls Ground Water Management Area.

42. While Rule 40 of the Conjuctive Management Rules is applicable to the two letters from May, described in Findings 29 and 31, neither Rule 40 nor any other provisions of the Conjunctive Management Rules are applicable to delivery calls or demands for water distribution by the holder of a senior priority water right against the holder of a junior priority surface water right.

43. On October 17, 2003, the Director provided a letter to May initially responding to May's letter of October 10, 2003, described in Finding 31, making a delivery call by seeking administration of water rights interfering with and impacting Rangen's water rights. In his October 17 letter, the Director advised that determinations regarding "material injury" and "reasonableness of water diversions" would be made pursuant to Rule 40 and Rule 42 of the Conjunctive Management Rules in responding to the delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130. In his October 17 letter, the Director also requested that he be provided copies of "all historical records of the amounts of water diverted under the listed rights as soon as practicable." Such records were not available to the Director for diversions under Rangen's water rights prior to 1995 because prior to 1995, the Department did not require the measurement and reporting of diversions under Rangen's rights and most other water rights that were not in organized water districts created pursuant to Idaho Code § 42-604.

44. On November 21, 2003, May transmitted on behalf of Rangen historical records of flow through the hatchery facilities owned and operated by Rangen. Included was the following sketch depicting the layout of the Rangen hatchery facilities, a summary of flows on a monthly basis, and records of periodic flow measurements beginning in 1966 through part of 2003.



Rangen Hatchery Facilities
Hagerman, Idaho

45. The flow measurements that are considered to be representative of the total supply of water available to the Rangen hatchery facilities under water rights nos. 36-15501, 36-02551, and 36-07694, consist of the sum of the discharge from raceways designated by Rangen as the "CTR" raceways and the flow over the check "Dam." The dam is sited upstream from the discharge points from the CTR raceways and downstream from the discharge points from raceways designated by Rangen as the "Large" raceways. The sum of the discharge from the CTR raceways and the flow over the check dam is considered to be representative of the total supply of water available even though at times some of the flow over the check dam may include water flowing from small springs downstream from the diversion to the Large raceways, water discharged from the Large raceways that was not diverted through the CTR raceways, and irrigation return flows.

46. The records of flow measurements submitted by May on behalf of Rangen for the years 1966 through 1974 consist of measurements or estimates of discharges from the Curran Spring made by George Lemmon, a former watermaster for Water District No. 36A. These recorded flows are not representative of the total supply of water available to the Rangen hatchery facilities because water rights for irrigation that are senior in priority to Rangen's rights are entitled to divert the first portion of the discharge from the Curran Spring during the irrigation season. In addition, the recorded flows do not include discharges from springs downstream of the Curran Spring that are upstream of Rangen's diversion to the Large raceways.

47. Without further explanation from Rangen, the Department can not confirm that the records of flow measurements submitted by May on behalf of Rangen for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities. Based on subsequent findings in this order, however, it is not necessary to confirm whether the flow measurements for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities.

Authorized Diversion Rate for Water Rights Nos. 36-15501, 36-02551, and 36-07694

48. Springs discharging in the Thousand Springs area do not discharge at a constant rate or at a rate that progressively increases or decreases from year to year. While there are overall increases or decreases in the discharge from individual springs between years (inter-year variations), there are also pronounced within-year or intra-year variations in discharge from individual springs.

49. Simplistically, overall variations between years in the discharge of springs in the Thousand Springs area result from differences between the amounts of ground water depletions and recharge to the ESPA above the springs, with delays in the response of spring discharge ranging at the extremes from days to decades depending on the proximity of ground water depletions and recharge as well as geologic and hydraulic characteristics of the ESPA. Factors affecting overall variations between years in the cumulative discharge from springs in the Thousand Springs area as well as from individual springs include but are not necessarily limited to: variations in surface water supplies available for irrigation above the ESPA, which affect

cropping decisions and the amount of incidental recharge to the ESPA; changes in the amounts and timing of tributary underflow to the ESPA, which also reflect numerous variations upgradient from where tributary underflow contributes to the ESPA; inter-year variations in precipitation and temperature, which not only affect the amount of surface water used above the ESPA and associated incidental recharge to the ESPA, but also affect the quantity of ground water withdrawals and depletions from the ESPA; and differences between years in the quantity of intentional or managed recharge to the ESPA.

50. Intra-year variations in the discharge from individual springs result from the factors described in Finding 49 but also from other factors including: variations in surface water application above the ESPA and associated incidental recharge in response to seasonal changes in precipitation and temperature; variations in timing of ground water withdrawals and depletions from the ESPA in close proximity to individual springs; and the timing of intentional or managed recharge to the ESPA in close proximity to individual springs.

51. While both the regional and local factors affecting inter-year and intra-year variations in spring discharge are generally understood, the interactions between these factors are complex and the specific effects of individual factors and various combinations of factors on the discharge from individual springs are not presently quantifiable.

52. Both inter-year and intra-year variations in the discharge from the springs that are the sources for water rights nos. 36-15501, 36-02551, and 36-07694 existed when appropriations for these rights were initiated (July 1, 1957; July 31, 1962; and April 12, 1977; respectively). Furthermore, the authorized diversion rates for water rights nos. 36-02551 and 36-07694 were licensed based on when the discharges from the springs that are the source for these rights were at or near the maximum intra-year discharges during the years for which the extent of beneficial use was deemed to be established or confirmed (November 1962 for 36-02551 and October 1972 for 36-07694), although erroneously for water right no. 36-07694 (see Findings 53 and 54 below). There are no other measurements of the total supply of water available to the Rangen hatchery facilities in 1962, nor any other means for determining the intra-year variations in the discharges from the springs comprising the source for water right no. 36-02551.

53. Water right no. 36-07694 was licensed on September 19, 1985, and has an authorized diversion rate of 26.00 cfs. The authorized diversion rate, as licensed, was not based on measurements of the amount of water actually diverted and applied to beneficial use. Rather, the authorized diversion rate was based on an estimate (not an actual measurement) made by George Lemon, a former watermaster for Water District No. 36A, of the discharge from the Curran Spring at or near its seasonal maximum flow in October of 1972. This estimate of the discharge from the Curran Spring was made nearly 5 years before the application for permit to appropriate water was filed for water right no. 36-07694.

54. Based on available records, there was not water available for appropriation at the time or subsequent to the date of appropriation for water right no. 36-07694. Therefore, the Department erred in licensing water right no. 36-07694, and should not have recommended this right for decree in the SRBA. Nonetheless, since the SRBA District Court decreed water right

no. 36-07694, Rangen may be entitled to divert water under this right when such water is physically available. However, because water was not available to appropriate on the date of appropriation for right no. 36-07694, Rangen may or not be entitled to have a delivery call recognized against junior priority water rights.

55. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities and the records maintained by the Department since 1995 show that the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) has been sufficient to continuously fill water right no. 36-15501 at the authorized diversion rate of 1.46 cfs.

56. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities show that 1987 was the last year in which the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) was sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs, when the cumulative discharges from springs supplying the Rangen hatchery facilities were at seasonal maximums (November). Since 1987, the quantity of water available at the Rangen hatchery facilities has not been sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs although in 1997 and 1998, the seasonal maximum quantity of water available came within about 5 cfs (or about 10 percent) of the authorized diversion rate.

57. The rates of diversion authorized pursuant to water rights nos. 36-15501 and 36-02551 (1.46 cfs and 48.54 cfs, respectively) are not quantity entitlements that are guaranteed to be available to Rangen. Rather, the authorized rates of diversion are the maximum rates at which water can be diverted under these rights, respectively, when such quantities of water are physically available and the rights are in priority. Rangen can not call for the curtailment of junior priority water rights at all times that insufficient water is physically available to fill water rights no. 36-02551 or no. 36-07694 at the authorized rates of diversion. Rangen is not entitled to a water supply that is enhanced beyond the conditions that existed at the time such rights were established; i.e., Rangen can not call for the curtailment of junior priority water rights simply because seasonally the discharge from springs is less than the authorized rates of diversion for Rangen's rights unless such seasonal variations are caused by depletions resulting from diversion and use of water under junior priority rights.

58. Rangen can only call for the distribution of water to its rights through the curtailment of junior priority ground water rights from the hydraulically-connected ESPA when such curtailment would result in a usable amount of water reaching Rangen's points of diversion in time of need, and depletions causing material injury as a result of diversion and use of ground water under such junior priority rights have not been adequately mitigated.

Factors Considered in Determining Material Injury To and Reasonableness of Water Diversions Under Water Rights Nos. 36-15501, 36-02551, and 36-07694

59. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the following table summarizes the maximum daily flow and average daily flow by month for the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) in 1987 and 2003. The year 1987 was the last year within which the discharge from springs supplying the Rangen hatchery facilities at the seasonal maximum (November) was sufficient to fill water rights nos. 36-15501 and 36-02551 at the cumulative authorized diversion rate of 50 cfs, and 2003 was the last year for which complete data are available.

Month	Year	Maximum Daily Flow	Average Daily Flow
January	1987	44.25 cfs	44.25 cfs
	2003	17.49	16.60
February	1987	42.89	39.75
	2003	16.15	15.07
March	1987	NM*	NM*
	2003	14.56	13.82
April	1987	32.52	28.55
	2003	13.45	12.81
May	1987	23.97	23.29
	2003	13.14	12.89
June	1987	30.43	27.58
	2003	13.00	12.59
July	1987	30.91	29.09
	2003	12.16	11.61
August	1987	40.13	36.70
	2003	12.49	12.02
September	1987	47.94	40.06
	2003	16.97	14.92
October	1987	46.93	46.93
	2003	19.26	18.30
November	1987	50.08	46.52
	2003	19.20	18.20
December	1987	44.39	44.22
	2003	17.10	16.10

*NM = No measurement

60. Comparing same-month maximum daily and average daily flows representing the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) between years for the years shown above demonstrates that there have been significant decreases in the water supply available to the Rangen hatchery facilities between 1987 and 2003. Flow measurements for the other years between 1987 and 2003 not shown above demonstrate that the water supply available to the Rangen hatchery facilities generally decreased from 1990 through 1996, rebounded in 1997 and 1998, and then significantly decreased again after 1998 to record lows by 2002 and 2003 for the post-1981 time period.

61. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the quantity of water available at the source for

water right no. 36-15501 with the priority date of July 1, 1957, is currently sufficient to fill this right at the authorized diversion rate of 1.46 cfs. (See IDAPA 37.03.11.042.01.a).

62. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, and taking into account the variations in spring flows between months that have existed since the date of appropriation for water right no. 36-02551, the quantity of water available at the source for water right no. 36-02551 with the priority date of July 13, 1962, is currently insufficient to fill this right at the authorized diversion rate of 48.54 cfs, even during months when the springs providing the source for this right are discharging at the highest seasonal flows during the year, generally October through January. Based on differences between average monthly flows for the years 1987 and 2003, the estimated annual decrease in the quantity of water available at the source for water right no. 36-02551 for 2003 is 16,000 acre feet. The annual shortage in the quantity of water available at the source for water right no. 36-02551 for 2004 is expected to be similar. (See IDAPA 37.03.11.042.01.a).

63. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the quantity of water available at the source for water right no. 36-07694 with the priority date of April 12, 1977, is wholly insufficient to fill this right at the authorized diversion rate of 26.00 cfs, even during months when the springs providing the source of water for this right are discharging at the highest seasonal flows during the year, generally October through January. As described in Findings 53 and 54, there was not any water available for appropriation at the time or subsequent to the time that the application for permit to appropriate water for water right no. 36-07694 was filed. (See IDAPA 37.03.11.042.01.a).

64. Based on the results from field inspections conducted on November 25, 2003, by the watermaster for Water District No. 130 and Brian Patton, a registered professional civil engineer, Rangen has expended reasonable efforts to divert water for right no. 36-02551 from its source for use at the Rangen hatchery facilities. (See IDAPA 37.03.11.042.01.b).

65. Based on simulations using the Department's existing ground water model for the ESPA, the diversion and use of ground water under water rights having priority dates later than the priority date for water right no. 36-02551 (July 13, 1962) do affect the quantity and timing of when water is available from springs discharging in the Thousand Springs area. (See IDAPA 37.03.11.042.01.c).

66. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, as well as the field investigations on November 25, 2003, described in Finding 64, Rangen is currently diverting and using surface water within the

authorized diversion rate for water rights nos. 36-15501 and 36-02551 (50 cfs total). (See IDAPA 37.03.11.042.01.e)

67. Based on the field investigations on November 25, 2003, described in Finding 64, the Rangen hatchery facilities have marginally adequate water measuring and recording devices. However, the watermaster for Water District No. 130 reports that the amounts of water diverted to domestic and irrigation uses is not measured, and the measurements of flows through hatchery raceways reported by Rangen may be systematically about 10 percent lower than actual flows. (See IDAPA 37.03.11.042.01.f).

68. Based on the results from the field inspection on November 25, 2003, described in Finding 64, two potential modifications to the existing Rangen hatchery facilities were identified that could increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. However, the combined additional flow that could be diverted is estimated to be 0.64 cfs, which is not significant given the shortages in water supply shown and described in Findings 59 and 60. (See IDAPA 37.03.11.042.01.g).

69. Based on the results from the field inspection on November 25, 2003, described in Finding 64, there are actions that potentially could provide alternate means of diversion or alternate points of diversion to increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. However, the feasibility of these actions is unknown and it is not clear that the actions identified would result in a sufficient increase in the water supply available to fill water right no. 36-02551. Therefore, it can not be determined at the present time whether there are alternate reasonable means of diversion or alternate points of diversion that should be pursued. (See IDAPA 37.03.11.042.01.h).

70. Given the magnitude of the decreases in the water supply available to the Rangen hatchery facilities between 1987 and 2003, shown and described in Findings 59 and 60, and given the facts set forth in Findings 64 through 69, material contributions to the decreased water supply available to the Rangen hatchery facilities caused by depletions to the ESPA resulting from diversion and use of ground water under water rights that are junior in priority to Rangen's water right no. 36-02551 cause material injury. The maximum extent of the material injury is currently estimated to be 16,000 acre feet per year (see Finding 62). The extent of material injury is dependent on the factors described in Findings 49 and 50, which can vary significantly from year to year. If material injury to Rangen's water right no. 36-02551 occurs beyond 2004, the amount of material injury must be determined on an annual basis, and will be set forth in subsequent order(s) as necessary.

Effects of Curtailing Ground Water Diversions Under Rights Junior to Water Right No. 36-02551

71. The Department's existing ground water model was used to simulate the effects of curtailing all diversions and use of ground water for agricultural irrigation purposes in Water Districts No. 120 and No. 130, pursuant to water rights that are junior in priority to Rangen's water right no. 36-02551, which has a priority date of July 13, 1962.

72. Only ground water diverted and used for agricultural irrigation purposes was included in the modeled curtailment simulation. Disregarding the priority dates of ground water rights from the ESPA, the Department has determined that agricultural irrigation using ground water results in 93.5 percent of the total consumptive use causing depletions to the ESPA that contributes to reduced reach gains (or spring discharges) in the Thousand Springs area and reaches of the Snake River that are hydraulically connected to the ESPA. Uses pursuant to all ground water rights from the ESPA for commercial, municipal, domestic, and other purposes besides agricultural irrigation have been determined by the Department to cause depletions to the ESPA of 1.5 percent, 4 percent, 0.5 percent, and 0.5 percent of the total depletions to the ESPA, respectively.

73. The results from the simulated curtailment described in Findings 71 and 72 showed no significant simulated increases in reach gains (spring discharges) in the Thousand Springs area from simulated complete curtailment of ground water rights for agricultural irrigation junior in priority to July 13, 1962, in Water District No. 120 at any time period following simulated curtailment. Therefore, depletions to the ESPA from the diversion and use of ground water in Water District No. 120 under water rights junior in priority to July 13, 1962, do not cause material injury to Rangen's water right no. 36-02551.

74. The results from the simulated curtailment described in Findings 71 and 72 showed an increase in reach gains (spring discharges) in the Thousand Springs area of 53,000 acre feet after one year of simulated complete curtailment of ground water rights for agricultural irrigation junior in priority to July 13, 1962, in Water District No. 130.

75. The 53,000 acre feet of increased reach gain (spring discharges) that resulted from simulated curtailment of ground water diversion and use under water rights for agricultural irrigation in Water District No. 130 junior in priority to Rangen's water right no. 36-02551 accrued to the reach of the modeled Thousand Springs area as a whole. The Department's existing ground water model for the ESPA cannot provide accurate simulations of the effects on individual springs in the Thousand Springs area from curtailing individual ground water rights or groups of ground water rights.

76. The Department's existing ground water model for the ESPA provides the best and most technically sound information that is currently available concerning the effects of ground water depletions on spring discharges in the Thousand Springs area. The new ground water model resulting from the reformulation and recalibration described in Finding 4 is expected to provide more detailed information concerning the effects of ground water depletions on spring discharges in the Thousand Springs area. The new ground water model is not expected to be ready for use in making water management decisions until the latter part of 2004.

77. There currently is no other technical basis as accurate as the simulations from the Department's existing ground water model for the ESPA that could be used to determine the amount of reductions in spring discharges in the Thousand Springs area caused by depletions from the diversion and use of ground water under junior priority rights that result in material

injury to senior priority rights to use water from sources provided by such spring discharges. There also is not currently a sufficient basis to determine that the amount of replacement water or mitigation required to offset such depletions in lieu of curtailment is different than the 53,000 acre feet in increased reach gains (spring discharges) that is simulated to result after one year of curtailing water rights for agricultural irrigation in Water District No. 130 that are junior to the July 13, 1962, priority date of Rangen's water right no. 36-02551.

78. The amount of replacement water or other mitigation required that could offset depletions from continued out-of-priority diversion and use of ground water is subject to change and may increase or decrease after 2004, depending on hydrologic conditions, the factors described in Findings 49 and 50, and other additional information that will become available, including simulations using the new ground water model resulting from the reformulation and recalibration described in Finding 4.

79. Assuming a crop mix based on averages for Gooding, Jerome, and Minidoka Counties weighted by area for the years 2000 through 2002 from the National Agricultural Statistics Service, U. S. Department of Agriculture, 80 percent of the consumptive crop irrigation use occurs for irrigation through August 14 for years similar to 2002, using the reference consumptive use measured at the Agrimet Station in Kimberly, Idaho.

79. Matters expressed herein as a Finding of Fact that are later deemed to be a Conclusion of Law are hereby made as a Conclusion of Law.

CONCLUSIONS OF LAW

1. Idaho Code § 42-602, addressing the authority of the Director over the supervision of water distribution within water districts, provides:

> The director of the department of water resources shall have direction and control of the distribution of water from all natural water sources within a water district to the canals, ditches, pumps and other facilities diverting therefrom. Distribution of water within water districts created pursuant to section 42-604, Idaho Code, shall be accomplished by watermasters as provided in this chapter and supervised by the director. The director of the department of water resources shall distribute water in water districts in accordance with the prior appropriation doctrine. The provisions of chapter 6, title 42, Idaho Code, shall apply only to distribution of water within a water district.

2. Idaho Code § 42-603, which grants the Director authority to adopt rules governing water distribution, provides as follows:

> The director of the department of water resources is authorized to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof. Promulgation of rules and regulations shall be in accordance with the procedures of chapter 52, title 67, Idaho Code.

In addition, Idaho Code § 42-1805(8) provides the Director with authority to "promulgate, adopt, modify, repeal and enforce rules implementing or effectuating the powers and duties of the department."

3. It is the duty of a watermaster, acting under the supervision of the Director, to distribute water from the public water supplies within a water district among those holding rights to the use of the water in accordance with the respective priority of the rights subject to applicable Idaho law, including applicable rules promulgated pursuant to the Idaho Administrative Procedure Act. See Idaho Code § 42-607.

4. The Department adopted Conjunctive Management Rules, effective October 7, 1994. IDAPA 37.03.11. The Conjunctive Management Rules prescribe procedures for responding to a delivery call made by the holder of a senior priority surface or ground water right against junior priority ground water rights in an area having a common ground water supply. IDAPA 37.03.11.001.

5. Rule 10 of the Conjunctive Management Rules contains the following pertinent definitions:

> **01. Area Having a Common Ground Water Supply.** A ground water source within which the diversion and use of ground water or changes in ground water recharge affect the flow of water in a surface water source or within which the diversion and use of water by a holder of a ground water right affects the ground water supply available to the holders of other ground water rights. IDAPA 37.03.11.010.01.
>
> **03. Conjunctive Management.** Legal and hydrologic integration of administration of the diversion and use of water under water rights from surface and ground water sources, including areas having a common ground water supply. IDAPA 37.03.11.010.03.
>
> **04. Delivery Call.** A request from the holder of a water right for administration of water rights under the prior appropriation doctrine. IDAPA 37.03.11.010.04.

6. Rule 20 of the Conjunctive Management Rules contains the following pertinent statements of purpose and policies for conjunctive management of surface and ground water resources:

> **01. Distribution of Water Among the Holders of Senior and Junior-Priority Rights.** The rules apply to all situations in the State where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply. IDAPA 37.03.11.020.01.
>
> **02. Prior Appropriation Doctrine.** These rules acknowledge all elements of the prior appropriation doctrine as established by Idaho law. IDAPA 37.03.11.020.02.

04. Delivery Calls. These rules provide the basis and procedure for responding to delivery calls made by the holder of a senior-priority surface or ground water right against the holder of a junior-priority ground water right. The principle of the futile call applies to the distribution of water under these rules. Although a call may be denied under the futile call doctrine, these rules may require mitigation or staged or phased curtailment of a junior-priority use if diversion and use of water by the holder of the junior-priority water right causes material injury, even though not immediately measurable, to the holder of a senior-priority surface or ground water right in instances where the hydrologic connection may be remote, the resource is large and no direct immediate relief would be achieved if the junior-priority water use was discontinued. IDAPA 37.03.11.020.04.

7. Rule 40 of the Conjunctive Management Rules sets forth the following procedures to be followed for responses to calls for water delivery made by the holders of senior priority surface or ground water rights against the holders of junior priority ground water rights from areas having a common ground water supply in an organized water district. IDAPA 37.03.11.040.

01. Responding to a Delivery Call. When a delivery call is made by the holder of a senior-priority water right (petitioner) alleging that by reason of diversion of water by the holders of one or more junior-priority ground water rights (respondents) from an area having a common ground water supply in an organized water district the petitioner is suffering material injury, and upon a finding by the Director as provided in Rule 42 that material injury is occurring, the Director, through the watermaster, shall:

a. Regulate the diversion and use of water in accordance with the priorities of rights of the various surface or ground water users whose rights are included within the district, provided, that regulation of junior-priority ground water diversion and use where the material injury is delayed or long range may, by order of the Director, be phased-in over not more than a five-year period to lessen the economic impact of immediate and complete curtailment; or

b. Allow out-of-priority diversion of water by junior-priority ground water users pursuant to a mitigation plan that has been approved by the Director.

02. Regulation of Uses of Water by Watermaster. The Director, through the watermaster, shall regulate use of water within the water district pursuant to Idaho law and the priorities of water rights as provided in section 42-604, Idaho Code, and under the following procedures:

a. The watermaster shall determine the quantity of surface water of any stream included within the water district which is available for diversion and shall shut the headgates of the holders of junior-priority surface water rights as necessary to assure that water is being diverted and used in accordance with the priorities of the respective water rights from the surface water source.

b. The watermaster shall regulate the diversion and use of ground water in accordance with the rights thereto, approved mitigation plans and orders issued by the Director.

c. Where a call is made by the holder of a senior-priority water right against the

holder of a junior-priority ground water right in the water district the watermaster shall first determine whether a mitigation plan has been approved by the Director whereby diversion of ground water may be allowed to continue out of priority order. If the holder of a junior-priority ground water right is a participant in such approved mitigation plan, and is operating in conformance therewith, the watermaster shall allow the ground water use to continue out of priority.

d. The watermaster shall maintain records of the diversions of water by surface and ground water users within the water district and records of water provided and other compensation supplied under the approved mitigation plan which shall be compiled into the annual report which is required by section 42-606, Idaho Code.

e. Under the direction of the Department, watermasters of separate water districts shall cooperate and reciprocate in assisting each other in assuring that diversion and use of water under water rights is administered in a manner to assure protection of senior-priority water rights provided the relative priorities of the water rights within the separate water districts have been adjudicated.

03. Reasonable Exercise of Rights. In determining whether diversion and use of water under rights will be regulated under Rules 40.01.a., or 40.01.b., the Director shall consider whether the petitioner making the delivery call is suffering material injury to a senior-priority water right and is diverting and using water efficiently and without waste, and in a manner consistent with the goal of reasonable use of surface and ground waters as described in Rule 42. The Director will also consider whether the respondent junior-priority water right holder is using water efficiently and without waste.

04. Actions of the Watermaster under a Mitigation Plan. Where a mitigation plan has been approved as provided in Rule 42, the watermaster may permit the diversion and use of ground water to continue out of priority order within the water district provided the holder of the junior-priority ground water right operates in accordance with such approved mitigation plan.

. . . .

8. Rule 42 of the Conjunctive Management Rules sets forth the factors the Director may consider in determining material injury and the reasonableness of water diversions:

01. Factors the Director may consider in determining whether the holders of water rights are suffering material injury and using water efficiently and without waste include, but are not limited to, the following:

a. The amount of water available in the source from which the water right is diverted.

b. The effort or expense of the holder of the water right to divert water from the source.

c. Whether the exercise of junior-priority ground water rights individually or collectively affects the quantity and timing of when water is available to, and the cost of exercising, a senior-priority surface or ground water right. This may include the seasonal as well as the multi-year and cumulative impacts of all ground water withdrawals from the area having a common ground water supply.

d. If for irrigation, the rate of diversion compared to the acreage of land served, the annual volume of water diverted, the system diversion and conveyance efficiency, and the method of irrigation water application.

e. The amount of water being diverted and used compared to the water rights.

f. The existence of water measuring and recording devices.

g. The extent to which the requirements of the holder of a senior-priority water right could be met with the user's existing facilities and water supplies by employing reasonable diversion and conveyance efficiency and conservation practices; provided, however, the holder of a surface water storage right shall be entitled to maintain a reasonable amount of carry-over storage to assure water supplies for future dry years. In determining a reasonable amount of carry-over storage water, the Director shall consider the average annual rate of fill of storage reservoirs and the average annual carry-over for prior comparable water conditions and the projected water supply for the system.

h. The extent to which the requirements of the senior-priority surface water right could be met using alternate reasonable means of diversion or alternate points of diversion, including the construction of wells or the use of existing wells to divert and use water from the area having a common ground water supply under the petitioner's surface water right priority.

02. The holder of a senior-priority surface or ground water right will be prevented from making a delivery call for curtailment of pumping of any well used by the holder of a junior-priority ground water right where use of water under the junior-priority right is covered by an approved and effectively operating mitigation plan.

9. The Director created Water Districts No. 130 and No. 120 on February 19, 2002, and extended the boundaries of Water Districts No. 130 and No. 120 on January 8, 2003, and January 22, 2004, respectively, to provide for the administration of ground water rights in the area overlying the ESPA in the Thousand Springs area and the American Falls area, pursuant to the provisions of chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights.

10. The Director has appointed watermasters for Water Districts No. 120 and No. 130 to perform the statutory duties of a watermaster in accordance with guidelines, direction, and supervision provided by the Director. The Director has given specific directions to the watermasters for Water Districts No. 120 and No. 130 to curtail illegal diversions, measure and report diversions, and curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

11. The two letters received on September 23 and October 10, 2003, by the Director from J. Dee May, representing Rangen, Inc., seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights" are either delivery calls as defined by Rule 10.04 of the Conjunctive Management Rules against

junior priority ground water rights or demands for the administration of surface water rights pursuant to Idaho Code § 42-607.

12. Rule 40 of the Conjunctive Management Rules applies to the delivery calls made by Rangen against the holders of junior priority ground water rights, but not surface water rights, in Water Districts No. 36A, No. 120, and No. 130.

13. There are no surface water rights in Water Districts No. 36A or No. 130 that are junior in priority to Rangen's water right no. 36-02551 and that are diverted from the same surface water source as right no. 36-02551. There are also no surface water rights in Water District No. 120.

14. There are no ground water rights in Water District No. 36A that are diverted from a source that is hydraulically connected to the source for water right no. 36-02551.

15. Rules 40 and 42 of the Conjunctive Management Rules require the Director to make determinations regarding "material injury" and the "reasonableness of water diversions" in responding to a delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130.

16. The reductions in the quantity of water discharging from springs in the Thousand Springs area attributable to depletions to the ESPA from the diversion and use of ground water in Water Districts No. 120 and No. 130 do not automatically constitute material injury to surface water rights diverting from springs or dependent on sources formed by springs even when the diversion and use of ground water occur under water rights that are junior in priority to such surface water rights. Whether reductions in the quantity of water discharging from springs caused by the diversion and use of ground water under junior priority rights in Water Districts No. 120 and No. 130 constitute material injury is dependent on the factors enumerated in Rule 42 of the Conjunctive Management Rules.

17. Based on simulations using the Department's existing ground water model simulating curtailment of all ground water rights for agricultural irrigation in Water District No. 120 junior in priority to July 13, 1962, there would be no material increase in reach gains (spring discharges) in the Thousand Springs area from such curtailment. Therefore, there are no material contributions to the decreased water supply caused by depletions to the ESPA resulting from diversion and use of ground water in Water District No. 120 under water rights that are junior in priority to water right no. 36-02551, and there is no material injury to water right no. 36-02551 from the diversion and use of ground water for agricultural irrigation under such rights

18. Given the magnitude of the decrease in the spring-dependent water supply currently available to the Rangen hatchery facilities, contributions to the decreased water supply caused by depletions to the ESPA resulting from diversion and use of ground water under water rights in Water District No. 130 that are junior in priority to Rangen's water right no. 36-02551 cause material injury.

19. Rule 42.02 of the Conjunctive Management Rules provides that the holder of a senior priority surface water right is prevented from making a delivery call for curtailment of pumping of any well under a junior priority ground water right if the ground water right is covered by an approved and effectively operating mitigation plan. IDAPA 37.03.11.042.02.

20. There currently is no approved and effectively operating mitigation plan in place to mitigate for reductions in discharges from the springs supplying Rangen's water right no. 36-02551 caused by depletions to the ESPA resulting from diversion and use of ground water under rights in Water District No. 130 that are junior to water right no. 36-02551. Therefore, the delivery call by Rangen for distribution of water to water right no. 36-02551 for use at the Rangen hatchery facilities is recognized.

21. The Department's existing ground water model for the ESPA cannot provide accurate simulations of the effects on individual springs in the Thousand Springs area from curtailing individual ground water rights or groups of ground water rights. There currently is no reliable method or basis for determining the effects of diversion and use of ground water under an individual water right or groups of water rights on individual springs in the Thousand Springs area.

22. Based on simulations using the Department's existing ground water model simulating curtailment of all ground water rights for agricultural irrigation in Water District No. 130 junior in priority to July 13, 1962, reach gains (spring discharges) in the Thousand Springs area would increase by a total of 53,000 acre feet after one year of simulated complete curtailment of such rights in Water District No. 130. To the extent that 53,000 acre feet of replacement water is supplied to increase spring discharges in the Thousand Springs area in 2004, or is used to obtain comparable results, no material injury could be determined to occur to water right no. 36-02551 in 2004 as a result of diversion and use of ground water for agricultural irrigation in Water District No. 130 under rights junior in priority to July 13, 1962.

23. Ground water districts created pursuant to Idaho Code §§ 42-5202 et seq. are specifically authorized by Idaho Code § 42-5224(11) to "... implement mitigation plans designed to mitigate any material injury caused by ground water use within the district upon senior water uses within and/or without the district."

24. Rule 40.02.b of the Conjunctive Management Rules requires the watermaster of Water District No. 130 to "regulate the diversions and use of ground water in accordance with the rights thereto, approved mitigation plans and orders issued by the Director." IDAPA 37.03.11.040.02.b.

ORDER

In response to the water delivery call made by Rangen, Inc., and for the reasons stated in the foregoing Findings of Fact and Conclusions of Law, the Director orders as follows:

IT IS, THEREFORE, HEREBY ORDERED that based on the information currently available to the Director, the watermaster for Water District No. 130 is directed to issue written notices within five (5) days of the date below to all holders of consumptive ground water rights in Water District No. 130 that are junior in priority to July 13, 1962, including consumptive ground water rights for agricultural, commercial, industrial, and municipal or other uses. The written notices are to advise the holders of such consumptive ground water rights of this order and to instruct the holders of such rights that they are not to divert ground water pursuant to their rights beginning April 1, 2004, in accordance with the provisions of Idaho Code §§ 42-602 and 42-607, applicable rules adopted pursuant to Idaho Code § 42-603, and the directions and orders of the Director, unless sufficient replacement water is provided as set forth herein.

IT IS FURTHER ORDERED that holders of consumptive ground water rights in Water District No. 130 that are junior in priority to July 13, 1962, who are members of the North Snake Ground Water District or the Magic Valley Ground Water District (the "Ground Water Districts") will be allowed to divert or continue to divert ground water pursuant to their rights beginning on April 1, 2004, or subsequent date as herein provided, through March 31, 2005, provided the following actions are taken by the Ground Water Districts and the associated conditions are satisfied:

(1) The Ground Water Districts must submit a plan to the Director, which the Director approves by April 1, 2004, for providing Rangen with 16,000 acre feet of replacement water of suitable water quality for use by Rangen, and at a location and time usable by Rangen*.

(2) As an alternative to provision (1), the Ground Water Districts must submit a plan to the Director, which the Director approves by April 1, 2004, for providing replacement water, including surface water used in place of diversion and use of ground water, in the amount of 53,000 acre feet between April 1, 2004, and March 31, 2005, to increase spring discharges in the Thousand Springs area, or is used to obtain comparable results.

(3) In the event a plan for providing replacement water pursuant to either provision (1) or provision (2) is submitted or approved after April 1, 2004, then those rights subject to this Order will not be allowed to divert or continue to divert ground water pursuant to their rights until such plan is approved.

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* This Order is issued in response to the delivery call made by Rangen, Inc. There is at least one other order pending that may cause this action, in and of itself, to be inadequate to avoid curtailment of some portion of consumptive ground water rights in the North Snake and Magic Valley Ground Water Districts that are junior in priority to July 13, 1962.

(4) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, monthly reports documenting the amount, location, and timing for replacement water supplied shall be submitted to the Director on the first of each month following the month in which the Director approves such plan for providing replacement water.

(5) The Director shall evaluate the monthly reports documenting the amount, location, and timing for replacement water supplied by the Ground Water Districts. If at any time the Ground Water Districts are not substantially on schedule to supply the required amount of replacement water in accordance with the plan approved by the Director, except as otherwise provided in provision (6) below, the Director shall determine, based upon the monthly reports and other current water supply information, whether the actions of the districts constitute good faith substantial compliance with the provisions of the water replacement plan. If the Director determines that the Ground Water Districts are not in substantial compliance with the plan, the Director may order the immediate curtailment of all or a portion of the consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962.

(6) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, and the full quantity of replacement water is not supplied, a portion of the replacement water not to exceed 20 percent may be supplied between April 1 and August 31, 2005. Documentation that such portion of the replacement water has been secured for delivery in 2005 must be submitted to the Director by August 1, 2004, and such replacement water shall be provided in addition to any other replacement water that may be required beginning April 1, 2005, by any subsequent order of the Director. This carryover provision is for contingency purposes only and will not be approved as an initial element of a plan to provide replacement water pursuant to either provision (1) or provision (2) above.

(7) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, and the monthly report required to be submitted on August 1, 2004, required in (4) above does not demonstrate that the full quantity of replacement water will be supplied prior to March 31, 2005, and the carryover provisions in (6) above are not satisfied, then all or a portion of consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962, will be curtailed by the watermaster beginning on August 15, 2004, for the remainder of the 2004 irrigation season as follows:

a. If the amount of replacement water confirmed to be supplied prior to March 31, 2005, is 80 percent or less of the amount required herein, then all consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962, will be curtailed beginning on August 15, 2004; or

b. If the amount of replacement water confirmed to be supplied prior to March 31, 2005, is more than 80 percent of the amount required herein, then the priority date for consumptive ground water rights in Water District No. 130 to be curtailed will be adjusted by the Director to a later date such that the curtailed ground water depletion equals the shortfall in the quantity of confirmed replacement water.

IT IS FURTHER ORDERED that the holder of any consumptive ground water right in Water District No. 130 that is junior in priority to July 13, 1962, who is not a member of either the North Snake Ground Water District or the Magic Valley Ground Water District, may petition the Director prior to March 15, 2004, setting forth the reasons why such right holder should not be subject to this order, or proposing a plan to offset the depletions to the ESPA caused by diversion and use of ground water under that holder's water right(s).

IT IS FURTHER ORDERED that any person aggrieved by this decision shall be entitled to a hearing before the Director to contest the action taken provided the person files with the Director, within fifteen (15) days after receipt of written notice of the order, or receipt of actual notice, a written petition stating the grounds for contesting the action and requesting a hearing. Any hearing conducted shall be in accordance with the provisions of chapter 52, title 67, Idaho Code, and the Rules of Procedure of the Department, IDAPA 37.01.01. Judicial review of any final order of the Director issued following the hearing may be had pursuant to Section 42-1701A(4), Idaho Code.

DATED this 25th day of February 2004.

KARL J. DREHER
Director

EXHIBIT E

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF WATER TO WATER RIGHTS NOS. 36-15501, 36-02551, AND 36-07694	))))	**AMENDED ORDER**

This matter comes before the Director of the Department of Water Resources ("Director" or "Department") as a result of a letter dated September 23, 2003, and a subsequent letter dated October 6, 2003. Both letters were from J. Dee May ("May"), an attorney representing Rangen, Inc. The September 23 letter sought administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights" for use at hatchery facilities owned and operated by Rangen near Hagerman, Idaho. Because there are no water rights in Water District No. 36A that are junior in priority to the water rights listed above and divert from the same sources as the listed rights, the Director requested additional clarification concerning the nature of the administration of water rights sought by Rangen. In his October 6 letter, May described the administration sought by Rangen to be the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above." The Director issued an Order on February 25, 2004, in response to these two letters. The Director now enters the following Findings of Fact, Conclusions of Law, and Amended Order with revisions to Findings of Fact Nos. 21, 54, 70, 74, 75, and 77, and Conclusions of Law No. 22.

FINDINGS OF FACT

The Eastern Snake River Plain Aquifer and the Department's Ground Water Model

1. The Eastern Snake River Plain Aquifer ("ESPA") is defined as the aquifer underlying the Eastern Snake River Plain as delineated in the report "Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho," USGS Professional Paper 1408-F, 1992, excluding areas lying both south of the Snake River and west of the line separating Sections 34 and 35, Township 10 South, Range 20 East, Boise Meridian. The ESPA is also defined as an area having a common ground water supply. (See IDAPA 37.03.11.050).

2. The water supply in the ESPA is hydraulically connected to the Snake River and tributary surface water sources at various places and to varying degrees. One of the locations at which a direct hydraulic connection exists between the ESPA and surface water sources tributary to the Snake River is in the Thousand Springs area located at the western edge of the ESPA east and southeast of Hagerman, Idaho.

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3. Simulations using the Department's calibrated computer model of the ESPA show that ground water withdrawals from certain portions of the ESPA for irrigation and other consumptive purposes cause reductions in spring flows tributary to the Kimberly to King Hill (or Thousand Springs) reach of the Snake River, although the reductions in flows from individual springs caused by ground water withdrawals from individual wells or groups of wells cannot be determined using the Department's existing ground water model for the ESPA.

4. Surface and ground water studies for the Eastern Snake River Plain, funded in part by the Idaho Legislature, were recently completed by or on behalf of the Department, with the participation of other public and private entities. These studies provide additional data that is being used to reformulate and recalibrate the ground water model used by the Department to calculate the amount, location, and timing of surface water depletions caused by the withdrawal and use of ground water throughout the plain overlying the ESPA. The purpose for the additional data collection and model reformulation/calibration is to reduce uncertainty in modeled results. Although development of the reformulated and recalibrated ground water model is nearly complete, the model will not be ready for use in making water management determinations until the latter part of 2004. In the meantime, the results from simulations using the Department's existing ground water model provide the best available technical basis for making some water management decisions.

5. The Department is implementing full conjunctive administration of rights to the use of interconnected surface and ground waters within the Eastern Snake River Plain consistent with Idaho law and available information. The results of simulations from the Department's existing ground water model are suitable for determining the area containing those ground water diversions for which the depletion of water from the ESPA results in the most direct and significant reduction in the flow of water from springs tributary to the Snake River in the Thousand Springs reach.

The Thousand Springs Ground Water Management Area and Interim Stipulated Agreement

6. Discharges from springs in the Thousand Springs area have diminished and are expected to be further diminished primarily because of significant reductions in incidental recharge of the ESPA from surface water irrigation, resulting from changes in surface water irrigation systems and application practices (conversion from application by flood irrigation to application by sprinkler systems), and the last four consecutive years of drought. For example, decreases in the springs supplying the Rangen hatchery facilities can be correlated with repairs made to the facilities of the North Side Canal Company to reduce losses of surface water to ground water from the canal company's facilities above those springs in 1987, 1998, and 2000. Spring discharges are also reduced as a result of ground water withdrawals from the ESPA for irrigation and other consumptive purposes that are diverted in relatively close proximity to the area of the springs. When superimposed on diminished spring discharges resulting from changes in surface water irrigation and drought, reductions in spring discharges caused by ground water

depletions under relatively junior priority water rights can potentially cause injury to senior priority water rights dependent on spring sources.

7. On August 3, 2001, the Director issued orders designating the Thousand Springs Ground Water Management Area and the American Falls Ground Water Management Area in exercise of his statutory authorities to administer rights to the use of ground water, in a manner that recognizes and protects senior priority surface water rights in accordance with the directives of Idaho law. In issuing these orders, the Director also announced his intent to issue additional orders prior to September 1, 2001, directing that holders of certain water rights for the use of ground water cease ground water withdrawals beginning March 15, 2002, pursuant to Idaho Code § 42-233b.

8. On August 31, 2001, the Director was advised by representatives of certain holders of senior priority surface water rights and certain holders of junior priority ground water rights that an agreement in principle had been reached under which the holders of junior priority ground water rights agreed to provide replacement surface water for the next two irrigation seasons in an amount equal to what the information then available to the Director indicated would have resulted from the curtailment of ground water diversions intended by the Director within the Thousand Springs Ground Water Management Area, or an appropriate reduction in ground water diversions to the extent that replacement water was not provided.

9. Based upon the representations that an agreement in principle had been reached, the Director announced on August 31, 2001, that no curtailment orders would be issued for the Thousand Springs or American Falls Ground Water Management Areas.

10. After August 31, 2001, representatives of holders of most of the affected ground water rights entered into a detailed, written, stipulated agreement with representatives of certain holders of senior priority surface water rights in the Thousand Springs area titled: "Interim Stipulated Agreement for Areas Within and Near IDWR Administrative Basin 36" (the "Stipulated Agreement"). The Director conditionally approved the Stipulated Agreement by interlocutory order on January 18, 2002. Rangen was not a signatory to the Stipulated Agreement.

11. Under the Stipulated Agreement, the represented holders of senior priority surface water rights agreed not to exercise their senior priorities against the represented holders of junior priority ground water rights in exchange for commitments by the ground water right holders to provide 40,000 acre feet of replacement water during each irrigation season of each year of the two-year term of the Stipulated Agreement as replacement for the estimated increase in the quantity of water that would have been discharged through springs in the Thousand Springs area as a result of curtailment of ground water diversions intended by the Director after six months, based on the Department's simulations of curtailment using the existing ground water model for the ESPA. The estimated increase in the amount of water that would have been discharged through springs in the Thousand Springs area after one full year of curtailment of the ground water diversions intended by the Director, based on the simulations of curtailment using the Department's existing ground water model for the ESPA, is 48,000 acre feet. The replacement

water was to be used to enhance spring flows in the Thousand Springs reach. In the event the full amount of replacement water could not be provided, the Stipulated Agreement provided that the holders of ground water rights would reduce their diversion and use of ground water for irrigation in proportion to the lack of replacement water provided up to a maximum reduction of 10 percent.

12. Under the Stipulated Agreement, the parties also agreed not to oppose the State of Idaho's motion to the District Court for the Snake River Basin Adjudication ("SRBA District Court") requesting authority for the Director to implement interim administration of water rights in Basin 36. Basin 36 is the administrative basin defined by the Department primarily for the purpose of managing surface water and for administering water rights for the use of surface water decreed in proceedings preceding the Snake River Basin Adjudication. Basin 36 includes most of the area in the Thousand Springs Ground Water Management Area. The remaining portion of the Thousand Springs Ground Water Management Area is within the Department's Administrative Basin 37.

13. The holders of ground water rights party to the Stipulated Agreement fully met their obligations under the Stipulated Agreement in 2002 and 2003.

14. On October 10, 2003, the Director issued *Order In the Matter of Distribution of Water to Water Rights Nos. 36-02659, 36-02680, 36-04032A, 36-04032B, 36-04032C, 36-04032D, 36-07004, 36-07080, 36-07167, 36-07176, 36-07725, 36-07731, and 36-08089* in which the Director determined that through his approval of the Stipulated Agreement, he approved the amount of replacement water as being adequate mitigation to the Thousand Springs reach for the depletionary effects of ground water withdrawals for the two-year term of the agreement. By offseting the depletionary effects, any material injury potentially caused by out-of-priority diversion of ground water was adequately mitigated during the term of the Stipulated Agreement.

15. The Stipulated Agreement expired on December 31, 2003, and is no longer in effect.

Creation and Operation of Water Districts No. 120 and No. 130,
And Status of Thousand Springs and American Falls Ground Water Management Areas

16. Consistent with the Stipulated Agreement, the State of Idaho filed a motion with the SRBA District Court on November 19, 2001, requesting an order authorizing the interim administration of water rights by the Director in all or parts of the Department's Administrative Basins 36 and 43 overlying the ESPA in the Thousand Springs area. The State of Idaho also sought authorization for the interim administration of water rights by the Director in all or parts of the Department's Administrative Basins 35 and 41 overlying the ESPA in the American Falls area. On January 8, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued two orders on February 19, 2002, creating Water District No. 120 and Water District No. 130 pursuant to the provisions of Idaho Code § 42-604.

17. On August 30, 2002, the State of Idaho filed a second motion with the SRBA District Court requesting an order authorizing the interim administration of water rights by the Director in the portion of the Department's Administrative Basin 37 overlying the ESPA in the Thousand Springs area. On November 19, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 8, 2003, revising the boundaries of Water District No. 130 to include the portion of Administrative Basin 37 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604. The boundaries for Water District No. 130 encompass the North Snake Ground Water District and most of the Magic Valley Ground Water District.

18. On July 10, 2003, the State of Idaho filed a third motion with the SRBA District Court requesting an order authorizing the interim administration of water rights by the Director in the portion of the Department's Administrative Basin 29 overlying the ESPA in the American Falls area. On October 29, 2003, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 22, 2004, revising the boundaries of Water District No. 120 to include the portion of Administrative Basin 29 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604.

19. Water Districts No. 120 and No. 130 were created, and the respective boundaries revised, to provide for the administration of water rights, pursuant to chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights. As a result, the watermasters for Water Districts No. 120 and No. 130 were given the following duties to be performed in accordance with guidelines, direction, and supervision provided by the Director:

a. Curtail illegal diversions (i.e., any diversion without a water right or in excess of the elements or conditions of a water right);

b. Measure and report the diversions under water rights;

c. Enforce the provisions of any stipulated agreement; and

d. Curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

20. During 2002, in the course of carrying out the duties set forth in Finding 19, the watermaster for Water District No. 130 identified five unauthorized diversions of ground water for uses that were in excess of the beneficial use authorized under a water right or for uses at unauthorized places of use. Pursuant to instructions from the Director, Notices of Violation were issued, Consent Orders entered, and penalties were assessed for each of these five illegal uses of ground water.

21. During 2003, in the course of carrying out the duties set forth in Finding 19, the watermaster for Water District No. 130 identified two additional unauthorized diversions of

ground water; one for violation of a Consent Order entered in 2002, and another for a large expansion in use beyond the beneficial use authorized under a water right. Notices of Violation have been issued for both unauthorized diversions.

22. The Director issued final orders on August 29, 2003, dissolving the Thousand Springs Ground Water Management Area and reducing the area of the American Falls Ground Water Management Area. Even though spring discharges in the Thousand Springs area have generally not improved since 2001 when the Thousand Springs Ground Water Management Area was designated, the Director determined that the Thousand Springs Ground Water Management Area was no longer necessary and preserving the original area of the American Falls Ground Water Management Area was no longer necessary to administer water rights for the protection of senior surface and ground water rights because administration of such rights is now accomplished through the operation of Water Districts No. 120 and No. 130.

The Conjunctive Management Rules

23. Idaho Code § 42-603 authorizes the Director "to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof." Promulgation of such rules and regulations must be in accordance with the procedures of chapter 52, title 67, Idaho Code.

24. On October 7, 1994, the Director issued *Order Adopting Final Rules*; the *Rules for Conjunctive Management of Surface and Ground Water Resources* (IDAPA 37.03.11) ("Conjunctive Management Rules"), promulgated pursuant to chapter 52, title 67, Idaho Code, and Idaho Code § 42-603.

25. The Conjunctive Management Rules "apply to all situations in the state where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply." IDAPA 37.03.11.020.01.

26. The Conjunctive Management Rules "acknowledge all elements of the prior appropriation doctrine as established by Idaho law." IDAPA 37.03.11.020.02.

27. The Conjunctive Management Rules "may require mitigation or staged or phased curtailment of a junior-priority use if diversion and use of water by the holder of the junior-priority water right causes material injury, even though not immediately measurable, to the holder of a senior-priority surface or ground water right ... ." IDAPA 37.03.11.020.04.

28. Pursuant to Idaho Code § 67-5291, the Conjunctive Management Rules were submitted to the 1st Regular Session of the 53rd Idaho Legislature (1995 session). During no legislative session, beginning with the 1st Regular Session of the 53rd Idaho Legislature, have the

Conjunctive Management Rules been rejected, amended, or modified by the Idaho Legislature. Therefore, the Conjunctive Management Rules are final and effective.

The Letters Submitted on Behalf of Rangen Seeking Administration of Water Rights and Application of the Conjunctive Management Rules

29. On September 23, 2003, the Director received a letter from May representing Rangen, Inc. seeking the administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights."

30. On September 25, 2003, the Director responded to the letter of September 23, 2003, from May requesting "additional clarification concerning the nature of the administration of water rights in Water District 36A" being sought, since "there are no water rights in Water District No. 36A that are junior in priority to the listed rights and divert from the same sources as the listed rights."

31. On October 10, 2003, the Director received a second letter from May dated October 6, 2003. In that letter, May clarified that Rangen was seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above."

32. The water rights held by Rangen that Rangen sought to have protected by the administration of junior priority water rights are as follows pursuant to decrees issued by the SRBA District Court:

Water Right No.:	36-15501	36-02551	36-07694
Priority Date:	July 1, 1957	July 13, 1962	April 12, 1977
Beneficial Use:	Fish Propagation	Domestic (0.1 cfs) and Fish Propagation (48.54 cfs)	Fish Propagation
Diversion Rate:	1.46 cfs	48.54 cfs	26.00 cfs
Period of Use:	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31

33. Rule 10.04 of the Conjunctive Management Rules defines a "delivery call" as: "A request from the holder of a water right for administration of water rights under the prior appropriation doctrine." The two letters from May seeking administration of water rights interfering with and impacting Rangen's water rights described in Findings 29 and 31 come within the definition of a delivery call.

34. Water Districts No. 36A, No. 120, and No. 130 were created pursuant to Idaho Code § 42-604. Water District No. 36A contains water rights senior in priority to Rangen's

water rights that divert from a portion of the same sources as Rangen's water rights as well as water rights that divert from other sources, most of which are hydraulically connected but some of which are not hydraulically connected to the sources for Rangen's water rights. Although some of the other sources are hydraulically connected to the sources for Rangen's water rights, water rights diverted from those sources do not interfere with and impact Rangen's water rights. Therefore, there are no water rights in Water District No. 36A that can be administered to prevent injury to Rangen's rights.

35. Water District No. 120 contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the source for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

36. Water District No. 130 contains surface water rights that divert from sources that are hydraulically connected to the sources for Rangen's water rights but do not interfere with or impact Rangen's water rights. Water District No. 130 also contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the sources for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

37. Rule 40 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights from Areas Having a Common Ground Water Supply in an Organized Water District." Rule 40 applies to the delivery calls made by Rangen against the holders of junior priority ground water rights in both Water District No. 120 and Water District No. 130.

38. Some of the junior priority ground water rights that could potentially interfere with and potentially impact Rangen's water rights are not in a water district created pursuant to the provisions of Idaho Code § 42-604 because a final decree has not been issued by the SRBA District Court and the requirements for interim administration of these rights pursuant to Idaho Code § 42-1417 have not been met. Also, some of the junior priority ground water rights that could potentially interfere with and potentially impact Rangen's water rights are in the American Falls Ground Water Management Area described in Findings 7 and 22.

39. Rule 30 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights Within Areas of the State Not in Organized Water Districts or Within Water Districts Where Ground Water Regulation Has Not Been Included in the Function of Such Districts or Within Areas That Have Not Been Designated Ground Water Management Areas."

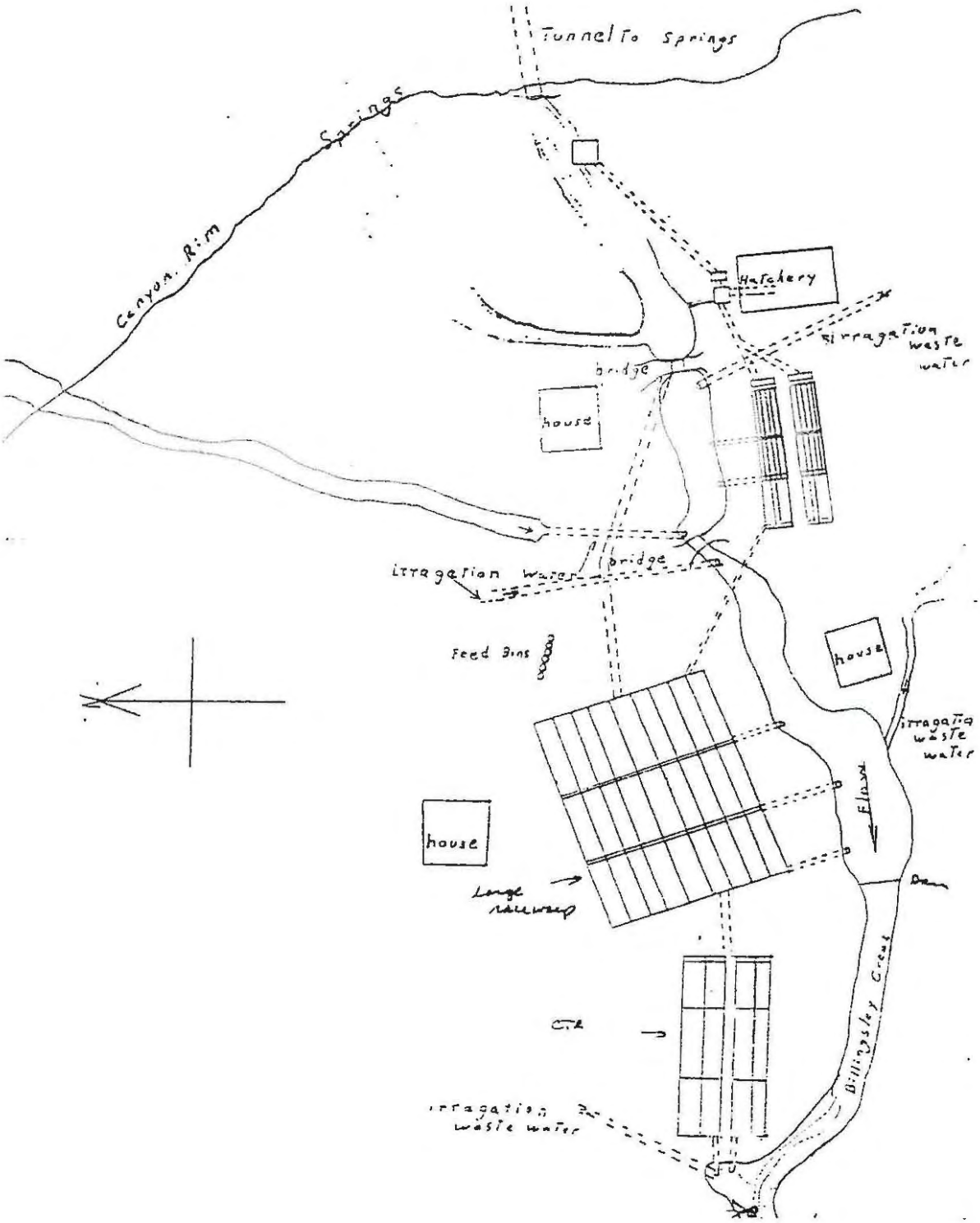
40. Rule 41 of the Conjunctive Management Rules is titled "Administration of Diversion and Use of Water Within a Ground Water Management Area."

41. The two letters from May, described in Findings 29 and 31, seeking administration of water rights interfering with and impacting Rangen's water rights did not meet the requirements set forth in Rule 30 of the Conjunctive Management Rules. Also, the two letters from May did not seek administration of junior priority ground water rights in the American Falls Ground Water Management Area as provided in Rule 41 of the Conjunctive Management Rules. Pursuant to Rule 41, such administration could not occur until the irrigation season of 2005, even if material injury to Rangen's rights was determined to be occurring as a result of diversion and use of ground water under junior priority rights in the American Falls Ground Water Management Area.

42. While Rule 40 of the Conjuctive Management Rules is applicable to the two letters from May, described in Findings 29 and 31, neither Rule 40 nor any other provisions of the Conjunctive Management Rules are applicable to delivery calls or demands for water distribution by the holder of a senior priority water right against the holder of a junior priority surface water right.

43. On October 17, 2003, the Director provided a letter to May initially responding to May's letter of October 10, 2003, described in Finding 31, making a delivery call by seeking administration of water rights interfering with and impacting Rangen's water rights. In his October 17 letter, the Director advised that determinations regarding "material injury" and "reasonableness of water diversions" would be made pursuant to Rule 40 and Rule 42 of the Conjunctive Management Rules in responding to the delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130. In his October 17 letter, the Director also requested that he be provided copies of "all historical records of the amounts of water diverted under the listed rights as soon as practicable." Such records were not available to the Director for diversions under Rangen's water rights prior to 1995 because prior to 1995, the Department did not require the measurement and reporting of diversions under Rangen's rights and most other water rights that were not in organized water districts created pursuant to Idaho Code § 42-604.

44. On November 21, 2003, May transmitted on behalf of Rangen historical records of flow through the hatchery facilities owned and operated by Rangen. Included was the following sketch depicting the layout of the Rangen hatchery facilities, a summary of flows on a monthly basis, and records of periodic flow measurements beginning in 1966 through part of 2003.



Rangen Hatchery Facilities
Hagerman, Idaho

45. The flow measurements that are considered to be representative of the total supply of water available to the Rangen hatchery facilities under water rights nos. 36-15501, 36-02551, and 36-07694, consist of the sum of the discharge from raceways designated by Rangen as the "CTR" raceways and the flow over the check "Dam." The dam is sited upstream from the discharge points from the CTR raceways and downstream from the discharge points from raceways designated by Rangen as the "Large" raceways. The sum of the discharge from the CTR raceways and the flow over the check dam is considered to be representative of the total supply of water available even though at times some of the flow over the check dam may include water flowing from small springs downstream from the diversion to the Large raceways, water discharged from the Large raceways that was not diverted through the CTR raceways, and irrigation return flows.

46. The records of flow measurements submitted by May on behalf of Rangen for the years 1966 through 1974 consist of measurements or estimates of discharges from the Curran Spring made by George Lemmon, a former watermaster for Water District No. 36A. These recorded flows are not representative of the total supply of water available to the Rangen hatchery facilities because water rights for irrigation that are senior in priority to Rangen's rights are entitled to divert the first portion of the discharge from the Curran Spring during the irrigation season. In addition, the recorded flows do not include discharges from springs downstream of the Curran Spring that are upstream of Rangen's diversion to the Large raceways.

47. Without further explanation from Rangen, the Department can not confirm that the records of flow measurements submitted by May on behalf of Rangen for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities. Based on subsequent findings in this order, however, it is not necessary to confirm whether the flow measurements for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities.

Authorized Diversion Rate for Water Rights Nos. 36-15501, 36-02551, and 36-07694

48. Springs discharging in the Thousand Springs area do not discharge at a constant rate or at a rate that progressively increases or decreases from year to year. While there are overall increases or decreases in the discharge from individual springs between years (inter-year variations), there are also pronounced within-year or intra-year variations in discharge from individual springs.

49. Simplistically, overall variations between years in the discharge of springs in the Thousand Springs area result from differences between the amounts of ground water depletions and recharge to the ESPA above the springs, with delays in the response of spring discharge ranging at the extremes from days to decades depending on the proximity of ground water depletions and recharge as well as geologic and hydraulic characteristics of the ESPA. Factors affecting overall variations between years in the cumulative discharge from springs in the Thousand Springs area as well as from individual springs include but are not necessarily limited to: variations in surface water supplies available for irrigation above the ESPA, which affect

cropping decisions and the amount of incidental recharge to the ESPA; changes in the amounts and timing of tributary underflow to the ESPA, which also reflect numerous variations upgradient from where tributary underflow contributes to the ESPA; inter-year variations in precipitation and temperature, which not only affect the amount of surface water used above the ESPA and associated incidental recharge to the ESPA, but also affect the quantity of ground water withdrawals and depletions from the ESPA; and differences between years in the quantity of intentional or managed recharge to the ESPA.

50. Intra-year variations in the discharge from individual springs result from the factors described in Finding 49 but also from other factors including: variations in surface water application above the ESPA and associated incidental recharge in response to seasonal changes in precipitation and temperature; variations in timing of ground water withdrawals and depletions from the ESPA in close proximity to individual springs; and the timing of intentional or managed recharge to the ESPA in close proximity to individual springs.

51. While both the regional and local factors affecting inter-year and intra-year variations in spring discharge are generally understood, the interactions between these factors are complex and the specific effects of individual factors and various combinations of factors on the discharge from individual springs are not presently quantifiable.

52. Both inter-year and intra-year variations in the discharge from the springs that are the sources for water rights nos. 36-15501, 36-02551, and 36-07694 existed when appropriations for these rights were initiated (July 1, 1957; July 31, 1962; and April 12, 1977; respectively). Furthermore, the authorized diversion rates for water rights nos. 36-02551 and 36-07694 were licensed based on when the discharges from the springs that are the source for these rights were at or near the maximum intra-year discharges during the years for which the extent of beneficial use was deemed to be established or confirmed (November 1962 for 36-02551 and October 1972 for 36-07694), although erroneously for water right no. 36-07694 (see Findings 53 and 54 below). There are no other measurements of the total supply of water available to the Rangen hatchery facilities in 1962, nor any other means for determining the intra-year variations in the discharges from the springs comprising the source for water right no. 36-02551.

53. Water right no. 36-07694 was licensed on September 19, 1985, and has an authorized diversion rate of 26.00 cfs. The authorized diversion rate, as licensed, was not based on measurements of the amount of water actually diverted and applied to beneficial use. Rather, the authorized diversion rate was based on an estimate (not an actual measurement) made by George Lemon, a former watermaster for Water District No. 36A, of the discharge from the Curran Spring at or near its seasonal maximum flow in October of 1972. This estimate of the discharge from the Curran Spring was made nearly 5 years before the application for permit to appropriate water was filed for water right no. 36-07694.

54. Based on available records, there was not water available for appropriation at the time or subsequent to the date of appropriation for water right no. 36-07694. Therefore, the Department erred in licensing water right no. 36-07694, and should not have recommended this right for decree in the SRBA. Nonetheless, since the SRBA District Court decreed water right

no. 36-07694, Rangen may be entitled to divert water under this right when such water is physically available. However, because water was not available to appropriate on the date of appropriation for right no. 36-07694, Rangen may not be entitled to have a delivery call recognized against junior priority water rights.

55. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities and the records maintained by the Department since 1995 show that the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) has been sufficient to continuously fill water right no. 36-15501 at the authorized diversion rate of 1.46 cfs.

56. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities show that 1987 was the last year in which the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) was sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs, when the cumulative discharges from springs supplying the Rangen hatchery facilities were at seasonal maximums (November). Since 1987, the quantity of water available at the Rangen hatchery facilities has not been sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs although in 1997 and 1998, the seasonal maximum quantity of water available came within about 5 cfs (or about 10 percent) of the authorized diversion rate.

57. The rates of diversion authorized pursuant to water rights nos. 36-15501 and 36-02551 (1.46 cfs and 48.54 cfs, respectively) are not quantity entitlements that are guaranteed to be available to Rangen. Rather, the authorized rates of diversion are the maximum rates at which water can be diverted under these rights, respectively, when such quantities of water are physically available and the rights are in priority. Rangen can not call for the curtailment of junior priority water rights at all times that insufficient water is physically available to fill water rights no. 36-02551 or no. 36-07694 at the authorized rates of diversion. Rangen is not entitled to a water supply that is enhanced beyond the conditions that existed at the time such rights were established; i.e., Rangen can not call for the curtailment of junior priority water rights simply because seasonally the discharge from springs is less than the authorized rates of diversion for Rangen's rights unless such seasonal variations are caused by depletions resulting from diversion and use of water under junior priority rights.

58. Rangen can only call for the distribution of water to its rights through the curtailment of junior priority ground water rights from the hydraulically-connected ESPA when such curtailment would result in a usable amount of water reaching Rangen's points of diversion in time of need, and depletions causing material injury as a result of diversion and use of ground water under such junior priority rights have not been adequately mitigated.

59. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the following table summarizes the maximum daily flow and average daily flow by month for the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) in 1987 and 2003. The year 1987 was the last year within which the discharge from springs supplying the Rangen hatchery facilities at the seasonal maximum (November) was sufficient to fill water rights nos. 36-15501 and 36-02551 at the cumulative authorized diversion rate of 50 cfs, and 2003 was the last year for which complete data are available.

Month	Year	Maximum Daily Flow	Average Daily Flow
January	1987	44.25 cfs	44.25 cfs
	2003	17.49	16.60
February	1987	42.89	39.75
	2003	16.15	15.07
March	1987	NM*	NM*
	2003	14.56	13.82
April	1987	32.52	28.55
	2003	13.45	12.81
May	1987	23.97	23.29
	2003	13.14	12.89
June	1987	30.43	27.58
	2003	13.00	12.59
July	1987	30.91	29.09
	2003	12.16	11.61
August	1987	40.13	36.70
	2003	12.49	12.02
September	1987	47.94	40.06
	2003	16.97	14.92
October	1987	46.93	46.93
	2003	19.26	18.30
November	1987	50.08	46.52
	2003	19.20	18.20
December	1987	44.39	44.22
	2003	17.10	16.10

*NM = No measurement

60. Comparing same-month maximum daily and average daily flows representing the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) between years for the years shown above demonstrates that there have been significant decreases in the water supply available to the Rangen hatchery facilities between 1987 and 2003. Flow measurements for the other years between 1987 and 2003 not shown above demonstrate that the water supply available to the Rangen hatchery facilities generally decreased from 1990 through 1996, rebounded in 1997 and 1998, and then significantly decreased again after 1998 to record lows by 2002 and 2003 for the post-1981 time period.

61. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the quantity of water available at the source for

water right no. 36-15501 with the priority date of July 1, 1957, is currently sufficient to fill this right at the authorized diversion rate of 1.46 cfs. (See IDAPA 37.03.11.042.01.a).

62. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, and taking into account the variations in spring flows between months that have existed since the date of appropriation for water right no. 36-02551, the quantity of water available at the source for water right no. 36-02551 with the priority date of July 13, 1962, is currently insufficient to fill this right at the authorized diversion rate of 48.54 cfs, even during months when the springs providing the source for this right are discharging at the highest seasonal flows during the year, generally October through January. Based on differences between average monthly flows for the years 1987 and 2003, the estimated annual decrease in the quantity of water available at the source for water right no. 36-02551 for 2003 is 16,000 acre feet. The annual shortage in the quantity of water available at the source for water right no. 36-02551 for 2004 is expected to be similar. (See IDAPA 37.03.11.042.01.a).

63. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, the quantity of water available at the source for water right no. 36-07694 with the priority date of April 12, 1977, is wholly insufficient to fill this right at the authorized diversion rate of 26.00 cfs, even during months when the springs providing the source of water for this right are discharging at the highest seasonal flows during the year, generally October through January. As described in Findings 53 and 54, there was not any water available for appropriation at the time or subsequent to the time that the application for permit to appropriate water for water right no. 36-07694 was filed. (See IDAPA 37.03.11.042.01.a).

64. Based on the results from field inspections conducted on November 25, 2003, by the watermaster for Water District No. 130 and Brian Patton, a registered professional civil engineer, Rangen has expended reasonable efforts to divert water for right no. 36-02551 from its source for use at the Rangen hatchery facilities. (See IDAPA 37.03.11.042.01.b).

65. Based on simulations using the Department's existing ground water model for the ESPA, the diversion and use of ground water under water rights having priority dates later than the priority date for water right no. 36-02551 (July 13, 1962) do affect the quantity and timing of when water is available from springs discharging in the Thousand Springs area. (See IDAPA 37.03.11.042.01.c).

66. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2003, as well as the field investigations on November 25, 2003, described in Finding 64, Rangen is currently diverting and using surface water within the

authorized diversion rate for water rights nos. 36-15501 and 36-02551 (50 cfs total). (See IDAPA 37.03.11.042.01.e)

67. Based on the field investigations on November 25, 2003, described in Finding 64, the Rangen hatchery facilities have marginally adequate water measuring and recording devices. However, the watermaster for Water District No. 130 reports that the amounts of water diverted to domestic and irrigation uses is not measured, and the measurements of flows through hatchery raceways reported by Rangen may be systematically about 10 percent lower than actual flows. (See IDAPA 37.03.11.042.01.f).

68. Based on the results from the field inspection on November 25, 2003, described in Finding 64, two potential modifications to the existing Rangen hatchery facilities were identified that could increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. However, the combined additional flow that could be diverted is estimated to be 0.64 cfs, which is not significant given the shortages in water supply shown and described in Findings 59 and 60. (See IDAPA 37.03.11.042.01.g).

69. Based on the results from the field inspection on November 25, 2003, described in Finding 64, there are actions that potentially could provide alternate means of diversion or alternate points of diversion to increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. However, the feasibility of these actions is unknown and it is not clear that the actions identified would result in a sufficient increase in the water supply available to fill water right no. 36-02551. Therefore, it can not be determined at the present time whether there are alternate reasonable means of diversion or alternate points of diversion that should be pursued. (See IDAPA 37.03.11.042.01.h).

70. Given the magnitude of the decreases in the water supply available to the Rangen hatchery facilities between 1987 and 2003, shown and described in Findings 59 and 60, and given the facts set forth in Findings 64 through 69, material contributions to the decreased water supply available to the Rangen hatchery facilities caused by depletions to the ESPA resulting from diversion and use of ground water under water rights that are junior in priority to Rangen's water right no. 36-02551 cause material injury. The maximum extent of the material injury can not be more than the decrease in the quantity of water available at the source for water right no. 36-02551, which is currently estimated to be 16,000 acre feet per year (see Finding 62). The extent of material injury is dependent on the factors described in Findings 49 and 50, which can vary significantly from year to year. If material injury to Rangen's water right no. 36-02551 occurs beyond 2004, the amount of material injury must be determined on an annual basis, and will be set forth in subsequent order(s) as necessary.

Effects of Curtailing Ground Water Diversions Under Rights Junior to Water Right No. 36-02551

71. The Department's existing ground water model was used to simulate the effects of curtailing all diversions and use of ground water for agricultural irrigation purposes in Water

Districts No. 120 and No. 130, pursuant to water rights that are junior in priority to Rangen's water right no. 36-02551, which has a priority date of July 13, 1962.

72. Only ground water diverted and used for agricultural irrigation purposes was included in the modeled curtailment simulation. Disregarding the priority dates of ground water rights from the ESPA, the Department has determined that agricultural irrigation using ground water results in 93.5 percent of the total consumptive use causing depletions to the ESPA that contributes to reduced reach gains (or spring discharges) in the Thousand Springs area and reaches of the Snake River that are hydraulically connected to the ESPA. Uses pursuant to all ground water rights from the ESPA for commercial, municipal, domestic, and other purposes besides agricultural irrigation have been determined by the Department to cause depletions to the ESPA of 1.5 percent, 4 percent, 0.5 percent, and 0.5 percent of the total depletions to the ESPA, respectively.

73. The results from the simulated curtailment described in Findings 71 and 72 showed no significant simulated increases in reach gains (spring discharges) in the Thousand Springs area from simulated complete curtailment of ground water rights for agricultural irrigation junior in priority to July 13, 1962, in Water District No. 120 at any time period following simulated curtailment. Therefore, depletions to the ESPA from the diversion and use of ground water in Water District No. 120 under water rights junior in priority to July 13, 1962, do not cause material injury to Rangen's water right no. 36-02551.

74. The results from the simulated curtailment described in Findings 71 and 72 showed an increase in reach gains (spring discharges) in the Thousand Springs area of 26,500 acre feet after one year of simulated complete curtailment of ground water rights for agricultural irrigation junior in priority to July 13, 1962, in Water District No. 130.

75. The 26,500 acre feet of increased reach gain (spring discharges) that resulted from simulated curtailment of ground water diversion and use under water rights for agricultural irrigation in Water District No. 130 junior in priority to Rangen's water right no. 36-02551 accrued to the reach of the modeled Thousand Springs area as a whole. The Department's existing ground water model for the ESPA cannot provide accurate simulations of the effects on individual springs in the Thousand Springs area from curtailing individual ground water rights or groups of ground water rights.

76. The Department's existing ground water model for the ESPA provides the best and most technically sound information that is currently available concerning the effects of ground water depletions on spring discharges in the Thousand Springs area. The new ground water model resulting from the reformulation and recalibration described in Finding 4 is expected to provide more detailed information concerning the effects of ground water depletions on spring discharges in the Thousand Springs area. The new ground water model is not expected to be ready for use in making water management decisions until the latter part of 2004.

77. There currently is no other technical basis as accurate as the simulations from the Department's existing ground water model for the ESPA that could be used to determine the

amount of reductions in spring discharges in the Thousand Springs area caused by depletions from the diversion and use of ground water under junior priority rights that result in material injury to senior priority rights to use water from sources provided by such spring discharges. There also is not currently a sufficient basis to determine that the amount of replacement water or mitigation required to offset such depletions in lieu of curtailment is different than the 26,500 acre feet in increased reach gains (spring discharges) that is simulated to result after one year of curtailing water rights for agricultural irrigation in Water District No. 130 that are junior to the July 13, 1962, priority date of Rangen's water right no. 36-02551.

78. The amount of replacement water or other mitigation required that could offset depletions from continued out-of-priority diversion and use of ground water is subject to change and may increase or decrease after 2004, depending on hydrologic conditions, the factors described in Findings 49 and 50, and other additional information that will become available, including simulations using the new ground water model resulting from the reformulation and recalibration described in Finding 4.

79. Assuming a crop mix based on averages for Gooding, Jerome, and Minidoka Counties weighted by area for the years 2000 through 2002 from the National Agricultural Statistics Service, U. S. Department of Agriculture, 80 percent of the consumptive crop irrigation use occurs for irrigation through August 14 for years similar to 2002, using the reference consumptive use measured at the Agrimet Station in Kimberly, Idaho.

79. Matters expressed herein as a Finding of Fact that are later deemed to be a Conclusion of Law are hereby made as a Conclusion of Law.

CONCLUSIONS OF LAW

1. Idaho Code § 42-602, addressing the authority of the Director over the supervision of water distribution within water districts, provides:

> The director of the department of water resources shall have direction and control of the distribution of water from all natural water sources within a water district to the canals, ditches, pumps and other facilities diverting therefrom. Distribution of water within water districts created pursuant to section 42-604, Idaho Code, shall be accomplished by watermasters as provided in this chapter and supervised by the director. The director of the department of water resources shall distribute water in water districts in accordance with the prior appropriation doctrine. The provisions of chapter 6, title 42, Idaho Code, shall apply only to distribution of water within a water district.

2. Idaho Code § 42-603, which grants the Director authority to adopt rules governing water distribution, provides as follows:

> The director of the department of water resources is authorized to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of

the rights of the users thereof. Promulgation of rules and regulations shall be in accordance with the procedures of chapter 52, title 67, Idaho Code.

In addition, Idaho Code § 42-1805(8) provides the Director with authority to "promulgate, adopt, modify, repeal and enforce rules implementing or effectuating the powers and duties of the department."

3. It is the duty of a watermaster, acting under the supervision of the Director, to distribute water from the public water supplies within a water district among those holding rights to the use of the water in accordance with the respective priority of the rights subject to applicable Idaho law, including applicable rules promulgated pursuant to the Idaho Administrative Procedure Act. See Idaho Code § 42-607.

4. The Department adopted Conjunctive Management Rules, effective October 7, 1994. IDAPA 37.03.11. The Conjunctive Management Rules prescribe procedures for responding to a delivery call made by the holder of a senior priority surface or ground water right against junior priority ground water rights in an area having a common ground water supply. IDAPA 37.03.11.001.

5. Rule 10 of the Conjunctive Management Rules contains the following pertinent definitions:

> **01. Area Having a Common Ground Water Supply**. A ground water source within which the diversion and use of ground water or changes in ground water recharge affect the flow of water in a surface water source or within which the diversion and use of water by a holder of a ground water right affects the ground water supply available to the holders of other ground water rights. IDAPA 37.03.11.010.01.
>
> **03. Conjunctive Management**. Legal and hydrologic integration of administration of the diversion and use of water under water rights from surface and ground water sources, including areas having a common ground water supply. IDAPA 37.03.11.010.03.
>
> **04. Delivery Call**. A request from the holder of a water right for administration of water rights under the prior appropriation doctrine. IDAPA 37.03.11.010.04.

6. Rule 20 of the Conjunctive Management Rules contains the following pertinent statements of purpose and policies for conjunctive management of surface and ground water resources:

> **01. Distribution of Water Among the Holders of Senior and Junior-Priority Rights.** The rules apply to all situations in the State where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply. IDAPA 37.03.11.020.01.

02. Prior Appropriation Doctrine. These rules acknowledge all elements of the prior appropriation doctrine as established by Idaho law. IDAPA 37.03.11.020.02.

04. Delivery Calls. These rules provide the basis and procedure for responding to delivery calls made by the holder of a senior-priority surface or ground water right against the holder of a junior-priority ground water right. The principle of the futile call applies to the distribution of water under these rules. Although a call may be denied under the futile call doctrine, these rules may require mitigation or staged or phased curtailment of a junior-priority use if diversion and use of water by the holder of the junior-priority water right causes material injury, even though not immediately measurable, to the holder of a senior-priority surface or ground water right in instances where the hydrologic connection may be remote, the resource is large and no direct immediate relief would be achieved if the junior-priority water use was discontinued. IDAPA 37.03.11.020.04.

7. Rule 40 of the Conjunctive Management Rules sets forth the following procedures to be followed for responses to calls for water delivery made by the holders of senior priority surface or ground water rights against the holders of junior priority ground water rights from areas having a common ground water supply in an organized water district. IDAPA 37.03.11.040.

01. Responding to a Delivery Call. When a delivery call is made by the holder of a senior-priority water right (petitioner) alleging that by reason of diversion of water by the holders of one or more junior-priority ground water rights (respondents) from an area having a common ground water supply in an organized water district the petitioner is suffering material injury, and upon a finding by the Director as provided in Rule 42 that material injury is occurring, the Director, through the watermaster, shall:

a. Regulate the diversion and use of water in accordance with the priorities of rights of the various surface or ground water users whose rights are included within the district, provided, that regulation of junior-priority ground water diversion and use where the material injury is delayed or long range may, by order of the Director, be phased-in over not more than a five-year period to lessen the economic impact of immediate and complete curtailment; or

b. Allow out-of-priority diversion of water by junior-priority ground water users pursuant to a mitigation plan that has been approved by the Director.

02. Regulation of Uses of Water by Watermaster. The Director, through the watermaster, shall regulate use of water within the water district pursuant to Idaho law and the priorities of water rights as provided in section 42-604, Idaho Code, and under the following procedures:

a. The watermaster shall determine the quantity of surface water of any stream included within the water district which is available for diversion and shall shut the headgates of the holders of junior-priority surface water rights as necessary to assure that water is being diverted and used in accordance with the priorities of the respective water rights from the surface water source.

b. The watermaster shall regulate the diversion and use of ground water in accordance with the rights thereto, approved mitigation plans and orders issued by the Director.

c. Where a call is made by the holder of a senior-priority water right against the holder of a junior-priority ground water right in the water district the watermaster shall first determine whether a mitigation plan has been approved by the Director whereby diversion of ground water may be allowed to continue out of priority order. If the holder of a junior-priority ground water right is a participant in such approved mitigation plan, and is operating in conformance therewith, the watermaster shall allow the ground water use to continue out of priority.

d. The watermaster shall maintain records of the diversions of water by surface and ground water users within the water district and records of water provided and other compensation supplied under the approved mitigation plan which shall be compiled into the annual report which is required by section 42-606, Idaho Code.

e. Under the direction of the Department, watermasters of separate water districts shall cooperate and reciprocate in assisting each other in assuring that diversion and use of water under water rights is administered in a manner to assure protection of senior-priority water rights provided the relative priorities of the water rights within the separate water districts have been adjudicated.

03. Reasonable Exercise of Rights. In determining whether diversion and use of water under rights will be regulated under Rules 40.01.a., or 40.01.b., the Director shall consider whether the petitioner making the delivery call is suffering material injury to a senior-priority water right and is diverting and using water efficiently and without waste, and in a manner consistent with the goal of reasonable use of surface and ground waters as described in Rule 42. The Director will also consider whether the respondent junior-priority water right holder is using water efficiently and without waste.

04. Actions of the Watermaster under a Mitigation Plan. Where a mitigation plan has been approved as provided in Rule 42, the watermaster may permit the diversion and use of ground water to continue out of priority order within the water district provided the holder of the junior-priority ground water right operates in accordance with such approved mitigation plan.

. . . .

8. Rule 42 of the Conjunctive Management Rules sets forth the factors the Director may consider in determining material injury and the reasonableness of water diversions:

01. Factors the Director may consider in determining whether the holders of water rights are suffering material injury and using water efficiently and without waste include, but are not limited to, the following:

a. The amount of water available in the source from which the water right is diverted.

b. The effort or expense of the holder of the water right to divert water from the source.

c. Whether the exercise of junior-priority ground water rights individually or collectively affects the quantity and timing of when water is available to, and the cost of exercising, a senior-priority surface or ground water right. This may include the seasonal as well as the multi-year and cumulative impacts of all ground water withdrawals from the area having a common ground water supply.

d. If for irrigation, the rate of diversion compared to the acreage of land served, the annual volume of water diverted, the system diversion and conveyance efficiency, and the method of irrigation water application.

e. The amount of water being diverted and used compared to the water rights.

f. The existence of water measuring and recording devices.

g. The extent to which the requirements of the holder of a senior-priority water right could be met with the user's existing facilities and water supplies by employing reasonable diversion and conveyance efficiency and conservation practices; provided, however, the holder of a surface water storage right shall be entitled to maintain a reasonable amount of carry-over storage to assure water supplies for future dry years. In determining a reasonable amount of carry-over storage water, the Director shall consider the average annual rate of fill of storage reservoirs and the average annual carry-over for prior comparable water conditions and the projected water supply for the system.

h. The extent to which the requirements of the senior-priority surface water right could be met using alternate reasonable means of diversion or alternate points of diversion, including the construction of wells or the use of existing wells to divert and use water from the area having a common ground water supply under the petitioner's surface water right priority.

02. The holder of a senior-priority surface or ground water right will be prevented from making a delivery call for curtailment of pumping of any well used by the holder of a junior-priority ground water right where use of water under the junior-priority right is covered by an approved and effectively operating mitigation plan.

9. The Director created Water Districts No. 130 and No. 120 on February 19, 2002, and extended the boundaries of Water Districts No. 130 and No. 120 on January 8, 2003, and January 22, 2004, respectively, to provide for the administration of ground water rights in the area overlying the ESPA in the Thousand Springs area and the American Falls area, pursuant to the provisions of chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights.

10. The Director has appointed watermasters for Water Districts No. 120 and No. 130 to perform the statutory duties of a watermaster in accordance with guidelines, direction, and supervision provided by the Director. The Director has given specific directions to the watermasters for Water Districts No. 120 and No. 130 to curtail illegal diversions, measure and report diversions, and curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

11. The two letters received on September 23 and October 10, 2003, by the Director from J. Dee May, representing Rangen, Inc., seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights" are either delivery calls as defined by Rule 10.04 of the Conjunctive Management Rules against junior priority ground water rights or demands for the administration of surface water rights pursuant to Idaho Code § 42-607.

12. Rule 40 of the Conjunctive Management Rules applies to the delivery calls made by Rangen against the holders of junior priority ground water rights, but not surface water rights, in Water Districts No. 36A, No. 120, and No. 130.

13. There are no surface water rights in Water Districts No. 36A or No. 130 that are junior in priority to Rangen's water right no. 36-02551 and that are diverted from the same surface water source as right no. 36-02551. There are also no surface water rights in Water District No. 120.

14. There are no ground water rights in Water District No. 36A that are diverted from a source that is hydraulically connected to the source for water right no. 36-02551.

15. Rules 40 and 42 of the Conjunctive Management Rules require the Director to make determinations regarding "material injury" and the "reasonableness of water diversions" in responding to a delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130.

16. The reductions in the quantity of water discharging from springs in the Thousand Springs area attributable to depletions to the ESPA from the diversion and use of ground water in Water Districts No. 120 and No. 130 do not automatically constitute material injury to surface water rights diverting from springs or dependent on sources formed by springs even when the diversion and use of ground water occur under water rights that are junior in priority to such surface water rights. Whether reductions in the quantity of water discharging from springs caused by the diversion and use of ground water under junior priority rights in Water Districts No. 120 and No. 130 constitute material injury is dependent on the factors enumerated in Rule 42 of the Conjunctive Management Rules.

17. Based on simulations using the Department's existing ground water model simulating curtailment of all ground water rights for agricultural irrigation in Water District No. 120 junior in priority to July 13, 1962, there would be no material increase in reach gains (spring discharges) in the Thousand Springs area from such curtailment. Therefore, there are no material contributions to the decreased water supply caused by depletions to the ESPA resulting from diversion and use of ground water in Water District No. 120 under water rights that are junior in priority to water right no. 36-02551, and there is no material injury to water right no. 36-02551 from the diversion and use of ground water for agricultural irrigation under such rights

18. Given the magnitude of the decrease in the spring-dependent water supply currently available to the Rangen hatchery facilities, contributions to the decreased water supply caused by depletions to the ESPA resulting from diversion and use of ground water under water rights in Water District No. 130 that are junior in priority to Rangen's water right no. 36-02551 cause material injury.

19. Rule 42.02 of the Conjunctive Management Rules provides that the holder of a senior priority surface water right is prevented from making a delivery call for curtailment of pumping of any well under a junior priority ground water right if the ground water right is covered by an approved and effectively operating mitigation plan. IDAPA 37.03.11.042.02.

20. There currently is no approved and effectively operating mitigation plan in place to mitigate for reductions in discharges from the springs supplying Rangen's water right no. 36-02551 caused by depletions to the ESPA resulting from diversion and use of ground water under rights in Water District No. 130 that are junior to water right no. 36-02551. Therefore, the delivery call by Rangen for distribution of water to water right no. 36-02551 for use at the Rangen hatchery facilities is recognized.

21. The Department's existing ground water model for the ESPA cannot provide accurate simulations of the effects on individual springs in the Thousand Springs area from curtailing individual ground water rights or groups of ground water rights. There currently is no reliable method or basis for determining the effects of diversion and use of ground water under an individual water right or groups of water rights on individual springs in the Thousand Springs area.

22. Based on simulations using the Department's existing ground water model simulating curtailment of all ground water rights for agricultural irrigation in Water District No. 130 junior in priority to July 13, 1962, reach gains (spring discharges) in the Thousand Springs area would increase by a total of 26,500 acre feet after one year of simulated complete curtailment of such rights in Water District No. 130. To the extent that 26,500 acre feet of replacement water is supplied to increase spring discharges in the Thousand Springs area in 2004, or is used to obtain comparable results, no material injury could be determined to occur to water right no. 36-02551 in 2004 as a result of diversion and use of ground water for agricultural irrigation in Water District No. 130 under rights junior in priority to July 13, 1962.

23. Ground water districts created pursuant to Idaho Code §§ 42-5202 et seq. are specifically authorized by Idaho Code § 42-5224(11) to "... implement mitigation plans designed to mitigate any material injury caused by ground water use within the district upon senior water uses within and/or without the district."

24. Rule 40.02.b of the Conjunctive Management Rules requires the watermaster of Water District No. 130 to "regulate the diversions and use of ground water in accordance with the rights thereto, approved mitigation plans and orders issued by the Director." IDAPA 37.03.11.040.02.b.

ORDER

In response to the water delivery call made by Rangen, Inc., and for the reasons stated in the foregoing Findings of Fact and Conclusions of Law, the Director orders as follows:

IT IS, THEREFORE, HEREBY ORDERED that based on the information currently available to the Director, the watermaster for Water District No. 130 is directed to issue written notices within five (5) days of the date of the original Order in this matter (February 25, 2004) to all holders of consumptive ground water rights in Water District No. 130 that are junior in priority to July 13, 1962, including consumptive ground water rights for agricultural, commercial, industrial, and municipal or other uses. The written notices are to advise the holders of such consumptive ground water rights of this order and to instruct the holders of such rights that they are not to divert ground water pursuant to their rights beginning April 1, 2004, in accordance with the provisions of Idaho Code §§ 42-602 and 42-607, applicable rules adopted pursuant to Idaho Code § 42-603, and the directions and orders of the Director, unless sufficient replacement water is provided as set forth herein.

IT IS FURTHER ORDERED that holders of consumptive ground water rights in Water District No. 130 that are junior in priority to July 13, 1962, who are members of the North Snake Ground Water District or the Magic Valley Ground Water District (the "Ground Water Districts") will be allowed to divert or continue to divert ground water pursuant to their rights beginning on April 1, 2004, or subsequent date as herein provided, through March 31, 2005, provided the following actions are taken by the Ground Water Districts and the associated conditions are satisfied:

(1) The Ground Water Districts must submit a plan to the Director, which the Director approves by April 1, 2004, for providing Rangen with 16,000 acre feet of replacement water of suitable water quality for use by Rangen, and at a location and time usable by Rangen*.

(2) As an alternative to provision (1), the Ground Water Districts must submit a plan to the Director, which the Director approves by April 1, 2004, for providing replacement water, including surface water used in place of diversion and use of ground water, in the amount of 26,500 acre feet between April 1, 2004, and March 31, 2005, to increase spring discharges in the Thousand Springs area, or is used to obtain comparable results.

(3) In the event a plan for providing replacement water pursuant to either provision (1) or provision (2) is submitted or approved after April 1, 2004, then those rights subject to this Order will not be allowed to divert or

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* This Order is issued in response to the delivery call made by Rangen, Inc. There is at least one other order pending that may cause action in compliance provision (1) to be inadequate to avoid curtailment of some portion of consumptive ground water rights in the North Snake and Magic Valley Ground Water Districts that are junior in priority to July 13, 1962.

continue to divert ground water pursuant to their rights until such plan is approved.

(4) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, monthly reports documenting the amount, location, and timing for replacement water supplied shall be submitted to the Director on the first of each month following the month in which the Director approves such plan for providing replacement water.

(5) The Director shall evaluate the monthly reports documenting the amount, location, and timing for replacement water supplied by the Ground Water Districts. If at any time the Ground Water Districts are not substantially on schedule to supply the required amount of replacement water in accordance with the plan approved by the Director, except as otherwise provided in provision (6) below, the Director shall determine, based upon the monthly reports and other current water supply information, whether the actions of the districts constitute good faith substantial compliance with the provisions of the water replacement plan. If the Director determines that the Ground Water Districts are not in substantial compliance with the plan, the Director may order the immediate curtailment of all or a portion of the consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962.

(6) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, and the full quantity of replacement water is not supplied, a portion of the replacement water not to exceed 20 percent may be supplied between April 1 and August 31, 2005. Documentation that such portion of the replacement water has been secured for delivery in 2005 must be submitted to the Director by August 1, 2004, and such replacement water shall be provided in addition to any other replacement water that may be required beginning April 1, 2005, by any subsequent order of the Director. This carryover provision is for contingency purposes only and will not be approved as an initial element of a plan to provide replacement water pursuant to either provision (1) or provision (2) above.

(7) If a plan to provide replacement water pursuant to either provision (1) or provision (2) above is approved by the Director, and the monthly report required to be submitted on August 1, 2004, required in (4) above does not demonstrate that the full quantity of replacement water will be supplied prior to March 31, 2005, and the carryover provisions in (6) above are not satisfied, then all or a portion of consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962, will be curtailed by the watermaster beginning on August 15, 2004, for the remainder of the 2004 irrigation season as follows:

a. If the amount of replacement water confirmed to be supplied prior to March 31, 2005, is 80 percent or less of the amount required herein, then all consumptive ground water rights in Water District No. 130 junior in priority to July 13, 1962, will be curtailed beginning on August 15, 2004; or

b. If the amount of replacement water confirmed to be supplied prior to March 31, 2005, is more than 80 percent of the amount required herein, then the priority date for consumptive ground water rights in Water District No. 130 to be curtailed will be adjusted by the Director to a later date such that the curtailed ground water depletion equals the shortfall in the quantity of confirmed replacement water.

IT IS FURTHER ORDERED that the holder of any consumptive ground water right in Water District No. 130 that is junior in priority to July 13, 1962, who is not a member of either the North Snake Ground Water District or the Magic Valley Ground Water District, may petition the Director prior to March 15, 2004, setting forth the reasons why such right holder should not be subject to this order, or proposing a plan to offset the depletions to the ESPA caused by diversion and use of ground water under that holder's water right(s).

IT IS FURTHER ORDERED that any person aggrieved by this decision shall be entitled to a hearing before the Director to contest the action taken provided the person files with the Director, within fifteen (15) days after receipt of written notice of the order, or receipt of actual notice, a written petition stating the grounds for contesting the action and requesting a hearing. Any hearing conducted shall be in accordance with the provisions of chapter 52, title 67, Idaho Code, and the Rules of Procedure of the Department, IDAPA 37.01.01. Judicial review of any final order of the Director issued following the hearing may be had pursuant to Section 42-1701A(4), Idaho Code.

DATED this 10th day of March 2004.

KARL J. DREHER
Director

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 10th day of March, 2004, the above and foregoing, was served on the following by placing a copy of the same in the United States mail, postage prepaid and properly addressed to the following:

J DEE MAY
MAY SUDWEEKS
PO BOX 1846
TWIN FALLS ID 83303-1846

DANIEL STEENSON
CHARLES L HONSINGER
RINGERT CLARK CHTD
PO BOX 2773
BOISE ID 83701-2773

MIKE CREAMER
JEFF FEREDAY
GIVENS PURSLEY
PO BOX 2720
BOISE ID 83701-2720

JOHN SIMPSON
BARKER ROSHOLT
PO BOX 2139
BOISE ID 83301

JOHN ROSHOLT
BARKER ROSHOLT
233 2ND ST N STE D
TWIN FALLS ID 83301

JOSEPHINE BEEMAN
BEEMAN & ASSOC
409 W JEFFERSON ST
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MAGIC VALLEY GWD
1099 N 400 W
RUPERT ID 83350

NORTH SNAKE GWD
152 E MAIN ST
JEROME ID 83338

FRANK ERWIN
WATER DIST 36A
2628 SOUTH 975 EAST
HAGERMAN ID 83332

CINDY YENTER
WATER DIST 130
1341 FILLMORE ST STE 200
TWIN FALLS ID 83301-3380

JASON MICIAK
PO BOX 2632
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410 17TH ST 22ND FLR
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KATHLEEN CARR
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BOISE ID 83724

Victoria Wigle
Administrative Assistant to the Director

EXHIBIT F

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF WATER TO WATER RIGHTS NOS. 36-15501, 36-02551, AND 36-07694	))))	**SECOND AMENDED ORDER**

This matter is before the Director of the Department of Water Resources ("Director" or "Department") as a result of a letter dated September 23, 2003, and a subsequent letter dated October 6, 2003. Both letters were from J. Dee May ("May"), an attorney representing Rangen, Inc. The September 23 letter sought administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights" for use at hatchery facilities owned and operated by Rangen near Hagerman, Idaho. Because there are no water rights in Water District No. 36A that are junior in priority to the water rights listed above and divert from the same sources as the listed rights, the Director requested additional clarification concerning the nature of the administration of water rights sought by Rangen. In his October 6 letter, May described the administration sought by Rangen to be the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above."

In response to the May letter of October 6, 2003, the Director issued an Order on February 25, 2004, and replaced it with an Amended Order on March 10, 2004. The Amended Order of March 10, 2004, was rescinded on March 14, 2005. Based upon the Director's further consideration of this matter, the Director enters the following Findings of Fact, Conclusions of Law, and Second Amended Order.

FINDINGS OF FACT

Procedural History

1. In addition to the letters from May dated September 23, 2003, and October 6, 2003, hereinafter referred to as the "*Rangen Call*," and in addition to the Orders of February 25, 2004, and March 10, 2004, the State of Idaho and parties to the *Rangen Call* signed an agreement titled "The Eastern Snake Plain Aquifer Mitigation, Recovery, and Restoration Agreement for 2004" on or about March 20, 2004. That agreement is hereinafter referred to as the "*ESPA Agreement*."

2. The ESPA Agreement included the provision that: "All pending delivery calls against the aquifer and conjunctive management litigation are stayed and no further delivery calls

PLAINTIFF'S EXHIBIT

against the aquifer will be made from March 15, 2004 to March 15, 2005." The ESPA Agreement also stated: "This Agreement shall be effective until March 15, 2005."

3. On March 24, 2004, the Director issued an order approving the ESPA Agreement as a mitigation plan. The ESPA Agreement was "approved by the Director according to it (sic) terms as interim mitigation for the period from March 15, 2004 through March 15, 2005."

4. On or about May 11, 2004, the Department and its contractors completed the development of a reformulated and recalibrated ground water model for the Eastern Snake Plain Aquifer ("ESPA"). This reformulated ground water model includes significant refinement of the calculated depletions to springs discharging from the Snake River Canyon in the Thousand Springs area resulting from the diversion and use of ground water and apportions the depletions among six adjacent groupings of spring complexes, or reaches, in the Thousand Springs area. The model provides calculated depletions to the reach containing the Curran Spring, from which Rangen receives surface water, resulting from the diversion and use of ground water for irrigation.

5. The calculated depletions to springs discharging in the Thousand Springs area upon which the Amended Order of March 10, 2004, was based, were determined from simulations using a coarser ground water model of the ESPA that was not as well calibrated as the reformulated model described in Finding 4. The ground water model preceding the reformulated model described in Finding 4 no longer provides the most accurate information available to the Director. As a result, the Amended Order of March 10, 2004, was rescinded by the order issued on March 14, 2005.

6. Results of simulations using the reformulated and recalibrated ground water model described in Finding 4 provide the best available science currently available to the Director and should be used to determine the extent of depletions to springs discharging in the Thousand Springs area resulting from the diversion and use of ground water.

The Eastern Snake River Plain Aquifer and the Department's Ground Water Model

7. The Eastern Snake River Plain Aquifer ("ESPA") is defined as the aquifer underlying an area of the Eastern Snake River Plain that is about 170 miles long and 60 miles wide as delineated in the report "Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho," U. S. Geological Survey ("USGS") Professional Paper 1408-F, 1992, excluding areas lying both south of the Snake River and west of the line separating Sections 34 and 35, Township 10 South, Range 20 East, Boise Meridian. The ESPA is also defined as an area having a common ground water supply. *See* IDAPA 37.03.11.050.

8. The ESPA is predominately in fractured Quaternary basalt having an aggregate thickness that may, at some locations, exceed several thousand feet, decreasing to shallow depths in the Thousand Springs area. The ESPA fractured basalt is characterized by high hydraulic conductivities, typically 1,000 feet/day but ranging from 0.1 feet/day to 100,000 feet/day.

9. Based on averages for the time period from May of 1980 through April of 2002, the ESPA receives approximately 7.5 million acre-feet of recharge on an average annual basis from the following: incidental recharge associated with surface water irrigation on the plain (3.4 million acre-feet); precipitation (2.2 million acre-feet); underflow from tributary drainage basins (1.0 million acre-feet); and losses from the Snake River and tributaries (0.9 million acre-feet).

10. Based on averages for the time period from May of 1980 through April of 2002, the ESPA also discharges approximately 7.5 million acre-feet on an average annual basis through sources including complexes of springs in the Thousand Springs area, springs in and near American Falls Reservoir, and the discharge of nearly 2.0 million acre-feet annually in the form of depletions from ground water withdrawals.

11. From the pre-irrigation conditions of the 1860s until the 1950s, the amount of water diverted from the Snake River and its tributaries for gravity flood/furrow irrigation increased substantially, from about 8 million acre-feet, or less, in the early 1900s to about 9.5 million acre-feet in the early 1950s. USGS Professional Paper 1408-F, p. F14. Significant quantities of the surface water diverted were in excess of crop consumptive uses and provided incidental recharge to the ESPA above the average incidental recharge of 3.4 million acre-feet described in Finding 9 for the May 1980 through April 2002 time period. Ground water levels across the ESPA responded by rising at many locations. For example, the average rise in ground water levels near Jerome, Idaho, and near Fort Hall, Idaho, was 20 to 40 feet over several tens of years. The average rise in ground water levels west of American Falls may have been 60 to 70 feet. USGS Professional Paper 1408A, p. A40. As a result, spring discharges in the Thousand Springs area correspondingly increased based on USGS data as shown on Attachment A.

12. Beginning in about the 1960s to 1970s time period through the most recent years, the total combined diversions of natural flow and storage releases above Milner Dam for irrigation using surface water supplies have declined from an average of nearly 9 million acre-feet annually to less than 8 million acre-feet annually, notwithstanding years of drought, because of conversions from gravity flood/furrow irrigation to sprinkler irrigation in surface water irrigation systems and other efficiencies implemented by surface water delivery entities. The measured decrease in cumulative surface water diversions above Milner Dam for irrigation reflects the fact that less water is generally needed in the present time to fully irrigate lands authorized for irrigation with a certain crop mix under certain climatic growing conditions than was needed in the 1960s to 1970s for the same lands, crop mix, and climatic growing conditions. With parallel appropriations of ground water, which dramatically increased beginning in about 1950, ground water levels across the ESPA have responded by declining at most locations where levels had previously risen, exacerbated by the worst consecutive period of drought years on record for the upper Snake River Basin. As a result, spring discharges in the Thousand Springs area have correspondingly declined based on USGS data as also shown on Attachment A.

13. The ground water in the ESPA is hydraulically connected to the Snake River and tributary surface water sources at various places and to varying degrees. One of the locations at

which a direct hydraulic connection exists between the ESPA and springs tributary to the Snake River is in the Thousand Springs area.

14. Hydraulically-connected ground water sources and surface water sources are sources that within which, ground water can become surface water, or surface water can become ground water, and the amount that becomes one or the other is largely dependent on ground water elevations.

15. When water is pumped from a well in the ESPA, a conically-shaped zone that is drained of ground water, termed a cone of depression, is formed around the well. This causes surrounding ground water in the ESPA to flow to the cone of depression from all sides. These depletionary effects propagate away from the well, eventually reaching one or more hydraulically-connected reaches of the Snake River and its tributaries, including springs in the Thousand Springs area. When the depletionary effects reach a hydraulically-connected reach of the Snake River or the points of discharge for springs in the Thousand Springs area, reductions in flow begin to occur in the form of losses from the river, reductions in spring discharge, or reductions in reach gains to the river. The depletions to the Snake River and its tributaries increase over time, with seasonal variations corresponding to seasonal variations in ground water pumping, and then either recede over time, if ground water pumping from the well ceases, or reach a maximum over time beyond which no further significant depletions occur, if ground water pumping from the well continues from year to year. This latter condition is termed a steady-state condition.

16. Various factors determine the specific hydraulically-connected reach of the Snake River or spring complexes affected by the pumping of ground water from a well in the ESPA; the magnitude of the depletionary effects to a hydraulically-connected reach or spring complex; the time required for those depletionary effects to first be expressed as reductions in river flow or spring discharge; the time required for those depletionary effects to reach maximum amounts; and the time required for those depletionary effects to either recede, if ground water pumping from the well ceases, or reach steady-state conditions, if ground water pumping continues. Those factors include the proximity of the well to the various hydraulically-connected reaches or springs, the transmissivity of the aquifer (hydraulic conductivity multiplied by saturated thickness) between the well and the hydraulically-connected reach of the Snake River or springs, the riverbed hydraulic conductivity, the specific yield of the aquifer (ratio of the volume of water yielded from a portion of the aquifer to the volume of that portion of the aquifer), the period of time over which ground water is pumped from the well, and the amount of ground water pumped that is consumptively used.

17. The time required for depletionary effects in a hydraulically-connected reach of the Snake River or tributary springs to first be expressed, the time required for those depletionary effects to reach maximum amounts, and the time required for those depletionary effects to either recede, if ground water pumping from the well ceases, or reach steady-state conditions, if ground water pumping continues, can range from days to years or even decades, depending on the factors described in Finding No. 16. Generally, the closer a well in the ESPA is located to a hydraulically-connected reach of the Snake River or tributary springs, the larger will be the flow

reductions in the hydraulically-connected reach or springs, as a percentage of the ground water depletions, and the shorter will be the time periods for depletionary effects to first be expressed, for those depletionary effects to reach maximum amounts, and for those depletionary effects to either recede or reach steady-state conditions. However, essentially all depletions of ground water from the ESPA cause reductions in flows in the Snake River and spring discharges equal in quantity to the ground water depletions over time.

18. The Department uses a calibrated ground water model to determine the effects on the ESPA and hydraulically-connected reaches of the Snake River and its tributaries from pumping a single well in the ESPA, from pumping selected groups of wells, and from surface water uses on lands above the ESPA.

19. In 2004, in collaboration with the Idaho Water Resources Research Institute ("IWRRI"), University of Idaho, U. S. Bureau of Reclamation ("USBR"), USGS, Idaho Power Company, and consultants representing various entities, including certain entities relying on the discharge of springs in the Thousand Springs area, the Department completed reformulation of the ground water model used by the Department to simulate effects of ground water diversions and surface water uses on the ESPA and hydraulically-connected reaches of the Snake River and its tributaries, including springs in the Thousand Springs area. This effort was funded in part by the Idaho Legislature and included significant data collection and model calibration intended to reduce uncertainty in the results from model simulations.

20. Below Milner Dam, the Snake River is incised and springs in the Thousand Springs area emanate from the canyon wall. The ground water model used by the Department prior to the reformulation of the model represented the Thousand Springs area as a single, hydraulically-connected, tributary reach of the Snake River. In the reformulated ground water model for the ESPA described in Finding 19, the Thousand Springs area was divided into six adjacent groupings of spring complexes, or spring reaches, based on the relative magnitude of spring discharge as follows:

a. Devil's Washbowl to the USGS stream gage located near Buhl, Idaho ("Buhl Gage") – includes springs having moderately large rates of discharge at intermittent locations;

b. Buhl Gage to Thousand Springs – includes springs having somewhat larger average rates of discharge per river mile than in the reach Devil's Washbowl to Buhl Gage;

c. Thousand Springs – includes springs having very large rates of discharge;

d. Thousand Springs to Malad Gorge – includes springs having moderate discharge;

e. Malad Gorge – includes springs having very large rates of discharge near the confluence of the Malad and Snake Rivers; and

f. Malad Gorge to Bancroft – includes springs having relatively small rates of discharge.

21. The segment that includes the Curran Spring from which Rangen diverts surface water is the Thousand Springs to Malad Gorge spring reach.

22. The reformulated ground water model for the ESPA was calibrated to recorded ground water levels in the ESPA, spring discharge in the spring reaches described in Finding 20, and reach gains or losses to Snake River flows, determined from stream gages together with other stream flow measurements, for the period May 1, 1980 to April 30, 2002. The calibration targets, consisting of measured ground water levels, reach gains/losses, and discharges from springs, have inherent uncertainty resulting from limitations on the accuracy of the measurements. The uncertainty in results predicted by the ESPA ground water model cannot be less than the uncertainty of the calibration targets. The calibration targets having the maximum uncertainty are the reach gains or losses determined from stream gages, which although rated "good" by the USGS, have uncertainties of up to 10 percent.

23. Discharges from springs in the segments or reaches described in Finding 20 have diminished primarily because of significant reductions in incidental recharge of the ESPA from surface water irrigation, resulting from changes in surface water irrigation systems and application practices (conversion from application by gravity flood/furrow irrigation to application by sprinkler systems), and the last five consecutive years of drought. For example, decreases in the springs supplying the Rangen hatchery facilities can be correlated with repairs made to the facilities of the North Side Canal Company to reduce losses of surface water to ground water from the canal company's facilities above those springs in 1987, 1998, and 2000.

24. Spring discharges are also reduced as a result of ground water withdrawals from the ESPA for irrigation and other consumptive purposes, especially ground water that is diverted in relatively close proximity to the area of the springs. Simulations using the Department's calibrated computer model of the ESPA show that ground water withdrawals from certain portions of the ESPA for irrigation and other consumptive purposes cause depletions in the flow of springs discharging in the spring reaches described in Finding 20. When superimposed on diminished spring discharges resulting from changes in surface water irrigation and drought, reductions in spring discharges caused by ground water depletions under relatively junior priority water rights can potentially cause injury to senior priority water rights dependent on spring sources.

25. The Department is implementing full conjunctive administration of rights to the use of hydraulically-connected surface and ground waters within the Eastern Snake River Plain consistent with Idaho law and available information. The results of simulations from the Department's ground water model are suitable for making factual determinations on which to base conjunctive administration of surface water rights diverted from the Snake River and its tributaries and ground water rights diverted from the ESPA.

26. The Department's ground water model represents the best available science for determining the effects of ground water diversions and surface water uses on the ESPA and hydraulically-connected reaches of the Snake River and its tributaries. There currently is no other technical basis as reliable as the simulations from the Department's ground water model for the ESPA that can be used to determine the effects of ground water diversions and surface water uses on the ESPA and hydraulically-connected reaches of the Snake River and its tributaries.

Creation and Operation of Water Districts No. 120 and No. 130

27. On November 19, 2001, the State of Idaho sought authorization from the Snake River Basin Adjudication ("SRBA") District Court for the interim administration of water rights by the Director in all or parts of the Department's Administrative Basins 35 and 41 overlying the ESPA in the American Falls area and all or parts of Basins 36 and 43 overlying the ESPA in the Thousand Springs area. On January 8, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued two orders on February 19, 2002, creating Water District No. 120 and Water District No. 130, pursuant to the provisions of Idaho Code § 42-604.

28. On August 30, 2002, the State of Idaho filed a second motion with the SRBA District Court seeking authorization for the interim administration of water rights by the Director in the portion of the Department's Administrative Basin 37 overlying the ESPA in the Thousand Springs area. On November 19, 2002, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 8, 2003, revising the boundaries of Water District No. 130 to include the portion of Administrative Basin 37 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604.

29. On July 10, 2003, the State of Idaho filed a third motion with the SRBA District Court seeking authorization for the interim administration of water rights by the Director in the portion of the Department's Administrative Basin 29 overlying the ESPA in the American Falls area. On October 29, 2003, the SRBA District Court issued an order authorizing the interim administration by the Director. After notice and hearing, the Director issued an order on January 22, 2004, revising the boundaries of Water District No. 120 to include the portion of Administrative Basin 29 overlying the ESPA, pursuant to the provisions of Idaho Code § 42-604.

30. Water Districts No. 120 and No. 130 were created, and the respective boundaries revised, to provide for the administration of water rights, pursuant to chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights. As a result, the watermasters for Water Districts No. 120 and No. 130 were given the following duties to be performed in accordance with guidelines, direction, and supervision provided by the Director:

a. Curtail illegal diversions (i.e., any diversion without a water right or in excess of the elements or conditions of a water right);

b. Measure and report the diversions under water rights;

c. Enforce the provisions of any stipulated agreement; and

d. Curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

31. On April 15, 2005, the State of Idaho filed three motions with the SRBA District Court seeking authorization for the interim administration of water rights by the Director in the Department's Administrative Basin 25; Basins 31, 32, and 33; and Basin 45. If the SRBA District Court authorizes interim administration in these administrative basins, nearly all ground water rights authorizing diversion of ground water from the ESPA will be subject to administration through water districts, when combined with the ground water rights already in Water Districts No. 120 and No. 130. At the time of filing Director's Reports in the SRBA later this year for the relatively few remaining ground water rights authorizing diversions from the ESPA, additional motions will be filed by the State of Idaho seeking authorization for interim administration of those remaining rights. While authorization for interim administration of the remaining ground water rights is subject to determinations to be made by the SRBA District Court, the Director anticipates that water districts covering all of the ESPA will be in place for the irrigation season of 2006, and all ground water rights authorizing diversions from the ESPA will be subject to administration through water districts established pursuant to chapter 6, title 42, Idaho Code.

32. The general location and existing boundaries for Water Districts No. 120 and No. 130, as well as the location and existing boundaries for the American Falls Ground Water Management Area, are shown on Attachment B. Boundaries for a proposed addition to Water District No. 120, as well as areas for potential future water districts (Water Districts No. 110 and No. 140), are also shown on Attachment B.

Conjunctive Management Rules

33. Idaho Code § 42-603 authorizes the Director "to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof." Promulgation of such rules and regulations must be in accordance with the procedures of chapter 52, title 67, Idaho Code.

34. On October 7, 1994, the Director issued *Order Adopting Final Rules*; the *Rules for Conjunctive Management of Surface and Ground Water Resources* (IDAPA 37.03.11) ("Conjunctive Management Rules"), promulgated pursuant to chapter 52, title 67, Idaho Code, and Idaho Code § 42-603.

35. Pursuant to Idaho Code § 67-5291, the Conjunctive Management Rules were submitted to the 1st Regular Session of the 53rd Idaho Legislature (1995 session). During no legislative session, beginning with the 1st Regular Session of the 53rd Idaho Legislature, have the

Conjunctive Management Rules been rejected, amended, or modified by the Idaho Legislature. Therefore, the Conjunctive Management Rules are final and effective.

36. The Conjunctive Management Rules "apply to all situations in the state where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply." IDAPA 37.03.11.020.01.

37. The Conjunctive Management Rules "acknowledge all elements of the prior appropriation doctrine as established by Idaho law." IDAPA 37.03.11.020.02.

The Letters Submitted on Behalf of Rangen Seeking Administration of Water Rights and Application of the Conjunctive Management Rules

38. On September 23, 2003, the Director received a letter from May representing Rangen, Inc. seeking the administration of "the diversion of water in District 36A in such a way that [Rangen] receives its full appropriation of the above referenced water rights."

39. On September 25, 2003, the Director responded to the letter of September 23, 2003, from May requesting "additional clarification concerning the nature of the administration of water rights in Water District 36A" being sought, since "there are no water rights in Water District No. 36A that are junior in priority to the listed rights and divert from the same sources as the listed rights."

40. On October 10, 2003, the Director received a second letter from May dated October 6, 2003. In that letter, May clarified that Rangen was seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights under the water right numbers referenced above."

41. The water rights held by Rangen that Rangen sought to have protected by the administration of junior priority water rights are as follows pursuant to decrees issued by the SRBA District Court:

Water Right No.:	36-15501	36-02551	36-07694
Priority Date:	July 1, 1957	July 13, 1962	April 12, 1977
Beneficial Use:	Fish Propagation	Domestic (0.1 cfs) and Fish Propagation (48.54 cfs)	Fish Propagation
Diversion Rate:	1.46 cfs	48.54 cfs	26.00 cfs
Period of Use:	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31	Jan. 1 – Dec. 31

42. Rule 10.04 of the Conjunctive Management Rules defines a "delivery call" as: "A request from the holder of a water right for administration of water rights under the prior appropriation doctrine." The two letters from May, described in Findings 38 and 40 seeking administration of water rights interfering with and impacting Rangen's water rights, come within the definition of a delivery call.

43. Water Districts No. 36A, No. 120, and No. 130 were created pursuant to Idaho Code § 42-604. Water District No. 36A includes water rights senior in priority to Rangen's water rights that divert from a portion of the same source as Rangen's water rights. Other water rights in Water District No. 36A, both senior in priority and junior in priority to Rangen's rights, are diverted from other sources that are hydraulically connected through the ESPA, to varying degrees, to the source for Rangen's water rights. Water rights diverted from these other sources, which are hydraulically connected through the ESPA to the source for Rangen's water rights, do not interfere with and impact Rangen's water rights. Therefore, there are no water rights in Water District No. 36A that can be administered to prevent injury to Rangen's rights.

44. Water District No. 120 contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the source for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

45. Water District No. 130 contains surface water rights that divert from sources that are hydraulically connected through the ESPA to the source for Rangen's water rights but do not interfere with or impact Rangen's water rights. Water District No. 130 also contains water rights that are junior in priority to Rangen's water rights and divert from ground water that is hydraulically connected to the source for Rangen's water rights. Such water rights could potentially interfere with and potentially impact Rangen's water rights.

46. Rule 40 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights from Areas Having a Common Ground Water Supply in an Organized Water District." Rule 40 applies to the delivery calls made by Rangen against the holders of junior priority ground water rights in both Water District No. 120 and Water District No. 130.

47. Some of the junior priority ground water rights that could potentially interfere with and potentially impact Rangen's water rights are not in a water district created pursuant to the provisions of Idaho Code § 42-604 because a final decree has not been issued by the SRBA District Court and the requirements for interim administration of these rights pursuant to Idaho Code § 42-1417 have not been met.

48. Rule 30 of the Conjunctive Management Rules is titled "Responses to Calls for Water Delivery Made by the Holders of Senior-Priority Surface or Ground Water Rights Against the Holders of Junior-Priority Ground Water Rights Within Areas of the State Not in Organized

Water Districts or Within Water Districts Where Ground Water Regulation Has Not Been Included in the Function of Such Districts or Within Areas That Have Not Been Designated Ground Water Management Areas."

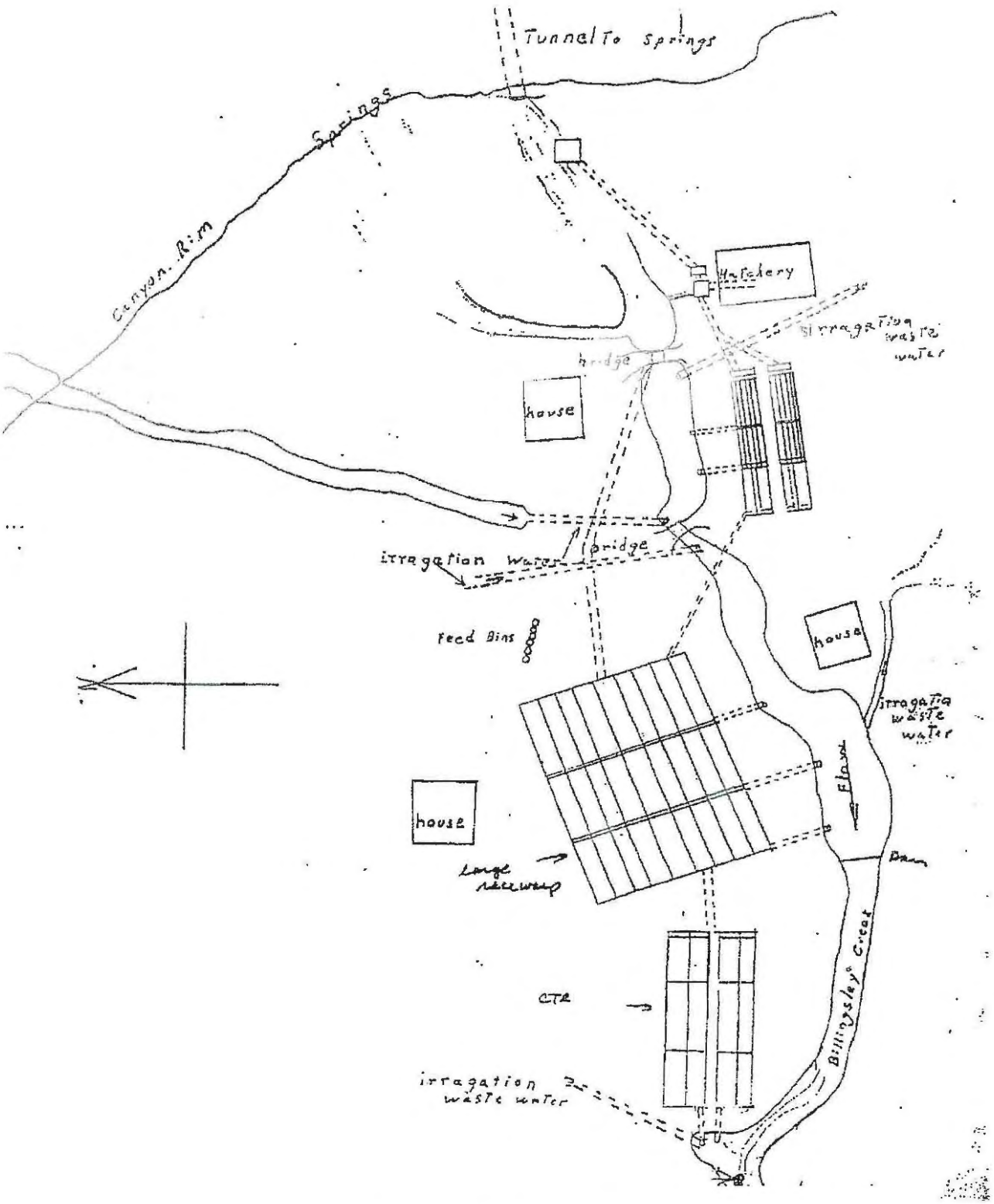
49. Rule 41 of the Conjunctive Management Rules is titled "Administration of Diversion and Use of Water Within a Ground Water Management Area."

50. The two letters from May, described in Findings 38 and 40, seeking administration of water rights interfering with and impacting Rangen's water rights did not meet the requirements set forth in Rule 30 of the Conjunctive Management Rules. Also, the two letters from May did not seek administration of junior priority ground water rights in the American Falls Ground Water Management Area as provided in Rule 41 of the Conjunctive Management Rules. Pursuant to Rule 41, such administration could not occur until the irrigation season of 2006, even if material injury to Rangen's rights was determined to be occurring as a result of diversion and use of ground water under junior priority rights in the American Falls Ground Water Management Area.

51. While Rule 40 of the Conjunctive Management Rules is applicable to the two letters from May, described in Findings 38 and 40, neither Rule 40 nor any other provisions of the Conjunctive Management Rules are applicable to delivery calls or demands for water distribution by the holder of a senior priority water right against the holder of a junior priority surface water right.

52. On October 17, 2003, the Director provided a letter to May initially responding to May's letter of October 10, 2003, described in Finding 40, making a delivery call by seeking administration of water rights interfering with and impacting Rangen's water rights. In his October 17 letter, the Director advised that determinations regarding "material injury" and "reasonableness of water diversions" would be made pursuant to Rule 40 and Rule 42 of the Conjunctive Management Rules in responding to the delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130. In his October 17 letter, the Director also requested that he be provided copies of "all historical records of the amounts of water diverted under the listed rights as soon as practicable." Such records were not available to the Director for diversions under Rangen's water rights prior to 1995 because prior to 1995, the Department did not require the measurement and reporting of diversions under Rangen's rights and most other water rights that were not in organized water districts created pursuant to Idaho Code § 42-604.

53. On November 21, 2003, May transmitted on behalf of Rangen historical records of flow through the hatchery facilities owned and operated by Rangen. Included was the following sketch depicting the layout of the Rangen hatchery facilities, a summary of flows on a monthly basis, and records of periodic flow measurements beginning in 1966 through part of 2003.



Rangen Hatchery Facilities
Hagerman, Idaho

54. The flow measurements that are considered to be representative of the total supply of water available to the Rangen hatchery facilities under water rights nos. 36-15501, 36-02551, and 36-07694, consist of the sum of the discharge from raceways designated by Rangen as the "CTR" raceways and the flow over the check "Dam." The dam is sited upstream from the discharge points from the CTR raceways and downstream from the discharge points from raceways designated by Rangen as the "Large" raceways. The sum of the discharge from the CTR raceways and the flow over the check dam is considered to be representative of the total supply of water available even though at times some of the flow over the check dam may include water flowing from small springs downstream from the diversion to the Large raceways, water discharged from the Large raceways that was not diverted through the CTR raceways, and irrigation return flows.

55. The records of flow measurements submitted by May on behalf of Rangen for the years 1966 through 1974 consist of measurements or estimates of discharges from the Curran Spring made by George Lemmon, a former watermaster for Water District No. 36A. These recorded flows are not representative of the total supply of water available to the Rangen hatchery facilities because water rights for irrigation that are senior in priority to Rangen's rights are entitled to divert the first portion of the discharge from the Curran Spring during the irrigation season. In addition, the recorded flows do not include discharges from springs downstream of the Curran Spring that are upstream of Rangen's diversion to the Large raceways.

56. Without further explanation from Rangen, the Department cannot confirm that the records of flow measurements submitted by May on behalf of Rangen for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities. Based on subsequent findings in this order, however, it is not necessary to confirm whether the flow measurements for the years 1975 through 1980 are representative of the total supply of water available to the Rangen hatchery facilities.

Authorized Diversion Rate for Water Rights Nos. 36-15501, 36-02551, and 36-07694

57. Springs discharging in the Thousand Springs area do not discharge at a constant rate or at a rate that progressively increases or decreases from year to year. While there are overall increases or decreases in the discharge from individual springs between years (inter-year variations), there are also pronounced within-year or intra-year variations in discharge from individual springs.

58. Simplistically, overall variations between years in the discharge of springs in the Thousand Springs area result from differences between the amounts of ground water depletions and recharge to the ESPA above the springs, with delays in the response of spring discharge ranging at the extremes from days to decades depending on the proximity of ground water depletions and recharge and the other factors set forth in Finding 16. Factors affecting overall variations between years in the cumulative discharge from springs in the Thousand Springs area as well as from individual springs include but are not necessarily limited to: variations in surface water supplies available for irrigation above the ESPA, which affect cropping decisions and the

amount of incidental recharge to the ESPA; changes in the amounts and timing of tributary underflow to the ESPA, which also reflect numerous variations upgradient from where tributary underflow contributes to the ESPA; inter-year variations in precipitation and temperature, which not only affect the amount of surface water used above the ESPA and associated incidental recharge to the ESPA, but also affect the quantity of ground water withdrawals and depletions from the ESPA; and differences between years in the quantity of intentional or managed recharge to the ESPA.

59. Intra-year variations in the discharge from individual springs result from the factors described in Finding 58 but also from other factors including: variations in surface water application above the ESPA and associated incidental recharge in response to seasonal changes in precipitation and temperature; variations in timing of ground water withdrawals and depletions from the ESPA in close proximity to individual springs; and the timing of intentional or managed recharge to the ESPA in close proximity to individual springs.

60. While both the regional and local factors affecting inter-year and intra-year variations in spring discharge are generally understood, the interactions between these factors are complex and the specific effects of individual factors and various combinations of factors on the discharge from individual springs are not presently quantifiable.

61. Both inter-year and intra-year variations in the discharge from the springs that are the sources for water rights nos. 36-15501, 36-02551, and 36-07694 existed when appropriations for these rights were initiated (July 1, 1957; July 13, 1962; and April 12, 1977; respectively). Furthermore, the authorized diversion rates for water rights nos. 36-02551 and 36-07694 were licensed based on when the discharges from the springs that are the source for these rights were at or near the maximum intra-year discharges during the years for which the extent of beneficial use was deemed to be established or confirmed (November 1962 for 36-02551 and October 1972 for 36-07694), although erroneously for water right no. 36-07694 (see Findings 62 and 63 below). There are no other measurements of the total supply of water available to the Rangen hatchery facilities in 1962, nor any other means for determining the intra-year variations in the discharges from the springs comprising the source for water right no. 36-02551.

62. Water right no. 36-07694 was licensed on September 19, 1985, and has an authorized diversion rate of 26.00 cfs. The authorized diversion rate, as licensed, was not based on measurements of the amount of water actually diverted and applied to beneficial use. Rather, the authorized diversion rate was based on an estimate (not an actual measurement) made by George Lemon, a former watermaster for Water District No. 36A, of the discharge from the Curran Spring at or near its seasonal maximum flow in October of 1972. This estimate of the discharge from the Curran Spring was made nearly 5 years before the application for permit to appropriate water was filed for water right no. 36-07694.

63. Based on available records, there was not water available for appropriation at the time or subsequent to the date of appropriation for water right no. 36-07694. Therefore, the Department erred in licensing water right no. 36-07694, and should not have recommended this right for decree in the SRBA. Nonetheless, since the SRBA District Court decreed water right

no. 36-07694, Rangen may be entitled to divert water under this right when such water is physically available. However, because water was not available to appropriate on the date of appropriation for right no. 36-07694, Rangen may not be entitled to have a delivery call recognized against junior priority water rights.

64. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities and the records maintained by the Department since 1995 show that the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) has been sufficient to continuously fill water right no. 36-15501 at the authorized diversion rate of 1.46 cfs.

65. The records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities show that 1987 was the last year in which the quantity of water available at the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) was sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs, when the cumulative discharges from springs supplying the Rangen hatchery facilities were at seasonal maximums (November). Since 1987, the quantity of water available at the Rangen hatchery facilities has not been sufficient to fill water right no. 36-02551 at the authorized diversion rate of 48.54 cfs although in 1997 and 1998, the seasonal maximum quantity of water available came within about 5 cfs (or about 10 percent) of the authorized diversion rate.

66. The rates of diversion authorized pursuant to water rights nos. 36-15501 and 36-02551 (1.46 cfs and 48.54 cfs, respectively) are not quantity entitlements that are guaranteed to be available to Rangen. Rather, the authorized rates of diversion are the maximum rates at which water can be diverted under these rights, respectively, when such quantities of water are physically available and the rights are in priority. Rangen cannot call for the curtailment of junior priority water rights at all times that insufficient water is physically available to fill water rights no. 36-02551 or no. 36-07694 at the authorized rates of diversion. Rangen is not entitled to a water supply that is enhanced beyond the conditions that existed at the time such rights were established; i.e., Rangen cannot call for the curtailment of junior priority water rights simply because seasonally the discharge from springs is less than the authorized rates of diversion for Rangen's rights unless such seasonal variations are caused by depletions resulting from diversion and use of water under junior priority rights.

67. Rangen can only call for the distribution of water to its rights through the curtailment of junior priority ground water rights from the hydraulically-connected ESPA when such curtailment would result in a usable amount of water reaching Rangen's points of diversion in time of need, and depletions causing material injury as a result of diversion and use of ground water under such junior priority rights have not been adequately mitigated.

68. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2004, the following table summarizes the maximum daily flow and average daily flow by month for the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) in 1987 and 2004. The year 1987 was the last year within which the discharge from springs supplying the Rangen hatchery facilities at the seasonal maximum (November) was sufficient to fill water rights nos. 36-15501 and 36-02551 at the cumulative authorized diversion rate of 50 cfs, and 2004 was the last year for which complete data are available.

Month	Year	Maximum Daily Flow	Average Daily Flow
January	1987	44.25 cfs	44.25 cfs
	2004	15.75	14.58
February	1987	42.89	39.75
	2004	13.58	13.29
March	1987	NM*	NM*
	2004	13.56	13.09
April	1987	32.52	28.55
	2004	12.24	11.74
May	1987	23.97	23.29
	2004	12.06	11.42
June	1987	30.43	27.58
	2004	12.77	12.23
July	1987	30.91	29.09
	2004	12.29	11.84
August	1987	40.13	36.70
	2004	12.38	11.85
September	1987	47.94	40.06
	2004	13.73	13.06
October	1987	46.93	46.93
	2004	15.19	14.39
November	1987	50.08	46.52
	2004	14.50	13.73
December	1987	44.39	44.22
	2004	12.87	12.76

*NM = No measurement

69. Comparing same-month maximum daily and average daily flows representing the water supply available to the Rangen hatchery facilities (sum of the discharge from the CTR raceways and the flow over the check dam) between years for the years shown above demonstrates that there have been significant decreases in the water supply available to the Rangen hatchery facilities between 1987 and 2004. Flow measurements for the other years between 1987 and 2004 not shown above demonstrate that the water supply available to the Rangen hatchery facilities generally decreased from 1990 through 1996, rebounded in 1997 and 1998, and then significantly decreased again after 1998 to record lows by 2002, 2003, and 2004 for the post-1981 time period.

70. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2004, the quantity of water available at the source for water right no. 36-15501 with the priority date of July 1, 1957, is currently sufficient to fill this right at the authorized diversion rate of 1.46 cfs. *See* IDAPA 37.03.11.042.01.a.

71. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2004, and taking into account the variations in spring flows between months that have existed since the date of appropriation for water right no. 36-02551, the quantity of water available at the source for water right no. 36-02551 with the priority date of July 13, 1962, is currently insufficient to fill this right at the authorized diversion rate of 48.54 cfs, even during months when the springs providing the source for this right are discharging at the highest seasonal flows during the year, generally October through January. The quantity of water available at the source for water right no. 36-02551 is expected to continue to be insufficient during 2005. *See* IDAPA 37.03.11.042.01.a.

72. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2004, the quantity of water available at the source for water right no. 36-07694 with the priority date of April 12, 1977, is wholly insufficient to fill this right at the authorized diversion rate of 26.00 cfs, even during months when the springs providing the source of water for this right are discharging at the highest seasonal flows during the year, generally October through January. As described in Findings 62 and 63, there was not any water available for appropriation at the time or subsequent to the time that the application for permit to appropriate water for water right no. 36-07694 was filed. *See* IDAPA 37.03.11.042.01.a.

73. Based on subsequent findings and conclusions, it is unnecessary to determine whether Rangen has or has not expended reasonable efforts to divert water for right no. 36-02551 from its source for use at the Rangen hatchery facilities. *See* IDAPA 37.03.11.042.01.b.

74. Based on the Department's water rights data base and simulations using the Department's ground water model for the ESPA described in Findings 19 and 20, the diversion and consumptive use of ground water under water rights having priority dates later than the priority date for water right no. 36-02551 (July 13, 1962), and which at steady-state conditions reduce spring discharge in the Thousand Springs to Malad Gorge spring reach by more than 10 percent of the amount of depletion to the ESPA resulting from those ground water diversions (10 percent is the uncertainty in model simulations, *see* Finding 22), has insignificant effects on the quantity and timing of water available from springs discharging in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water. *See* IDAPA 37.03.11.042.01.c.

75. Based on the records of flow measurements submitted by May on behalf of Rangen that are representative of the total supply of water available to the Rangen hatchery facilities for the years 1981 through part of 2003 and annual reports submitted by Rangen to the Department for the years 1995 through 2004, as well as field investigations conducted on November 25, 2003, by the watermaster for Water District No. 130 and Brian Patton, a registered professional civil engineer, Rangen is currently diverting and using surface water within the authorized diversion rate for water rights nos. 36-15501 and 36-02551 (50 cfs total). *See* IDAPA 37.03.11.042.01.e.

76. Based on the field investigations on November 25, 2003, described in Finding 75, the Rangen hatchery facilities have marginally adequate water measuring and recording devices. The watermaster for Water District No. 130 reports that the amounts of water diverted to domestic and irrigation uses are not measured, and the measurements of flows through hatchery raceways reported by Rangen may be systematically about 10 percent lower than actual flows. *See* IDAPA 37.03.11.042.01.f.

77. Based on the results from the field inspection on November 25, 2003, described in Finding 75, two potential modifications to the existing Rangen hatchery facilities were identified that could increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. However, the combined additional flow that could be diverted is estimated to be 0.64 cfs, which is not significant given the shortages in water supply shown and described in Findings 68 and 69. *See* IDAPA 37.03.11.042.01.g.

78. Based on subsequent findings and conclusions, it is unnecessary to determine whether there are actions that potentially could provide alternate means of diversion or alternate points of diversion to increase the supply of water to the Rangen hatchery facilities during times that water right no. 36-02551 is not satisfied. *See* IDAPA 37.03.11.042.01.h.

Effects of Curtailing Ground Water Diversions Under Rights Junior to Water Right No. 36-02551

79. The following water rights authorize the diversion and use of ground water for consumptive uses from the area of common ground water supply described in Finding 7, have priority dates later than the priority date for water right no. 36-02551 (July 13, 1962), and based on model simulations reduce spring discharge in the Thousand Springs to Malad Gorge spring reach by more than 10 percent of the amount of depletion to the ESPA resulting from those ground water diversions (10 percent is the uncertainty in model simulations, *see* Finding 22):

Water Right No.	Priority Date	Diversion Rate	Authorized Use	Water Right Holder of Record
37-02733	04/12/1966	0.57 cfs	Irrigation of 32 acres	Scott & Sandi Luttmer
36-07156	02/08/1971	2.56	Irrigation of 190 acres	Orval & Bonnie Vader
36-07376	09/29/1973	2.75	Irrigation of 185 acres	Len Riddle & Frank Veenstra
36-07666A	01/05/1977	1.64	Irrigation of 82 acres	Frank Veenstra
36-07666B	01/05/1977	0.66	Commercial/Stock	Frank Veenstra
36-16146	11/25/1977	0.08	Irrigation of 4 acres	Larry & Lauri Nielson
36-07995	07/17/1981	0.20	Commercial/Domestic	Leo & Judith Ray
36-08100	07/13/1982	0.15	Irrigation of 5 acres	Lavar Jackson
36-08101	07/13/1982	0.80	Irrigation of 40 acres	Lavar Jackson
36-08268A	03/26/1985	0.04	Irrigation of 1 acre	Richard & Shelly Regnier
36-08333	08/25/1987	3.66	Irrigation of 183 acres	Ronnie & Sharlene Smith
36-08561	08/24/1990	0.18	Irrigation of 6 acres	Walter & Margaret Candy
36-08652	04/27/1992	0.24	Irrigation of 4½ acres	Valley View Homeowners
36-08662	05/26/1992	0.24	Commercial/Stock	Harry & Flora Bokma
36-08715	07/02/1993	2.00	Municipal	City of Hagerman
36-08747	02/02/1996	0.35	Irrigation of 8 acres	Northview Water Assoc.
36-16204	02/09/2004	0.18	Irrigation of 9 acres	Northview Water Assoc.

80. The Department's ground water model for the ESPA, described in Findings 19 and 20, was used to simulate the effects of permanently curtailing the diversion and use of ground water for the irrigation of 735 equivalent[1] acres under the water rights listed in Finding 79 for irrigation purposes. The results of the simulation show that permanently curtailing the diversion and use of ground water for the irrigation of these lands would increase the discharge of springs in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water, by an average amount of 0.4 cfs at steady state conditions.

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[1] For the ESPA ground water model, an algorithm is used to simulate the effects of supplemental ground water irrigation where surface water is deliverable for some portion of the irrigation of those lands. For each model cell, acreages simulated to be irrigated with both surface water and supplemental ground water are replaced with acreages simulated to be irrigated using all ground water such that the simulated consumptive use on the replacement acreage equals the consumptive use on the acreage with supplemental ground water irrigation. The equivalent acreage consists of the sum of acreages irrigated solely with ground water and the replacement acreages for acreages irrigated with both surface water and ground water.

81. Finding 80 is consistent with results from simulations conducted by IWRRI using the Department's ground water model for the ESPA. IWRRI simulated the effects of permanently curtailing ground water diversion and use across the ESPA under ground water rights junior to January 1, 1870; January 1, 1949; January 1, 1961; January 1, 1973; and January 1, 1985; with no other changes, using separate model simulations (the "Curtailment Scenario"). IWRRI Technical Report 04-023. Simulating the permanent curtailment of ground water diversions under rights junior to January 1, 1961, for irrigation in areas both within and outside the area having a common ground water supply described in Finding 7, results in the simulated curtailment of ground water irrigation on a total of 664,300 equivalent acres of land. IWWRI's simulation of the effects of such curtailment showed that spring discharges would increase in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water, by an average amount of 5 cfs at steady state conditions. Simulating the permanent curtailment of essentially all ground water irrigation (ground water rights junior to January 1, 1870), which would curtail the irrigation of 1,102,000 acres, showed that spring discharges would increase in the Thousand Springs to Malad Gorge spring reach by an average amount of 8 cfs at steady state conditions.

82. Only ground water diverted and used for agricultural irrigation purposes was included in the modeled curtailment simulations conducted by Department staff and IWRRI. Based on USGS data, and disregarding the priority dates of ground water rights from the ESPA, about 95 percent of the ground water diverted from the ESPA is used for irrigation. Uses pursuant to ground water rights from the ESPA for public, domestic, industrial, and livestock purposes constitute 2.6 percent, 1.2 percent, 0.7 percent, and 0.6 percent of the total ground water diversions from the ESPA, respectively. Since a significant portion of these other uses is nonconsumptive, the depletions to the ESPA from irrigation uses that contribute to reduced spring discharges in the Thousand Springs area, and other reaches of the Snake River that are hydraulically connected to the ESPA, are greater than 95 percent of the total depletions from all uses of ground water.

83. Using the Department's ground water model for the ESPA to simulate increases in reach gains and spring discharges resulting from the curtailment of the diversion and use of ground water solely for agricultural irrigation purposes provides reasonable quantification of the increases in reach gains and spring discharges resulting from the curtailment of the diversion and use of ground water for all purposes.

84. Based on simulations using the Department's ground water model for the ESPA and accounting for the level of uncertainty in the model (10 percent as described in Finding 22), curtailment of the diversion and use of ground water under all water rights with priority dates later than July 13, 1962, the priority date for water right no. 36-02551, will not at any time result in a meaningful increase in the quantity of water discharging from springs in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water.

85. Matters expressed herein as a Finding of Fact that are later deemed to be a Conclusion of Law are hereby made as a Conclusion of Law.

CONCLUSIONS OF LAW

1. Idaho Code § 42-602, addressing the authority of the Director over the supervision of water distribution within water districts, provides:

> The director of the department of water resources shall have direction and control of the distribution of water from all natural water sources within a water district to the canals, ditches, pumps and other facilities diverting therefrom. Distribution of water within water districts created pursuant to section 42-604, Idaho Code, shall be accomplished by watermasters as provided in this chapter and supervised by the director. The director of the department of water resources shall distribute water in water districts in accordance with the prior appropriation doctrine. The provisions of chapter 6, title 42, Idaho Code, shall apply only to distribution of water within a water district.

2. Idaho Code § 42-603, which grants the Director authority to adopt rules governing water distribution, provides as follows:

> The director of the department of water resources is authorized to adopt rules and regulations for the distribution of water from the streams, rivers, lakes, ground water and other natural water sources as shall be necessary to carry out the laws in accordance with the priorities of the rights of the users thereof. Promulgation of rules and regulations shall be in accordance with the procedures of chapter 52, title 67, Idaho Code.

In addition, Idaho Code § 42-1805(8) provides the Director with authority to "promulgate, adopt, modify, repeal and enforce rules implementing or effectuating the powers and duties of the department."

3. The issue of how to integrate the administration of surface and ground water rights diverting from a common water source in the Eastern Snake Plain area has been a continuing point of debate for more than two decades. To date, no court has directly and fully addressed the issue of how to integrate the administration of the surface and ground water rights that were historically administered as separate sources. The progress made in adjudicating the ground water rights in the Snake River Basin Adjudication and the development of the reformulated ground water model for the ESPA used by the Department to simulate the effects of ground water depletions on hydraulically-connected tributaries and reaches of the Snake River now allow the State to address this issue during this period of unprecedented drought.

4. Resolution of the conjunctive administration issue lies in the application of two well established principles of the prior appropriation doctrine: (1) the principle of "first in time is first in right" and (2) the principle of optimum use of Idaho's water. Both of these principles are subject to the requirement of reasonable use.

5. "Priority of appropriations shall give the better right as between those using the water" of the state. Art. XV, § 3, Idaho Const. "As between appropriators, the first in time is first in right." Idaho Code § 42-106.

6. "[W]hile the doctrine of 'first in time is first in right' is recognized [and applies to ground water rights], a reasonable exercise of this right shall not block full economic development of underground water resources." Idaho Code § 42-226.

7. Because it is the policy of this state to integrate the appropriation, use, and administration of ground water tributary to a stream with the use of surface water from the stream in such a way as to optimize the beneficial use of all of the water of this state, "[a]n appropriator is not entitled to command the entirety of large volumes of water in a surface or ground water source to support his appropriation contrary to the public policy of reasonable use of water . . .." IDAPA 37.03.11.020.03; *see also Schodde v. Twin Falls Land & Water Co.*, 224 U.S. 107, 119 (1912).

8. It is the duty of a watermaster, acting under the supervision of the Director, to distribute water from the public water supplies within a water district among those holding rights to the use of the water in accordance with the prior appropriation doctrine as implemented in Idaho law, including applicable rules promulgated pursuant to the Idaho Administrative Procedure Act. *See* Idaho Code § 42-607.

9. The Director created Water Districts No. 130 and No. 120 on February 19, 2002, and extended the boundaries of Water Districts No. 130 and No. 120 on January 8, 2003, and January 22, 2004, respectively, to provide for the administration of ground water rights in the area overlying the ESPA in the Thousand Springs area and the American Falls area, pursuant to the provisions of chapter 6, title 42, Idaho Code, for the protection of prior surface and ground water rights.

10. The Director has appointed watermasters for Water Districts No. 120 and No. 130 to perform the statutory duties of a watermaster in accordance with guidelines, direction, and supervision provided by the Director. The Director has given specific directions to the watermasters for Water Districts No. 120 and No. 130 to curtail illegal diversions, measure and report diversions, and curtail out-of-priority diversions determined by the Director to be causing injury to senior priority water rights that are not covered by a stipulated agreement or a mitigation plan approved by the Director.

11. In accordance with chapter 52, title 67, Idaho Code, the Department adopted rules regarding the conjunctive management of surface and ground water effective October 7, 1994. IDAPA 37.03.11. The Conjunctive Management Rules prescribe procedures for responding to a delivery call made by the holder of a senior priority surface or ground water right against junior priority ground water rights in an area having a common ground water supply. IDAPA 37.03.11.001.

12. Rule 10 of the Conjunctive Management Rules, IDAPA 37.03.11.010, contains the following pertinent definitions:

01. Area Having a Common Ground Water Supply. A ground water source within which the diversion and use of ground water or changes in ground water recharge affect the flow of water in a surface water source or within which the diversion and use of water by a holder of a ground water right affects the ground water supply available to the holders of other ground water rights.

03. Conjunctive Management. Legal and hydrologic integration of administration of the diversion and use of water under water rights from surface and ground water sources, including areas having a common ground water supply.

04. Delivery Call. A request from the holder of a water right for administration of water rights under the prior appropriation doctrine.

07. Full Economic Development Of Underground Water Resources. The diversion and use of water from a ground water source for beneficial uses in the public interest at a rate that does not exceed the reasonably anticipated average rate of future natural recharge, in a manner that does not result in material injury to senior-priority surface or ground water rights, and that furthers the principle of reasonable use of surface and ground water as set forth in Rule 42.

08. Futile Call. A delivery call made by the holder of a senior-priority surface or ground water right that, for physical and hydrologic reasons, cannot be satisfied within a reasonable time of the call by immediately curtailing diversions under junior-priority ground water rights or that would result in waste of the water resource.

14. Material Injury. Hindrance to or impact upon the exercise of a water right caused by the use of water by another person as determined in accordance with Idaho Law, as set forth in Rule 42.

16. Person. Any individual, partnership, corporation, association, governmental subdivision or agency, or public or private organization or entity of any character.

17. Petitioner. Person who asks the Department to initiate a contested case or to otherwise take action that will result in the issuance of an order or rule.

19. Reasonably Anticipated Average Rate Of Future Natural Recharge. The estimated average annual volume of water recharged to an area having a common ground water supply from precipitation, underflow from tributary sources, and stream losses and also water incidentally recharged to an area having a common ground water supply as a result of the diversion and use of water for irrigation and other purposes. The estimate will be based on available data regarding conditions of diversion and use of water existing at the time the estimate is made and may vary as these conditions and available information change.

20. Respondent. Persons against whom complaints or petitions are filed or about whom investigations are initiated.

13. As used herein, the term "injury" means "material injury" as defined by Rule 10.14 of the Conjunctive Management Rules.

14. The diversion and use of ground water under existing rights results in an average annual depletion of ground water from the ESPA of nearly 2.0 million acre-feet and does not exceed the "Reasonably Anticipated Average Rate of Future Natural Recharge," consistent with Rule 10.07 of the Conjunctive Management Rules.

15. Rule 20 of the Conjunctive Management Rules contains the following pertinent statements of purpose and policies for conjunctive management of surface and ground water resources:

> **01. Distribution of Water Among the Holders of Senior and Junior-Priority Rights.** The rules apply to all situations in the State where the diversion and use of water under junior-priority ground water rights either individually or collectively causes material injury to uses of water under senior-priority water rights. The rules govern the distribution of water from ground water sources and areas having a common ground water supply.
>
> **02. Prior Appropriation Doctrine.** These rules acknowledge all elements of the prior appropriation doctrine as established by Idaho law.
>
> **03. Reasonable Use Of Surface And Ground Water.** These rules integrate the administration and use of surface and ground water in a manner consistent with the traditional policy of reasonable use of both surface and ground water. The policy of reasonable use includes the concepts of priority in time and superiority in right being subject to conditions of reasonable use as the legislature may by law prescribe as provided in Article XV, Section 5, Idaho Constitution, optimum development of water resources in the public interest prescribed in Article XV, Section 7, Idaho Constitution, and full economic development as defined by Idaho law. An appropriator is not entitled to command the entirety of large volumes of water in a surface or ground water source to support his appropriation contrary to the public policy of reasonable use of water as described in this rule.
>
> **04. Delivery Calls.** These rules provide the basis and procedure for responding to delivery calls made by the holder of a senior-priority surface or ground water right against the holder of a junior-priority ground water right. The principle of the futile call applies to the distribution of water under these rules. Although a call may be denied under the futile call doctrine, these rules may require mitigation or staged or phased curtailment of a junior-priority use if diversion and use of water by the holder of the junior-priority water right causes material injury, even though not immediately measurable, to the holder of a senior-priority surface or ground water right in instances where the hydrologic connection may be remote, the resource is large and no direct immediate relief would be achieved if the junior-priority water use was discontinued.
>
> **05. Exercise Of Water Rights.** These rules provide the basis for determining the reasonableness of the diversion and use of water by both the holder of a senior-priority water right who requests priority delivery and the holder of a junior-priority water right against whom the call is made.

11. Domestic and Stock Watering Ground Water Rights Exempt. A delivery call shall not be effective against any ground water right used for domestic purposes regardless of priority date where such domestic use is within the limits of the definition set forth in Section 42-111, Idaho Code, nor against any ground water right used for stock watering where such stock watering use is within the limits of the definition set forth in Section 42-1401A(12), Idaho Code; provided, however, this exemption shall not prohibit the holder of a water right for domestic or stock watering uses from making a delivery call, including a delivery call against the holders of other domestic or stockwatering rights, where the holder of such right is suffering material injury.

16. Rule 40 of the Conjunctive Management Rules sets forth the following procedures to be followed for responses to calls for water delivery made by the holders of senior priority surface or ground water rights against the holders of junior priority ground water rights from areas having a common ground water supply in an organized water district:

01. Responding to a Delivery Call. When a delivery call is made by the holder of a senior-priority water right (petitioner) alleging that by reason of diversion of water by the holders of one or more junior-priority ground water rights (respondents) from an area having a common ground water supply in an organized water district the petitioner is suffering material injury, and upon a finding by the Director as provided in Rule 42 that material injury is occurring, the Director, through the watermaster, shall:

a. Regulate the diversion and use of water in accordance with the priorities of rights of the various surface or ground water users whose rights are included within the district, provided, that regulation of junior-priority ground water diversion and use where the material injury is delayed or long range may, by order of the Director, be phased-in over not more than a five-year period to lessen the economic impact of immediate and complete curtailment; or

b. Allow out-of-priority diversion of water by junior-priority ground water users pursuant to a mitigation plan that has been approved by the Director.

02. Regulation of Uses of Water by Watermaster. The Director, through the watermaster, shall regulate use of water within the water district pursuant to Idaho law and the priorities of water rights as provided in section 42-604, Idaho Code, and under the following procedures:

a. The watermaster shall determine the quantity of surface water of any stream included within the water district which is available for diversion and shall shut the headgates of the holders of junior-priority surface water rights as necessary to assure that water is being diverted and used in accordance with the priorities of the respective water rights from the surface water source.

b. The watermaster shall regulate the diversion and use of ground water in accordance with the rights thereto, approved mitigation plans and orders issued by the Director.

c. Where a call is made by the holder of a senior-priority water right against the holder of a junior-priority ground water right in the water district the watermaster shall first determine whether a mitigation plan has been approved by the Director

whereby diversion of ground water may be allowed to continue out of priority order. If the holder of a junior-priority ground water right is a participant in such approved mitigation plan, and is operating in conformance therewith, the watermaster shall allow the ground water use to continue out of priority.

d. The watermaster shall maintain records of the diversions of water by surface and ground water users within the water district and records of water provided and other compensation supplied under the approved mitigation plan which shall be compiled into the annual report which is required by section 42-606, Idaho Code.

e. Under the direction of the Department, watermasters of separate water districts shall cooperate and reciprocate in assisting each other in assuring that diversion and use of water under water rights is administered in a manner to assure protection of senior-priority water rights provided the relative priorities of the water rights within the separate water districts have been adjudicated.

03. Reasonable Exercise of Rights. In determining whether diversion and use of water under rights will be regulated under Rules 40.01.a., or 40.01.b., the Director shall consider whether the petitioner making the delivery call is suffering material injury to a senior-priority water right and is diverting and using water efficiently and without waste, and in a manner consistent with the goal of reasonable use of surface and ground waters as described in Rule 42. The Director will also consider whether the respondent junior-priority water right holder is using water efficiently and without waste.

04. Actions of the Watermaster under a Mitigation Plan. Where a mitigation plan has been approved as provided in Rule 42, the watermaster may permit the diversion and use of ground water to continue out of priority order within the water district provided the holder of the junior-priority ground water right operates in accordance with such approved mitigation plan.

17. In accordance with Rule 40 of the Conjunctive Management Rules, curtailment of junior priority ground water rights may only occur if the use of water under senior priority rights is consistent with Rule 20.03 of the Conjunctive Management Rules and injury is determined to be caused by the exercise of the junior priority rights. Factors that will be considered in determining whether junior priority ground water rights are causing injury to the senior priority water rights held by Rangen are set forth in Rule 42 of the Conjunctive Management Rules as follows:

01. Factors. Factors the Director may consider in determining whether the holders of water rights are suffering material injury and using water efficiently and without waste include, but are not limited to, the following:

a. The amount of water available in the source from which the water right is diverted.

b. The effort or expense of the holder of the water right to divert water from the source.

c. Whether the exercise of junior-priority ground water rights individually or collectively affects the quantity and timing of when water is available to, and the cost of exercising, a senior-priority surface or ground water right. This may include the seasonal as well as the multi-year and cumulative impacts of all ground water withdrawals from the area having a common ground water supply.

d. If for irrigation, the rate of diversion compared to the acreage of land served, the annual volume of water diverted, the system diversion and conveyance efficiency, and the method of irrigation water application.

e. The amount of water being diverted and used compared to the water rights.

f. The existence of water measuring and recording devices.

g. The extent to which the requirements of the holder of a senior-priority water right could be met with the user's existing facilities and water supplies by employing reasonable diversion and conveyance efficiency and conservation practices; provided, however, the holder of a surface water storage right shall be entitled to maintain a reasonable amount of carry-over storage to assure water supplies for future dry years. In determining a reasonable amount of carry-over storage water, the Director shall consider the average annual rate of fill of storage reservoirs and the average annual carry-over for prior comparable water conditions and the projected water supply for the system.

h. The extent to which the requirements of the senior-priority surface water right could be met using alternate reasonable means of diversion or alternate points of diversion, including the construction of wells or the use of existing wells to divert and use water from the area having a common ground water supply under the petitioner's surface water right priority.

02. Delivery Call For Curtailment of Pumping. The holder of a senior-priority surface or ground water right will be prevented from making a delivery call for curtailment of pumping of any well used by the holder of a junior-priority ground water right where use of water under the junior-priority right is covered by an approved and effectively operating mitigation plan.

18. The two letters received on September 23 and October 10, 2003, by the Director from J. Dee May, representing Rangen, Inc., seeking the administration of "all water right diversions junior to [Rangen's] that are interfering with and impacting [Rangen's] water rights" are either delivery calls as defined by Rule 10.04 of the Conjunctive Management Rules against junior priority ground water rights or demands for the administration of surface water rights pursuant to Idaho Code § 42-607.

19. Rule 40 of the Conjunctive Management Rules applies to the delivery calls made by Rangen against the holders of junior priority ground water rights, but not surface water rights, in Water Districts No. 36A, No. 120, and No. 130.

20. There are no surface water rights in Water Districts No. 36A or No. 130 that are junior in priority to Rangen's water right no. 36-02551 and that are diverted from the same

surface water source as right no. 36-02551. There are also no surface water rights in Water District No. 120.

21. There are no ground water rights subject to administration included within Water District No. 36A.

22. Rules 40 and 42 of the Conjunctive Management Rules require the Director to make determinations regarding "material injury" and the "reasonableness of water diversions" in responding to a delivery call against junior priority ground water rights in Water Districts No. 120 and No. 130.

23. The reductions in the quantity of water discharging from springs in the Thousand Springs area attributable to depletions to the ESPA from the diversion and use of ground water in Water Districts No. 120 and No. 130 do not automatically constitute material injury to surface water rights diverting from springs or dependent on sources formed by springs even when the diversion and use of ground water occur under water rights that are junior in priority to such surface water rights. Whether reductions in the quantity of water discharging from springs caused by the diversion and use of ground water under junior priority rights in Water Districts No. 120 and No. 130 constitute material injury is dependent on the factors enumerated in Rule 42 of the Conjunctive Management Rules.

24. Since the records of flow measurements submitted by May on behalf of Rangen and the records maintained by the Department since 1995 show that the quantity of water available at the Rangen hatchery facilities has been sufficient to continuously fill water right no. 36-15501 at the authorized diversion rate of 1.46 cfs, the exercise of junior priority ground water rights have not reduced the quantity of water available for water right no. 36-15501. Therefore, there is no material injury to water right no. 36-15501.

25. Based on simulations using the Department's reformulated and recalibrated ground water model, permanently curtailing the diversion and use of ground water under rights for agricultural irrigation that (1) are in the area of common ground water supply described in Finding 7, (2) have priority dates later than the priority date for water right no. 36-02551 (July 13, 1962), and (3) reduce spring discharge in the Thousand Springs to Malad Gorge spring reach by more than 10 percent of the amount of depletion to the ESPA resulting from those ground water diversions (10 percent is the uncertainty in model simulations, see Finding 22), would increase the discharge of springs in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water, by a total average amount of 0.4 cfs at steady state conditions. Therefore, the delivery call against ground water rights junior in priority to July 13, 1962, to supply water right no. 36-02551 is futile because an insignificant quantity of water would accrue to the entirety of the Thousand Springs to Malad Gorge spring reach (*see* IDAPA 37.03.11.010.08), and since the diversion and use of ground water under rights junior in priority to July 13, 1962, do not significantly affect the quantity of water available for water right no. 36-02551, there is no material injury to water right no. 36-02551 (*see* IDAPA 37.03.11.042.01.c).

26. If the area of simulated permanent curtailment includes all of the area included in the ESPA ground water model (not limited to the area of common ground water supply described in Finding 7), and the uncertainty in the model simulations is disregarded, simulating the permanent curtailment of ground water under rights for agricultural irrigation that have priority dates later than the priority date for water right no. 36-02551 (July 13, 1962) would increase the discharge of springs in the Thousand Springs to Malad Gorge spring reach, which includes the Curran Spring from which Rangen diverts surface water, by a total average amount of less than 5 cfs at steady state conditions. Even if an average accrual of 5 cfs in the Thousand Springs to Malad Gorge spring reach would result from the permanent curtailment of 664,300 irrigated acres, curtailment of such rights would be precluded under principles of the prior appropriation doctrine as established by Idaho law. *See e.g.*, IDAPA 37.03.11.020.03; *Schodde*, 224 U.S. at 119.

27. Based on available records, there has never been water available for water right no. 36-07694 (See Finding 63). The exercise of junior priority ground water rights cannot reduce the quantity of water available for water right no. 36-07694 since water has never been available anyway. Therefore, there is no material injury to water right no. 36-07694 caused by the diversion and use of ground water under junior priority rights. Even if water had been available at one time to partially or completely satisfy water right no. 36-07694, the delivery call would still be futile and no material injury would be found. See Conclusion 25.

28. The Director should deny Rangen's delivery call.

ORDER

In response to the water delivery call made by Rangen, Inc., and for the reasons stated in the foregoing Findings of Fact and Conclusions of Law, the Director orders as follows:

IT IS HEREBY ORDERED that the delivery call made by Rangen through the letters filed with the Director by J. Dee May on September 23, 2003, and October 6, 2003 is hereby DENIED.

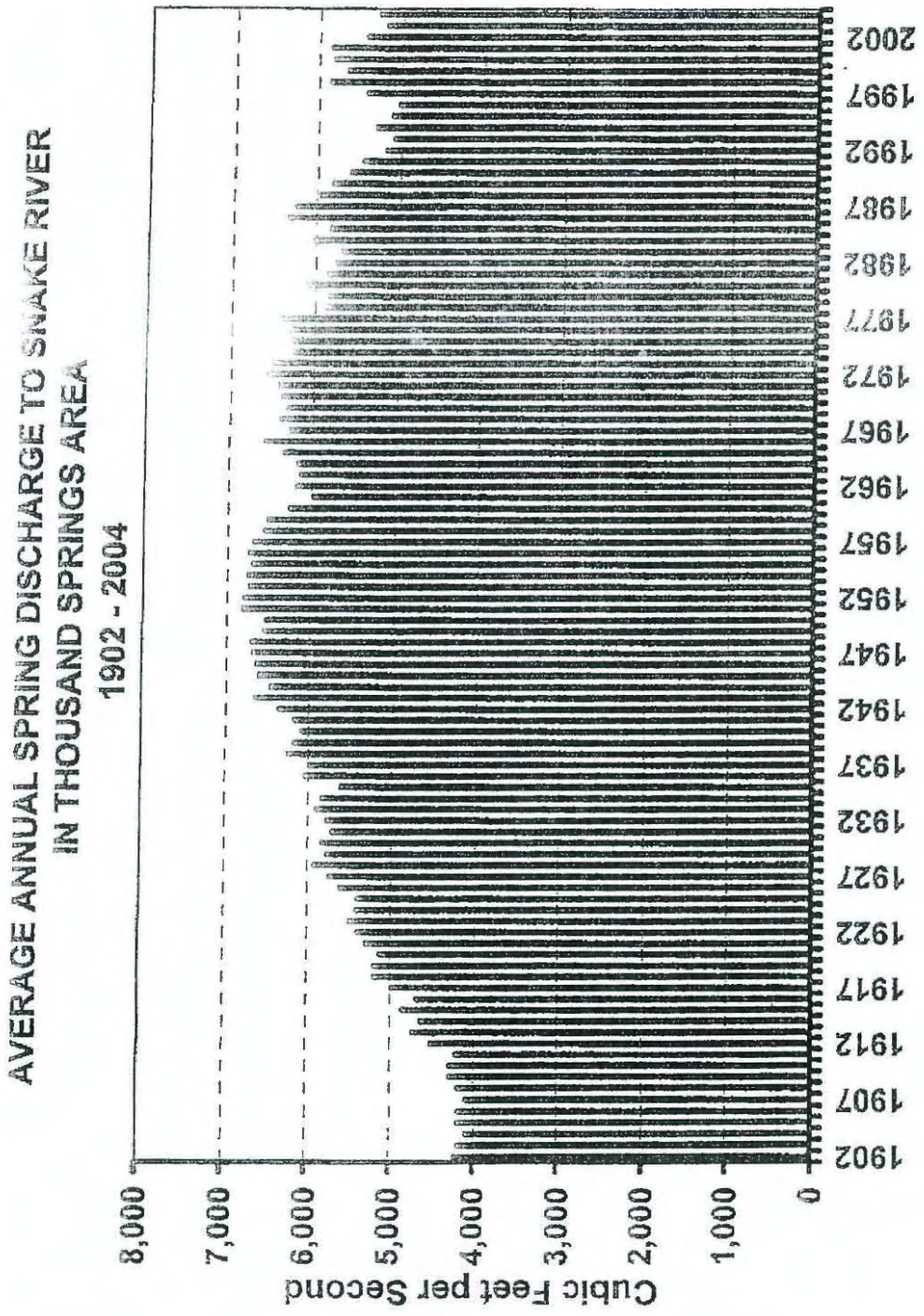
IT IS FURTHER ORDERED that this is a final order of the agency. Any party may file a petition for reconsideration of this final order within fourteen (14) days of the service date of this order. The agency will dispose of the petition for reconsideration within twenty-one (21) days of its receipt, or the petition will be considered denied by operation of law pursuant to Idaho Code § 67-5246.

IT IS FURTHER ORDERED that any person aggrieved by this decision shall be entitled to a hearing before the Director to contest the action taken provided the person files with the Director, within fifteen (15) days after receipt of written notice of the order, or receipt of actual notice, a written petition stating the grounds for contesting the action and requesting a hearing. Any hearing conducted shall be in accordance with the provisions of chapter 52, title 67, Idaho Code, and the Rules of Procedure of the Department, IDAPA 37.01.01. Judicial review of any final order of the Director issued following the hearing may be had pursuant to Idaho Code § 42-1701A(4).

DATED this 19th day of May 2005.

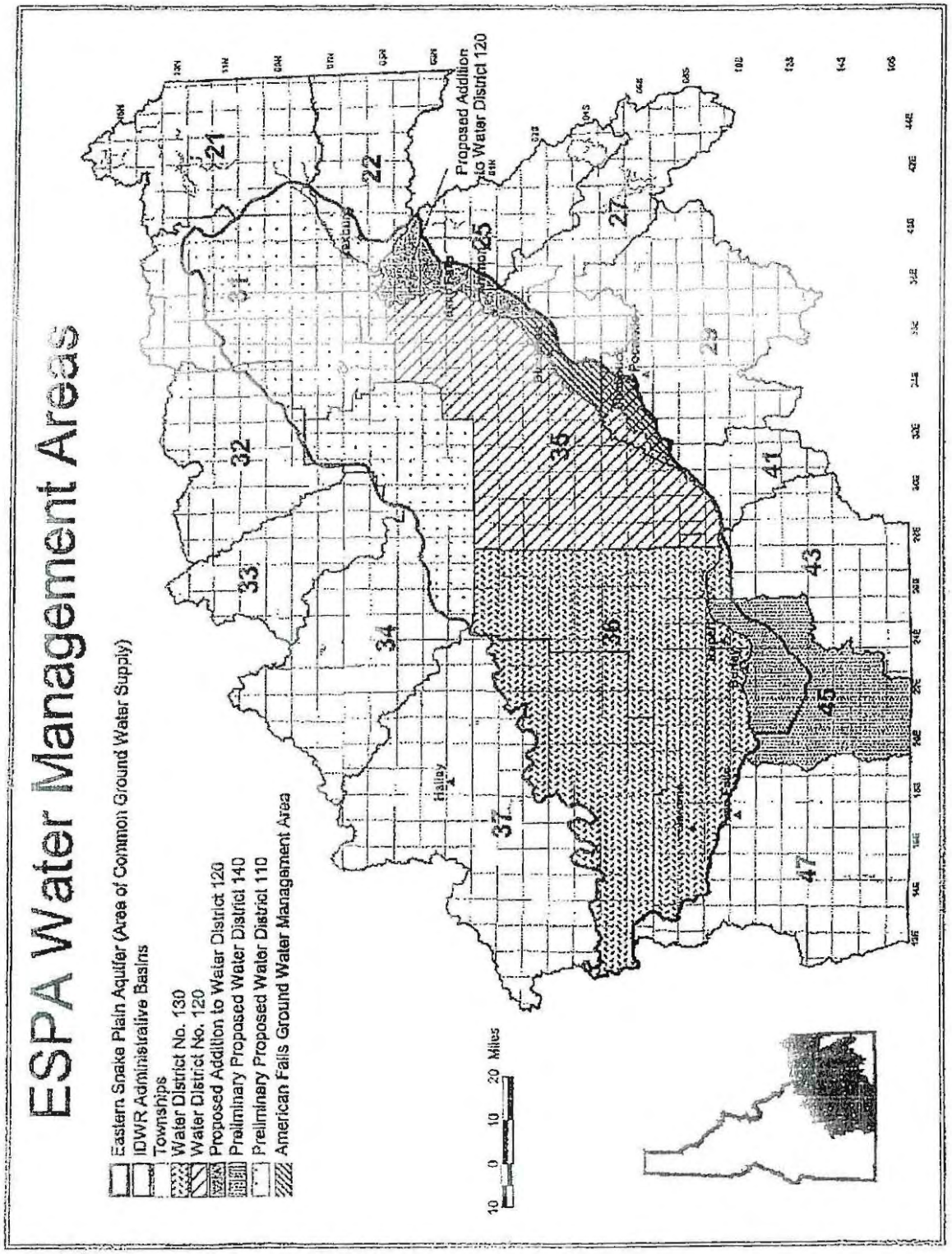
KARL J. DREHER
Director

ATTACHMENT A



RAN 779

ATTACHMENT B



RAN 780

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 19th day of May, 2005, the above and foregoing document was served by the method indicated:

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Victoria Wigle
Administrative Assistant to the Director
Idaho Department of Water Resource

EXHIBIT G

FILED-DISTRICT COURT
CASE #
2010 MAY -4 AM 9:46
DUANE SMITH, CLERK
DEPUTY

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

A & B IRRIGATION DISTRICT, Petitioner, vs. THE IDAHO DEPARTMENT OF WATER RESOURCES and GARY SPACKMAN in his official capacity as Interim Director of the Idaho Department of Water Resources, Respondents. **IN THE MATTER OF THE PETITION FOR DELIVERY CALL OF A & B IRRIGATION DISTRICT FOR THE DELIVERY OF GROUND WATER AND FOR THE CREATION OF A GROUND WATER MANAGEMENT AREA**	Case No. 2009-000647 **MEMORANDUM DECISION AND ORDER ON PETITION FOR JUDICIAL REVIEW**

Ruling:

The 1951 Idaho Ground Water Act, I.C. § 42-226 *et seq.*, applies retroactively with respect to the administration of ground water rights including the management of ground water levels.

The Director did not err in finding that reasonable pumping levels had not been exceeded based on determination that the 36-2080 right suffered no material injury at current levels. Consistent with a finding of no material injury, Director was not required to make a determination on reasonableness of pumping levels.

The Director erred in failing to apply proper evidentiary standard of clear and convincing evidence in finding of no material injury to A & B's right. Remanded for purpose of applying correct evidentiary standard.

The Director did not err by analyzing material injury to the 36-2080 right in cumulative as opposed to analyzing injury separately to the 177 points of diversion based on the way in which the right was licensed and decreed.

The Director did not err by failing to designate a Ground Water Management Area pursuant to I.C. § 42-233b.

Appearances:

John K. Simpson, Travis L. Thompson, Paul Arrington, Sarah W. Higer, Barker Rosholt & Simpson, LLP, Twin Falls, Idaho, on behalf of Petitioner A & B Irrigation District, ("A & B"), (Travis Thompson argued);

Phillip J. Rassier, Chris M. Bromley, Deputy Attorneys General of the State of Idaho, Idaho Department of Water Resources, Boise, Idaho, on behalf of Respondents Idaho Department of Water Resources, and Gary Spackman in his capacity as Interim Director of the Idaho Department of Water Resources, ("Director," "IDWR" or "Department") (Chris M. Bromley argued);

Randall C. Budge, Candice M. McHugh, Scott J. Smith, Racine Olson Nye Budge & Bailey, Chartered, Pocatello, Idaho, on behalf of Respondent Idaho Ground Water Appropriators, Inc. ("IGWA") (Candice M. McHugh argued);

Sarah A. Klahn, White & Jankowski, LLP, Denver, Colorado, A. Dean Tramner, Pocatello, Idaho, on behalf of Respondent City of Pocatello ("City of Pocatello") (Sara A. Klahn argued);

Jerry R. Rigby, Rigby, Andrus & Rigby, Chartered, Rexburg, Idaho, on behalf of Fremont Madison Irrigation District, Robert & Sue Huskinson, Sun-Glo Industries, Val Schwendiman Farms, Inc., Darrell C. Neville, Scott C. Neville, and Stan D. Neville, ("Fremont-Madison *et. al.*").

I.

STATEMENT OF THE CASE

A. Nature of the Case

This case is a proceeding for judicial review of the *Final Order Regarding the A & B Delivery Call* ("*Final Order*") issued June 30, 2009, by David R. Tuthill, Jr., Director of IDWR. Record ("R.") R. 3318-3325. Following the retirement of Director Tuthill on June 30, 2009, Gary Spackman was appointed Interim Director. The *Final Order* was issued at the conclusion of proceedings relating to a *Petition for Delivery Call* originally filed with the Department by A & B on July 26, 1994. R. 12-14. The *Petition for Delivery Call* also requested that the Director designate the Eastern Snake Plain Aquifer ("ESPA") as a Ground Water Management Area ("GWMA") pursuant to Idaho Code § 42-233b. The *Final Order* denied both the delivery call and the request for GWMA designation. On August 31, 2009, A & B filed the instant *Notice of Appeal and Petition for Judicial Review of Agency Action* ("*Petition for Judicial Review*") pursuant to the Idaho Administrative Procedure Act, Title 67, Chap 52, Idaho Code.

B. Course of Proceedings

On June 26, 1994, A & B filed the *Petition for Delivery Call* seeking administration of ground water rights diverting from the ESPA that were junior in priority to water right 36-2080, as well as GWMA designation of the ESPA. R. 12-14. The *Petition* alleged *inter alia* that junior priority ground water pumping from the ESPA had lowered the water table an average of 20 feet and in excess of 40 feet in some areas. The Petition also alleges that the declines in the water table level resulted in reducing A & B's diversions from its authorized 1,100 cfs to 974 cfs and reduced diversions from 40 wells serving approximately 21,000 acres to a diversion rate insufficient to irrigate the lands served by the wells. R. 13.

Notice of the filing was served on approximately 7,200 holders of water rights who divert from the ESPA with priorities junior to September 16, 1994. R. 669. Responses were received from over 200 junior water right holders or entities representing water right holders. *Id.* Thereafter, A & B, IDWR and the participating respondents

entered into a stipulation, which among other things, stayed the *Petition for Delivery Call* until such time as any party filed a *Motion to Proceed* to have the stay lifted. R. 1106.

On March 16, 2007, A & B filed a *Motion to Proceed* with the Department, moving to lift the stay agreed to by the parties. Following a status conference on the *Motion to Proceed*, the Director issued an order lifting the stay. *Id.* On January 29, 2008, the Director issued an *Order* ("*January 29, Order*") denying A & B's *Petition for Delivery Call* and request for GWMA designation. R. 1105-1151. The *January 29, Order* concluded, based on the application of the *Rules for Conjunctive Management of Surface and Ground Water Resources*, IDAPA 37.03.11 ("CMR"), that A & B's 36-2080 water right had not suffered "material injury." *Id.* at 1151. In response, A & B requested an administrative hearing challenging the *January 29, Order*. R. 1182. An evidentiary hearing was conducted December 3 through 17, 2008, before Hearing Officer Gerald F. Schroeder ("Hearing Officer"). Respondents IGWA, City of Pocatello and Fremont Madison *et. al.* participated in the hearing. R. 116-17.

On March 27, 2009, the Hearing Officer entered his *Opinion Constituting Findings of Fact, Conclusions of Law and Recommendations* ("*Recommended Order*"). R. 3078-3120. The *Recommended Order* agreed with the conclusion of the Director's *January 29, Order*, that A & B's water right no. 36-2080 had not suffered material injury and that designation of a GWMA would not add any benefit to the management of the ESPA that could not already be accomplished through the water districts already in existence. *Id.* On May 29, 2009, the Hearing Officer issued an *Order Granting in Part and Denying in Part A & B's Petition for Reconsideration*, correcting certain errors in the *Recommended Order* but otherwise affirming the *Recommended Order*. R. 3231-3233. On June 19, 2009, the Hearing Officer issued a response to *A & B's Petition for Clarification* which clarified the Hearing Officer's use of the term "total project failure." R. 3262. A & B filed exceptions to the *Recommended Order* on June 30, 2009. R. 3318. On June 30, 2009, the Director issued the *Final Order* accepting all substantive recommendations of the Hearing Officer. On August 4, 2009, the Director issued an *Order Denying Petition for Reconsideration* making the *June 30, 2009, Order*, final. R. 3360.

On August 31, 2009, A & B timely filed the *Petition for Judicial Review* now before the Court. IGWA, City of Pocatello and Fremont-Madison *et. al.* all appear as Respondents. This case was assigned to the undersigned Judge in his capacity as a District Judge and not in his capacity as Presiding Judge of the Snake River Basin Adjudication ("SRBA").

C. Statement of Relevant Facts

1. A & B Irrigation Project

The North Side Pumping Division of the Minidoka Project was developed by the United States Bureau of Reclamation ("USBOR"). The project was completed in 1963. A & B is an irrigation district organized by the landowners of the North Side Pumping Division of the Minidoka Project. The USBOR transferred operation and maintenance of the project to A & B in 1966 pursuant to a repayment contract. The project consists of two units. Unit A serves approximately 15,000 acres with surface water diverted from the Snake River. Unit B serves approximately 66,000 acres with ground water pumped from the ESPA primarily authorized under the 36-2080 water right.[1]

2. Water Right 36-2080

Water right 36-2080 is a ground water right held in trust by the USBOR for the benefit of the landowners within A & B Irrigation District. *See United States v. Pioneer Irr. Dist.*, 144 Idaho 106, 157 P.3d 600 (2007). The right was decreed with a priority date of September 9, 1948, and cumulatively authorizes the diversion of 1100 cfs from 177 separate points of diversion (wells) for the irrigation of 62,604.3 acres from April 1 to October 31. The decreed quantity calculates to 0.88 miner's inches per acre.[2] A partial decree was issued for the right in the SRBA on May 7, 2003. Exh. 139.

A subsequent administrative transfer approved the use of up to 188 wells and expanded the authorized number of acres to 66,686.2. A & B currently operates 177

[1] Unit B is also irrigated with other ground water rights, including enlargement rights, which cumulatively authorize the irrigation of 66,686.2 acres. R. 1112.

[2] This is calculated as follows: 1,100 cfs / 62,604.3 acres = .0176 cfs or 0.88 (0.0176/.02) miner's inches per acre. However, this is an average, as not all wells produce 0.88 inches per acre some produce more and others less. R. 3108. Well capacity ranges from 0.8 cfs to 10.6 cfs. R. 3093

wells. R. 3081. The place of use for all points of diversion is described as "the boundary of A & B Irrigation District service area pursuant to Section 43-323, Idaho Code." R. 3094. As a result, water diverted from any one of the wells is appurtenant to all acres within the place of use. R. 3092. The rate of diversion for the right is decreed in the cumulative and does not ascribe any rate of diversion to a particular well. The USBOR applied to have the right licensed in this manner to provide for the greatest amount of flexibility in distributing water throughout the project. R. 3093-94; Exh. 157D.

Despite being decreed in this manner, the Unit B ground water project is not a system of interconnected wells. The Unit is comprised of 130 independent well systems. R. 3093. A well system consists of one or more wells that provide water to a distribution system that services a particular number of acres. On average, five farm units are served from each well system. Eighty-eight of the systems consist of a single well. Approximately 40 of the systems consist of two wells. The Unit has two or three systems comprised of three wells. R. 3092-93. Water delivery for the average well system requires less than one mile of canal with a capacity of 5.6 cfs. R. 3095. Although not all of A & B's wells are underperforming, because of the design of the system and the geographic layout of the lands within the Unit, water cannot readily be distributed throughout the Unit from areas served by wells capable of pumping more than required for the area of service, to areas served by underperforming wells. R. 3095.

3. Historical Development of the Unit B Ground Water Project System

The Unit B ground water project was originally designed as an open discharge system where water was pumped from the ground into surface ponds and delivered through open lateral systems to the user. R. 3098. Irrigation was initially accomplished by gravity flow. R. 3099. Gravity flow has been replaced by more efficient sprinkler systems. R. 3099. As of 2007, only 3 to 4 percent of the irrigation in Unit B was gravity flow. *Id.* The original conveyance system included 109.71 miles of laterals and 333 miles of drains. The current system includes 51 miles of laterals, 138 miles of drains and 27 miles of distribution piping. Sixty-nine water injection wells have also been eliminated and the water applied to other purposes. R. 3099. In sum, the current system

is more efficient than the original system. Conveyance loss system wide is between 3 and 5 percent. R. 3099. These efficiencies reduced the amount of water re-entering the ESPA. R. 3102.

A & B maintains the Unit B ground water project system on an annual basis including a "rectification" program for underperforming wells. The rectification program includes deepening wells, drilling new wells and increasing horsepower to existing pumps. A & B's criteria for rectification targets wells delivering below 0.75 miner's inches per acre. R. 3101.

4. Declines in ESPA Levels

The project was developed when water levels in the ESPA were at their peak. Gravity flow irrigation from the Snake River resulted in significant amounts of recharge to the ESPA. Ground water pumping was also limited. Since that time changes in irrigation practices reducing incidental recharge, ground water pumping and drought have all contributed to declines in aquifer levels. Declines in aquifer levels since the wells were installed range from 8.5 feet to 46.4 feet. Although the overall annual recharge to the ESPA exceeds depletions from ground water pumping, less water enters the project area than leaves the area. Despite declines in certain areas the aquifer is not being "mined" by ground water pumping. R. 3113.

5. A & B's Delivery Call

The declines in aquifer levels have resulted in A & B being unable to pump the full amount of its authorized rate of diversion during peak demand periods. The declines reduced cumulative withdrawals from 1,100 cfs (0.88 miner's inches per acre) to 974 cfs (0.78 miner's inches per acre) for the entire project. Depletions have also resulted in some wells being abandoned. The shortages are not uniform throughout the project. A & B alleges ground water pumping by juniors has materially injured the 36-2080 water right. R. 3113. However, certain areas within the project, which lie over hydrogeologic regions of poor transmissivity, have realized the greatest shortages. These areas are primarily located in the southwest region of the project but shortages are not exclusively limited to that area. R. 3111; Exh. 200N & 216.

D. Decision of the Director

The Hearing Officer's *Recommended Order* determined the following: 1) A & B's 36-2080 right was subject to the provisions of the Idaho Ground Water Act (I.C. §§ 42-226 *et seq.*) ("GWA") and A & B's wells had not exceeded reasonable pumping levels; 2) 0.75 miner's inches per acre was the minimum quantity necessary to satisfy A & B's water requirements despite the 36-2080 right being decreed in the aggregate for 0.88 miner's inches per acre; 3) inherent hydrogeologic conditions making pumping difficult in certain areas of the project was not a basis for curtailment; 4) A & B was required to take reasonable measures to move water to underperforming areas within the project; 5) A & B had not suffered material injury to its senior water right; and 6) no additional benefit to the management of the ESPA would result from the formation of a GWMA. R. 3078. In the *Final Order* the Director accepted all substantive recommendations of the Hearing Officer. R. 3318.

II.
ISSUES PRESENTED ON APPEAL

A & B raises the following issues on appeal:

A. Whether the Director erred in concluding that the provisions of the GWA apply to pre-enactment water rights?

B. Whether the Director unconstitutionally applied the CMR by disregarding the proper presumptions and burdens of proof resulting in: (i) reducing A&B's diversion rate per acre from 0.88 to 0.75 miner's inches; (ii) creating a new "failure of the project" standard for injury; and (iii) using a "minimum amount needed" for crop maturity standard?

C. Whether the Director erred in failing to separately analyze A & B's 177 individual points of diversion, as opposed to cumulatively, for purposes of determining injury to A & B's senior water right?

D. Whether the Director erred and unconstitutionally applied the CMR by concluding that A & B must interconnect individual wells or well systems across the project before a delivery call can be filed even though water right 36-2080 was developed, licensed and decreed with as many as 130 individual well systems?

E. Whether the Director erred in finding that A & B has not been required to pump water beyond a "reasonable ground water pumping level" even though (1) the Director provided no factual support for this conclusion, (2) the evidence demonstrates that A&B has been forced to drill wells deeper and even abandon wells as water supplies become more and more depleted, and (3) no such level has ever been determined as required by Idaho Code § 42-226?

F. Whether the Director erred in failing to designate all or a portion of the ESPA as a GWMA pursuant to Idaho Code § 42-233b?

G. Whether the Director violated I.C. § 42-231 by failing to protect the ESPA, set a reasonable pumping level or designate a GWMA?

H. Whether the Director erred by failing to issue a final order in compliance with I.C. § 67-5248?

III.
MATTER DEEMED FULLY SUBMITTED FOR DECISION

Oral argument before the District Court in this matter was held March 2, 2010. The parties did not request the opportunity to submit additional briefing and the Court does not require any additional briefing in this matter. Therefore, this matter is deemed fully submitted for decision on the next business day or March 3, 2010.

IV.

APPLICABLE STANDARD OF REVIEW

Judicial review of a final decision of the director of IDWR is governed by the Idaho Administrative Procedure Act (IDAPA), Chapter 52, Title 67, I.C. § 42-1701A(4). Under IDAPA, the Court reviews an appeal from an agency decision based upon the record created before the agency. Idaho Code § 67-5277; *Dovel v. Dobson,* 122 Idaho 59, 61, 831 P.2d 527, 529 (1992). The Court shall not substitute its judgment for that of the agency as to the weight of the evidence on questions of fact. Idaho Code § 67-5279(1); *Castaneda v. Brighton Corp.,* 130 Idaho 923, 926, 950 P.2d 1262, 1265 (1998). The Court shall affirm the agency decision unless the court finds that the agency's findings, inferences, conclusions, or decisions are:

(a) in violation of constitutional or statutory provisions;

(b) in excess of the statutory authority of the agency;

(c) made upon unlawful procedure;

(d) not supported by substantial evidence on the record as a whole; or,

(e) arbitrary, capricious, or an abuse of discretion.

Idaho Code § 67-5279(3); *Castaneda,* 130 Idaho at 926, 950 P.2d at 1265.

The petitioner or appellant must show that the agency erred in a manner specified in I.C. § 67-5279(3), and that a substantial right of the party has been prejudiced. I.C. § 67-5279(4). *Barron v. IDWR,* 135 Idaho 414, 417, 18 P.3d 219, 222 (2001). Even if the evidence in the record is conflicting, the Court shall not overturn an agency's decision that is based on substantial competent evidence in the record.[3] *Id.* The Petitioner (the party challenging the agency decision) also bears the burden of documenting and proving that there was not substantial evidence in the record to support the agency's decision. *Payette River Property Owners Assn. v. Board of Comm'rs.* 132 Idaho 552, 976 P.2d 477 (1999).

The Idaho Supreme Court has summarized these points as follows:

[3] Substantial does not mean that the evidence was uncontradicted. All that is required is that the evidence be of such sufficient quantity and probative value that reasonable minds *could* conclude that the finding – whether it be by a jury, trial judge, special master, or hearing officer – was proper. It is not necessary that the evidence be of such quantity or quality that reasonable minds *must* conclude, only that they *could* conclude. Therefore, a hearing officer's findings of fact are properly rejected only if the evidence is so weak that reasonable minds could not come to the same conclusions the hearing officer reached. *See eg. Mann v. Safeway Stores, Inc.* 95 Idaho 732, 518 P.2d 1194 (1974); *see also Evans v. Hara's Inc.*, 125 Idaho 473, 478, 849 P.2d 934, 939 (1993).

> The Court does not substitute its judgment for that of the agency as to the weight of the evidence presented. The Court instead defers to the agency's findings of fact unless they are clearly erroneous. In other words, the agency's factual determinations are binding on the reviewing court, even where there is conflicting evidence before the agency, so long as the determinations are supported by substantial evidence in the record.... The party attacking the Board's decision must first illustrate that the Board erred in a manner specified in Idaho Code Section 67-5279(3), and then that a substantial right has been prejudiced.

Urrutia v. Blaine County, 134 Idaho 353, 2 P.3d 738 (2000) (citations omitted); *see also, Cooper v. Board of Professional Discipline,* 134 Idaho 449, 4 P.3d 561 (2000).

If the agency action is not affirmed, it shall be set aside in whole or in part, and remanded for further proceedings as necessary. I.C. § 67-5279(3); *University of Utah Hosp. v. Board of Comm'rs of Ada Co.,* 128 Idaho 517, 519, 915 P.2d 1375, 1377 (Ct.App. 1996).

V.
ANALYSIS AND DISCUSSION

A. The Director Did Not Err in Concluding the GWA Applies to the Administration of the Right to Use Water Rights Pre-dating its Enactment.

A & B argues the Director erred in adopting the Hearing Officer's conclusion that the GWA applies to water rights appropriated prior to its enactment. Water right 36-2080 has a priority date of September 9, 1948. The GWA was enacted in 1951. 1951 Idaho Sess. Laws, ch. 200, pp. 423-29 (codified as Idaho Code §§ 42-226 *et. seq.*). The significance of whether the GWA applies to water rights established prior to its enactment comes from I.C. § 42-226 which was amended in 1953 to provide:

> [W]hile the doctrine of 'first in time is first in right' is recognized, a reasonable exercise of this right shall not block full economic development of underground water resources, *but early appropriators of underground water shall be protected in the maintenance of reasonable pumping levels* as may be established by the state reclamation engineer as herein provided.

1953 Idaho Sess. Laws, ch. 182, p. 278 (emphasis added).[4]

A & B argues that because water right 36-2080 was established prior to the enactment of the GWA, the right is not subject to the "reasonable pumping level" provision of I.C. § 42-226. A & B argues instead that the right is protected to historic pumping levels as provided by common law. In support of its argument, A & B cites to the plain language of the 1987 amendment to I.C. § 42-226, which remains in the current version of the statute, and provides: "This act shall not affect the rights to the use of ground water in this state acquired before its enactment." 1987 Idaho Sess. Laws Ch. 347, p. 743. Among other things, A & B also points out where this same provision has been cited to by both the Idaho Supreme Court and the SRBA District Court for the proposition that the GWA does not apply to water rights pre-existing its enactment. *See Musser v. Higginson*, 125 Idaho 392, 396, 871 P.2d 809, 813 (1994); *In re: SRBA Case No. 39576, Order on Cross Motions for Summary Judgment*, Subcase No. 91-00005, p.22 (July 2, 2001)(citing *Musser*). The issue of whether the GWA applies to pre-existing water rights is a question of law over which a reviewing court exercises free review. *Farber v. Idaho State Insurance Fund*, 147 Idaho 307, 310, 208 P.3d 289, 292 (2009). Moreover, the issue requires a comprehensive review of the GWA in its entirety.

1. Application of Standards of Statutory Interpretation to the GWA.

The objective of statutory interpretation is to derive the intent of the legislative body that adopted the act. *Farber at* 310, 208 P.3d at 292 (2009) (citing *Payette River Prop. Owners Ass'n v. Bd. Of Comm'rs of Valley County*, 132 Idaho 551, 557, 976 P.2d 477, 483 (1999)). Statutory interpretation begins with the literal language of the statute. *Id.* (citing *Paolini v. Albertson's, Inc.*, 143 Idaho 547, 549, 149 P.3d 822, 824 (2006)). When the statutory language is unambiguous, the clearly expressed intent of the

[4] The original language has since been amended but not in substance. I.C. § 42-226 currently provides:

> [W]hile the doctrine of 'first in time is first in right' is recognized, a reasonable exercise of this right shall not block full economic development of underground water resources. *Prior appropriators of underground water shall be protected in the maintenance of reasonable pumping levels* as may be established by the director of the department of water resources as herein provided.

legislative body must be given effect, and the court need not consider rules of statutory construction. *Id.* (citing *Payette River*, 132 Idaho at 557, 976 P.2d at 483). Statutory provisions should not be read in isolation, but must be interpreted in the context of the entire document. *Id.* (citing *Westerburg v. Andrus*, 114 Idaho 401, 403, 757 P.2d 664, 666 (1988)). The statute should be considered as a whole and the words given their plain, usual, ordinary meaning. *Id.* A statute is passed as a whole and not in parts or sections. Each part or section should therefore be construed in connection with every other part or section so as to produce a harmonious whole. It is not proper to confine interpretation to the one section to be construed. SUTHERLAND, STAT. CONST. § 46:05 (6th ed. 2001).

2. When Construed in its Entirety, it is Clear the Legislature Intended the GWA to Apply to the *Administration* of *All* Rights to the Use of Ground Water Whenever or However Acquired.

The language of the 1987 amendment to I.C. § 42-226, which provides "[t]his act shall not affect the rights to the use of ground water in this state acquired before its enactment" appears, when read in isolation, to exempt water rights existing prior to the enactment of the GWA from its application. However, when construing the Act in its entirety, and specifically taking into account the plain language of I.C. § 42-229, it becomes clear that the Legislature intended a distinction between the "right to the use of ground water" and the "*administration* of all rights to the use of ground water." This distinction is significant in that the plain language of the Act makes clear that the Act applies retroactively to the later category unless specifically exempted.

Prior to the enactment of the GWA in 1951, Idaho did not have a statutory scheme in place specifically governing the appropriation and administration of ground water. In discussing the enactment of the GWA in 1951, the Idaho Supreme Court has noted that:

> In the years since World War II, most western states have enacted legislation establishing administrative controls over ground water withdrawals . . . Idaho was in the vanguard of this movement when we enacted our Ground Water Act in 1951 I.C. §42-226 et seq.

Baker v. Ore-Ida Food, 95 Idaho 575, 580, 513 P.2d 627, 632 (1973).

In its original form, Section 1 of the Act (now codified as I.C. § 42-226) re-affirmed that the traditional policies of this state pertaining to the beneficial use of water through appropriation apply to ground water:

> Section 1 GROUND WATERS ARE PUBLIC WATERS
>
> It is hereby declared that the traditional policy of the state of Idaho, requiring the water resources of this state to be devoted to beneficial use in reasonable amounts through appropriation, is affirmed with respect to the ground water resources of this state as said term is hereinafter defined. All ground waters in this state are declared to be the property of the state, whose duty it shall be to supervise their appropriation and allotment to those diverting the same for beneficial use. ***All rights to the use of ground water in this state however acquired before the effective date of this act are hereby in all respects validated and confirmed.***

1951 Idaho Sess. Law, ch. 200, pp. 423-424. (emphasis added).

Section 1 of the Act was subsequently amended by the Legislature in 1953, 1980, and 1987.[5] The phrase: "*All rights to the use of ground water in this state however acquired before the effective date of this act are hereby in all respects validated and confirmed*" remained in force until the 1987 amendment when that provision was replaced by the following provision now at issue: "*This act shall not affect the rights to the use of ground water in this state acquired before its enactment.*" 1987 Idaho See. Laws ch. 347, p. 743. (emphasis added). By its plain language, the 1987 amendment applies only to "the rights to the use of ground water."

In its original form, Section 4 of the Act (now codified as I.C. § 42-229) provided as follows:

> Section 4. METHODS OF APPROPRIATION
>
> The ***right to the use of ground water of this state*** may be acquired only by appropriation. Such appropriations may be perfected by means of diversion and application to beneficial use or by means of the application permit and license procedure in this act provided. All proceedings commenced prior to the effective date of this act for the acquisition of rights to the use of ground water under the provisions of chapter 2 of title 42, Idaho Code, may be completed under the provisions of said chapter 2 and rights to the use of ground water may be thereby acquired. ***But the administration of all rights to the use of ground water, whenever or***

[5] In 1953, Section 1 was amended to include the "full economic development" and "reasonable ground water pumping levels" provisions. See *Supra* fn. 4

however acquired or to be acquired, shall, unless specifically excepted therefrom, be governed by the provision of this act.

1951 Idaho Sess. Laws, ch. 200, p.424. (emphasis added). The plain language of the last sentence of this provision specifically addresses and applies to "the *administration*" of the right to the use of ground water. The last sentence of the original Section 4 has remained unchanged and appears in its original form in the current version of I.C. § 42-229.

When the two above-mentioned provisions are read in conjunction it is clear that the last sentence of I.C. § 42-226 governs the applicability of the GWA to rights to the use of ground water acquired before its enactment, whereas the last sentence of I.C. § 42-229 applies to the *administration* of rights to the use of ground water acquired before its enactment. By its plain language then, the GWA applies to the *administration* of rights to the use of ground water "whenever or however" acquired. I.C. § 42-229.

A & B's argument that the 1987 amendment language to what is now I.C. § 42-229 excludes the application of the GWA from pre-existing water rights leads to two problematic results. First, the interpretation renders the "whenever or however acquired" language of the last sentence of I.C. § 42-229, which pertains to the administration of the right to use ground water, meaningless. Courts must give effect to all the words and provisions of a statute so that none will be void, superfluous or redundant. *Faber*, 147 Idaho at 310, 208 P.3d at 293. Second, the argument results in the conclusion that pre-existing water rights are insulated from *all* administrative provisions enumerated in the GWA, including but not limited to provisions regarding the equipping of wells with flow valves, rights of inspection by IDWR, maintenance of casings, pipes, fittings, etc. *See* I.C. § 42-237a.g. This conclusion leads to an absurd result and must be rejected. As shown above, the Director has the authority under the GWA to administer rights to the use of ground water "whenever or however acquired."

3. Within the Structure of the GWA, the Management of Ground Water Pumping Levels was Intended to be Addressed under the Purview of the *Administration* of Ground Water Rights.

The GWA vests the Director with a number of enumerated powers and responsibilities associated with the supervision and administration of ground water rights. Of significance to the facts of this case, the maintenance of ground water levels is one such power:

> To assist the director of the department of water resources in the administration and enforcement of this act, and in making determinations upon which said orders shall be based, he may establish a ground water pumping level or levels in an area or areas having a common ground water supply as determined by him as hereinafter provided. Water in a well shall not be deemed available to fill a water right therein if withdrawal therefrom of the amount called for by such right would affect, contrary to the declared policy of this act, the present or future use of any prior surface or ground water right or result in the withdrawing of the ground water supply at a rate beyond the reasonably anticipated average rate of future natural recharge. However, the director may allow withdrawal at a rate exceeding the reasonably anticipated rate of future natural recharge if the director finds it is in the public interest and if it satisfies the following criteria . . . .

I.C. § 42-237a.g.[6]

Within the structure of the GWA, the management of ground water pumping levels was therefore intended to be addressed under the purview of the *administration* of groundwater rights. Although (as is discussed below) the common law may have protected the means of diversion of senior appropriators to historic pumping levels, ground water pumping levels have never been treated as an element of a water right, nor have pumping levels been memorialized in any decree or license. *See. e.g.* I.C. § 42-1409 (required elements in Notice of Claim – no reference to well depth); I.C. § 42-222 (setting forth changes to water right requiring transfer proceeding – no reference to well depth); I.C. § 42-202 (contents of permit application – no reference to well depth). Likewise in *Baker v. Ore-Idaho Foods*, the Idaho Supreme Court recognized most western states, including the state of Idaho via the GWA "have enacted legislation establishing *administrative* controls over ground water withdrawals." *Baker*, 95 Idaho at 580, 513 P.2d at 632 (emphasis added).

[6] This provision was originally included in the 1953 version of the GWA and read the same except that it referred to the "state reclamation engineer."

The fact that (1) pumping level is not considered an element of a right, (2) the GWA delegated a number of duties to IDWR associated with the maintenance of ground water levels, and (3) the acknowledgement by the Idaho Supreme Court that the GWA established administrative controls over the withdrawal of groundwater in *Baker v. Ore-Ida Foods* all strongly suggest that the issues pertaining to ground water levels fall under the category of the administration of the right to the use of ground water. The plain language of I.C. § 42-229 makes clear that the *administration* of the right to the use of ground water shall be governed by the GWA "whenever or however" the water right was acquired.

4. The Case Law Applying the GWA is Consistent with this Interpretation.

The limited case law applying the provisions of the GWA is consistent with the conclusion that the management of ground water levels is a matter of administration and therefore is subject to the retroactive application of the GWA. In *Noh v. Stoner*, 53 Idaho 651, 26 P. 531 (1933), prior to the enactment of GWA in 1951, the Idaho Supreme Court addressed the issue of maintenance of water tables in a dispute involving a junior well interfering with a senior ground water right. The Court held that senior well owners were protected absolutely to the extent of their historical pumping level. Junior well owners could not be enjoined from pumping so long as they held the senior harmless for the cost of modifying or lowering the senior's means of diversion such that the senior received the same flow of water. *Id.* at 657, 26 P.2d at 1114.

In *Baker v. Ore-Ida Foods, Inc.*, 95 Idaho 575, 513 P.2d 627 (1973), the Idaho Supreme Court addressed the application of the GWA in a dispute between ground water pumpers over the maintenance of ground water tables. The Court concluded the GWA was "consistent with the constitutionally enunciated policy of promoting optimum development of water resources in the public interest." *Id.* at 584, 513 P.2d at 636 (citing Idaho Const. Art. 15 § 7). The Court held:

> [A] senior appropriator is not absolutely protected in either his historic water level or his historic means of diversion. Our Ground Water Act contemplates that in some situations senior appropriators may have to

> accept some modification of their rights in order to achieve the goal of full economic development. . . .
>
> In the enactment of the Ground Water Act, the Idaho legislature decided, as a matter of public policy, that it may sometimes be necessary to modify private property rights in ground water to promote full economic development of the resource . . . .
>
> We conclude that our legislature attempted to protect historic water rights while at the same time promoting full economic development of ground water. Priority rights in ground water are and will be protected insofar as they comply with reasonable pumping levels. Put otherwise, although a senior may have a prior right to ground water, if his means of diversion demands an unreasonable pumping level his historic means of diversion will not be protected.

Id. at 584, 513 P.2d at 636 (citations omitted). The Court determined the holding in *Noh* was "inconsistent with the full economic development of our ground water resources" and that "the Ground Water Act was intended to eliminate the harsh doctrine of *Noh*." *Id.* at 581-82, 513 P.2d at 633-34. Further:

> Where the clear implication of a legislative act is to change the common law rule we recognize the modification because the legislature has the power to abrogate the common law. . . . We hold *Noh* to be inconsistent with the constitutionally enunciated policy of optimum development of water resources in the public interest. *Noh* is further inconsistent with the GWA.

Id. at 583, 513 P.2d at 635 (citations omitted). Although the Court never specifically addressed the issue of whether or not the reasonable pumping level provisions of the GWA were intended to apply to pre-existing rights, two of the senior rights held by the plaintiffs who made the delivery call had priorities pre-dating the enactment of the GWA. Consequently the Court did in fact apply the reasonable pumping provision to pre-existing rights. While the case is not dispositive of the issue, the ruling makes it clear that the Legislature through the enactment of the GWA modified the common law rule in *Noh*.

In *Parker v. Wallentine*, 103 Idaho 506, 650 P.2d 648 (1982), a subsequent case involving a delivery call by a holder of a domestic ground water right, the Idaho Supreme Court applied the historic pumping level rule in *Noh* to the circumstance where it was

determined that the GWA did not apply. In *Parker*, the senior domestic water right had a priority date of 1964. The Idaho Supreme Court held that prior to the 1978 amendment the GWA did not apply to domestic wells. In reaching the holding the Court relied on the original 1951 version of the GWA which provided an exclusion for domestic use until 1978 when the GWA was amended to eliminate the exclusion.[7] *Id.* at 510, 650 P.2d 652. The Court held that the 1951 version of the language excluding domestic wells to be unambiguous. *Id.* at 511, 650 P.2d 653. After determining that the GWA did not apply the Court distinguished the holding in *Baker* and applied the ruling in *Noh*.

> Although this Court in *Baker v. Ore-Ida Foods, Inc.*, 95 Idaho 575, 581-83, 513 P.2d 627, 633-35 (1973), held that *Noh* is not applicable to cases determined under the reasonable pumping level provisions of the Ground Water Act, *Noh* is applicable to circumstances such as these in which [the GWA] does not apply.

Id. at 513, 650 P.2d 655. On first impression the holding in *Parker* appears inconsistent with the holding in *Baker*, which arguably overruled the rule in *Noh* independent of the GWA. However, it is important to note that prior to the 1978 amendment, the GWA did not apply in any respect, retroactively or otherwise to domestic wells. This blanket exclusion was solely limited to domestic wells. Accordingly, the holding in *Parker* is consistent with *Baker* for purposes of applying the GWA to water rights that are not expressly exempt from its application.

5. The *Musser* Decision

The issue of whether the GWA was intended to apply retroactively to the administration of pre-existing rights has never been squarely addressed by the Idaho Supreme Court. However, as correctly argued by A & B, the Idaho Supreme Court decided the case of *Musser v. Higginson*, 125 Idaho 392, 396, 871 P.2d 809, 813 (1994), in part, on the basis that the "statute [I.C. § 42-226] does not affect the rights to the use of ground water acquired before enactment of the statute." *Id.* at 396, 871 P.2d at 813 (citing the language of the 1987 amendment to I.C. § 42-226). In *Musser*, the Director

[7] Section 2 of the original version of the GWA provided an exclusion for domestic wells as follows: "The excavation and opening of wells and withdrawal of water therefrom for domestic purposes *shall not be in any way affected by this act*." 1951 Idaho Sess. Laws, ch. 200, p. 424 (now codified as I.C. § 42-227)

refused to honor the demand for a delivery call initiated by a senior surface user. The Director reasoned he lacked the authorization to conjunctively administer ground and surface water within a water district without a formal hydrologic determination that conjunctive management was appropriate. *Id.* at 394, 871 P.2d at 811. The district court issued a writ of mandate, ordering the Director to administer the rights. The Director appealed. *Id.*

On appeal, the Director argued that although he had a mandatory statutory duty to administer water within a water district, I.C. § 42-226 left to the Director's discretion the means used to respond to delivery calls. The Supreme Court rejected the argument citing the principle that, although certain details regarding how an agency is to carry out a mandatory duty are left to the agency's discretion such, is not a basis for relief from mandamus. *Id.* at 394-395, 871 P.2d at 811-12 (citations omitted). The Supreme Court held:

> This principle applies to this case. The director's duty pursuant to I.C. § 42-602 is clear and executive. Although the details of the performance of the duty are left to the director's discretion, the director has the duty to distribute water.

Id. The basis for the holding is the Director's duty to distribute water pursuant to I.C. § 42-602. The Court then goes on to address the Director's explanation for refusal to honor the demand:

> The director defended his refusal to honor the Mussers' demand by claiming that a 'policy' of the department prevented him from taking action. In his testimony at the hearing to consider whether the writ would issue, the director referred to I.C. § 42-226 and stated 'a decision has to be made in the public interest as to whether those who are impacted by ground water development are unreasonably blocking full use of the resource.'
>
> We note that the original version of what is now I.C. § 42-226 was enacted in 1951. 1951 Idaho Sess. Laws, ch. 200, § 1, p. 423. *Both the original version and the current statute make it clear that this statute does not affect rights to the use of ground water acquired before the enactment of the statute. Therefore, we fail to see how I.C. § 42-226 in anyway affects the director's duty to distribute water to the Mussers, whose priority date is April 1, 1892.*

(emphasis added). In 1978, I.C. § 42-227 was amended to eliminate the exclusion. 1978 Idaho Sess. Laws, ch. 323, p. 819.

Id. at 396, 871 P.2d at 813 (emphasis added).

This language is compelling if read outside of the context of the entire GWA. It is important to note, however, that *Musser* was decided based on principles governing mandamus in relation to the Director's duty to distribute water in water districts pursuant to I.C. § 42-602 and not the application of the GWA. In citing to I.C. § 42-226, the Court was responding to one of the defenses raised by the Director. Since enactment, the GWA has undergone several amendments and I.C. § 42-226 is only one component of the act. The application of I.C. § 42-226 or the GWA was not before the Court in *Musser*. Accordingly, the Court did not have the occasion to analyze the issue in the framework of the entire GWA, nor was it necessary.[8] As shown above, it is clear when read in its entirety that the intent of the legislature in passing the GWA was to distinguish between the right to the use of ground water and the administration of the right to the use of ground water. It is also clear that under the plain language of I.C. § 42-229 the GWA applies to the administration of all rights to the use of ground water whenever or however acquired.

6. The More Reasonable Interpretation and Purpose of the Language of the 1987 Amendment.

As noted previously, the GWA was the first statutory scheme in place specifically governing the appropriation and administration of ground water. However, the GWA was not the first authorization of the ability to appropriate a ground water right. The more reasonable interpretation of the intent of the original language "[a]ll rights to the use of ground water in this state however acquired before the effective date of this act are hereby in all respects validated and confirmed" was to acknowledge this very point and eliminate any confusion that ground water rights of existing holders were unauthorized or that existing right holders would have to make application under the GWA. While this interpretation is straight forward, the confusion arises as a result of the 1987 amendment, which when read independently from the rest of the act, appears to exempt pre-existing

[8] The SRBA also cited *Musser* for the proposition that the 1951 GWA did not apply to pre-existing water rights. The issue of the retroactive application of the GWA was not before the Court. In Re: SRBA Case

rights from the GWA. However, the more plausible justification behind the amendment and its choice of language was to avoid confusion in the forthcoming SRBA. Namely, that the validated and confirmed language could be construed as a legislative determination of the validity of pre-existing rights. Accordingly, this Court concludes that both the original language and the 1987 amendment were not intended to exempt pre-existing rights from the application of the GWA but rather to establish that pre-existing rights were acknowledged as valid and not supplanted by the operation of the GWA. Therefore this Court holds the Director did not err in concluding that the reasonable pumping level provisions of the GWA apply to pre-enactment water rights.

B. The Director did not err in determining that A & B had not been required to pump below a reasonable pumping level. This determination however, is dependent on the Director's material injury analysis and his determination that there is sufficient water available to supply 0.75 miner's inches per acre.

A & B argues the Director erred by concluding A & B had not been forced to exceed reasonable ground water pumping levels to satisfy its right without first establishing a reasonable ground water pumping level from which to make the determination. In his *January 29, 2008 Order*, the Director determined "[a]though ground water levels throughout the ESPA have declined from their highest levels reached in the 1950's, ground water levels generally remain of pre-irrigation developmental levels. There is no indication that ground water levels in the ESPA exceed reasonable ground water levels required to be protected under the provisions of Idaho Code § 42-226." R. 1109. In the *Recommended Order*, the Hearing Officer determined: 1) A & B is not protected to historic levels; 2) that the aquifer is not being mined in that more water enters the aquifer than is being removed by ground water pumping; and 3) that A & B's poorest performing wells could not be used as a measure for establishing the reasonableness of the ground water levels. R. 3113. Ultimately the Hearing Officer concluded "[t]he right to water [quantity] established in the partial decree remains, but that right is dependent upon A & B's ability to reach the water from those wells or to

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No. 39576, *Order on Cross Motions for Summary Judgment; Order on Motion to Strike Affidavits*, Subcase 91-00005 (Basin-Wide Issue 5) (July 2, 2001), p.22.

import it from other wells." *Id.* The Director adopted the Hearing Officer's recommendation in the *Final Order*. R. 3321.

Idaho Code § 42-237a.g. sets forth the Director's duties with respect to establishing ground water levels:

> In the administration and enforcement of this act and in the effectuation of the policy of this state to conserve its ground water resources, the director of the department of water resources ***in his sole discretion*** is empowered . . .
>
> g. To supervise and control the exercise and administration of all rights to the use of ground waters ***and in the exercise of this discretionary power*** he may initiate administrative proceedings to prohibit or limit the withdrawal of water from any well during any period that he determines that water to fill any water right in said well is not there available. To assist the director of the department of water resources in the administration and enforcement of this act, and in making determinations upon which said orders shall be based, he ***may*** establish a ground water pumping level or levels in an area or areas having a common ground water supply as determined by him as hereinafter provided. Water in a well shall not be deemed available to fill a water right therein if withdrawal therefrom of the amount called for by such right would affect, ***contrary to the declared policy of this act***[9], the present or future use of any prior surface or ground water right ***or result in the withdrawing of the ground water supply at a rate beyond the reasonably anticipated rate of future natural recharge.***

(emphasis added). Accordingly, the GWA does not mandate that the Director establish ground water levels automatically as a matter of course in conjunction with a delivery call by a ground water pumper.

The Hearing Officer's conclusion that reasonable pumping levels had not been exceeded was based on the finding that sufficient water was available satisfy the 36-2080 right at current pumping levels following the consideration of factors associated with the material injury analysis. In light of this finding the Hearing Officer concluded it was not necessary for the Director to establish a reasonable level in conjunction with the delivery call. This Court agrees and affirms the determination, subject to one proviso.

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[9] The policy of the GWA is included in I.C. § 42-226 which provides in relevant part: "Prior appropriators of underground water shall be protected in the maintenance of reasonable ground water pumping levels as may be established by the director of the department of water resources as herein provided."

The Director's conclusion is based on two threshold determinations made in conjunction with the material injury analysis. First, the Director's determination that sufficient water exists at current pumping levels relies on the finding that 0.75 miner's inches per acre is sufficient quantity to satisfy the purpose of use for the 36-2080 right despite the right being decreed for 0.88 miner's inches per acre. Second, the Director's determination that it was appropriate to analyze injury cumulatively based on injury to the entire right as opposed to evaluating injury to the 177 separate points of diversion. The significance of which would require A & B to move available water around within the project from wells capable of over performing to those areas served by underperforming wells. In other words injury would not be determined without looking at the depletive effects to entire right as opposed to individual points of diversion. These threshold issues are addressed separately in this opinion. To the extent the Director erred in either of these determinations it may require that the Director revisit the issue of the reasonableness of the pumping levels.

C. The Director erred in failing to apply the constitutionally protected presumptions and burdens of proof.

A & B argues the Director unconstitutionally applied the CMR by failing to apply the proper presumptions and burdens of proof resulting the reduced diversion rate per acre for the 36-2080 right from 0.88 to 0.75 miner's inches. This Court agrees. The 36-2080 right was licensed and ultimately decreed with a diversion rate of 0.88 miner's inches per acre for the 62,604.3 acre place of use.[10] Following application of the CMR, Rule 42 in particular, the Director determined that 0.75 miner's inches met A & B's minimum irrigation needs. The 0.75 miner's inches per acre, among other things, was therefore used to arrive at the finding of no material injury.

1. The CMR, Material Injury, and Efficient use of Water Without Waste.

[10] The fact that the right was decreed for 1,100 cfs to a 62,604.3 place of use involves a separate issue addressed later in this opinion.

The 36-2080 right is included in an organized water district. CMR Rule 40 pertains to responses to delivery calls in organized water districts, and in relevant part provides as follows:

> **040. RESPONSES TO CALLS FOR WATER DELIVERY MADE BY THE HOLDERS OF SENIOR PRIORITY SURFACE OR GROUND WATER RIGHTS AGAINST THE HOLDERS OF JUNIOR PRIORITY GROUND WATER RIGHTS FROM AREAS HAVING A COMMON GROUND WATER SUPPLY IN AN ORGANIZED WATER DISTRICT (RULE 40).**
>
> **01. Responding To a Delivery Call.** When a delivery call is made by the holder of a senior-priority water right (petitioner) alleging that by reason of a diversion of water by the holders of one (1) or more junior-priority ground water rights (respondents) from an area having a common ground water supply in an organized water district the petitioner is suffering ***material injury***, and upon a finding by the Director as provided in Rule 42 that ***material injury*** is occurring, the Director, through the water master, shall:
>
> **a.** Regulate the diversion and use of water in accordance with the priorities of rights of the various surface or ground water users whose rights are included within the district . . . .

IDAPA 37.03.11.040.01.a (emphasis added). CMR Rule 040.03 provides:

> **Reasonable exercise of rights.** In determining whether diversion and the use of water under rights will be regulated under Subsection 040.01.a. or 040.01.b, the Director shall consider whether the petitioner making the delivery call is ***suffering material injury to a senior-priority water right and is diverting and using water efficiently without waste,*** and in a manner consistent with the goal of reasonable use of surface and ground waters as described in Rule 42. ***The Director will also consider whether the respondent junior-priority water right holder is using water efficiently and without waste.***

IDAPA 37.03.11.040.03. (emphasis added). CMR 010.14 defines "***material injury***" as: "***Hindrance to or impact upon the exercise of a water right caused by the use of water by another person as determined in accordance with Idaho Law, as set for in Rule 42.***" IDAPA 37.03.11.010.14 (emphasis added).

CMR Rule 42 sets forth the factors for determining material injury and the use of water efficiently without waste as follows:

042. DETERMINING MATERIAL INJURY AND REASONABLENESS OF WATER DIVERSIONS (RULE 42).

01. Factors. Factors the Director may consider in determining whether the holders of water rights are ***suffering material injury and using water efficiently without waste,*** include but are not limited to:

a. The amount of water available in the source from which the water is diverted.

b. The effort or expense of the holder of the water right to divert the water from the source.

c. Whether the exercise of junior-priority ground water rights individually or collectively affects the quantity and timing of when water is available to, and the cost of exercising, a senior-priority surface or ground water right. This may include the seasonal as well as the multi-year cumulative impacts of all ground water withdrawals from and area having a common ground water supply.

d. If for irrigation, the rate of diversion compared to the acreage of the land served, the annual volume of water diverted, the system diversion and conveyance efficiency, and the method of irrigation water application.

e. The amount of water being diverted and used compared to other rights.

f. The existence of water measuring and recording devices.

g. The extent to which the requirements of the holder of a senior-priority water right could be met with the user's existing facilities and water supplies by employing reasonable diversion and conveyance efficiency and conservation practices. . . .

h. The extent to which the requirements of the senior-priority surface water right could be met using alternate reasonable means of diversion or alternate points of diversion, including the construction of wells or the use of existing wells to divert and use water from the area having a common ground water supply under the petitioner's surface water right priority.

IDAPA 37.03.11.042.01.a.-h.

2. *American Falls Reservoir Dist. No. 2 v. IDWR*

In *American Falls Reservoir Dist. No. 2 v. IDWR*, 143 Idaho 862, 154 P.3d 433 (2007) (*AFRD #2*), the Idaho Supreme Court addressed the constitutionality of the CMR in the context of a facial challenge. The issue arose as a result of senior surface right holders challenging the constitutionality of the CMR because the Rules required the senior making the call to prove material injury after the Director requested information from the surface users for the prior fifteen irrigation seasons instead of automatically giving effect to the decreed elements of the water right. The district court held the CMR to be facially unconstitutional for failing to "also integrate the concomitant tenets and procedures relating to a delivery call, which have historically been necessary to give effect to the constitutional protections pertaining to senior water rights. . . ." *Id.* at 870, 154 P.3d at 441. The district court held that "under these circumstances, no burden equates to impermissible burden shifting." *Id.* at 873, 154 P.3d at 444.

On appeal, the Idaho Supreme Court held that the CMR were not facially defective for failure to include the applicable burdens of proof and evidentiary standards based on the application of principles unique to facial challenges. Integral to the Supreme Court's determination was the recognition that:

> CM Rule 20.02 provides that: '[T]hese rules acknowledge all elements of the prior appropriation doctrine as established by Idaho law.' 'Idaho law' as defined by CM Rule 10.12 means '[T]he constitution, statutes, administrative rules and case law of Idaho.' Thus, the Rules incorporate by reference and to the extent the Constitution, statutes and case law have identified the proper presumptions, burdens of proof, evidentiary standards and time parameters, those are part of the CM Rules.'

Id. at 873, 154 P.3d at 444. Accordingly, even though the CMR do not expressly address the burdens and presumptions the Director could still apply the CMR in a constitutional manner by including the constitutional burdens and presumptions. The Court then held that "**the Rules do not permit or direct the shifting of the burden of proof . . . [r]equirements pertaining to the standard of proof and who bears it have been developed over the years and are to be read into the CM Rules.**" *Id.* at 874, 154 P.3d at 445 (emphasis added). Further:

> **The Rules should not be read as containing a burden-shifting provision to make the petitioner re-prove or re-adjudicate the right which he already has.** . . . While there is no question that some information is relevant and necessary to the Director's determination of how best to respond to a delivery call, **the burden is not on the senior water rights holder to re-prove an adjudicated right. The presumption under Idaho law is that the senior is entitled to his decreed water right, but there certainly may be some post-adjudication factors which are relevant to the determination of how much water is actually needed. The Rules may not be applied in such a way as to force the senior to demonstrate an entitlement to the water in the first place; that is presumed by the filing of a petition containing information about the decreed right.** The Rules do give the Director the tools by which to determine "how the various ground and surface water sources are interconnected, and how, when, where and to what extent the diversion and use of water from one source impacts [others]." *A & B Irrigation Dist.*, 131 Idaho at 422, 958 P.2d at 579. **Once the initial determination is made that material injury is occurring or will occur, the junior then bears the burden of proving that the call would be futile or to challenge, in some other constitutionally permissible way, the senior's call.**

Id. at 877-78, 154 P.3d at 448-49 (emphasis added).

3. The Significance of a Licensed or Decreed Water Right.

In applying the factors as set forth in CMR Rule 42, the Director concluded that despite a decreed rate of diversion of 0.88 miner's inches per acre, the minimum rate of diversion per acre that would satisfy A & B's irrigation requirements was 0.75 miner's inches. The Director concluded sufficient water supply was available to provide the 0.75 miner's inches and denied A & B's delivery call. The issue arises as a result of the variance between the quantity decreed for the water right and the quantity the Director determined was actually needed to accomplish the decreed purpose of use, or put differently, the quantity that could be put to beneficial use.

As part of Idaho's licensure statutes the permit holder is required to make proof of beneficial use and the Department is required to examine such use. I.C. § 42-219. Idaho Code § 42-219 provides:

> [U]pon receipt by the department of water resources of all the evidence in relation to such final proof, it shall be the duty of the department to carefully examine the same, and if the department is satisfied that the law

> has been fully complied with and that the water is being used at the place claimed and for the purpose for which it was originally intended, the department shall issue to such user or users a license confirming such use. Such license shall . . . state . . . the purpose for which such water is used, the quantity of water which may be used, ***which in no case shall be an amount in excess of the amount that has been beneficially applied.***

Id. (emphasis added). Idaho Code § 42-220 provides that "[s]uch license shall be binding upon the state as to the right of such licensee to use the amount of water mentioned therein, and shall be prima facie evidence as to such right . . . ." Further, "neither such licensee nor anyone claiming a right under such decree, shall at any time be entitled to the use of more water than can be beneficially applied on the lands for the benefit of which such right may have been confirmed . . . ." I.C. § 42-220.

Idaho's adjudication statutes require the Director to evaluate the extent and nature of each water right for which a claim was filed based on state law. I.C. § 42-1410. The Department's role in the adjudication "is that of an independent expert and technical assistant to assure that claims to water rights acquired under state law are accurately reported." Further, [t]he director shall make recommendations as to the extent of beneficial use and administration of each water right under state law. . . . I.C. § 41-1401B. Idaho Code § 42-1402 provides: "The right confirmed by such decree . . . shall describe the land to which such water shall become appurtenant. The amount of water so allotted shall never be in excess of the amount actually used for beneficial purposes for which such right is claimed . . . ." Idaho Code § 42-1411 requires the Director to prepare and file a director's report which among other things determines the quantity of water used. The statute further provides that "[e]ach claimant of a water right has the ultimate burden of persuasion for each element of the water right." Further, that because the "director's report is prima facie evidence of the nature and extent of the water rights acquired under state law, a claimant of a water right acquired under state law has the burden of going forward with the evidence to establish any element of a water right which is in addition to or inconsistent with the description in a director's report." I.C. § 42-1411(5). Finally, Idaho Code § 42-1420 provides "the decree entered in a general adjudication shall be conclusive as to the nature and extent of all water rights in the adjudicated system." I.C. § 42-1420.

Accordingly, both Idaho's licensure and adjudication statutory schemes expressly take into account the extent of the beneficial use in regards to the quantity element of a water right and expressly prohibit quantity from exceeding the amount that can be beneficially used. **In sum, the quantity specified in a decree of an adjudicated water right is a judicial determination of beneficial use consistent with the purpose of use for the water right.**

4. The License or Decree However, is not Conclusive as to the Quantity Put to Beneficial Use Due to Post-Decree Factors.

Although a license or decree among other things includes a determination of beneficial use for a water right, it is not conclusive that the water user is actually putting the full quantity to beneficial use. In *State v. Hagerman Water Right Owners*, 130 Idaho 736, 947 P.2d 409 (1997), the Idaho Supreme Court acknowledged in the context of the SRBA that the Director was not obligated to accept a prior decree as conclusive proof of a water right because water rights can be lost or reduced based on evidence that the water right has been forfeited. *Id.* at 741, 947 P.2d at 414. The Supreme Court acknowledged this same point in *AFRD#2* noting that there may be post-adjudication factors relevant to the determination of how much water is actually needed. *AFRD#2* at 878, 154 P.3d at 449.

Conditions surrounding the use of water are not static. Post-adjudication circumstances can result where a senior may not require the full quantity decreed. The most obvious example would be if the senior is not irrigating the full number of acres for which the right was decreed. Efficiencies, new technologies and improvements in delivery systems that reduce conveyance losses can result in a circumstance where the full decreed quantity may not be required to irrigate the total number of decreed acres. The subsequent lining or piping of a ditch or the conversion from gravity fed furrow irrigation to sprinkler irrigation can reduce the quantity of water needed to accomplish the purpose of use for which the right was decreed.[11] Year to year variations in water

[11] Also, the rate of diversion for an irrigation water right sets a maximum rate of diversion to satisfy the peak water demand for the most water intensive crop grown in the region. In the event the senior is irrigating a less water intensive crop, the maximum rate of diversion may not be required. However, this limitation is less significant in the administration of ground water and tempered by the fact that any relief

requirements also result from the types of crops that may be planted. The Idaho Legislature specifically acknowledged water users could reduce water requirements through the implementation of efficiencies and authorized the ability to expand irrigated acreage so long as the rate of diversion was not increased. *See* I.C. § 42-1426.

In this case, the Director determined that A & B successfully implemented a number of measures that have reduced the amount of water required to irrigate the 62,604.3 acres: including the conversion of 1440 acres from ground to surface water irrigation; reduction of conveyance losses from approximately 8 percent to 3 percent; conversion of 96 percent of the irrigation systems to sprinkler; and the re-use of drain water. R. 1148. It should therefore come as no surprise that a water user can require less water than the decreed quantity to accomplish the purpose for which the right was decreed. As such, the quantity reflected in a license or decree is not conclusive as to whether or not all of the water diverted is being put to beneficial use in any given irrigation season.

5. Waste Results from the Failure to Put the Full Diverted Quantity to Beneficial Use.

If circumstances do not require the full amount of the decreed quantity to accomplish the purpose of use but the senior nonetheless continues to divert the decreed quantity, the issue is one of waste. The wasting of water is not only contrary to Idaho law but it is a recognized defense to a delivery call. In *Martiny v. Wells*, 91 Idaho 215, 218-19, 419 P.2d 470 (1966), the Idaho Supreme Court held:

> Wasting of irrigation water is disapproved by the constitution and laws of this state. As we said in *Mountain Home Irrigation District v. Duffy*, supra, ***it is the duty of a prior appropriator of water to allow the use of such water by a junior appropriator at times when the prior appropriator has no immediate need for the use thereof.***

Id. (emphasis added). Simply put, a water user has no right to waste water. If more water is being diverted than can be put to beneficial use, the result is waste.

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from regulation of junior wells is typically not instantaneous. Therefore, even though a senior may not be irrigating the most water intensive crop in the current irrigation season administration needs to take into account the ability of a senior to rotate to a more water intensive crop in the next irrigation season.

Consequently, Idaho law prohibits a senior from calling for the regulation of juniors for more water than can be put to beneficial use.

This exact issue was addressed in context of the SRBA. The SRBA Court addressed the issue of whether or not partial decrees should include a remark qualifying that the amount of water that could be sought incident to a delivery call was limited to the quantity that could be beneficially used as opposed to the quantity actually stated in the decree. The Hon. R. Barry Wood presiding, expressly rejected the necessity of such a remark based on the following reasoning:

> Implicit in the quantity element in a decree, is that the right holder is putting to beneficial use the amount decreed. As the Idaho Supreme Court has stated: 'Idaho's water law mandates that the SRBA not decree water rights 'in excess of the amount actually used for beneficial purposes for which such right is claimed'.' State v. Hagerman Water Right Owners, 130 Idaho 727, 730, 947 P.2d 400, 403 (1997); quoting I.C. § 42-1402. However, **the quantity element in a water right necessarily sets the 'peak' limit on the rate of diversion that a water right holder may use at any given point in time. In addition to this peak limit, a water user is further limited by the quantity that can be used beneficially at any given point in time** (i.e. there is no right to divert water that will be wasted). A & B Irrigation District v. Idaho Conservation League, 131 Idaho 411, 415, 958 P.2d 568 (1997). **The quantity element is a fixed or constant limit, expressed in terms of rate of diversion (e.g. cfs or miners inches), whereas the beneficial use limit is a fluctuating limit, which contemplates both rate of diversion and total volume, and takes into account a variety of factors, such as climatic conditions, the crop which is being grown at the time, the stage of the crop at any given point in time, and the present moisture content of the soil, etc. The Idaho Constitution recognizes fluctuations in use in that it does not mandate that non-application to a beneficial use for any period of time no matter how short result in a loss or reduction to the water right.** State v. Hagerman Water Right Owners, at 730, 947 P.2d at 403.
>
> Finally, it is a fundamental principal of the prior appropriation doctrine that a senior right holder has no right to divert, (and therefore to 'call,') more water than can be beneficially applied. Stated another way, a water user has no right to waste water. In State v. Hagerman Water Rights Owners, 130 Idaho at 735, 947 P.2d at 408, the Idaho Supreme Court stated:
>
> > A water user is not entitled to waste water...It follows that a water right holder cannot avoid a partial forfeiture by wasting portion of his or her water right that cannot be put

> to beneficial use during any part of the statutory period. If a water user cannot apply a portion of the water right to beneficial use during any part of the statutory period, but must waste the water in order to divert the full amount of the water right, forfeiture has taken place.

Id. (citations omitted).

> NSGWD has not convinced this Court that it is necessary to have a restatement of this principal on the face of a water right decree. More importantly, the quantity element of a water right does not contemplate minute by minute, or hour by hour, limitations on diversions, as this truly would be an administrative nightmare.

American Falls Reservoir District # 2 v. IDWR, Gooding Dist. Court Case No. CV-2005-0000600, page 95 (June 2, 2006) (Hon. R. Barry Wood) (quoting *Memorandum Decision and Order on Challenge; Order Granting State of Idaho's Motion for the Court to Take Judicial Notice of Facts; Order of Recommitment with Instructions to Special Master Cushman* (Nov. 23, 1999)) (emphasis in original). The significance of the decision is the recognition that the partial decree is a determination of beneficial use. The inclusion of the remark would require the senior to "prove up" the extent of beneficial use every time administration is sought. The decision did not reject the argument that the senior has no right to call for water that is not or will not be put to beneficial use. However, implicit in the rejection of the remark is the recognition that the senior's failure to put the decreed quantity to beneficial use is a defense to a delivery call. The SRBA Court rejected the inclusion of an undefined limitation on the decreed quantity requiring the senior making the call to re-establish the extent of beneficial use.

In sum, if a water user is not making beneficial use of the water diverted, irrespective of the quantity decreed, the result is waste. Idaho law prohibits a senior from depriving a junior appropriator of water if the water called for is not being put to beneficial use. Therefore a decree or license does not insulate a senior appropriator from an allegation of waste or the failure to put the decreed quantity to beneficial use. Waste or the failure to put the decreed quantity to beneficial use is a defense to a delivery call.

6. The Burden to Establish Waste as a Defense is on the Junior Appropriator and Must be Shown by Clear and Convincing Evidence.

Idaho law provides that the burden of establishing waste is on the junior appropriator. *Gilbert v. Smith*, 97 Idaho 735, 739, 552 P.2d 1220, 1224 (1976). Idaho law has also consistently required that incident to a delivery call the burden is on the junior to establish by clear and convincing evidence that the diverting of water by the junior will not injure the right of the senior appropriator on the same source. *Cantlin v. Carter*, 88 Idaho 179, 397 P.2d 761 (1964); *Josslyn v. Daly*, 15 Idaho 137, 96 P. 568 (1908); *Moe v. Harger*, 10 Idaho 302, 7 P. 645 (1904). Accordingly whether the junior's defense is that there is no injury because the diversions of the junior do not physically interfere with the right of the senior (i.e futile call) or that the senior is not injured because the senior is putting less than the decreed quantity of water to beneficial use or wasting water, that burden rests on the junior. Clear and convincing evidence refers to a degree of proof greater than a mere preponderance of the evidence or evidence indicating that the thing to be proved is highly probable or reasonably certain. *State v. Kimball*, 145 Idaho 542, 546, 181 P.3d 468, 472 (2008); *Idaho State Bar v. Top*, 129 Idaho 414, 416, 925 P.2d 1113, 1115 (1996).

A determination that a portion of a decreed water right is being wasted (or is not being put to beneficial use) is a diminishment of a property right. The decreed quantity is reduced by the amount determined not being put to beneficial use. Whether the senior is deprived of water for part of an irrigation season, an entire irrigation season or the quantity element is permanently reduced through a finding of partial forfeiture, the senior's right to divert water up to the decreed quantity is nonetheless diminished.[12] The

[12] The counter-argument raised by Respondents is that there is not a diminishment in the property right because the senior's property right is limited to the amount that can be put to beneficial use. While that may be true, the argument overlooks the fact that the decree is a determination of the beneficial use subject to various defenses. The burden is on the junior to show by clear and convincing evidence that less than the decreed amount is being put beneficial use. To conclude otherwise accords no presumptive weight to the decree. This is precisely the reason why the SRBA Court rejected including a remark expressly limiting quantity to that put to beneficial use. The inclusion of such a remark would have resulted in an unlawful shifting of the burden of proof by making the senior re-prove quantity in conjunction with a delivery call. Simply put, the senior is entitled to the quantity reflected in the decree unless it can be shown by clear and convincing evidence that the full quantity is not or would not be put to beneficial use. The process gives proper presumptive weight to the decree and at the same time takes into account that the decree is not conclusive. However, the standard of proof (clear and convincing evidence) required for establishing that less than the decreed quantity is being put to beneficial use is much higher than the standard of proof (preponderance) initially required in the adjudication and distinguishes what is truly a defense to the right from a re-adjudication of the right.

Idaho Supreme Court has consistently held that actions resulting in the diminishment of a water right must be proved by clear and convincing evidence. Forfeiture or abandonment of a water right must be established by a standard of clear and convincing evidence. *Crow v. Carlson*, 107 Idaho 461, 467, 690 P.2d 916, 922 (1984); *Jenkins v. IDWR*, 103 Idaho 384, 388-89, 647 P.2d 1256, 1260-61 (1982). The same is true with respect to establishing prescriptive title to the water right of another. *Gilbert* at 739, 552 P.2d at 1224 (citing *Loosli v. Heseman*, 66 Idaho 469, 162 P.2d 393 (1945)). Similarly, a futile call defense requires a showing of clear and convincing evidence that diversions by a junior appropriator will not injure the rights of a senior appropriator.

The application of the clear and convincing standard of proof only makes sense from a common sense perspective. If the Director determines that a senior can satisfy the decreed purpose of use on less than the decreed quantity reflected, he needs to be certain to a standard of clear and convincing evidence. In making a determination of whether or not to regulate juniors, the Director is required to evaluate whether the quantity available meets or exceeds the quantity the senior can put to beneficial use. If the Director regulates juniors to satisfy the senior's decreed quantity there is no risk of injury to the senior. However, if the Director regulates juniors to satisfy a quantity less than decreed, there is risk to the senior that the Director's determination is incorrect. There is no remedy for the senior if the Director's determination turns out to be in error and the senior comes up short of water during the irrigation season. Any burden of this uncertainty should be borne by the junior. The only way to eliminate risk to the senior while at the same time give effect to full economic development and optimum use of the water resources is to require a high degree of certainty supporting the Director's determination. Put differently, if the Director has a high degree of certainty that the senior is exceeding beneficial use requirements then there is no risk of injury to the senior. However, if the Director's determination is only based on a finding "more probable than not," the senior's right is put at risk and the junior is essentially accorded the benefit of that uncertainty. The requisite high standard accords appropriate presumptive weight to the decree.

7. Reconciling the Alleged Disparity Between the Decreed Quantity and the Quantity of Water Actually Required to Satisfy the Purpose of Use Consistent with Idaho Law and Without Re-Adjudicating the Quantity Element.

In recognizing that a difference can exist between the decreed quantity and the quantity put to beneficial use, the question becomes how the Director can give proper effect to the decree and still administer to the quantity put to beneficial use without resulting in a *de facto* re-adjudication of the water right? The answer lies in the application of the constitutionally engrained presumptions and burdens of proof.

The following example illustrates the conundrum that occurs when proper effect is not given to the decree. Assume for the sake of discussion that A & B claimed the 36-2080 right in the SRBA with a diversion rate of 0.88 miner's inches per acre. The Director investigated the claim and recommended a diversion rate of 0.75 miner's inches. A & B filed an objection to the recommendation. IGWA, the City of Pocatello and Fremont Madison *et al.* file responses and a trial is held. At trial A & B presents its case including expert testimony in support of the claim that the requisite rate of diversion is 0.88 miner's inches. The respondents present conflicting evidence including expert testimony that 0.75 miner's inches or less is sufficient to accomplish the purpose of use. The experts present opinions on the amount of water necessary to raise crops to maturity, the significance of soil moisture etc. Ultimately, the SRBA Court finds that A & B established a quantity of 0.88 miner's inches by a preponderance of the evidence and issues a partial decree for that quantity. Six months later A & B is unable to pump the full decreed quantity and seeks administration from the Department. The Director performs a "material injury" analysis and concludes that 0.75 miner's inches is sufficient to satisfy A & B's purposes of use. A & B disagrees with the determination and requests a hearing. At the hearing A & B presents its case including expert testimony in support of the claim that the requisite rate of diversion is 0.88 miner's inches. The respondent's present conflicting evidence, including the expert testimony that 0.75 miner's inches or less would be sufficient to accomplish the purpose of use. The experts present opinions on the amount of water necessary to raise crops to maturity, the significance of soil moisture etc. Déjà Vu? Ultimately the Director concludes by a preponderance of the evidence that 0.75 miner's inch per acre is sufficient. The example illustrates that under

the Director's application of the CMR the senior can be forced to re-litigate the exact same issue when proving up the elements of the water right and when subsequently seeking administration for the same right.

In this case the Hearing Officer's recommendation acknowledged that "the analysis of experts varies dramatically" on the amount of water needed to meet the minimum requirements for the crops. "Farmers with comparable experience differ on the amount needed to meet minimum requirements. Experts with comparable education have similar disagreements." R. 3109. The Hearing Officer ultimately concluded "the Director's determination is supported by substantial evidence." R. 3110. No reference was made to the evidentiary standard applied.

In *AFRD #2* the Supreme Court made it clear that the CMR should not be read to require the senior to re-prove or re-adjudicate a decreed right but also acknowledged that there may be post-adjudication factors relevant to the determination of how much water is actually needed. At the district court level in *AFRD#2* Judge Wood opined that "a decreed water right is far more than a right to have another lawsuit only this time with the Director." *American Falls Reservoir District # 2 v. IDWR*, at 93. Absent the application of an evidentiary standard of clear and convincing evidence this Court has difficulty distinguishing how this is not a re-adjudication of A & B's right. Issues pertaining to necessary quantity, beneficial use, evapotranspiration of crops, waste and the like should have been identified in Director's recommendation and ultimately litigated in the context of the SRBA proceedings. The Director reasons that it is not a re-adjudication of A & B's right because A & B still has the right to divert up to the full 0.88 miner's inches when water is available but that the Director will only consider the administration of junior's based on the determination of actual need of the senior, which is the 0.75 miner's inch per acre. This Court fails to see the distinction. In a prior appropriation system a water right becomes meaningless if not honored in times of shortage. The call is the means by which effect is given to the priority date. The priority date is the essence of a water right in a prior appropriation system.

The problem arises with the initial determination of "material injury." *In AFRD #2* the Supreme Court held once the initial determination is made that "material injury" is occurring or will occur, the junior then bears the burden of proving that the call would be

futile or to challenge, in some other constitutionally permissible way, the senior's call. *AFRD #2*, 143 Idaho at 878, 154 P.3d at 449. However, the Director's "threshold" material injury determination includes what would otherwise be a defense to a delivery call. The problem with this approach is that it circumvents the constitutionally inculcated presumptions and burdens of proof.

The CMR distinguish between "material injury" and "using a water right efficiently without waste." CMR Rule 010.14 defines "material injury" as "hindrance to or impact upon the exercise of a water right caused by the use of water by another person." CMR Rule 010.25 defines "water right" as the legal right to divert and use . . . the public waters of the state of Idaho where such right is evidenced by a decree, permit or license . . . ." Prior to regulating junior rights in an organized water district, CMR Rule 040.03 requires the Director to consider whether the senior is suffering "material injury" ***and*** "is diverting and using water efficiently and without waste." The factors in Rule 042.01 also provides "[f]actors the Director may consider in determining whether holders of water rights are suffering material injury ***and*** using water efficiently without waste include. . . ." (emphasis added). Although the CMR address the two concepts in conjunction with each other, the Supreme Court held the rules cannot be read as a burden shifting provision to require the senior to re-prove or re-adjudicate his right. *AFRD#2* 143 Idaho at 877-78, 154 P.3d at 448-49.

Therefore, this Court holds that in order to give the proper presumptive weight to a decree any finding by the Director that the quantity decreed exceeds that being put to beneficial use must be supported by clear and convincing evidence. Accordingly, this Court holds the Director erred by failing to apply the correct presumptions and burdens of proof. The case is remanded for this purpose.

D. The Director Did Not Err by Failing to Separately Consider Depletions to Individual Points of Diversion For Purposes of Determining Material Injury to the 36-2080 Right.

A & B argues the Director erred in failing to determine material injury based on depletions to the 177 individual points of diversion as opposed to determining injury

based on depletions to the cumulative decreed quantity. A & B argues further that the Director erred by requiring that A & B take reasonable steps to interconnect individual wells or systems within the Unit prior to seeking regulation of junior pumpers. The Hearing Officer concluded that it was proper to consider the system as a whole but that consideration must be given to account for the fact that water from one well is not accessible to the entire acreage:

> Considering the fact that the project was developed, licensed and partially decreed as a system of separate wells with multiple points of diversion, it is not A & B's obligation to show interconnection of the entire system to defend its water rights and establish material injury. However, it is equally clear that the licensing requested by the Bureau of Reclamation envisioned flexibility in moving water from one location to another. Consequently, there is an obligation of A & B to take reasonable steps to maximize the use of that flexibility to move water within the system before it can seek curtailment or compensation from juniors. A & B has some interconnection within the system to utilize the water it can pump. But the record does not establish whether further interconnection is either financially or technically practical.

R. 3096. This Court agrees that the system must be considered as a whole based on the way in which the water right is decreed. Further, that the extent to which the Director may require A & B to move water around within the Unit prior to regulating junior pumpers is left to the discretion of the Director. The Director concluded that A & B must make reasonable efforts to maximize interconnection of the system and placed the burden on A & B to demonstrate where interconnection is not physically or financially practical. The Director did not abuse discretion in imposing such a requirement.

The way in which the 36-2080 water right was licensed and ultimately decreed in the SRBA is not typical. The partial decree does not define or limit the place of use for any of the 177 points of diversion within the boundaries of the Unit. Instead, the decree lists the 177 different points of diversion and describes the place of use as "the boundary of A & B Irrigation District service area pursuant to Section 43-323, Idaho Code." *See* Exh. 139. The legal effect is that water diverted from any one of the points of diversion is appurtenant to and therefore can be used on any and all of the 62,604.3 acres within the defined place of use. The license or partial decree also does not describe or assign a rate of diversion or volumetric limitation to any of the individual points of diversion. Instead,

the right is licensed and decreed at the cumulative diversion rate of 1,100 cfs with a 250,417.20 AFY limitation for the entire water right. The legal effect is that up to the full rate of diversion can be diverted from any combination of the 177 points of diversion up to the AFY volumetric limitation and applied to any of the lands within the Unit.

Structuring the right in this manner was not due to oversight. The USBOR applied for the right to be licensed as such in order to provide for the greatest amount of flexibility in distributing water throughout the project. R. 3093-94. In a response from the USBOR to the Department regarding the permit application, the USBOR states:

> We emphasize that the project is one integrated system, physically, operationally, and financially. Some lands, depending on project requirements, can be served from water from several wells. Therefore, it is impractical and undesirable to designate precise land area within the project served by each of the specific wells on the list.

Exh. 157D.

Although decreed as such, the Unit presently does not consist of a system of interconnected wells and due to the geographic terrain, water cannot presently readily be distributed throughout the entire project from any particular well or system. Nonetheless, the right is essentially decreed as having alternative points of diversion for the 1100 cfs for the entire 62,604.3 acres. Therefore, because no rate of diversion or volumetric limitation is decreed to a particular point of diversion, A & B has no basis on which to seek regulation of juniors in order to divert a particular rate of diversion from a particular point of diversion, provided a sufficient quantity can be diverted through the various alternative points of diversion that are appurtenant to the same lands. Simply put, based on the way in which the right is decreed A & B does not get to dictate particular quantities that need to be diverted from particular points of diversion.

If A & B wishes to have its right administered on a more regionalized basis, it would be incumbent on A & B undergo a transfer proceeding to have particular points of diversion assigned to more discrete places of use within the Unit. The drawback would be that A & B may have to forgo the high degree of flexibility it currently holds with respect to the use of the water within the project. The current flexibility with respect to the use of the right results in uncertainty over the availability of water to subsequent appropriators because A & B is authorized under the right to divert up to its decreed

amount from any combination of its points of diversion at its discretion. However, A & B can't have it both ways. Flexibility has its benefits and burdens. The Director also has flexibility when it comes to responding to requests for regulation. Until such time as the right is defined with more particularity, the extent to which the Director can require interconnectedness is left to his discretion.

1. Issues with Respect to Enlargement Claims.

Another problem with seeking regulation of juniors to satisfy underperforming wells is that A & B has been allowed to establish enlargement claims pursuant to I.C. § 42-1426, based on areas of the project that produce water in excess of what is required in a particular area of the project. A & B irrigates approximately 2000 enlargement acres. The way in which the right is decreed creates an anomaly whereby A & B seeks regulation of juniors to satisfy underperforming points of diversion for the 36-2080 right while at the same time continues to irrigate enlargement acres from alternative points of diversion authorized under the same right. The indirect result is that the enlargement rights are protected under the September 9, 1948, priority date and the subordination provision that applies to all enlargement rights is circumvented.[13] Accordingly, prior to seeking regulation of pumpers junior to September 9, 1948, it would be incumbent on A & B to first apply the water servicing the enlargement acres on its original lands or alternatively to factor that quantity of water used in conjunction with the enlargement acres into the Director's material injury analysis in determining water shortages, if any, to the 36-2080 right. Thereafter, if there is insufficient water to satisfy the enlargement

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[13] The following subordination remark is included in all enlargement rights perfected pursuant to I.C. § 42-1426:

> This water right is subordinate to all other water rights with a priority date earlier than April 12, 1994, that are not decreed as enlargements pursuant to section 42-1426, Idaho Code. As between water rights decreed as enlargements pursuant to section 42-1426, Idaho Code, the earlier priority is the superior right.

The remark was included in decrees for enlargement rights following the Idaho Supreme Court's holding in *Fremont-Madison Irr. Dist. v. Idaho Ground Water Appropriators, Inc.*, 129 Idaho 454, 926 P.2d 1301 (1996). Ironically the inclusion of the remark was challenged by A & B in the SRBA with respect to its enlargement claims stemming from the 36-2080 right. *In Re: SRBA Case No. 39576, Order on Challenge, (A & B) Irr. Dist.*, Subcase Nos. 36-2080 *et. al.* (April 25, 2003) (Hon. Roger S. Burdick). The inclusion of the remark was affirmed by the Idaho Supreme Court in *A & B Irr. Dist. v. Aberdeen-American Falls Ground Water Dist. et. al.*, 141 Idaho 746, 118 P.3d 78 (2005).

rights A & B can seek administration in accordance with the priority limitations assigned to the enlargement acres.

Therefore, based on the way in which the right is structured and in giving proper legal effect to the decree, this Court holds the Director did not err in considering the project as a whole for purposes of determining material injury.

2. The Director Erred in Applying a "Failure of the Project Standard."

A & B argues that the Hearing Officer erred by applying a failure of the project standard. The Hearing Officer concluded:

> There is evidence that in 2007 there was 5000 acres in Unit B that were being served by well systems that delivered less than 0.75 miner's inches per acre. The limited amount of this acreage is a result of costly rectification efforts. . . . The wells that are short in the production of water that are unlikely to be susceptible to successful remediation are limited to the southern portion of the project. They do not serve a sufficient portion of the project to deem their failure a failure of the project as a whole considering the terms of the license and partial decrees.

R. 3097. A & B also notes that underperforming wells are not just located in the southern part the Unit but rather are located throughout the project. *See* Exh. 200N & 216.

Whether or not the Hearing Officer actually applied or relied on a "failure of the project standard" or was making a finding of fact is not entirely clear.[14] However, A & B is correct in that there is not a recognized legal basis for applying a failure of the project standard - even based on the way in which A & B's right is decreed. The fact that an injury may be arguably be so slight as to represent only a small portion of the overall project is irrelevant. Injury to a water right is still injury. However, as previously discussed, the Director must evaluate material injury from the perspective that A & B has

[14] The *Hearing Officer's Response to A & B's Petition for Clarification* states:

> In context the finding that there has not been a 'total project failure' is a finding of fact, not a measure of material injury. Material injury may occur before a total project failure. It is a finding made because of the extensive evidence offered concerning the nature and operation of the project, not as a threshold requirement before curtailment or mitigation can be sought.

R. 3262.

the obligation to move water around within the Unit as all points of diversion are appurtenant to all lands within the Unit. If performing wells are capable of producing sufficient water to compensate for underperforming areas then injury may not exist. Alternatively, if performing wells are incapable of producing additional water needed to compensate for underperforming wells then injury may exist. This Court recognizes, however, that the regulation of juniors to increase performance of underperforming wells located in regions of poor transmissivity may be subject to a futile call defense.[15]

In sum, aside from there being no legally recognized *de minimus* threshold exclusion for finding injury, based on this Court's analysis there is no reason to engage in a "failure of the project" standard, as established legal principles governing water law adequately address the issue.

E. The Director Did Not Err in Failing to Designate All or a Portion of the ESPA as a Ground Water Management Area (GWMA) Pursuant to Idaho Code § 42-231.

A & B next argues that the Director erred by failing to designate a GWMA for either all or a portion of the ESPA. The Director concluded that the designation of a GWMA was not necessary because the water rights are now included in an organized water district. The Director reasoned that the designation of a GWMA would not confer any additional management function that is not already available in an organized water district. This Court agrees.

The decision of whether or not to designate a GWMA is discretionary with the Director. Idaho Code § 42-231 sets forth the duties of the Director with respect to the management of ground water:

> It shall likewise be the duty of the [Director] to control the appropriation and use of the ground water of this state as in this [GWA] provided and to

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[15] CMR 010.08 defines "Futile Call" as:

> A delivery call made by a holder of a senior-priority surface or ground water right that, for physical or hydrologic reasons, cannot be satisfied within a reasonable time of the call by immediately curtailing diversions under junior- priority ground water rights or that would result in waste of the resource.

IDAPA 37.03.11.010.08.

do all things reasonably necessary or appropriate to protect the people of the state from depletion of ground water resources contrary to the public policy expressed in this [GWA].

Idaho Code § 42-237a defines the power of the Director with respect to carrying out the provisions of the GWA:

> In the administration and enforcement of this act and in effectuation of the policy of this state to conserve its ground water resources, the director of the department of water resources *in his sole discretion,* is empowered:
>
> . . .
>
> g. To supervise and control the exercise and administration of all rights to the use of ground waters *and in the exercise of this discretionary power he may* initiate administrative proceedings to prohibit or limit the withdrawal of water from any well during any period that he determines that water to fill any water right in said well is not there available. . . .

(emphasis added). Idaho Code § 42-233a provides:

> When a 'critical ground water area'[16] is designated by the [Director], or at anytime thereafter during the existence of the designation, the director *may approve a ground water management plan for the area.* The ground water management plan shall provide for managing the effects of ground water withdrawals on the aquifer from which withdrawals are made and any other hydraulically connected sources of water.

(emphasis added).

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[16] Idaho Code § 42-233a defines "critical ground water area" as:

> [A]ny ground water basin, or designated part thereof, not having sufficient ground water to provide a reasonably safe supply for irrigation of cultivated lands, or other uses in the basin at the then current rates of withdrawal, or rates of withdrawal projected by consideration of valid and outstanding applications and permits, as may be determined and designated, from time to time, by the director of the department of water resources.

Idaho Code § 42-233b sets forth the conditions for the designation of a GWMA.[17] In this case, the Director determined factually that despite declines, the aquifer was neither being mined nor that reasonable pumping levels had been exceeded. Further that a moratorium on new permit applications was in effect. Hence, the aquifer was not approaching critical ground water area conditions thereby triggering the need for the designation of a GWMA. However, even if the Director concluded aquifer levels met the criteria of a critical ground water area, the designation of a GWMA is still not mandatory. The designation of a GWMA is one of the tools or mechanisms available to the Director for carrying out his duty to manage the aquifer as required by I.C. § 42-231.

Another mechanism available is the creation of an organized water district pursuant to I.C. § 42-602.[18] Unlike the designation of a GWMA, the Director is required

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[17] Idaho Code § 42-233b provides as follows:

> **Ground water management area.** – 'Ground water management area' is defined as any ground water basin or designated part thereof which the director of the department of water resources *has determined may be approaching the conditions of a critical ground water area.*
>
> When a ground water management area is designated by the director of the department of water resources, or at any time thereafter during the existence of the designation, the director *may* approve a ground water management plan for the area. The ground water management plan shall provide for managing the effects of ground water withdrawals on the aquifer from which withdrawals are made and on any other hydraulically connected sources of water.
>
> Applications for permits made within a ground water management area shall be approved by the director only after he has determined on an individual basis that sufficient water is available and that other prior water rights will not be injured.
>
> The director *may* require all water right holders within a designated water management area to report withdrawals of ground water and other necessary information for the purpose of assisting him in determining available ground water supplies and their usage.
>
> *The director, upon determination that the ground water supply is insufficient to meet the demands of water rights within all or portions of a water management area, shall order those water right holders on a time priority basis, within the area determined by the director, to cease or reduce withdrawal of water until such time as the director determines there is sufficient ground water. . . .*

(emphasis added).

[18] Idaho Code § 42-602 *et seq.* sets forth the requirements for the creation and distribution of water in water districts as follows:

> **Director of the department of water resources to supervise water distribution within water districts.** – The director of the department of water resources shall have direction

to create water districts. I.C. § 42-604.[19] However, the creation of water districts only applies with respect to adjudicated water rights.[20] I.C. § 42-604. Because a GWMA designation does not have the same restriction, the designation of a GWMA has been used as a mechanism prior to water rights being decreed in the SRBA and included in the boundaries of an organized water district. However, the position of the Director is that after an organized water district is created as required then a GWMA is no longer necessary:

> Following the creation of water districts in accordance with chapter 6, title 42, Idaho Code, the Director rescinded, in whole or in part, his orders that

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> and control of the distribution of water from all natural water sources within a water district to the canals, ditches, pumps and other facilities diverting therefrom. Distribution of water within water districts created pursuant to section 42-604, Idaho Code, shall be accomplished by watermasters as provided in this chapter and supervised by the director.
>
> *The director of the department of water resources shall distribute water in water districts in accordance with the prior appropriation doctrine. The provisions of chapter 6, title 42, Idaho Code, shall apply only to distribution of water within a water district.*

(emphasis added). Idaho Code § 42-607 governs the distribution of water within a water district:

> **Distribution of water.** – It shall be the duty of said watermaster to distribute the waters of the public stream, streams or water supply, comprising a water district, among the several ditches taking water therefrom *according to the prior rights of each respectively* . . .

(emphasis added).

[19] Idaho Code § 42-604 requires the creation of water districts:

> **Creation of water districts.** – The director of the department of water resources *shall divide the state into water districts* in such manner that each public stream and tributaries, or independent source of water supply, shall constitute a water district: provided, that any stream of water supply, when the distance between the extreme points of diversion thereon is more than forty (40) miles, may be divided into two (2) or more water districts: provided, that any stream tributary to another stream may be constituted into a separate water district when the use of the water therefrom does not affect or conflict with the rights to the use of the water of the main stream: provided, that any stream may be divided into two (2) or more water districts, irrespective of the distance between the extreme points of diversion, where the use of the waters of such stream by appropriators in one district does not affect or conflict with the use of the waters of such stream by appropriators outside such district: *provided, that this section shall not apply to streams or water supplies whose priorities of appropriation have not been adjudicated by the courts having jurisdiction thereof.*

(emphasis added).

[20] Prior to entry of the final decree in the SRBA the Department has sought interim administration from the SRBA Court, pursuant to I.C. § 42-1417, prior to creating water districts.

> created the American Falls and Thousand Springs Ground Water Management Areas. The Director determined that preserving the ground water management areas was no longer necessary to administer water rights for the protection of senior surface and ground water rights because administration of such rights is now accomplished through the operation of water districts.

R.1110.

Water District Nos. 100, 110, 120, 130 and 140 were either established or boundaries revised between February 19, 2002, and December 20, 2006, in order to provide for the administration of water rights diverting from the ESPA. There has also been in effect since 1992 a moratorium on permit applications for new water rights developed from the ESPA.

At the hearing Tim Luke from the Department testified as to the administrative difference between a GWMA and an organized water district:

> **Q.** No effective difference between what you can do administratively in a water district and ground water management area?
>
> **A.** I think anything that you do in a ground water management area can also be done in a water district.
>
> **Q.** Greater flexibility of the water district.
>
> **A.** I think so.

Tr. pp. 1324-25.

In regards to flexibility, the CMR expressly distinguish between delivery calls made within an organized water district (CMR 040), from those made in a ground water management area (CMR 041). The process for responding to a delivery call in an organized water district requires less procedural components prior to the regulation of junior water users.

The Hearing Officer ultimately concluded that "[t]he benefit of designating the ESPA as a [GWMA] is not apparent. There may be no harm in doing so, but it would appear to add an administrative overlay without identifiable benefits." R. 3116. This Court agrees.

For the above-stated reasons, the Director did not abuse discretion by failing to designate the ESPA as a GWMA, and his decision is therefore affirmed.

F. The Director's *Final Order* Complies with Idaho Code § 67-5248(1).

Idaho Code § 67-5248(1)(a) provides in relevant part that an order must be in writing and shall include "a reasoned statement in support of the decision." It further provides that findings of fact, if set forth in statutory language, "shall be accompanied by a concise and explicit statement of the underlying facts of record supporting the findings." *Id.* A & B argues that certain conclusions set forth in the *Final Order* do not comply with Idaho Code § 67-5248(1)(a) on the grounds that they are not supported by reasoned statements. At issue is the Director's conclusion that "[t]he record does not support the relief requested by A & B in its Exceptions Brief," and his conclusion that the Hearing Officer's interpretations of "the State Constitution, Idaho Statutes and the Conjunctive Management Rules" in previous delivery call proceedings will not be incorporated into the *Final Order*. R. at 3322.

With respect to the conclusion that "[t]he record does not support the relief requested by A & B in its Exceptions Brief," A & B reads this statement in isolation. Such a reading is too narrow. The *Final Order* expressly incorporates "the Findings of Fact entered previously by the Director and recommendations of the Hearing Officer," as well as the "Conclusions of Law set forth in the Director's orders in the above-captioned matter" unless expressly modified by the *Final Order*. R. at 3321 & 3322.

Aside from a couple newly raised procedural issues which were specifically addressed in the *Final Order*,[21] A & B's Exceptions Brief asserts the same substantive arguments it set forth at hearing before the Hearing Officer, in its *Petition for Reconsideration*, and in its *Petition for Clarification*. These arguments have been fully addressed, and reasoned statements supporting the resulting conclusions set forth, by the Director in his *January 29, Order*, as well as by the Hearing Examiner in his *Recommended Order*, his *Order on Clarification* and his *Order on Reconsideration*. Indeed, A & B does not identify any *specific* exception set forth in its Exceptions Brief that it alleges has not been addressed in this matter or that the resulting conclusion has

not been supported with a reasoned statement. The Director is not required to engage in the needless duplication of established findings where, as here, he incorporates by reference and accepts findings of fact and conclusions of law previously entered in the same matter.

Likewise, the conclusion that the Hearing Officer's interpretations of "the State Constitution, Idaho Statutes and the Conjunctive Management Rules" in previous delivery call proceedings will not be incorporated into the *Final Order* complies with Idaho Code § 67-5248(1)(a). The Director supported his conclusion with reasoned statements, including but not limited to, that the records developed in the other delivery call proceedings are distinct from the record developed in this proceeding.

Accordingly, the Director did not err by failing to issue a final order in compliance with I.C. § 67-5248.

VI.
CONCLUSION AND INSTRUCTIONS ON REMAND

In conclusion, this Court holds and provides the following instructions on remand:

1. The decision of the Director that the 1951 GWA applies to the administration of pre-enactment water rights is **affirmed**.

2. The Director erred by failing to apply the evidentiary standard of clear and convincing evidence in conjunction with the finding that the quantity decreed to A & B's 36-2080 exceeds the quantity being put to beneficial use for purposes of determining material injury. The case is remanded for the limited purpose of the Director to apply the appropriate evidentiary standard to the existing record. No further evidence is required.

3. The decision of the Director that A & B has not been required to exceed reasonable pumping levels is **affirmed.** This is based on the finding of no material injury

[21] These procedural issues revolve around the Director's ability to shorten time to file exceptions.

3. The decision of the Director that A & B has not been required to exceed reasonable pumping levels is **affirmed.** This is based on the finding of no material injury at existing pumping levels. On remand, following the application of the appropriate evidentiary standard a finding of material injury may require that the Director reevaluate this determination.

4. The decision of the Director to evaluate material injury to the 36-2080 water right based on depletion to the cumulative quantity as opposed to determining injury based on depletions to individual points of diversion is **affirmed.** The decision of the Director to require A & B to take reasonable steps to move water from performing to underperforming areas or alternatively demonstrate physical or financial impracticability is **affirmed.**

5. The decision of the Director not to designate the ESPA as a GWMA is **affirmed.**

6. The Director did not fail to issue a final order in compliance with I.C. § 67-5248.

IT IS SO ORDERED

Dated May 4, 2010

ERIC J. WILDMAN
Presiding Judge of the Snake River Basin Adjudication

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

A & B IRRIGATION DISTRICT, Petitioner, vs. THE IDAHO DEPARTMENT OF WATER RESOURCES and GARY SPACKMAN in his official capacity as Interim Director of the Idaho Department of Water Resources, Respondents. **IN THE MATTER OF THE PETITION FOR DELIVERY CALL OF A & B IRRIGATION DISTRICT FOR THE DELIVERY OF GROUND WATER AND FOR THE CREATION OF A GROUND WATER MANAGEMENT AREA**	Case No. 2009-000647 **MEMORANDUM DECISION AND ORDER ON PETITIONS FOR REHEARING**

Ruling: Affirming prior ruling.

Appearances:

John K. Simpson, Travis L. Thompson, Paul Arrington, Sarah W. Higer, Barker Rosholt & Simpson, LLP, Twin Falls, Idaho, on behalf of Petitioner A & B Irrigation District, ("A & B");

Chris M. Bromley, Deputy Attorney General of the State of Idaho, Idaho Department of Water Resources, Boise, Idaho, on behalf of Respondents Idaho Department of Water Resources, and Gary Spackman in his capacity as Interim Director of the Idaho Department of Water Resources, ("Director," "IDWR" or "Department");

Randall C. Budge, Candice M. McHugh, Scott J. Smith, Racine Olson Nye Budge & Bailey, Chartered, Pocatello, Idaho, on behalf of Respondent Idaho Ground Water Appropriators, Inc. ("IGWA");

Sarah A. Klahn, White & Jankowski, LLP, Denver, Colorado, A. Dean Tramner, Pocatello, Idaho, on behalf of Respondent City of Pocatello ("City of Pocatello");

Jerry R. Rigby, Rigby, Andrus & Rigby, Chartered, Rexburg, Idaho, on behalf of Fremont Madison Irrigation District, Robert & Sue Huskinson, Sun-Glo Industries, Val Schwendiman Farms, Inc., Darrell C. Neville, Scott C. Neville, and Stan D. Neville, ("Fremont-Madison *et. al.*").

I. PROCEDURE

A. Issue on rehearing.

On rehearing this Court is asked by the Department, IGWA and the City of Pocatello (collectively as "Ground Water Users") to reconsider its ruling in the ***Memorandum Decision and Order on Petition for Judicial Review*** (May 4, 2010) ("***Order***") regarding the appropriate burden of proof and evidentiary standards applied in a delivery call made pursuant to the Department's *Rules for Conjunctive Management of Surface and Ground Water Resources,* IDAPA 37.03.11. ("CMR"). In particular, the issue pertains to the standard of proof and burdens necessary to support a determination of no material injury when the determination relies on a finding by the Director that the water requirements of the senior right holder initiating the call can be satisfied with less than the decreed quantity. This Court held that such a finding must be supported by clear and convincing evidence. The issue on rehearing therefore involves the significance of a partial decree in a delivery call proceeding made pursuant to the CMR, and the standard of proof required to support a determination by the Director that the senior user initiating the call requires less water than previously decreed.

B. The purpose of the remand.

The ***Order*** remanded the case to the Director for application of the standard of proof to his determination that A & B could get by with less water than decreed to it in the SRBA. In the June 30, 2009, Final Order, the Director did not state the evidentiary standard applied. In *Sagewillow, Inc. v. IDWR*, 138 Idaho 831, 843, 70 P.3d 669, 681 (2003) the Idaho Supreme Court held that where the Department failed to state whether or not its findings were based on clear and convincing evidence it was outside the role of the reviewing court to review the evidence and decide whether there was clear and convincing evidence supporting the Department's findings. Following *Sagewillow*, this Court did not review the evidence to determine whether the above-mentioned finding was supported by clear and convincing evidence, but rather remanded the case to the Director to make such a determination.

C. The reasoning supporting the *Order*.

This Court reasoned that a decreed quantity in a SRBA decree is a judicial determination of the quantity of water put to beneficial use consistent with the purpose of use for which the right was decreed. Therefore, any determination that a senior right holder can accomplish the purpose of use for the water right on a quantity less than decreed would be akin to a finding of waste because the senior would not be making beneficial use of the entire decreed quantity. No material injury to the senior water right would inure and junior rights could not be regulated to satisfy the senior's decreed quantity. In the ***Order***, the Court held that a finding of waste requires the higher standard of clear and convincing evidence.

The holding reconciled the objectives of giving proper effect and certainty to the adjudicated elements of a water right while at the same time also giving effect to the CMR by acknowledging that a quantity less than decreed may be all that is necessary to satisfy a senior right at the time a delivery call is made. The reasoning, however, placed any risk of uncertainty in the Director's determination resulting in the senior having an insufficient water supply on junior water rights. Absent a higher standard, the senior making the call can be put in the position of re-proving or re-litigating quantity

requirements for a particular water right. Simply put, if the Director is going to administer to provide the senior with less than the decreed quantity, taking into account the implementation of any reasonable measures imposed on the senior, the Director should be convinced to a high degree of certainty that his determination will provide the senior with sufficient water to accomplish the purpose of use. The high degree of certainty is necessary because a water right is a valuable property right. If the Director is turns out to be incorrect in his determination that senior can get by with less than the decreed quantity of water, the senior will receive less water than he would otherwise be entitled under the decree. Under those circumstances the senior is in effect deprived a portion of his property right. Such diminishment of the senior's right should only be made through the evidentiary standard of clear and convincing evidence.

II. CLARIFICATION, RESPONSES TO ISSUES RAISED AND DISCUSSION

A. The clear and convincing standard does not guarantee the senior the decreed quantity nor does it require that the Director administer according to strict priority.

The Ground Water Users argue the Court's ***Order*** results in requiring that the Director administer strictly to the decree unless juniors intervene and demonstrate by clear and convincing evidence less water is necessary. This argument misunderstands the Court's ***Order***.

1. The presumptions and burdens of proof were not clearly addressed in the administrative proceedings as required by *AFRD* #2.

This Court previously discussed the significance of the Idaho Supreme Court's decision in ***American Falls Reservoir District No. 2. v. IDWR***, 143 Idaho 862, 154 P.3d 433 (2007) (***AFRD #2***). ***Order,*** 27-28. The Supreme Court held that the CMR survived a facial challenge despite the lack of stated burdens of proof and evidentiary standards applicable to a delivery call. Nevertheless, the Court recognized that the Department is

still required to apply the proper evidentiary standards and burdens of proof in order to apply the CMR in a constitutional or "as applied" manner. In the instant case, the evidentiary standards and burdens of proof were not clearly articulated by the Director.

i. Administration of rights in an organized water district does not avoid the application of the established burdens of proof.

The CMR distinguish between whether or not administration is sought in an organized water district. (*Compare* CMR Rule 40 and Rule 30). The initiation of a contested case is not required in an organized water district. This is significant because in an organized water district, water rights must first be adjudicated. *See* I.C. § 42-604 (requirements for water district). In responding to a delivery call in an organized water district, the Director is required to make findings and to administer rights through a water master if material injury is found. This is accomplished without the initiation of a contested case process. In ***AFRD #2*** the Idaho Supreme Court held that "[r]equirements pertaining to the standard of proof and who bears it have been developed over the years and are to be read into the CM Rules. There is simply no basis from which to conclude the Director can never apply the proper evidentiary standard in responding to a delivery call." *Id.* at 874, 154 P.3d at 445. Therefore, whether or not a junior intervenes in the proceedings, the Director must give effect to established evidentiary burdens and presumptions.

ii. The CMR do not modify the burdens or presumptions applied in a delivery call.

The Ground Water Users argue that the burden of proof is a preponderance of the evidence as it is the appropriate evidentiary standard in most administrative proceedings. The Ground Water Users additionally assert that the evidentiary standards that apply to the administration of ground water rights are different from those involving solely surface water administration. The Ground Water Users also argue the cases relied on by the Court in the ***Order*** only address surface to surface administration and that different

burdens and evidentiary standards apply in cases involving ground water administration. This Court disagrees that different burdens and evidentiary standards apply.

Again, in ***AFRD #2*** the Supreme Court did not hold that a different set of evidentiary standards and burdens apply to the administration of ground water. The Supreme Court held that the CMR were not unconstitutional for failing to articulate the appropriate standards and burdens. The Court added that "[r]equirements pertaining to the standard of proof and who bears it have been developed over the years and are to be read into the CM Rules." *Id.* at 874, 154 P.3d at 445. This statement is unequivocal. The argument that the CMR modify historically developed burdens and presumptions is inconsistent with that holding.

The City of Pocatello argues that the burden is on the senior to prove material injury. *Pocatello Opening Brief* at 10-11. In ***AFRD #2*** American Falls argued that specific provisions of the CMR squarely contradict Idaho law by placing the burden of proving material injury on the senior making the call. The Supreme Court held "[n]owhere do the Rules state that the senior must prove material injury before the Director will make such a finding. To the contrary, this Court must presume the Director will act in accordance with Idaho law, as he is directed to do under CM Rule 20.02. . . . [O]ur analysis is limited to the rules as written, or 'on their face,' and the rules do not permit or direct the shifting of the burden of proof." *Id.* at 873-74, 154 P.3d at 444-45. Accordingly, the express provisions of the CMR do not operate to modify the historically recognized burdens and presumptions.

Finally, the issue before this Court does not deal with the complexities and uncertainties posed by the hydraulic interrelation of ground and surface water. On rehearing, the issue focuses solely on the presumptive weight accorded a partial decree and the standard of proof required to support a determination that the senior initiating the call requires less water than previously decreed. At issue is the quantity of water necessary to accomplish the senior's purpose of use.

iii. The Court's *Order* does not result in the Director administering rights strictly in accordance with the decreed quantity.

The Court's ***Order*** does not conclude that a senior right holder is guaranteed the maximum quantity decreed or that the Director is required to administer strictly according to the decree. Rather, the ***Order*** concludes that the decreed quantity includes a quantitative determination of beneficial use resulting in a presumption that the senior is entitled to that decreed quantity. The ***Order*** contemplates that there are indeed circumstances where the senior making the call may not at the present time require the full decreed quantity and therefore is not entitled to administration based on the full decreed quantity. The ***Order*** holds, however, that any determination by the Director that the senior is entitled to less than the decreed quantity needs to be supported by a high degree of certainty.

The clear and convincing evidentiary standard is not an insurmountable standard. The Department is not new to the administration of water and should be able to determine present water requirements taking into account multiple factors including the existing conveyance system. If the senior right holder has made efficiencies or changes to a delivery system resulting in the conservation of water, such should be no more difficult to establish at the higher evidentiary standard. Therefore the senior is not guaranteed the decreed quantity nor is the Director required to administer strictly in accordance with the decreed quantity. While a senior may not be guaranteed the decreed quantity in a delivery call, he should have assurances that any reduced quantity determined to be sufficient to satisfy current needs is indeed sufficient. Otherwise what occurs is a redistribution of the senior right to be apportioned among junior rights. The apportionment of water among users as common property was rejected by the Idaho Supreme Court in the early stages of water development. *Kirk v. Bartholomew*, 3 Idaho 367, 29 P. 40 (1892).

iv. The application of a clear and convincing standard does not turn a delivery call proceeding into a hearing on forfeiture.

The Ground Water Users argue that the Court's ruling essentially turns a delivery call into a proceeding on forfeiture. The Ground Water Users argue that that the Court's reliance on waste is in error because in a delivery call the senior's water right is not permanently reduced. This argument misses the point of the ruling. The Court simply

held that the quantity element represents a quantitative determination of beneficial use. In the delivery call, the senior's present water requirements are at issue. If it is determined that the senior's present use does not require the full decreed quantity, then the quantity called for in excess of the senior's present needs would not be put to beneficial use or put differently would be wasted. One leading commentator in analyzing the development of the use of the concepts of reasonable use and economical use in association with beneficial use among various western states, including Idaho, states:

> As considered and applied in these decisions, economical use is an antonym of waste. If an appropriator wastes, he necessarily is not using it economically. As he has no right to waste water unreasonably or unnecessarily, then of necessity he must make economical as well as reasonable and beneficial use. . . . The limitation of the appropriative right to economical and reasonable use thus precludes any waste of water that can reasonably be avoided. The use of water is so necessary as to preclude its being allowed to run to waste. Its 'full beneficial and economical use requires' that when the wants of one appropriator are supplied, another may be permitted to use the flow.

Wells A. Hutchins, *Water Rights in the Western Nineteen States*, Vol I, 502 (1971). The holdings of the SRBA District Court have historically viewed waste and beneficial use in this manner. For example, the SRBA Court rejected the inclusion of a remark in partial decrees which specified that the quantity sought in a delivery call is limited to that which the senior right holder put to beneficial use. The SRBA Court reasoned that the remark was not necessary because it was a restatement of the law and held "that a senior has no right to divert, (and therefore to 'call,') more water than can be beneficially applied. Stated another way, a water user has no right to waste water." ***Order*** at 32 (quoting *Memorandum Decision and Order on Challenge; Order Granting State of Idaho's Motion for the Court to Take Judicial Notice of Facts; Order of Recommitment with Instructions to Special Master Cushman* (Nov. 23, 1999)).

It is apparent that water quantity can be reduced based on a waste analysis without resulting in a permanent reduction of the water right through partial forfeiture. Only if the waste occurs for the statutory period can forfeiture be asserted. However, whether the senior's right is permanently reduced through partial forfeiture or is only temporarily reduced though administration in times of shortage and the reduction leaves the senior

with an insufficient water supply to satisfy present needs, the property right is nonetheless diminished.

B. The historically developed burdens and presumptions.

On rehearing, the parties identify those cases that address the burdens of proof and evidentiary standards applicable to disputes between competing water users under Idaho law. A review of these cases is worthwhile.

The early case of *Moe v. Harger*, 10 Idaho 302, 77 P. 645 (1904) addressed a dispute between surface water users on a common source, the Big Lost River. The case was commenced by certain senior water appropriators to enjoin certain junior water appropriators from diverting water to the alleged injury of the seniors' rights of use. With respect to the applicable burdens of proof and evidentiary standards, the Court instructed that once the senior appropriators' rights of use are established, the burden shifts to the junior to prove by clear and convincing evidence that his use will not injure the seniors' rights of use:

> So soon as the prior appropriation and right of use is established, it is clear, as a proposition of law, that the claimant is entitled to have sufficient of the unappropriated waters flow down to his point of diversion to supply his right, and an injunction against interference therewith is proper protective relief to be granted. The subsequent appropriator, who claims that such diversion will not injure the prior appropriator below him, **should be required to establish that fact by clear and convincing evidence**.

Id. at 307, 77 P. at 647 (emphasis added).

In *Josslyn v. Daly*, 15 Idaho 137, 96 P. 568 (1908) the Idaho Supreme Court again addressed a dispute between surface water users. With respect to the applicable burdens of proof and evidentiary standards, the Court instructed, consistent with *Moe*, that the burden is on the party alleging that his appropriation will not injure a prior appropriator's right of use to prove the same by clear and convincing evidence:

> It seems self-evident that to divert water from a stream or its supplies or tributaries must in a large measure diminish the volume of water in the main stream, and, where an appropriator seeks to divert water on the grounds that it does not diminish the volume in the main stream or

> prejudice a prior appropriator, he should, as we observed in *Moe v. Harger*, 10 Idaho, 305, 77 Pac. 645, **produce 'clear and convincing evidence** showing that the prior appropriator would not be injured or affected by the diversion.' The burden is on him to show such facts.

Id. at 149, 96 P. at 571–72 (emphasis added).

Neil v. Hyde, 32 Idaho 576, 186 P. 710 (1920) and *Jackson v. Cowan*, 33 Idaho 525, 196 P. 216 (1921) likewise involved disputes between surface water users on common sources. The junior appropriators in those cases argued that their use did not injure the senior users. The Idaho Supreme Court directed in both cases that the burden of proof rested on the junior appropriators to show that their use did not injure the seniors, and held that the juniors in both cases failed to carry their burden.[1] *Neil*, 32 Idaho at 587, 186 P. at 713; *Jackson*, 33 Idaho at 528, 196 at 217.

A different issue than those addressed by the Court in the above-mentioned cases arose in the context of a dispute between two groups of artesian groundwater users in *Jones v. Vanausdeln*, 28 Idaho 743, 156 P. 615 (1916). In that case, the ultimate issue was one of hydrologic connectivity; that is, whether the respective artesian basins from which plaintiffs and defendants received their water were hydraulically connected:

> The ultimate fact in issue was whether the [defendants'] wells drew their supply from the same underground flow as [plaintiffs'] wells, thereby causing a diminution in the flow of the [plaintiffs'] wells.

Id. at 751, 156 P. at 618. The district court denied plaintiffs' request that the defendants' use be enjoined on the grounds that no subterranean connection existed between the respective artesian basins and that, as a result, the two groups received their water from separate and unconnected sources. *Id.* at 747–48, 156 at 616. The Idaho Supreme Court confirmed, providing that when the issue is whether two sources are hydraulically connected, the burden of proof is on the senior appropriator to establish that such a connection exists before a junior's use will be enjoined. *Id.* at 749, 156 at 617.

The Idaho Supreme Court again took up a dispute between various artesian groundwater users in *Silkey v. Tiegs*, 51 Idaho 344, 5 P.2d 1049 (1931) ("*Silkey I*") and *Silkey v. Tiegs*, 54 Idaho 126, 28 P.2d 1037 (1934) ("*Silkey II*"). In that case, the district

[1] Although the Court directed that the burden of proof rested with the junior appropriators, in neither case did the Court specify the applicable evidentiary standard the juniors had to meet.

court adjudicated the rights of the parties, entered a decree curtailing the rights of several of the junior appropriators at the request of the senior appropriator and retained jurisdiction over the case to adjust the allowance of water permitted each user if necessary. *Silkey I*, 51 Idaho at 348–49, 5 P.2d at 1051. Unlike *Jones*, connectivity of source was not the ultimate issue in *Silkey*. Indeed, the district court found, and the Idaho Supreme Court affirmed, that "the waters flowing from the artesian well of each party is derived from the same source, and the supply of said wells constitutes one interdependent and connected source of supply." *Id.* at 348, 5 P.2d at 1051.

The appeal in *Silkey II* arose when the junior appropriators curtailed in *Silkey I* moved the district court under its retained jurisdiction to modify its earlier decree to permit them to use more water. *Silkey II*, 54 Idaho at 127, 28 P.2d at 1037. The junior appropriators argued that such additional use would not deplete the amount of water available to the senior appropriator. *Id.* The Idaho Supreme Court affirmed the district court's denial of the junior appropriators' motion, holding that the juniors failed to sustain their burden of proving that their use would not injure the senior's use:

> The burden was on appellants herein to sustain their motion by direct and convincing testimony, this language in Moe v. Harger, 10 Idaho, 302, 77 P. 645, 646, being particularly apt: "This court has uniformly adhered to the principle, announced both in the Constitution and by the statute, that the first appropriator has the first right; and it would take more than a theory, and in fact clear and convincing evidence, in any given case, showing that the prior appropriator would not be injured or affected by the diversion of a subsequent appropriator, before we would depart from a rule so just and equitable in its application, and so generally and uniformly applied by the courts.

Id. at 128–29, 28 P.2d at 1038. Consistent with *Moe*, the Court again made clear that the standard of proof was clear and convincing evidence if the juniors wished to prove that their use would not injure the senior appropriator.

The case history can be reconciled. *Jones* instructs that the initial burden rests upon the senior appropriator to establish that he and the junior appropriator receive water from the same hydraulically connected source. Once it is determined that the senior and junior derive water from a common source, as was the case in all of the above-mentioned cases except for *Jones*, the burden rests on the junior appropriator to prove by clear and convincing evidence that his use will not injure the senior's right of use. One leading

commentator on the subject has summarized the application of the burdens of proof as follows:

> [W]hen a senior appropriator seeks to enjoin a junior diversion, the senior – the person seeking judicial intervention to change an existing situation – must prove the water sources for the two diversions are connected. But once hydrologic connection is shown, it becomes probable that the junior diversion interferes with the senior right, if the senior's source is fully appropriated by rights prior to the junior diversion. Then the junior appropriator – the person arguing against probabilities – must show his particular water use somehow does not cause interference.

Douglas L. Grant, *The Complexities of Managing Connected Surface and Ground Water Under the Appropriation Doctrine*, 22 Land & Water L.Rev. 63, 92–93 (1987).

It is significant that this Court established the hydrologic connection in ***Memorandum Decision and Order of Partial Decree*** in Basin Wide Issue No. 5 "Connected Sources General Provision" for the Snake River Basin. Among other things, the general provision identifies hydraulically connected ground and surface sources in the Snake River Basin for the purposes of administration and defining the legal relationship between connected sources. In pertinent part, the general provision provides as follows:

> Except as otherwise specified above, all other water rights within Basin __ will be administered **as connected sources** of water in the Snake River Basin in accordance with the prior appropriation doctrine as established by Idaho law.

(emphasis added). A *Partial Decree for Connected Sources* is issued for each basin within the Snake River Basin. Thus, unless water rights are listed as "otherwise specified" in the *Partial Decree for Connected Sources* for a given basin that the source from which a junior appropriator receives his water shall be administered separately from all other water rights in the Snake River Basin, the issue of whether or not the senior and junior divert water from a common source has already been answered in the positive. This is also consistent with the provisions of the Ground Water Act, IC. § 42-237a.g. which requires the Director to determine areas of the state having a common ground water supply. When it is determined that the area having a common ground water supply affects the flow of water in any stream in an organized water district, then the Director includes the stream in the water district. Conversely, when it is determined that the area having a common ground water supply does not affect the flow of a stream in an

organized water district, then the Director incorporates the area in a separate district. Under such circumstances, the senior appropriator's burden of proof to establish a common source is satisfied.

The burden is then on the junior right holder to show by clear and convincing evidence that his use will not injure the senior's right. One way in which this may be demonstrated is by showing that the senior's present water use does not require the full decreed quantity. A clear and convincing standard is consistent with the historically recognized burdens of proof and also insures that any amount determined to be sufficient to accomplish the present use is in fact sufficient.

C. The significance of the decree issued in a general adjudication in a delivery call.

The Ground Water Users argue the purpose and significance of a partial decree issued in a general adjudication differs substantially from its purpose and significance in delivery call proceedings. Specifically, the Ground Water Users assert the adjudication only establishes the historical maximum quantity that can be put to beneficial use. They argue that a delivery call proceeding, in contrast, requires that the Director examine the senior's current beneficial use requirements which may vary from the decreed quantity. The argument is that the decree is only conclusive as to historical maximum beneficial use for the water right and has little or no relevance as to present beneficial use requirements for the same right. This Court agrees that an appropriator's present water requirements can vary from the quantity reflected in the decree after taking into account such considerations such as post decree factors. However, the Ground Water User's characterization of decrees minimizes their intended purpose, undermines the certainty of the decrees and disregards that the issues that can be raised in a general adjudication pertaining to the quantity element extend beyond the maximum quantity that was historically put to beneficial use.

1. Idaho law contemplates certainty and finality so that water rights can be administered according to the decrees.

Idaho Code § 42-1420 provides: "[t]he decree entered in a general adjudication shall be conclusive as to the nature and extent of all water rights in the adjudicated water system. . . ." In *State v. Nelson*, 131 Idaho 12, 16, 951 P.2d 943, 947 (1998), the Idaho Supreme Court pronounced that "[f]inality in water rights is essential." Further, "[a] decree is important to the continued efficient administration of a water right. The watermaster must look to the decree for the source of the water. . . . If the provisions define a water right, it is essential that the provisions are in the decree, *since the water master is to distribute water according to the adjudication decree.*" *Id.* (citations omitted) (emphasis added). Clearly Idaho law contemplates certainty and finality of water right decrees for effective administration. Absent a higher evidentiary standard, any certainty and finality in the decree is undermined.

The position advocated by the Ground Water Users would significantly minimize the purpose and utility of the decree in times of shortage and any reliance on the decree for effective administration, particularly in a water district, is undermined. If the sole purpose of the decreed quantity is to identify the maximum quantity when sufficient water is available, the result is that the decreed quantity has little probative or presumptive weight and litigation over the senior's present needs would be a virtual necessity in every delivery call. This is contrary to the holding in ***AFRD #2***, which provides that: "The Rules should not be read as containing a burden-shifting provision to make the petitioner re-prove or re-adjudicate the right which he already has . . . . The presumption under Idaho law is that the senior is entitled to his decreed water right, but there may be some post-adjudication factors which are relevant to how much water is actually needed." *Id.* at 877-78, 154 P.3d at 448-49

2. The quantity element is a quantitative determination of beneficial use.

The argument against applying the clear and convincing standard erroneously assumes that the decreed quantity element is not a quantitative determination of beneficial use. The argument assumes that the Department's role in the SRBA is to recommend water rights based on established historical maximum beneficial use rather than present beneficial use requirements. For example, the Ground Water Users assert

that recommendations for previously decreed and licensed rights were recommended based on the previously decreed or licensed quantity. As such, the last field examination for the right could have taken place as long ago when the right was previously decreed or licensed. Since that time, the right holder could have made efficiencies to the conveyance system thereby requiring less water than was decreed or licensed. An example is converting from gravity irrigation to sprinkler irrigation or a tiled ditch system. As a result, the Ground Water Users argue that the decreed quantity in the SRBA may not reflect the quantity of water that is actually put to beneficial use. The Ground Water Users also argue that the quantity element is a maximum which provides for the highest degree of flexibility to provide for the most water intensive use within the scope of the purpose of use. For example, a quantity sufficient to allow an irrigator to rotate crops allows for growing the most water intensive crop in the hottest part of the irrigation season.

The argument ignores both the purpose of the decree as well as the scope of the issues raised in a general adjudication. This Court previously discussed the Department's statutory directive in issuing licenses and recommendations which limit the quantity to the amount of water beneficially used. ***Order*** at 28-30. Idaho Code § 42-220 provides:

> [W]hen water is used for irrigation, no such license or decree of the court allotting such water shall be issued confirming the right to use more than one second foot of water for each fifty (50) acres of land so irrigated, unless it can be shown to the satisfaction of the [Department] in granting such license *and to the court in making such decree*, that a greater amount is necessary. . . .

I.C. § 42-220 (emphasis added). Idaho Code § 42-1420 provides "the decree entered in a general adjudication shall be conclusive as to the nature and extent of all water rights in the adjudicated system." As such, the appropriate time for contesting the Department's recommendation as to quantity was in the adjudication. I.C. § 42-1420.

Case law also supports the proposition that the quantity element in a decree represents a quantitative determination of beneficial use. Issues over excess quantity arise in proceedings relating to the adjudication of rights. In *Abbott v. Reedy*, 9 Idaho 577, 75 P. 764 (1904), in an adjudication to determine the respective rights on Soldier Creek in Blaine County, the Idaho Supreme Court held:

> It is true that he said he had been using about two inches per acre, but the law only allows the appropriator the amount actually necessary for the useful or beneficial purpose to which he applies it. The inquiry was, therefore, not what he had used, but how much was actually necessary. There was a clear and substantial conflict in the evidence as to the quantity of water per acre necessary for the successful irrigation of appellant's lands.

Id. at 578, 75 P. at 765. The issue arose in the context of an adjudication as opposed to a delivery call proceeding.

The case of *Farmers Cooperative Ditch Co. v. Riverside Irr. Dist.*, 16 Idaho 525, 102 P. 481 (1909), involved the adjudication of water rights on the Boise River. At issue was whether the quantity decreed for certain classes of rights exceeded the duty of water for the purpose of use of the rights. In deciding whether or not to grant a new trial on the issue, the Court relied on the following:

> In determining the duty of water, reference should always be had to lands that have been prepared and reduced to a reasonably good condition for irrigation. Economy must be required and demanded in the use of application of water. Water users should not be allowed an excessive quantity of water to compensate for and counterbalance their neglect or indolence in the preparation of their lands for the successful and economical application of the water. One farmer, although he has a superior water right, should not be allowed to waste enough water in the irrigation of his land to supply both him and his neighbor simply because his land is not adequately prepared for the economical application of the water.

Farmers at 535-36, 102 P. 483-89. Again, the issue arose in the context of an adjudication as opposed to a delivery call proceeding. *Vineyard Land & Stock Co. v. Twin Falls Oakley Land & Water Co.*, 245 F. 30 (D. Idaho 1917), involved an action to quiet title of water rights held on Goose Creek in Idaho and Nevada. In applying Idaho law, the Court held:

> Much is said about the duty of water. . . .The Land and Stock Company insists that the duty of water should still be measured by the old method of irrigation of pasture and the native grasses for the production of hay, which was by the flooding system, that allowed the water to cover the surface of the soil, and actually to remain thereon for considerable periods of time. This method is being disapproved of in more recent years as wasteful and not an economical use. No person is entitled to more water

> than he is able to apply to a reasonable an economical use. True, it may be that good results are obtainable from the former method, but that does not augur that just as good results may not be secured by a much more moderate use, which would leave a large quantity of water for others, who need it as much as the Land & Stock Company.

Id. at 33-34.

In *Reno v. Richards*, 32 Idaho 1, 178 P. 81 (1918), one of the issues before the Idaho Supreme Court was the sufficiency of the evidence supporting the adjudicated quantity of a beneficial use claim, the Court reasoned:

> 'The quantity of water decreed to an appropriator, in an action wherein priority of appropriation is the issue, should be upon the basis of cubic feet per second of time of the water actually applied to a beneficial use, and should be definite and certain as to the quantity appropriated and necessarily used by the appropriator.'

Id. at 15, 178 P.at 86. (quoting *Lee v. Hanford*, 21 Idaho 327, 121 P. 558 (1912)). Further:

> Water rights are valuable property, and a claimant seeking a decree of a court to confirm his right to the use of water by appropriation must present to the court sufficient evidence to enable it to make definite and certain findings as to the amount actually diverted and applied, as well as the amount necessary for the beneficial use for which the water is claimed.

Id. at 15. Kinney on Irrigation provides with respect to economic use and the suppression of waste:

> [T]he Courts have been and are now being called upon to fix by decrees the duty of water for certain tracts of land. . . . In fixing the duty of water for a certain tract of land, such an amount per acre should be awarded, within the lawful claim of the prior appropriator, as is essential or necessary for the proper irrigation of the land on which the water is used, and upon which the duty is being fixed; which water, when economically applied without waste, will result in the successful growing of crops on the land. Further than this, as far as the rights of the prior appropriator are concerned, the courts should not and can not lawfully go, where the result would be in cutting down the quantity of water to which the prior appropriator is entitled and reasonably needs for his purpose and the awarding of a certain amount of his water to subsequent appropriators.

2 Kinney on Irrigation and Water Rights § 905 at 1595-96 (2nd ed. 1912).

The Ground Water Users assume that the quantity element of decreed water rights is not reflective of present needs, or is "bloated" (i.e. in excess of the quantity needed) or at a minimum always represents a quantity which provides for the highest degree of flexibility in order to allow for the most water intensive use within the scope of the purpose of use. The argument oversimplifies what takes place in the SRBA. Water rights are claimed based on permits and licenses, prior decrees in both private and general adjudications), beneficial use, posted notice, and adverse possession, mesne deed conveyances, splits of property and appurtenant rights etc. As a result, the quantity claimed for one water right may include excessive water for a particular purpose while for another water right the quantity may provide for little or no flexibility. Therefore the amount of excess water, if any, or the degree of flexibility built into the quantity element of partial decree issued in the SRBA could be in actuality "all over the map."

The Director's recommendation as to quantity, whether or not an in-depth field investigation was conducted in preparing the recommendation, is by no means the final word on the matter. The quantity recommendation is subject to objections by the claimant and any other party to the adjudication. If such an objection is made it may be litigated and determined by the Court. Issues such as waste (i.e. reasonableness of conveyance works), duty of water, partial forfeiture, and excessive conveyance loss can and have been litigated in the SRBA whether or not they were considered in the Director's recommendation. If the Director makes a recommendation based on a prior license where the delivery system that has since changed (i.e. gravity to sprinkler), third parties can object and assert partial forfeiture of any quantity no longer put to beneficial use. Accordingly, the degree to which the quantity element is scrutinized varies among the decrees issued in the SRBA. Nonetheless, parties were provided the opportunity to raise and litigate issues affecting quantity. Consequently, the partial decree issued in the SRBA is consistent with Idaho law and represents a quantitative determination of beneficial use.

The result is that the issues litigated and evidence presented in support of the quantity element in the adjudication can be exactly the same as the issues presented and the evidence relied upon in conjunction with the delivery call. As such, depending on the

particular case, the argument that the issues are distinguishable because the issue in the adjudication is historical maximum beneficial use and in a delivery call only present need is at issue may be a difference in label only.

III. CONCLUSION

In sum, the application of a clear and convincing standard to the determination that a senior can get by with less water than decreed is consistent with the established presumptions and standards of proof. The standard reconciles giving the proper presumptive weight to the quantity decreed while at the same time allowing the Director to take into account such considerations as post-decree factors and in particular waste under the CMR. The standard avoids putting the senior right holder in the position of re-defending or re-litigating that which was already established in the adjudication. It avoids the risk that an erroneous determination will leave the senior short of water to which he was otherwise entitled, thereby promoting certainty and stability of water rights. The standard provides for effective timely administration by reducing contests to the sufficiency of the Director's findings. The Director's determination in an organized water district will be difficult to challenge by either the senior or junior sought to be enjoined. The alternative is a system which lacks certainty in water rights. For these reasons the Court affirms its prior decision on this issue and **denies** the *Petitions for Rehearing*.

DATED: November 2, 2010

ERIC J. WILDMAN
DISTRICT JUDGE

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the 2nd day of November, 2010, she caused a true and correct copy of the foregoing MEMORANDUM DECISION AND ORDER ON PETITIONS FOR REHEARING on the persons listed below by mailing in the United States mail, first class, thereto to the parties at the indicated address:

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Santos Garza, Deputy Clerk

EXHIBIT H

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION OF	)	
WATER TO WATER RIGHT NOS. 36-02551	)	Docket No.
AND 36-07694	)	CM-DC-2011-004
	)	
(RANGEN, INC.)	)	
	)	

DEPOSITION OF FRANK ERWIN

SEPTEMBER 13, 2012

REPORTED BY:

JEFF LaMAR, C.S.R. No. 640

Notary Public

other words, the water's running through them, but there's no screens in them. So I know there's no production going on there.

Q. When you have to deal with Rangen, who is your primary contact over there?

A. I'm going to say the majority of the time it's Wayne Courtney.

Q. Okay. Have you ever met a fellow by the name of Dan Maxwell?

A. Yes, uh-huh.

Q. Okay. Now, I know you mentioned that you went out there and saw them measuring some water.

Was that Dan that you were with?

A. I've watched Dan do it, and I've watched Lonny do it, both.

Q. When you were with Dan, did you take issue with how he took the measurements?

A. I -- I have no issues with it. I had to agree with him a couple of times that he was a little more accurate at reading the staff gauge than I was.

Q. Is there anything that you've ever asked Dan to do differently in terms of how he measures the water?

A. No.

Q. How about Lonny, have you ever watched him

measure the water?

A. I believe I did one time, uh-huh.

Q. And did you have any issue with how Lonny did it?

A. No.

Q. And you said that you get annual water reporting from Rangen; is that right?

A. Yes, uh-huh.

Q. And is that Lonny that gives it to you or Dan?

A. I can't remember now. I think it comes from the office in Buhl, I believe. I'm not exactly sure. I get -- to give you an idea, there's 54 main reporting stations here in the district. And I can't remember exactly for sure where theirs originates. But I believe it comes out of the office in Buhl, but I'm not sure. Or it could come from a local here at Hagerman too. I don't know. I'd have to go back and look on the report, because I don't know off the top of my head.

Q. Have you ever had any issue with those annual reports that Rangen has provided?

A. No, I haven't.

Q. As the watermaster, do you have the authority to reject those measurements if you don't

EXHIBIT I

May 26, 1993

Keith Higginson, Director
Idaho Department of Water Resources
Statehouse Mail
Boise ID 83720

Dear Mr. Higginson:

Calls have been made for the delivery of water rights to Roger Crandlemire, Walter Candy and Rangen Co. from the Curran Tunnel. These are decreed rights under the New International Mortgage Bank v. Idaho Power Company decision.

The water supplied to the Curran Tunnel dropped rapidly in April. The depletion is occurring from water taken from underground flows prior to the water reaching the Curran Tunnel. The Director's Report noted under General Provisions, Paragraph 5 that the Snake River Aquifer is hydrologically interconnected to the waters in the Hagerman Basin.

The Curran Tunnel water users have pointed out that the junior appropriators of the underground water must be shut down until their prior decreed water is delivered to the Curran Tunnel for their diversion.

The users of underground water, including the Snake River Aquifer, are outside District 36A. Therefore, I am making a demand on the Department of Water Resources to deliver water to the Curran Tunnel. The law requires you to deliver water in accordance with rights of prior appropriation.

All three parties are suffering damage to their crops and business as a direct result of the insufficient delivery of water. Water must be delivered immediately.

Very truly yours,

Geo P Lemmon

GEORGE LEMMON
Watermaster, District 36A

admits that the ultimate source of Petitioners' water is the Snake Plain Aquifer. IDWR admits that the immediate source of Petitioners' irrigation water is tributary to the Snake River and hydrologically interconnected to the Snake Plain Aquifer. IDWR admits that some ground water diversions from the Snake Plain Aquifer reduce the quantity of water at the Martin-Curren Tunnel during the irrigation season. IDWR has insufficient knowledge to form an opinion as to when Petitioners need water and insufficient knowledge regarding the interrelationship between rights using the Martin Curren Tunnel flows and other rights diverting from the aquifer to form an opinion as to when Petitioners have the right to said water diverted by other ground water diversions under Idaho law, and therefore denies the same. Except as expressly admitted or denied above, IDWR denies paragraph 9.

1.11 Answering paragraph 10 IDWR has insufficient knowledge to admit or deny the allegations in paragraph 10 and therefore denies the same.

1.12 Answering paragraph 11 IDWR admits that the exchange of correspondence shown as Exhibits A, B, C, D took place on the dates described, and that true and correct copies of that correspondence is attached to the Complaint and speaks for itself. Except as expressly admitted above IDWR denies paragraph 11.

1.13 Answering paragraph 12, IDWR denies paragraph 12.

1.14 Answering paragraph 13, IDWR denies paragraph 13.

1.15 Answering paragraph 14, IDWR denies paragraph 14.

right to have junior water rights regulated by the Director pursuant to I.C. § 42-602 and mandate is improper.

2.5 Petitioners have not exhausted their administrative remedies pursuant to I.C. §§ 42-237e and 42-1701A(3). Petitioners have never requested a hearing from IDWR and have not responded to the Notice and Order of Contested Case entered July 6, 1993.

2.6 Petitioners' Complaint does not request that IDWR perform a specific and recognizable duty but, instead, is an improper request for issuance of a mandate to IDWR to perform its duties generally.

2.7 Petitioners have an adequate remedy at law. Petitioners can sue ground water users for damages or for an injunction if those water users are improperly taking water to which Petitioners are entitled.

2.8 Petitioners' Complaint requests different relief than that demanded in Exhibits A and D to the Complaint. The relief requested in Exhibits A and D was for the "full and immediate" regulation of junior priority water rights, which the Director refused to do. Petitioners' request for a writ of mandate requests that the Director simply fulfill his statutory duty under I.C. § 42-602. IDWR has not refused Petitioners' demand as set forth in the Complaint.

2.9 Many uncertainties regarding both the relationship between Petitioners water rights and ground water rights in the Snake Plain Aquifer and the rights themselves exist which must be ultimately resolved in the Snake River Basin Adjudication and

EXHIBIT J

Hydrology, Water Right and Groundwater Modeling Evaluation Of Rangen Delivery Call

By

Charles M. Brendecke, PhD, PE

AMEC Environment & Infrastructure

For

Racine, Olson, Nye, Budge and Bailey, Chartered
Boise Idaho

December 21, 2012

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1.0 INTRODUCTION

1.1 Objectives

The objective of this report is to review the hydrology, water rights and groundwater modeling of the Eastern Snake Plain Aquifer (ESPA) in the vicinity of the Rangen, Inc., (Rangen) aquaculture facility, as they relate to the delivery call placed by Rangen on December 13, 2011. That delivery call requests the curtailment of all groundwater rights within the domain of the Enhanced Snake Plain Aquifer Model (ESPAM) that are junior to July 13, 1962. The primary study area of focus of this report is shown on Figure 1.1.

1.2 Organization of Report

This report is organized into 6 sections, beginning with this Introduction and Summary of Conclusions. Section 2 presents an overview of hydrology and water development in the area of the Rangen facility. Section 3 provides a detailed description of the Rangen facility itself and the water rights pertinent to it. Section 4 describes development and calibration of the ESPAM Version 2.1 (ESPAM2.1) by the Idaho Department of Water Resources (IDWR). Section 5 describes analysis of the effects of curtailment of junior groundwater rights using ESPAM2.1 and its predecessor, ESPAM2.0. Section 6 presents an analysis of curtailment effects using a modified version of ESPAM2.1 that more closely reflects hydrogeologic conditions near Rangen.

A related discussion of hydrogeology of the Rangen area is presented in Hinckley (2012).

1.3 Summary of Conclusions

Based on the analyses and evaluations I carried out in preparing this report, I conclude that:

1. The Martin-Curren Tunnel is a distinct source of water separate from natural springs that also supply Rangen.
2. The July 13, 1962, Rangen water right that is the basis of the delivery call (36-2551) is sourced at the Martin-Curren Tunnel.
3. The April 12, 1977, water right (36-7694) held by Rangen is sourced at the Martin-Curren Tunnel.
4. The Martin-Curren Tunnel is an artificial excavation that was constructed to access groundwater for irrigation purposes.
5. The Martin-Curren Tunnel meets the physical definition of a well contained in Idaho Code 42-230(b).
6. Neither observed nor estimated flows from the Martin-Curren Tunnel have ever been high enough to provide water in-priority to the 1977 water right (36-7694) held by Rangen.
7. Observed flows of Billingsley Creek reported by Rangen have not been high enough to provide any water to Rangen's 1977 water right (36-7694) since October of 1976, a date which precedes the priority of the water right.
8. Inspection of Rangen facilities and diversions by the Department of Water Resources concluded, among other things, that water right 36-7694 "should not have been issued."

9. Water right 36-7694 has never been able to divert and beneficially use water in priority.
10. Neither observed nor estimated flows from the Martin-Curren Tunnel have ever been high enough to deliver the maximum rate of diversion authorized under water right 36-2551.
11. Rangen's measurement of water flows through its property underestimates actual flows by 10-12%
12. It is feasible for Rangen to make more efficient use of available flows by delivering water from Billingsley Creek to its small raceways.
13. As a result of incidental recharge from surface water irrigation, spring flows in the Milner to King Hill reach are currently 25 percent greater than natural, pre-development flows.
14. Much of the change in spring discharge in the Milner to King Hill reach since 1960 can be attributed to reduction in incidental recharge from surface water irrigation due to changes intended to reduce waste.
15. Neither ESPAM 2.1 nor its predecessors is capable of separating the effects of groundwater pumping on flows from the Martin-Curren Tunnel from the effects of groundwater pumping on flows from other springs in the Rangen complex. .
16. The predictive uncertainty analysis of ESPAM2 and ESPAM2.1 carried out by the IDWR explores only a limited aspect of model uncertainty and does not quantify overall model uncertainty.
17. Fundamental to overall model uncertainty is the uncertainty associated with the conceptual model reflected in ESPAM2.1. The predictive uncertainty analysis relies on a single conceptual model and does not explore the uncertainty that arises from improper conceptualization of local geologic and hydraulic conditions that influence discharge of specific spring complexes, such as those at Rangen.
18. Alternative conceptual models can be developed that better reflect hydro-geologic conditions near Rangen and which produce substantially different effects of curtailment than does ESPAM2.1.
19. That ESPAM2.1 can fairly closely mimic the observed past behavior of a spring complex is not proof that it represents hydrogeologic reality sufficiently to predict accurately future behaviour of that complex, especially under aquifer water use conditions (e.g., curtailment of junior groundwater pumping) that are radically different from those extant in the model calibration period.
20. The ESPAM2.1 is not sufficiently detailed in either its general formulation or its representation of hydrogeologic conditions at Rangen, to be used reliably to predict changes in flow available to water right 36-2551 due to curtailment of junior groundwater rights on the ESPA.
21. ESPAM2.1 represents the details of the Rangen spring complex and the surrounding geology in highly simplified form, omitting several key features and that would make significant differences in predicted benefits of curtailment.
22. Using ESPAM2 and ESPAM2.1, less than 3 % of the curtailed groundwater rights junior to Rangen's 1962 priority, under the 10% trimline, would accrue to the Rangen complex; the rest would accrue to other connected river reaches, springs and baseflows, including those on which there are no water rights or diversions, those on which there are no delivery calls, those on which

approved mitigation plans are already in place, and those on which diversions occur under water rights junior to those of the curtailed rights.

23. An even smaller amount of the curtailed water use described in conclusion (23) above would accrue to the Martin-Curren Tunnel.
24. Using ESPAM2, less than 1% of the curtailed groundwater rights junior to Rangen's 1962 priority over the entire model domain, such as requested by Rangen, would accrue to the Rangen complex, the rest accruing to other connected river reaches, springs and baseflows, including those on which there are no water rights or diversions, those on which there are no delivery calls, those on which approved mitigation plans are already in place, and those on which diversions occur under water rights junior to those of the curtailed rights.
25. Because the model domain, irrigated lands and water rights are the same in ESPAM2.1 as in ESPAM2, conclusion (25) above would also apply to results from ESPAM2.1.
26. An even smaller amount of the curtailed water rights described in conclusion (25) above would accrue to the Martin-Curren Tunnel.
27. Alternative calibrated models that better reflect hydro-geologic conditions near Rangen show that curtailment of groundwater rights, within the 10% trimline and junior to Rangen's 1962 right, would produce only half, and possibly as little as 5%, of the benefit to Rangen predicted by ESPAM2.1.
28. Analysis using ESPAM2.1 shows that implementation of Rangen's request for widespread curtailment will, by any reasonable standard, result in waste of the water resource.
29. If the Director uses ESPAM2.1 to quantify the benefits to water right 36-2551 from curtailment of junior groundwater uses, this quantification should reflect the substantial uncertainty of that benefit that derives from use of a regional model to predict discharge from a particular spring outlet at the edge of the aquifer system. Due to this uncertainty, any curtailment based on ESPAM2.1 should be limited to junior-priority rights for which ESPAM2.1 predicts a significant benefit to Rangen. In my opinion, to recognize uncertainty and prevent unreasonable waste, application of ESPAM2.1 should at a minimum restrict curtailment to junior rights for which ESPAM2.1 predicts at least 10% of the curtailed water will accrue to Rangen.
30. Even use of a 10% trimline results in waste of the water resource because the vast majority of that foregone use would not accrue to the benefit of Rangen.
31. Use of trimlines smaller than 10% increases the relative waste of the water resource.

Hydrology and Water Development

32. Spring discharge is closely related to incidental recharge from surface water irrigation within the service area of the North Side Canal Company.
33. The sensitivity of spring discharge to incidental recharge is likely increased near the edges of the aquifer system near the Hagerman Rim and Rangen.
34. The Winter Water Savings Program of the North Side Canal Company alone may have reduced incidental discharge to the ESPA above the Thousand Springs reach by roughly 150,000 acre-feet per year beginning in 1961.

35. Conversion of irrigated lands from flood and furrow irrigation to sprinkler irrigation has significantly reduced incidental recharge.
36. Sprinkler usage under the North Side Canal Company grew from zero percent of the service area in 1982 to 100% of the service area by 2008.
37. Approximately 24,000 linear feet of lateral off the W-canal in the area west of Wendell, in proximity to Rangen, have been lined or placed in pipe since the 1990s, primarily to reduce excessive seepage losses, which are incidental recharge.
38. All of the foregoing reductions in incidental discharge are reductions in waste of water.
39. Prior to development of irrigation under the North Side Canal Company natural flow from springs in the Milner to King Hill reach was estimated to be about 4,000 cfs. Spring flows reached a peak at about 7,000 cfs in the early 1950s and have declined since that time. The average annual discharge for the 10-year period ending in 2011 is about 5,000 cfs, which is still above the natural (predevelopment) levels
40. When significant surface water irrigation began in the NSCC area the seasonal variability of spring discharges increased in addition to the magnitude of average annual flows. Prior to development, the pronounced seasonal pattern of spring flows that currently exists did not appear to exist.
41. Reductions in total annual spring discharge are also related to drought episodes.

Rangen Water Use

42. Discharges from the Curren Tunnel are divided between Rangen pipelines, three irrigation diversions, and spills to Billingsley Creek from the Rangen Box.
43. The North Snake Groundwater District has been providing mitigation supplies to the irrigation water users through the Sandy Pipeline since 2003. This pipeline is believed to have nearly eliminated irrigation diversions from the Curren Tunnel outlet.
44. Flows in Billingsley Creek are divertible by gravity to Rangen's large raceways but not to the hatch house, upper (small) raceways, or culinary use, all of which are presently supplied only by pipelines from the Tunnel.
45. Spills from the Rangen Box may remain in Billingsley Creek and bypass the Rangen facilities under some circumstances.
46. It is feasible to pump water from Billingsley Creek to Rangen's small raceways from the same point where Rangen diverts water into the large raceways. This would increase the efficiency of use of Rangen's existing physical supplies by making the total discharge of the Rangen complex available to all of Rangen's raceways.

ESPAM2.1 Model

47. Observations of ESPA geology suggest it is highly complex, comprised of overlapping fractured basalts interspersed with sedimentary formations, with hydraulic characteristics that can vary substantially over short distances.

48. ESPAM2.1 is, like all models, a simplified representation of reality, and this leads to model uncertainty.
49. ESPAM2.1 is comprised of cells that are one mile square.
50. Within each ESPAM2.1 grid cell, aquifer characteristics are assumed to be homogenous and isotropic.
51. This assumption of homogeneity means that hydrologic and geologic details of a scale smaller than the cell cannot be explicitly represented in the model.
52. Considerable amounts of pertinent input data are not known at even the one-square mile level of spatial resolution of the ESPAM2.1 grid.
53. ESPAM2.1 is comprised of a single layer of cells of uniform thickness.
54. ESPAM2.1 assumes constant thickness throughout the model domain and constant transmissivity within each cell. These assumptions may result in substantial misrepresentation of flow conditions in some parts of the aquifer, such as the Hagerman rim, where thinning occurs and preferential flow pathways become more restricted.
55. The discharges at Rangen are represented in ESPAM2.1 as a single drain.
56. This single-drain representation does not allow ESPAM2.1 to distinguish flows emanating from the Curren Tunnel from flows emanating from natural springs in the Rangen complex.
57. The generalizations and simplifications in ESPAM2.1 can introduce significant error into model results, particularly for highly localized conditions such as those governing discharge from specific outlets of a specific spring complex.
58. ESPAM2.1 has a large number of cells and each cell has a large number of adjustable parameters, so the total number of adjustable parameters in the ESPAM2.1 model is large.
59. The large number of parameters reflected in ESPAM2.1 increases the likelihood that the model is not unique.
60. ESPAM2.1 simulates conditions that are not physically possible and conditions that are in direct opposition to observed conditions in the real system. These discrepancies reveal serious model misrepresentation of detailed aquifer behaviour in the Rangen area, and raise doubt as to the accuracy of model predictions there.
61. Many of the conceptual aspects of ESPAM2.1 fail to reflect observed characteristics of the aquifer system in the Rangen area. These failures lead to conceptual uncertainty in the ESPAM2.1.
62. Each of the input data types used in ESPAM2.1 carries its own uncertainties that can stem from, among other things, the inability to measure a condition accurately (or at all) and from the spatial or temporal resolution of measurements.

ESPAM2.1 Calibration

63. Calibration uncertainty reflects the fact that many combinations of model parameter values may lead to equally well-calibrated models.

64. The ESPAM2.1 was calibrated under the assumption that aquifer transmissivity in any given cell is constant over the calibration period. This assumption has not been validated, and there are many locations and situations in the model domain and over the model calibration period where it is probably not true.
65. ESPAM2.1 was calibrated using an automated approach implemented in a computer program called PEST.
66. ESPAM2.1 systematically under-estimates discharge at the Rangen spring in the early years of the calibration period while over-estimating it in the later years.
67. ESPAM2.1 systematically under-predicts the water level at the closest well to Rangen that was used for calibration by 20 feet. ESPAM2.1 also consistently under-predicts the water level in another nearby well.
68. The under-prediction of water levels near Rangen is partly a result of the fact that discharge targets were weighted more heavily than water level targets in the calibration process.
69. Because predicted water levels are too low, PEST increased the drain conductance to values higher than are suggested by observation, thereby embodying in ESPAM2.1 a mischaracterization of the real physical relationship between water levels and flows at Rangen.
70. This mischaracterization results in over-sensitivity of the change in drain flow to a simulated change in water level due to curtailment. This over-sensitivity is carried into the superposition model used for curtailment, with the result that changes in spring flows are over-predicted by nearly a factor of 4.
71. The calibrated drain conductances in ESPAM2.1 range over 4 orders of magnitude. This extremely large variation suggests that the set of calibrated parameters is quite fragile and that PEST can readily find alternative parameter sets that provide acceptable calibrations.
72. ESPAM2.1 differs from ESPAM2 in the correction of an error that arose in the calculation of the water budget in the Mud Lake area and overestimated aquifer recharge by approximately 89,000 acre-feet/year in that area of the model domain. This represents a change of less than one percent in the overall water balance for the ESPA.
73. Correction of this error required re-calibration of the model, so a new set of model parameters, including drain conductances were developed. These are the parameters used in ESPAM2.1.
74. The drain conductances in ESPAM2.1 differ from those used in ESPAM2 by more than the 1% change in water budget associated with the correction. The conductance for the Rangen drain decreased by about 4%, but some drain conductances in the area changed by nearly 1000%. Some cell transmissivities in the area near Rangen changed by more than 100%.
75. These changes in conductance and transmissivity are carried directly into the superposition models used to calculate the flow changes resulting from curtailment.
76. The area encompassed by the 5% trimline is substantially larger with ESPAM2.1 compared to ESPAM2, and this expansion is mainly in areas on the opposite side of the Malad Gorge from Rangen, which are hydrogeologically disconnected from the Rangen spring.

77. Large changes in calibrated parameter values and model results suggest that ESPAM2 and ESPAM2.1 may be over-parameterized, and that other comparable calibration solutions easily can be reached with only minor perturbations in model assumptions.

Estimation of Benefits from Curtailment

78. ESPAM2.1 represents the Rangen spring as a drain and the flow in that drain as a linear function of water level in the cell that contains the drain.

79. Application of ESPAM2.1 to estimate changes in spring flow due to curtailment employs the method of superposition.

80. The principle of superposition relies on the assumption that the system being modeled and the model behaves in a completely linear way.

81. If the system being simulated or the model exhibits important non-linear behaviours, a superposition model can introduce significant error into the analysis of effects of stress changes.

82. Analysis of observed water levels and Range spring flows by Hinckley demonstrates that the relationship of Rangen flow to water levels in nearby wells is not linear.

83. The structure of the aquifer and conditions in the aquifer along the Hagerman Rim in the region of Rangen indicate that the behaviour of the aquifer in that region is not linear.

84. The large number of parameters reflected in ESPAM2.1 increases the likelihood that the model is not linear.

85. There are a total of 406 groundwater irrigated acres relying on rights junior to Rangen's 1962 priority within the 10% trimline, using 1,445 acre-feet of groundwater. At steady state, curtailment of pumping on these lands would cause total modeled flow at the Rangen springs to increase by 0.19 cfs (141 af/y assuming year around flow). Not all of this increase would accrue to the Martin-Curren Tunnel, but the ESPAM2.1 model does not represent flows in the tunnel. It would take somewhat less than a year for discharge to reach 90% of this modeled steady state increase.

86. There are a total of 565,023 groundwater irrigated acres within the model domain relying on rights junior to Rangen's1962 priority, using 1.46 million acre-feet (MAF) of groundwater. At steady state, ESPAM2 predicts that curtailment of pumping on these lands would cause modeled discharge at Rangen to increase by 18.07 cfs. It would take approximately 16 years for modeled discharge to reach 90% of this steady state increase.

87. Because the model domain, irrigated lands and water rights are the same in ESPAM2.1 as in ESPAM2, conclusion (86) above would also be expected to apply to results from ESPAM2.1.

2.0 WATER DEVELOPMENT AND USE ON THE EASTERN SNAKE PLAIN

2.1 Hydrology

The Snake River flows along the southern edge of the Eastern Snake River Plain (ESRP), a broad arcuate plain that covers an area of approximately 10,000 square miles in southeastern Idaho. As shown on Figure 2.1, the two main branches of the Snake River are the South Fork, which primarily drains the eastern side of the Teton mountain range, and the Henry's Fork, which primarily drains the western side of the Teton Range and joins the South Fork near Idaho Falls. Several smaller tributaries enter the Snake River from the south, the largest being Willow Creek and the Blackfoot, Portneuf and Raft rivers. With few exceptions, tributaries from the mountains to the north of the plain flow out onto the plain and recharge the underlying aquifer. Because of its porous surface, there are no significant surface water features on the plain itself.

At Milner Dam, northeast of Twin Falls, the Snake River drops into a canyon making gravity diversion of river flows impossible; large irrigation canals at Milner seasonally divert all but a small amount of the river flow. The canals diverting from the Snake River at Milner Dam, as well as others diverting from the lower Big and Little Wood Rivers, deliver large amounts of irrigation water to lands in Jerome, Gooding and Lincoln Counties above the north rim of the river canyon. The Snake River itself is largely restored by the time it reaches King Hill due to spring discharges from the north wall of the Snake River canyon and tributary streams such as Rock Creek, Salmon Falls Creek and the Malad River.

The ESRP is underlain by a vast basalt aquifer system, the Eastern Snake Plain Aquifer (ESPA), formed when intermittent lava flows filled ancestral valleys and canyons of the Snake River (Stearns and Crandall, 1938). In the central part of the ESPA, these and other formations extend to a depth of more than 3,000 feet (Whitehead, 1992). The total volume of water stored in the ESPA has been estimated to be as high as 1 billion acre-feet (IDEQ, 2006).

The agriculturally productive areas of the Plain occur in sedimentary and aeolian deposits overlying the most recent (Quaternary) basalts, which outcrop in numerous places. The porous and fractured basalt formations in the upper part of the ESPA can store and transmit large amounts of water and have been developed as a groundwater resource. Lindholm (1996) estimated that the upper 500 feet of the aquifer may contain 200-300 million acre-feet, an amount approximately 50 times greater than the combined surface water storage above King Hill.

Between Milner Dam and King Hill are numerous springs that emerge from the north side of the canyon and flow to the river. In some cases there are very well-defined outlets for these springs while in other cases they discharge through talus slopes and the actual outlets in the canyon wall can't be seen. There are also some springs that emerge in the river itself. This reach of the river is often referred to as the Thousand Springs Reach, though there is also an individual spring complex named Thousand Springs. A few of the larger spring complexes along the north wall of the canyon are at Crystal Springs, Clear Lakes, Box Canyon, Thousand Springs, Billingsley Creek and the Malad Gorge.

Figure 2.2 shows the annual average water budget for the period 1981-2008 used in development of the ESPAM2.1. Note that this is not a water budget for the ESPA, as it includes surface water supplies that are consumed directly without entering the aquifer. Based on Figure 2.1, average recharge to the aquifer system from precipitation on non-irrigated lands, from tributary underflow, and from non-Snake River seepage is 2.46 million acre-feet (MAF). This relatively small component of overall aquifer recharge is still greater than the total groundwater consumption simulated in curtailment to 1870 (Sukow, 2012) indicating that groundwater use remains less than the reasonably anticipated rate of future natural recharge.

2.2 North Side Canal Company

Early irrigation development on the ESRP was concentrated in the upper portions of the basin, above Blackfoot. Irrigation development in the lower portion of the plain began in 1877 with appropriations from the lower Big and Little Wood Rivers north of Wendell and Shoshone. By 1900, surface water rights totalling more than 900 cfs had begun operating to irrigate lands above the Malad Gorge (at their confluence, the Big and Little Wood Rivers become the Malad River).

Diversions from the Snake River onto the western ESPA began in 1905 with the development of the Twin Falls Project. Small diversions by the Twin Falls North Side Land & Water Company (predecessor to the North Side Canal Company) began in 1908. Diversions quickly grew from 250 thousand acre-feet (KAF) in 1909 to 1.2 million acre-feet (MAF) in 1912 (USGS, 1956). Considerable water was diverted in the first decade of canal operation to fill the Jerome Reservoir, but that project was abandoned in 1918 after it became clear that seepage losses from the reservoir would prevent it ever being filled (Crandall, 1923; USGS, 1956). North Side Canal Company (NSCC) diversions at Milner Dam have averaged about 986,000 af/y over the last 10 years. Present acreage served by the NSCC is reported to be 154,067 acres. Figure 2.3 shows the present service area and main canals and laterals of the NSCC.

For the first half of the 20th century, the NSCC diverted water in the winter as well as during the irrigation season. This was done primarily to provide domestic and stock water to small towns and farms. There is no significant crop water demand in the winter, so considerable amounts of the winter diversions undoubtedly recharged the ESPA in Jerome and Gooding Counties or were spilled over the canyon rim at the ends of laterals.

As part of its Regional Aquifer System Analysis (RASA) study, the USGS estimated that by 1952 more than 24 MAF of water had been added to the aquifer by incidental recharge from surface water irrigation (Kjelstrom, 1995). The importance of incidental recharge resulting from seepage losses from surface irrigation systems is evident in Figure 2.4a, b which is reproduced from the RASA study. Figure 2.4a shows the close correlation between incidental recharge and spring discharges in the Milner to King Hill reach of the river. The pattern of incidental recharge is clearly superimposed on a longer term increasing trend of spring discharge from 1912 to the mid-1950s, and is very closely related to the declining trend in spring discharge since the mid-1950s. Figure 2.4b shows the estimated change in ground water storage from this incidental recharge.

Figures 2.5 and 2.6 are from another RASA report (Goodell, 1988). Figure 2.5 shows the early 20th century increase in water levels in three observation wells, the locations of which are shown on Figure 2.6. Water levels in observation well 8S-17E-19BBB1 reflect water levels in the aquifer beneath the area irrigated by the North Side Canal Company. It can be seen that the aquifer water level in this area rose by approximately 45 feet between 1900 and 1950 as the result of incidental recharge from surface water irrigation.

Winter diversions all but ended in about 1960 as the Company participated in the Winter Water Savings Program, which sought to stop 435,000 af of "wasteful non-irrigation season diversions" and redirect this water to storage in Palisades and American Falls Reservoirs (USBR, 1946). The Palisades Winter Water Savings agreements went into operation in 1961 and generally required participating canal companies to cease diversions in the months of November through March. Figure 2.7 is derived from records of the USGS and the IDWR and shows the historical November through March diversions of the NSCC. The onset of the Winter Water Savings Program is clearly evident in this diversion record. Based on Figure 2.7, the Winter Water Savings of the North Side Canal Company alone may have reduced incidental recharge to the ESPA above the Thousand Springs reach by roughly 150,000 acre-feet per year (207 cfs).

Prior to the 1950s, flood and furrow irrigation was the primary method of water application on the ESRP. Kjelstrom (1995) notes that by the 1970s about 20 percent of surface water irrigation distribution systems had converted from gravity application methods to sprinkler application methods and that this conversion had reduced deep percolation to the aquifer. In 1981 the University of Idaho published (Hamilton, et al., 1981) the results of a survey of the responses of irrigators to the severe drought of 1977. Table 2.1 is reproduced from the Hamilton report. It shows that many irrigators on the ESRP had installed sprinkler systems, had added gated pipe, and had lined ditches as a result of the 1977 drought.

Information provided to the IDWR by the North Side Canal Company in connection with the 2005 delivery call of the Surface Water Coalition shows that in 2004 sprinklers were the primary method of water application on 88 percent of the North Side service area. Documentation for the current groundwater model of the Eastern Snake Plain Aquifer (ESPAM2.1) reflect a growth in sprinkler usage under the NSCC from 0% of the service area in 1982 to 100% by 2008. This has undoubtedly further reduced aquifer recharge in the area of the springs.

Figure 2.8 shows the portion of the NSCC service area generally between the town of Wendell and the head of Billingsley Creek. The irrigation laterals shown in this area are part of the W-lateral system. Lateral W-40 extends nearly to the head of Billingsley Creek, ultimately reaching a spill point on the canyon rim immediately to the north of the Rangen aquaculture facility. Recent data (Sullivan, 2012) show that flows into the lower portion of the W-lateral system, have declined about 20,000 af/y since the late 1980s. Interviews of NSCC personnel (Wertz, pers. comm., 2012) revealed that approximately 24,000 linear feet of laterals off the W-Canal in the area west of Wendell have been lined or placed in pipe since the 1990s, primarily to reduce excessive seepage losses.

The spill point at the end of W-40 was visited in June, 2012, and did not show evidence of current use. As with other canal companies in the area, the NSCC has been attempting in recent years to consolidate and reduce spills to the river for water quality management purposes. The primary spill point for the W-Canal system is now into the Malad Gorge just downstream of the State Park.

2.3 Springs in the Milner to King Hill Reach

As mentioned previously, between Milner Dam and King Hill the Snake River flows in a deep canyon. There are numerous springs discharging from the walls of this canyon, the majority of them being on the north side in an area known as the Thousand Springs reach, including an individual spring complex named Thousand Springs. In some cases there are very well-defined outlets for these springs while in other cases they discharge through talus slopes and the actual outlets in the canyon wall can't be seen. There are also some springs that emerge in the river itself. Figure 2.9 shows the locations of major spring complexes in the Milner to King Hill reach.

The earliest records of spring discharge measurements in this reach of the river date back to 1902. In the spring of that year the U.S. Department of Agriculture and the U.S. Geological Survey (USGS) separately made measurements on several of the springs in this reach of the river. These and other early measurements are summarized in Nace, et al., (1958). J.D. Stannard, the investigator for the Department of Agriculture estimated the total discharge of springs on both sides of the river between a point 3 miles above Twin Falls and a point 10 miles below the Malad River (roughly the entire Milner to King Hill reach) to be 3,833 cfs. These 1902 measurements were made before irrigation development under the North Side Canal system, though not before irrigation diversions began from the lower Wood River to supply lands north of Wendell and Shoshone. Kjelstrom (1995) estimated that the pre-irrigation (pre-1880) discharge of springs between Milner and King Hill averaged about 3.0 maf, or 4,140 cfs. Mundorff, et.al. (1964) estimated the natural discharge from the aquifer in the Thousand Springs Reach to be 4,000 cfs, and possibly less.

When significant surface water irrigation began in the North Side Canal area spring discharges changed, increasing in seasonal variability and in overall magnitude. Meinzer (1927) prepared an inventory and description of large springs in the United States, including the springs in the reach of the Snake River between Milner Dam and King Hill. Figure 2.10, reproduced from the Meinzer report, illustrates the close relationship he found between the combined spring discharges at the Blue Lakes and Clear Lakes spring complexes and the quantity of irrigation water applied to the Eastern Snake River Plain above the springs via the North Side Canal Company. Figure 2.10 shows that the monthly rise and fall pattern of North Side Canal diversion is followed, in a slightly delayed fashion, by a similar monthly pattern in spring discharge. Canal diversions were substantially smaller in 1919 (shortly after the Jerome Reservoir project was abandoned) than they were in the preceding two years, and the subsequent rise in spring discharge is also substantially smaller. A comparison of the two 1902 observations of flow at Blue Lakes given in Nace, one in April and one in August, showed almost equal flow rates. So the seasonal spring discharge pattern evident in the period 1917-1920 didn't appear to exist in 1902 at Blue Lakes and Clear Lakes, prior to major irrigation development above the springs. This emphasizes the importance of localized patterns of incidental recharge to flows of specific springs.

The IDWR prepares estimates of the annual spring discharge to the Thousand Springs Reach based on a method originally developed by Kjelstrom (1995b) and documented in USGS Water-Resources Investigation Report 95-4055. Figure 2.11 is a plot of the discharge estimates prepared by the IDWR for the period 1902-2011. The average of the annual discharge values for the 10-year period from 1902-1911 is 4,207 cfs. The average annual discharge for the 10-year period ending in 2011 is 5,019 cfs.

Also shown on Figure 2.11 is the annual value of the Palmer Drought Severity Index (PDSI) for NOAA Climate Zone 7 (NOAA Earth System Research Laboratory Physical Sciences Division 2012). The PDSI is a commonly used water supply index that incorporates precipitation, temperature, runoff and soil moisture conditions. Greater positive values of the PDSI reflect increasingly cooler and wetter conditions; greater negative values reflect increasingly warmer and drier conditions. A relationship can be seen in Figure 2.11 between drought episodes and reductions in total estimated spring discharge to the Milner to King Hill reach.

From the foregoing, it can be concluded that pre-development springs flows in the Thousand Springs Reach were probably not greater than 4100 cfs; that flows peaked in the early 1950s at approximately 6900 cfs primarily as a result of surface water irrigation development; and that flows have declined to current levels as a result of changes in surface water irrigation practices, drought and groundwater development. However, spring discharge between Milner and King Hill remains above natural (predevelopment) levels.

2.4 Groundwater Development

With the exception of shallow wells constructed in the Mud Lake area in the 1920s, ground water development of the ESPA did not begin in earnest until the late 1940s. The first project relying heavily on ground water supplies was the Minidoka North Side Pumping Division of the Minidoka Project (now the A&B Irrigation District) which began operation in 1948. While the majority of the subsequent permits were for irrigation of new lands, many were for supplemental irrigation of lands already irrigated with surface water supplies. In addition, the benefits of sprinkler irrigation have led to the conversion of some formerly surface-water irrigated lands to ground water use. Ground water development began to level off in the 1980s and a moratorium on new irrigation well development has been in place since 1992.

Farms in the Wendell area were initially supplied with irrigation water by the NSCC (Sullivan, 2012). Conversion of irrigated lands from surface to groundwater sources and development of new groundwater-supplied lands in the area began in the 1950s. Figure 2.12 shows the growth in groundwater permits in the area from 1948 until 1992, when a moratorium on further groundwater irrigation permitting went into effect. Notable increases in permitting occurred in 1960-61, just prior to Rangen's application for water right 36-2551, and in 1973-76, just prior to Rangen's application for water right 36-7469. Figure 2.13 shows the current Points of Diversion for groundwater rights in the area between Wendell and the head of Billingsley Creek; these points are color-coded to show their priorities relative to July 13, 1962.

Sullivan estimates that there were approximately 25,000 acres of irrigated land under the W Canal in 1953 and about 30,500 acres in 2009. In 1953 there was little or no groundwater irrigation under the W Canal. By 2009 roughly 10,000 of the formerly surface-water irrigated acres were supplied in whole or in part with groundwater and about 9,300 acres of new acreage was being served by groundwater (about 3,500 acres of surface water irrigation had been retired). Given the 1992 moratorium on new groundwater irrigation, it is reasonable to assume that nearly all of this groundwater use was actually in place by 1992.

Figure 2.14 shows observed groundwater levels in two wells in the area between Wendell and Rangen. Records of groundwater levels are less complete as one goes back in time, so the wells shown in Figure 2.14 do not illuminate aquifer conditions in earlier periods. It can be seen from Figure 2.14 that that seasonal fluctuations in water levels are about 5 feet in this area, with lows generally occurring in the months of March (well 992) and July (well 989). Annually, water levels have declined somewhat since 1985, with levels appearing more stable in the last 10 years. These declines are likely due to changes in surface water irrigation practices, including spill management, lining or piping of laterals, and conversions from surface to groundwater use, to drought, and to that increment of groundwater pumping brought online since 1985.

3.0 RANGEN SPRINGS DEVELOPMENT AND USE

3.1 Billingsley Creek Overview

Billingsley Creek enters the Snake River northwest of the town of Hagerman, just upstream from Lower Salmon Falls Dam. The creek is fed by a series of springs emanating from the Quaternary basalts forming the canyon rim in western Gooding County. Figure 3.1 is an aerial photo of the area showing the creek and the locations of selected spring discharge points. Figure 3.2 shows the measured flows of Billingsley Creek at the USGS gaging station (13134600) at the Highway 30 bridge just north of Hagerman. Records at this station are not continuous, and spring and creek flows are diverted both above and below the station for aquaculture, irrigation and other uses.

The Martin-Curren (aka Curran, Kearn) Tunnel and Rangen aquaculture facility are located at the upper end of Billingsley Creek. Figure 3.3 is an aerial photo of the Rangen facility showing key features of the area that will be referred to later in this section. Flows from the Tunnel and from other spring outlets and seeps in the Rangen area form the headwaters of Billingsley Creek.

The Rangen facility was constructed in 1962, apparently expanding on an earlier, smaller aquaculture operation purchased by Rangen in May of that year (Twin Falls Times-News, December 30, 1962). The facility was launched as a research center focused on trout diseases and diet, and on hatchery management problems.

The primary physical sources of water used at the Rangen facility are the Martin-Curren Tunnel and natural springs, most of which emerge from the talus slope about 45 feet in elevation below the tunnel portal (Farmer, 2009). Water from the Tunnel is divided between Rangen pipelines and three irrigation diversions. The natural springs all discharge to Billingsley Creek. Flows in Billingsley Creek are divertible by gravity to Rangen's large raceways but not to the hatch house, upper raceways, or culinary use, all of which are presently supplied only by pipelines from the Tunnel. Inspection of the Rangen facilities by IDWR personnel in 2003 concluded that some spring inflow to Billingsley Creek also occurs below the diversion for the large raceways (Berkey, 2003a).

3.2 Water Rights

Water rights for flows in the headwaters of Billingsley Creek in the area of the Rangen facility are listed in Table 3.1. The earliest rights date to 1884 and are for irrigation and domestic use.

The earliest right for fish propagation is Rangen's 1957 priority for 1.46 cubic feet per second (cfs). This may have been the primary water right for Rangen's predecessor. The present delivery call seeks administration of groundwater rights junior to Rangen's 1962 priority (36-2551), which is sourced by the Snake River Basin Adjudication (SRBA) Court at the Martin-Curren Tunnel.

The irrigation rights of Candy, Morris and Musser are also sourced at the Martin-Curren Tunnel. These diversions provide water to irrigate parcels south of Billingsley Creek. The water rights for these diversions are senior to the Rangen rights, dating to as early as 1884. Because the irrigation diversions are consumptive with respect to Billingsley Creek, they reduce the water supply available to Rangen from the Tunnel.

In 2003, anticipating that groundwater users might in the future be required to mitigate declines in Tunnel and spring flows, the North Snake Groundwater District (NSGWD) voluntarily constructed a pipeline (the "Sandy Pipeline") from ponds in Section 5 of T8S, R14E (the "Sandy Ponds") to the Curren Ditch. The pipeline was constructed so that it could also supply irrigation water to Candy, Morris and Musser, thereby reducing or eliminating those irrigation diversions at the Tunnel and increasing the Tunnel supply available for Rangen. This pipeline is in operation and is believed to have nearly eliminated irrigation diversions from the Tunnel outlet.

The Curren Ditch diverts from the creek below the Rangen facility under irrigation rights that are also senior to the Rangen aquaculture rights. However, since Rangen's aquaculture use is non-consumptive, the Curren Ditch does not call for bypass of Rangen's more junior aquaculture rights.

Groundwater development on the plain above the Curren Tunnel began in the early 1950's. Figure 2.12 showed the evolution of groundwater rights in the area east of Billingsley Creek. The earliest groundwater rights in the immediate area date to 1952. Notable increases in permitted acreage occurred in 1959-61 and in 1973-76, just prior to Rangen's applications for water rights 36-2551 and 36-7694. By the time of Rangen's 1962 water right, about 3900 acres had been permitted. At the time of Rangen's 1977 water right, about 8300 acres had been permitted. By 1992, when the moratorium on new groundwater irrigation went into effect, permits for about 10,000 acres had been issued.

3.3 Curren Tunnel Development

The Curren Tunnel is excavated into the canyon rim above the Rangen facility. It extends roughly 100-300 ft into the basalt forming the rim (Tate deposition testimony, 2012), at a depth roughly 70 feet below the ground surface above the rim (Hinckley, 2012). The tunnel is bifurcated some distance into the cliff into north and east forks. Water flows out of the Tunnel by gravity.

It appears that the Tunnel excavation had at least commenced by October of 1884 (New International Mortgage, 1932) with the aim to deliver irrigation water via a ditch (i.e., by gravity) to lands on the bench area south of Rangen. A feature article in the December 30, 1962, Twin Falls Times-News describes the source of Rangen's supply as "man-made springs on the north side of the canyon" where "early pioneers in search of irrigation water drilled a hole into the cliff and struck water." USGS Water Supply Paper 1463 (Nace, et.al., 1958) contains a Billingsley Creek flow observation made in April, 1902, with remarks that "Water emerges from a tunnel dug into brecciated, highly permeable basalt, and from the talus slope below the tunnel..." The 1932 decree from New International Mortgage Bank v Idaho Power Company, et.al., an adjudication of

water rights in Billingsley and Riley Creeks, grants 1884 priority rights to water "...developed and diverted...by means of a tunnel commonly known as the Curran Tunnel...".

According to Idaho Code 42-230(b) a "well" is defined as "an artificial excavation or opening in the ground more than eighteen (18) feet in vertical depth below land surface by which groundwater of any temperature is sought or obtained." Based on the foregoing descriptions of its development, the Curren Tunnel appears to meet this definition.

About the first 50 feet of the Tunnel is lined with large diameter corrugated steel pipe; beyond this the tunnel is unlined. It is not known when the corrugated steel lining was installed. A 6" diameter PVC pipe is laid along the bottom of the steel pipe, extending beyond it into the unlined portion to the bifurcation. This PVC pipe carries water for laboratory, culinary and landscape irrigation use at the Rangen facility. Based on a diagram produced by Rangen (RANGEN001907), it is believed that this PVC pipe was installed in 1976.

The PVC pipe does not carry all the water emerging from the Tunnel. The remainder of tunnel discharge is collected in a concrete division box (the "Farmers box") at the mouth of the tunnel, shown in Figure 3.4. The Candy, Morris and Musser pipelines deliver water from this division box to parcels south of the Rangen facility; the elevation of the Tunnel outlet allows this irrigation delivery to operate by gravity.

Two Rangen pipelines also take water from the Farmers box and water can spill from the box. The two Rangen pipelines flow into another concrete box, the "Rangen box" shown in Figure 3.5, which is further down the slope toward the Rangen facility. There they enter the pipeline serving the hatch house and research facility. Spills from the Rangen box, as well as flows from other spring outlets, flow into Billingsley Creek and can be diverted into Rangen's large raceways.

There are other spring outlets in the vicinity that also supply water to the Rangen facility. The largest of these emerges about 45 ft below the Curren Tunnel and flows to Billingsley Creek. Based on recent discharge records, discussed in more detail below, these "lower" springs produce roughly twice the flow of the Tunnel.

3.4 Discharge Records

The earliest record of discharge from springs in the Rangen area is contained in Nace (1958). Table 27 in that report shows a Billingsley Creek flow of 54.3 cfs in April, 1902, at a location where Road E2900S (aka Hagerman Highway) crosses Billingsley Creek. This observation post-dates the excavation of the Tunnel, and potentially includes discharges from other springs in the area. Other than a few subsequent measurements in the general vicinity, systematic recording of spring discharge in the area did not begin until the Rangen facility was operating.

The only measurement of discharge specifically from the Curren Tunnel was in the period between 1993 and 2009 when the IDWR operated a sonic measuring device inside the tunnel. This measured the portion of tunnel flow not conveyed in the 6" PVC pipe installed in the tunnel

by Rangen. All other historical measurements of spring discharge are derived from measurements made by Rangen at locations within the hatchery or on Billingsley Creek.

Flow measurement within the Rangen facility relies primarily on recording the depth of water flowing over the check dams in the "large" and "CTR" raceways, and depth of water flowing over the "lodge dam" in Billingsley Creek shown in Figure 3.6. Flow depth is apparently measured by a metal ruler placed on the crest of the dams as shown in Figure 3.7 (Exhibit 7a from Rangen 1st Request; Yenter, 2003). It appears that the flow from the CTR raceways reflects flow through the Rangen hatchery and, when combined with discharge over the lodge dam and diversions for irrigation, gives the total discharge of the spring complex.

Along with most other spring users, Rangen began submitting diversion records to the IDWR in 1995. In late 2003, responding to a request from IDWR Director Karl Dreher, Rangen submitted monthly flow records covering the period 1966-2003. These data, and the measurement methods used by Rangen, were subsequently reviewed by IDWR technical staff (Yenter, 2003; Berkey, 2003, 2003a). This review included field inspection of measurement sites and methods, and verification of various estimates used by Rangen in its flow summarization. The inspection concluded, among other things, that the flow record reflected total spring complex discharge rather than Rangen diversions and found that Rangen's flow measurement methods could underestimate the total discharge by 10-12%.

Figure 3.8 shows the IDWR records of total discharge from the Rangen complex, as well as observed flows from the Curren Tunnel and IDWR records for flow in the 6" PVC pipe from the Tunnel. Seasonal variability of flow is plainly evident as are longer term wet and dry spells. In the period of overlap between total flow and Tunnel flow records, it appears the Tunnel flow is the greater source of this seasonal variability. This is to be expected as the Tunnel penetrates the aquifer at a higher elevation than that of the natural springs. In his May 19, 2005, Order, former Director Dreher found decreases in the springs supplying the Rangen hatchery facilities to be correlated with repairs made to the facilities of the North Side Canal Company to reduce losses of surface water to ground water from the canal company's facilities above those springs in 1987, 1998, and 2000 (Order, FF 23). The 1992 moratorium on new irrigation wells suggests that decreases in discharge after the mid-1990's are not the result of groundwater pumping.

Figure 3.9 shows a regression analysis of total Rangen flow against observed Curren Tunnel flow. It can be seen that the relative contribution of the Tunnel is somewhat greater at higher total flow; this is to be expected from the relative elevations of the Tunnel and the natural springs that contribute to the total flow. At lower flow levels, the Tunnel may represent as little as 20% of the total Rangen flow. Over the last 10 years, the Tunnel discharge has represented roughly one-third of the total Rangen flow.

The regression shown in Figure 3.9 was used to generate estimates of Curren Tunnel flow for the entire period of record for Rangen total flow. The results of this procedure are shown on Figure 3.10, which plots both the monthly total Rangen flow and the monthly Curren Tunnel flow for the period 1966 through 2012. Also shown on Figure 3.10 are the cumulative water rights sourced at the Martin-Curren Tunnel by the Snake River Basin Adjudication (SRBA). The cumulative rights

at the Tunnel were 61.29 cfs prior to Rangen's April, 1977, appropriation. With that appropriation, cumulative rights at the Tunnel rose to 87.29 cfs.

It can be seen from Figure 3.10 that the flows from the Martin-Curren Tunnel have never been high enough to fully satisfy Rangen's 1962 priority (36-2551) and have never been high enough to provide any water to Rangen's 1977 priority (36-7694). Accordingly, it can be concluded that water was not available to water right 36-7694 at the time of its appropriation nor at any later time.

In his May 19, 2005, Order former Director Dreher found that the Department of Water Resources erred in licensing water right 36-7694 and should not have recommended it in the SRBA, because water was not available to it either at the time of its appropriation or subsequently (Order, FF 62, 63, 72). The foregoing analysis of Rangen discharge records shown in Figure 3.10 supports this conclusion.

Director Dreher also found that curtailment of water rights junior to July 13, 1962 (Rangen water right 36-2551) would "not at any time result in a meaningful increase in the quantity of water discharging from springs in the Thousand Springs to Malad Gorge reach of the Snake River, which includes the Curran Springs from which Rangen diverts surface water." (Order, FF 84). In its disclosure of June 12, 2012, the Department produced modeling results, apparently related to this finding, showing an analysis by Allan Wylie with a conclusion that Rangen could "at best expect" an increase of 0.22 cfs from curtailment.

A decomposition and back-casting of the historical monthly total discharge of the Rangen spring complex was also undertaken by Brannon (2009) apparently in anticipation of its use as a target for groundwater model calibration. This decomposition relied on Rangen measurements dating back to 1966. Figure 3.11 shows the results of this effort. Documentation of this work has not been provided by Rangen, though notes in the spreadsheet file submitted by Brannon to the IDWR allude to such documentation (Rangen Water History for IDWR.xls). Inspection of this decomposition supports the preceding conclusions that there has never been water available to water right 36-7694 since its time of appropriation.

While flows diverted from the Martin-Curren Tunnel can be delivered through the small raceways and reused in the large raceways, spring flows emerging below the Tunnel cannot. Based on a reconnaissance-level analysis (Coleman, 2012), it is feasible to pump water from Billingsley Creek to the small raceways from the same point where the diversion to the large raceways is made. This would increase the efficiency of use of Rangen's existing physical supplies by making the total discharge of the Rangen complex available to all of Rangen's raceways.

4.0 MODEL DEVELOPMENT

4.1 Background

The Enhanced Snake Plain Aquifer Model (ESPAM) is the current incarnation of numerical modeling of the Eastern Snake Plain Aquifer (ESPA) that began in 1974 (deSonneville, 1974). The ESPAM was created with review and input from the Eastern Snake Hydrologic Modeling Committee (ESHMC). The ESHMC is comprised of professionals working on water issues on the eastern Snake River Plain. Regular members include agency representatives (Idaho Department of Water Resources, U.S. Bureau of Reclamation, U.S. Geological Survey, U.S. Fish and Wildlife Service), industry representatives (Idaho Power), researchers (University of Idaho, Idaho Water Resources Research Institute) and private consultants representing various water user interests. While a diversity of interests are represented on the ESHMC, the committee is constituted by request and invitation and not through election or appointment on the basis of population, water right amounts, irrigated acreage, or other such factors. Committee decisions are generally reached by consensus, though this is not always possible to achieve.

Actual development of ESPAM was carried out by the IDWR and the Idaho Water Resources Research Institute (IWRRI). Model design, construction and calibration were reviewed and in some instances redirected by the ESHMC.

From the outset of the ESPAM modeling effort, it was recognized that there would be a need for future enhancements to the model as new information and modeling approaches became available. ESPAM Version 1.0 (ESPAM1.0) was released in 2004, followed shortly by ESPAM1.1 which corrected an input data error. Discussions regarding the scope of future enhancements to ESPAM1.1 began shortly after its release (e.g., Brendecke, 2009a). ESPAM2.0 was released in the summer of 2012; correction of an input data error has recently resulted in the distribution of ESPAM2.1.

4.2 Model Structure

4.2.1 Overview

Like its predecessors, the ESPAM2.1 is developed in MODFLOW, a groundwater modeling environment developed by the U.S. Geological Survey (McDonald and Harbaugh, 1988; 2000). In MODFLOW, aquifers are represented as a collection of rectilinear elements or "cells". The MODFLOW code solves the equations of flow between these cells to determine how the aquifer will respond to changes in inputs or outputs. Figure 4.1 shows the grid of model cells used for ESPAM2.1.

Within each cell, aquifer characteristics (e.g., porosity, hydraulic conductivity) are assumed to be homogenous (the same throughout the cell) and isotropic (allowing flow to occur in all directions with equal ease) as would be the case if the cell were filled with clean sand of uniform grain size. This assumption of homogeneity means that hydrologic and geologic details of a scale smaller

than the cell cannot be explicitly represented in the model. MODFLOW has the capability to represent anisotropy (where flow occurs in preferential directions), but this feature has not been used in any versions of the ESPAM.

A MODFLOW model may be comprised of one or more vertical layers of cells. Multiple layers are typically used when there is more than one geologic layer that is meaningful to groundwater flow patterns. The thickness of cells in model layers can vary to reflect changes in thickness of subsurface formations, such as the thinning of water bearing formations that often occurs at the edges of aquifers.

Boundary conditions must be defined to characterize the patterns of flow into and out of the model domain, and MODFLOW provides a variety of special cell types for this purpose. River cells are used to represent subsurface flow between river reaches and the aquifer. Drain cells are used to represent aquifer discharge through springs. Constant flux cells are used to represent fixed amounts and patterns of subsurface flow into the aquifer from tributary valleys. Other special-purpose cells serve other functions.

Most of the cells in a MODFLOW model are general purpose cells. It is in these model cells that aquifer recharge from precipitation and irrigation, and aquifer withdrawals by pumping and evapotranspiration, among other things, are represented. To carry out a groundwater flow simulation, it is first necessary to develop a water budget of aquifer inflows and outflows at each model cell and to develop, through calibration, estimates of parameters representing the aquifer characteristics at each cell.

4.2.2 General Structure of ESPAM2.1

Like its predecessors, the ESPAM2.1 is comprised of cells that are one mile square. This means that features having dimensions smaller than one mile cannot be explicitly represented in the model. However, considerable amounts of pertinent input data are not known at even this one-square mile level of spatial resolution. For example, subsurface geology on the ESPA is known with certainty only at outcrops or at locations where drilling logs are available. Crop distribution information on the ESPA is available only at a county level from annual agricultural statistics based on self-reported data. Detailed water distribution to lands within canal companies can be quite variable as shares are transferred between users; even if this information were readily available it is difficult to embody in model inputs. As a result of these latter data limitations, crop distributions in ESPAM2.1 are assumed to be uniform county-wide, and surface water distribution is assumed to be uniform across every parcel of served land within groups of canal companies.

The resolution of input data may not present a problem when doing a regional-scale analysis because local errors, if random, may effectively cancel each other in the larger context. However, the questions presented in the present delivery call are quite localized in nature and this "error cancelling" cannot simply be assumed to occur. Hinckley (2012) has illustrated some of the discrepancies that exist between the coarse simplifications of ESPAM2.1 and the details of Rangen-area hydrogeology.

Like its predecessors, ESPAM2.1 is comprised of a single layer of cells of uniform thickness. This means that substantial aquifer thinning, such as occurs in the Hagerman-Wendell, Burley-Pocatello, and Rigby Fan-Mud Lake areas (Whitehead, 1992), is not represented in the model. This is important because aquifer transmissivity (T) is a linear function of the hydraulic conductivity of the aquifer material (K) and the aquifer saturated thickness (b), as shown in the following equation:

$T = Kb$

As the aquifer material (in this case the Quaternary basalt) thins, the transmissivity is reduced and resistance to groundwater flow increases. Saturated thickness is also reduced by drawdown of the water table, e.g., by pumping or by spring discharge, resulting in a non-linear relationship between water level and flow. The ESPAM2.1 assumes constant transmissivity throughout the model domain. This assumption is made largely for reasons of computational convenience, as will be discussed later in this report, but may result in substantial misrepresentation of flow conditions in some parts of the aquifer, such as the Hagerman rim, where thinning occurs and preferential flow pathways become more restricted.

Like its predecessors, the ESPAM2.1 represents springs using special-purpose drain cells. As shown in Figure 4.2, discharge from a drain cell is a function of the difference in head (Δh) between the computed water level in the cell and the assumed elevation of the drain outlet, and a conductance parameter (C) that effectively acts as a throttle on the rate of discharge. The conductance parameter can be expressed in units of cubic feet per second (cfs) per foot of head difference. While it is a calibrated value in ESPAM2.1 (calibration is discussed in a later section), under certain conditions it can be estimated from field observations.

Like its predecessors, the ESPAM2.1 uses data from a variety of sources to represent the water budgets of the aquifer and of individual model cells. These data include precipitation, surface water diversions, subsurface inflows from tributary basins, stream gage records, county surveys of crop distributions, estimates of evapo-transpiration (ET), methods of irrigation water application, and assumptions about irrigation canal seepage, among others. With few exceptions, the data sources used in the ESPAM2.1 are the same as those used in its predecessors.

From the foregoing, it can be seen that the ESPAM2.1 should not be viewed as a new model of the ESPA but as a relatively modest refinement of earlier versions of ESPAM. It has the same conceptual formulation as its predecessors and relies on the same data sources as its predecessors. Its spatial resolution is the same as that of its predecessors. Like its predecessors it "...is a regional-scale model ... best applied for regional-scale predictions." (IDWR, 2012).

4.2.3 Key Differences between ESPAM2.1 and Its Predecessors

The ESPAM2.1 utilizes a longer study period (1980-2008) than did ESPAM1.1 (1980-2002). The addition of six years to the study period means that more input data are used in the ESPAM2.1,

though the basic data sources used remain the same in both models. The ESPAM2.1 utilizes monthly stress periods where ESPAM1.1 used semi-annual stress periods; the increased number of stress periods also increased the amount of input data used in ESPAM2.1, since each formerly semi-annual data value was replaced with 6 monthly values. In some cases (e.g., precipitation, canal diversions) this allowed more accurate temporal representation of water budget terms, while in others (e.g., tributary underflow) it required further disaggregation of data for which only annual estimates are available.

Surface water conveyance and application efficiency are represented in more detail in the ESPAM2.1 than in ESPAM1.1. A greater number of leaky canals were explicitly represented in ESPAM2.1 (primarily in eastern portions of the plain), though canal seepage losses are still considered to be constant throughout the model study period. Farm irrigation efficiency is assumed to increase somewhat in water-short years in ESPAM2.1 through an "On-Farm Algorithm" that operates on model input data. Irrigated acreage is slightly higher in ESPAM2.1 due primarily to the use of better image processing methods than were used for ESPAM1.1 (Sukow, 2012).

The ESPAM2.1 is calibrated to a larger number of spring complexes in the Milner-King Hill reach of the Snake River than was ESPAM1.1. This stems largely from efforts to develop more complete data sets of spring discharges than were available for ESPAM1.1. In large part, these data sets are based on diversion and flow measurements reported by spring users, with extrapolation to fill missing data. The data sets were then used as targets for calibration of drain cells representing those spring complexes. Some spring complexes in ESPAM2.1 are represented by using two drains within the same model cell; in general, this was done to encompass the range of observed outlet elevations of springs falling within the cell, but in some cases the springs so represented may have little hydro-geologic relation to one another. Figure 4.3 shows the distribution of drain cells used to represent springs in the ESPAM2.1.

The more comprehensive representation of spring complexes in ESPAM2.1 necessitated the use of General Head Boundary (GHB) cells to represent observed river gains that were not accounted for in spring discharge data (Wylie, 2012 memo). These unaccounted for flows were implicit in ESPAM1.1 spring discharges. GHB cells work in a fashion similar to drain cells in that their discharge is a function of head difference and a calibrated conductance parameter. Figure 4.3 also shows the distribution of these GHB cells, some of which occur in cells already containing drains representing springs.

4.3 Rangen Area Representation in ESPAM2.1

While all the refinements made in ESPAM2.1 have some effect on simulated flows and impacts at the Rangen springs, two refinements bear directly on them. The first of these is the use of the Rangen springs as a specific calibration target in ESPAM2.1. Figure 4.4 shows a close-up of the ESPAM2.1 model grid in the area of the Rangen complex. In ESPAM1.1, flows at the Rangen springs were estimated as a percentage of overall spring discharge to the Thousand Springs - Malad subreach (the cells that comprised this reach are highlighted on Figure 4.4). In ESPAM2.1, historical diversions and Billingsley Creek flow measurements reported to the IDWR

by Rangen were used to derive estimates of monthly total discharge that were used as a calibration target. The discharges at Rangen are represented in ESPAM2.1 as a single drain, though discharges actually occur at multiple outlets. This single drain representation does not allow ESPAM2.1 to distinguish flows emanating from the Curren Tunnel from flows emanating from natural springs in the Rangen complex.

The second ESPAM2.1 refinement of particular consequence in the Rangen area is the elimination of the Hagerman Valley from the model domain. This was done at the recommendation of geologist Dennis Ralston, who studied the area and reported to the ESHMC that the Tertiary formations underlying the Valley were not connected to the ESPA (Ralston, 2008)[1]. As a result, the canyon rim became the westernmost extent of the model domain in the Hagerman area in ESPAM2.1. Figure 4.5 shows the changes in the model domain made with ESPAM2.1, highlighting the change in the Rangen area.

Later, after comparing the historical discharges of springs used for calibration targets with reach gains computed from river gages, it was discovered that the observed reach gains substantially exceeded, by roughly 25%, the sum of spring discharges used as calibration targets (Wylie, 2011; 2012 memo). To remedy this discrepancy, GHBs were defined through several reaches to account for the undocumented gains, or "baseflows." This at least partially undid the change in model domain, as the baseflows from the ESPA are now assumed to pass through Ralston's "unconnected formations" to reach the Snake River. As will be discussed later, this results in simulation of unrealistic groundwater flow patterns in the Rangen area.

4.4 Model Calibration Process

4.4.1 General Approach

After conceptual formulation and data development, the next step in groundwater model development is calibration. Calibration is a form of "history matching" wherein initial values of model parameters (such as transmissivity) are adjusted to achieve a better correspondence between historical targets (e.g., measured water levels and spring flows) and model-predictions. Ordinary least-squares regression may be the most familiar example of this process; in it, the parameters of the regression equation (slope, intercept) are adjusted to minimize the sum of the squared differences between the regression line and the data observations. In this context, the groundwater model can be viewed conceptually as a regression equation.

Because of the many parameters that must be adjusted (several for each model cell), groundwater model calibration is often done using special software programs that solve this "inverse problem", so called because its aim is to use observed behaviors to specify the model rather than to use the model to describe the behaviors. The software program used to calibrate

[1] In his mapping of the geohydrologic framework of the Eastern Snake River Plain, Whitehead (1992) also excluded the Hagerman Valley from the Quaternary basalt aquifer system.

all versions of ESPAM has been the model-independent Parameter ESTimation program (PEST) developed by John Doherty (Watermark, 2005).

To find the "best" solution to the inverse problem, PEST seeks to minimize an objective function that reflects the overall sum of squared differences (or "residuals") between historical aquifer observations, or "calibration targets", and model predictions. The ultimate goal of calibration is to determine the set of parameter values that produce the smallest overall value of this objective function. Historical calibration targets included observed aquifer water levels, reach gains and spring discharges over the period 1980-2008, though not all targets had continuous data over this period. While PEST produces quantitative measures of calibration success, it is ultimately a matter of judgement for the modeller to decide that a given calibration is "good enough" for the purpose at hand.

The objective function used in model calibration effectively aggregates, using weighting and indexing assumptions, all the residuals in the model calibration data set down to a single number. The weighting assumptions used in ESPAM2.1 calibration were based on judgement. Because the objective function is a single number, it is normal for PEST to identify a parameter set that provides a closer calibration to some targets than to others. As the desired use of the model focuses on ever more detailed locations and time periods, it becomes more and more important to examine calibration success in specific areas of the model.

While the calibration of models with large numbers of parameters (such as ESPAM2.1) allows consideration of more factors affecting aquifer conditions, it increases the risk that any given PEST solution (i.e., an "optimal" set of parameter values) is not unique (Watermark, 2005). This means that there may be many other combinations of parameter values could produce a similarly minimized value of overall model error. This non-uniqueness creates one dimension of overall model uncertainty, which is discussed in more detail in a later section.

4.4.2 Calibration of ESPAM2.1

The parameters that PEST was allowed to adjust in ESPAM2.1 included conventional aquifer parameters such as transmissivity, specific yield, and streambed, drain and GHB conductances. In addition, PEST was allowed to manipulate a number of terms in the aquifer water budget where precise values could not be known. For example, PEST was allowed to adjust tributary inflow estimates and surface water irrigation efficiency assumptions, among other things. Given the large number of active cells in the model and the many aquifer water budget terms considered at each cell, the number of adjustable parameters in ESPAM2.1 calibration is large.

Doherty (Watermark, 2005) cautions that "...increased parameterisation normally results in increased parameter non-uniqueness at the same time as any semblance of model linearity rapidly fades from view." As will be discussed later in this report, the assumption of linearity is fundamental to both IDWR and Rangen efforts to quantify the flow changes resulting from curtailment. The large number of parameters reflected in ESPAM2.1 increases the likelihood that the model is not linear.

Reach gain and spring discharge targets were given greater weight in the calibration of ESPAM2.1 due to the fact that there were a far greater number of calibration target values for aquifer water levels than there were for these discharges. Without preferential weighting, PEST would try to match all targets with similar accuracy, by default placing more emphasis on aquifer water level targets. The weighting applied to targets essentially determines the degree to which PEST "focuses" its effort on minimizing error in certain types of model behavior. PEST provides guidelines for such weighting, but it ultimately becomes a decision made by the modeller.

The ESPAM2.1 was calibrated under the assumption that aquifer transmissivity in any given cell is constant over the calibration period. This assumption is computationally convenient in part because it avoids iterative recalculation of transmissivity as simulated water levels change, but it can lead to overestimation of transmissivity in some areas of the model domain (Johnson, et.al., 2010). A common rule of thumb in determining whether this assumption is justified is that simulated changes in water level should not be greater than 10% of overall saturated thickness (Reilly, et al, 1987). Areas where this condition is most likely not to be met are those where the aquifer is thinnest, such as at its edges, as is the case in the present delivery call. Hinckley (2012) estimates that the saturated thickness of the ESPA in the vicinity of Rangen is on the order of 50 feet. Water level changes in wells near Rangen are on the order of 5 feet, making the assumption of constant transmissivity (and the convenient assumption of linearity that it allows) questionable. Compounding this is the fact that fractures and heterogeneities of a scale much smaller than one mile likely dominate flow hydraulics at the thin edges of the aquifer.

4.5 Calibration Results

Calibration success can be assessed in several ways besides the final objective function value produced by PEST, which is not by itself informative. The most commonly used methods for assessing calibration are visual and mathematical comparisons of simulated values and their corresponding targets. It is also useful to examine simulated and observed flow regimes to assess whether model performance reflects general observations and geological constraints that might not be represented explicitly.

4.5.1 Comparison with Calibration Targets in Rangen Area

Figure 4.6 shows the calibrated and target discharge for the Rangen spring complex from the ESPAM2.1 final calibration, along with other representations of calibration fit. In general, the broader patterns of observed discharge are reflected in the modeled values; multi-year cycles and trends are apparent in both, as are seasonal variations. However, the ESPAM2.1 systematically under-estimates discharge in the early years of the calibration period while over-estimating it in the later years.

This systematic error is more apparent by the analysis of residuals that is also shown in Figure 4.6. This analysis shows the error in monthly simulation relative to mean discharge. If simulation errors are random, this plot of residuals should vary randomly about the zero line over time. In fact, Figure 4.6 shows that that ESPAM2.1 consistently under-predicts (by as much as 15 cfs) the total flows from the Rangen complex in the early part of the calibration period and consistently

over-predicts (by as much as 15 cfs) these flows in the more recent part of the period. Since similar patterns are evident at other target springs in the area it raises the prospect of a more general problem with ESPAM2.1 representation of springs in the Hagerman area and suggests that curtailment analyses, which look forward from present conditions, may over-predict increases in spring discharge from curtailment.

Figure 4.7 shows a comparison between simulated and target water levels in calibration well #989 (7S14E29CDC1). There is no calibration well in the Rangen cell, but well #989 is in the model cell immediately northeast from the Rangen cell and is the closest well used in calibration. The simulated water level in this well is systematically more than 20 feet lower than observed level. Also shown on Figure 4.7 is a comparison between simulated and observed water levels in well 7S14E33BBB1. This well was identified as calibration well #992, but for unknown reasons was not included in the target calibration data set. Figure 4.7 shows that ESPAM2.1 also underpredicts the water level in this well.

In 2008 the IDWR completed a monitoring well (7S14E32SENW, aka the "Rangen Monitor Well") on the plain just above the Curren Tunnel (Farmer, 2009). Observations from this well could not be used in ESPAM2.1 calibration because measurements did not begin until the very end of the model calibration period. Nevertheless, the range of observed values reasonably can be compared to simulated water levels in the Rangen cell for the last few years of the calibration period. This comparison is shown in Figure 4.8. It can be seen that ESPAM2.1 predicts recent water levels in the Rangen cell that are substantially lower than what has been observed in the Rangen Monitor Well.

The underprediction of water levels near Rangen is partly a result of the fact that discharge targets were weighted more heavily than water level targets in the calibration process. If predicted water levels were too low, PEST could still meet the more important discharge target by increasing the drain conductance. This is problematic because it embodies, in the drain conductance parameter, a mischaracterization of the real physical relationship between water levels and flows at Rangen. This, in turn, results in mischaracterization of change in drain flow as a result of simulated change in water level due to curtailment. If the calibrated drain conductance parameter is too high, the benefits to Rangen from curtailment will be over-stated.

That the Rangen discharge calibration is as good as it is despite the underprediction of surrounding water levels illustrates another important modeling concept...that good calibration is not necessarily evidence of correct physical representation (Bredehoeft, 2005).

Table 4.1 lists the ESPAM2.1 drain parameters determined by PEST for target springs in the Billingsley Creek area. Drain elevation assumptions were generally chosen to reflect actual elevations, or a range of actual elevations where multiple drains were used. PEST was allowed to adjust drain conductances as needed to match spring discharge targets using simulated water levels. As can be seen in Table 4.1, the calibrated conductances range over 4 orders of magnitude. This extremely large variation suggests that the set of calibrated parameters is quite fragile and that PEST can readily find alternative parameter sets that provide acceptable calibrations.

4.5.2 Comparison to Observed Conditions in Rangen Area

The ESPAM2.1 posits a strictly linear relationship between water level in the Rangen cell and discharge from the Rangen drain. The ESPAM2.1 drain conductance has a calibrated value of 4.85 cfs/foot, meaning that a one foot increase in water level in the Rangen cell will result in a 4.85 cfs increase in drain discharge. The only water level observations close enough to Rangen to be considered within the Rangen cell are those from the Rangen Monitor Well. Hinckley (2012) demonstrates that Curren Tunnel discharge is not the simple linear function of nearby water level represented in ESPAM2.1, a fact that appears also to be acknowledged by Rangen experts (Brannon, 2009). If this relationship is in fact non-linear, the principle of superposition cannot be used to reliably determine the effects of curtailment on Rangen flows.

Even if a linear relationship were to be derived from Hinckley fig 19, it suggests that a one foot increase in nearby water level would cause a discharge increase of 1.37 cfs rather than the 4.85 cfs embodied in ESPAM2.1. In this case the ESPAM2.1 overstates the benefit from curtailment by nearly a factor of 4.

Observed water level in the Rangen monitor well varies over a range from about elevation 3151 ft to 3166 ft (msl). Farmer (2009) estimated the elevation of the outlet of the Curren Tunnel to be 3145 ft (msl) and the elevation of the lower springs to be about 3100 ft (msl). This suggests that the saturated thickness of the aquifer above the Tunnel outlet is not greater than 6-21 feet and that the saturated thickness of the aquifer above the lower springs is in the range of 50-65 feet. Water levels in the monitor well vary seasonally by about 5 feet, and predicted (by ESPAM2.1) water level change in the Rangen cell from curtailment is about 4 feet. These changes are nearly 100% of the saturated thickness above the Tunnel and about 10% of the thickness above the lower springs, further indicating that the requirements for superposition are not met at Rangen.

Hinckley (2012) has shown that for a given water level in the Rangen Monitor well, the discharge from the Curren Tunnel can vary by 4 cfs. In other words, with *no difference* in observed water level, observed discharge varies by 100% of its average value over the observation period. Similarly, Hinckley has shown that a given level of Rangen discharge can be associated with water levels that vary over a 2.5-foot range. This casts further doubt on the accuracy with which ESPAM2.1 can predict the benefit to Rangen from curtailment.

Figure 4.9 shows the ESPAM2.1 change in calibrated values of aquifer transmissivity in the vicinity of Rangen. Notable on this figure is the fact that transmissivities increase in magnitude closer to the canyon rim above Rangen. This is the opposite of what would be expected as the aquifer thins out and saturated thickness decreases. Some of this is undoubtedly a result of the higher weighting placed on discharge targets than on water level targets, but Johnson (2011) suggests it may be a result of calibration using the assumption of constant transmissivity. It is likely that fracture or conduit flow, more than porous media flow, dominates hydraulic behavior near springs in the rim area. These other flow paradigms are not reflected in any of the MODFLOW constructs used in ESPAM2.1.

Farmer (2009) describes a geological discontinuity in the vicinity of Rangen where the Quaternary basalt forming the main aquifer effectively ends at the canyon rim. The Quaternary basalt below the rim immediately west of Rangen is postulated to have flowed down a "ramp" from the southeast. Because of this discontinuity, groundwater entering this lower basalt flow has to come from the southeast rather than directly through the Rangen area. However, in ESPAM2.1 there is a simulated groundwater flow of 320 cfs across this discontinuity from the Rangen cell into the cell containing Tucker and Stewart Springs. As a result of this high flux, simulated water level in the Tucker/Stewart cell is very high (above actual ground surface) and causes a simulated groundwater gradient sloping to the south. Hinckley (2012) points out that the observed groundwater gradient in this area is in the opposite direction from that simulated by ESPAM2.1. These discrepancies reveal serious model misrepresentation of detailed aquifer behaviour in the Rangen area, and raise doubt as to the accuracy of model predictions there.

4.5.3 Comparison of ESPAM2.1 with Previous Versions of ESPAM

ESPAM1.1 and ESPAM2.0

The IDWR carried out a comparison of ESPAM1.1 and ESPAM2.0 performance (Sukow, 2012a) using the paradigm of the generic curtailment scenarios originally run by IWRRI for ESPAM1.1 (Contor, et al, 2004). This comparison utilized a steady-state version of the primary input file (the .wel file) in both the ESPAM1.1 and ESPAM2.0 and simulated the curtailment to 5 generic dates. Table 4.2 reproduces the results of this comparison for the generic curtailment date of January 1, 1961.

Table 4.2 makes two different comparisons. The first compares results from using the ESPAM1.1 input file in both the ESPAM1.1 and ESPAM2.0; this comparison illuminates the change in model results that can be attributed mainly to changes in model structure and parameters (which have been described above). The second compares results between the two models each using their own input file; this comparison illuminates the change in model results that can be attributed mainly to changes in input data. With respect to spring flows below Milner, the IDWR analysis found that flows due to 1961 curtailment increased from 352 cfs to 454 cfs using the ESPAM2. The analysis also concluded that roughly 75% of this change was the result of changes in model input data, primarily the use of more recent years for estimation of irrigated acreage and irrigation water requirements. This highlights the sensitivity of ESPAM2 results to conditions in particular years. Review of updated comparisons using ESPAM2.1 (Sukow, 2012b) leads to the same conclusion.

ESPAM2.0 and ESPAM2.1

Shortly after its release, an error was discovered in the input data for ESPAM2.0. The error arose in the calculation of the water budget in the Mud Lake area and caused an overestimate of aquifer recharge of approximately 89,000 acre-feet/year in that area of the model domain. The error was corrected and the model was recalibrated creating ESPAM2.1, which was made available on November 16th of this year.

The water budget error at Mud Lake was on the order of 1% of the overall ESPAM water budget. It was expected that the relatively small size of this error and its location at the far northeastern part of the model domain would not result in significant changes to the model at its western end.

Table 4.3 shows the change in calibrated values of drain conductance parameters in the Thousand Springs reach and Rangen area, between ESPAM2.0 and ESPAM2.1. As can be seen in Table 4.3, many of the conductances in the western end of the model domain changed by amounts substantially greater than the 1% change in water budget associated with the correction. The conductance for the Rangen drain decreased by about 4%, but some drain conductances in the area changed by nearly 1000%. Figure 4.9 shows how transmissivity values changed as a result of the error correction. Some cell transmissivities in the area near Rangen changed by as much as 500%. As will be discussed in a later section, these changes in conductance and transmissivity are carried directly into the superposition models used to calculate the flow changes resulting from curtailment. Large changes in calibrated parameter values suggest that ESPAM2.0 and ESPAM2.1 may be over-parameterized, and that other comparable calibration solutions easily can be reached with only minor perturbations in model assumptions. This substantially raises the level of uncertainty in model predictions, since other models can readily be found (by PEST) that are as well-calibrated but have very different parameter values in specific locations.

Further evidence of unexpectedly large changes in ESPAM2.1 is seen in Figure 4.10, which depicts the boundary of the 5% and 10% trimlines for Rangen using ESPAM2.0 and ESPAM2.1. Figure 4.10 shows that the area encompassed by the 5% trimline is substantially larger with ESPAM2.1, but that this expansion is mainly in areas on the opposite side of the Malad Gorge from Rangen. Given the fact that the Gorge severs the Quaternary basalts that form the aquifer (Hinckley, 2012), it is difficult to see why wells west of Bliss should now be viewed as having increased effect on Rangen flows simply because of a small data error at Mud Lake.

4.6 Model Uncertainty

The ESPAM2 is, like all models, a simplified representation of reality, and this leads to model uncertainty. When viewed from a distance, the generalizations and simplifications made to construct the model may be sufficient to support regional scale analyses. However, when called upon to represent highly localized conditions such as those governing discharge from specific outlets of a specific spring complex, the generalizations and simplifications can introduce significant error into model results. Actual subsurface conditions within the ESPA are understood only in specific locations where lithology has been observed (e.g., boreholes and outcrops) and where hydraulic characteristics have been measured (e.g., pump tests). Observations of ESPA geology suggest it is highly complex, comprised of overlapping fractured basalts interspersed with sedimentary formations, with hydraulic characteristics that can vary substantially over short distances (Lindholm, 1996; Hinckley, 2012).

4.6.1 Overview - General Dimensions of Model Uncertainty

Model uncertainty has several dimensions, and these have been described in various submittals to the ESHMC (e.g., Brendecke, 2009a,b; 2012). In a nutshell, the principal dimensions of model uncertainty are those associated with model conceptualization, with model input and with model calibration. While all of these dimensions are important, conceptual uncertainty is fundamental. No amount of data improvement, re-sampling or recalibration can correct errors stemming from incorrect (or simply incomplete) model conceptualization (Bredehoeft, 2005).

Model conceptualization involves the identification and adoption of a model framework that the modeller believes can properly represent the behavior of the underlying real system. At a practical level it is the selection of a modeling code (in the present case MODFLOW) and the formulation of the model structure (e.g., defining the domain, deciding whether to operate it as a confined or unconfined system, adopting cell sizes, layering, boundary conditions, etc.). Previously in this chapter we have examined how many of these conceptual aspects of ESPAM2.1 fail to reflect observed characteristics of the aquifer system in the Rangen area. These failures lead to conceptual uncertainty in the ESPAM2.1.

Rigorous evaluation of conceptual uncertainty is difficult. There may be a large number of plausible conceptual models of an aquifer system and these models can't be rigorously evaluated until they are built. As a result, this critical dimension of model uncertainty is often "swept under the rug" in favor of more constrained and tractable evaluations that focus on input data and calibration. In the case of ESPAM2.1, this conceptual uncertainty bears directly on its suitability in the present matter.

Once a conceptual model has been identified and formulated, it must be populated with input data reflective of the important aspects of the aquifer water budget. In the case of ESPAM2.1, these data include precipitation, tributary underflows, irrigated acreage, crop distributions, surface water supplies, water application methods and efficiencies, etc. Each of these input data types carries its own uncertainties that can stem from, among other things, the inability to measure a condition accurately (or at all) and from the spatial or temporal resolution of measurements. Sometimes these uncertainties can be reduced by further data collection efforts, though these may be time-consuming and expensive. The effects of input data uncertainty can sometimes be explored through sensitivity analysis or through Monte Carlo analysis, which seeks to translate probabilistic descriptions of model input data to probabilistic descriptions of model output.

Once the conceptual model has been populated with input data, it must be calibrated. The calibration process has been addressed previously in this section. Calibration uncertainty essentially reflects the fact that many combinations of model parameter values (which in the case of ESPAM2.1 include aspects of the aquifer water budget) may lead to equally well-calibrated models. The uncertainty arises because the predictions made by these equally well-calibrated models may be significantly different.

4.6.2 IDWR Uncertainty Analysis

The uncertainty of ESPAM2.0, and selected aspects of ESPAM2.1, have been explored by the IDWR using a technique called "Predictive Analysis" that is available as part of the PEST software (Watermark, 2005). Predictive Analysis is described in the PEST documentation as

> "... the task of calculating the effect of parameter uncertainty, as estimated through the calibration process, on predictive uncertainty."

Predictive analysis essentially answers the question "If I use slightly different values for selected model parameters, do I get different values for key model results?" The analysis requires assumptions about the meaning of "slightly different" and whether such differences are small enough that the model can still be considered calibrated. The analysis does not explore alternative conceptual representations of aquifer hydrogeology, although it can be used in a limited way to explore input data uncertainty.

Table 4.3 summarizes the predictive analysis carried out by the Department (Wylie, 2012c,d) for ESPAM2.0, showing updates for selected portions using ESPAM2.1. The analysis made several simplifying assumptions to make the work computationally more efficient; for example, it assumed that pumping stress for entire Water Districts could be applied at the centroid of each District without loss of accuracy. The predictive analysis was designed to be generic, and did not examine parameter sensitivity of predictions of Rangen discharge. The conclusion that can be drawn from Table 4.3 is that parameter uncertainty variable of the model domain (e.g., the relationship between pumping in Water District 34 and reach gains between Blackfoot and Minidoka is apparently larger than that between pumping in Water District 130). The important thing to remember with this analysis is that it relies on a single conceptual model and does not explore the uncertainty that arises from improper conceptualization of local geologic and hydraulic conditions that influence discharge of specific spring complexes, such as those at Rangen.

4.6.3 Rationale for alternative models

In the uncertainty evaluation carried out for the ESPAM2.1, the model and parameter structure are assumed fixed, as are many data inputs. This approach is valuable in illuminating those parameters for which further investigation might reduce the uncertainty of the chosen model (James, et. al., 2009), but does not address larger questions of model uncertainty described above. More exhaustive evaluation approaches, such as Monte Carlo simulation, may shed greater light on the probability distributions of model errors. However, unless such approaches address all the dimensions of model uncertainty, including conceptual uncertainty, they too will be incomplete.

Conceptual uncertainty can only be addressed by considering alternative models. The poor correspondence between ESPAM2.1 assumptions about hydrogeology and aquifer behavior in the Rangen area indicate that at the very least a refined version of ESPAM2.1 is required. One very preliminary set of refinements are discussed in a later section of this report.

4.7 Limitations of ESPAM2

While it is clearly an improvement over its predecessor, several important features are the same in ESPAM1.1 and ESPAM2.1. The two are still conceptually the same regional model. Differences between them are largely the result of differences in input data and in values of calibration parameters resulting from the use of that input data. Both models represent the details of the Rangen spring complex and the surrounding geology in highly simplified form, omitting several key features and that would make significant differences in predicted benefits of curtailment.

Particularly important to the present case is the fact that ESPAM2.1 systematically underestimates water levels in the Rangen area. Because simulated heads are too low in the cells above Rangen, the calibrated drain conductances have to be made higher in order to meet the discharge calibration targets. This means that the drains are overly-sensitive to small changes in head. This over-sensitivity is carried into the superposition model used for curtailment, with the result that changes in spring flows are substantially over-predicted.

For these reasons, the ESPAM2.1 is subject to the same general limitations as ESPAM1.1, despite the increased attention given to the use of springs as calibration targets. That ESPAM2.1 can fairly closely mimic the observed past behavior of a spring complex is not proof that it sufficiently represent hydrogeologic reality to accurately predict future behaviour of that complex, especially under aquifer water use conditions (e.g., curtailment of large amounts of junior groundwater pumping) that are radically different from those extant in the model calibration period.

The ESPAM2.1 documentation describes limitations on model usage, highlighting the facts that a number of simplifying assumptions had to be made and that many components of the model water budget were uncertain. The documentation cautioned that ESPAM2.1 is a regional ground-water model best used for broad-scale predictions.

5.0 SIMULATION OF CURTAILMENT OF JUNIOR GROUNDWATER RIGHTS

5.1 Background

IDWR practice has been to create superposition versions of the ESPA groundwater model for use in evaluating curtailment (and other) scenarios. Superposition models are used primarily for reasons of convenience; it is faster and easier to perform analyses with superposition models than it is with "fully populated" models. A fully populated model contains all the water budget (input) data and parameters used in model calibration; outputs from a fully populated model can reflect simulated values of characteristics that may be directly observable in the aquifer. However, to examine effects of changes in input data, such as reduced pumping withdrawals, it is necessary to make two runs of a fully populated model and then determine effects by differencing the results of the two runs. The use of a superposition model allows this differencing to be accomplished in a single model run.

A superposition model preserves the parameters of the flow relationships between model cells but sets the initial condition of the groundwater flow regime to one of zero flux. Existing fluxes are eliminated by setting all aquifer heads and elevation differences to zero. The aquifer is converted, conceptually, into a still pool but one in which all the water molecules preserve fixed, predetermined relationships to one another. The relationships that are preserved in a superposition model are embodied in the calibrated parameters governing flow rates and responses: transmissivity, specific yield, conductance (of drains, riverbeds, and general head boundaries) and seepage rates from canals. The effect of a selected model stress, such as a reduction in groundwater withdrawal, can then be evaluated with the superposition model simply by applying that incremental stress and examining how heads and fluxes (including reach gains and drain flows) have changed from their zero condition.

The principle of superposition relies on the assumption that the system being modeled behaves in a completely linear way…that is, that flow relationships are independent of flow magnitude. In a linear model, the rate of flow caused by a half-foot difference in water level between two cells will be the same whether the cells contain water 1 ft or 1000 ft deep. Superposition models perform identically at all levels of assumed stress change, even those outside their range of calibration. If the system being simulated exhibits important non-linear behaviors, such as those that have been described in preceding sections of this report, a superposition model can introduce significant error into the analysis of effects of stress changes.

The practice of the IDWR has been to define three superposition versions of the ESPAM, a steady state version (dubbed "SuperSS"), and two transient versions (dubbed "SuperTransient10yr_monthly" and "SuperTransient150yr"). The transient versions allow simulation of how assumed stress changes evolve over time, the former reflecting a repeated seasonal pattern of conditions and the latter reflecting a constant annual pattern. The constant annual pattern is used to assess the speed at which the aquifer reaches equilibrium (steady state) conditions after introduction of a change.

Simulation of curtailment of groundwater irrigation rights junior to Rangen's 1962 Curren Tunnel water right has been carried out with ESPAM2.0 by both the IDWR and by Rangen experts. Simulation of curtailment using ESPAM2.1 has been carried out in a generic sense by the IDWR (Sukow, 2012b) and for the Rangen water rights by AMEC. These simulations are briefly described and evaluated below.

5.2 IDWR Curtailment Analyses

5.2.1 Generic Curtailment Analysis

As part of the development of ESPAM2.1, the IDWR carried out a comparative analysis of the effects of curtailment as simulated by ESPAM1.1, ESPAM2.0 and ESPAM2.1. The simulated curtailments were those described by Contor, et.al. (2005) for ESPAM1.1. The curtailments did not reflect priority dates of any specific water rights nor were they limited spatially to the the Area of Common Groundwater defined in Rule 50 of the Conjunctive Management Rules. The curtailment dates used in the analyses were January 1 of the years 1870, 1949, 1961, 1973 and 1986. The January 1, 1870, curtailment date reflected curtailment of all groundwater use in the model domain except that occurring under tribal water right settlement agreements.

The January 1, 1961, curtailment is roughly comparable to that which would occur under the present delivery call for Rangen's July 13, 1962, water right. Table 4.2 in the preceding section showed the results of the hypothetical 1961 curtailment using ESPAM1.1 and ESPAM2.1.

5.2.2 Rangen Curtailment Analyses

In its document production of June 12, 2012, the IDWR produced model files containing results of curtailment analyses for the present Rangen delivery call. These files indicate that the Department evaluated the effects of July 13, 1962, curtailment with ESPAM2.0 using various "trimline" assumptions.

The "trimline" defines a zone of exclusion outside of which the benefits of curtailing a well are less than a threshold percentage of the amount of water use curtailed, as determined by the groundwater model. The trimline concept was originally adopted by former Director Karl Dreher in his 2005 Orders stemming from the delivery calls of Blue Lakes Trout, Clear Springs Foods, the Surface Water Coalition, Rangen, Inc., and others. Director Dreher adopted a 10% trimline and stated in hearing testimony that he viewed this as a minimum level of model uncertainty, noting that model uncertainty had not been quantified. He went on to say that:

> *"...I made the determination it was not appropriate to curtail such junior priority ground water use if, in fact, we didn't know whether curtailment would result in a meaningful amount of water reaching the calling senior right."* (Transcript at 1167: 4-80)

Table 5.1 summarizes the results of the IDWR curtailment analyses using ESPAM2.0. The analyses considered trimline thresholds between 0.2% and 10%, as well as trimlines limited only by the Rule 50 Area of Common Groundwater Supply and by the ESPAM2.0 model domain. As

the trimline threshold decreases the area encompassed by curtailment increases. As shown in Table 5.1, there are a total of 406 groundwater irrigated acres relying on rights junior to Rangen's 1962 priority within the 10% trimline; there are a total of 565,023 groundwater irrigated acres within the model domain relying on rights junior to Rangen's1962 priority.

Table 5.1 shows that curtailment of the junior groundwater rights within the 10% trimline would immediately eliminate 1,445 acre-feet of groundwater pumping and, at steady state, would cause total modeled flow at the Rangen springs to increase by 0.19 cfs (141 af/y assuming year around flow). This increase in modeled spring discharge represents 9.5% of the pumping foregone by the curtailed wells and, assuming a permitted groundwater diversion rate of 1 miners inch (1") per acre, 0.66% of the curtailed water rights. It would take somewhat less than a year for discharge to reach 90% of this modeled steady state increase.

Curtailment of the junior groundwater rights within the entire model domain would immediately eliminate 1.46 million acre-feet (MAF) of groundwater pumping and, at steady state, would cause modeled discharge from the Rangen spring complex to increase by 18.07 cfs. This increase represents 0.9% of the pumping foregone by the curtailed wells, and 0.06% of the curtailed water rights. It would take approximately 16 years for modeled discharge to reach 90% of this steady state increase.

Foregone groundwater use that is not simulated to accrue to Rangen would accrue to other connected river reaches, springs and baseflows, including those on which there are no water rights or diversions, those on which there are no delivery calls, those on which approved mitigation plans are already in place, and those on which diversions occur under water rights junior to those of the curtailed rights.

5.3 Rangen Analysis

In its December 13, 2011, delivery call Rangen included a curtailment analysis (Exhibit 11 to the petition) carried out by its experts (McGrane et.al., 2011). The details of this analysis were requested at the outset of discovery for this case, but were not produced by Rangen until November 28th of this year. Accordingly, the conclusions below are based primarily on a facial interpretation of Exhibit 11 and may be supplemented when time permits a more careful examination of Rangen's late production.

The Rangen analysis appears to be a transient analysis using average monthly stresses. The use of a transient, average monthly analysis permits the display of simulated seasonal effects of curtailment. It does not appear that the version of ESPAM2.0 used for the analysis is the final calibrated version. The analysis recommends against the use of the trimline concept and concludes with a recommendation that Rangen seek curtailment of all junior (to July 13, 1962) groundwater irrigation rights within the ESPAM2.0 domain. As noted above, this would immediately dry up 565,023 acres of groundwater irrigated land.

Figure 5.1 is reproduced from Exhibit 11 of the Rangen petition. It shows that curtailment would achieve a simulated annual average increase in total Rangen discharge of 17 cfs after 20-plus

years of curtailment. After twenty five (25) years of continuous curtailment, simulated minimum seasonal flows from the Rangen complex would increase by about 9 cfs.

Presumably the curtailed groundwater acreage and water use amounts implicit in the Rangen analysis are similar to those of the IDWR analysis with no trimline, and that similar conclusions could be drawn regarding the portion of curtailed use and water rights that would accrue to Rangen's benefit.

5.4 Rangen Curtailment Using ESPAM2.1

AMEC has carried out analyses of curtailment for Rangen's 1962 water right using ESPAM2.1. These analyses were carried out using the assumption of a 10% trimline. A 10% trimline assumption was adopted based on precedent; previous curtailment analyses and orders by the IDWR have used this assumption, which stems from Director Dreher's Orders in 2005.

AMEC compared the spatial extent of the 5% and 10% trimlines for ESPAM2.1 as defined based on steady-state response functions published by the IDWR (http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/model_files/Version_2.1_Current). Figure 4.10 shows the 10% and 5% trimlines for ESPAM2.0 and ESPAM2.1. The 10% trimline is the same for both models, but the 5% trimline for ESPAM2.1 encompasses a larger area than that for ESPAM2.0. This is presumably the result of recalibration due to correction of the Mud Lake data error described previously, though it is difficult to see why a small change in input data in the opposite end of the model domain would cause such a large change in the trimline. It is noteworthy that the extension of the trimline occurs in the area west of Bliss, which is separated from the Rangen area by the Malad Gorge.

Table 5.2 summarizes the steady state results of the 10% trimline curtailment using ESPAM2.1. Curtailment to the 10% trimline has results nearly identical to the ESPAM2.0 analysis done by the IDWR. This curtailment would immediately dry up 406 acres of groundwater irrigated land and eliminate 1,446 acre-feet of groundwater use. Total simulated flow at Rangen would increase 0.21 cfs, which is slightly higher than the 0.19 cfs predicted by the IDWR analysis. This small difference may be attributable to changes in the transmissivity distribution that occurred in recalibration of ESPAM2.1.

6.0 Alternative Conceptual Models

This section describes the development of two alternative conceptual models (labelled #1 and #2 below) of the ESPA in the immediate area of the Rangen complex. The aim of this effort is not to present a definitive reformulation of ESPAM2.1, but to illustrate how a few relatively minor changes to its conceptual structure, suggested by detailed hydro-geologic review, could result in significantly different conclusions from a curtailment analysis. In order for either of these alternative conceptual models to be fully developed, it would be necessary to perform similar analyses at other spring complexes as were presented in the foregoing sections of this report and to extend the reach of calibration from that used herein. Nevertheless, the results of these

preliminary steps at more realistic representation of local hydrogeology illustrate the potential for significant conceptual uncertainty in the application of ESPAM2.1 to localized problems.

6.1 Description of Modifications to ESPAM2.1

The alternative modeling effort focused on making small changes to the construction of ESPAM2.1 to explore what effect these changes have on simulated Rangen discharge and simulated water levels in the vicinity of Rangen. Concepts for these changes are based primarily in hydrogeologic analyses and interpretations presented in Ralston (2008), Farmer (2009) and Hinckley (2012) and on discussions with Neal Farmer on August 22, 2012.

6.1.1 Horizontal Flow Barrier

The main geologic formations that influence the groundwater flow and spring discharge near the Hagerman area are the Quaternary basalts that form the ESPA and the less permeable Tertiary formations (e.g., Glenns Ferry) that underlie it. Current geologic understanding of the Hagerman area is that the ESPA effectively terminates along the Hagerman rim and that the underlying formations restrict subsurface flow from it into the Hagerman Valley. At the south end of the rim, however, Quaternary basalt flows form a "ramp" (Farmer, 2009) creating a pathway to feed lower-elevation springs such as Tucker and Stewart as shown in Figure 6.1. Between this ramp and the rim is a geologic discontinuity, possibly faulting, that restricts groundwater movement directly from the rim to the lower elevation springs. Observed gradients indicate that groundwater flows into this lower area from the southeast rather than the northeast.

To reflect this geological feature, a horizontal flow barrier (Hsieh, 1993) was inserted between columns 12 and 13 for the cells in rows 42 and 43 of the model domain. For model #2, this barrier was shortened to only row 42, as shown in Figure 6.2. A horizontal flow barrier restricts groundwater flow between the cells for which the HFB is defined. With this barrier in place, the preponderance of flow moving southwest through the ESPA must go around the discontinuity to reach the lower springs.

6.1.2 Multiple Drains

Groundwater flows from the Rangen complex emerge at several locations. Farmer (2009) and personal observation note at least two discharge areas, the Curren Tunnel and a set of springs emerging from the slope below it. Farmer estimated the Tunnel to be at elevation 3145 ft (msl) and the lower springs to be at elevation 3100 ft. Koreny (2011) presented spring survey data indicating a Tunnel elevation of 3150 ft "plus or minus two feet." Covington and Weaver (1991) note an elevation of 3138 ft for the "Rangen spring." Elsewhere in the Thousand Springs reach, complexes with discharge points having a range of elevations have been represented using two drains. Given the range and uncertainty in elevations of discharges at Rangen, it seems appropriate to use the same multiple drain construct to represent Rangen as was used in other nearby locations.

Accordingly, another modification made to the alternative models was to represent the Rangen complex using two drains. A new upper drain (DRN218) was added to the Rangen cell, and to the CRIV group. In both models the lower drain was given an elevation of 3100 ft. In alternative model #1 the upper drain was given an elevation of 3152 ft, while in model #2 it was given an elevation of 3148 ft, thus bracketing the upper elevation estimates for the Tunnel presented by Koreny (2011).

6.1.3 Removal of GHB Cells

As noted in Section 4, the use of General Head Boundaries (GHBs) to reflect unmeasured flows from the ESPA to the Snake River effectively undid the removal of the Hagerman Valley from the model domain. Present geologic understanding is that the Hagerman Valley is not part of the ESPA, yet the use of GHBs along the Hagerman rim implies that the ESPA continues through the valley to the river.

It is conceivable that ESPA discharges could be made to the river at the northern and southern edges of the Hagerman Valley. Covington and Weaver note the presence of springs at river level downstream of Lower Salmon Falls dam. Low elevation springs and seeps also exist in the area of the Hagerman Fish Hatchery operated by the State of Idaho.

The third modification made in the alternative models was to remove four GHB cells immediately north of Rangen to prevent simulation of ESPA flows through the Hagerman Valley. This reconfiguration is shown on Figure 6.3. This removal forces baseflows in the Buhl to Lower Salmon Falls reach to move through the remaining GHB cells defined in ESPAM2.1.

6.1.4 Increased Weighting on Recent Rangen Flows

A notable feature of the ESPAM2.1 calibration and validation is the over-prediction of Rangen flows in recent years. Given that any management action would look forward from the present, it seems appropriate that greater emphasis should be placed on simulation of current aquifer behavior. Accordingly, a further modification undertaken in Alternate Model #2 was to assign increased calibration weight to Rangen flow observations after the year 2000. The aim of this modification was to improve the model simulation of Rangen discharge in recent years.

6.2 Calibration of Alternative Models

6.2.1 General Approach

The alternative models were calibrated using the PEST software. Calibration adjustments were limited to parameters in the CRIV group; no recalibration of model transmissivity or specific yield was done, nor were any water budget terms adjusted in the calibration.

Calibration targets for the alternative models were the same as those used in ESPAM2.1, except for the addition of water level targets for PEST well #992. This well, which lies immediately northeast of the Rangen cell, was listed as a target for ESPAM2.1 but was apparently never

used. This inclusion of well #992 added 166 additional target values to the calibration data set. These were given calibration weights the same as those used in ESPAM2.1 for other transient water level targets.

6.2.2 Calibration Results Model #1

Figure 6.4a shows the results of calibration of model #1 for the Rangen discharge and Figure 6.5a shows the results for water levels in wells 989 and 992.

In ESPAM2.1, modeled groundwater levels in calibration well 989 are 20 ft lower than observed levels, and in well 992 the modeled levels are around 2 to 8 ft lower than observed levels (well 992 was apparently not used in the ESPAM2.1 calibration).

In alternative model #1, simulated water levels are higher in both wells, matching observations better than in ESPAM2.1. The most marked improvement is in well 989, which was underpredicted by approximately 20 feet in ESPAM2.1; with model #1 the underprediction is about 10 feet. ESPAM2.1 underpredicted water levels in well 992 by about 5 feet, though somewhat less in more recent years; with model #1 there is good match to water levels in well 992, though there is a slight overprediction in recent years.

The simulated Rangen discharge in model #1 is nearly identical to ESPAM2.1. From the foregoing I would conclude that the calibration of model #1 in the Rangen area is at least as good as that of ESPAM2.1.

6.2.3 Calibration Results Model #2

Figure 6.4b shows the results of calibration of model #1 for the Rangen discharge and Figure 6.5b shows the results for water levels in wells 989 and 992.

In alternative model #2, simulated water levels are not as high as with model #1, but correspondence with well 989 is still improved over ESPAM 2.1. Calibration to flow at Rangen is somewhat poorer in the early years of the calibration than is ESPAM2.1, but calibration in recent years is much better. Model #2 appears to resolve the overprediction problem noted for ESPAM 2 ? in recent years.

6.3 Curtailment Analysis with Alternative Models

Both alternative models were run to simulate curtailment of junior groundwater uses within a 10% trimline. This trimline is consistent with past practice and with IDWR water rights transfer policy. The results of these runs are shown in Table 6.1. Also shown in this table are the results of the same curtailment analysis using ESPAM2.1.

It can be seen by this comparison that the relatively minor modifications made to ESPAM2.1 to better reflect local hydrogeology have substantial effect on simulated benefits to Rangen from curtailment. In the case of alternative model #1, the benefit from curtailment is roughly half that

predicted by ESPAM2.1. In the case of alternative model #2, the benefit is about 5% of that predicted by ESPAM2.1.

6.4 Conclusion

The foregoing alternative model simulations demonstrate how sensitive the predictions from ESPAM2.1 can be to the model representation of local hydro-geologic conditions. Relatively minor changes in ESPAM2.1 conceptualization, made to more closely reflect the local conditions at Rangen, result in model predictions that differ substantially from those of ESPAM2.1. The substantial differences in model predictions highlight the potential magnitude of conceptual uncertainty in ESPAM2.1, a dimension of uncertainty not addressed in the IDWR's predictive analysis.

EXHIBIT K

RANGEN GROUNDWATER DISCHARGE AND ESPAM2.1 HYDROGEOLOGIC INVESTIGATION

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December 20, 2012

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INTRODUCTION AND SUMMARY

The objective of this report is to review the hydrogeology of the western edge of the Eastern Snake Plain Aquifer (ESPA) in the Malad Gorge to the Thousand Springs area, with particular reference to the hydrogeology affecting the groundwater supply of Rangen, Inc., and to groundwater flow modeling of the area with the Enhanced Snake Plain Aquifer Model (ESPAM Version 2.1).

The first section of this report – "Hydrogeologic Setting" – outlines the hydrogeologic features of the study area, i.e. the geologic deposits present and their water-bearing characteristics, to establish the context for specific evaluation of the groundwater discharges at Rangen. This section draws upon the rich professional literature on the extraordinary aquifer created by the flood basalts of the eastern Snake River Plain, focusing on those aspects of the hydrogeology most relevant to the Rangen investigation, including stratigraphy, definition of "aquifers", general patterns of groundwater flow, and the important hydrogeologic boundary between the primary aquifer and underlying deposits.

The second section of this report – "Rangen Groundwater Discharge" – focuses on the hydrogeology of the Curren Tunnel and the natural springs that supply groundwater to the Rangen facilities. This section presents a conceptual hydrogeologic model for the Rangen area based on the observable and reasonably-inferred characteristics of the physical system as a foundation from which to evaluate the ESPAM representation of that system.

The third section – "Groundwater Development Opportunity" – evaluates the general feasibility of augmenting the groundwater supply at Rangen with development of wells.

The fourth and final section of the report – "Groundwater Modeling of the Eastern Snake Plain Aquifer" – draws upon the previous sections to inform comparisons between the hydrogeology of the study area and its representation by the ESPAM 2.1 groundwater model. A number of inconsistencies, shortcomings, and conceptual errors are discussed.

Attached to this report as Figure 1 is a map showing the general study area for this investigation.

This investigation was closely coordinated with that of Brendecke (2012), the results and conclusions of which have been submitted as a separate report.

In summary, I conclude:

1. The primary aquifer of the Eastern Snake River Plain is comprised of a series of extraordinarily productive Quaternary-age basalt flows and, at Rangen, by immediately underlying highly-permeable sediments. (See "Stratigraphy", pp. 4-7; "Aquifer Definition", pp. 11-12.)

2. The topography of the base of this primary aquifer is a major control on the discharge of groundwater from the aquifer along the Hagerman Rim, including at the location of Rangen. (See "Base of the Primary Aquifer", pp. 13-19; "Rangen Groundwater Discharge", p. 20.)

3. The Curren Tunnel is a horizontal flowing well, increasing groundwater production relative to natural springs, but providing minimal available groundwater drawdown, and discharge rates that are especially vulnerable to small changes in aquifer groundwater levels. (See "Curren Tunnel", pp. 20-23.)

4. The tunnel was not constructed to maximize sustainable, year-round production for the present application. (See "Curren Tunnel", p. 20 - 23.)

5. The geometry of the base of the primary aquifer combines with internal variations in permeability to create more complex groundwater flow patterns and more complex relationships between aquifer water levels and groundwater discharge than have previously been reported (See "Site Hydrogeology", "Flow Data", and "Groundwater Gradients", pp. 23 - 28.)

6. In the area immediately east of Rangen, in the same aquifer, there are opportunities to develop substantially more robust access to quantities of groundwater comparable to those historically measured at the Curren Tunnel. (See "Groundwater Development Opportunity", pp. 28-30.)

7. The ESPAM2.1 groundwater model is poorly reflective of actual hydrogeologic conditions in the study area (see "Groundwater Modeling of the Eastern Snake Plain Aquifer", pp. 30-34) and specifically at Rangen due to:

- its inability to reflect important local changes in transmissivity and aquifer saturated thickness; (See "Aquifer Transmissivity" section, pp. 34-35.)

- its inability to distinguish the primary aquifer from underlying strata, overlooking a regionally important inter-aquifer boundary; (See "Aquifer Anisotropy and Model Layers" section, pp. 35-37.)

- its inability to reflect the detailed paleotopograhy that is understood to control major groundwater discharge along the Hagerman Rim; (See "Grid Size " section, p. 37.)

- its inability to accurately represent the westward termination of groundwater flow in the primary aquifer along the Hagerman Rim; (See "Aquifer Discontinuity", pp. 37-39.)

- its inability to distinguish between groundwater discharges associated with the Curren Tunnel and those associated with lower-elevation, natural springs at Rangen; (See "Rangen 'Drain' Modeling" section, pp. 39-41.)

- its inability to represent the observed relationship between aquifer water levels and groundwater discharge; (See ""Rangen 'Drain' Modeling" section, pp. 39-41.)

- its ambiguity with respect to the critical elevation parameters; (See "Elevation Uncertainties " section, pp. 41-42.)

- its uncertainty regarding a major component of the water balance, the non-spring gains to the Snake River; (See "Snake River Gains" section, pp. 42-44.)

- its inaccuracies in the representation of local aquifer groundwater levels; (See "Calibration Comparisons" section, p. 44.) and

- its inaccuracies in the volume of groundwater flow and in the magnitude and timing of seasonal fluctuations of groundwater flow at Rangen. (See "Calibration Comparisons" section, p. 44.)

8. These discrepancies between the ESPAM2.1 and the observable characteristics of the Eastern Snake Plain Aquifer, along with poorly understood details of the hydrogeology of the Eastern Snake Plain Aquifer discharge area, create considerable uncertainty in the use of the ESPAM2.1 to inform detailed hydrologic analyses of the groundwater discharges at Rangen.

HYDROGEOLOGIC SETTING

STRATIGRAPHY

This section outlines the basic components of the hydrogeology of the study area, describing the composition and distribution of relevant geologic deposits and their primary groundwater characteristics.

"Stratigraphy" refers to the characteristics and arrangement of the various layers of rock that lie beneath the landscape. The occurrence of a particular rock formation at the surface is called "outcrop". Subsurface locations can be directly assessed by wells, or estimated by projection from the surface. Formation names are typically derived from the location at which the formation was first identified. Map symbols consist of a capital initial (Q, T, etc.) based on the age of the deposit, followed by the initials of the formation name, e.g. "Qnb" for the Quaternary-age Notch Butte basalt flow. "Quaternary" refers to the last 1.6 million years; "Tertiary" age refers to the period between 66 and 1.6 million years old.

The outcrop geology for the study area is presented on Figure 2; the relevant formation symbols are explained below. Figure 3 presents a summary of the basic stratigraphy, grouped by general rock type. The "Volcanic Deposits" are basalt flows in this case; the "Mixed Lacustrine and Alluvial Deposits" are lake and stream deposits, respectively, consisting of layers of silt, sand, and gravel; the "Bonneville Flood Deposits" are primarily sand and gravel; and the "Mass

Movement Deposits" are talus slopes and landslide deposits. The green and blue arrows on Figure 2 indicate the flow direction of two massive floods in the geologic past.

Both figures 2 and 3 are duplicated from published geologic mapping by the Idaho Geological Survey (IGS) 1:24,000-scale geologic mapping program (Kauffman et al., 2005; and Othberg et al., 2005). From top to bottom, i.e. in order of increasing age, the deposits of interest to the present study can be grouped into four general sequences:

1. Quaternary Sediments

These are a complex assemblage of Quaternary-age alluvial and lacustrine sediments associated with both the routine erosion and deposition of landscape evolution and the extraordinary history of natural impoundments and flooding along this reach of the Snake River. These include alluvial deposits, talus and landslide deposits, sand dunes, and clay and gravel deposits specifically associated with the Bonneville Flood. These are the materials listed in the upper right on Figure 3. (See Othberg et al., 2005 for details.) These are relatively thin, localized, surficial deposits, of marginal relevance to the present study. Two units of interest are:

> Crowsnest Gravel (Qcg) - 6 ft. of "Stratified sand and pebble gravel" (Othberg et al., 2005)
>
> Yahoo Clay (Qy) - "Laminated to thin-bedded clay and silty clay." (Othberg et al., 2005)

In the study area, the Quaternary sediments are limited to the Hagerman valley and along the Snake and Malad Rivers. The Yahoo Clay is present over much of the area immediately west of the Hagerman rim. Although the stratigraphic column (Figure 3) indicates the Yahoo Clay and the Basalt of McKinley Butte are of similar age, Othberg et al. (2005) conclude that the former was deposited behind a lava dam created by the latter. Thus, within the study area, the Quaternary sediments are consistently younger than, and deposited on top of, the Quaternary basalts discussed below.

Groundwater Characteristics. The Yahoo Clay is hydrologically significant locally in that its relatively low permeability impedes groundwater flow. For example, the overlying relatively-permeable Crowsnest Gravel southwest of Rangen collects precipitation and irrigation recharge, producing springs at its contact with the underlying Yahoo Clay (Covington and Weaver, 1990; spring nos. 20, 21, 26 ("Stewart")). Such springs are not part of the regional aquifer system.

These sediments are not considered a part of the regional aquifer system, but may locally play a role in controlling the occurrence of groundwater discharge by restricting groundwater flow.

2. Quaternary Basalts

These are a series of overlapping Quaternary-age basalt flows from multiple eruptive centers. This series is regionally termed the "Snake River Group", extending east from the study area

across the entire eastern Snake River Plain and attaining thicknesses as much as 5,000 ft. (e.g. Whitehead, 1992). Geologists differ on the naming of individual units, and not all flows are present at all locations. In the study area, IGS mapping has identified, in descending order (getting older):

Basalt of McKinley Butte (Qmk);
Basalt of Notch Butte (Qnb), (Sand Springs Basalt (Qss) of Covington and Weaver (1990) around the town of Hagerman);
Basalt of Bacon Butte (younger) (Qbby);
Basalt of Bacon Butte (older) (Qbbo);
Basalt of Flat Top Butte (Qftb);
Basalt of Gooding Butte (Qgb); and
Madison Basalt (Qma).

In the study area, all these units are described as "fine grained basalt" (e.g. Kauffman et al., 2005). They create the extensive plateau east of the Hagerman rim. Individual basalts are named for their inferred eruption center (e.g. McKinley Butte, Gooding Butte), all of which are from 10 to 20 miles north, northeast, east, or southeast of the study area. Naming conventions vary, as each of these "basalts" consists of multiple, individual flows. In a detailed examination of core from a US Geological Survey borehole northeast of Wendell (plotted on Figure 1), for example, 25 "flow boundaries" were identified in the 400 ft. of Quaternary basalts penetrated (Whitehead and Lindholm, 1985).

The emplacement history of these basalts is a complex function of the locations of eruptive centers, the nature of the individual flows, and the topography upon which they flowed. The older flows that cover the plateau-area above the Hagerman Rim (i.e. Qma and Qgb on Figure 2) filled stream channels carved into the underlying Tertiary-age Glenns Ferry Fm. when it formed the land surface east of the present Hagerman Rim (discussed below, p. 6)[1]. The somewhat younger Qftb flow mapped above Thousand Springs is interpreted as having been constrained by an "ancestral Snake River" channel immediately west of the present rim (Kauffman et al., 2005). The still younger Qnb flow appears to have flowed northwestward into the Hagerman Valley from the southeast and to have locally spilled over the present rim (e.g. 2.5 miles north of Rangen).

Along the Hagerman rim, the exposed basalt sequence is 50 - 100 ft. thick (e.g. at Rangen). At the Henslee well (3 miles east of the rim), the basalts are 240 ft. thick. At the USGS Wendell well (11 miles ENE), the basalts are 400 ft. thick. (See Fig. 1 for locations.)

East of the rim, Quaternary basalts are exposed immediately southwest of Rangen, beneath the Yahoo Clay along the scarp east of the National Fish Hatchery, and north and west of the town

[1]Such ancient, buried channels are called "paleo-channels".

of Hagerman. They are not present at all locations, however. In some places the Quaternary sediments immediately overlie the Tertiary-age deposits described below.

Groundwater Characteristics. "The largest and most productive aquifers in the Snake River Plain are composed of Quaternary basalts of the Snake River Group ... Aquifer tests and simulation indicate that transmissibility [transmissivity] of the upper 200 feet of the basalt aquifer in the eastern plain commonly ranges from about 100,000 to 1,000,000 feet squared per day." (Lindholm, 1996). These basalts comprise the "primary aquifer" as referenced in this report.

The Quaternary basalts are the source for nearly all the springs of significance in the study area – total Buhl to Lower Salmon Falls springs discharge averages 2500 cfs (Wylie, 2012a) – including both the tunnel and natural spring flow at Rangen (described in detail below).

Discharge from this aquifer produces springs where topography (e.g. the Hagerman rim, the Snake River canyon) intersects the Quaternary basalt water table, most commonly occurring at the contact between Quaternary basalts and underlying, dramatically less permeable Tertiary-age units. The details of these "contact springs" may be complicated by overlying landslide deposits obscuring contacts, but the basic relationship is the same: groundwater is discharged to the surface at local topographic low points where downward infiltration is inhibited by lower permeability materials.

Along the Hagerman Rim, the primary aquifer has been fully dissected by erosion. Although these deposits are 50-100 ft. thick, because they are drained by springs along their lower contact, the saturated thickness is substantially less than that. Saturated thickness increases eastward from the Rim springs, to 170 ft. at the Henslee and Wendell wells.

Regionally westward groundwater flow towards the rim terminates along the rim, either as discharge to the surface (e.g. at Rangen) or as a change-of-direction to flow toward the lower-elevation discharges along the Malad River (north) or in the Thousand Springs area (south). At the north end, the Hagerman Rim terminates at its intersection with the east-west trending Malad Gorge. At the south end of the rim, its topographic "step" simply attenuates, and by a point 1.5 miles southeast of Rangen, there is continuous outcrop of basalt from the eastern plateau area to the edge of the Snake River canyon (see Figure 2). Groundwater in the primary aquifer south of the termination of the Hagerman Rim continues southwestward to discharge in the Thousand Springs area.

Groundwater also discharges from the Quaternary basalts where they were dissected by erosion along the Snake River north of Hagerman. Covington and Weaver (1990) map an extensive group of springs below the Lower Salmon Falls Dam, with total flow estimated at 20 cfs. As with the springs along the Hagerman Rim, discharge commonly occurs at the contact with the underlying, Tertiary-age deposits. Additional discharge from the Quaternary basalts may occur upstream of the Lower Salmon Falls Dam, where these deposits extend to below-reservoir level.

While this basalt aquifer may behave in a general and predictable manner at a regional scale, the USGS studies point out that "locally, hydraulic characteristics of basalt and rate and direction of water movement vary widely within a short distance." (Whitehead, 1992; p. B23).

Geologists describing the core from the USGS Wendell borehole concluded, "Contacts between flows are commonly rubbly and have high porosities and hydraulic conductivities, which make interflow zones major avenues for horizontal movement of water" and "the basalt ranges from very vesicular with high hydraulic conductivity to crystalline with little or no hydraulic conductivity" (Whitehead and Lindholm, 1985).

A common source of greatly-enhanced basalt permeability occurs through the formation of "pillow basalts". Whitehead (1992; p. B15) explains the process: "Extremely rapid cooling, as in shallow water, causes steam explosions, and the cooled lava solidifies into a wide size range of generally rounded forms, or pillow lavas.", and describes mapping of "the north wall of the Snake River canyon between King Hill and Milner" that "verified that the largest springs issue at various altitudes from pillow lavas [filling] in ancestral Snake River canyons." (p. B26).

Detailed studies in the Quaternary basalt aquifer in the central Eastern Snake Plain Aquifer found "core-scale permeability of basalt varies by six orders of magnitude ..." (Welhan et al., 2002; p. 439). These authors also evaluated the impact of "fissure networks" on basalt permeability and concluded, "should such fracture networks prove to be important features of the eastern SRP [Snake River Plain] basalts, the high permeability and extreme hydraulic anisotropy[2] they would impart to the aquifer would explain such high-volume, localized spring discharges from the eastern SRP as are found at Thousand Springs." (p. 453).

At a regional scale, of course, local anisotropies tend to average out, but even so, the USGS Regional Aquifer-System Analysis (RASA) modeling used a "model calibrated" horizontal to vertical permeability ratio of 100 for basalt units (Garabedian, 1992; p. F44).

3. Tertiary Sediments

Underlying the Quaternary basalts (Snake River Group) in much of the study area are sediments primarily of Tertiary age. Although present beneath the study area east of the Snake River, these sediments are of greatest thickness and most extensive outcrop west of the river, part of a mixed volcanic and sedimentary series regionally termed the "Idaho Group"[3]. Within the study area, the Tertiary sediments are represented by:

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[2]"anisotropy - condition of having different properties in different directions" ("Dictionary of Geologic Terms", Doubleday, 1962)

[3]Over the larger area of the eastern Snake River Plain, the Idaho Group includes some deposits of Quaternary age (e.g. Whitehead, 1992), but IGS mapping in the study area places these deposits in the Tertiary Period.

Tuana Gravel (Tt) - "Well bedded and sorted pebble and cobble gravel interbedded with layers of sand and silt" (Kauffman et al., 2005).

Glens Ferry Formation (Tsgf) - "Poorly consolidated, bedded lake and stream deposits. In Hagerman Valley primarily flood plain lithofacies that include calcareous olive silt, dark clay, sand locally cemented, and fine pebble gravel." (Kauffman et al., 2005).

Across most of the study area, these sediments are present beneath the Quaternary basalts and this contact marks the bottom of the primary aquifer. In some areas, the Tertiary sediments were removed by erosion prior to deposition of Quaternary basalts (or were never deposited), and the lower contact of the primary aquifer is with the Tertiary basalt sequence described below.

Outcrops of Tertiary sediments on the east side of the Snake River are largely confined to the steep slopes beneath capping Quaternary basalts flows, where a mantle of basalt talus commonly obscures contact relationships. For example, Covington and Weaver (1990) map nearly all the slope along the Hagerman rim as Quaternary-age "talus", with exposed "Tg" (= Glenns Ferry Fm.) outcrop only along the Vader Grade. IGS mapping (Figure 2) presents nearly all this slope as Glenns Ferry Fm. ("Tsgf") outcrop.

The eastward termination of the Glenns Ferry Fm. is uncertain. The schematic cross-section presented by Whitehead (1992, Plate 3) suggests a roughly horizontal, tabular body of sediments between the Quaternary basalts and Tertiary basalts, extending eastward approximately 15 miles from the Hagerman rim, and terminating in some unknown geometry. Malde (1991; p. 258) concludes that "the Glenns Ferry Formation thins eastward and pinches out between Banbury Basalt and overlying basalt of the Snake River Plain about 20 km east of Hagerman". (The Banbury Basalt is of Tertiary age, discussed below. The "overlying basalt" is in the Quaternary basalt group described above.)

In some areas, the Tertiary sediments and basalts are interlayered. This is most common on the west side of the Snake River, where, adjacent to the present study area, the sediments of the Glens Ferry Formation dominate from river level to the upland surface (e.g. see the "Tsh" basalt units west of the river on Figure 2.) East of the Snake River, Kaufman et al. (2005) map Tertiary basalts overlying Glenns Ferry Fm. in a small exposure near the mouth of Malad Gorge. Farmer (undated; p. 69) suggests springs in the Thousand Springs area emerge at the top of the Tertiary basalts, one flow of which overlies an outcrop of sediments tentatively identified as Glenns Ferry Fm. Similarly, USGS investigators suggest sedimentary strata within the Tertiary basalt sequence are Glenns Ferry equivalents (e.g. Whitehead and Lindholm, 1985).

The Tuana Gravel (Tt) outcrops extensively west of the Snake River, capping the Glenns Ferry Fm. strata over most of the upland area above 3400 ft. elevation. East of the Snake River, Tuana Gravel outcrop is mapped only in a small patch atop the Glenns Ferry Fm. at the top of the Vader Grade (see Fig. 1 for location), at elevation 3230 ft. This is consistent with the interpretation of Othberg et al., 2005 that "the gravel was deposited by an ancestral Salmon Falls Creek [a west-side Snake tributary] that prograded braided-stream deposits across a high, nearly flat plain

formed on the Glenns Ferry Formation" if the original Glenns Ferry Fm. were continuous across the present Snake River Canyon, i.e. sloping eastward through the present Hagerman rim. Link et al. (2002; p. 114) studied the emplacement of the Tuana Gravel with respect to the evolution of the Snake River drainage, and concluded, "The main stem of the Snake River need not have been present during any deposition at Hagerman".

Although of quite limited extent on the east side of the Snake River, the potential significance of this unit to my study is the conclusion of Farmer (2009; discussed further below) that the Tuana Gravel plays an important role in the Rangen groundwater discharge. Both the lithologic description and local expertise (Farmer, 2012) indicate this unit is locally highly permeable, with water-production potential akin to the overlying basalts. By virtue of its high permeability and only local occurrence, for purposes of hydrostratigraphic characterization, this gravel is combined with the overlying Quaternary basalts unit as part of the "primary aquifer". The following discussion of the groundwater characteristics of the Tertiary sediments addresses only the Glenns Ferry Fm.

Groundwater Characteristics. The groundwater-production and transmission potential of the Glenns Ferry Fm. is small. Although, well-driller logs note the presence of discernable groundwater (i.e. checking the "Y" [yes] in the "water" column of the standard IDWR "Driller's Report") in individual strata, they commonly drill on through to the underlying basalts even for the modest demands of domestic and stock use, suggesting generally low productivity.

The USGS exploration well northeast of Wendell ("Wendell Well" on Figure 1) penetrated a body of sediment identified as Glenns Ferry Fm.: 100 ft. of gravel and conglomerate and 100 ft. of clay, silt, and sand. The Glenns Ferry Fm. deposits were interpreted as "the confining layer" "that separates the two basalt units". Groundwater-level monitoring piezometers completed above and below these sedimentary layers monitored a consistent head[4] difference, approximately 64 ft. higher in the lower basalt unit, over a 3-year period (1982 - 1984). (Whitehead and Lindholm, 1985).

Closer to Rangen, the Henslee monitor well, interpreted by Farmer (2009) as having penetrated the Glenns Ferry Fm., found a 5 ft. head difference (again, higher in the deeper unit) across this sedimentary sequence. The role of the Glenns Ferry Fm. with respect to groundwater flow between the underlying and overlying basalts likely varies locally, but it consistently provides a much lower permeability in contrast with the highly-permeable, overlying Quaternary basalts in the study area.

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[4]"Head" is the fluid pressure in the aquifer, commonly expressed as the level to which groundwater will rise in a cased well. A substantial difference in head over a short vertical distance indicates the presence of confining layers which impede the equalization of head throughout an aquifer.

4. Tertiary Basalts

Underlying the Quaternary basalts and the Tertiary sediments (where present) in the study area are a thick sequence of basalts of Tertiary age forming the bulk of the regional "Idaho Group":

> Basalt of Shoestring Road (Tsh) - "Forms a thin layer 30-50 feet thick within the Glenns Ferry sediments on the west side of the Snake River" (Othberg et al., 2005).
>
> Basalt of Oster Lakes (Tos) - "Banbury Basalt, basalt of upper part" of Covington and Weaver, 1990 (Othberg et al., 2005).
>
> Older basalt flows, undivided (Tub) - also part of "Banbury Basalt, basalt of upper part" of Covington and Weaver, 1990; "includes fine-grained sediments either intercalated with or underlying the basalt near the mouth of Malad River" (Othberg et al., 2005).

These units underlie the entire study area, and extend eastward beneath the eastern Snake River Plain. In the study area, the Tertiary basalts outcrop only where erosion along the Snake and Malad Rivers have cut down through the Quaternary sediments, Quaternary basalts, and Tertiary sediments. The distribution and thickness of Tertiary volcanics beneath the broader eastern Snake River Plain are poorly understood. Where the Tertiary sedimentary strata were stripped away prior to emplacement of the Quaternary basalt flows, the upper contact of the Tertiary basalts marks the bottom of the primary aquifer.

Groundwater Characteristics. Although of similar origin, the lower (Tertiary) basalts are widely understood to have substantially lower permeability than the overlying, younger basalts (Quaternary), e.g. "The older volcanic rocks are typically much less transmissive than the Quaternary basalts", (Whitehead, 1992; p. B1). For a test hole in the central Eastern Snake Plain Aquifer, Whitehead (1992; p. B28) reports, "transmissivity of the Quaternary basalt was estimated to be 1,000 to 10,000 times greater than that of the Tertiary basalt".

As with the upper basalts, the Tertiary-age flows also exhibit significant anisotropy. There are confining units both above and within the Tertiary basalt sequence. For example, the USGS "Wendell" well referred to above also completed two piezometers within the Tertiary basalts - one at the top of the sequence, and one 416 ft. deeper, at the top of "sediments ... believed to be the middle member of the Banbury Basalt" (Whitehead and Lindholm, 1985; p. 17). In that case, a head difference of 93 ft was observed, more than the head difference across the Glenns Ferry Fm. discussed above. The confining layer (within the Tertiary basalt sequence) is described as "clay-filled vesicular basalt, crystalline basalt, and clay" (Whitehead and Lindholm, 1985).

Although generally forming a low-permeability barrier, above which nearly all the large springs of the study area discharge, the Tertiary sediments and Tertiary basalts are not entirely unproductive of groundwater. At the USGS Wendell borehole, for example, "Eighty of the top 100 ft [of Tertiary basalts] is a porous cinder zone with high hydraulic conductivity." (Whitehead and Lindholm, 1985; p. 16). Whether due to poor permeability or to the abundant

groundwater supply commonly available from shallower units, there are no high-volume wells completed in this lower aquifer in the study area (Farmer, 2012). Development of the Tertiary basalts has apparently been successful for domestic and stock wells along the Hagerman rim where the primary aquifer is unsaturated, forcing development into the underlying strata (e.g. Ramsey well, Anderson well; see Figure 4 for locations).

AQUIFER DEFINITION

This section evaluates how the hydrogeologic units described above have been grouped into identified "aquifer(s)" for the development of conceptual evaluations and numerical groundwater flow modeling. As explained above, my analysis concludes that the Quaternary basalts form the primary aquifer in the study area, but that the Tertiary sediments and basalts constitute a separate, lower aquifer within the regional groundwater framework.

Regional groundwater flow modeling of the eastern Snake River Plain has been undertaken by various groups over the last several decades. The USGS Regional Aquifer-System Analysis (RASA) investigations use the term, "Snake River Plain Regional Aquifer System", but the precise hydrostratigraphic delineation is uncertain. Whitehead, 1992; p. B19 refers to "a series of basalt flows and intercalated pyroclastic and sedimentary materials that underlie the Snake River Plain". However, the focus of attention is clearly on the younger basalts, e.g. Whitehead (1992) notes that the Quaternary basalts form "the most transmissive part of the aquifer system" (p. B19), and that "chiefly Quaternary basalt of the Snake River Group contain and yield exceptionally large volumes of water" (p. B22), and his summary of aquifer hydrology is titled "Hydraulic Characteristics of Quaternary Basalt and Alluvial Aquifers".

In terms of modeling groundwater flow within the aquifer, the regional RASA research divided the aquifer into 4 layers as arbitrary thickness slices. At the western edge, they maintained the 200 and 300-ft. thickness of the two uppermost model layers, regardless of lithology. Thus, in the present study area, the RASA modeling subsumed the uppermost Tertiary basalts, the Tertiary sediments, the Quaternary basalts, and the Quaternary sediments into a single layer, underlain by 300 ft. of additional Tertiary basalts (and interlayered sediments).(Garabedian, 1992; p. F38 and Figure 23).

The documentation for the Enhanced Snake Plain Aquifer Model (ESPAM), also a regional-scale model, refers generally to the "eastern Snake River Plain aquifer", but provides no specific vertical delineation. For groundwater modeling, an arbitrary elevation of 2000 ft. was adopted for the base of the effective aquifer, although "the active portion of the aquifer often is thought to be limited to the upper several hundred feet of saturated thickness" (Cosgrove et al., 2006; p. 13).

The ESPAM modeling (versions 1 and 2) treats the entire aquifer as a single layer, representing all four of the sequences described above only in terms of their impacts on average, cell-by-cell hydrologic properties[5].

Ralston (2008; p. 3), working in the present study area, discards all deposits beneath the Quaternary basalts in concluding, "The Snake Plain aquifer in the general vicinity of the Thousand Springs to Malad reach is hosted by the Quaternary basalt units with thin sedimentary units. The effective base of the aquifer is the contact between the Quaternary basalt units and the underlying Tertiary sedimentary and/or basalt units. Almost all of the springs within the Thousand Springs to Malad reach are located along the contact between the Quaternary basalt units and the underlying Tertiary sedimentary and/or basalt units."

Farmer (2009), also working at the scale of the present study area, echos the concept of "the upper Quaternary basalt flows that host the Eastern Snake Plain Aquifer" (Farmer, p. 36), but suggests there are underlying aquifers as well. He proposes "a three-layer geologic model ... [as] the foundation for the hydrostratigraphic model" (Farmer, p. 17): 1) Quaternary basalt; 2) Glens Ferry Fm.; and 3) Tertiary basalt, i.e. sequences 2, 3 and 4 as described above (pp. 4-10); see Figure 5 for Farmer's schematic cross-section. He goes on (p. 36), "The GFF [Glenns Ferry Fm.] likely forms a wedge of clastic sediments eastward from Rangen towards Wendell and may create vertically divergent groundwater flow paths with a deep path flowing through basalts underlying the GFF." and refers to "a deep aquifer system beneath the Glenns Ferry Formation that is not being used" (Farmer, p. 33).

Delineations of the regional aquifer west of the Hagerman rim also vary. The RASA and ESPAM 1 models carried the regional aquifer west to the Snake River, but Whitehead (1992; Plate 3) terminates the Quaternary basalt at the rim. (West of the rim, the thickness of the Quaternary basalts is described as, "Generally none. If present, of small areal extent and less than 100 ft. thick.") ESPAM 2 and 2.1 terminate the aquifer along or just west of the Hagerman rim, consistent with the conclusions of Bendixen (1995) and Ralston (2008) that the basalts west of the rim have no hydrologic connection with the regional aquifer. (For example, "The available data indicate that water producing zones (aquifers) in the area between the Plateau rim [Hagerman Rim] and the Snake River are not part of the Snake Plain aquifer, regardless of the age of the basalt units." (Ralston, 2008; p. 5).) Farmer (2009) concluded that those basalts are somewhat connected, not via direct east-to-west groundwater flow, but via a "ramp" down which groundwater flows from the south end (i.e. northward from the Thousand Springs area). IDWR well records do not suggest there is a significant aquifer present in this area (west of the rim and north of Rangen), i.e. there are no irrigation wells, and the highest listed production rate is only 85 gpm (for a domestic well use).

[5]One ESPAM2.1 model cell is 1 mile by 1 mile by 4,000 ft. thick.

GROUNDWATER FLOW

At the regional scale, groundwater in the Eastern Snake Plain Aquifer is recharged with surface and groundwater inflow from the north and by precipitation and surface-water irrigation infiltration across the expansive outcrop surface. Groundwater flow is generally westward, as presented on regional potentiometric surface maps, e.g. Figure 6.

At the scale of the present study area, Figure 7 presents a more detailed view. This contouring is of November, 2011 synoptic measurements of groundwater levels including the present study area, collected by IDWR (contoured by Farmer and Blew, 2012 as their "Figure 14"). With the exception of a few wells right along the rim, these data are from the Quaternary basalt aquifer. Flow toward the Hagerman rim from east and northeast is demonstrated, which of course is required by the copious discharge from the aquifer to the many springs along the Snake River. But Farmer and Blew conclude there are "at least six groundwater divides" in this reach, separating the generalized eastward groundwater flow to converge on specific discharge areas (see groundwater flow arrows[6]).

BASE OF THE PRIMARY AQUIFER

Division of the deposits of the study area into an upper, "primary" aquifer and a "lower" aquifer, requires delineation of the boundary between the two. This section of the report begins with an explanation of the hydrogeologic importance of that delineation, then addresses the boundary for each of several portions of the Rangen study area (Malad Gorge, Hagerman Rim, Hagerman Valley, Magic Springs / Thousand Springs, and East of Rim).

As described above, there are many hydraulic boundaries within the larger stratigraphic sequences present beneath the study area. Vertical flow barriers of unknown lateral extent exist within individual basalt flows and between flows. Fine-grained sedimentary deposits within and between basalt sequences are also likely present at many geographic scales, adding further to the complexity of groundwater flow. However, there is one, major, regional hydrogeologic boundary of widely recognized importance at the base of the primary aquifer (Quaternary basalts):

> "Large springs in the Snake River canyon between Milner and King Hill [locations which span the study area] issue at the contact between the highly transmissive pillow lava and the less transmissive underlying rocks" (Whitehead, 1992; p. B1)
>
> "the altitude of north-side springs are controlled by several factors: (1) altitude of the contact between relatively impermeable Banbury Basalt and basalt of the Snake River

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[6]Groundwater flow directions on this and other figures in this report are inferred based on perpendicularity to equal-head contours. In basalt aquifers, this generalization is more appropriate over larger areas than at very local scales.

Group, (2) location of lake clays, and (3) location of relatively impermeable Idaho Group (Glenns Ferry Formation) sedimentary rocks." (Garabedian, 1992; p. F17)

"Therefore, in the Thousand Springs area, sedimentary rocks constitute the base of the Quaternary basalt aquifer. The steeper water-table gradient in this part of the Snake River Plain is attributed to lower transmissivity caused by thinning of the basalt aquifer" (Whitehead, 1992; p. B27)

"The topography of the geologic contact between the Quaternary basalt units and the underlying Tertiary sedimentary and/or basalt units along the plateau rim is an important controlling factor for ground-water flow and spring discharge characteristics in the Thousand Springs to Malad reach." (Ralston, 2008; p. 5)

"The topography of the bottom of the Quaternary basalt is the dominant control for the locations and amounts of water discharged from springs and the sensitivity of the springs to changes in ground-water levels." (Ralston, 2008; p. 6).

"the Rangen Spring (and probably other springs north from Rangen up to Malad Gorge) has a strong component of paleo-topographic lows controlling flow characteristics" (Farmer, 2009; p. 18).

"Highly permeable pillow lavas and the interconnection of ancestral canyons make the basaltic aquifer along the river reach from Kimberly to Bliss highly transmissive." (Garabedian, 1992; p. F18)

The terms "paleo-topography" and "ancestral canyons" in these statements refer to the shape of the land surface prior to emplacement of the Quaternary basalts. As these basalts, in liquid form, spread across the landscape, they filled in the existing stream channels and valleys and solidified to create a new topography. The drainage network subsequently established on that new surface guided the deposition of later basalt eruptions and gradually the primary aquifer was built up across the eastern Snake River Plain to produce the present surface topography. Thus, there are many inter-flow surfaces beneath the present land surface - as between the cards in a deck - but the surface at the bottom of the "deck", where the Quaternary basalts overly the lower-permeability Tertiary deposits is the surface of interest here.

The lower boundary of the primary aquifer controls the occurrence of major springs in the study area. It is also important for its impact on the saturated thickness of the primary aquifer, i.e. the thickness through which groundwater flows and through which any impacts to groundwater flow must be transmitted. The saturated thickness is the difference between the groundwater level and the lower boundary of the aquifer.

Over the great majority of the aquifer, saturated thickness is likely quite large, vastly more than the few feet or even tens of feet of water level impacts due to changes in recharge or groundwater extractions. In such circumstances, precise delineation of the bottom of the aquifer

may be of little significance. Where the saturated thickness is relatively small, however, as it is along the spring discharges of the Hagerman rim, including at Rangen, seasonal and long-term changes in water level may be a significant fraction of saturated thickness. As stated by Ralston (2008, p. 7), "The saturated thickness of the aquifer is small near the Plateau Rim. Lowered groundwater levels result in not only decreased hydraulic head for the springs but also significantly decreased transmissivity." Thus, delineation of the base of the primary aquifer is particularly significant along the Hagerman Rim.

Finally, the elevation of the base of the primary aquifer is important in creating horizontal boundaries to groundwater flow where the base of the aquifer intersects the land surface. This occurs where the aquifer is severed by the Hagerman Rim, the Snake River, and by a section of the Malad River.

Figure 8 presents a schematic contour map of the bottom surface of the primary aquifer. The figure is based on concepts developed by previous investigators (e.g. Farmer, various dates; Ralston, 2008) and the depositional history of the Tertiary sediments discussed above (pp. 7-8), controlled to mapped outcrops, well logs[7], and inferences based on the location of springs. The dots on Figure 8 present the control points. Contouring distant from control points and in areas with only "less-than" control points is hypothetical, presenting an interpretation consistent with the available data, but more conceptual than precise. With the exception of the Rangen area, I have not attempted to resolve the geometry of each spring system along the Hagerman Rim, but expect that considerable detail could be added through careful review of outcrops, springs, and local well logs.

The Figure 8 horizon marks the top of either the Glenns Ferry Fm. or of the Tertiary basalt sequence where Glenns Ferry Fm. deposits are either absent or occur within the Tertiary basalt sequence. For purposes of this investigation, the Tuana Gravel is included with the primary aquifer, despite the geologic age difference, due to the sporadic occurrence and inferred high permeability of the gravel unit. From a hydrostratigraphic perspective, the effective aquifer is defined by the hydrologically-connected body of relatively high-permeability material, bounded on the bottom by the strong permeability contrast with underlying materials (Glenns Ferry Fm. and Tertiary basalts).

Lateral boundaries of the primary aquifer, i.e. the exposed contact with the underlying deposits, are indicated by the red line in Figure 8. At many locations, that contact is obscured by the veneer of Quaternary sediments.

The following paragraphs discuss the base of the primary aquifer for specific portions of the study area.

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[7]The logs for relatively deep wells in the contoured area were reviewed to find both contact elevations and, absent encountering the Quaternary:Tertiary contact, elevations below which that contact is assumed to occur (i.e. the elevation of the bottom of the well).

Malad Gorge

Both Othberg et al. (2005) and Covington and Weaver (1990) map a small outcrop of Glenns Ferry Fm. and Tertiary basalt near the mouth of the gorge. At this point, the primary aquifer is severed by the Malad River. Erosion has carved the gorge entirely through the Quaternary basalt flows to expose the underlying, much-lower-permeability, lower aquifer. Hydrologic continuity within the primary aquifer is likely established upstream (east) of the spring area, where there is substantial, saturated Quaternary basalt thickness above the Glenns Ferry Fm. contact.

Along the river upstream from the Tertiary basalt/Tertiary sediments outcrops at the mouth of the gorge, prolific springs issue from Quaternary basalt flows, at elevations from 2850 to 3090 ft. (Covington and Weaver, 1990). In a schematic north-south cross-section through this reach Farmer and Blew (2009; Figure 7, reproduced here as "Figure 9") suggests springs emerging at river level are a function of a Glenns Ferry Fm. floor to the canyon, i.e. the primary aquifer is draining to the level of the Glenns Ferry Fm. at this point.

In east-west cross-section, detailed examination of groundwater levels associated with dye tracer studies led Farmer and Blew (2012; p. 8) to conclude, "The contour lines show a trough-like depression in the water table with the same long axis orientation of northwest/southeast as the tracer test flow path .... The location of this water table depression fits near where Malde (1971) mapped it. If the ancient canyon exists here, and has highly permeable pillow rubble zones at depth, then in effect the subsurface mega-scale feature is acting like a drain (Stearns, 1936) that captures the Eastern Snake Plain Aquifer water and routes it down the ancient canyon towards the Malad Gorge." Thus, the Quaternary basalt/Tertiary basalt contact dips eastward from the mouth of the gorge, but then rises to the east further upstream. Well logs adjacent to the canyon upstream of the springs (around I-80) report sediments interpreted as Glenns Ferry Fm. at elevations around 3100 ft., marking the northeast bank of the suggested north-south paleo-channel (e.g. see the "2900" contour on Fig. 8).

Hagerman Rim

Covington and Weaver (1990) map the west-facing slope below this topographic rim between the as simply, "Landslide deposit", with the exception of an outcrop of Glenns Ferry Fm. at the Vader Grade, ½ mile northwest of Rangen. Kaufman et al. (2005) and Othberg et al. (2005) map most of this slope as Glenns Ferry Fm. outcrop, and provide a Quaternary basalt : Glenns Ferry Fm. contact from just south of the Malad Gorge (Glenns Ferry Fm. top at 3125 ft. elevation) through the Vader Grade (3210 ft.) and on to approximately 1 mile southeast of Rangen (3180 ft.). This contact forms a broad arch in north-south profile.

At a finer scale, this arch is cut by notches (interpreted as roughly east-west paleochannels eroded into the Glenns Ferry Fm. surface), which serve as outlet points along the west edge of the Quaternary basalt aquifer that covers the plateau and fills the paleochannels. Data from the Rangen area mark the top of the Glenns Ferry Fm. at 3210 ft. elevation on the Vader Grade outcrop, 3400 ft. northwest of the Curren Tunnel (Kaufman, 2005); at 3159 ft. elevation in the

Rangen Monitor Well 600 ft. east of the tunnel (Farmer, 2009), and at 3100 ft (Farmer, 2009) where the springs below the Curren Tunnel discharge. Thus, the local relief on the base of the primary aquifer at Rangen is on the order of 100 ft.

Farmer (2009; Figure 24) suggests that the Curren Tunnel, at elevation 3145 ft., may mark the actual base of the Quaternary basalts, with the larger, lower groundwater discharges (at 3100 ft. elevation) issuing from underlying, high-permeability layers of the Tuana Gravel. If so, the Tuana deposits serve as part of the primary aquifer despite their Tertiary age, with groundwater

discharge controlled by the occurrence of underlying, low-permeability units of the Glenns Ferry Fm. proper.

The 3210 ft. elevation for the top of the Glenns Ferry Fm. cited above from outcrop mapping is based on the location of the Glenns Ferry Fm. / Tuana Gravel contact, i.e. grouping the Tuana Gravel with the overlying basalts. Well logs in the area are interpreted similarly (see Figure 4 for locations):

Richardson well: 3161 ft. - contact between "crevas w/ cinders" and "clay"
Prisbrey well: 3166 ft. - contact between "sand & gravel" and "clay"
Anderson well: 3189 ft. - contact between "basalt gray" and "clay"
Ramsey well: 3157 ft. - contact between "cinders" and "clay"
Rangen Monitor Well: 3100 ft. - contact between "gravel" and "clay & gravel"/"clay sand"
Hosman well: 3168 ft. - contact between "basalt grey" and "clay"
Kelley well: 3098 ft. - contact between "sand" and "clay"
Waters well: 3138 ft. - contact between "basalt grey" and "clay"

The saturated thickness of the primary aquifer is 170 ft. at the Henslee well, 3 miles east of the rim. But comparing the bottom elevations with the groundwater elevations along the rim, e.g. 3155 ft. in the Rangen Monitor Well (Farmer, 2009), demonstrates that the saturated thickness of the primary aquifer is zero at many locations. Farmer (undated, p. 82) makes this point for the Quaternary basalt:Glenns Ferry Fm. contact outcrop at the Veenstra Dairy (1 mile south of Rangen), where the 3162 ft. elevation of the contact leaves the primary aquifer unsaturated.

Saturation is maintained along the rim only where the elevation of the base of the primary aquifer is relatively low, at the "notches" in the underlying Glenns Ferry Fm. through which aquifer discharge takes place. Eastward from the rim, the saturated thickness of the primary aquifer increases substantially, as the groundwater level gets higher in elevation (Fig. 7) and the base of the aquifer gets lower (Fig. 8).

Based on his 30 years of local well-drilling experience, Wendell driller Larry Nielson (2012) recommends staying back from the rim (east) to avoid dry holes and sand problems; "closer to the rim, your chances of a big well are slimmer", "a half a mile can make a big difference".

Hagerman Valley

West of the Hagerman rim, the top of the Glenns Ferry Fm. is substantially lower than along the rim. This reflects the complex erosional history of the present Snake River gorge and, perhaps, downdropping of parts of the valley along rim-parallel faults (e.g. a "ramp fault" above the National Fish Hatchery suggested by Farmer (e.g. undated, p. 66) and the Kauffman et al., 2005 conclusion that, "The stratigraphic relationship [of the Tuana Gravel] at Vader Grade is similar to that at the top of Snake River bluffs to the west where the contact is about 3,400 feet in

elevation, suggesting the section is downdropped to the east. Evidence from well drillers' logs in the Tuttle quadrangle support that conclusion."

In any case, the Quaternary basalt aquifer is severed along the rim, creating a series of springs along its exposed lower contact. Quaternary basalt flows overlying the Glenns Ferry Fm. within the Hagerman valley (i.e. below the rim) have the potential for hydrological continuity with the larger Eastern Snake Plain Aquifer only south of the middle of Sec. 5 (T8S, R14E), i.e. at the head of Farmer's "ramp" structure (e.g. Farmer and Blew, 2012), (see Figure 1 for location). Farmer (2009) suggests that "Groundwater is flowing down this ramp structure through a pillow zone and contact between Quaternary basalt flows."

Younger (post-Quaternary basalts) sediments obscure the Quaternary basalt: Glenns Ferry Fm. contact through much of this area. Minimum elevations around 2850 ft. are provided by mapped Glenns Ferry Fm. outcrops along the Snake River between Lower Salmon Falls and the Malad Gorge (Covington and Weaver, 1990), and by mapped Tertiary basalt outcrops at 2950 ft. elevation 2 miles south of Hagerman (Kaufman, 2005). A Quaternary basalt:Glenns Ferry Fm. contact is mapped at 3020 ft. in the middle of Sec. 6 (T8S, R14E), at the north end of the Hagerman National Fish Hatchery (Kaufman, 2005). For this contact surface to remain buried beneath the younger sediments, a northward dip is required.

Magic Springs / Thousand Springs

Covington and Weaver (1990, 1991) map only a thin band of landslide deposits between outcrops of the Quaternary basalts and the underlying Tertiary basalts in this area, i.e. a contact elevation of approximately 3000 ft. Kaufman et al. (2005) mapping indicates that the Glenns Ferry Fm. is locally absent south of the middle of Sec. 5 (T8S, R14E), i.e. the Eastern Snake Plain Aquifer terminates at the major spring line on top of the Tertiary basalts. Spring elevations in this reach are around 2980 ft., emerging "at the top of the Banbury Basalt" (Tertiary basalt) (Covington and Weaver, 1990).

East of Rim

As described above, the Quaternary basalt/Glenns Ferry Fm. contact appears to dip eastward from near the mouth of the Malad Gorge, then to rise beneath the upstream portion of the gorge. The eastward dip appears to be maintained to the south, i.e. east from along the Hagerman rim.

Farmer (2009) provides cross sections for the Rangen area indicating a locally eastward dip, on which he identifies the top of the Glenns Ferry Fm. at 3028 ft. elevation – 80 ft. lower than on the Vader Grade – in the "Henslee" well, 3 miles east of Rangen.

Wells sufficiently deep to hit the Glenns Ferry Fm. (or Tertiary basalts) east of the Hagerman rim are relatively rare due to the widespread productivity of the overlying Quaternary basalts (i.e. there is little reason to explore for deeper groundwater). Thus, there are few data with which to profile the base of the primary aquifer.

The most detailed stratigraphy available is from a hole cored to a depth of 1123 ft., drilled by the USGS northeast of Wendell in support of their RASA work. Sedimentary rocks were encountered between 403 and 590 ft. in depth: "The 187-ft thick interval of low electrical resistivity material that underlies the basalt consists of sediments that grade downward from gravel to clay. Correlation with other drill holes and comparison with outcrops near the Snake River suggest that the sediments are part of the Tertiary and Quaternary Glenns Ferry Formation." (Whitehead and Lindholm, 1985; p. 16). The elevation of the top of this sedimentary sequence is 3197 ft., 169 ft. higher than at the "Henslee" well and thus requiring a relatively low area between the Wendell well and the Rangen rim, similar to that suggested by Farmer and Blew (2012) for the Malad area.

The southeastward extension of the paleo-channel that intersects the Malad Gorge (see Figure 8) is based on the Quaternary:Tertiary contact in the USGS "Wendell" well (Whitehead and Lindholm, 1985), the Henslee well (Farmer, 2009), and along the Hagerman rim (Idaho Geological Survey mapping). Logs for wells indicated with a "?" symbol on Figure 8 do not provide clear indication of the contact at the contoured elevation; whether due to the absence of a significant thickness of contact-identifying sedimentary layers or due to errors in this interpretation of the contact surface, is beyond the scope of this investigation.

In addition to the USGS "Wendell" well, examination of driller's logs for the area east of Rangen finds a group of wells 7 miles ESE of Wendell (southwest of Jerome; T8S, R16E, Secs. 21, 28, 33) that encountered from 95 to 174 feet of fine-grained sediment (e.g. "clay & sand stripe", "yellow clay", "clay sticky", "clay"), with upper-contact elevations between 3304 and 3376 ft. (depths around 200 ft.). Wells within two miles north and northwest failed to report significant thicknesses of sedimentary deposits, despite bottom-hole elevations around 3200 ft. elevation, indicating the sediments either represent a local high spot on the base of the primary aquifer or a discrete body of sediments within the widespread series of basalt flows. In either case, this area appears to represent a barrier to groundwater flow in the primary aquifer, as the saturated interval above the fine-grained sediment sequence is minimal to zero, i.e. there may be no effective Quaternary basalt aquifer at this locations.

RANGEN GROUNDWATER DISCHARGE

This section presents a focused discussion of the details of the specific groundwater discharges supplying the Rangen facilities. Like the discussion of the study area hydrogeology above, the objective is to develop a foundation from which to examine the fidelity of the ESPAM2.1 groundwater flow model to the actual conditions at Rangen. The two groundwater discharges at Rangen – the Curren Tunnel and the "lower springs" are described, followed by evaluation of the groundwater flow system they reflect and conditions in the supplying aquifer.

Figure 10 presents a topographic profile of the groundwater discharge at the Rangen complex; Figure 11 shows the area photographically.

The rim of the plateau immediately above the Rangen complex is at approximate elevation 3220 ft., then rises gradually to the east (e.g. 3250 ft. elevation 1 mile away). The rim and the plateau to the east consist entirely of basalt flows, with the tiny exception of a small outcrop of Glenns Ferry Fm. and Tuana Gravel on the plateau at the top of the Vader Grade (see Figure 2).

Pillow basalts are well exposed in outcrops immediately below the rim. Below an elevation of approximately 3170 ft, continuous outcrop is uncommon as rubble has accumulated on the less-steep slopes. Also, as seen in Figure 11, vegetation further obscures outcrop relationships.

CURREN TUNNEL

There are various groundwater discharge points feeding the Rangen complex. Highest in elevation is the Curren Tunnel. This tunnel was bored into the hillside beneath the rim. The tunnel opening is approximately 75 ft. west of the rim and approximately 70 ft. below the rim elevation. The tunnel begins in a deposit of large basalt boulders, immediately downslope from conspicuous outcrops of pillow basalts. At the outlet, the tunnel is lined with 6-ft. diameter corrugated steel pipe. This pipe extends into the hillside for approximately 50 ft. (visual inspection and IDWR, 1993), beyond which the tunnel extends as an open rock excavation (see Figure 11). Groundwater enters the tunnel from the aquifer at unknown (probably numerous) points and flows by gravity to discharge at the tunnel mouth.

The history and construction details of the Curren Tunnel are unclear. The earliest water right attributed to the tunnel has an 1884 priority date. Testimony by Lonny Tate (2012; pp. 14, 60, 61) states that the tunnel is "maybe 300 foot" long, at a fairly constant elevation, and includes a fork about 3/4 of the way to the end. Flow is described as somewhat greater from the east [south] fork. Dan Maxwell has also been inside the tunnel. He described the length of the tunnel as "oh, 100 feet maybe", but also remembers the fork described by Tate (deposition testimony 2012, p. 9).

Assuming groundwater does not enter the tunnel through the steel culvert lining, the first opportunity for collection of groundwater is at the end of the lining. Given the slope of the hillside above the tunnel entrance, this groundwater-entry point is at least 40 ft. below the land

surface, and the effective "depth" of the tunnel increases with greater penetration into the hillside. As the tunnel proceeds eastward beneath the plateau rim, it is approximately 70 ft. beneath the ground surface (see Figure 10).

The earliest water rights on production from the tunnel are for irrigation (e.g. Candy, Crandelmeier), with an 1884 priority. These rights irrigate land to the south and west of the tunnel which, for gravity irrigation, require delivery of water at an elevation of at least 3130 ft. (e.g. the Candy right in the NE1/4 SE 1/4 Sec. 31, T7S, R14E; see Fig. 4 for location of this area). Thus, although there are natural springs at a lower elevation (described below) there was obvious value in intersecting the groundwater table at as high an elevation as possible, to allow irrigation of the target lands by gravity flow.

There are small seeps on the hillside just north of the tunnel entrance, suggesting there may have been a natural groundwater discharge at the site of the tunnel, although these seeps may be a function of irrigation runoff from the adjacent rim (see Figure 11). An article in the December 30, 1962 Twin Falls Times News suggests the source of the Rangen groundwater supply as "man-made springs", created when "early pioneers in search of irrigation water drilled a hole into the cliff and struck water" (emphasis added). The source of this report is unclear (and it was clearly long after tunnel construction), but it describes an excavation to develop groundwater in the absence of an existing spring. It is unclear if the tunnel sought to develop additional groundwater at a site of existing discharge or was excavated into a dry hillside in hopes of intersecting the groundwater table as the tunnel penetrated into the aquifer.

Whether the 50 ft. of lining was necessary to ensure tunnel stability, or reflects the distance to the first significant groundwater flow (or flow increase), is also unknown. It is clear, however, that the tunnel would have substantially increased the flow of groundwater from the aquifer at this point, both by greatly increasing the surface area through which groundwater escapes the aquifer, and by penetrating into the higher aquifer water levels east of the rim (i.e. increasing the available drawdown[8]). And the tunnel is certainly instrumental in maintaining the discharge of groundwater at this point in times of declining aquifer water levels (i.e. groundwater might not discharge in the absence of tunnel excavation).

The Curren Tunnel is a horizontal, flowing well. Just as a vertical well is constructed to provide access to groundwater below the water table, allowing the removal of water to create a gradient toward the well, a horizontal well creates drawdown in the aquifer by virtue of penetrating a sloping water table. Discharge is a function of the difference between the hydraulic head at the point(s) where groundwater enters the well and the head in the surrounding aquifer. The greater that difference, whether created by pumping water from the well, relieving the pressure in an artesian aquifer, or excavating a horizontal well to a point further below the aquifer water table,

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[8]The difference between the total depth of a well and the water level in the surrounding aquifer is the "available drawdown", i.e. how far down the water level can be drawn to induce flow into the well.

the greater the discharge. The advantage of a flowing well, whether vertical or horizontal, is that groundwater can be extracted from the aquifer without use of a pump.

To provide quantitative analysis of the potential impact of the construction of a horizontal well like the Curren Tunnel, a small MODFLOW-based groundwater model was developed by Dwivedi and Clark (2012). The aquifer at the tunnel was idealized as a rectangular prism, 606 ft. long (the approximate distance between the tunnel outlet and the Rangen Monitor Well), 408 ft. wide (representing the paleochannel filled with pillow basalts and Tuana Gravel), and 60 ft. deep (the difference in elevation between the outlet of the lower springs at Rangen and groundwater level in the Rangen Monitor Well). The aquifer to the east is represented by a constant head boundary at one end of the aquifer; the tunnel is represented by a 250-ft long horizontal line of constant-head cells extending back into the aquifer from the west end (see Figure 12). The elevation difference between the constant head boundary and the drain discharge is 10 ft. The aquifer transmissivity was adjusted to produce a steady-state flow rate of 26 cfs from the tunnel. When the tunnel was reduced to a single constant-head cell to represent a pre-tunnel natural spring at the location of the tunnel outlet, the flow was reduced to 6.7 cfs. Under this schematic-level modeling, the impact of construction of a drainage tunnel was to increase flow by 19 cfs, a factor of 3.

Of course, this illustrative model provided no alternative outlet for groundwater. For the Curren Tunnel, the pre-construction discharge may have been zero, i.e. the entire production is a function of the creation of the tunnel as a high-level groundwater discharge facility. To the extent aquifer management decisions, calculations of impacts as percentages of discharge, etc. distinguish natural springs from constructed wells, the Curren Tunnel may appropriately be considered a well.

The Rangen Monitor Well is located 588 ft. east of the outlet of the Curren Tunnel (Farmer, 2009). The outlet elevation of the Curren Tunnel has been variously reported as 3138 ft. (Covington and Weaver, 1990), 3145 ft. (Farmer, 2009) and 3150 ft. (IDWR, 2011). The water level elevation in the well has varied between 3153 and 3158 ft. over the 2008 - 2012 period of record. Thus, the aquifer water level may vary between as little as 3 and 8 ft. above the tunnel outlet. That this small difference is sufficient to produce the observed flows is testimony to the utility of tunnel construction and of the permeability of the aquifer, but also indicates the potential vulnerability of tunnel production to small changes in aquifer water levels. The greater fluctuations in flow from the tunnel as compared with the fluctuations in the lower springs (discussed below, p. 23) are likely the result of this tenuous intersection of the groundwater table.

As with a vertical well, the production capacity of a horizontal well like the Curren Tunnel is limited by the available drawdown (< 8 ft.). Although the tunnel is 70 ft. below the ground surface, it is only slightly below the surrounding water level in the aquifer. With only a small head difference between the tunnel outlet and the water table in the host aquifer, the tunnel is akin to a vertical well that barely penetrates the saturated portion of the aquifer. Such a "shallow" well is poorly constructed with respect to maintaining production if aquifer water

levels drop, as may happen in response to reduced aquifer recharge (e.g. a decrease in precipitation or irrigation canal seepage) or increased aquifer discharge (e.g. development of the aquifer by other groundwater users). By way of comparison, wells constructed in the primary aquifer immediately east of Rangen have available drawdown of 69 ft. (Tate), 105 ft. (Gibson), and 170 ft. (F. Henslee) (see Figure 4 for locations). The location and construction of the Curren Tunnel render its discharge highly vulnerable to relatively small changes in the water levels in the supplying aquifer.

Had the original intent for the Curren Tunnel been as a year-round supply of water to hatchery facilities at Rangen rather than gravity irrigation of crops on the surrounding uplands, construction of the tunnel at the elevation of the lower springs would likely have provided more water and been far less vulnerable to impacts of fluctuations in regional groundwater levels.

LOWER SPRINGS

There is a small area of seeps north of the tunnel at similar elevation to the tunnel, but natural discharge is predominantly downslope from the tunnel. The geologic conditions of the main springs are not entirely clear, as downslope of the tunnel, vegetation and talus mantle the hillside, obscuring bedrock outcrop relationships. Substantial discharge emerges from areas of angular basalt cobbles and boulders, with and without associated soils and vegetation. Nace et al. (1958; p. 54) describe the "Curran Spring" as, "Water emerges from tunnel dug into brecciated, highly permeable basalt, and from talus slope below tunnel." Farmer (2009; p. 28) describes "a large discharge area" he calls the "lower spring zone", at an approximate elevation of 3100 ft., and relates an employee report that approximately 2/3 of the total flow of the system originates from these springs.

Discharge from the Curren Tunnel and the Lower Springs is collected through a complex of collection boxes, pipes and open channels to aggregate to the full water supply of the Rangen facilities.

SITE GEOLOGY

An understanding of the relationship between Rangen groundwater discharges and water levels in the supplying aquifer is necessary to assess the response of the former to changes in the latter. Farmer (2009; Figures 20 and 24) offers a conceptual model of the Rangen system. Those perpendicular-to-the-cliff and parallel-to-the-cliff cross-sections are reproduced here as Figures 5 and 13. In this interpretation, the basic control on groundwater discharge is the strong permeability contrast between the primary aquifer and the underlying Glenns Ferry Fm.. In detail, Farmer places the tunnel at the bottom of a paleo-channel eroded into underlying sediments and filled with Quaternary pillow basalts. Groundwater infiltrates from the bottom of this channel into permeable strata of the Tuana Gravel, and/or other post-channel-erosion gravel deposits, to emerge as the "lower spring zone" at the top of the laterally extensive clay-dominated layers of the Glenns Ferry Fm..

Well logs for the area are consistent with this interpretation of a paleochannel eroded into the Glenns Ferry Fm. The Rangen Monitor Well (see Figure 4 for location) encountered the Quaternary basalt : sediment contact at 3159 ft., i.e. 10-15 ft. above the observed Quaternary basalts at the Curren Tunnel, but did not encounter consistent clay strata, i.e. the Tuana Gravel : Glenns Ferry contact, until elevation 3100 ft.. Further north, that contact is mapped in outcrop, at elevation 3210 ft. and was encountered in a nearby well ("Ramsey"; Farmer, 2009; Figure 14) at elevation 3157 ft. There was clearly substantial relief on the Glenns Ferry Fm. surface upon which the primary aquifer was emplaced, whether as a gravel[9] or pillow-basalt deposit or some combination of the two.

Others, e.g. Covington and Weaver (1990, Fig. 3), have suggested that differing spring elevations along the Hagerman Rim are a function of groundwater emerging from a thick blanket of talus, beneath which the elevation of the controlling basalt:Glenns Ferry contact is obscure. Under this interpretation, the differing elevation of the Curren Tunnel and Lower Springs would be a function of differing pathways through the slope-manteling talus deposits. However, Kaufman et al. (2005) map most of Covington and Weaver's (1990) slope-mantling "landslide deposits", including at Rangen, as Glenns Ferry Fm. outcrop, placing the various springs at the Quaternary basalt:Glenns Ferry Fm. contact (Figure 2) and rejecting the Covington and Weaver interpretation.

Farmer (2009) also rejects a multiple-pathways-through-the-talus interpretation, based on the relatively thin talus associated with the clear Glenns Ferry outcrops on the Vader Grade, and his observations of outcrops of what he interprets as bedrock sediments at the Rangen Lower Springs. His interpretation explains the differing discharge elevations with a two-step permeability contrast: the tunnel flows originate at the Quaternary basalts : sediment contact, and the lower spring flows originate at a gravel : clay contact within the underlying sediments.

Hydrologically, this two-step distinction may be of little significance, as a complex basalt flow likely contains within itself a high degree of permeability contrast and groundwater channelization. Whether due to lithologic differences (pillow basalt vs. underlying gravels) or simply heterogeneity within the same lithology (pillow basalt), the steeper gradient between the wider aquifer and the point of discharge favors greater flow from the lower spring than from the tunnel.

FLOW DATA

The hydrogeologic model presented in the previous section is consistent with the measured flow data for the Rangen system. Flow data for the Rangen system have been developed in various ways over the past 30 years, varying from automated flow gaging at the Curren Tunnel by IDWR to ad hoc measurements at various weirs and raceways by Rangen personnel. (See Brendecke,

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[9]Farmer (2009, p. 28) suggests this gravel may be either the Tuana Gravel or "Quaternary age (Qg) gravels eroded from the Tuana"

2012 for detailed review of Rangen discharge data.) Figure 14 presents reported flow measurements/estimates for the period since IDWR began discrete monitoring of the Curren Tunnel in 1993. Qualitatively, these data are consistent with a straightforward model of aquifer head, gradients, and discharge, with two distinct discharge pathways:

> In the 1990s, flow from the tunnel and the springs are of comparable magnitude, despite the lower discharge elevation (i.e. higher gradient) of the springs. This requires a higher effective aquifer permeability for the tunnel, e.g. due to its much larger area open to the aquifer and its penetration into the hill reducing the effective distance to the background aquifer.
>
> Both spring and tunnel discharge declined with the onset of the drought of the 2000s, although the tunnel was affected more strongly than the springs. This is consistent with the springs' lower elevation, in that a unit change in aquifer water level creates a proportionately larger change in gradient for the tunnel.
>
> Similarly, the higher elevation of the tunnel will result in larger fluctuations in discharge from the tunnel as fluctuations in aquifer water level impact the gradient that drives water from the aquifer to the tunnel more than they impact the gradient to the lower springs.

At a more detailed level, these flow data demonstrate another potentially important aspect of the system: the inadequacy of a simple hydraulic model of flow as a linear response to changes in head in the common aquifer. For example, at points "A", "B", and "C" on Figure 14, tunnel and spring flows variously rise together, one flow rises while the other falls, and one flow rises while the other remains unchanged. A more complex hydraulic model and/or a substantial degree of error in these flow data is indicated. The issue of uncertainty in the relationship between aquifer water levels and groundwater discharges is further addressed below.

GROUNDWATER GRADIENTS

Groundwater flow is controlled by groundwater gradients, i.e. the difference in hydraulic head between two points; "water runs downhill". While recognizing that, in a groundwater system, "downhill" can describe both horizontal flow (within a layer) and vertical flow (between layers), and that gradients in a confined aquifer can be upward, the Rangen discharges are assumed to generally result from unconfined flow in the primary, Quaternary-basalt aquifer[10]. The geometry and saturated thickness of the primary aquifer in the study area were discussed above. Here, I

[10] "The aquifer in basalt of the Snake River Group as a whole behaves as an unconfined system." (Whitehead, 1992; p. B29).

look at the groundwater elevation data and the indicated groundwater flow directions[11] and rates for the Rangen system specifically.

As noted above (p. 12) the contouring of Figure 7 (after Farmer and Blew, 2012) depicts the variations from simple, east-to-west groundwater flow in the aquifer to a more complex pattern as flow approaches discharge points along the Hagerman Rim. This depiction is based on a simple, automated contouring of the input data, however, and careful examination of the Rangen area finds that groundwater flow under the head distribution of Figure 7 would be away from, rather than into the Rangen discharge points. Rangen is perched on a potentiometric ridgeline in this interpretation (see flow arrows on Figure 7). Because that is clearly not the case (or there would be relatively little Rangen flow), the actual situation is obviously more complicated.

Similarly, the contouring of Figure 7 includes a closed contour approximately 1 mile northeast of Rangen. This represents a depression in the potentiometric surface, an unlikely occurrence in a prolific aquifer outside the active irrigation season. Hydrographs for two IDWR-monitored wells in this area - the "33BBB" and "29CDC"[12] wells - are provided as Figure 15. (See Figure 4 for locations.) The westernmost of these two wells (29CDC) consistently reports the higher groundwater elevation of the two, demonstrating that groundwater flow is not simply east-to-west through this area. Local groundwater flow from west-to-east is demonstrated here, and the creation of a "sink" in this vicinity is unlikely, i.e. the contouring of Figure 7 is incorrect with respect to the Rangen area.

Figure 16 presents a more detailed examination of groundwater levels in the Rangen area. First, water-level data from wells that are not completed in the primary aquifer (or are completed in portions of the aquifer that are not hydraulically connected with the aquifer that supplies the Rangen discharges) are removed from the Farmer and Blew (2012) dataset supporting Figure 7. These are wells located at T8S, R14E, Sec. 5bbb; T8S, R14E, Sec. 5bba ("Waters"); and T7S, R14E, Sec. 31adc.

Second, the November, 2011 dataset is augmented by other late 2000s water levels measured in October or November[13], the season of highest groundwater levels. These points are measurements from wells at (see Figure 4 for locations):

T7S, R14E, Sec. 28DCB1 - measurement taken 11/29/2007
T7S, R14E, Sec. 29CDC1 - measurement taken 10/20/2011

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[11]In strongly anisotropic permeability distributions, as are likely present at local scales in a basalt aquifer, groundwater flow may be oblique to equipotential contours. Absent sufficient data to suggest the patterns of such anisotropy, conventional, perpendicular-to-equipotential-contours flow is assumed here.

[12]This well is Well No. 989 used in the calibration of ESPAM2.1.

[13]Data from: http://www.idwr.idaho.gov/hydro.online/gwl/default.html

T7S, R14E, Sec. 33BBB1 - measurement taken 12/8/2011

Third, the contouring of Figure 16 is guided by an understanding of the physical system: 1) the simple presence of major groundwater discharge at Rangen requires a local convergence of groundwater flow; 2) my interpretation of the configuration of the base of the primary aquifer (Figure 8) includes a locally-thicker aquifer in a paleo-channel extending eastward from Rangen; and 3) consideration of the emplacement of the lava flows creating the aquifer suggests such a channel as a likely place for high-permeability pillow basalts. In short, a groundwater "channel" as shown on Figure 16 is a reasonable interpretation of the groundwater flow system feeding the Rangen discharges.

Although data density in the area is insufficient to delineate local gradients in detail, the contouring of Figure 16 offers an interpretation that is more consistent with the available data than previous mapping. Under this interpretation, a zone of high transmissivity, e.g. coincident with the increased aquifer thickness and pillow-basalt deposition of a paleo-channel, drains a portion of the regional aquifer to discharge at Rangen. A groundwater divide to the south distinguishes the local Rangen system from the Thousand Springs area. A groundwater divide to the north distinguishes the local Rangen system from rim springs between Rangen and the Malad River.

Groundwater gradients also determine the discharge rates of springs and drainage tunnels. Given an opportunity for discharge (e.g. a well, a drainage tunnel, a low spot in the exposed contact with an underlying formation) discharge rate is a function of the gradient (the difference in elevation per unit of distance) between the aquifer and the discharge point. Because the elevation of the discharge points – the Curren Tunnel and the springs -- and the distance between the discharge and any reference point in the aquifer are fixed, the gradient is controlled by the only variable quantity in this relationship: the water level in the surrounding aquifer. Higher aquifer water levels produce higher discharge rates. (Because the Curren Tunnel is relative high relative to the water level in the supplying aquifer, only relatively small gradients into the tunnel are possible.)

Figure 17 presents the relationship between the water level in the aquifer at the IDWR-monitored well in T7S, R14E, Sec. 33BBB1 and the estimated monthly flows from the Rangen groundwater discharges. While the expected general association of higher aquifer water levels with greater discharge is obvious, the scatter on the plot is remarkable. For example, a water level elevation of 3169.5 ft. has corresponded with Rangen flows anywhere from 18 to 50 cfs. Similarly, the same system discharge of 30 cfs has corresponded with groundwater elevations varying by 5 ft. By way of comparison, in the ESPAM2.1 model cell containing the 33BBB well, the change in water level predicted to result from the curtailment of all post-1962 priority wells across the Eastern Snake Plain Aquifer, is also 5 ft. (Brendecke, 2012).

Some interference with the direct relationship between aquifer water levels and groundwater discharge might be expected over the 1.1 miles between the 7S 14E 33BBB1 monitored well and Rangen, particularly during the irrigation season, and additional scatter might be expected from

the use of averaged monthly data. However, a similar ambiguity is apparent in much more well-controlled data from the "Rangen Monitor Well", compiled in Figure 18. This well was constructed by IDWR in 2008. It is the nearest groundwater monitoring point to the Rangen discharges. The well is 588 ft. east of the outlet of the Curren Tunnel (Farmer, 2008) . The well is a dedicated monitoring well and there are no other wells (producing or monitoring) between this monitor well and the Rangen facilities. There is one small sprinkler-irrigated field between the monitor well and the rim above Rangen, and a small irrigation tailwater ditch. Thus, there is very limited opportunity for significant interference with the relationship between aquifer water levels and aquifer discharge. Furthermore, there are frequent measurements available for this well (albeit over a limited period of record), which can be rigorously paired with daily flow measurements from the Curren Tunnel to minimize time-related discrepancies. (System-wide Rangen flows are only available as average monthly estimates.)

Figure 18 shows the expected general correspondence between higher aquifer water levels (i.e. higher gradients) and greater flow from the aquifer, via the tunnel in this case. As with Figure 17, however, the relationship is inconsistent in detail. A groundwater elevation of 3154 ft. in the Rangen Monitor well corresponded with Curren Tunnel flows varying between 3.6 and 7.5 cfs; the range in values approaches 100% of the average flow. Similarly, groundwater elevations varying by 2.5 ft. have been measured at the same measured flow of 5.5 cfs.

Because accurate predictions of the impact of water-level changes in the aquifer on groundwater discharge depend on an accurate understanding of the relationship between the two, Figures 17 and 18 represent considerable uncertainty in such predictions.

GROUNDWATER DEVELOPMENT OPPORTUNITY

As noted above, the Curren Tunnel is far from an ideal facility for the production of groundwater due to its small available drawdown and the resulting sensitivity to small changes in aquifer water levels. A grant application filed by Rangen to investigate additional horizontal well drilling to enhance their water supply recognized the importance of available drawdown, recommending targeting "an elevation below the Curren Tunnel", suggesting that such "a horizontal well could provide substantial increase in flow", and characterizing the proposal as a "well deepening" (Rangen, Inc., 2004).

Another alternative is the construction of a vertical well or wells into the very productive aquifer that supplies the Rangen discharge. In the Rangen-to-Wendell area, approximately 50% of the 40+ irrigation wells for which yields are listed in the IDWR database[14] report yields in excess of 750 gpm. The aquifer is sufficiently productive that few wells penetrate to great depth. For this area, the average irrigation well is 150 ft. deep, and the average depth-to-water in these wells is 100 ft. The average available drawdown is 50 - 60 ft. This is substantially less than the full

[14]http://www.idwr.idaho.gov/ftp/gisdata/Spatial/Wells/WellConstruction/WellConstruction.zip

saturated thickness of the primary aquifer (e.g. 170 ft. at the F. Henslee well, Fig. 4), indicating that additional production likely could be realized from deeper wells. By way of comparison, the available drawdown for the Curren Tunnel (based on average depths to water in the Rangen Monitor well, and using Farmer's (2009) discharge elevation of 3145 ft.) is only 10 ft. Based on the IDWR (2011) discharge elevation of 3150 ft., the available drawdown averages only 5 ft.

Within 2-1/2 miles of Rangen, east of the rim, there are 19 permitted irrigation wells. These wells are plotted, along with reported depth and yield on Figure 19. The highest reported yield in this group is 4500 gpm, from an irrigation well approximately 0.6 mile northeast of Rangen. The average permit yield (for those listing a yield) is 2500 gpm. Test data are reported for few wells in this area, but four of these irrigation wells include some quantitative indication of aquifer productivity:

production (gpm)	duration (min)	dia (in)	drawdown (ft)	indicated T[15] (ft^2/day)	Owner
4000	300	16	15	54,000	F. Henslee
4500	60	16	1.25	800,000	T. Gibson
3800	180	20	"None"	>800,000[16]	P.H. Hess
2817	240	20	13	40,000	P.H. Hess

Local driller Larry Nielson (2012) reports a group of wells 8 miles southest of Wendell that are less than 100 ft deep, with a 70-ft. static water level, yet produce 3200 gpm.

Although highly-productive wells appear to be common in the area, the variations in pump-test responses compiled here demonstrate the expected inhomogeniety of this complex aquifer. (The occurrence of domestic wells in the area for which 40 and 54 ft. of drawdown are reported demonstrates the same point.)

Regional groundwater flow modeling (e.g. ESPAM2.1) assigned somewhat higher transmissivities, i.e. between 800,000 and 1,500,000 ft^2/day, to the area between Rangen and Wendell; Mundorf et al. (1984) estimated a value of 700,000 ft^2/day for analysis of wellfield production, based on aquifer tests and flow net analysis. These values are based on the entire productive thickness of the aquifer, but that productivity is concentrated in the uppermost layers. Mundorf et al. (1984) report the results of 9 pump tests in the Eastern Snake Plain Aquifer in Gooding County (the County including Rangen and Wendell), which produced an average realized specific capacity of 900 gpm per ft. of drawdown. That study estimated a maximum drawdown for a row of fifty, 2250 gpm wells (i.e. 250 cfs total) between Wendell and Rangen. Drawdown was only 10.5 ft. for the mid-point of the wellfield, if pumped for 122 days each year, for 50 years.

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[15]Transmissivities calculated from Theis Equation with assumed S = 0.10.

[16]Assume drawdown < 1 ft. to be reported as "none".

Comparison of Figures 8 and 16 indicates a saturated thickness of approximately 100-150 ft. for much of the area immediately east of Rangen. In this setting, the drawdowns projected for even the aggressive development discussed in the previous paragraph certainly do not produce unreasonable pumping levels.

Figure 20 provides one of the longer groundwater-level records for the area. Although the generally lower levels associated with the 2000s drought is evident, this hydrograph demonstrates that the aquifer is not in long-term decline, i.e. that groundwater withdrawals are not significantly exceeding normal rates of recharge, and that seasonal fluctuations in groundwater levels would not present a significant impediment to additional development.

Construction of vertical wells on the order of 200 - 250 ft. deep at favorable locations would insulate the Rangen water supply from the impacts of the relatively small variations in groundwater levels experienced in the primary aquifer. Moving the point of diversion for this groundwater extraction from the tunnel to vertical wells would not be expected to significantly alter the quality or temperature of the groundwater, since production would be from the same aquifer as currently supplies both the Curren Tunnel and the lower springs.

GROUNDWATER MODELING OF THE EASTERN SNAKE PLAIN AQUIFER

This section examines the representation of the Eastern Snake Plain Aquifer by the ESPAM2.1 groundwater flow model with respect to the detailed examination of the hydrogeology of the Rangen discharge area developed in the previous sections. (More detailed discussions of the history of groundwater modeling of the Eastern Snake Plain Aquifer and the development of the ESPAM2.1 are provided in Brendecke (2012), who was also the source for all ESPAM2.1 output values cited herein.)

ESPAM2.1 represents the aquifer as a series of "cells", each of which is one mile by one mile in plan view, and 4,000 ft. thick. The aquifer is represented as a single layer. Figure 21 presents approximately the western quarter of the ESPAM2.1 model area. Vertical lines show the location of individual ESPAM2.1 columns along this model row (Row 42, the row containing the Rangen discharge). Aquifer properties within each cell – transmissivity and storativity – are the same throughout that cell and are held constant through time.

The inset on Figure 21 represents the present report, which focuses on the Rangen study area to investigate how well the ESPAM2.1 generalizations capture important aspects of the hydrogeology in this specific area of aquifer discharge. Even at the scale of this figure, it is obvious that considerable local detail is lost in the ESPAM model structure.

Figures 22, 23, and 25 provide three cross-sections within the study area, along the specified ESPAM2.1 model rows, south of, north of, and at Rangen. (See Fig. 1 for the lines of section.) Topographic profiles and geologic contacts (in black) are from USGS topographic maps and IGS geologic maps, respectively. Subsurface interpretations are schematic, controlled to outcrops and well-log formation tops where available. Groundwater level profiles (in blue) are based on

observed spring elevations and groundwater levels in monitoring wells. Superimposed on these cross sections (in red) are the ESPAM2.1 columns (numbered across the top), cell-by-cell ESPAM2.1 groundwater elevations (from the "steady-state" model run developed to initialize annual calculations[17]) and the ESPAM2.1 modeled elevations for springs (drains) and general head boundaries (GHB).

Figure 22 is the simplest of the three cross sections. The measured water level and the modeled water levels are in reasonable conformity in the eastern (right-hand) portion of the figure. The westward flow of groundwater terminates along the Snake River canyon, both in the model and in reality. Groundwater leaves the model domain, in column 12, via springs at elevations 3092 and 2970 ft., and via a general head boundary provided to simulate groundwater flow directly into the Snake River at modeled elevation 2877 ft.. The "3092" and "2970" used by ESPAM2.1 come from surveying by HDR (IDWR, 2011) of the highest and lowest spring discharges in this one-mile-wide model cell[18].

The ESPAM water level and drain elevations for column 12 are presented to one decimal place in order to show that a small gradient from the aquifer to the spring is modeled. Model calibration assigned an extraordinary drain conductance of 300,000,000 ft^2/day (190 times the average of all other drains) in order to simulate the spring flow at this location.

Figure 22 uses a value of 3050 ft. for the actual groundwater discharge elevation in this line of section, based on the inferred location of the geologic contact between the Quaternary and Tertiary deposits (Gillerman et al., 2005), which is understood to control the location of these springs (e.g. Covington and Weaver, 1991[19]). Because ESPAM2.1 explicitly includes neither the surface topography of the Snake River canyon, nor the geologic contact controlling the Thousand Springs, basically, it models this area as a 1 mi^2 bucket, filled with water to elevation 3092 ft., with three holes in the side to represent a range of spring elevations and the Snake River.

The line of section presented in Figure 23 is complicated by groundwater discharges along both the Malad and Snake Rivers. Figure 24 presents the ESPAM2.1 grid and Covington and Weaver (1990) springs in plan view. In ESPAM2.1, all springs within a single model cell are simulated as a "drain" (or "drains") in the center of that 1-mile-by-1-mile cell (the red dots on

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[17]This dataset was chosen to reflect the general, "average" conditions modeled. Limited examination of transient model calculations for individual months does not find sufficient variation to significantly affect the conclusions presented here.

[18]IDWR (2011) note that the "3092" value actually comes from the adjacent cell (row 45), "but since it obtains water from the same hydrogeologic feature as Thousand Springs and Minnie Miller Springs the ESHMC has chosen to model it as if it were in cell 1045012."

[19]"springs emerge at top of Banbury Basalt"

Fig. 24. Each drain is assigned a single elevation to represent all associated springs, and the springflows are aggregated to that point.

The large difference in ESPAM2.1 drain elevations in column 14 was necessitated by the model's one-mile cell size encompassing springs near river level (2730 ft. of Fig. 23; #73 on Fig. 24) along the Snake River within the canyon in the northern part of the cell, and also springs issuing from talus slopes under the Hagerman Rim (2975 ft.; #65) in the southeast corner of the cell. It is doubtful that there is significant real hydrologic connection between these disparate locations, but ESPAM2.1 can only treat all groundwater discharges within a model cell as occurring at the same point (in plan view) and from the same, continuous aquifer.

Similarly, the springs at #68 (elevation 2750 ft[20].) , #69 (elevation 2765 ft.) , #70 (elevation 2750 ft.) , #71 (elevation 2740 ft.) , and #72 (elevation 2740 ft.) are not explicitly modeled by ESPAM2.1. (Much of the flow at #68, #69, and #70 falls outside the active ESPAM2.1 model grid.)

The two discrete ESPAM2.1 drain elevations in column 15 (Fig. 23) span the discharge elevations for a nearly continuous string of large springs along the Malad River between elevations 2860 ft. (#75; 2850-2860 ft.) and 2990 ft. (#52; 2975-2990 ft.). The Figure 23 line of section intersects the river at approximately 2900 ft. These high-discharge springs continue upstream along the Malad River into ESPAM2.1 model column 16. With a modeled discharge elevation of 3010 ft. This ESPAM2.1 "drain" corresponds with mapped springs #53, which extend upstream from elevation 3010 ft. to elevation 3090 ft.

The 3040 ft. ESPAM2.1 drain in column 16 corresponds with a discrete spring (#51) located north of the river. The steady-state ESPAM2.1 groundwater elevation for model cell 36-16 is 3015 ft.. This water level in the aquifer would leave the ">10 cfs" (Covington and Weaver, 1990; #51) ESPAM2.1 drain at 3040 ft. dry[21], and would provide no discharge corresponding (in elevation) to the continuous string of mapped springs along the 0.75 miles of river between elevations 3015 ft. and 3090 ft. (#53).

The striking divergence of the actual and modeled water tables in this area (the red and blue lines on Figure 23), and of the actual and modeled elevations and locations of the springs (Figure 24), are largely a function of applying a relatively coarse model grid to this area of complex topography and groundwater flow patterns. While ESPAM2.1 may usefully simulate the overall discharge of groundwater from the generalized aquifer in this area in terms of aggregate volumes and wide elevation ranges, the Malad River area illustrates the uncertainty with which simulation of individual discharges at specific elevations must be viewed.

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[20]Spring elevations are from Covington & Weaver, 1990.

[21]ESPAM2.1 assigns a conductance of 1 ft^2/day to this drain, precluding significant discharge in any case.

Figure 25, for the Rangen area, is the most complicated of the three cross sections developed here. As with Figure 22, there is a general conformity between modeled and measured (or inferred) groundwater elevations in the eastern (right hand) portion of the section, but that conformity breaks down in the critical area of groundwater discharge in model columns 12, 13, and 14. As interpreted here, there are three, and possibly four local groundwater systems:

1. The discharges from the primary aquifer at elevations 3150 ft[22] (Curren Tunnel) and 3100 ft. (lower springs), which are modeled by ESPAM2.1 with a single drain elevation, in a model cell with no internal layering.

2. The discharge from a local groundwater system developed within the Quaternary sediments at elevation 3045 ft., i.e. the Crowsnest gravel draining from the contact with the underlying Yahoo Clay (Covington and Weaver, 1990; spring #26), which is modeled by ESPAM2.1 as simply another discharge point for the regional aquifer.

3. The discharge from Quaternary basalts at elevation 2958 ft., well below the Hagerman Rim and not immediately connected with the primary aquifer east of the rim, which is modeled by ESPAM2.1 as simply another discharge point for the regional aquifer.

4. Whatever discharge occurs through the lower-permeability Tertiary deposits directly to the Snake River, which is modeled by ESPAM2.1 using a General Head Boundary (GHB) in model column 12. (The ESPAM2.1 active grid does not extend to the Snake River.)

As on Figures 22 and 23, all of these disparate features are modeled as elevation-controlled discharge points from the same, thick, interconneted, regional aquifer. In the case of flow system no. 1, ESPAM2.1 uses a single elevation - 3138 ft. - to model both upper and lower discharges.

Figure 26 presents the potentiometric surface generated from ESPAM2.1 groundwater level output for the study area for November, 2007[23]. Regional westward flow is indicated, broadly diverging along the western edge of the model toward major discharge points representing the

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[22]A 3150 ft. elevation for the Curren Tunnel is diagramed based on HDR surveying (IDWR, 2011). Farmer (2008, 2009) reported an elevation of 3145, but the IDWR spreadsheet received in association with Farmer and Blew (2012) ("Mass Meas. all data (except #1101 & 1103) with springs.XLS") cites an elevation of 3149.83 ft., suggesting an updated understanding.

[23]ESPAM2.1 cell-by-cell groundwater head values were placed at the grid cell centers and contoured using SURFER, without adjustment. The ESPAM2.1 November dataset closest in time to that of Figure 7 was chosen for comparability; November water levels are typically the seasonal maxima, outside the short-term, local fluctuations due to irrigation-season recharge and discharge activity.

Malad Gorge and Thousand Springs. Comparison with either Figure 7 – a first-approximation contouring of the actual water table in the study area after Farmer and Blew (2012) – or Figure 16 – my more detailed examination of groundwater gradients in the immediate Rangen area – demonstrates the level of generalization to which the ESPAM2.1 model design is constrained. Missing from the ESPAM2.1 representation are the multiple groundwater divides noted by Farmer and Blew (2012; p. 11) and the local convergence of groundwater flow necessary to create the Rangen discharge.

The following sections provide additional comparisons between specific features of ESPAM2.1 and what is known or can reasonably be interpreted regarding the study area hydrogeology.

Aquifer Transmissivity

The ease with which groundwater flows within an aquifer is controlled by the permeability of the aquifer material and the saturated thickness of the aquifer. Higher permeability material and more material through which to flow generate more groundwater flow at any given gradient. The permeability multiplied by the thickness is the transmissivity.

At the regional scale, the RASA modelers observed, "The steep gradient near the Snake River is due to thinning of the basalt aquifer and reduction in transmissivity" (Garbedian, 1992, p. F29), and in the ESPAM1.1 documentation, Cosgrove et al. (2006; pp. 16, 17) note that "Steep hydraulic gradients are apparent near the margins of the plain due to tributary valley inflow and lower transmissivity relative to the center of the plain." and that, "Steep gradients also are apparent near the Kimberly to King Hill discharge area due to convergence of flow lines and probable aquifer thinning."

Referring specifically to springs along the Hagerman Rim, Ralston (2008) states, "The lower aquifer transmissivity is associated with smaller spring discharge with a greater sensitivity to changes in the regional water table." and "The saturated thickness and thus the transmissivity of the aquifer are greater in the Thousand Springs area and the Malad River canyon than anywhere in the Thousand Springs to Malad reach."

Farmer (2009, p. 41) makes the case that, "The transmissivity of the aquifer at the Curren Tunnel will be more responsive [to changes in aquifer water levels] than further east because the saturated thickness is less near Rangen".

Consideration of Figures 8 (base of the primary aquifer) and 16 (groundwater levels) demonstrates the pronounced decrease in saturated thickness of the primary aquifer from east to west as the Hagerman Rim is approached. Absent a change in aquifer permeability, the transmissivity of the aquifer will decrease accordingly.

No explicit "aquifer thinning"is possible in the ESPAM2.1 structure, nor can the calibration-assigned transmissivity be responsive to temporal changes in water levels. Transmissivities are constant values. The model tacitly includes an effective aquifer thickness in its assignment of

transmissivities, e.g. a lower modeled tranmissivity could reflect a lower permeability and/or a smaller effective aquifer thickness. The ESPAM1.1 documentation argues, "Neither the hydraulic conductivity nor the saturated thickness must be individually well understood." (IDWR, 2012; p. 23).

However, the ESPAM2.1 transmissivity distribution shows no decrease in aquifer transmissivity along the western edge of the model for either reason (thickness or permeability). Model transmissivities are highly variable (e.g. values from 0.6 million ft^2/day to 36 million ft^2/day within three model cells from Rangen), but there is no reflection of decreased transmissivity at the western edge of the aquifer in the study area[24]. ESPAM2.1 transmissivities are actually higher along the Hagerman Rim cells (average 11 million ft^2/day) than in the aquifer 3 miles to the east (average 2.3 million ft^2/day), and higher than at Thousand Springs (0.7 - 1.1 million ft^2/day) or Malad Gorge (0.2 million ft^2/day).

In the Rangen area specifically, the model cell (42-13) containing the Rangen discharges has an ESPAM2.1-assigned transmissivity of 1.6 million ft^2/day. The cell immediately to the northwest (41-13) has T = 4.3 million ft^2/day. The cell immediately northeast (42-14) has T = 1.5 million ft^2/day. Yet in much of the northwest model cell, the primary aquifer is either absent (west of the rim) or dry (e.g. at the Ramsey and Anderson wells; see Figure 4). In the model cell northeast of Rangen, the primary aquifer is thicker than in the Rangen cell and the water level is higher, so the saturated thickness is certainly higher, yet the ESPAM2.1 transmissivity is slightly lower.

Although of less immediate importance with respect to Rangen flows, the ESPAM2.1 transmissivities also fail to reflect areas of locally small (or absent) saturated thickness in the primary aquifer across the plateau area east of the rim, e.g. as identified southwest of Jerome (p. 19).

The ESPAM2.1-assigned transmissivity distribution is not well matched with the hydrogeology in the Rangen area.

Aquifer Anisotropy and Model Layers.

As described above, the geologic deposits of the Rangen area are far from homogeneous (the same at all locations) or isotropic (the same in all directions). The Quaternary and Tertiary basalt sequences are composed of multiple flows, with multiple zones within each flow. While layer-like in aggregate, individual flows are of limited horizontal extent and can vary widely in

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[24]The ESPAM2 documentation (IDWR, 2012; p. 87) includes the statement, "The map of the calibrated model transmissivity (Figure 100) shows that estimated transmissivity values tend to be lower along the margins of the plain and higher towards the center. ... these features in the calibrated transmissivity distribution are consistent with my current understanding of the aquifer.", but this is only generally correct, on a regional scale. Cell-by-cell values in the Rangen study area were examined for the present investigation.

thickness in response to the topography of the surface upon which they were emplaced. Sedimentary units are also layered at a regional scale, but in detail include lenses and stringers of varying lithology, with poorly understood geometries (and permeabilities) in the subsurface.

While such variations in aquifer characteristics are unlikely to impact regional flow modeling and associated regional-scale modeling conclusions, as aquifer inconsistencies tend to "even out" over large distances, the potential for local anisotropy is a major source of uncertainty with respect to modeling individual groundwater discharge points. Consideration of the mixed nature of the primary aquifer at Rangen (basalt, pillow basalts, gravel, sand) and of the ambiguous relationship between aquifer water levels and groundwater discharge (p. 27), indicate Rangen as a location where a more detailed model would better support local-scale conclusions.

ESPAM2.1 provides very little accommodation for aquifer anisotropy and inhomogeniety at a scale potentially important to individual groundwater discharge points such as Rangen.

The most pervasive anisotropy in the study area is, of course, the difference between the primary aquifer hosted by the Quaternary basalts, and the underlying units. This difference controls the location of the majority of the natural discharge from the aquifer in the Rangen area. The most common method for accommodation of such model-scale differences in hydrogeologic characteristics is by discriminating separate model layers. The USGS RASA modeling divided the aquifer into four layers, the uppermost of which was considered "unconfined" (Garabedian, 1992), meaning transmissivity was allowed to vary over time as the saturated thickness changes in response to changes in withdrawals and recharge.

Farmer (2009) did not develop a groundwater flow model, but his three-layer conceptualization was proposed to capture the locally important differences between the upper basalts, the Glenns Ferry Fm. sediments, and the lower basalts (see Figure 5). Relatively few data are available with which to quantify geometric or hydrologic distinctions between Farmer's Layers 2 and 3 (Glenns Ferry Fm. and Tertiary basalts), but the "Base of The Primary Aquifer" section above, provides a study-area delineation of his Layer 1 : Layer 2 contact.

ESPAM2.1 is constructed with only one model layer. All variations between and within the four sequences described in the "Stratigraphy" section of this report are consolidated into singular values of transmissivity and storativity for each model cell.

The absence of aquifer layering in ESPAM2.1 precludes model representation of:

- the important geologic contact at the base of the Quaternary basalts that is responsible for nearly all large springs in the Milner to King Hill reach of the Snake River, including the groundwater discharges at Rangen;

- the paleotopography widely understood to control the location of springs along the Hagerman Rim, including the groundwater discharges at Rangen; and

- the changes in aquifer transmissivity that accompany changes in aquifer water levels in the thin, western edge of the primary aquifer.

Grid Size

Another basic element of the ESPAM2.1 structure is grid size. While the 1 square mile cells of ESPAM2.1 may be adequate to represent aquifer conditions over the vast expanse of the Eastern Snake Plain Aquifer to the east, the aquifer discharges along the Hagerman rim are understood to be controlled by paleotopographic features on a finer scale. At Rangen, for example, the bottom of the primary aquifer varies from 3100 ft elevation at the lower spring to 3189 ft. at the Anderson well, a distance of 0.7 miles. As outlined above, this difference is instrumental in creating and controlling the observed discharge. Farmer and Blew (2012; p. 11) suggest that "if a numerical flow and transport computer model honors the field data then the computer grid cell size needs to be at least ¼ mile in size for several miles away from the spring area." Koreny et al. (2006) also suggested that the ESPAM "model grid in the reach below Milner is too coarse for representation of individual springs".

The grid spacing for ESPAM2.1 precludes realistically modeling potentially important details of the hydrogeology along the Hagerman Rim, including the groundwater discharges at Rangen.

Aquifer Discontinuity

Another important aspect of the upper, most productive portion of the Eastern Snake Plain Aquifer that is lost in a single-layer model is the severing of that layer along the Hagerman rim. The springs along the rim stand witness to the termination of the primary aquifer as its water table intersects the ground surface and downward migration is greatly restricted by the lower permeability of the underlying deposits.

ESPAM2.1 represents the rim springs using "drain" cells, for which a specified elevation and conductance control the discharge from a model cell that, in most cases, remains saturated well above the discharge point (e.g. Figs. 22, 23, and 25). Like a straw into a sandbox full of water, the "spring" does not mark the end of the aquifer, but simply draws off a flow of water, allowing the remaining groundwater to proceed as dictated by surrounding gradients. In this sense, the Rangen discharge is modeled like a well with a fixed "pumping" water level, completed in a laterally continuous aquifer.

This is illustrated by ESPAM2.1 water levels and groundwater flow in the cell containing the Rangen discharge (42-13) and the model cell immediately to the southwest (42-12). The actual groundwater flow passing westward beneath Rangen is obviously zero in the primary aquifer,

and is likely relatively small in the underlying Glenns Ferry Fm. and Tertiary basalt sequences. Yet the steady-state ESPAM2.1 groundwater flow westward from the Rangen is 319 cfs[25].

As noted on Figure 25, the ESPAM2.1 estimation of substantial flow through the rim produces a modeled groundwater elevation in the adjacent cell to the southwest (42-12) of 3127 ft., despite the ground surface being well below that elevation in all but the cell's far east corner (see Fig. 4). For most of this cell, the modeled groundwater elevation is more than 170 ft. above the ground surface.

This aberration cascades through the immediate area of the model, as ESPAM2.1 water levels in the cells between Rangen and Thousand Springs, i.e. along column 12, define a gradient creating southeastward groundwater flow. This is 180° opposed to the flow direction cited by both Farmer (2011, p. 17) and Ralston (2008)[26] based on review of local hydrogeology and water level measurements, which present flow to the northwest. In the three model cells running NW from the Thousand Springs area (44,43,42-12) modeled groundwater elevations create a southeastward gradient of approximately 15 ft/mi.

In the Malad Gorge area, similar discrepancies are modeled (see Figures 23 and 26). Groundwater flow from the ESPAM2.1 model cell at the mouth of the gorge (36-14) and from the cells immediately southeast (37-14) and northwest (35-14) is to the northeast, i.e. away from the Snake river and in "under" the rim. Mapping by Othberg et al. (2005) suggests there is little or no Quaternary basalt in the cell at the mouth of the gorge, and the underlying Tertiary basalts are disected by the Snake River down to an elevation of 2720 ft. The ground surface for nearly the entire cell (36-14) is below 2900 ft. elevation, yet this cell has a modeled groundwater elevation of 3108 ft.

As noted in the discussion of study area hydrogeology (p. 15, Figure 9), the gorge has been interpreted as dissecting the Quaternary basalt aquifer in the lower springs area of the Malad Gorge. The river has cut down to an elevation below 2900 ft. in this reach, creating a ceiling to groundwater flow in the productive aquifer. However, the groundwater model produces a groundwater elevation of 3074 in this area (cell 36-15, Figs. 23, 26). This provides 150 - 200 ft. of saturated aquifer across the Malad Gorge, through which modeled groundwater impacts can be communicated. If the aquifer is severed by the gorge, however, any impacts to groundwater levels on the north side can only be communicated to the south side via the continuously saturated portions of the primary aquifer further east, or through the lower aquifer, which is deeply exposed by erosion (and thus drained) in the adjacent channel of the Snake River.

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[25]Were this correct, mitigation of impacts to the Rangen flows could be a simple matter of intercepting a portion of the passing groundwater flow.

[26]"This suggests ground-water flow is from south to north in the area between the plateau rim and the Snake River." (p. 5)

The configuration of ESPAM2.1 precludes modeling the important impacts of aquifer-severing topography in the Rangen area.

Rangen "Drain" Modeling.

In ESPAM2.1, groundwater discharge at Rangen is modeled using a single "drain" cell. A drain cell is a standard feature of the MODFLOW code used by ESPAM2.1. The mathematical representation of a drain is the linear equation:

A) Discharge = Conductance * (aquifer water elevation - drain elevation)

with the condition that once the aquifer water elevation falls to or below the drain elevation, i.e. the groundwater gradient from the aquifer to the "drain" decreases to zero, discharge is set to zero (McDonald and Harbaugh, 1988; p. 9-3). Discharge is a linear function of gradient; a graph of the gradient (elevation difference) vs. discharge will be a straight line, with the slope defined by the conductance term. ("Linear" in this context means that twice the elevation difference produces twice the flow, half the elevation difference produces half the flow, and so forth. Discharge is assumed to be predictable based solely on a given elevation difference and a constant conductance, and discharge is directly proportional to that elevation difference.)

In ESPAM1.1, both the drain elevation and the conductance of the Rangen cell were adjusted to approximate the historical flows in aggregate with other springs in the reach. In ESPAM2.1, the reported elevation for the "Rangen Spring" from Covington and Weaver (1990) was used to represent the total Rangen discharge with a fixed value (IDWR, 2012; p. 29) and the combined Rangen discharge became a single calibration objective. Thus, the aquifer water elevation is determined by the ESPAM2.1 model integration of all inputs and outputs across the model domain; the drain elevation and drain flows are directly observed; and the "conductance" term is adjusted to provide an acceptable level of reconciliation of modeled and measured flows through the model calibration process.

This modeling approach presents two problems:

1. In reality, there appear to be at least two outlet elevations. Figure 14 presented the bimodal discharge response for the Rangen system, i.e. the Curren Tunnel and the lower spring have reacted differently to changes in water level in the supplying aquifer. ESPAM2.1 provides only one response function for the Rangen system, with a single discharge elevation. Currently (the 2000s) the majority of the overall Rangen discharge occurs at an elevation of approximately 3100 ft., rather than the 3138 ft. assigned by ESPAM2.1.

The conductance term assigned by ESPAM2.1 to the Rangen drain is 419,036 ft^2/day. The average conductance value for other springs in the Thousand Springs to Malad reach is 32,209 ft^2/day. Presumably, the relatively high Rangen conductance was necessary to produce the target flow with the relatively small head difference between the drain and the surrounding aquifer (1 to 10 ft.). A more realistic elevation for the bulk of the Rangen discharges would certainly

change the calibrated conductance value, and would likely generate collateral changes in other model parameters and results. Recognition of the lower-elevation discharge of the Rangen system would generate a subdued response to small changes in aquifer water levels as are predicted to occur were groundwater pumping curtailed in the supplying aquifer.

Figure 27 presents ESPAM2.1 simulation of the water levels in the model cell containing the Rangen discharges, highlighting the 3150 ft. elevation (IDWR, 2011) of the Curren Tunnel discharge for comparison. As modeled, there would have been no discharge from the Curren Tunnel for the 88% of the time (1980 - 2008) that the aquifer water level was below the tunnel.

This problem was encountered by IDWR (Wylie, 2012b) in their modeling of the "1900 Validation Scenario". The ESPAM2.1 simulation of the 1900 aquifer water level in the Rangen cell was only 3136 ft., leaving the overall Rangen (both tunnel and springs) discharge at zero, even though the ESPAM2.1 modeled discharge elevation is 3138 ft.

A similar discrepancy was discussed above (p. 31) in relation to a spring in ESPAM2.1 cell 36-16, for which ESPAM2.1 provides no flow, despite a reported discharge of ">10 cfs".

Koreny et al. (2006), concluded "further refinement is needed" (in ESPAM1.1) including the use of "multiple drains to represent multiple springs within a model cell" because "in reality, each model cell may contain numerous springs" which "makes the cumulative discharge behavior nonlinear because the springs at higher elevations will see larger flow declines than springs at lower elevations for the same head decline in the aquifer".

Again, while ESPAM2.1 may satisfactorily route aquifer recharge and discharge at the scale of the 150-mile wide aquifer, its ability to duplicate the details of individual cell flows and to predict the impacts on those flows of changes in the regional aquifer, is compromised by its generalization of potentially important local details.

2. The relationship between aquifer water levels and Rangen discharge does not appear to be a simple, linear function. (See discussion above, p. 27.) Farmer (2009; pp. 40-41) noted that a "non-linear relationship may exist" between aquifer water levels and discharge at Rangen, analogizing the "U" shape of the paleo-channel at Rangen to a "V-notched weir", which has a strongly non-linear depth-to-flow response. Figure 17 is essentially the same graph presented to the Sept. 21, 2009 ESHMC meeting by Jim Brannon of Leonard Rice Engineers, with the accompanying statement, "hydrographs are indicating some hydrogeologic controls that exhibit faster responses than regional scale aquifer head controls".

ESPAM2.1 is structurally incapable of modeling the relationships shown on Figures 17 and 18. Figure 28, for example, presents the data of Figure 18, expressed as deviations from an ideal,

linear model as required by ESPAM2.1[27]. The average error in the predicted discharge is 20% of the average discharge, and deviations as large as 50% are not uncommon. Because Figure 28 uses well-measured, paired daily data (e.g. rather than monthly averages), and because the monitor well and discharge points are in near proximity, the relationship presented should be well controlled with respect to data-collection and location based errors.

While the flow patterns reported for the Rangen groundwater discharges appear to conform qualitatively with a straightforward model of aquifer gradients, a more careful examination finds additional complexity that calls into question the ability of ESPAM2.1 modeling to confidently predict the impact of changes in aquifer levels on groundwater discharge at this location.

Elevation Uncertainties

The ESPAM1.1 documentation states that, "It was agreed that the true elevations of the drains are unknown", and modeled elevations were arbitrarily set to 30 ft. lower than the model-predicted water level elevation in the host model cell to keep cells from going dry (Cosgrove et al., 2006; p. 108). For ESPAM2.1, this conclusion was reversed, and the Rangen discharge was modeled with a single, fixed elevation, at 3138 ft.

In 2011, HDR surveyed spring elevations for the development of ESPAM2.1 (IDWR, 2011). Their Nov. 9, 2011 value for the "Currant Tunnel-Portal" was 3150 ft., with a stated vertical accuracy of "less than plus/minus 2 ft.". In reference to the HDR survey, however, IDWR (2011) states, "the cell containing Curren Spring, has only one drain with an assigned elevation of 3138 feet from Covington and Weaver. The HDR survey did visit Curren Spring, but surveyed the "Tunnel Portal" which is not the low elevation of the spring. I visited Curren Spring and believe that significant water discharges from the below the tunnel. Therefore I recommend that the ESHMC continue using the 3,138-foot elevation." Recognizing that a single elevation did not properly reflect the Rangen discharge, Wylie apparently opted for a value an arbitrary 12 ft. lower as something of a compromise.

The "3138" value is cited by Covington and Weaver (1990) for the "developed" "Rangen Spring". Farmer (2008; pp. 3,4; 3.6-ft elevation accuracy) cites, "where it discharges from the Curren Tunnel is 3145 feet".

With an ESPAM2.1 water level elevation for the Rangen cell (42-13) of 3144 ft. (the steady-state model value), the "correct" elevation for the tunnel (either the HDR or Farmer elevation) produces no flow at all. Similarly, based on the average groundwater-level elevation reported by Farmer (2009) for the Rangen Monitor Well (3155 ft.), 588 ft. to the east of the tunnel outlet, the groundwater gradient between the well and the outlet of the Curren Tunnel is (3155-3145)/588 =

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[27]The linear function used here is a "best fit" (least-squares) to the data of Figure 18; ESPAM2.1 explicitly models neither the Curren Tunnel discharge nor the Rangen Monitor Well aquifer levels.

0.0170. Substituting the HDR-reported elevation for the tunnel (3150 ft.) reduces the gradient to 0.0085; use of the Covington and Weaver (and ESPAM2.1) elevation (3138 ft.) increases the gradient to 0.0289. In an ideal aquifer, discharge is a linear function of gradient. The implied discharge rates for these three gradients would vary by a factor of 3.4.

On one hand, as long as ESPAM2.1 uses an internally consistent set of elevations for groundwater levels and discharge points, gradients and flows may still be correct. On the other hand, with small changes in gradient creating large changes in flow, the importance of accurate elevations and the ambiguity of model calibration targets adds to the uncertainty of model results.

Elevation uncertainties and calibration of ESPAM2.1 to a Rangen discharge elevation understood to uniquely represent neither the Curren Tunnel nor the lower spring compromise the ability of ESPAM2.1 to achieve a credible calibration and to accurately predict the impacts of small changes in aquifer water levels at this location.

Snake River Gains.

At the west edge of the study area, ESPAM2.1 is ambivalent on the nature of the effective aquifer. While the model domain was reduced from that of ESPAM1.1 to exclude connection to the Snake River through the Hagerman valley, under the Ralston (2008) interpretation that the Eastern Snake Plain Aquifer terminates at the rim and does not extend beneath the Hagerman valley to the Snake River (IDWR, 2009; p. 9), this design decision was effectively reversed by the inclusion of a series of general head boundaries (GHB) representing flow from the western terminus of the aquifer into the Snake River[28].

In the development of the ESPAM2 groundwater model, the measured gains in flow between the Buhl and Lower Salmon Falls streamflow gages were found to significantly exceed the measured/estimated flow of the springs tributary to this reach. From the 1980 - 2008 average estimated river gain of 3370 cfs, 2463 cfs of spring inflow were subtracted to conclude the average groundwater inflow directly to the river channel averages 907 cfs (Wylie, 2012a).

The 907 cfs of unaccounted-for groundwater discharges to the Buhl-to-Lower-Salmon-Falls reach were further disaggregated for the ESPAM2 modeling: subtraction of 494 cfs average measured just from the Thousand and Magic Springs model cells[29], and 63 cfs measured from the Blue Heart model cell specifically (Wylie, 2012a); left a 350 cfs average to spread across the

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[28]Flow to the Snake River is not explicit in the model, but the elevations of the general head boundaries and the calibration targets for these flows were developed based on the elevations and unaccounted-for underflow into the Snake River (Wylie, 2012a).

[29]The values calculated from upstream and downstream gaging ranged from 224 to 765 cfs.

remaining 14 model cells of the reach. The GHBs in model rows 37 - 41 are assigned identical elevations and conductances, and their ESPAM2.1-modeled discharges are nearly constant, all between 29 and 31 cfs. The row 42 GHB was given the same conductance, but a slightly higher elevation (reflecting the higher level of the river behind the Upper Salmon Falls Dam). ESPAM2.1-modeled discharge for that cell is nearly constant at 22 cfs.

Thus, for the 6 model cells along the Hagerman Rim, ESPAM models 174 cfs of groundwater inflow into the Snake River in addition to the output of the observable springs.

For most of the Buhl-to-Lower Salmon Falls reach, the Snake River channel has been eroded into Tertiary deposits (Kauffman et al., 2005; Othberg et al., 2005; Gillerman et al., 2005), suggesting the "non-spring" gaged gains are evidence of groundwater flow within deposits below the primary aquifer. Whether these gains are the result of groundwater flow into the channel from the Tertiary deposits, however, is confounded by the occurrence of over-the-rim basalt flows of the Quaternary aquifer and outcrop-obscuring talus at various locations. At Blue Heart Springs, geologic mapping suggests groundwater flow may be through the primary (Quaternary) aquifer. At Thousand / Magic Springs, a small area of Quaternary basalts are mapped down to river level, but for the most part, the Snake River channel is bounded by exposed Tertiary deposits. Covington and Weaver ((1990; springs #68 - #72) map a series of springs at river level just upstream of the Lower Salmon Falls gage, with a total estimated flow of approximately 20 cfs, identified with the upper contact of the Tertiary basalts (i.e. springs issuing from the Quaternary units)[30].

Wylie (2012a; p. 5) states that "the underflow targets [for ESPAM calibration] will be average underflow for the model period (1980 - 2008)". Thus, a constant, average value is used to represent these flows in ESPAM2.1, despite the fact that the total gains through this reach have declined over the period, and include seasonal fluctuations of 700 cfs.

In summary, the geographic distribution, source aquifer, and seasonal variations for 900 cfs of groundwater flow, over a 21-mile reach of the Snake River including most of the study area for the present report, are poorly understood and grossly reflected in the ESPAM2.1 flows. At an average of 907 cfs, these flows constitutes 27%[31] of the total groundwater discharge through the reach. Calibration of ESPAM2.1 to this large component of groundwater discharge is thus subject to substantial uncertainty with respect to the local transmissivities and groundwater gradients produced by that calibration.

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[30]The status of these springs is unclear, as they fall outside the ESPAM2.1 model, but contribute to the "springs" portion of total reach gains above the Lower Salmon Falls gage.

[31]907 / 3370 = 27% (Wylie, 2012a)

Calibration Comparisons

The calibration of ESPAM2.1 is dealt with in detail by Brendecke (2012). In this section, select examples are drawn from the ESPAM2.1 reporting to illustrate discrepancies related to the issues discussed above. While groundwater flow models are rarely able to duplicate every variation in aquifer behavior, consistent errors in the same direction indicate a systematic failure to capture relevant characteristics of the groundwater system. ("Differences between simulated and measured head and spring discharge also indicate areas where model refinement is needed." (Garabedian, 1992; p. F31).)

Figure 29 compares the ESPAM2.1-modeled aquifer water levels with the calibration well closest to Rangen, PEST #989[32]. The modeled levels are consistently around 25 ft. lower than the measured levels at this point in the aquifer. Groundwater flow to the Rangen "drain" is controlled by the difference in water level between the aquifer and the "drain" elevation. (This difference is the groundwater "gradient".) Because ESPAM2.1 underestimates this gradient, it must overestimate the aquifer transmissivity and/or drain conductance value by a compensating amount to simulate the observed Rangen discharge. Higher transmissivities and conductance values make groundwater discharge from a cell more sensitive to changes in aquifer water levels, e.g. as are projected to occur as a result of groundwater pumping curtailment.

Figure 30 compares the ESPAM2.1-modeled discharge at Rangen with the reported estimates of actual flow for the 2000s[30]. Over this period: 1) the model consistently overpredicts the flow; 2) modeled seasonal fluctuations generally exceed those observed; and 3) ESPAM2.1 consistently predicts the month of lowest flow 3 months earlier than it actually occurs.

The general overprediction of Rangen flows suggests local ESPAM2.1 transmissivities are too high, the drain conductance assigned to the Rangen discharge is too high, modeled aquifer water levels are too high, the assigned drain elevation is too low, or some combination of these factors.

Potential reasons for ESPAM2.1's overprediction of annual fluctuations include incorrect elevations, incorrect modeling of a multiple-elevation discharge, incorrect aquifer storage properties, and incorrect modeling of aquifer recharge and/or discharge (e.g. recharge from surface irrigation operations, precipitation recharge, groundwater irrigation extractions).

Errors in the timing of the annual cycle of discharge may be generated by many of these same factors. Rogers (2012) has analyzed the relationship between seasonal flow fluctuations and the operation of the Rangen fish-rearing facilities. He evaluated the relationship between annual cycles in the water demands of Rangen fish production and annual cycles in the availability of groundwater discharge. A "bottleneck" in the Rangen operation occurs when demands are high and supplies are low. A multi-month difference in the timing of seasonal low flows may have a

[32]From IDWR spreadsheet, "ESPAM2_ESPAM21.XLS"

significant effect on the assessment of the impacts to Rangen of the curtailment scenarios generated using ESPAM2.1.

Figure 3 compares the ESPAM2.1-modeled discharge for the Buhl-to-Lower Salmon Falls reach of the Snake River (which includes the Rangen discharge) with the reported estimates of actual flow for the 2000s[30]. Over this period, the model consistently overpredicts the flow, by 170 cfs on average. Also, the model produces a seasonal range of flows generally less than 100 cfs, compared with measured seasonal fluctuations in excess of 300 cfs. During the 1980s, ESPAM2.1 consistently underestimates these flows, suggesting the calibration to constant monthly values has compromised its ability to address either long-term or seasonal discharge relationships.

Figure 32 presents ESPAM2.1-modeled discharge through the GHBs for the Magic and Thousand Springs model cells (43-12 and 44-12), and includes the specific measurements from which the ESPAM2.1 treatment of reach gains in this reach was developed (Wylie, 2012a). As above, the very generalized nature of ESPAM2.1 treatment of this component of the groundwater balance is obvious.

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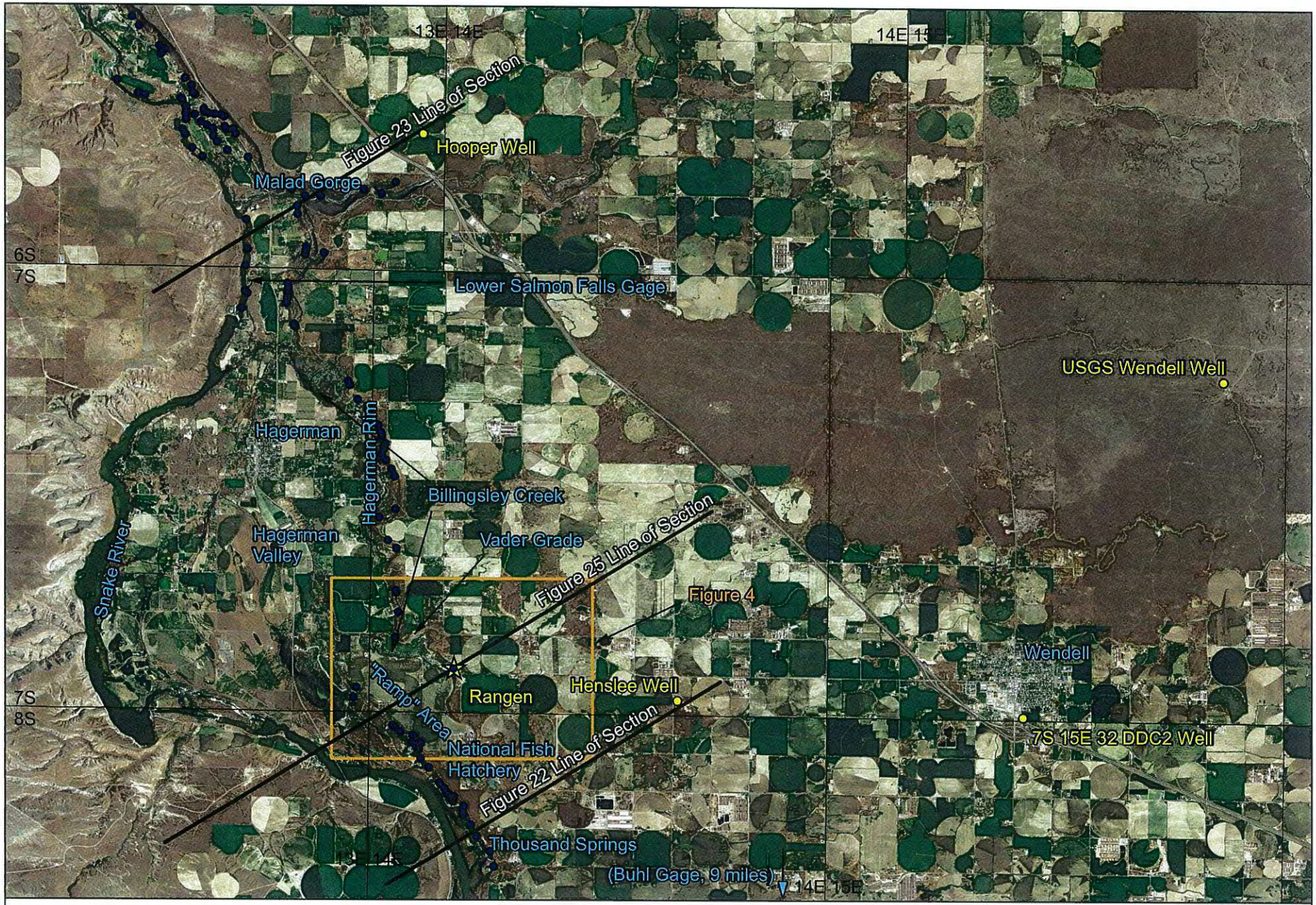
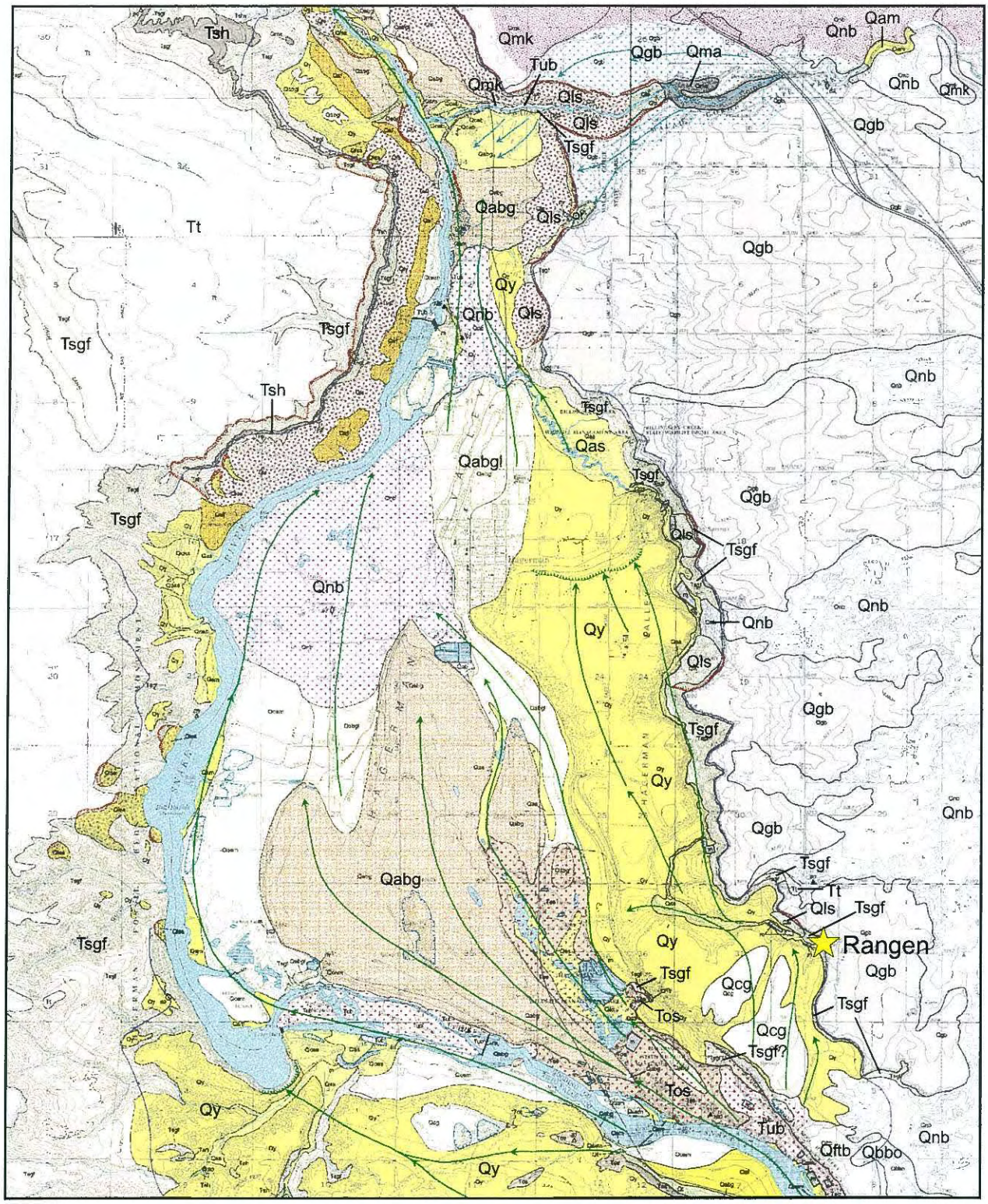
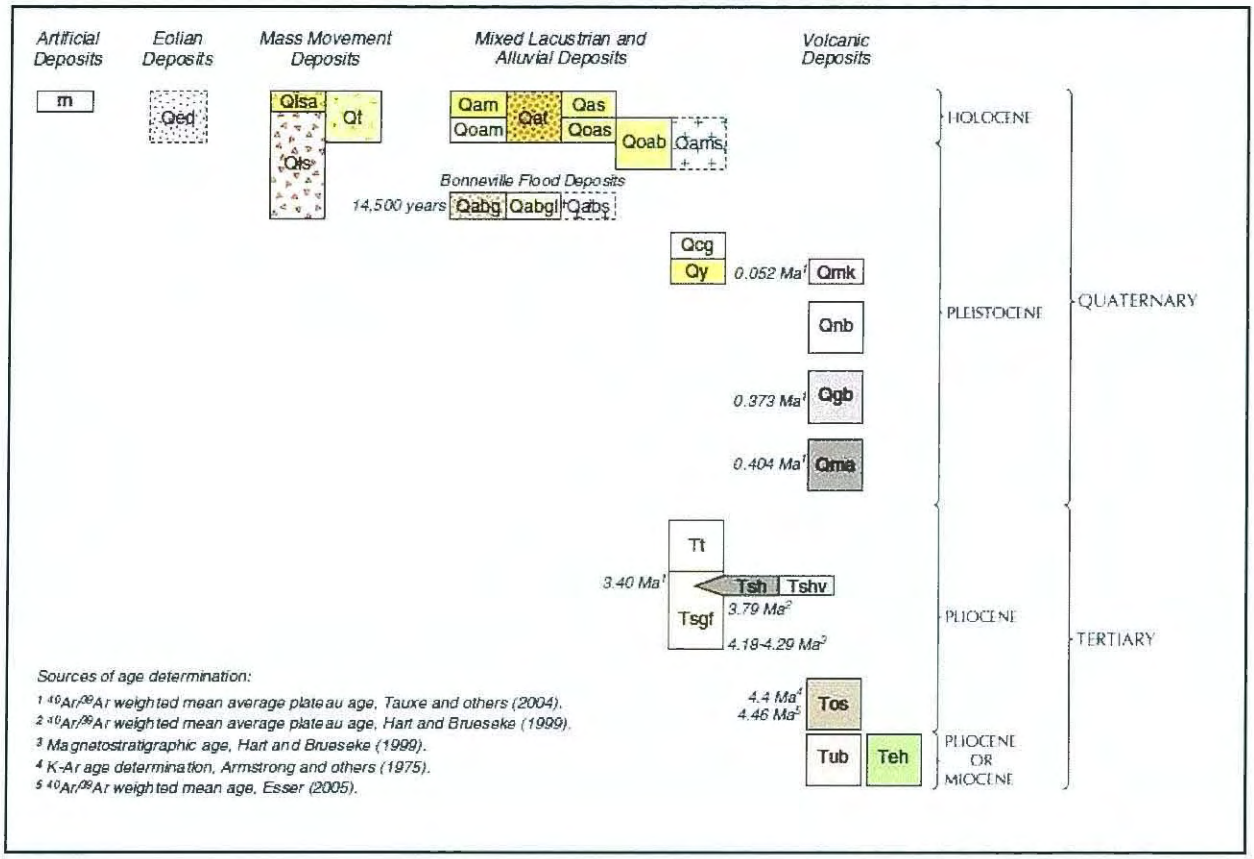


Figure 1 - Study Area Location Map



Source: Othberg et al., 2005 and Kauffman et al., 2005

Figure 2 - Study Area Geology



Source: Kaufman et al., 2005

Figure 3 - Stratigraphic Summary and General Lithology

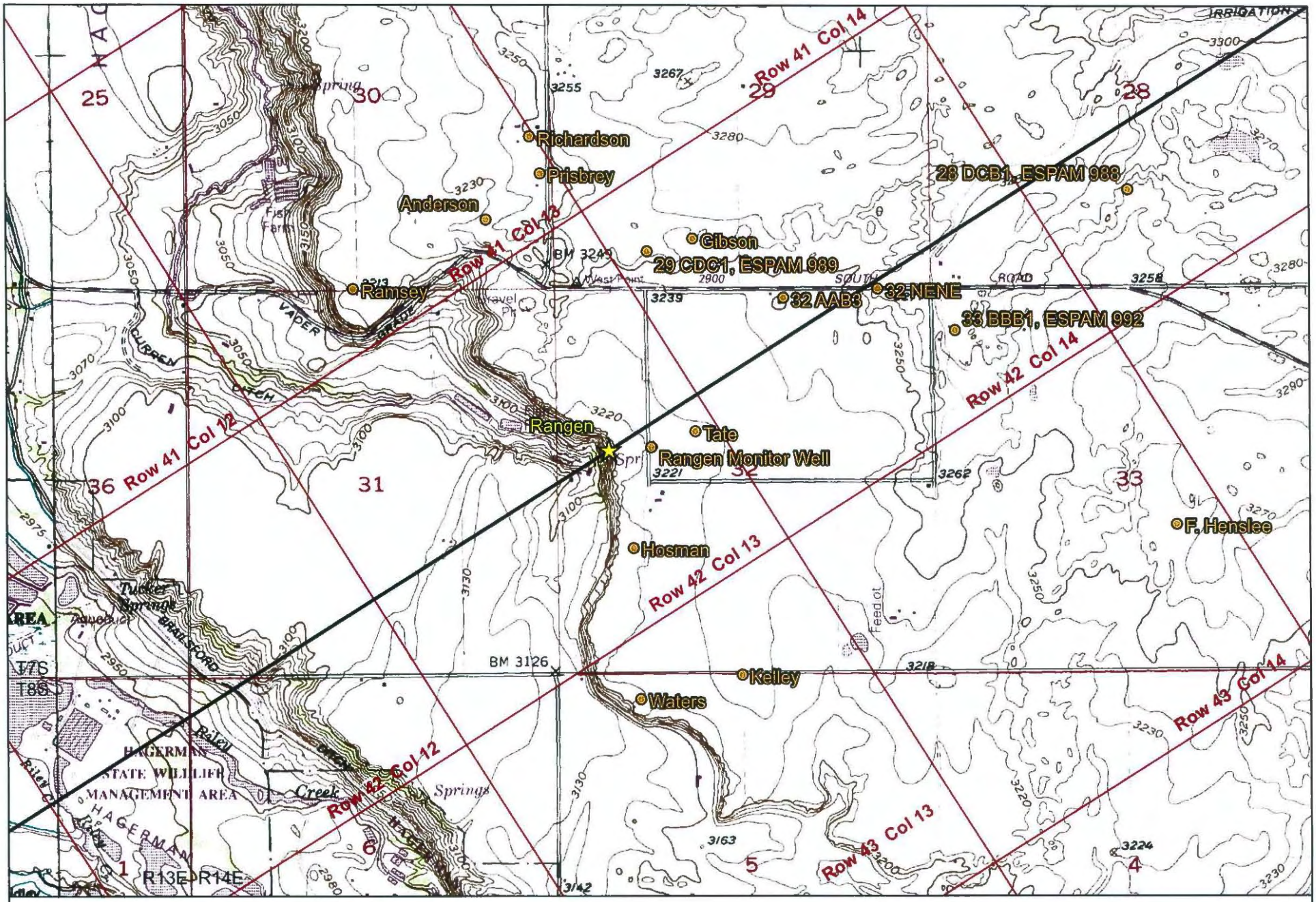


Figure 4 - Rangen Area Location Map

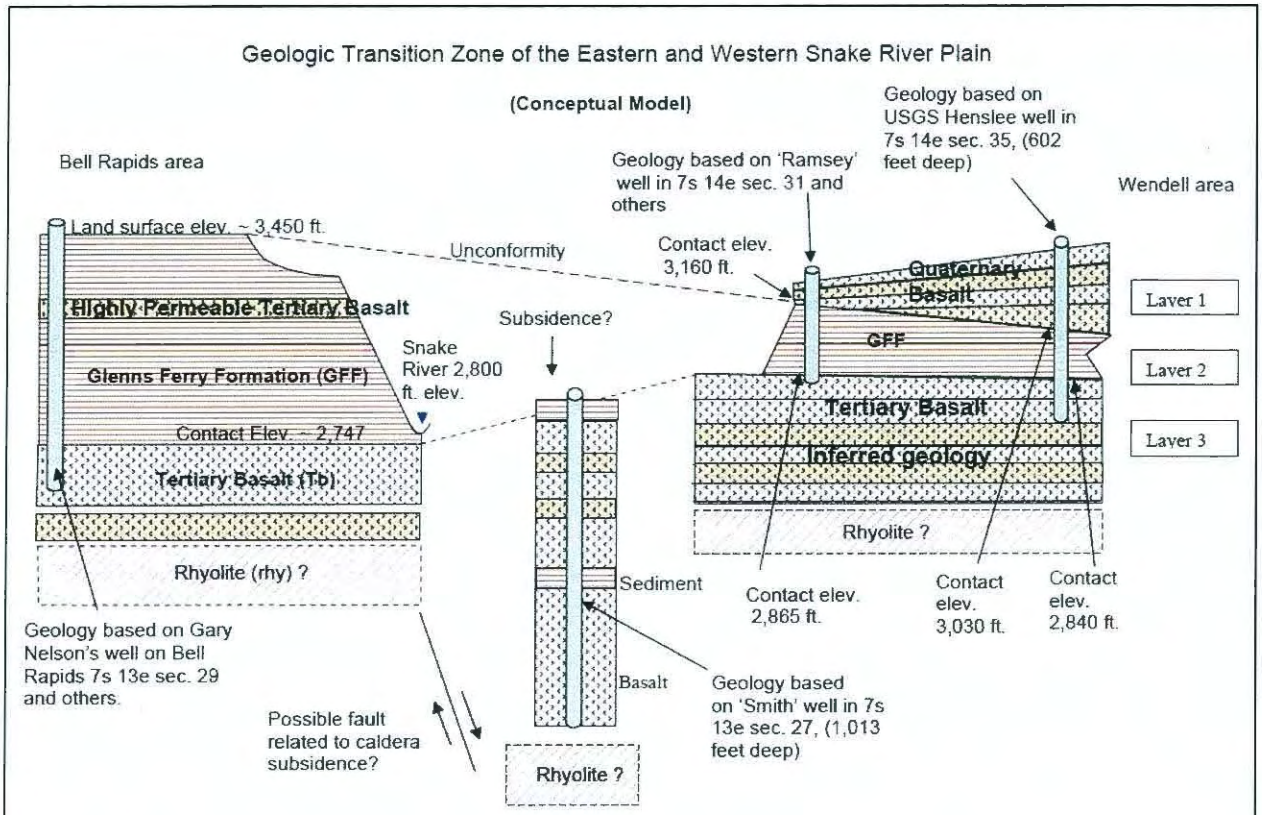


Figure 9. Conceptual 3-layer model of east Hagerman Valley (not to scale). The Tb/rhy contact may not have been horizontal and the Qb/GFF contact is erosional.

Source: Farmer, 2009; Fig. 9

Figure 5 - Rangen Conceptual Model

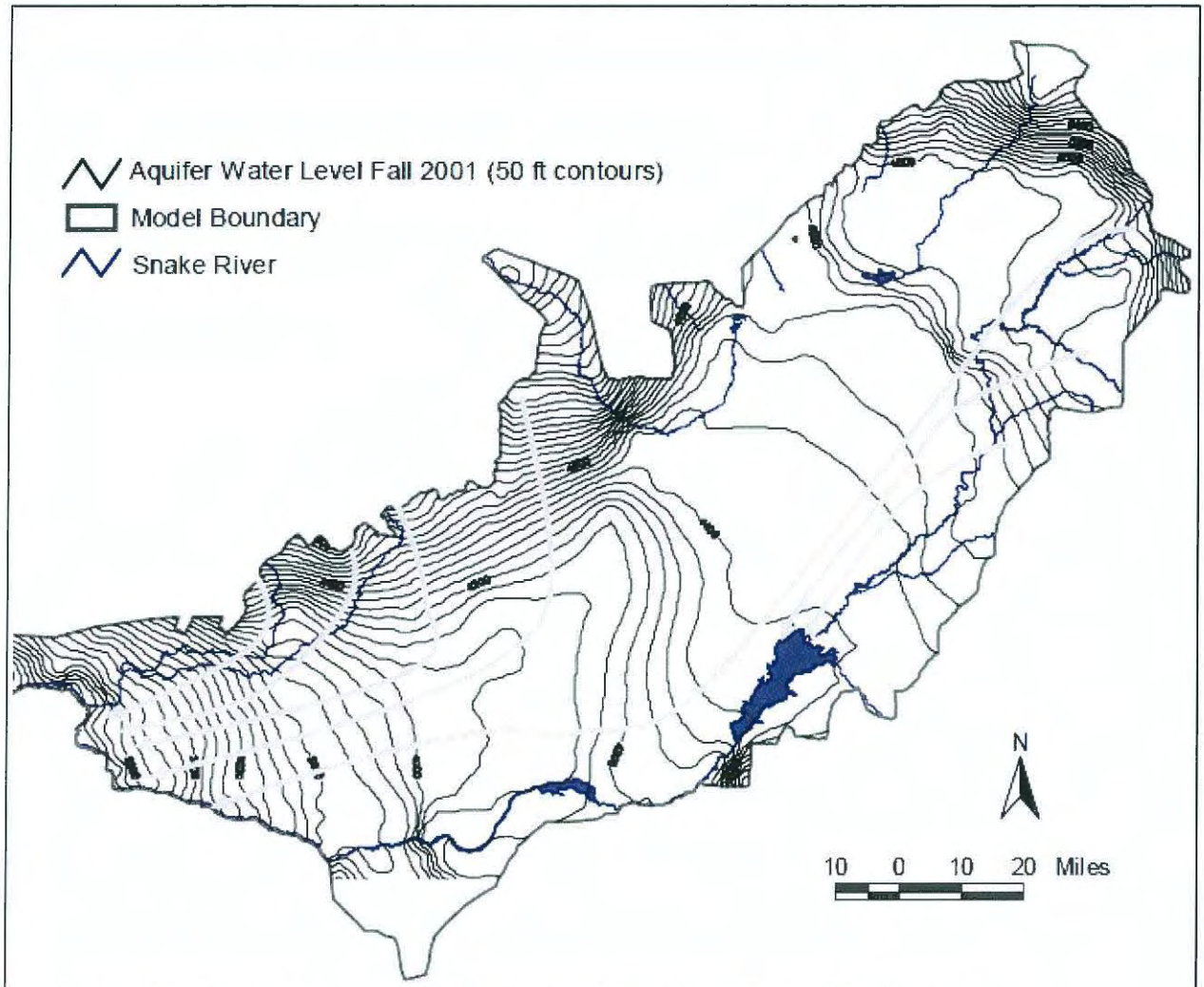
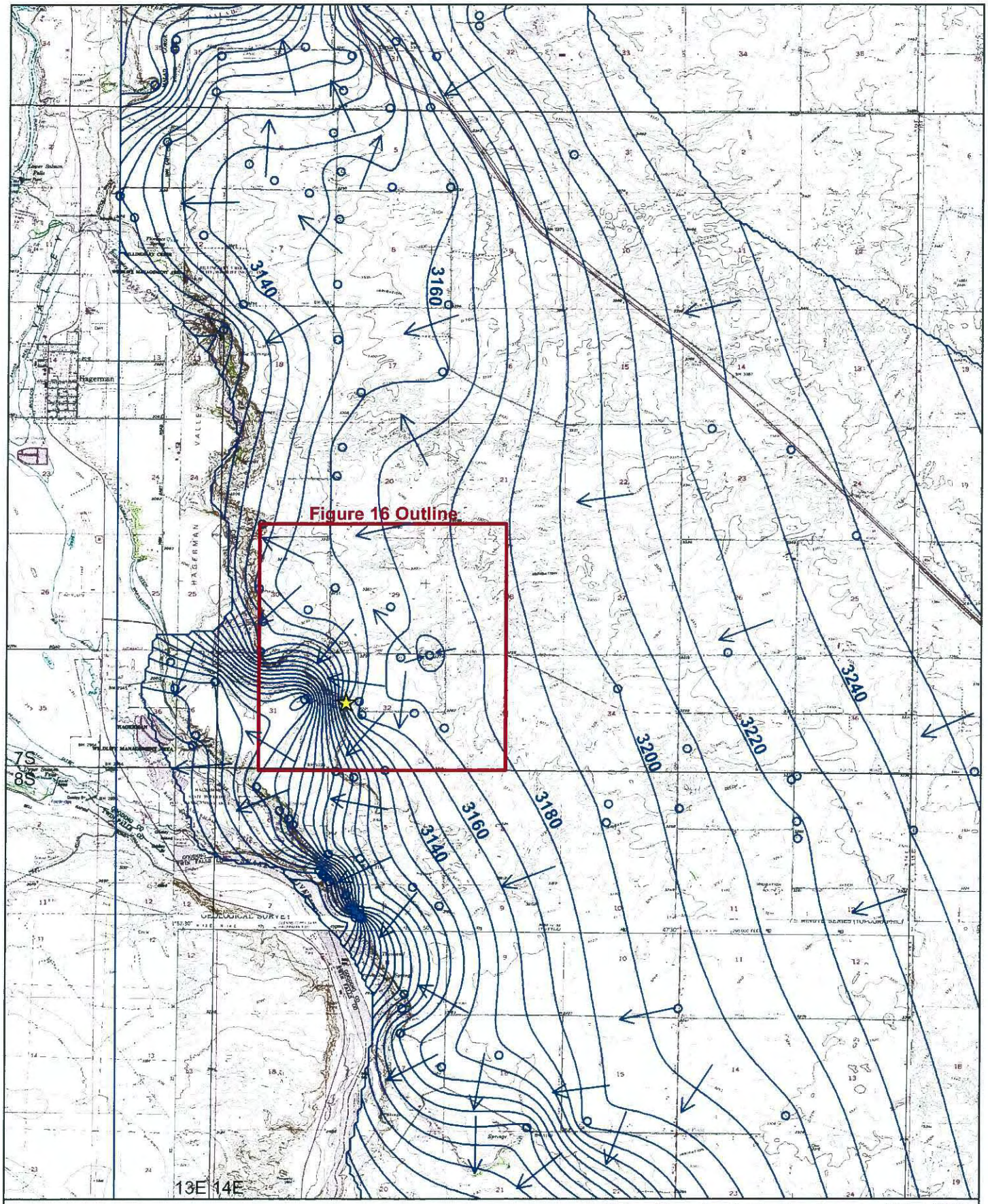


Figure 10. Contours of the Fall, 2001potentiometric surface of the Snake River Plain Aquifer and estimated aquifer flow lines.

Source: Cosgrove et al., 2006

Figure 6 - Potentiometric Surface for the Eastern Snake Plain Aquifer



Data points and contouring from Farmer and Blew (2012)
(Shapefile: Nov. 2011 WT map (10ft.) contours CLIPPED, found at http://www.idwr.idaho.gov/Browse/WaterMngmt/Rangen Delivery Call/Rangen Spring Hydrology Discussion/%237/Mass Measurement/2011 Nov. Mass Meas/)

Figure 7 - Study Area Potentiometric Surface Nov. 2011

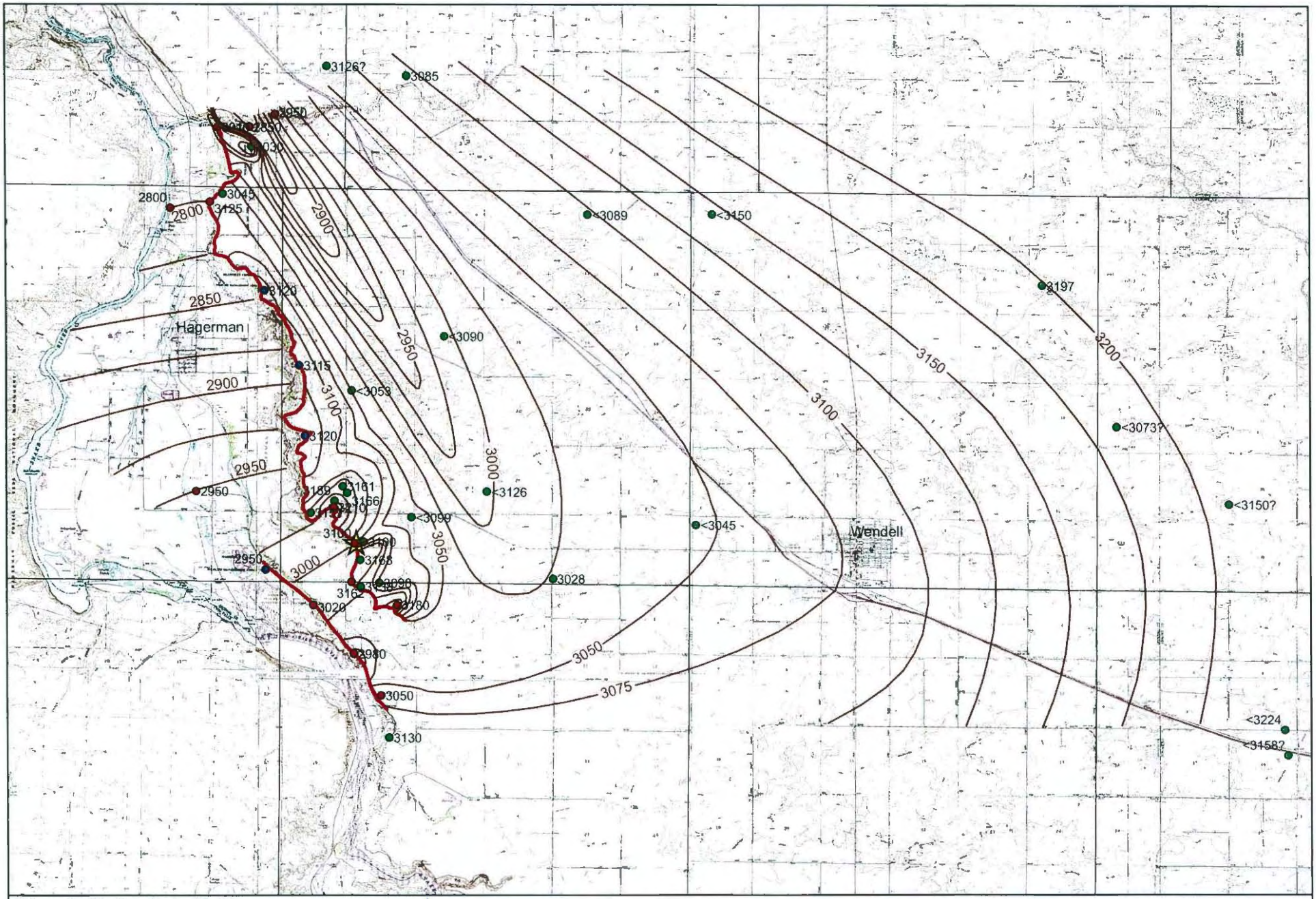
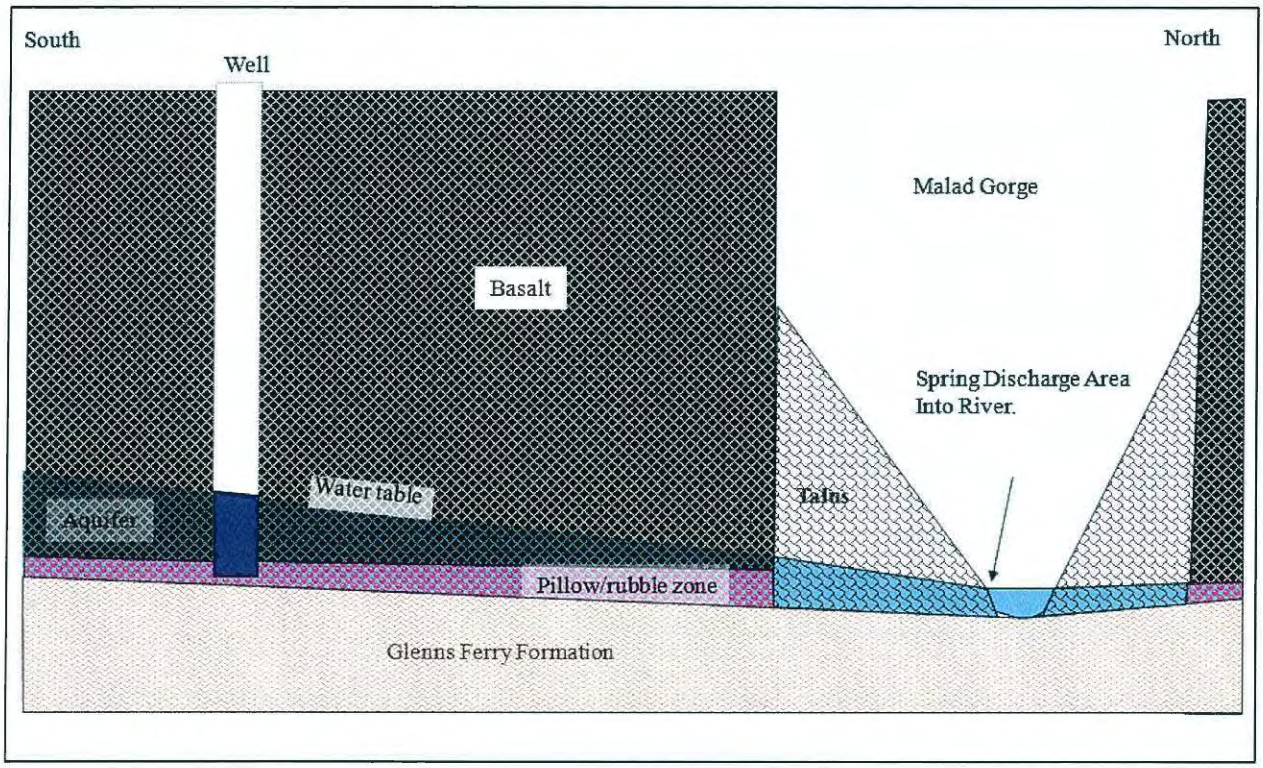


Figure 8 - Schematic Contouring of Base of Primary Aquifer



Source: Farmer and Blew (Sept. 2009; Fig. 7)

Figure 9 - Malad Gorge Schematic Geologic Cross-Section

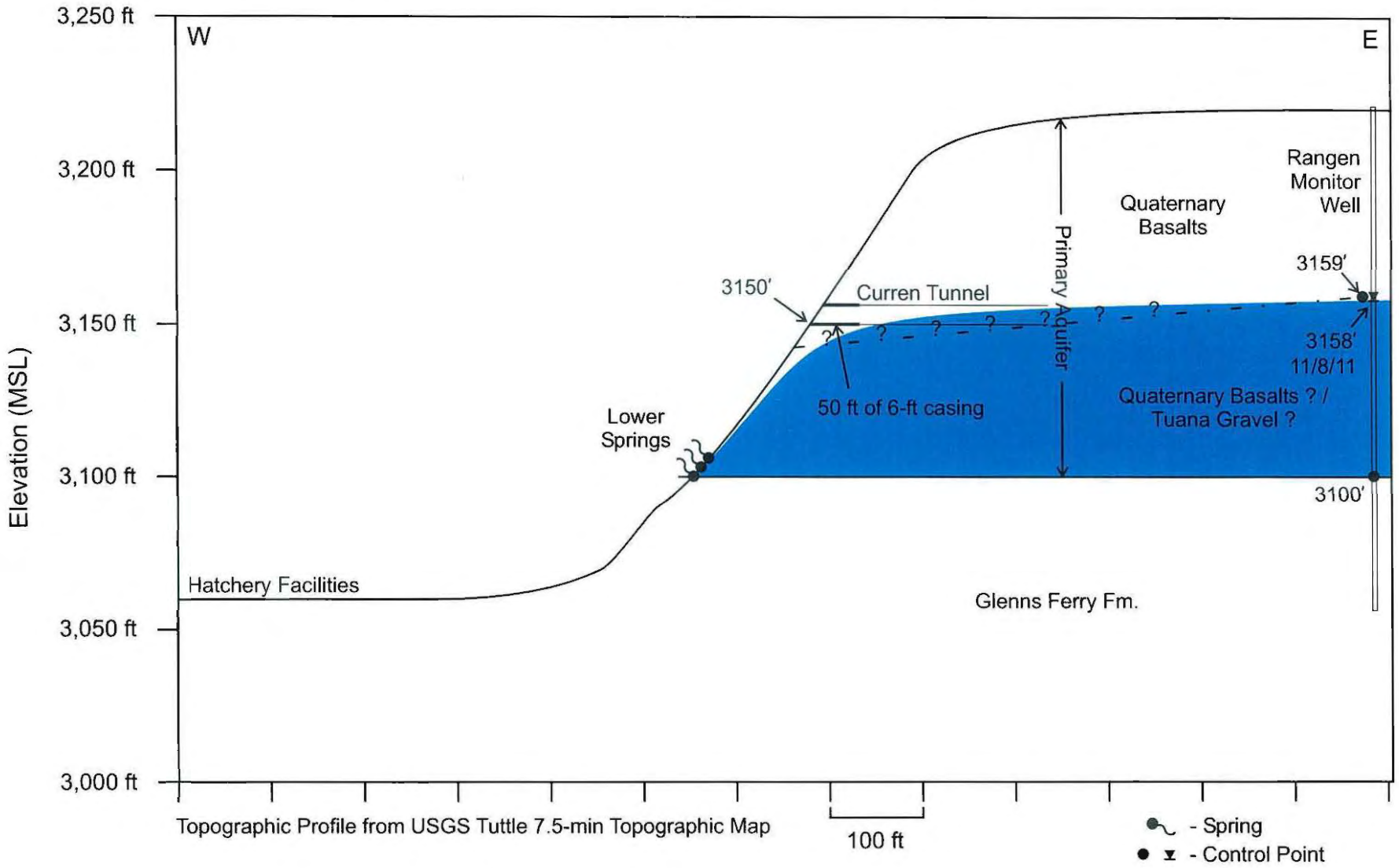
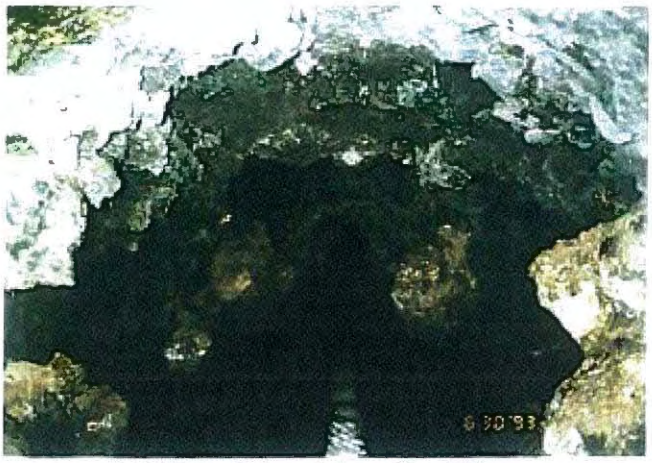


Figure 10 - Rangen Groundwater Discharge Profile

Imagery Source: GoogleEarth 9/21/11

source: IDWR (1993)

Entrance to Curren Tunnel



source: IDWR (1993)

Curren Tunnel Beyond Lining

Figure 11 - Rangen Groundwater Discharge

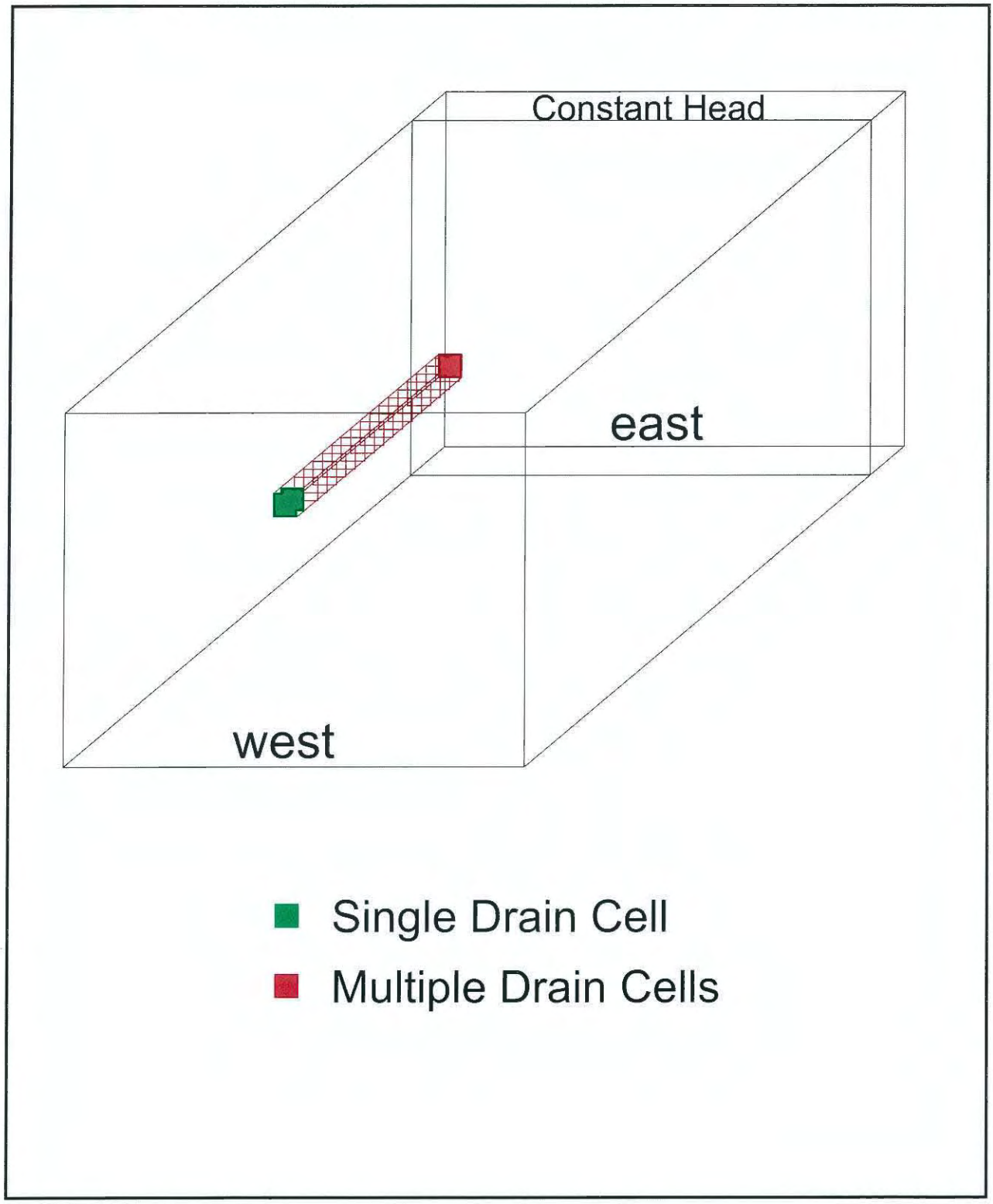


Figure 12 - Drainage Tunnel Groundwater Model Schematic

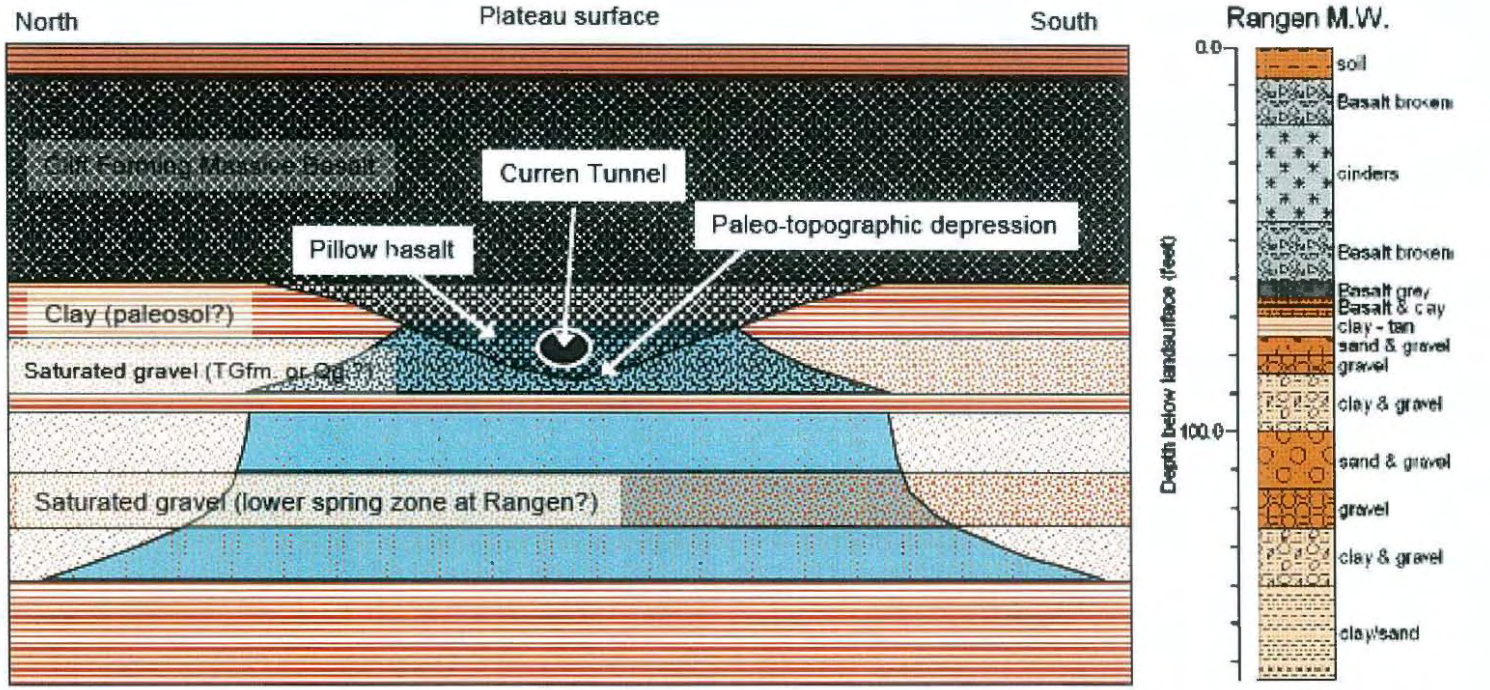


Figure 24. Conceptual hydrostratigraphic model for the Rangen spring area showing the paleo-topographic depression filled with pillow basalts and underlying sediments transporting groundwater.

Source: Farmer (2009)

Figure 13 - Rangen Groundwater Discharge Cross-Section

Figure 14 - Rangen Discharge 1993 - 2009

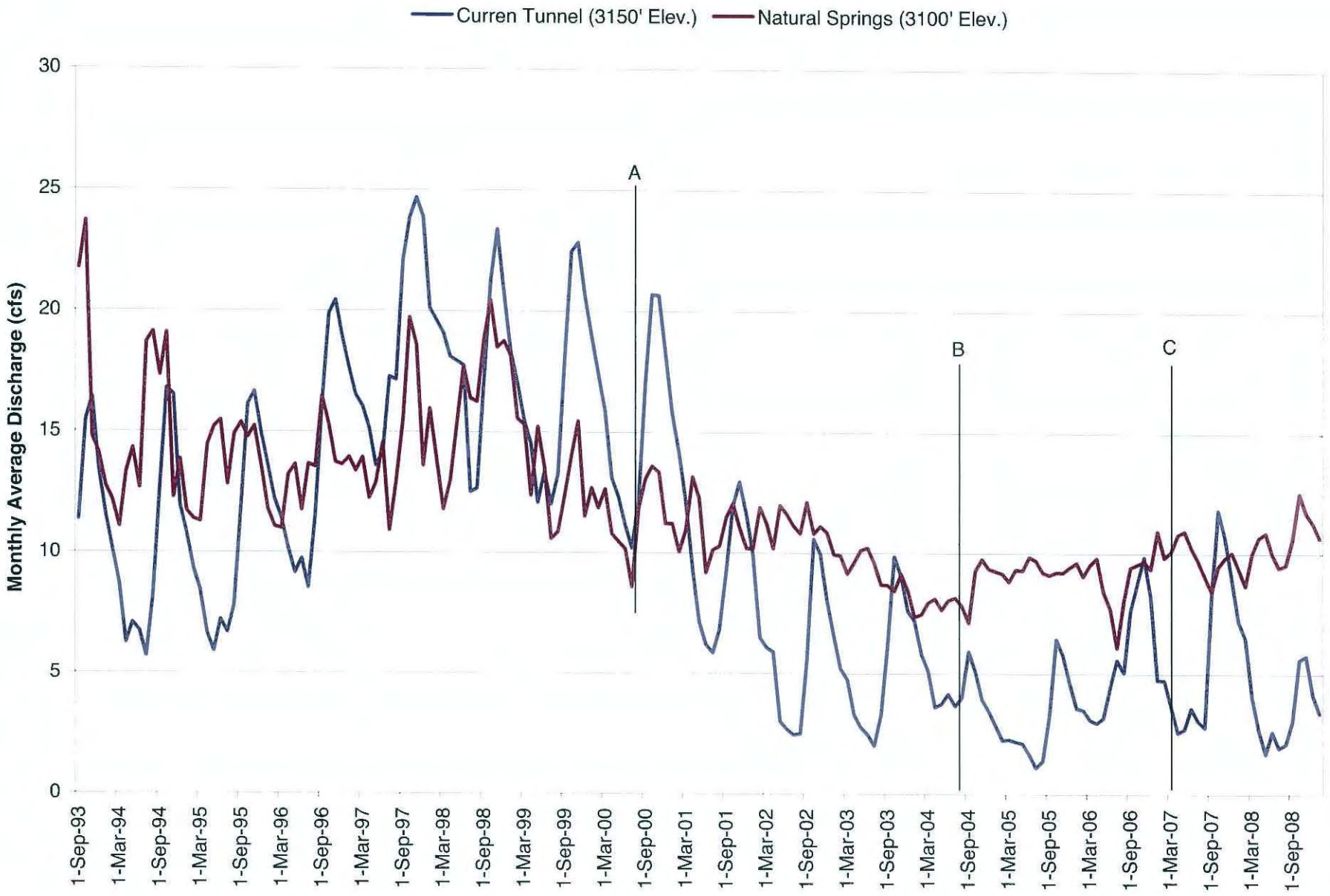
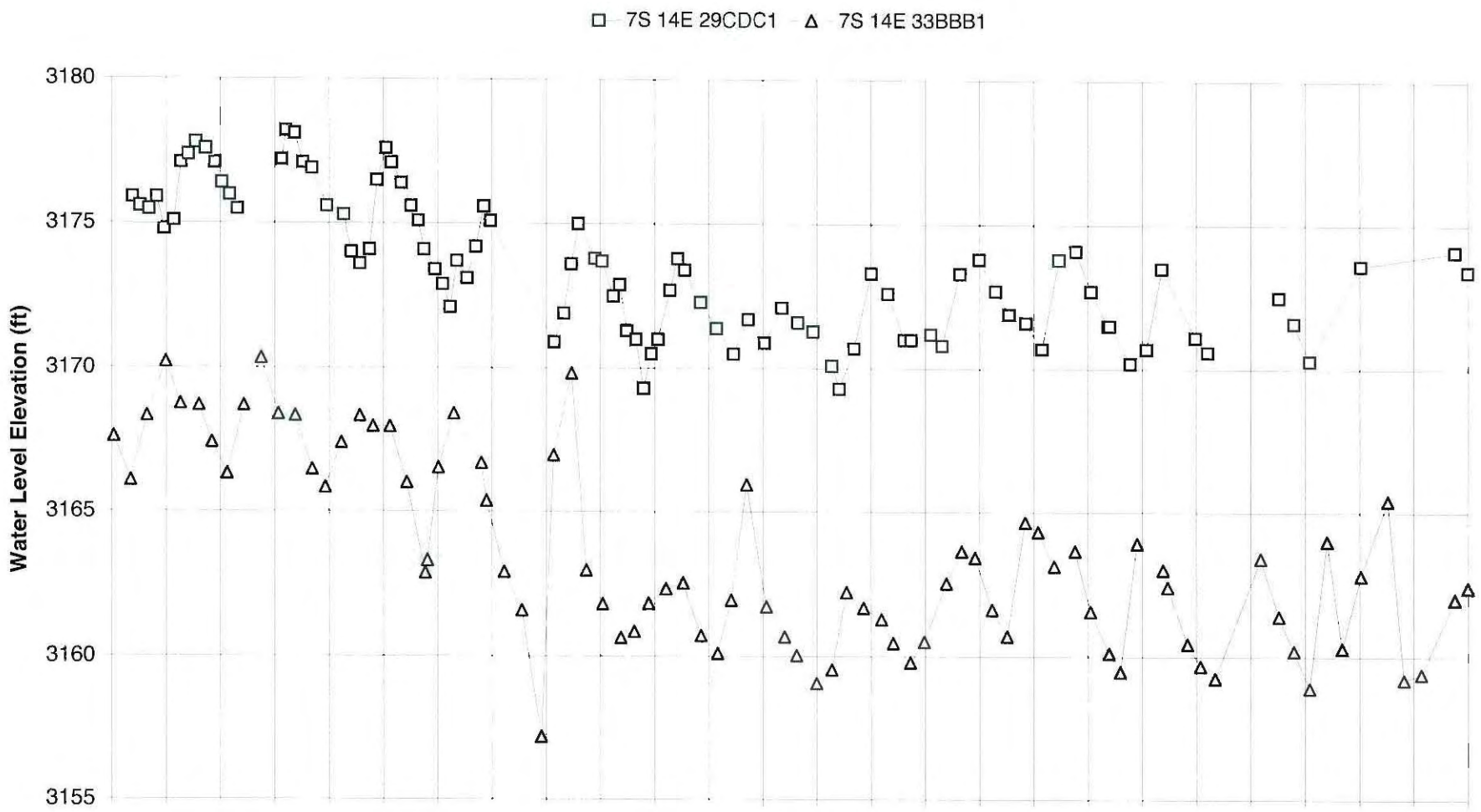


Figure 15 - Rangen Area Groundwater Elevations



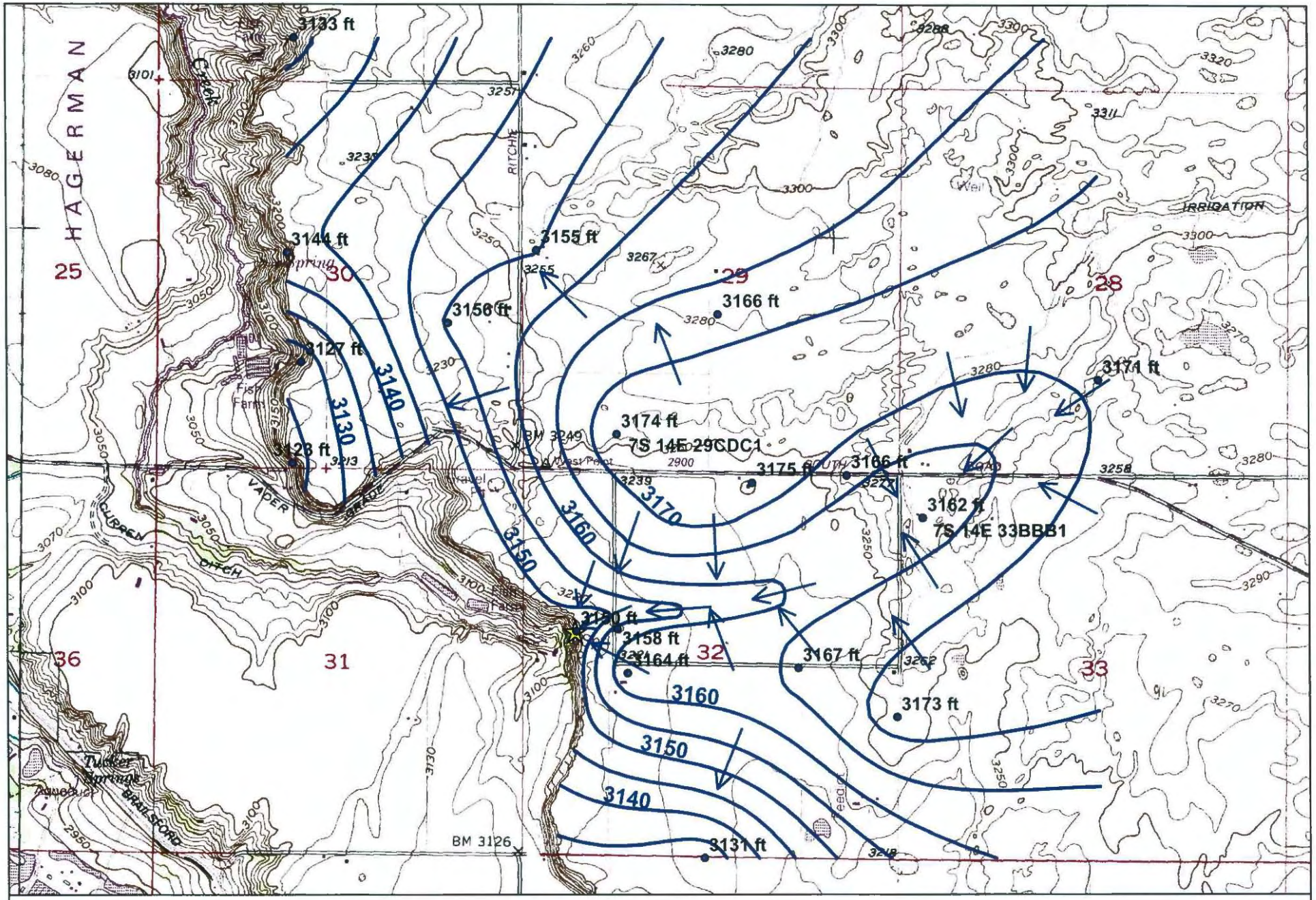


Figure 16 - Rangen Area Groundwater Level Schematic

Figure 17 - Rangen System Discharge and Aquifer Water Level Elevation
8/6/1985 - 5/4/2009; Well 7S 14E 33 BBB1

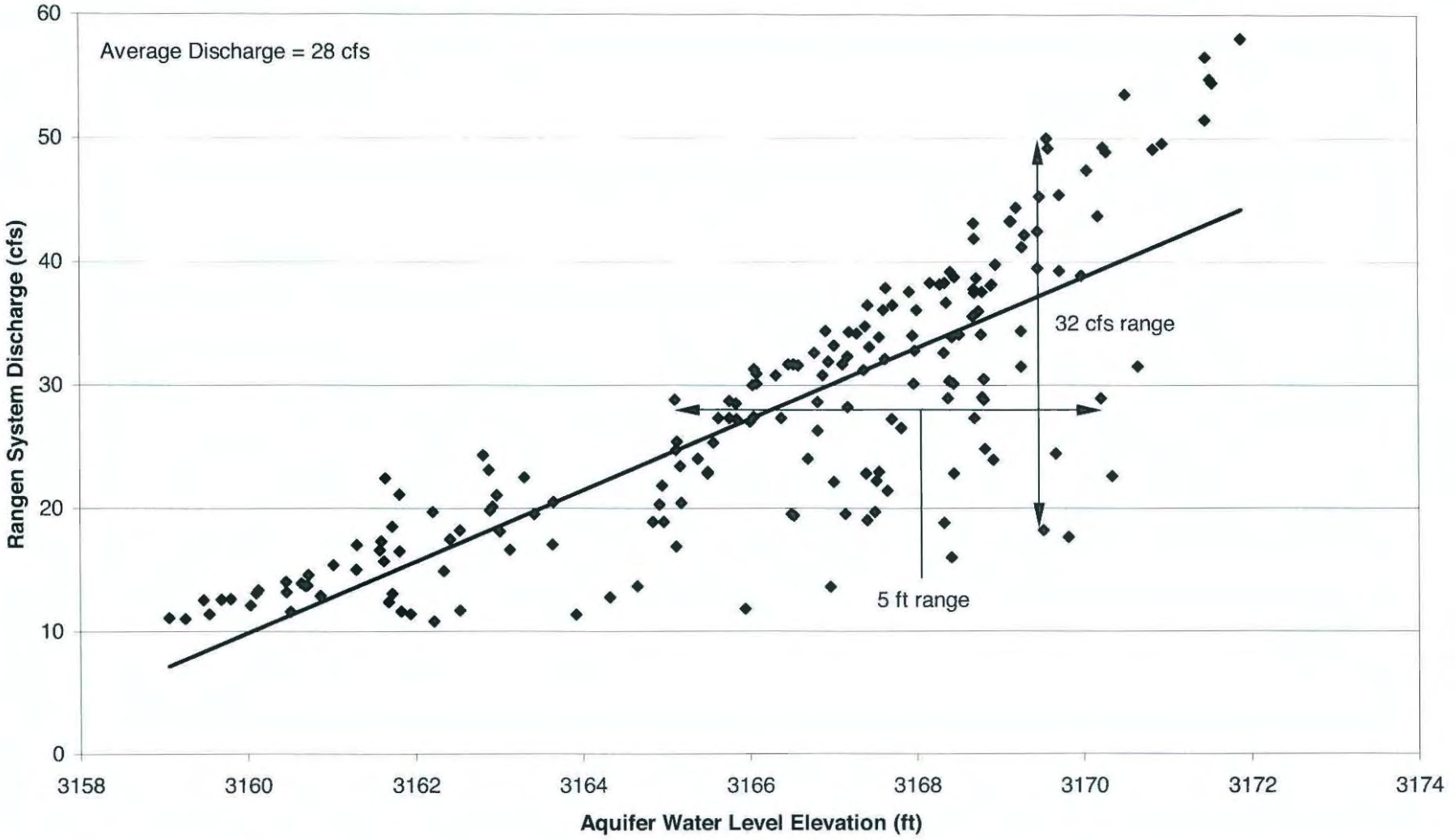
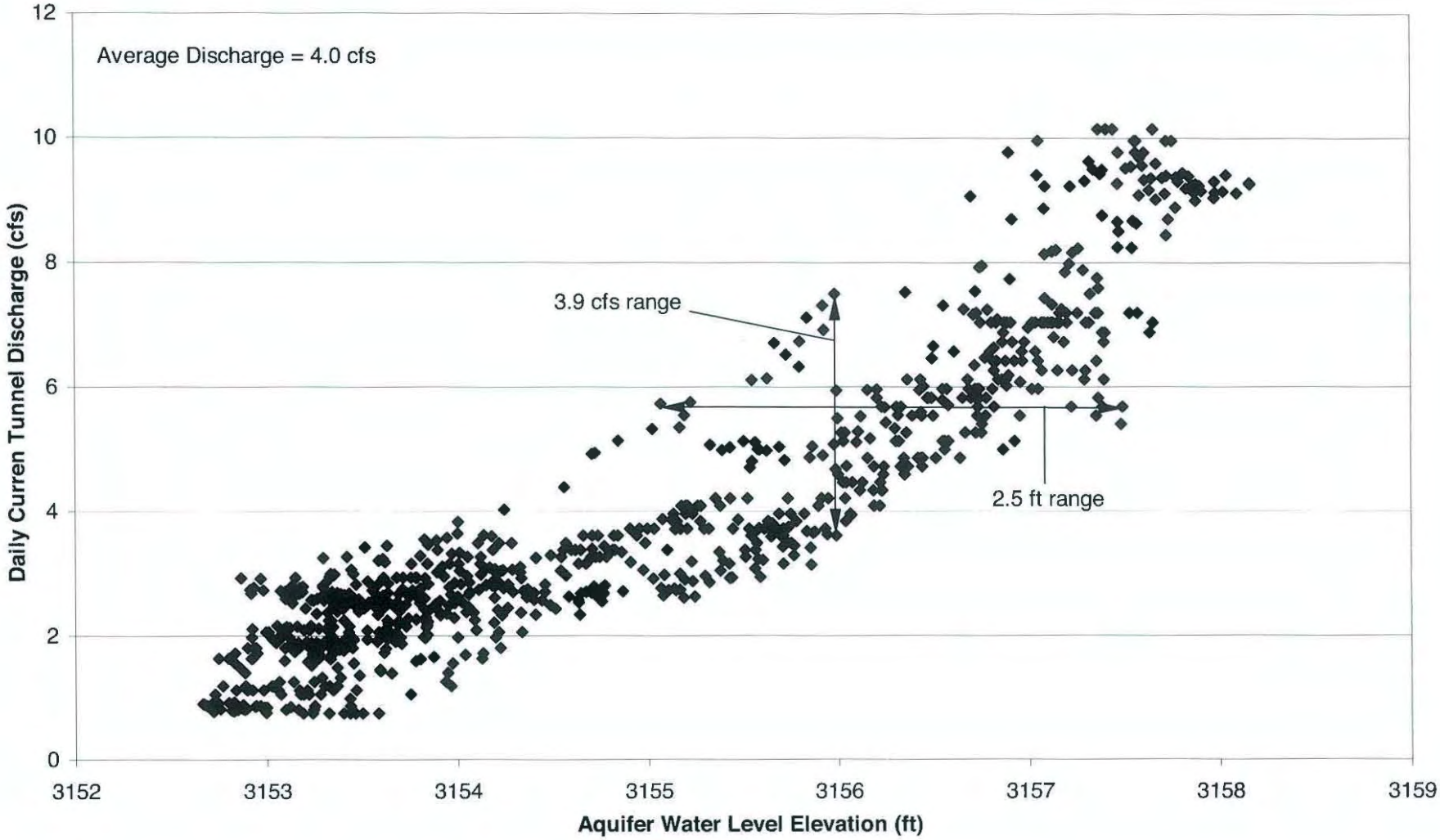
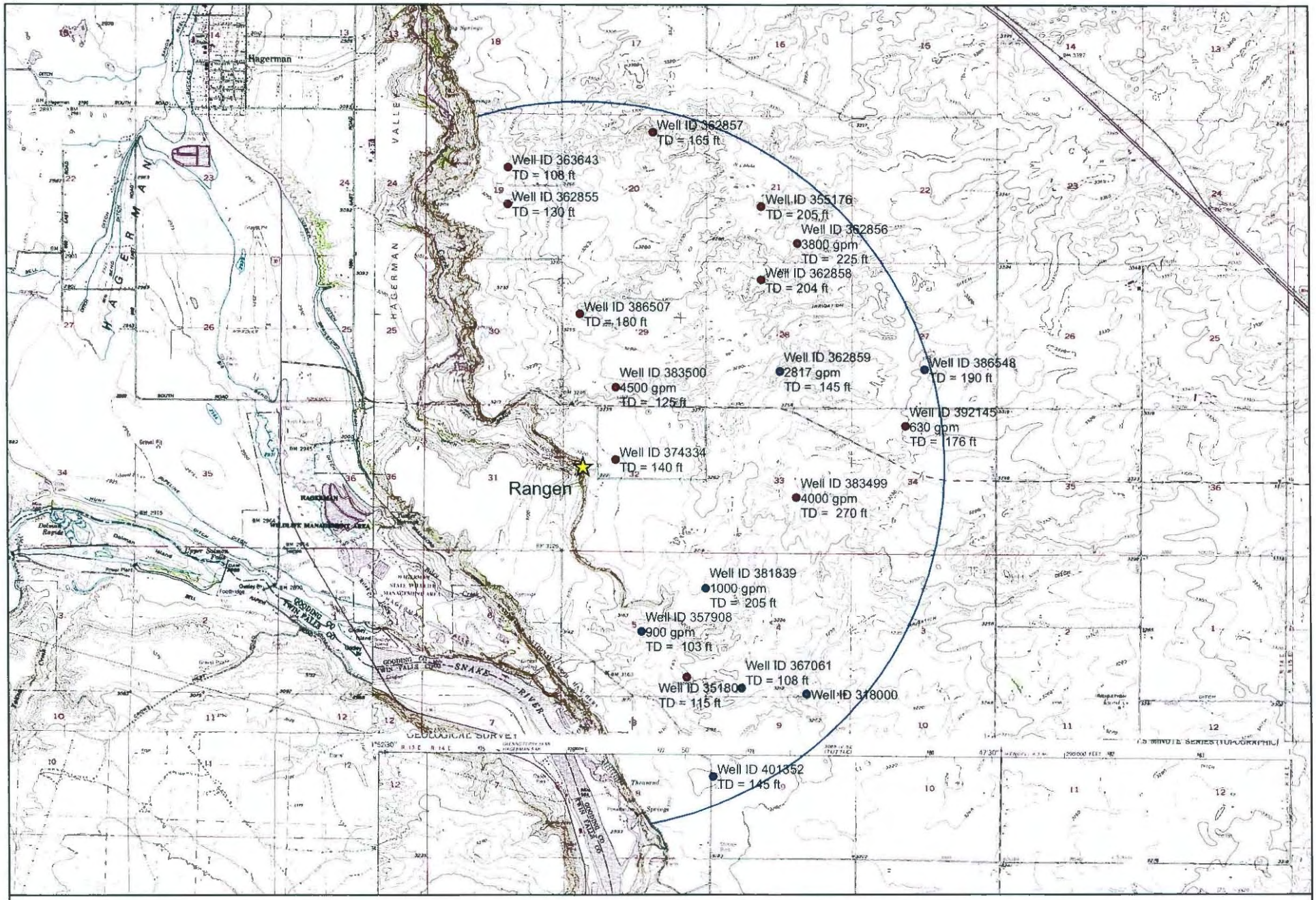


Figure 18 - Curren Tunnel Discharge and Aquifer Water Level Elevation
8/6/2008 - 1/31/2012; Rangen Monitor Well 7S 14E 32 SENW





Irrigation Wells

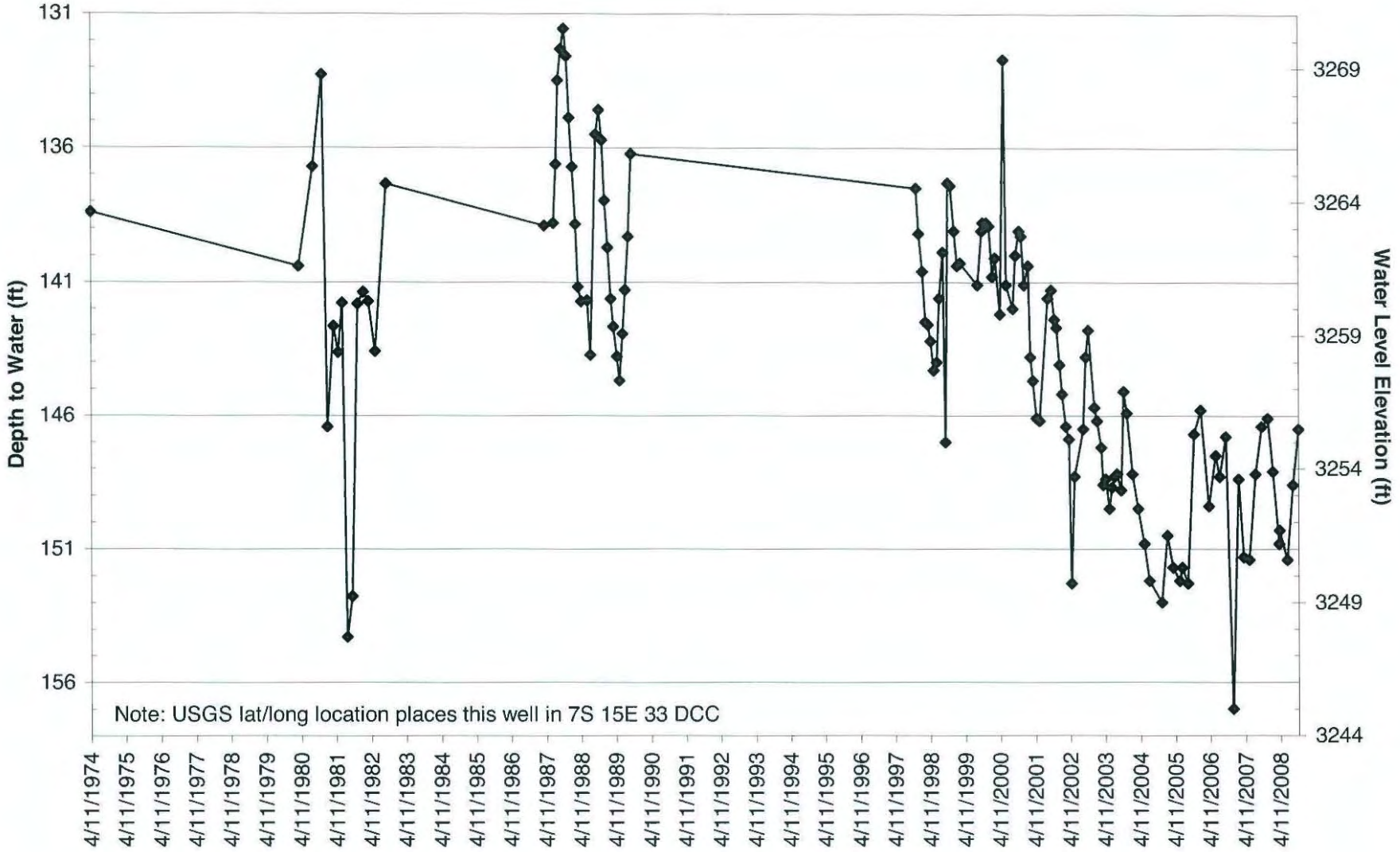
- GPS/Air Photo Location
- Qtr-Qtr Location

Source: http://www.idwr.idaho.gov/ftp/gisdata/Spatial/Wells/WellConstruction/WellConstruction.zip

Area within 2 1/2 miles of Rangen, east of the rim.

Figure 19 - Rangen Area Irrigation Wells

Figure 20 - IDWR Well Number 7S 15E 32 DDC2



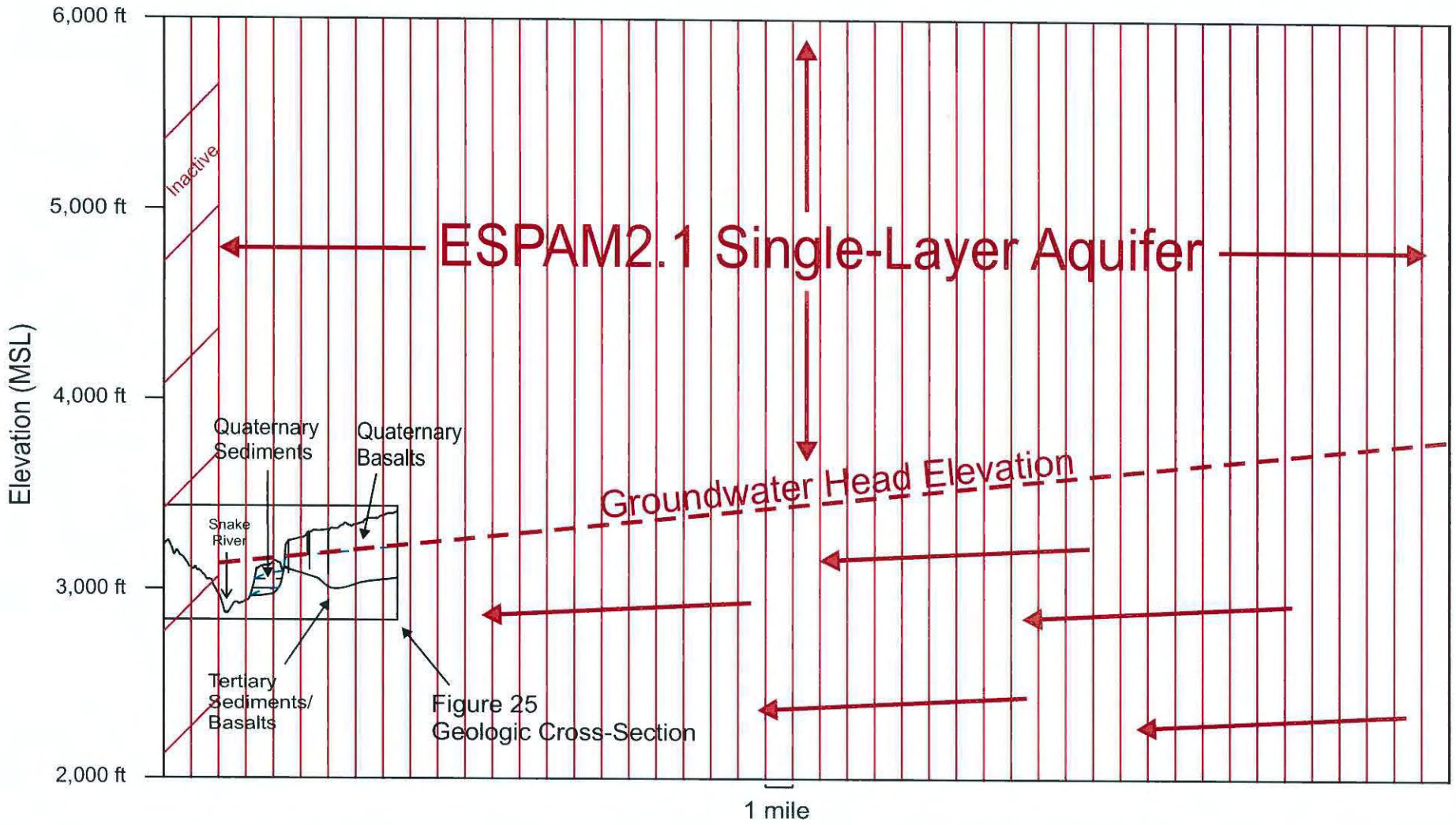


Figure 21 - ESPAM2.1 Row 42 Cross-Section with Rangen Inset

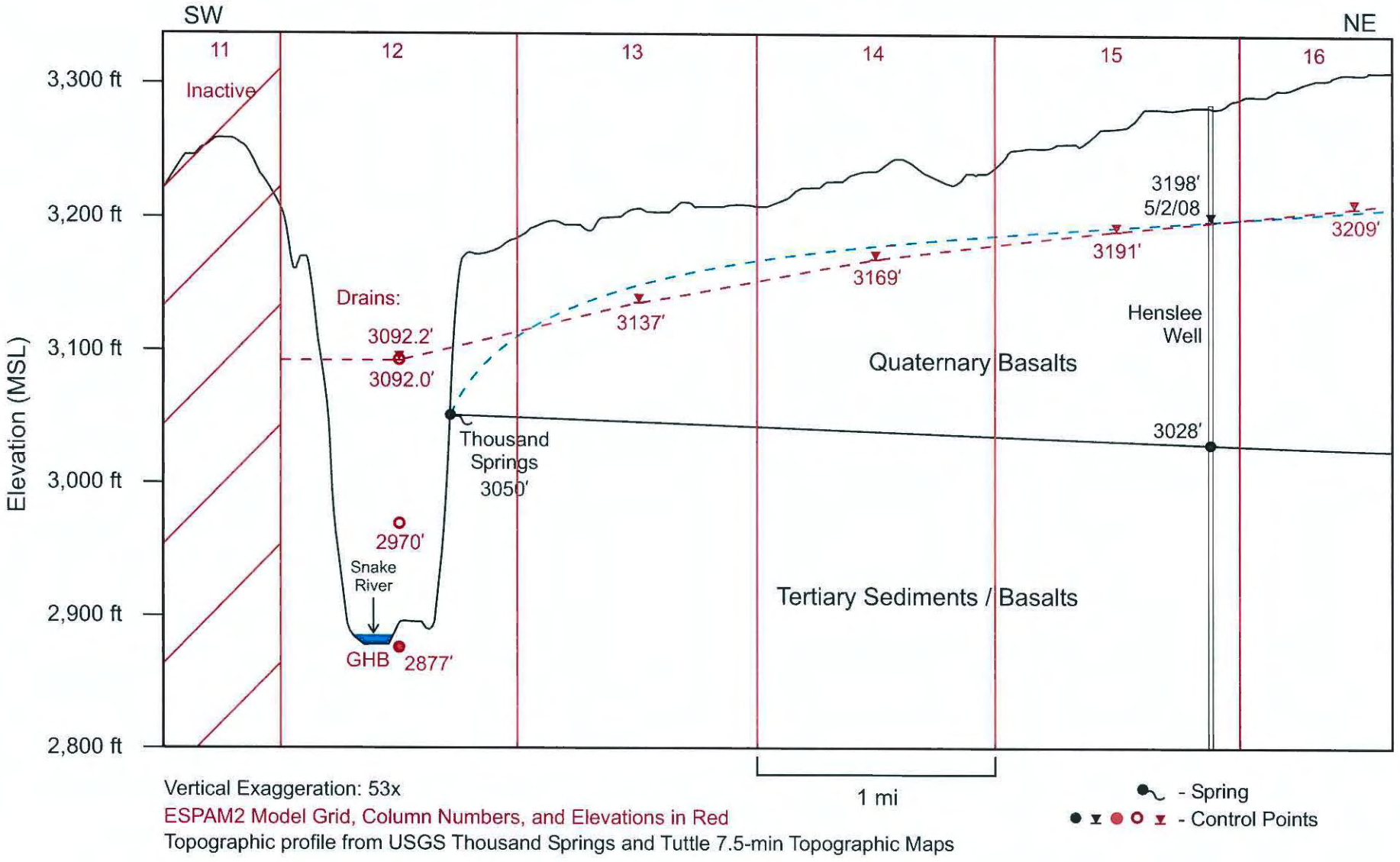


Figure 22 - ESPAM2.1 Row 44 Schematic Profile and Model Overlay

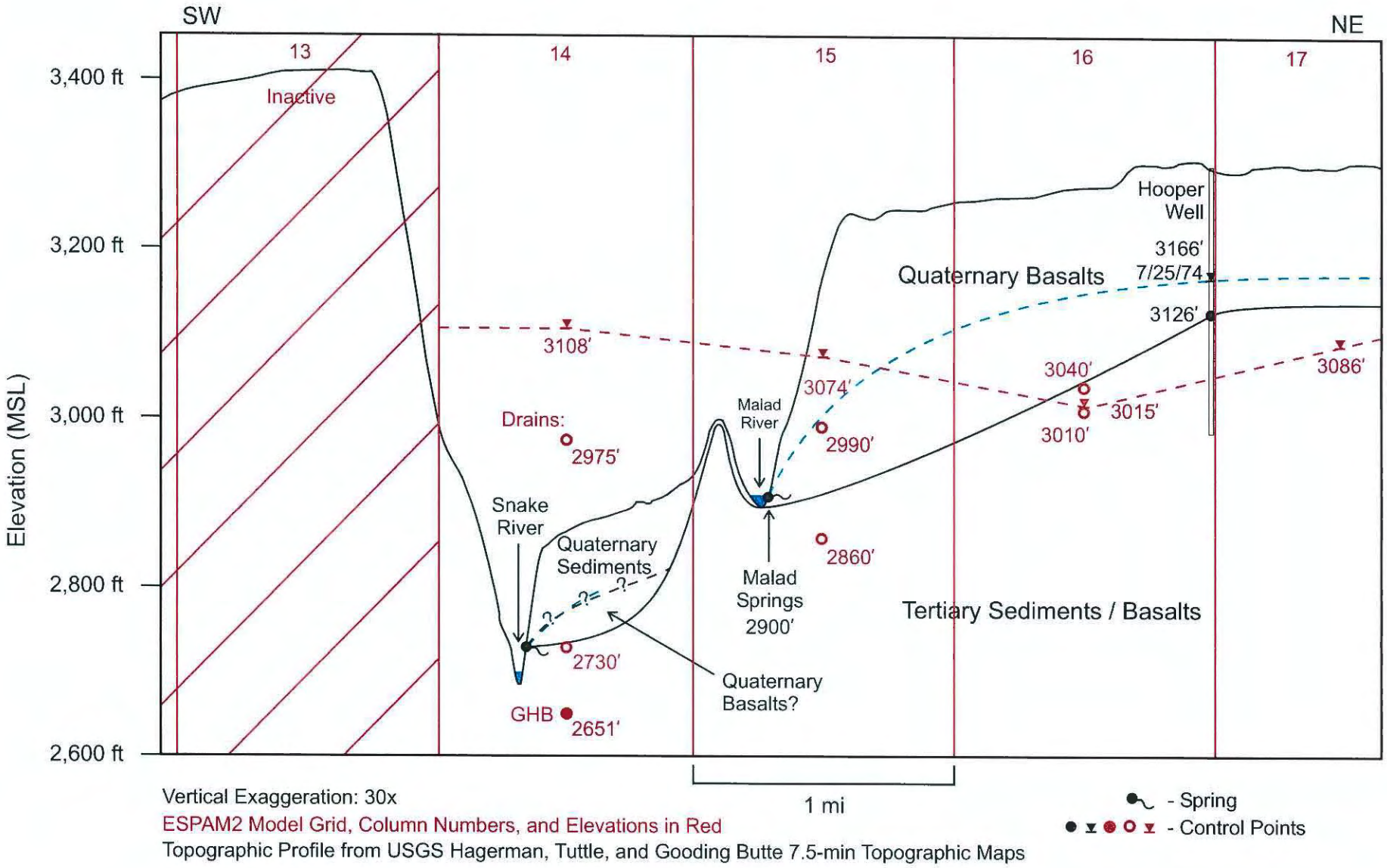
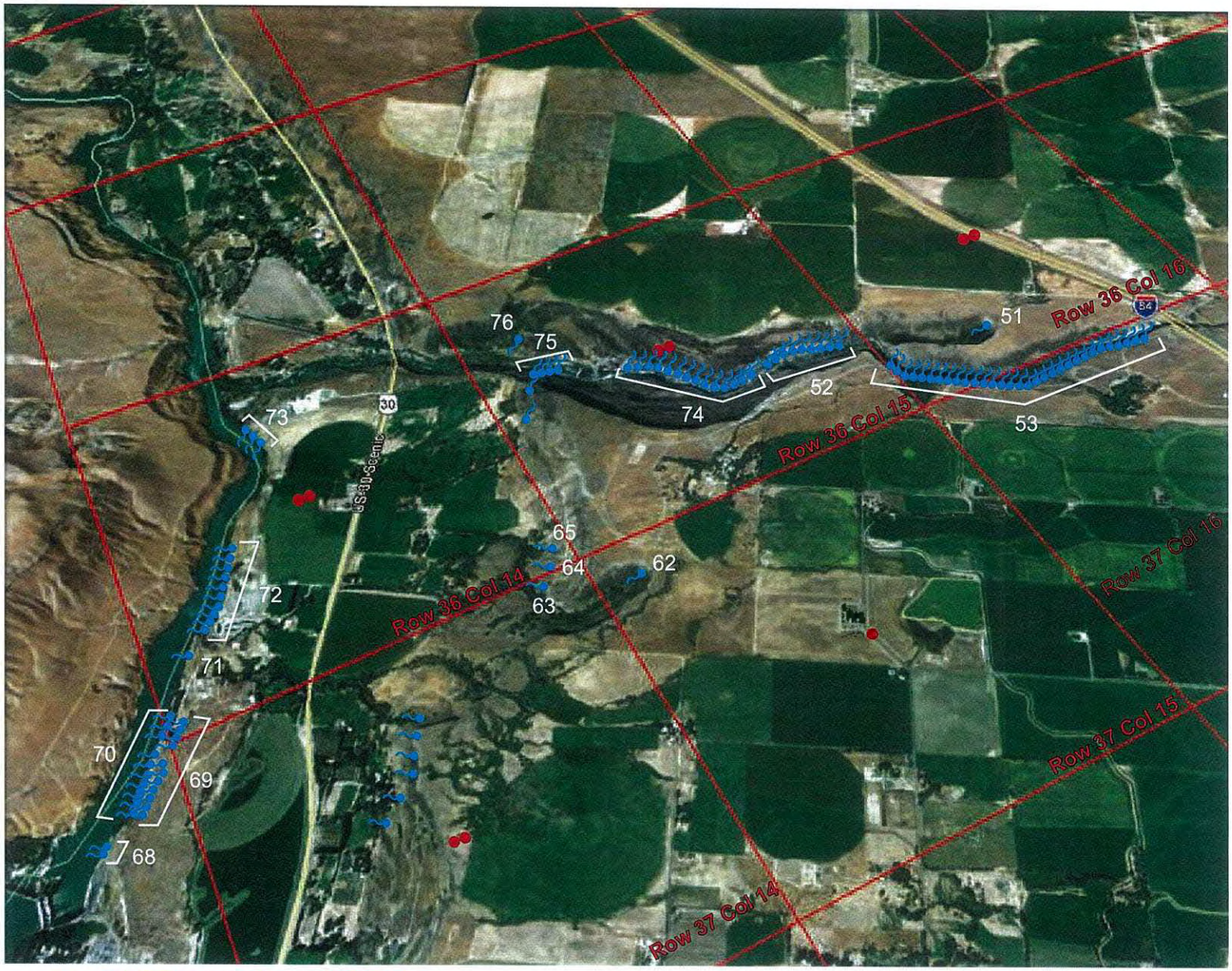


Figure 23 - ESPAM2.1 Row 36 Schematic Profile and Model Overlay



Imagery Source: Google Earth, 9/21/2011

Figure 24 - Malad River ESPAM2.1 Model Area

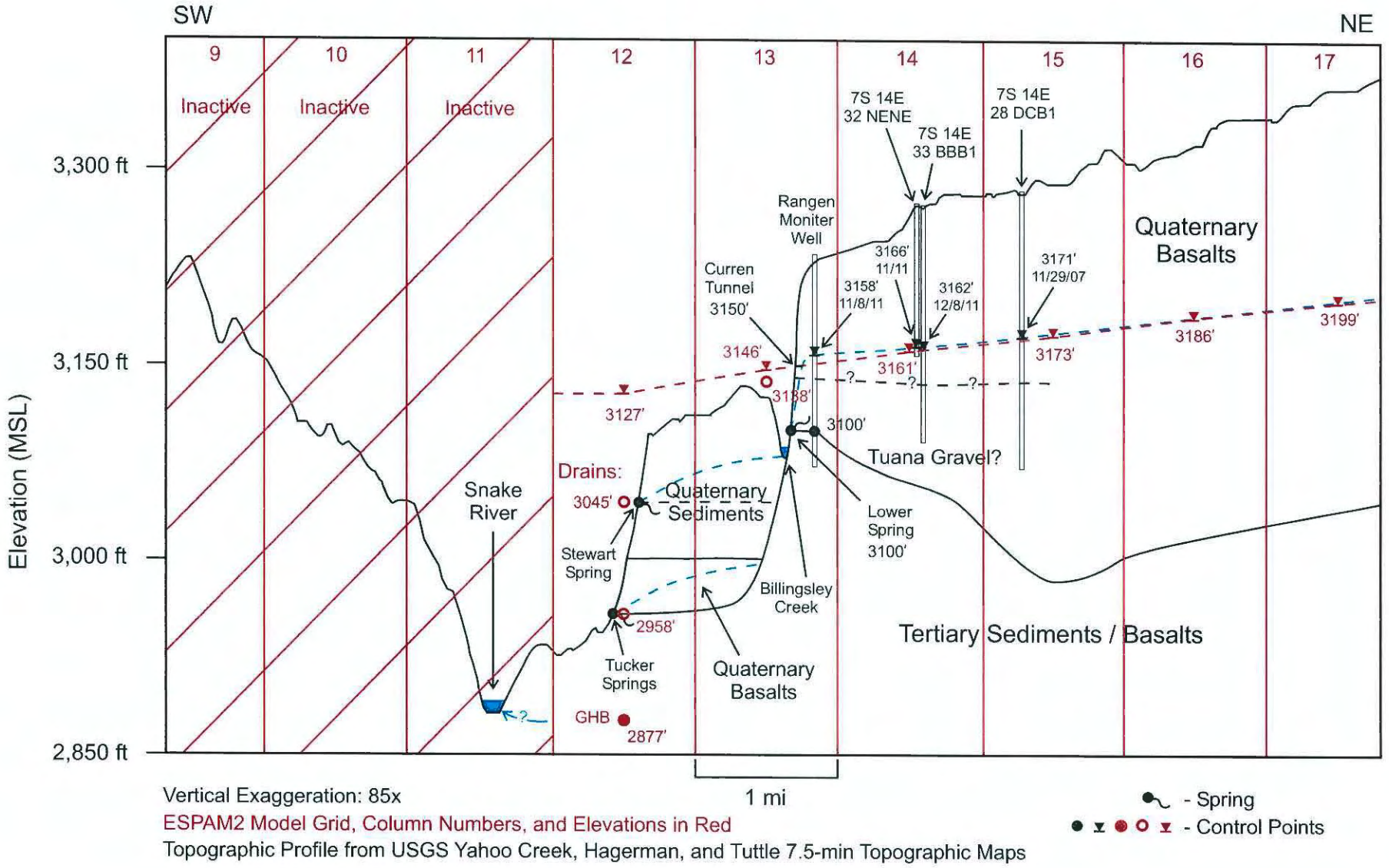


Figure 25 - ESPAM2.1 Row 42 Schematic Profile and Model Overlay

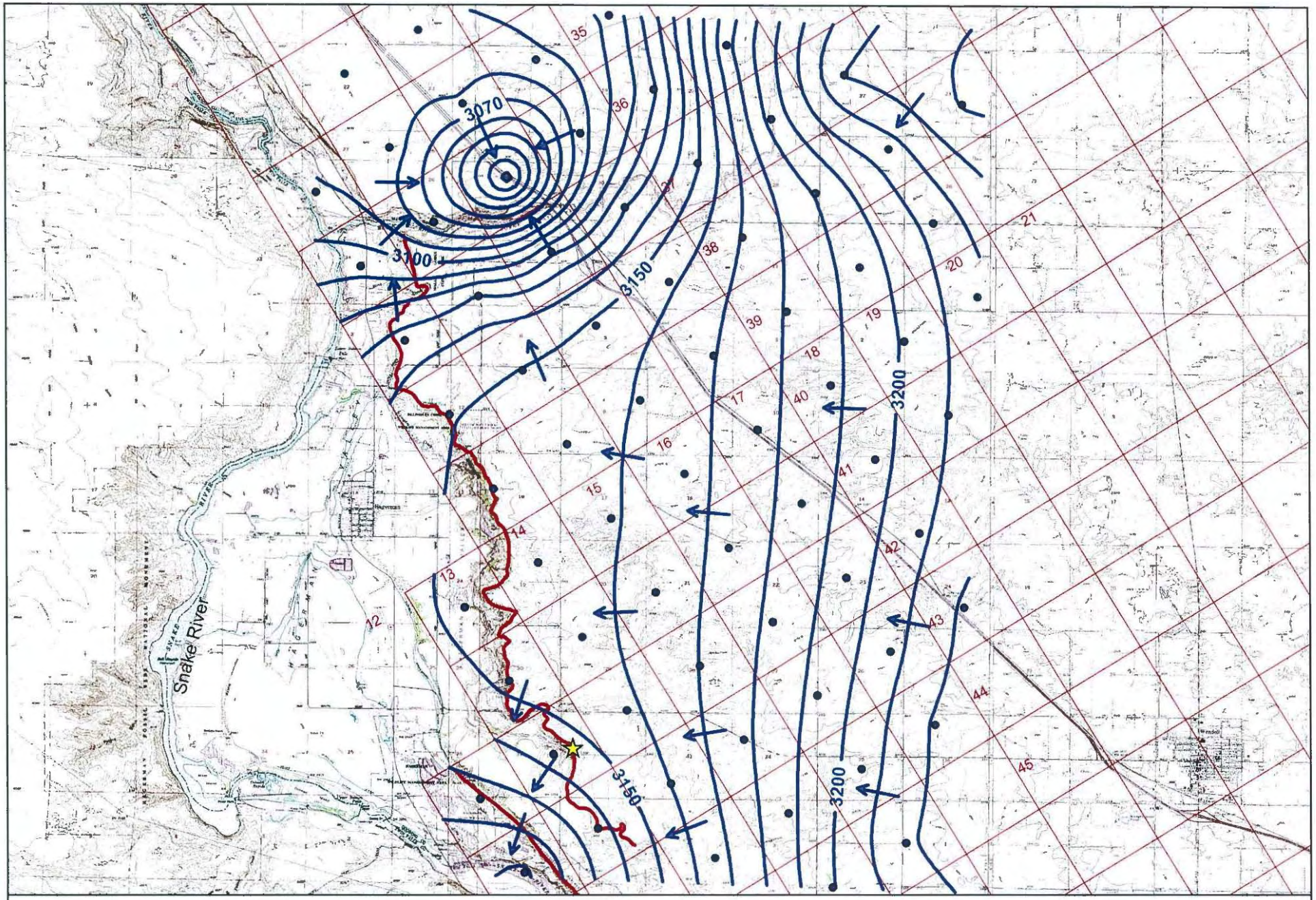


Figure 26 - ESPAM2.1 Nov. 2007
Aquifer Head Distribution

Figure 27 - ESPAM2.1 "Rangen" Cell (42-13) Modeled Water Level

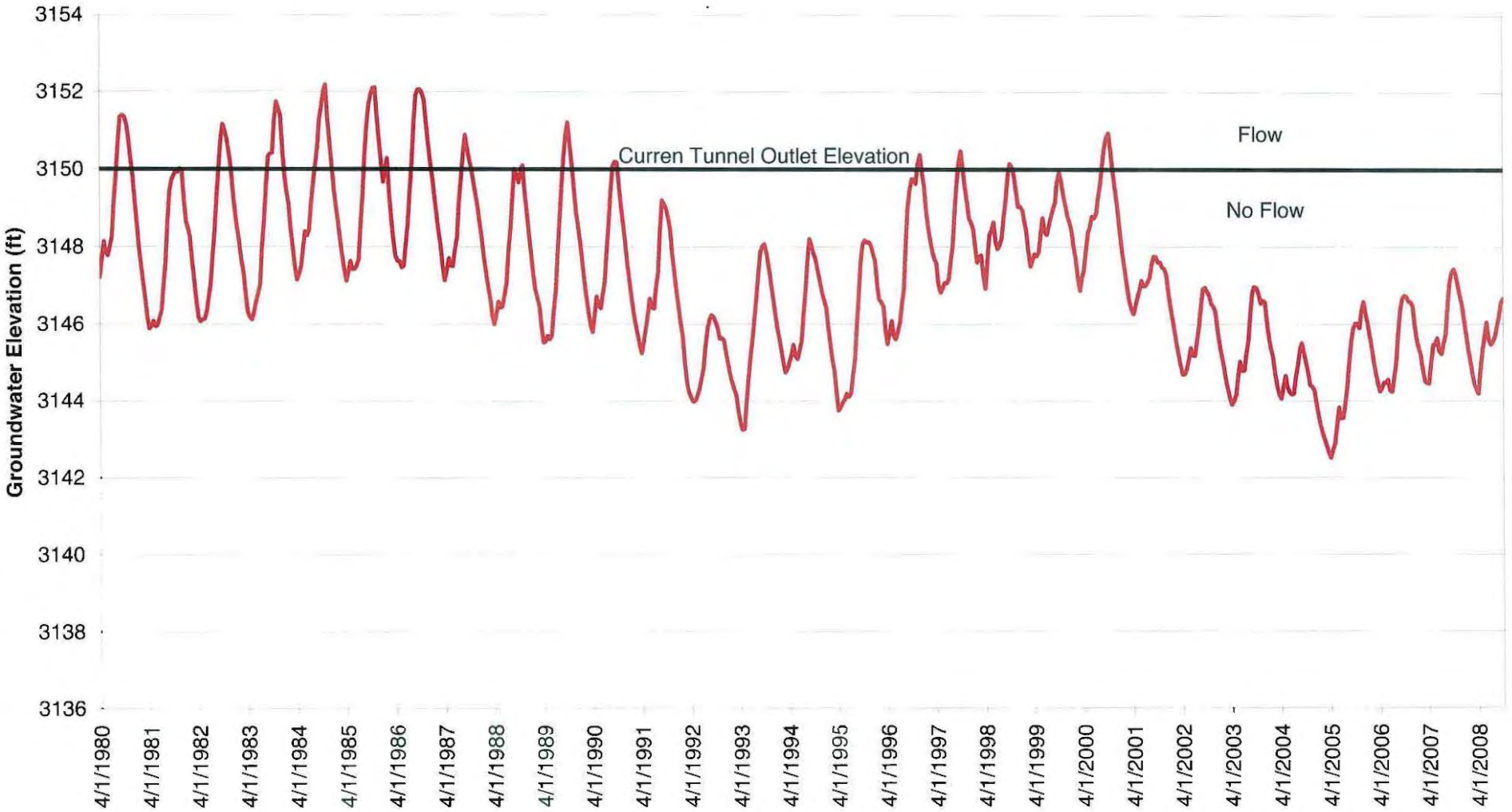


Figure 28 - Curren Tunnel Discharge Deviations from Linear Function
Rangen Monitor Well 7S 14E 32 SENW

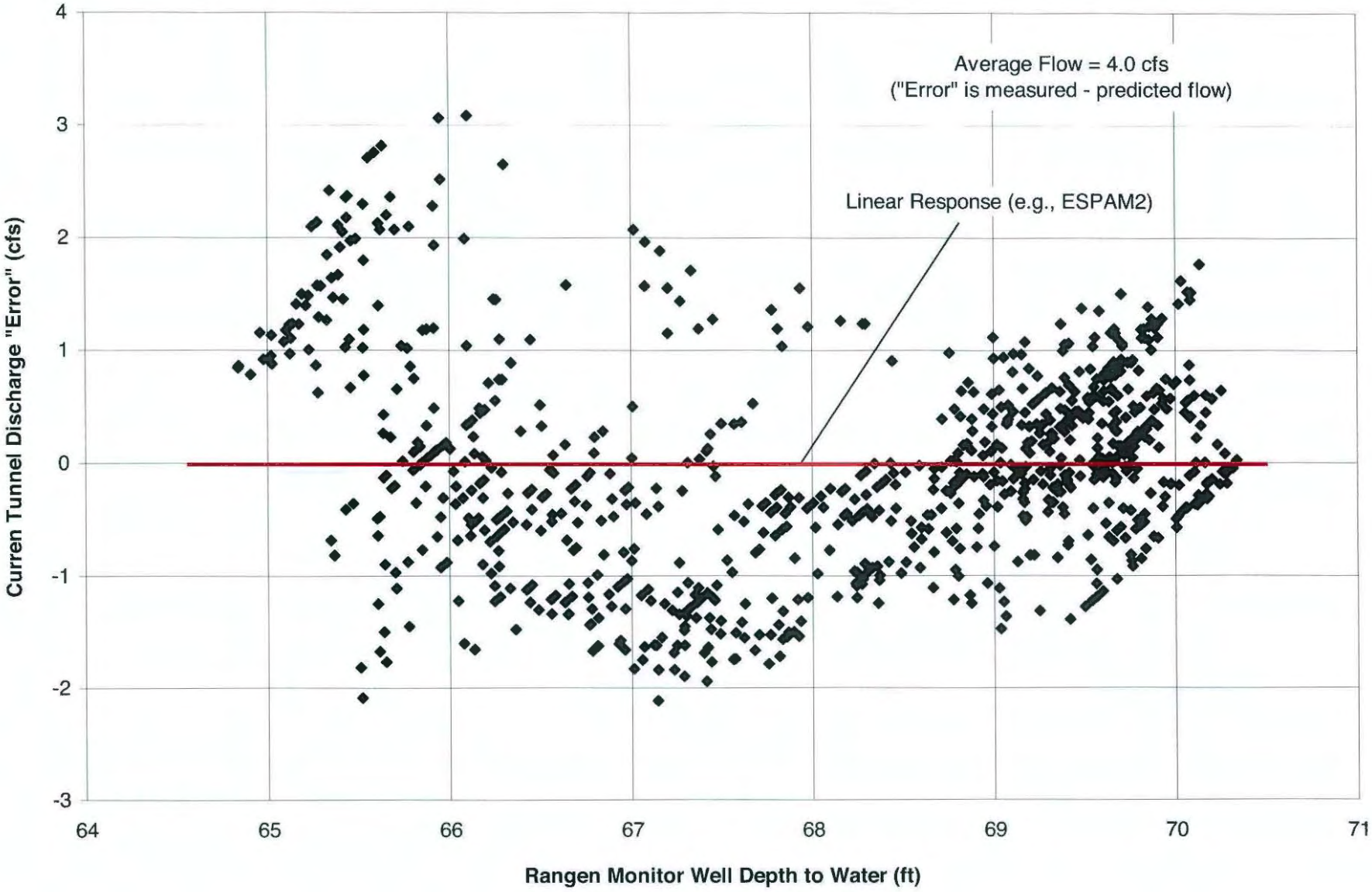
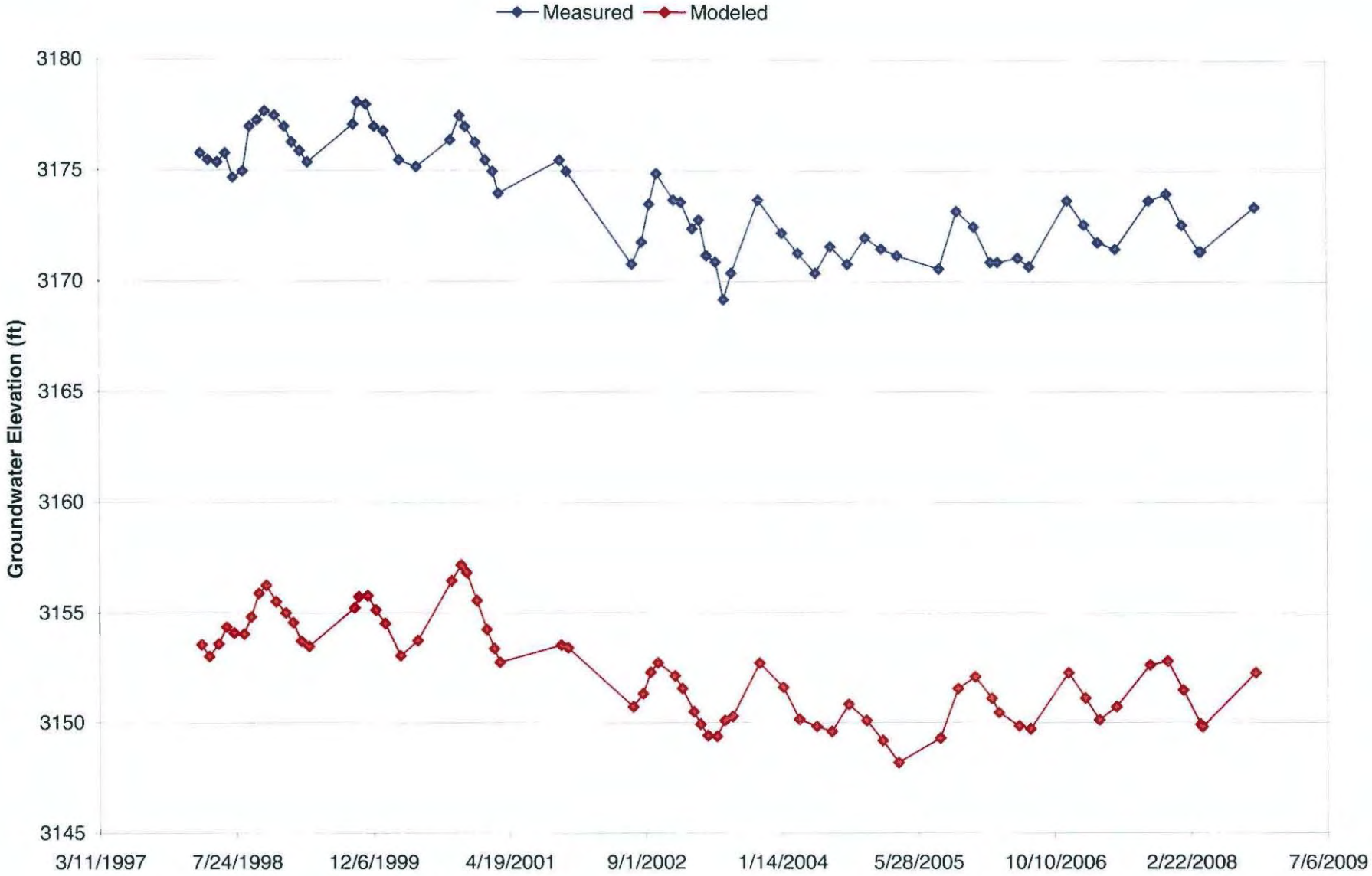
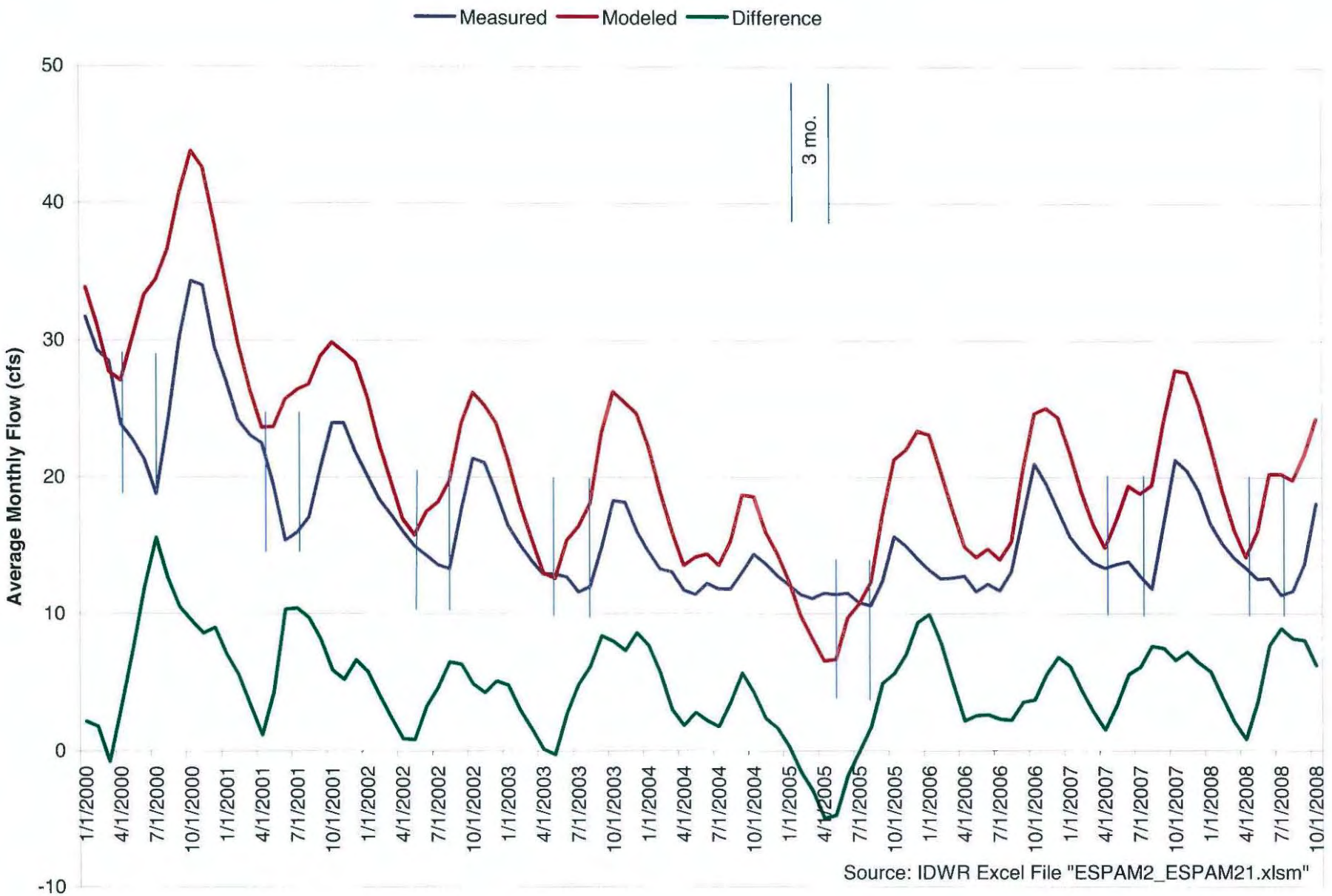


Figure 29 - ESPAM2.1 Calibration Well #989
(7S 14E 29 CDC1)



Source: IDWR Excel File "ESPAM2_ESPAM21.xlsm"

Figure 30 - Rangen Groundwater Flow Calibration



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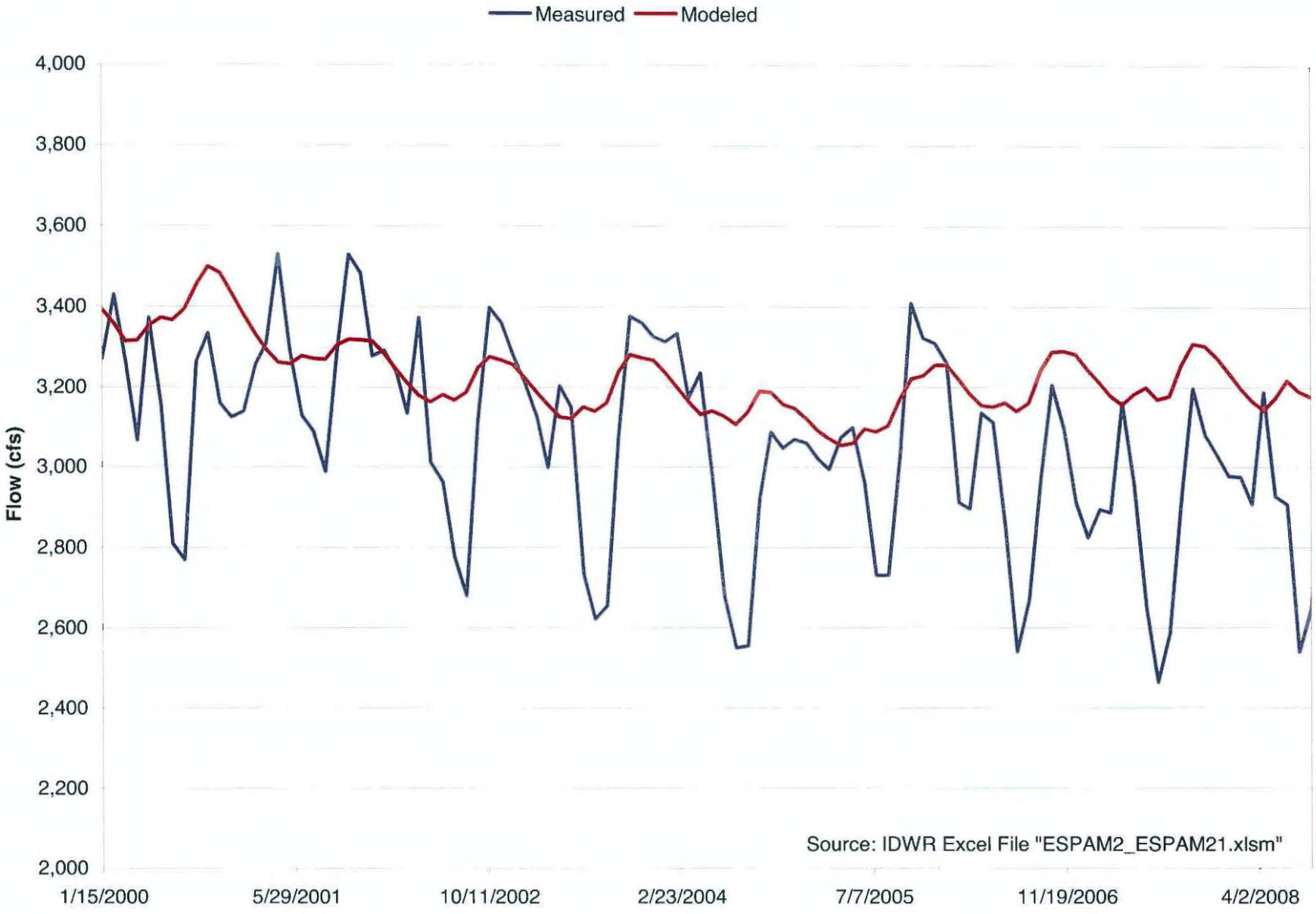

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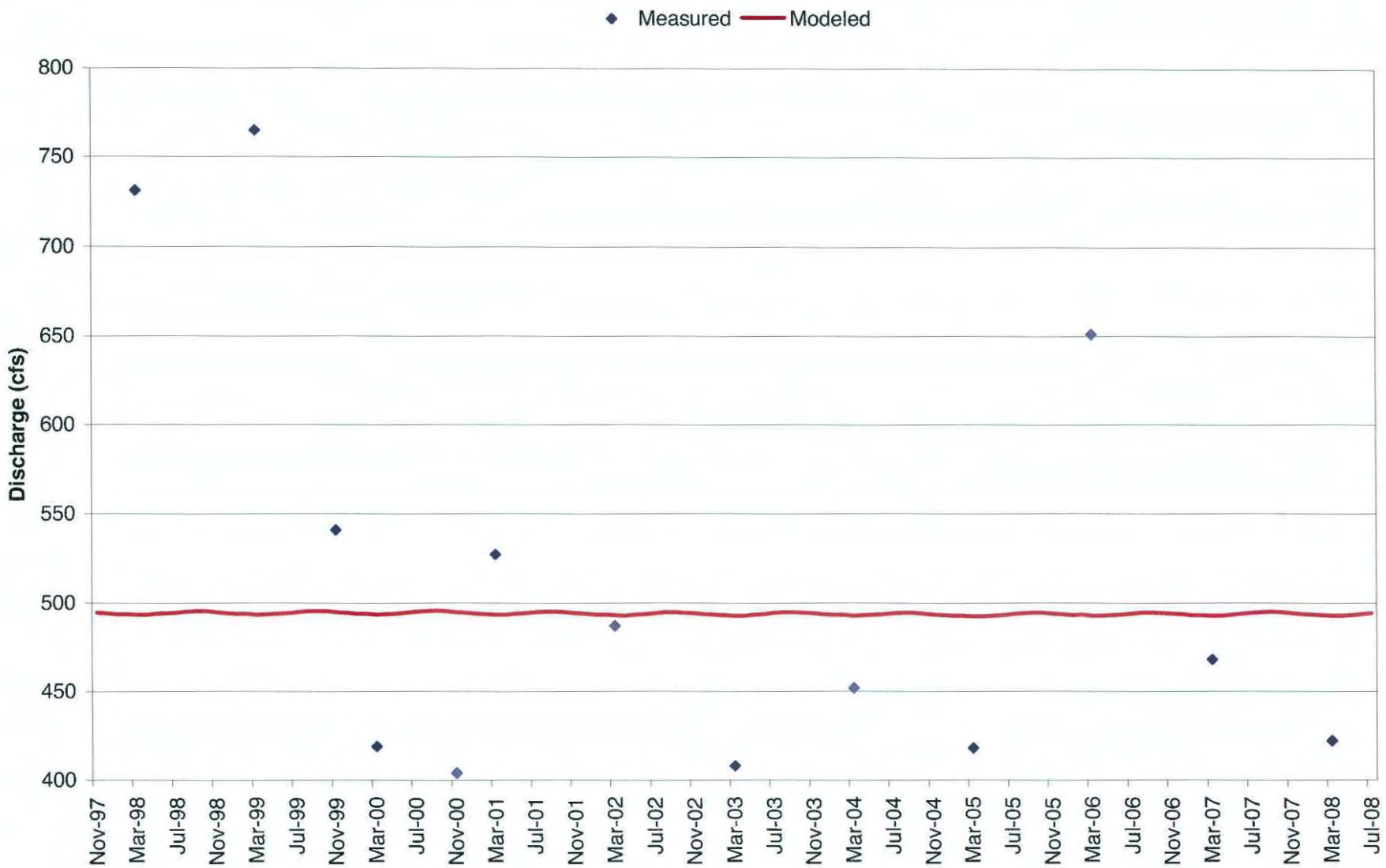

EXHIBIT L

BEFORE THE DIRECTOR
OF THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO

IN THE MATTER OF DISTRIBUTION FOR WATER TO WATER RIGHT NOS. 36-02551 AND 36-07694 (RANGEN, INC.)	**SPRONK WATER ENGINEERS, INC. EXPERT REPORT DATED DECEMBER 21, 2012 PREPARED FOR THE CITY OF POCATELLO**

Gregory K. Sullivan, P.E.
Spronk Water Engineers, Inc.
1000 Logan Street
Denver, Colorado 80203

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Expert Report
Dated December 21, 2012
Prepared for the
City of Pocatello

1.0 Introduction

On December 13, 2011, Rangen, Inc. ("Rangen") filed a Petition for Delivery Call ("Rangen Petition," or "Rangen Call") with the Idaho Department of Water Resources ("IDWR") seeking curtailment of ground water rights in the Eastern Snake Plain Aquifer ("ESPA") with priority dates junior to Rangen's water right nos. 36-02551 (July 13, 1962 priority) and 36-07694 (April 12, 1977 priority). As part of the petition, Rangen requested that the Director:

A. *find that Rangen has suffered, and will suffer, material injury as a result of junior-priority ground water pumping in the areas encompassed by ESPAM2;*

B. *administer and distribute water in the areas encompassed by ESPAM2 in accordance with the prior appropriation doctrine as required by I.C. § 42-602;*

C. *order the water masters of the areas encompassed by ESPAM2 to curtail junior-priority ground water pumping as necessary to deliver Rangen's water in accordance with the prior appropriation doctrine. See I.C. § 42-607.*

D. *order immediate curtailment before any hearing is held because: (i) immediate curtailment is necessary to secure an important government or public interest, to-wit, the guaranteed delivery of water rights obtained under the laws of the State of Idaho; (ii) there is a need for prompt action in that junior diversions continue to prevent Rangen's ability to obtain all its decreed water flows; and (iii) the State of Idaho, by and through its Department of Water Resources and Director, has a duty to supervise the allotment of both surface and ground water to those diverting water for any beneficial purpose; and*

E. *if the Department does not order immediate curtailment, then convene a timely hearing of this matter before further damage is done by junior-priority ground water pumping*

On May 29, 2012, IDWR entered an Order that designated the City of Pocatello ("Pocatello" or "City") as a respondent in the Rangen Call. Unlike in prior delivery calls, IDWR has not issued a preliminary order assessing the merits of the call.

The Rangen Research Hatchery, also known as the Rangen Aquaculture Research Center ("Rangen Hatchery"), is located at the headwaters of Billingsley Creek approximately four miles southeast of Hagerman, Idaho. **Figure 1-1** is a map showing the locations of the Rangen Hatchery and the City of Pocatello ("Pocatello"). Pocatello has an interest in the case because its municipal water supply is derived primarily from wells, many of which are junior to Rangen's 1962 and 1977 priority water rights that are the subject of the delivery call. This report was prepared to provide technical information relevant to the Rangen Call and to support Pocatello's response and defense against the delivery call.

Section 2 of the report describes the Rangen Hatchery and summarizes historical records of Rangen's water use. Section 3 discusses the source of supply for Rangen's water rights. Section 4 summarizes fish production records disclosed by Rangen. Section 5 summarizes research data that were obtained from Rangen. Section 6 summarizes water quality data that is submitted by Rangen in compliance with its NPDES discharge permit. Section 7 describes Pocatello's water system, its reliance on ground water as a primary source of municipal water supply, and its ground water rights that are potentially subject to curtailment as a result of Rangen Call. Section 8 analyzes the effect of Pocatello's pumping on the Curren Spring. Section 9 lists the information that was relied on in preparing the report.

2.0 Rangen Hatchery

Rangen is primarily a producer and supplier of fish feed to fish hatcheries. The Rangen Hatchery was developed so that Rangen could conduct research to improve its fish feed. Commercial production of fish for sale to fish processors also became a function of the Rangen Hatchery, with production reaching a peak of almost 800,000 pounds in 1988. There has been little research performed at the Rangen Hatchery in recent years, and the hatchery is operated primarily to supply fish to the Idaho Power Company ("Idaho Power") for the fish stocking requirements that are part of its FERC licenses for hydropower production on the Snake River.

The Rangen Hatchery is located in the Hagerman Valley just below the rim of the Snake River canyon as shown in **Figure 2-1**. An aerial photograph of the Rangen facility is provided in **Figure 2-2**. The facility is comprised of a Hatch House and Greenhouse (aka Research Lab), which are indoor facilities; and three sets of outdoor raceways identified from upstream to downstream as the Small Raceways, the Large Raceways, and the CTR Raceways.

The fish rearing facilities are supplied water from a complex of springs known as the Curren Spring located immediately east of the hatchery. The Curren Spring is comprised of two components, (1) the Martin-Curren Tunnel ("Curren Tunnel" aka "Curran Tunnel") located approximately 60 feet below the canyon rim, and (2) other springs that emerge at various locations from the talus slope below the Curren Tunnel. The Curren Spring is one of many spring complexes between Kimberly and the Malad River that are surface expressions of ground water flow from the Eastern Snake Plain Aquifer ("ESPA").

A photograph of the Curren Tunnel diversion complex is shown in **Figure 2-3**. Rangen's domestic water supply is diverted through a four-inch white PVC pipeline that originates inside of the Curren Tunnel as shown on the right side of **Figure 2-3**. Two larger white PVC pipes in the center of **Figure 2-3** emerge from a collection box and provide a portion of the water supply to the Rangen Hatchery. The white pipe to the left labeled "HH/GH/SR" transmits water by gravity to a splitter box further down the hill where the water can be (a) diverted into a steel pipeline that flows to the Hatch House, Greenhouse, and Small Raceways, or (b) discharged onto the hillside where the Curren Tunnel flow mixes with the flow from the springs that emerge from the talus slope below the tunnel. The white pipe on the right side of the collection box labeled "Lower" also discharges Curren Tunnel flow to the hillside where it comingles with the flow from the talus springs.

The Curren Tunnel was also originally the source for three other irrigation pipelines not associated with the Rangen Hatchery. These pipelines, marked as "Irrigation Pipelines" in **Figure 2-3**, extend south from the collection box along the hillside to farms southwest of the Rangen Hatchery. In 2003, the Sandy Pipeline was constructed by IGWA to provide a substitute

source of irrigation water to the other Curren Tunnel users for the purpose of mitigating impacts from pumping on the Curren Tunnel flow that was available to Rangen. Other than a small amount of domestic water that reportedly is still diverted through one of the irrigation pipelines, water from the Curren Tunnel is now used solely to supply the Rangen facility.

A schematic diagram showing how water flows through the fish-rearing facilities is shown in **Figure 2-4**. There are two sources of "first use" water to the Rangen facility. Water from the Curren Tunnel is piped to the Hatch House, the Greenhouse, and the Small Raceways (collectively referred to as the "upper facilities"). The upper facilities operate in parallel, with no opportunity for reuse from one facility to another (e.g., water used in the Hatch House cannot be used in the Greenhouse or Small Raceways).

The portion of the Curren Tunnel flow that is not sent to the upper facilities (i.e., the discharges to the hillside from the Rangen pipelines described above) plus the flow from the talus springs below the Curren Tunnel collects in a basin adjacent to the Hatch House and Greenhouse, and these flows are available for diversion at Rangen's lower diversion facility for delivery to the Large Raceways. The outflow from the Small Raceways can be discharged to Billingsley Creek or reused by delivery to the Large Raceways. The outflow from the Large Raceways is the sole source of supply to the CTR Raceways.

2.1 Water Rights

According to the Rangen Petition, there are five water rights that supply water to the Rangen facility as shown in **Table 2-1**. The two most senior water rights (36-134B and 36-135A) are each decreed for less than 0.1 cubic feet per second ("cfs") for domestic and irrigation uses. Rangen has not placed a delivery call for these rights.

There are three water rights that provide water to the fish hatchery, and the decreed source for each of these is the Martin-Curren Tunnel. The most senior of the three rights (36-15501) is decreed for 1.46 cfs with a priority date of July 1, 1957. Rangen has not placed a delivery call for the 1957 right because there has reportedly always been enough water to fill it. The other two

water rights that supply the fish hatchery are 36-2551 for 48.54 cfs with a priority date of July 13, 1962, and 36-7694 for 26 cfs with a priority date of April 12, 1977. Rangen claims these two water rights are being injured by junior ground water pumping from the ESPA, and these rights are the subject of Rangen's delivery call.

At the bottom of **Table 2-1** there is a summary of the senior irrigation water rights that formerly diverted from the Curren Tunnel to supply the irrigation pipelines that extend to the south, but which now are supplied water delivered through the North Side Canal via the Sandy Pipeline. Water from the Curren Tunnel can still be used to supply these senior irrigation water rights if there is insufficient water from the Sandy Pipeline. There reportedly has been little if any water diverted from the Curren Tunnel under these irrigation water rights in recent years.

2.2 Historical Flow Records

Historical records of the flow available for use at the Rangen facility were disclosed by Rangen in response to written discovery request and requests made during depositions of Rangen employees. The following is general description of the records that have been provided by Rangen:

- Monthly handwritten records of total hatchery flow from 1966 – 2012,
- Weekly handwritten records of total hatchery flow from 1981 – 2012,
- Weekly electronic records of total hatchery flow from 1996 – 2012,
- Monthly electronic records of Martin-Curren Tunnel flow to irrigation pipelines from 1992 – 1996, and
- Monthly electronic records of total Martin-Curren Tunnel flow from 1994 – January 2009.

Rangen flow data were also obtained from IDWR as follows:

- Weekly electronic flow data measured at the Large Raceways, CTR Raceways, and Billingsley Creek Dam from 1981 – November 2003,
- Daily data of total Rangen flow from March 1995 – present, and
- Daily data of total Martin-Curren Tunnel flow from September 8, 1993 – 2011.

During depositions, the Rangen employees reported that the flow available to Rangen is diverted either at the Curren Tunnel diversion or at a headgate located in a collection area below the tunnel and adjacent to the Hatch House. Flow through the Rangen facility is currently

determined as the sum of (a) the measured flow in each of the CTR Raceways, and (b) the flow at a check dam in Billingsley Creek adjacent to the CTR Raceways ("Dam").

Rangen's consultant, Leonard Rice Engineers, Inc. ("LRE"), tabulated the hand-written and electronic hatchery flow records from 1966 – 2009 and entered them into a spreadsheet. Notes in the handwritten records show that there were variations in where the flows were measured. From 1966 – 1980, documentation in the handwritten records is not sufficient to determine where the total flow measurements were collected. From 1981 – 2009, the total Rangen flow was calculated by summing the flows measured or estimated at various locations as follows:

Period	Flow computed as:
1981 – 1983	Sum of (a) [CTR + Large Raceway flows] / 2, (b) "fishout/creek," and (c) estimated farmers flow
1984 – 1991	Sum of (a) [CTR + Large Raceway flows] / 2, (b) Dam flow, and (c) estimated farmers flow
1992 – 1993	Sum of (a) [CTR + Large Raceway flows] / 2, and (b) estimated farmers flow
1994 – 1996	Sum of (a) [CTR + Large Raceway + Dam flows] / 2, and (b) estimated farmers flow
1997	Sum of (a) CTR Raceway flows and (b) Dam flows
1998	Sum of (a) CTR Raceway flows (b) Dam flows and (c) estimated farmers flow
1999 – 2009	Sum of (a) CTR Raceway flows and (b) Dam flows

From March 1995 – 2011, there are daily Rangen flow records available from IDWR. Total hatchery flows in the IDWR records were computed as described above, but the monthly average flows do not match the values contained in the LRE spreadsheet. For the period of concurrent IDWR and LRE records from 1995 – 2009, the differences in monthly flows range as high as 5.0 cfs and average 0.2 cfs.

In Finding of Fact No. 76 in the May 19, 2005 Second Amended Order ("2005 Order") issued in response to the prior Rangen delivery call, the Director found that "...measurements of flows through hatchery raceways reported by Rangen may be systematically about 10 percent lower than actual flows." This finding was based on a December 15, 2003 memorandum from Cindy Yenter to Karl Dreher that compared measurements of Rangen flows made by IDWR staff to the flows reported by Rangen. There is insufficient information contained in the 2003 memorandum to fully understand the reasons why IDWR concluded that the Rangen staff was under-measuring the flow. In addition, the period of the flow records that may be affected by the under-measurement is also unknown. In any event, there appears to be some uncertainty about the accuracy of the historical Rangen flow records.

The handwritten Rangen flow records from 1981 - 2012 typically include one measurement for each week. The weekly flow measurements were averaged by Rangen to compute a monthly average flow. In contrast, the IDWR estimated the daily flows between the weekly flow measurements by assuming the flow remained the same until the next measurement. IDWR computed an average monthly flow by averaging the measured and estimated daily flows during the month. For purposes of the data summaries described in this report, the LRE dataset was used for 1966 – February 1995 and 2012, and the IDWR dataset was used from March 1995 – 2011.

The reported monthly average Rangen flows from January 1966 – November 2011 are summarized in **Table 2-2**. The annual average Rangen flow increased from 50 cfs in 1967 to a maximum of 58.7 cfs in 1972, and then declined to a minimum of 12.3 cfs in 2005. The flow has recovered since that time to an annual average of 15.0 cfs in 2011. The highest reported monthly average flow was 76.1 cfs in October 1972 and the lowest recorded monthly flow was 10.7 cfs in July and August of 2005.

Monthly average historical Rangen flows from 1966 – 2012 are plotted in **Figure 2-5**. The flows vary seasonally with the minimum flow occurring in the spring or summer and the maximum

flow occurring in the fall. The seasonal variation in flow was approximately 35 cfs in the late 1960s and early 1970s, and has decreased to approximately 10 cfs as the Rangen flows have declined. In addition to the seasonal flow variations, there have also been longer term cycles in the Rangen flows. The flows rose through the late 1960s and reached a peak in 1972. This was followed by declining flows through 1981, increases in flows from 1982 – 1986, decreases in flow from 1987 – 1993, increases from 1994 – 1997 and decreases from 1998 – 2005. Since 2005, the flows have recovered slightly with greater increases in the fall peak.

In addition to the reduction in the seasonal flow variations described above, there has also been a shift in the timing of the low flow point in the annual flow hydrograph. **Figure 2-6** contains line graphs illustrating the monthly average flows for five earliest years of record (1966 – 1970) and five recent years of record (2007 – 2011). During the earlier period in the mid- and late-1960s, the monthly average flow typically reached a minimum between April and May. With the decline in spring flows that have occurred during the last several decades, the minimum flow typically occurs in July. There has been a more subtle shift in the timing of the peak of the Rangen flow hydrograph. In the 1960s the peak flow typically occurred in October, while in recent years the peak flow has shifted more towards November.

The total reported flow through the Rangen facility represents the sum of the flow diverted at the Curren Tunnel and the additional flow from various springs that emerge below the tunnel and is collected and diverted at Rangen's lower diversion facility that supplies the Large Raceways and CTR Raceways. In September 1993, IDWR began measuring and reporting the flow of the Curren Tunnel. **Figure 2-7** shows the total reported flow through the hatchery, the flow measured at the Curren Tunnel, and the difference, which is the flow that originates below the tunnel. From 1993 – 2011, the Curren Tunnel flows averaged 40 percent of the total Rangen flow. Since 2001, the Curren Tunnel flow has comprised approximately 30 percent of the total Rangen flow.

The total flow necessary to satisfy Rangen's 1962 water right is 50 cfs, including 1.46 cfs for Rangen's 1957 water right. Another 22 cfs, for a total of 72 cfs, is necessary to fully satisfy

Rangen's 1977 water right. Assuming the flows of the Curren Spring in 1962 were similar to the flows that existed during the middle and late 1960s as shown in **Figures 2-5 and 2-6**, it appears there would have been sufficient flow at the time of appropriation to fully satisfy Rangen's 1962 water right from January through July, but insufficient flow would have existed during August through December.

The reported monthly average flow in April 1977 was 35.2 cfs, and this is far less than would have been necessary to supply any portion of Rangen's April 12, 1977 priority water right. The highest monthly average flow reported in 1977 was 47.1 cfs. Based on Rangen's diversion records, there was no flow available in 1977 for Rangen to appropriate on top of its 1962 water right.

In Finding of Fact No. 63 in 2005 Order, the Director stated the following:

> Based on available records, there was not water available for appropriation at the time or subsequent to the date of appropriation for water right no. 36-07694. Therefore, the Department erred in licensing water right no. 36-07694, and should not have recommended this right for decree in the SRBA. Nonetheless, since the SRBA District Court decreed water right no. 36-07964, Rangen may be entitled to divert water under this right when such water is physically available. However, because water was not available to appropriate on the date of appropriation for water right no. 36-07694, Rangen may not be entitled to have a delivery call recognized against junior priority water rights.

As described above, the reported total Rangen flow has typically been computed as the sum of (a) the flow in the Large Raceways, CTR Raceways, or an average the two, and (b) the flow over the Dam in Billingsley Creek. **Figure 2-8** summarizes the weekly spot flow measurements reported by Rangen from 1981 – 2003 for the Large Raceways, the Small Raceway, and the Dam. During this period, the flows at the Dam averaged 3.8 cfs, and ranged from an annual average of 1.34 cfs in 2003 to 6.4 cfs in 1986. The Dam flows represented an average of 13.6 percent of the total Rangen flow, ranging from an annual average of 6.9 percent in 1983 to 22.4 percent in 1993. It is unknown how much of the Dam flow was water bypassed at the lower Rangen diversion structure and how much was natural inflow or irrigation return flows to Billingsley Creek between the lower diversion structure and the Dam.

2.3 Facility Capacities

Fish production data and other information provided by Rangen were reviewed to identify the flow capacity of the rearing facilities at the Rangen Hatchery. Research reports obtained from Rangen (see Section 5.0) indicate maximum trough flows of 35 gallons per minute ("gpm") in the past while the more recent Idaho Power Hatchery Production Summaries (see Section 4.0) typically show maximum trough flows of 28 gpm. Based on these data, the combined flow capacity of the twelve hatchery troughs is in the range of 336 gpm to 420 gpm (0.75 cfs to 0.94 cfs).

The maximum flows for the Greenhouse barrels reported in the research documents are 11.5 gpm per barrel, while Doug Ramsey testified in his deposition that the barrels are typically run at 8 gpm per barrel. Based on this information, the total flow capacity of the Greenhouse barrels ranges from 192 gpm to 276 gpm (0.43 cfs to 0.62 cfs).

The flow data contained in the Idaho Power Hatchery Production Summaries were reviewed to assess the flow capacities of the raceways. The average and maximum reported flows in each of the Small Raceways, Large Raceways, and CTR Raceways are summarized in **Figure 2-9**. As shown in the diagram included in **Figure 2-9**, there are five raceways in each of the four Small Raceway strings. Water flows through two sets of parallel narrow raceways (e.g., #1, #2, #9, and #10), and then the flow is combined into a wide raceway (e.g., #17). Doug Ramsey testified in his deposition that flow can be introduced at the head of any of the narrow small raceways (i.e., #1 - #16). This is why the flow records sometimes show a greater flow in the second of two narrow raceways in series (e.g., the flow in #9 is greater than the flow in #1).

The total capacity of the Rangen raceways was estimated by multiplying the maximum flow[1] in the raceways that are currently in use by the total number of raceways that exist as follows:

[1] The maximum per raceway flow was computed at the maximum of the combined total reported flow for each type of raceways divided by the number of raceways in use at the time.

- Small Raceways – Capacity computed as the maximum wide raceway flow (2.68 cfs) multiplied by four wide raceways resulting in a total capacity of 10.7 cfs.

- Large Raceways – Capacity computed as the maximum reported flow (4.82 cfs) multiplied by ten parallel raceway strings resulting in a total capacity of 48.2 cfs.

- CTR Raceways – Capacity computed as the maximum reported flow in (17.26 cfs) multiplied by four raceway strings resulting in a total capacity of 69.0 cfs. Without the CTR Raceway that is currently being used as a waste pond, the total capacity of the three remaining CTR Raceways is 51.8 cfs.

The foregoing calculations indicate that the total current flow capacity of the Rangen facility is slightly greater than 50 cfs, which is the combined flow rate of Rangen's 1957 and 1962 priority water rights. Therefore, Rangen has little capacity in its existing facilities to convey any of the additional 22 cfs associated with the 1977 priority water right.

Additional discussion of the Rangen flows is provided in Section 4.0 in conjunction with the fish production data that were disclosed by Rangen.

3.0 Source of Water

The water source is a key element of a water right that defines what water a user is entitled to divert. The decreed source of water for all of the Rangen water rights is the Martin-Curren Tunnel. Since the source element of the decree does not appear to include the sources beyond the Curren Tunnel, it is not clear that Rangen can demand curtailment to satisfy deliveries associated with the springs below the Curren Tunnel that supply the Large Raceways and CTR Raceways. The IDWR Director needs to interpret Rangen's partial decrees to determine the appropriate scope of the Rangen delivery call.

4.0 Rangen Fish Production Data

Rangen disclosed incomplete records of fish production in various forms for the period from 1972 – 2012 in response to written discovery requests and requests made during depositions of the Rangen lay witnesses. The following is a list of the various types of data reports that were provided, and examples of the various reports are contained in the referenced appendices:

- Daily Fish Sales Tickets (**Appendix A**) – Receipts for individual sales of fish to Idaho Power, Sea Pac, and others. The records typically list the date, the pounds of fish, and the raceway from which the fish were obtained. These records were provided for the period from 1998 – 2002, and 2005 – 2011 (missing months in 1998 and 2002).

- Daily Feed & Mort Reports (**Appendix B**) – Reports summarizing the daily feed use (pounds) and the number of fish mortalities for each raceway. These records were provided from 1992, 1995, 1996, and 2002 – 2012 (missing months in 1995 and 1996).

- Monthly Hatchery Reports (**Appendix C**) – Monthly reports summarizing the overall fish inventory, mortalities, feed use, fish sales, water flow, and other information. These reports are typically hand-written and were provided from 1987 – 2003 and 2005 – 2012 (missing months in 1992, 1993, 2002, 2003, 2005, and 2012).

- Monthly Fish Sale Summary Reports (**Appendix D**) – Summaries of the daily fish sales for each month. These reports were provided from 1987 – 2011.

- Monthly Fish Inventory Reports (**Appendix E**) – Summaries of the beginning and end of month fish contained in each raceway by number and pounds, the quantities of fish added and removed, feed use, mortalities, and other parameters. These reports were provided from 1994 – 2003 and 2005 – 2010 (missing months in 1994, 2001, and 2005).

- Idaho Power Hatchery Production Summaries (**Appendix F**) - Detailed fish production data are contained in monthly reports from August 2006 – July 2012 to summarize the production of trout to satisfy Rangen's contracts with Idaho Power. The monthly reports document development of the fish for delivery to Idaho Power in the spring and fall. The reports summarize for each Trough and Raceway in use (a) the number, weight, and mean length of fish, (b) the mortalities, feed use, weight gain, and increase in length since the last report, and (c) the computed Density Index and Flow Index. Rangen's contract with Idaho Power requires that the Density Index not exceed 0.3 and the Flow Index not exceed 0.8. Rangen did not provide production reports for another Idaho Power contract that requires delivery of 8,000 pounds of fish in late May or early June each year. Graphs of the information reported in the Hatchery Production Summaries are attached in **Appendix G**.

- Annual Fish Production Report (**Appendix H**) – Report summarizing annual values of available flow rate, average inventory, fish production, feed use, fish production, and average flow rate from 1972 – 1989 (fiscal year from July – June).

Figure 4-1 is a bar chart that summarizes the years for which the above records were provided, and this chart illustrates the gaps in the data provided by Rangen. Most of the above information was provided in paper format, much of which was handwritten. Certain of the paper fish

production data were input to spreadsheets and summary tables and charts were prepared to illustrate the Rangen operations.

Summaries of the annual Rangen fish production from 1972 – 2011are provided in **Figure 4-2.** The upper chart in **Figure 4-2** shows the annual Rangen fish production in pounds along with the mean annual flow of the Curren Spring. While there was a downward trend in the annual average Curren Spring flow during the 1970s and 1980s, Rangen's fish production increased during the same period. This was followed by a precipitous decline in production from 772,000 pounds in 1988 to 218,000 pounds in 1994. Production increased again through the early 2000s, averaging 392,000 pounds from 1998 – 2001. This was followed by another sharp decline when production fell to approximately 200,000 pounds and remained at that level from 2002 - 2007. Production fell again to its current level of approximately 140,000 pounds in 2008.

The lower chart in **Figure 4-2** shows the computed annual fish production in thousand pounds per cfs ("lbs/cfs"), and for discussion purposes, this metric is defined as "production efficiency." Rangen's production efficiency generally increased through the 1970s and 1980s reaching a peak in 1988 at about 20,000 lbs/cfs, and this resulted in Rangen's fish production increasing at the same time the Curren Spring flow was declining. A sharp decline in production efficiency occurred in the early 1990s reaching a minimum in 1994 at 9,400 lbs/cfs. Production efficiency gradually increased again starting in the mid-1990s, reaching 17,200 lbs/cfs in 2005, before it fell sharply in 2008 to its current level of about 10,000 lbs/cfs.

The relatively low current production efficiency appears to be due in part to the flow and density criteria for the fish delivered to Idaho Power which suppresses the amount of fish that Rangen could otherwise raise. In addition, Rangen reportedly disposed of three other fish rearing facilities in the Magic Valley after the early 2000s that were reportedly used to assist with the fish production at the Rangen Hatchery by providing additional rearing space for portions of the fish production cycle.

The upper chart in **Figure 4-3** shows the fish production that could have occurred at Rangen if the production efficiency had been at 15,000 lbs/cfs and 20,000 lbs/cfs during the entire 1972 – 2011 period. The lower chart in **Figure 4-3** shows the difference between the fish production that could have occurred at the 15,000 lbs/cfs and 20,000 lbs/cfs production efficiency levels compared to the actual historical production.

Figure 4-4 summarizes the monthly fish sales and end-of-month fish inventory in pounds from January 1987 – July 2012. The sum of these two monthly amounts represents the pounds of fish that were contained in the Rangen Facility at some time each month. The blue bars in **Figure 4-4** represent sales to Idaho Power and the red bars are sales to others. Rangen is currently contracted to deliver fish to Idaho Power three times per year with 72,000 fish delivered in the Spring (March), 72,500 fish delivered in the Fall (October), and 8,000 pounds of fish delivered in late May or early June. The current contract between Rangen and Idaho Power was signed in June 2011. The only contracts provided by Rangen prior to 2011 were contracts back to 2006 for the 8,000 pounds of fish delivered in late May or early June. However, review of the records of sales to Idaho Power show a pattern of March and October delivery back to 2006.

Table 4-1 is a summary of the March and October fish sales to Idaho Power from Spring 2007 – Spring 2012. Also shown in **Table 4-1** are data from the Idaho Power Hatchery Production Summaries for the Large and CTR Raceways at or near the time of the sales including (a) the date of the report, (b) the number of fish, (c) the weight of the fish, (d) the mean length of the fish, and (e) the mean number of fish per pound.

Rangen's records of sales to Idaho Power are reported in pounds of fish rather than number of fish described in the 2011 contract. The number of fish involved in the spring and fall sales to Idaho Power were estimated by multiplying the reported pounds of fish sold to Idaho Power in each March and October by the corresponding average number of fish per pound from the Idaho Power Hatchery Production Summaries. The results are shown in the second column from the right in **Table 4-1**. From 2007 to 2011, Rangen sold an estimated average of 148,000 fish per year to Idaho Power, with an average of 85,000 fish in the Spring and an average of 64,000 fish

in the Fall. The estimated average annual sale of fish to Idaho Power during 2007 – 2011 (148,000 fish) is close to the current contract amount of 144,250 fish for the Spring and Fall deliveries. It appears that the 2011 contract with Idaho Power has leveled the Spring and Fall deliveries compared to the deliveries in the past that were greater in the Spring than the Fall.

The following is a summary of the pounds of fish sold to Idaho Power and to others since 2006.

Rangen Fish Sales (lbs)

2006 - 2011

Year	Sales to Idaho Power	Sales to Others	Total Sales
2006	56,700	150,400	207,000
2007	64,100	119,500	183,600
2008	71,900	61,000	132,900
2009	75,300	59,500	134,800
2010	74,300	80,600	154,900
2011	72,600	69,300	141,900
Average	69,200	90,000	159,200

Rangen sold to others an average of 90,000 pounds per year beyond what it sold to Idaho Power.

As described above, Rangen's contracts with Idaho Power require it to raise fish with a Density Index not to exceed 0.3 and a Flow Index not to exceed 0.8. **Figures 4-5 and 4-6** summarize the Density Index and Flow Index values, respectively, contained in the Idaho Power Hatchery Production Summaries since 2006. The data in **Figures 4-5 and 4-6** are color coded with the production cycles for the spring and fall deliveries of ten-inch fish shown in blue and red, respectively. The shape of the marker denotes where the index was computed (Troughs, Small Raceways, Large Raceways, or CTR Raceways). Rangen typically only computed the Density Index and Flow Index values when the fish were in the Small Raceways, Large Raceways, or CTR Raceways. The only times that Flow Index and Density Index values were reported for the

Troughs was in the Idaho Power Hatchery Production Summaries for the 2007 spring and fall production cycles.

The Density Index data in **Figure 4-5** indicate that the 0.3 limit in the Idaho Power contract is sometimes reached while the fish are in the Small Raceways, and this likely necessitates moving the fish to the large raceways. After several months in the Large Raceways, the Density Index limit is occasionally approached again, requiring some fish to be moved to the CTR Raceways.

In contrast, the Flow Index data in **Figure 4-6** reveal that the 0.8 limit is not approached while the fish are in Small Raceways. Only towards the end of the production cycle when the fish are in the Large Raceways is the Flow Index limit approached, and this is likely another reason that fish are occasionally transferred from the Large Raceways to the CTR Raceways.

The Idaho Power Hatchery Production Summaries are typically prepared monthly, and include daily flow measurements made on the date of the report in each raceway containing Idaho Power fish. **Figure 4-7** summarizes the daily flow measurements contained in the monthly reports using the same symbols and color-coding used in **Figures 4-5 and 4-6**. Also shown in **Figure 4-7** are the daily measured Curren Tunnel flow and total Rangen flow. As described above, the water supply for the Hatch House Troughs and the Small Raceways is provided from the Curren Tunnel. Comparison of the Curren Tunnel flows to the daily spot flow measurements for the Troughs and Small Raceways indicates the extent to which the Curren Tunnel flows are being fully utilized. Similarly, comparison of the total Rangen flows to the spot measurements for the Large Raceways and CTR Raceways indicates the extent to which the total flow is being utilized.

During depositions, the Rangen staff reported that availability of flow from the Curren Tunnel produces a bottleneck in the Rangen Hatchery that, at times of low flow, can limit fish production and research opportunities in the Hatch House, the Greenhouse, and the Small Raceways. This can be seen by comparing the daily spot flow measurements in **Figure 4-7** for the Troughs (diamond symbols) and Small Raceways (square symbols) to the reported Curren Tunnel flow during the low part of the flow hydrograph. During the low flow portion of the

Curren Tunnel hydrograph in the fall production cycles, most of the Curren Tunnel flow is delivered through the Small Raceways. At these times, the data in **Figure 4-5** indicate computed Density Index values approach the limit in the Idaho Power contract (0.3). This would hasten the need to move the fish out of the Small Raceways and into the Large Raceways. It may also limit the amount of flow that could be used in the Hatch House or Greenhouse.

One way to alleviate the reported bottleneck in the Small Raceways would be to construct a pumping system to deliver additional water to the Small Raceways from the collection pond that collects the flow from the talus springs for diversion at Rangen's lower diversion structure. It appears the bottleneck could be alleviated by pumping less than five cfs during the low flow portion of the Curren Tunnel hydrograph. After being used in the Small Raceways, the pumped water would be available for use in the Large Raceways and CTR Raceways. Based on the deposition testimony from Doug Ramsey that water quality is not a limitation to raising fish in the raceways, the increased proportion of second use water in the Large Raceways and CTR Raceways that would result from operation of a pumping system would not appear to be a problem.

Figures 4-8, 4-9 and 4-10 were prepared to illustrate how much of the available flow that Rangen has been using to meet the spring and fall delivery obligations to Idaho Power. **Figure 4-8** shows the reported flows in the Troughs (orange bars) and Small Raceways (brown bars) in cfs compared to the monthly average Curren Tunnel flow reported by IDWR. The flow diverted from the Curren Tunnel to the upper Rangen facilities can be directed either to the Troughs or the Small Raceways, and therefore, the bars illustrating these flows are stacked on one another.

Figure 4-9 shows the reported flows in the Large Raceways (green bars) and the CTR Raceways (purple bars) compared to the total Rangen flow. Water exiting the Large Raceways is the supply for the CTR Raceways, and therefore the bars illustrating these flows are shown side-by-side and are not stacked.

The upper chart in **Figure 4-10** illustrates all of the information contained in **Figures 4-8 and 4-9,** with the flows in the Troughs and Small Raceways combined. The lower chart in **Figure 4-10** shows the unused Curren Tunnel flow in the upper Rangen facilities (shown in blue) computed as the difference between the tunnel flow and the sum of the flows in the Troughs and Small Raceways. Also shown in the lower chart is the unused flow in the lower Rangen facilities (shown in grey) computed as the difference between the total Rangen flow and either the flow in the Large Raceways or the flow in the CTR Raceways (whichever difference is less).

In summary, the available flow records show that Rangen has more than enough flow to meet its delivery obligations to Idaho Power, and that Rangen could grow more fish if it wasn't constrained by the flow and density criteria in the Idaho Power contracts. Rangen could alleviate the flow bottleneck that exists during the low flow portion of the Curren Tunnel hydrograph by constructing a facility to deliver flow collected from the talus springs for use in the indoor rearing facilities and the small raceways.

5.0 Rangen Research Data

Because Rangen holds itself out as a research hatchery, Pocatello and IGWA requested documents related to research conducted at the Rangen Hatchery. The following describes the process by which certain documents were obtained:

1. Pocatello and IGWA initially requested that Rangen provide information regarding the fish research conducted at the Rangen Hatchery. In response, Rangen agreed to make available for review at the hatchery various research proposals, data, reports, and other documents related to the research.

2. Initially, Rangen disclosed a research index listing all "Work Units" with which Rangen was involved between 1984 and 2011 and a few research reports in electronic form from recently completed research studies. Rangen also indicated that the remainder of the research documents were stored in a room at the Rangen facility. After reviewing the index and identifying Work Units of interest, attorneys for Pocatello and IGWA traveled to the Rangen Hatchery and attempted to obtain copies of the documents.

3. However, as Pocatello and IGWA learned upon their arrival to review Rangen's research documents, a Work Unit is simply a research idea that a Rangen scientist believes may warrant further investigation. The presence of a Work Unit in the research index does not

indicate that a study about the topic was actually performed. At a deposition following the document review, Doug Ramsey, Rangen's Research Scientist, could not identify which of the Work Units had resulted in actual research studies.

4. The research documents that Rangen made available were all located in one room in the basement of a house on site, and generally consisted of documents in binders for research performed between the late1980s and early 2000s, and older documents contained in cardboard boxes. While the binders were arrange chronologically, the contents of the cardboard boxes were not well organized. After spending some time going through the documents, it became apparent that there were no final reports, proposals, or other information available for many of the Work Units in the research index.

5. To the extent possible, the attorneys obtained copies of documents for the Work Units of interest. In addition, they reviewed all of the materials in the binders and boxes for Work Unit-related documents that (a) included flow information, (b) were studies conducted in raceways, and/or (c) contained other potentially relevant information.

6. Copies of the marked documents were obtained on October 16, 2012.

7. After reviewing the copies of the Work Unit documents identified during the site visit, Doug Ramsey was subpoenaed for a second deposition on November 13, 2012. Attached to the subpoena was the research index, highlighted to indicate the Work Units for which related documents had already been obtained. The subpoena requested that Rangen provide copies of all documents for research studies conducting during or after 2001 that were not highlighted in the index (i.e., all post-2000 research documents that had not already been provided). In response to the subpoena, Rangen provided a DVD containing additional research documents.

Rangen conducts what Doug Ramsey, Rangen's Research Scientist, describes as "applied research," because results from the research are used primarily to develop or promote Rangen's fish feed formulations. Rangen personnel testified that their preference is to conduct research in the raceways rather than in the indoor facilities, but that research in the raceways was limited because of water shortages.

The research documents obtained by Pocatello and IGWA were reviewed to attempt to summarize the types of research conducted at the Rangen facility as well as where the research occurred and the flows that were utilized during the research. Preparation of the summaries was hampered because Rangen does not follow a standardized practice for documenting its Work Unit research. In addition, basic information was often missing from the Work Unit documents,

including the geographic location of the research (i.e., whether the research was conducted at Rangen or at another facility), the location of the research within the Rangen Hatchery, the water flow rates used, the species of fish involved, and the start and end dates of the research. With the foregoing qualifications, **Figures 5-1 - 5-4** were prepared to summarize the Rangen research Work Units.

Figure 5-1a summarizes the geographic locations of the Work Unit research. As shown in the graph, the geographic location of most of Rangen's research over the years cannot be determined or else was conducted at other facilities.

Figure 5-1b summarizes the type of study. As expected, based on testimony of Rangen staff, research related to fish nutrition was the most common area of research.

Figure 5-1c summarizes the location as either off-site, unknown, or within the Rangen Hatchery. The majority of the studies were conducted in the Hatch House or Greenhouse. There were a maximum of six studies performed in the raceways in any one year (1984). During the last ten years there have only been two studies performed in the raceways; one in 2008, and the ongoing study in 2012.

Figure 5-2 summarizes the location of the research within the Rangen Hatchery and the months when the research was performed. This graph shows that most of the research took place in the Hatch House and Greenhouse and that little research has been performed at Rangen since the early 2000s.

Figures 5-3a - 5-3c summarize the type of documentation that was obtained for Work Units involving cold water or unknown species. **Figure 5.3a** shows that in many instances, no documentation was obtained, either because it couldn't be located by Pocatello's and IGWA's attorneys or because it wasn't provide by Rangen in response to discovery requests. In **Figure 5-3b**, summaries of the hatchery location, start and end dates, and flow rates were compiled from the Work Unit research documents, and in some instances from the entries on the research index.

The remained of the graphs in **Figure 5-3** similarly compile information regarding the Work Unit research documents and index entries.

Figure 5-4 summarizes the limited flow data that were provided for the relatively few studies that included this information. The upper chart in **Figure 5-4** compares the reported flow for studies in the Small Raceways, Hatch House and Greenhouse to the Rangen flow from the Curren Tunnel. There appears to be sufficient flow from the Curren Tunnel to support the studies that are conducted in the indoor facilities and the Small Raceways, except during the low flow portion of the Curren Tunnel hydrograph where there may not be sufficient flow to run some of the Small Raceway studies. The lower chart in **Figure 5-4** compares the total Rangen flow to the flows that were used in studies that were performed in all Rangen facilities. Except for some Large Raceways studies performed in 1983 and 1984, there is generally sufficient flow currently available to Rangen to perform all of the documented studies that have been performed since the early 1980s.

6.0 Water Quality Data

Rangen has a National Pollutant Discharge Elimination System (NPDES) permit (#IDG-130015) for discharge of water to Billingsley Creek. The permit was issued in October 2000, and is part of a general permit for aquaculture facilities in Idaho. The permit sets forth limitations on total phosphorus and total dissolved solids, requirements for preparing a Best Management Practices Plan, monitoring requirement, reporting requirements, and compliance responsibilities of the permit holder. Among other things, the permit requires Rangen to perform quarterly monitoring of total suspended solids ("TSS") and total phosphorus ("TP"). The loading in pounds per day of each of these constituents is limited by the permit to certain values that vary depending on the flow measured in Billingsley Creek in the CTR Raceways. The constituent loading limitations were determined based on a Total Maximum Daily Load ("TMDL") analysis for Billingsley Creek prepared by the Idaho Department of Environmental Quality (IDEQ) in 1992 and approved by the Environmental Protection Agency (EPA) in 1993.

Figure 6-1 is a summary of the reported quarterly TSS and TP loadings from 2001 – present as reported in Rangen's Discharge Monitoring Reports ("DMR"). The reported loadings have typically been well below the computed limits.

7.0 Description of Interests of the City of Pocatello

Pocatello operates a municipal water system serving a population of approximately 50,000 residents in southeastern Idaho. The City's primary water service area lies along Portneuf River valley floor and the surrounding foothills, and is supplied water from numerous wells in the Lower Portneuf River Valley Aquifer ("LPRVA") and two wells in the ESPA. These wells are collectively referred to as the "City Wells." The LPRVA is an alluvial aquifer that underlies the Portneuf River and extends from the Portneuf Gap south of the City to the intersection with the ESPA north of the City. The City Wells that deliver water for culinary uses are interconnected and have been partially decreed in the SRBA as alternate points of diversion for each other.

Another water service area is located in and around the Pocatello Airport. Wells in the ESPA supply culinary water to the airport and associated development, and for irrigation of fields around the airport that are used for land application of biosolids from the City's wastewater treatment plant pursuant to an NPDES permit. These wells are collectively referred to as the "Airport Wells."

A map showing the location of the City Wells and Airport Wells is provided as **Figure 7-1**.

Wells that are located within the area of common ground water supply for the ESPA, as defined in Rule 50 of the Conjunctive Management Rules, are subject to potential administration and curtailment pursuant to the Rangen Delivery Call. The current area of common ground water supply defined in Rule 50 of the Conjunctive Management Rules does not include the LPRVA. However, in 2011 IDWR commenced a rule-making to consider modification of the area of common ground water supply for the ESPA. The proposed modifications would generally expand the area of common ground water supply to add areas tributary to the Snake River and the ESPA, including the LPRVA as well as other areas north and east of Pocatello. On August 9,

2011, the IDWR Director issued a letter that put on hold the rule-making to modify the area of common ground water supply as defined in Rule 50 pending completion of ESPAM version 2.0 that was under development at that time.

While Pocatello's LPRVA wells are currently outside the administrative boundary for the Rangen delivery call, it is possible they could be brought into the administrative area for the Rangen Delivery Call in the future, or for other delivery calls.

Two of the City Wells (Well Nos. 32 and 43) and all of the Airport Wells are located within the area of common ground water supply of the ESPA and are subject to potential curtailment as a result of the Rangen Delivery Call.

In addition to its ground water wells, Pocatello also has several sources of surface water. These include surface water rights on Mink Creek and Gibson Jack Creek, which are tributaries of the Portneuf River southwest of the City. These surface water rights served as the original water supply for the City. The City also has a contract with the Bureau of Reclamation ("Reclamation") for 50,000 acre-feet in Palisades Reservoir.

A tabulation of Pocatello's water rights is provided in **Table 7-1**. Rangen has requested curtailment of all ground water rights with priorities junior to July 13, 1962, which is the senior of the two water rights for which Rangen has made its delivery call. Pocatello has ground water priorities junior to the 1962 Rangen water right totaling 20.3 cfs in the ESPA and 38.6 cfs in the LPRVA, and curtailment of the junior Pocatello ground water rights would substantially impact the City's water supply.

Pocatello maintains records of monthly pumping from each of its wells. A summary of the total annual pumping from the City Wells and the Airport Wells during the past five years is provided in **Table 7-2**. Annual pumping during 2007 – 2011 from the City Wells averaged 13,845 acre-feet, and of this amount, 5,389 acre-feet were from wells with priorities junior to the July 13, 1962 Rangen water right (505 acre-feet from ESPA wells). Annual pumping during 2007 – 2011

from the Airport Wells averaged 3,588 acre-feet with 2,689 acre-feet from wells junior to the 1962 Rangen water right. Based on this information, approximately 8,078 acre-feet, or 46 percent of Pocatello's current water supply is potentially subject to curtailment as a result of the Rangen delivery call (3,194 acre-feet from ESPA wells).

8.0 Effect of Pocatello Water Use on Curren Spring Flows

If IDWR determines that Rangen has been injured as a result of pumping by junior ground water rights, the next step will be to determine what junior ground water rights should be curtailed to provide additional water to Rangen. In prior delivery calls, IDWR has determined that ground water uses that have little impact on the depleted supply should not be subject to curtailment. This section of the report describes the impact of Pocatello's pumping on the Curren Spring flow, and is relevant if IDWR determines that remote water users should be excluded from curtailment because their impact on the Rangen water supply is not material or is too remote in time to make curtailment a viable administration option.

As shown in **Figure 2-1**, the distance between Pocatello's wells and the Curren Spring is approximately 150 miles, and American Falls Reservoir, the Snake River, and portions of the Portneuf River are hydraulically connected to the ESPA in between Pocatello's wells and the Curren Spring. Because of these facts, intuition would suggest that most of the effect of Pocatello's pumping is likely to these surface water sources, and there would be relatively little impact on the flow of the springs along the western extent of the ESPA, and even less impact on the flow of a particular spring such as the Curren Spring.

As described above, Pocatello's wells that are within the ESPA area of common ground water supply include all of the Airport Wells and two of the City Wells (Well Nos. 32 and 43). Response functions developed using the ESPAM 2.1 were compiled to estimate the effect of pumping of Pocatello's ESPA wells on the flow of the Curren Spring. There are two types of response functions that can be computed using a ground water model like the ESPAM 2.1, steady-state response functions and transient response functions.

8.1 Steady-State Response Functions

A steady-state response function describe the simulated effect on the flow at a particular location (e.g., a river reach, spring reach, or particular spring) that would result from continuous pumping at a particular location at a constant rate for a long period of time until the simulated effect has stabilized. The response function is expressed as a decimal fraction of the pumping rate. For example, a steady-state response function of 0.05, means that pumping at particular location would deplete the flow at the point of interest by five percent of the pumping rate after a long period of pumping.

IDWR prepared steady-state response functions for ESPAM 2.1, and these were downloaded from the IDWR website. The response functions were developed using the ESPAM 2.1 run in superposition mode in which all of the model inputs were set to zero, and a unit stress was simulated at each active cell of the model. The resulting impact at each river reach, spring reach, and spring cell was compiled by IDWR into a spreadsheet.

A summary of the steady-state response functions is provided in **Table 8-1** for each of the model cells that contain one or more of Pocatello's ESPA wells. The arithmetic average of the steady-state response functions is 0.00437 (0.437 percent) for the ESPA wells. This means that 0.437 percent of Pocatello's ESPA well pumping would impact the flow of the Curren Spring under steady-state conditions. The steady-state impact on the flow of the Curren Spring from Pocatello's ESPA wells that are junior to the 1962 Rangen water right was computed by multiplying the current annual pumping of the junior ESPA wells (approximately 3,200 af/y) by their respective average response functions. The resulting steady state impact is 13.7 acre-feet per year, or an average of 0.019 cfs.

8.2 Transient Response Functions

A transient response function describes the simulated effect on the flow at a particular location that would during the months and years following the initiation of pumping, or conversely the reduction in depletions at a particular location resulting from curtailment of pumping that had previously reached a steady-state impact. Transient response functions are expressed as a series

of decimal fractions that describe the portion of the pumping that affects the location of interest during a specified time-step (e.g., months or years). The sum of the decimal fractions adds to 1.0.

Transient response functions for the model cells containing the Pocatello Wells were prepared by AMEC/Hydrosphere, consultant to the Idaho Ground Water Appropriators "(IGWA"), at the request of SWE. These response functions were also developed using the ESPAM 2.1 operated in superposition mode. A chart illustrating the average transient response functions for Pocatello's ESPA wells is shown in **Figure 8-1**.

Assuming annual pumping of 3,200 acre-feet per year for the ESPA wells, and assuming the impact on the Curren Spring from this pumping amounts had reached steady-state, **Figure 8-2** summarizes the computed increase in flow that would accrue to the Curren Spring through time as a result of curtailment of Pocatello's ESPA wells that are junior to the 1962 Rangen water right. After 10 years, the flow of the Curren spring would increase by 0.014 cfs. After 30 years, the spring flow would increase by a total of 0.018 cfs.

The results in **Figure 8-2** are based on an assumption that the depletions to the Curren Spring resulting from Pocatello's pumping had reached steady-state prior to curtailment. In actuality, the depletions have not reached steady-state, and therefore the computed accrual of water to the Curren Spring from curtailment would be less than the amounts shown in **Figure 8-2**.

8.3 Trimline

In prior delivery calls, IDWR used the ESPAM to establish a trimline for the ESPA, and ground water users outside of the trimline were excluded from curtailment. The trimlines in the prior delivery calls excluded from curtailment ground water users with steady-state impacts to the supply of the calling water right of less than 10 percent of their pumping. The 10 percent figure was selected based on the estimated accuracy of the ESPAM. During recent years, there have been discussions whether a trimline should continue to be employed in the administration of delivery calls, and if so, whether it should be based on a 10 percent impact or some other figure.

The steady-state response functions from ESPAM 2.1 were analyzed to determine the locations of trimlines assuming various steady-state pumping impact criteria ranging from 0.1 percent of pumping to 10 percent of pumping. A map showing the locations of the trimlines for these various impact criteria area shown in **Figure 8-3.**

IDWR previously conducted an analysis using the ESPAM 2.0 to determine trimline locations in using the procedure described above, and the resulting trimline locations were similar to those shown in Figure 8.3. IDWR also ran the ESPAM 2.0 to estimate the increase in the flow of the Curren Spring that would occur through curtailment of ground water users junior to Rangen's 1962 priority within the areas encompassed by the various trimlines (0.1% - 10%). **Figure 8-4** summarizes the irrigated area that would be curtailed and the computed increase in flow at the Curren Spring at steady-state for each of the trimlines that were analyzed by IDWR using ESPAM 2.0. If IDWR performed the same analysis using the ESPAM 2.1, the results would be similar to those shown in **Figure 8.4**.

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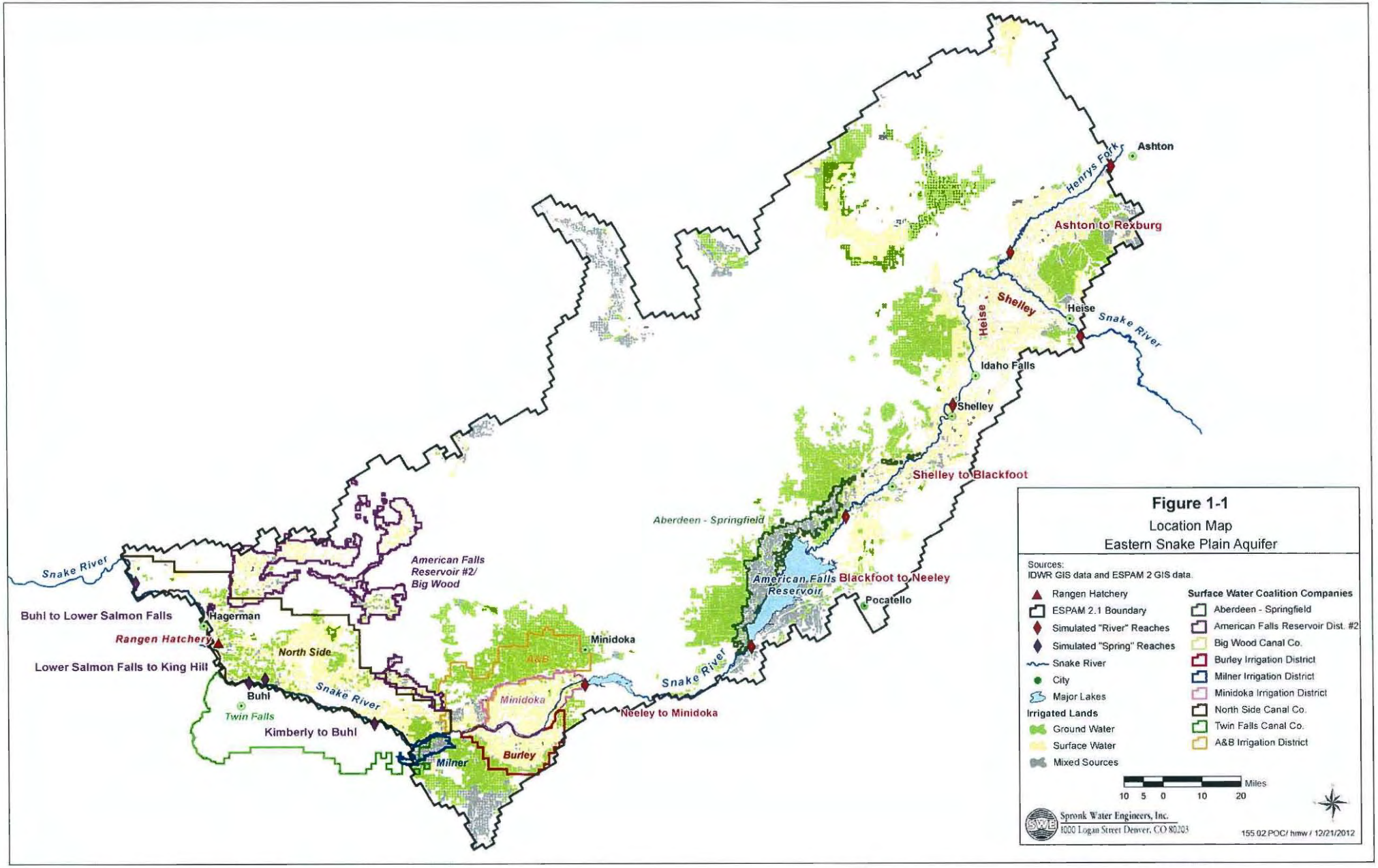
Figures


Ashton
Henrys Fork
Ashton to Rexburg
Heise
Shelley
Heise - Shelley
Snake River
Idaho Falls
Shelley
Shelley to Blackfoot
Aberdeen - Springfield
American Falls Reservoir #2/ Big Wood
American Falls Reservoir
Blackfoot to Neeley
Pocatello
Snake River
Buhl to Lower Salmon Falls
Hagerman
Rangen Hatchery
North Side
Lower Salmon Falls to King Hill
Buhl
Twin Falls
Kimberly to Buhl
Snake River
Minidoka
A&B
Minidoka
Neeley to Minidoka
Snake River
Burley
Milner
Figure 1-1
Location Map
Eastern Snake Plain Aquifer
Sources:
IDWR GIS data and ESPAM 2 GIS data.
Rangen Hatchery
ESPAM 2.1 Boundary
Simulated "River" Reaches
Simulated "Spring" Reaches
Snake River
City
Major Lakes
Irrigated Lands
Ground Water
Surface Water
Mixed Sources
Surface Water Coalition Companies
Aberdeen - Springfield
American Falls Reservoir Dist. #2
Big Wood Canal Co.
Burley Irrigation District
Milner Irrigation District
Minidoka Irrigation District
North Side Canal Co.
Twin Falls Canal Co.
A&B Irrigation District
10 5 0 10 20
Miles
Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203
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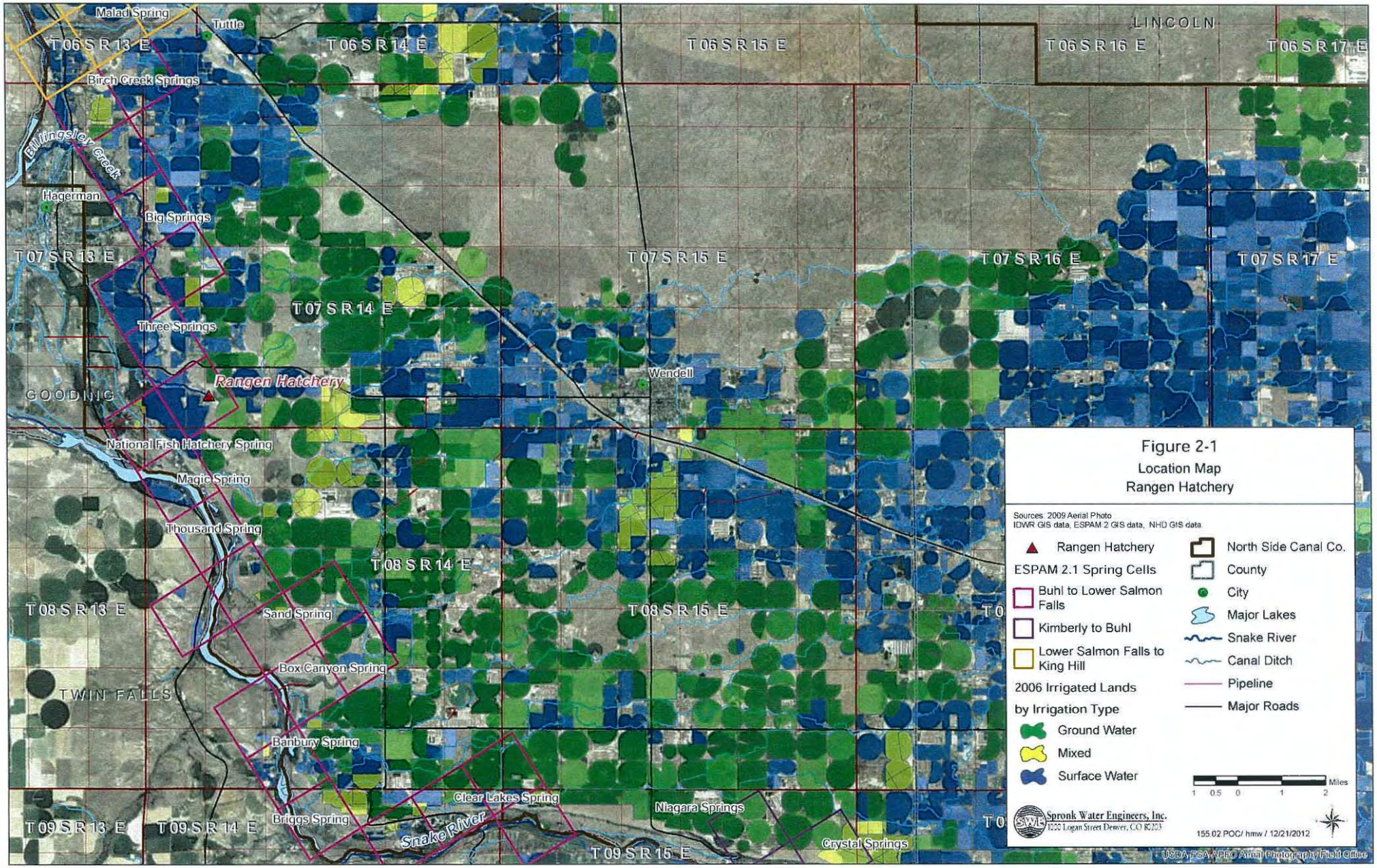

Malad Spring
Tuttle
T06S R13 E
T06S R14 E
T06S R15 E
T06S R16 E
T06S R17 E
LINCOLN
Birch Creek Springs
Billingsley Creek
Hagerman
Big Springs
T07S R13 E
T07S R15 E
T07S R16 E
T07S R17 E
T07S R14 E
Three Springs
Rangen Hatchery
Wendell
GOODING
National Fish Hatchery Spring
Magic Spring
Thousand Spring
T08S R14 E
T08S R13 E
T08S R15 E
Sand Spring
Box Canyon Spring
TWIN FALLS
Banbury Spring
Clear Lakes Spring
Niagara Springs
Briggs Spring
Snake River
T09S R13 E
T09S R14 E
T09S R15 E
Crystal Springs
Figure 2-1
Location Map
Rangen Hatchery
Sources: 2009 Aerial Photo
IDWR GIS data, ESPAM 2 GIS data, NHD GIS data
Rangen Hatchery
ESPAM 2.1 Spring Cells
Buhl to Lower Salmon Falls
Kimberly to Buhl
Lower Salmon Falls to King Hill
2006 Irrigated Lands
by Irrigation Type
Ground Water
Mixed
Surface Water
North Side Canal Co.
County
City
Major Lakes
Snake River
Canal Ditch
Pipeline
Major Roads
Miles
1 0.5 0 1 2
Spronk Water Engineers, Inc.
1200 Logan Street Denver, CO 80203
155.02 POC/ hmw / 12/21/2012
USDA FSA APFO Aerial Photography Field Office

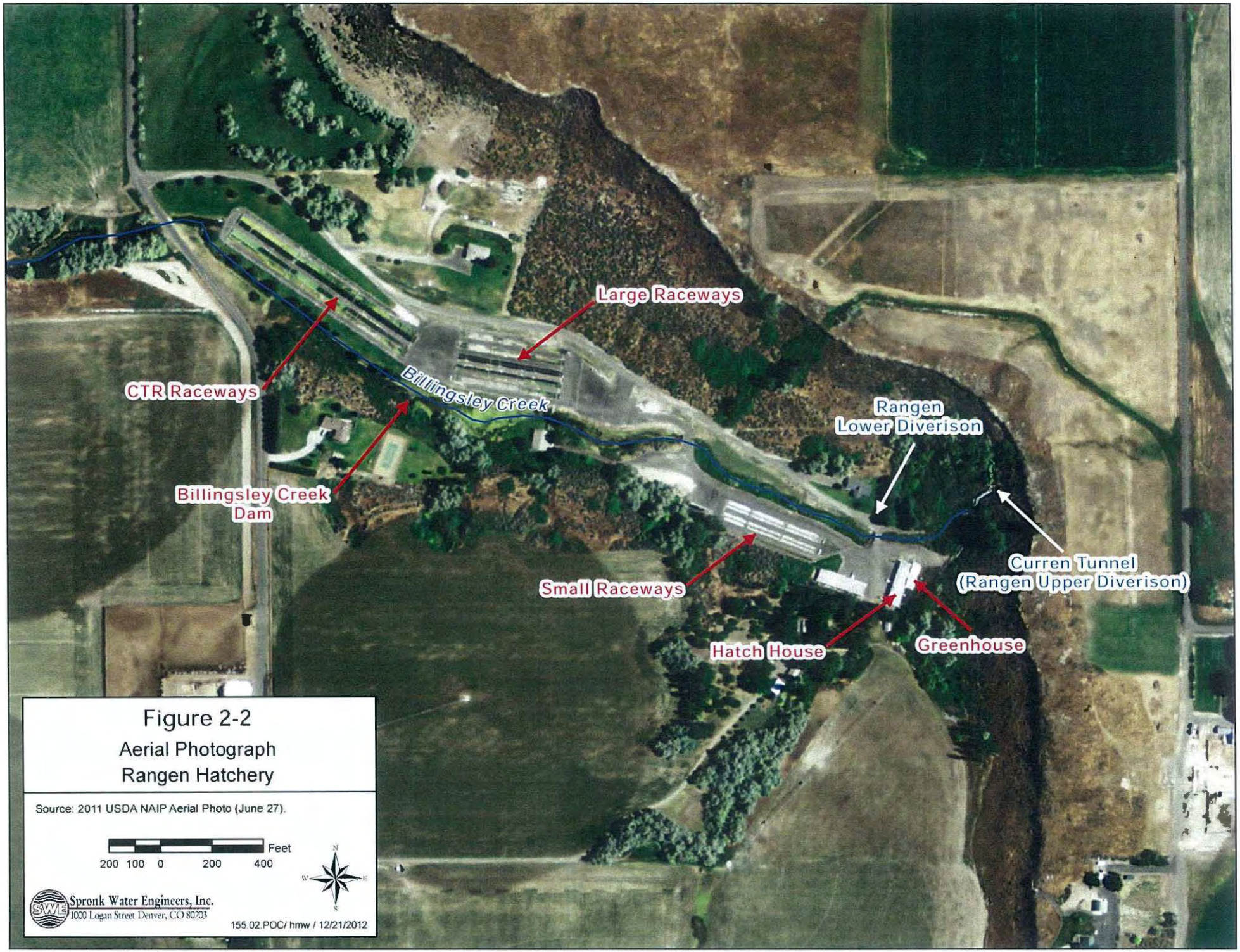


Figure 2-2

Aerial Photograph

Rangen Hatchery

Source: 2011 USDA NAIP Aerial Photo (June 27).

200 100 0 200 400 Feet

N

W E

S

Spronk Water Engineers, Inc.

1000 Logan Street Denver, CO 80203

155.02.POC/ hmw / 12/21/2012

Figure 2-3

Photograph of Curren Tunnel Diversion Facilities

Photo taken on June 19, 2012.

FIGURE 2-4

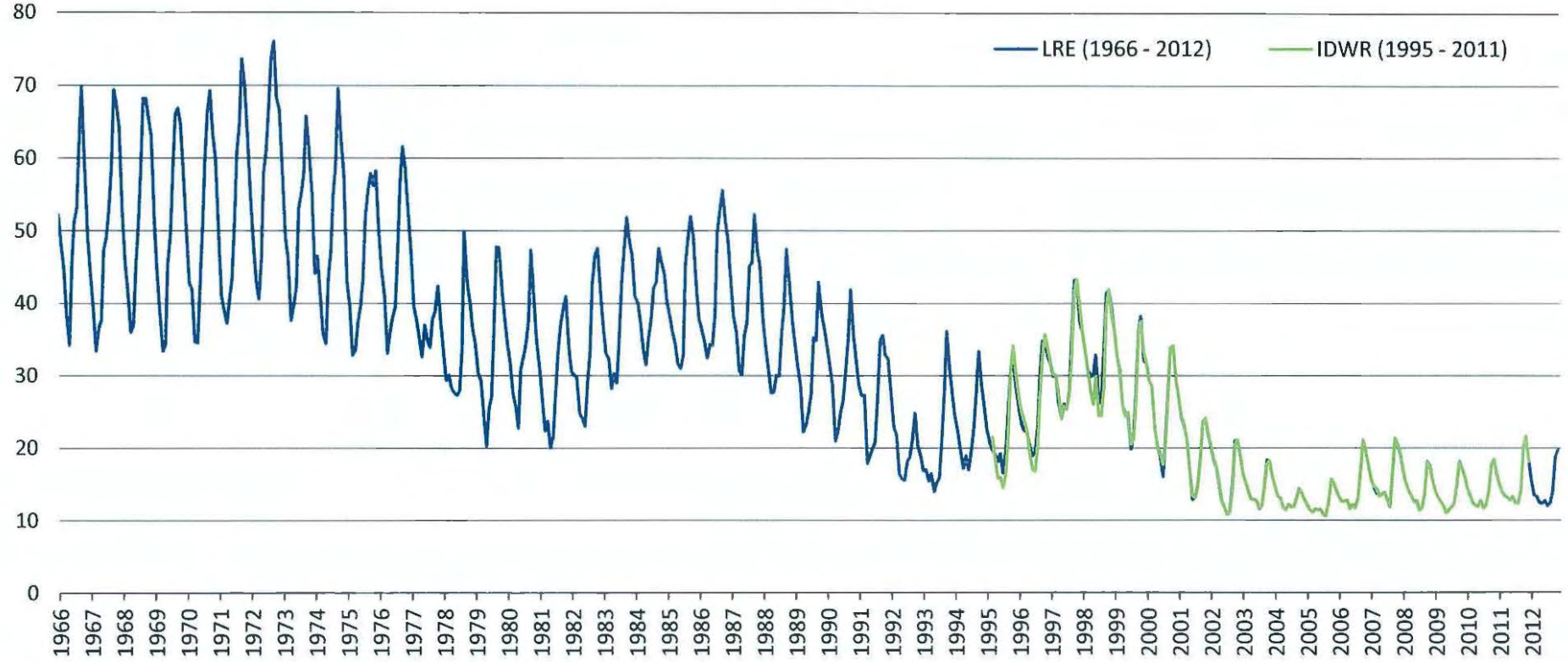
2 pages of confidential information

removed due to

Protective Order

Figure 2-5

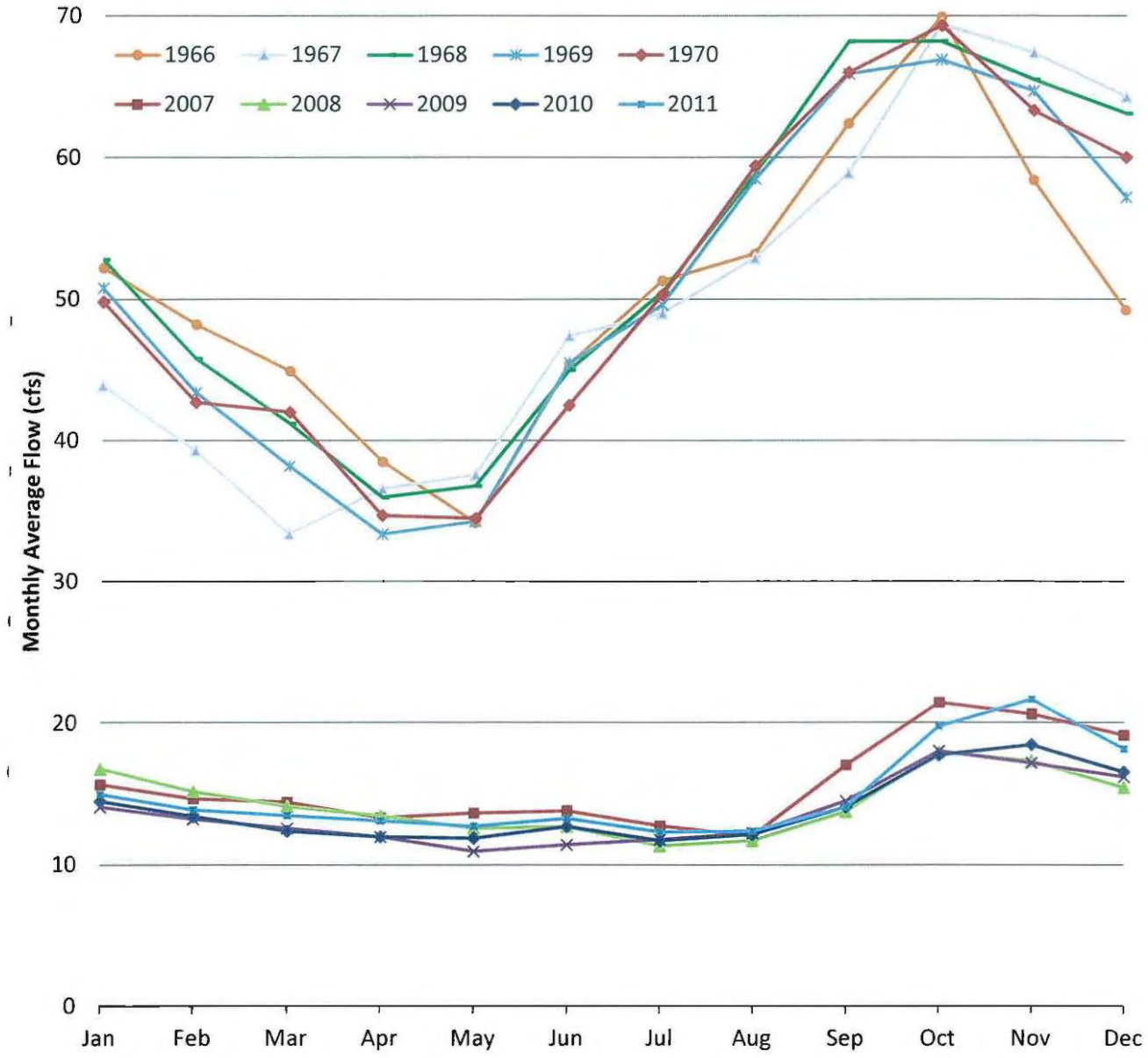
Monthly Average Flow
Rangen Hatchery
1966 - 2012
Values in CFS



Source: Rangen monthly flow data reported by Rangen and IDWR reported flow data (March 1995 - 2011).

Figure 2-6

Monthly Average Flows
Rangen Hatchery
1966 - 1970 and 2007 - 2011
Values in CFS

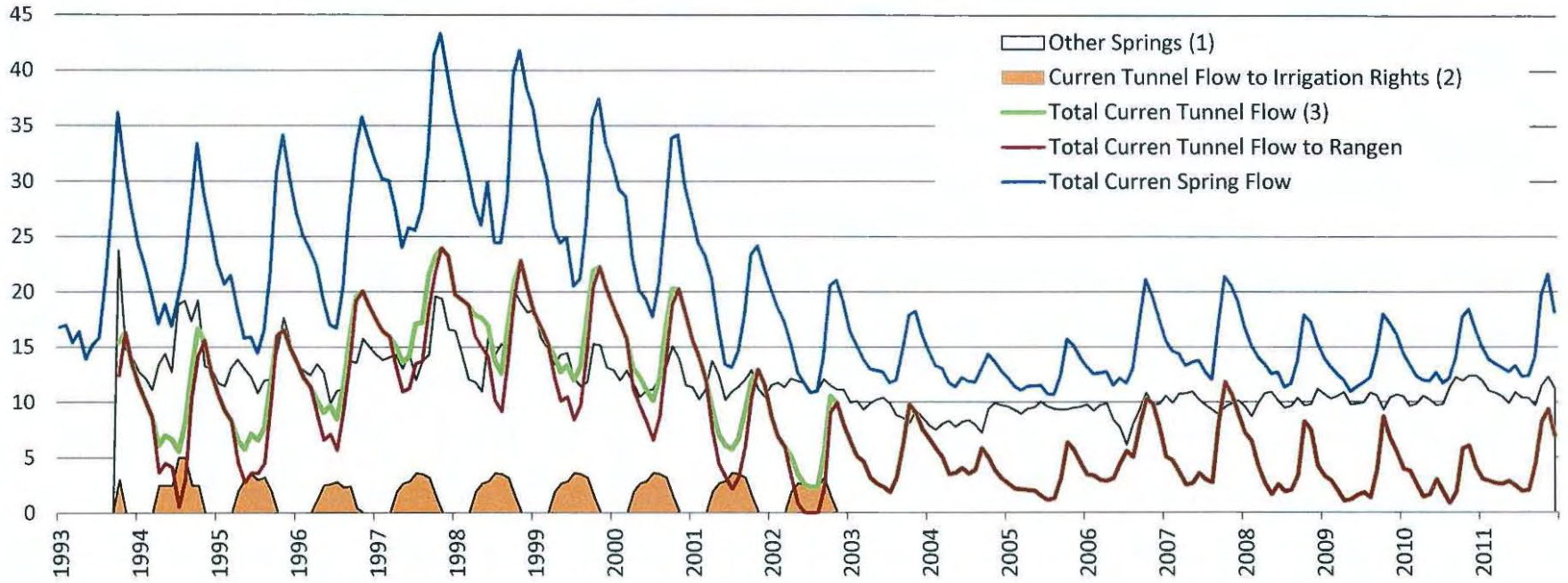


Source: Rangen monthly flow data reported by Rangen (1966 - 1970) and flow data reported by IDWR (2007 - 2011).

Figure 2-7

Monthly Average Rangen Hatchery Flow vs. Curren Tunnel and Other Springs 1993 - 2011

Values in CFS



Source: Rangen monthly flow data reported by Rangen (1993 - Feb 1995) and IDWR reported flow data (March 1995 - 2011).
Curren Tunnel flow data provided by IDWR.

Notes: The 2008 data and 2011 Curren Tunnel data have been graded by the IDWR as poor due to equipment problems. IDWR generated the 2011 data by replicating Box Canyon Spring data with a reduced amplitude and fitting the data to the flow measurements made on site.

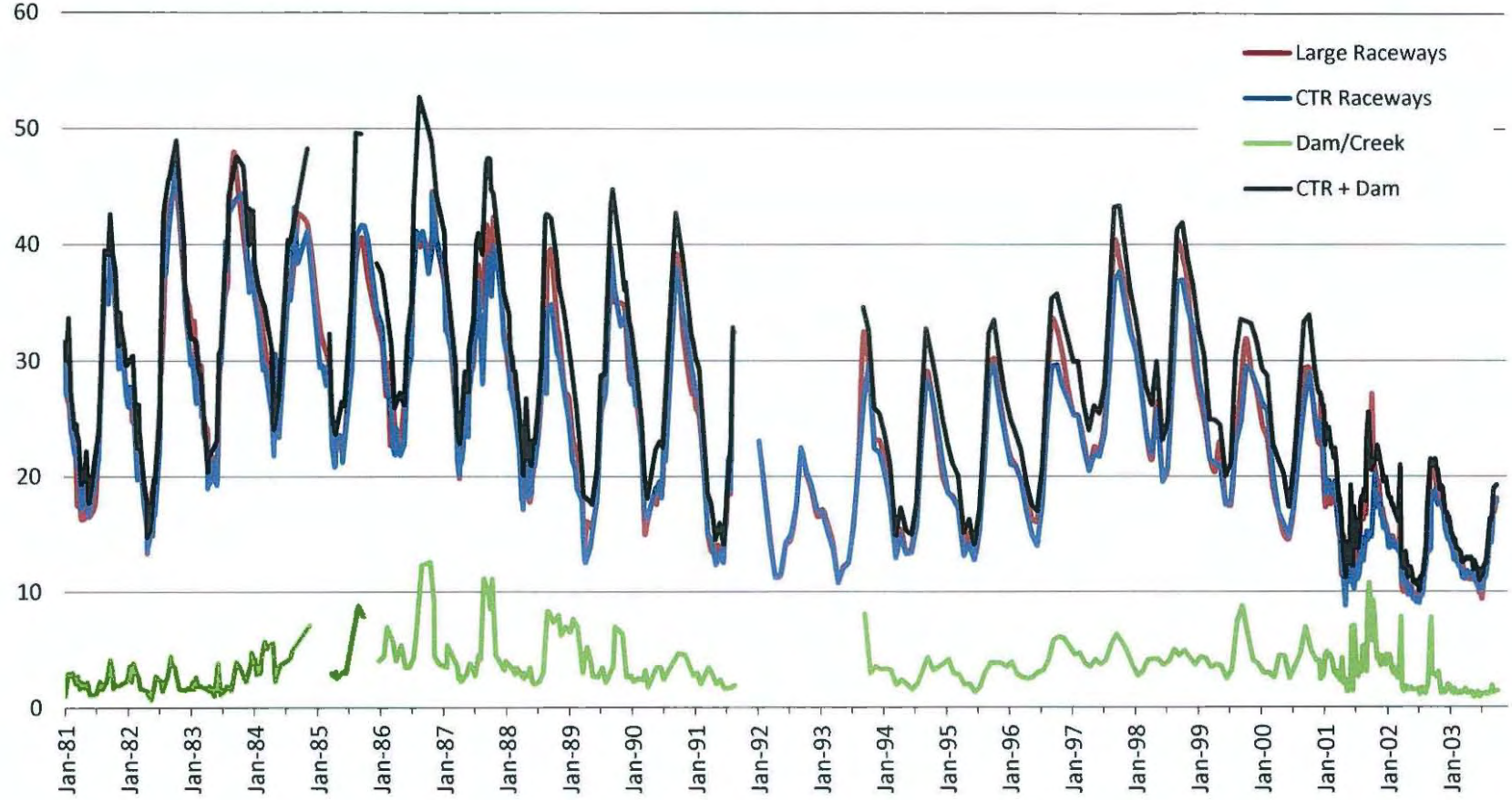
(1) Computed as Total Curren Spring Flow minus Total Curren Tunnel Flow.

(2) Curren Tunnel to irrigation rights from 1993 - 1996 provided by George Lemmon. The 1997 - 2002 irrigation diversions were estimated based on the 1993 - 1996 average monthly diversions. Diversions of the irrigation rights from the Curren Tunnel ceased after 2002 with the construction of the Sandy Pipeline to supply the irrigation water rights from the North Side Canal.

(3) Total Curren Tunnel Flow includes total flow to Rangen plus flow to irrigation pipelines, but does not include flow in Rangen's domestic pipeline.

Figure 2-8

Daily Flows
Rangen Hatchery
1981 - 2003
Values in CFS



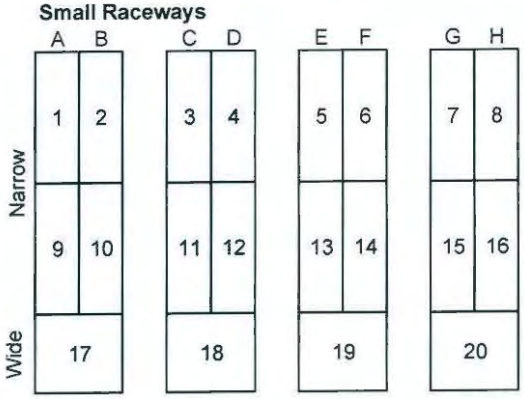
Source: Data were submitted to IDWR by May, Sudweeks & Browning, LLP on behalf of Rangen Hatchery, November 21, 2003.

Figure 2-9

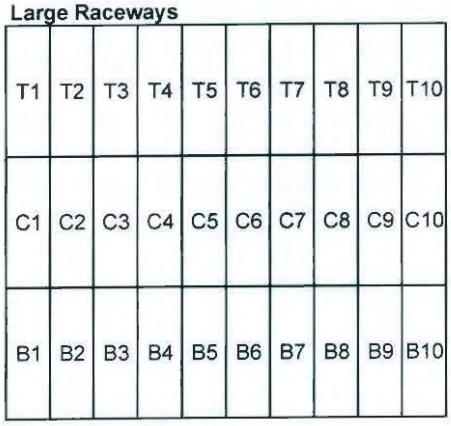
Raceway Volumes and Identifiers
Rangen Hatchery

Raceway Type	Volume (ft^3)	Identifier
Green House Tank	27	(1-24)
Hatch House Trough	17	(1-12)
Small Raceway (narrow)	580	(1-16)
Small Raceway (wide)	934	(17-20)
Large Raceway	1,640	(1-10 T,C, B)
CTR Raceway	8,244	(A, B, & D)

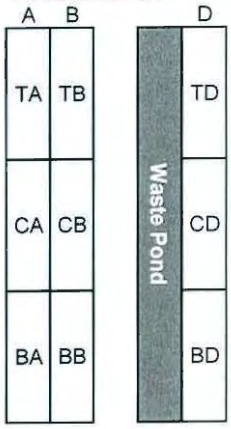
Small Raceways



Large Raceways



CTR Raceways



Based on flow restrictors

Max Tank flow (11.5 GPM) =	0.03 cfs
~Capacity Flow (flow x 24) =	0.61 cfs

Based on maximum flows (2007-2012)*

Max Trough flow =	0.06 cfs
~Capacity Flow (avg flow x 12) =	0.75 cfs
Est. capacity of Tanks and Troughs =	1.36 cfs

Based on average flows (2007-2012)

Avg Sm. Raceway (wide) flow =	2.28 cfs
~Capacity Flow (avg flow x 4) =	9.11 cfs

Based on maximum flows (2007-2012)*

Max Sm. Raceway (wide) flow =	2.68 cfs
~Capacity Flow (avg flow x 4) =	10.72 cfs

Based on average flows (2007-2012)

Avg Lg. Raceway flow =	4.29 cfs
~Capacity Flow (avg flow x 10) =	42.92 cfs

Based on maximum flows (2007-2012)*

Max Lg. Raceway flow =	4.82 cfs
~Capacity Flow (max flow x 10) =	48.18 cfs

Based on average flows (2007-2012)

Avg CTR flow =	12.39 cfs
~Capacity Flow (avg flows x3) =	37.18 cfs
~Capacity Flow w/o WP (avg flows x4) =	49.58 cfs

Based on maximum flows (2007-2012)

Max CTR flow =	17.26 cfs
~Capacity Flow (max flows x3) =	51.77 cfs
~Capacity Flow w/o WP (avg flows x4) =	69.03 cfs

*Total reported flow divided by number of raceways in operation.

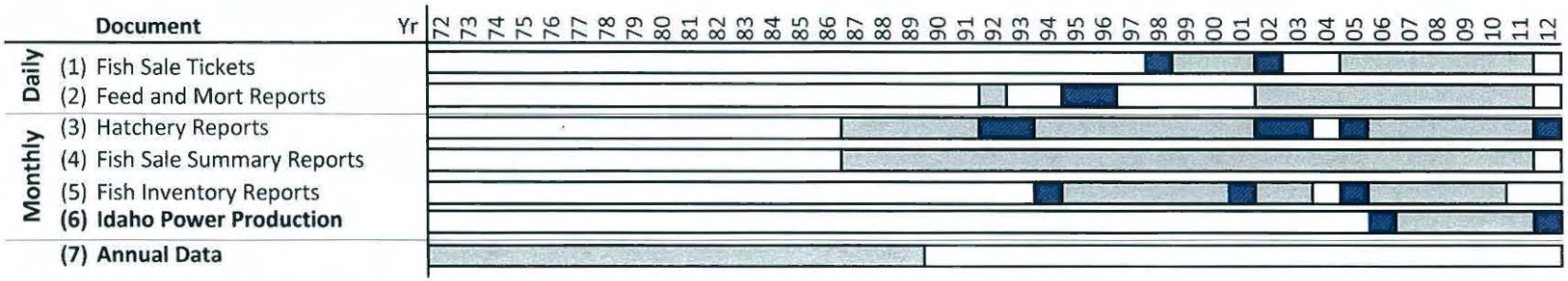
Notes

(1) Volumes from Idaho Power Hatchery Production Summaries.

(2) Raceway identifiers provided by Lonny Tate during his deposition on September 11, 2012.

Figure 4-1

Fish Production Data Provided by Rangen
1972 - 2012



Notes:

(1) Invoices showing date of sale, pounds of fish sold, type of fish sold, and buyer.

(2) Feed fed to fish and fish mortalities by raceway.

(3) Hatchery data (monthly total pounds of fish, number of fish, pounds and/or number of sales, number of mortalities, and flow in cfs).
Data in 1986 has been redacted.
Data from 1987 - 1991 difficult to read.
Missing data for all but one month in 1993 and in a few months in 1992, 2002, 2003, 2005, and 2012.
Data by raceway (inventory data) is shown in Hatchery Reports for Sep-94, Oct-94, Jul-94, Mar-95, May-95, 1998, Jul-10, Nov-11, and Dec-11.

(4) Summary of monthly sales data including date of sale, invoice number, pounds of fish sold, pond from which fish where sold, buyer, etc.

(5) Inventory data (number of fish, pounds of fish, mortalities, feed fed, weight gain, feed conversion ratio, etc.) by raceway.

(6) Idaho Power Hatchery Production Summaries by raceway for March and October sales only. Data include total pounds of fish, number of fish, length of fish, number of mortalities, feed fed, feed conversion ratio, weight gain, length increase, density index, flow index, and flow in cfs. These data do not include production data for the 8,000 lbs of fish delivered in late May or early June pursuant to a separate contract.

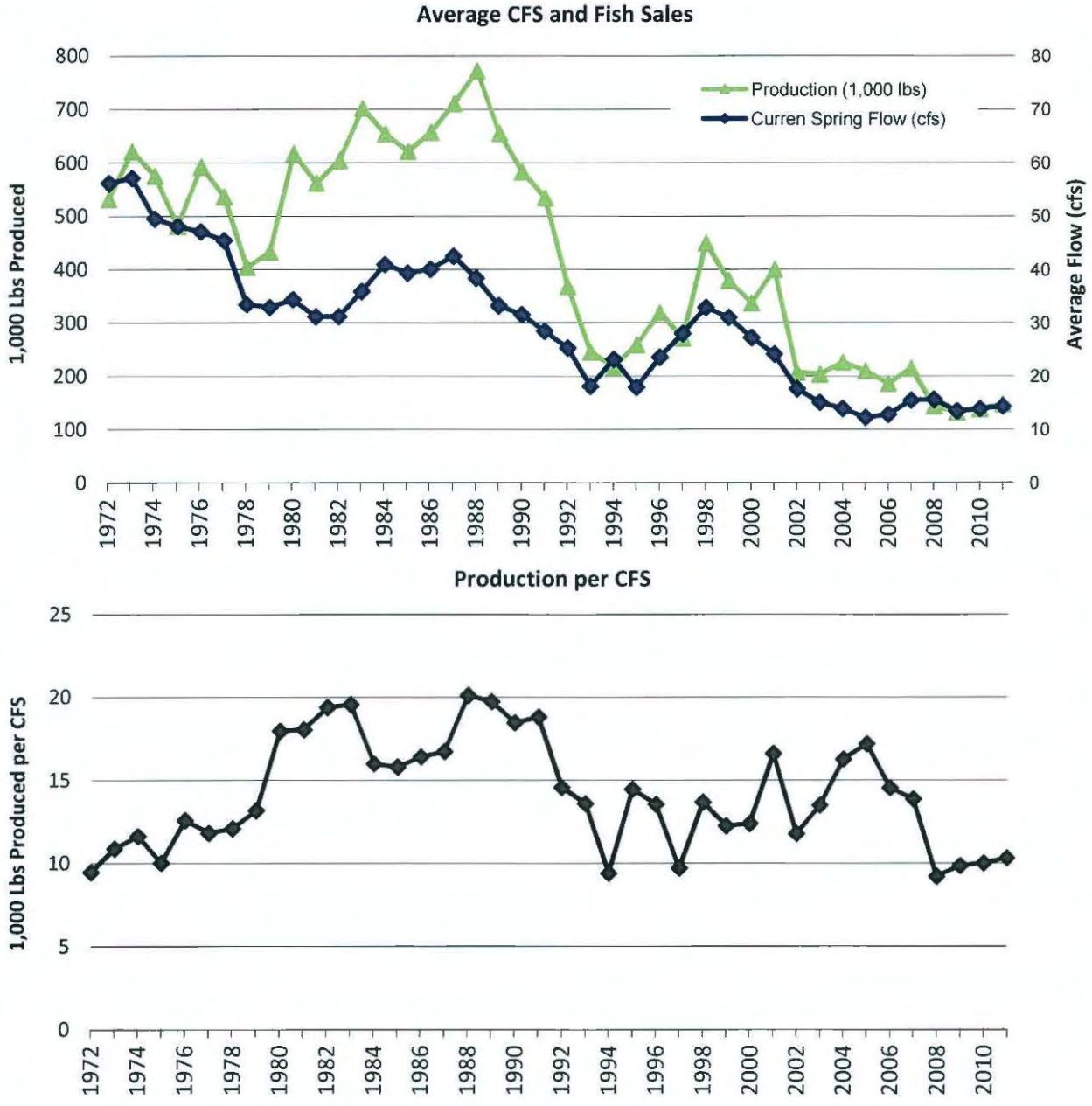
(7) Annual production and feed data summary (fiscal year totals 1972 - 1989).

Key

- Complete data provided by Rangen.
- Partial data provided by Rangen (one or more missing months).
- No data.

Figure 4-2

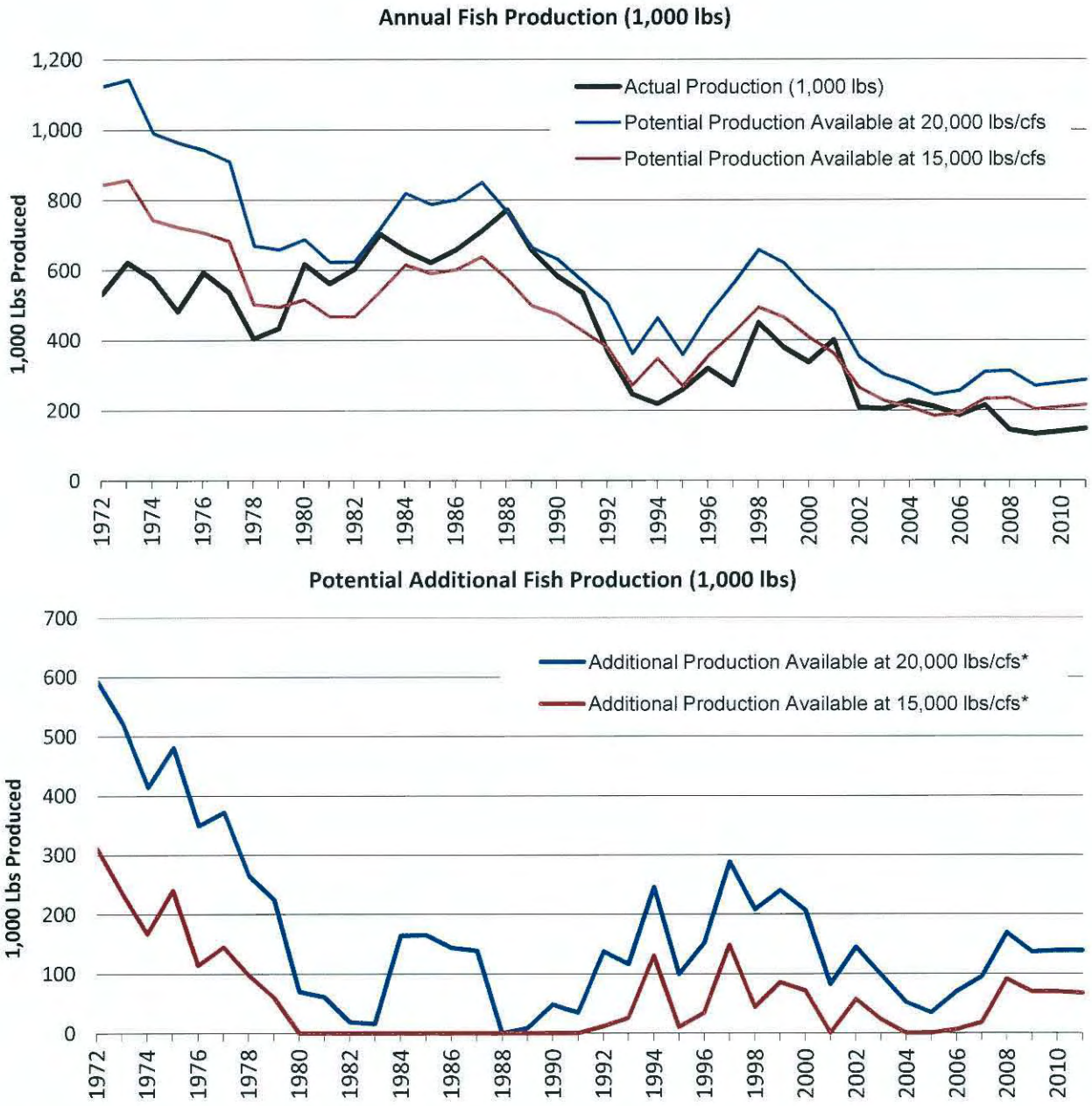
Annual Production Data
Rangen Hatchery
Fiscal Years 1972 - 2011



Sources: Rangen's Annual Production Report (Fiscal Years 1972 - 1989).
Production based on fiscal year (July 1 - June 30) sales in Rangen's monthly Hatchery Reports, spreadsheets, and sales summaries from 1990 - 2011.
Fiscal year annual flow computed from total Rangen flow ("Curren Spring Flow") reported by Rangen (1972 - February 1995) and reported by IDWR (March 1995 - 2011).

Figure 4-3

Potential vs. Actual Annual Production
Rangen Hatchery
Fiscal Years 1972 - 2011

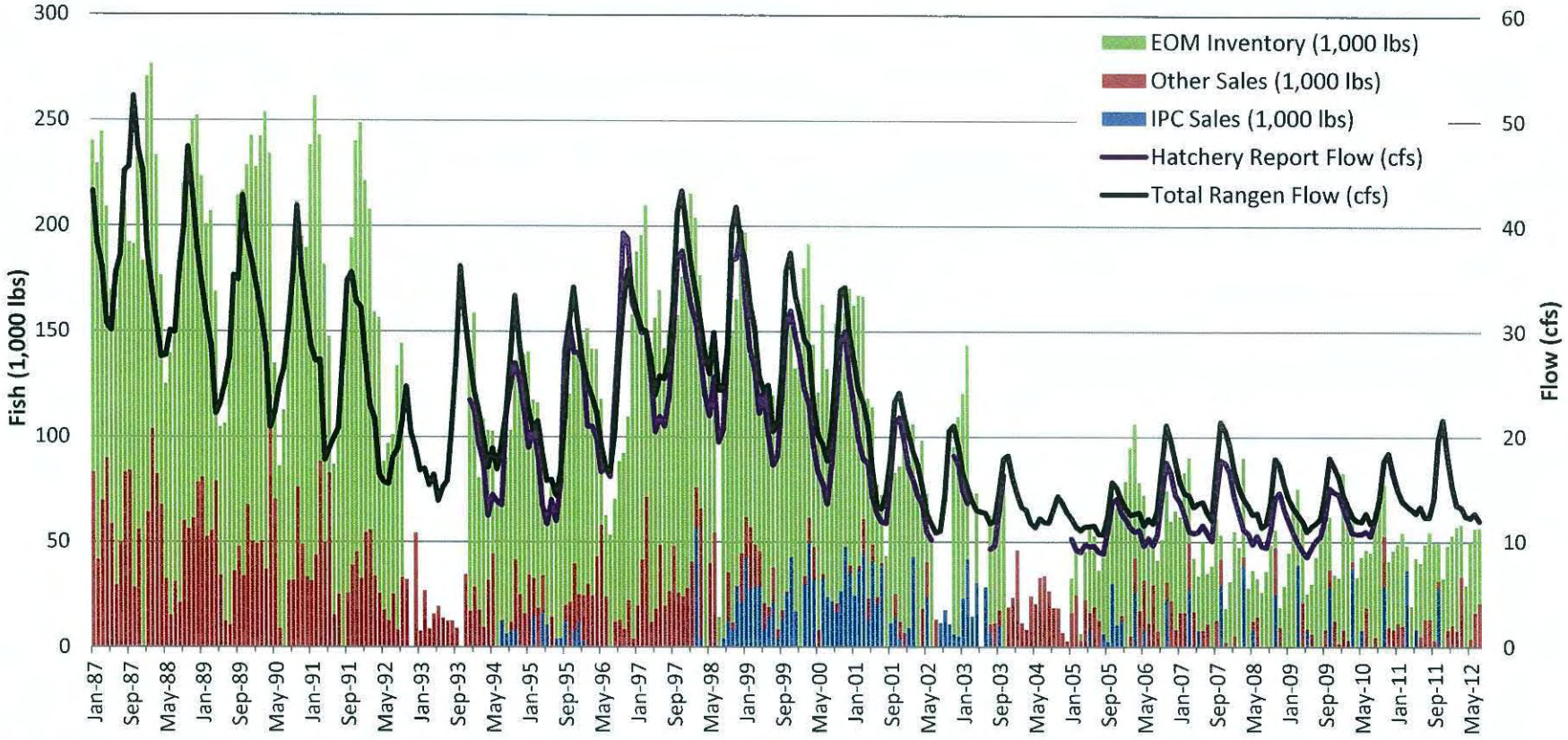


Sources: Rangen's Annual Production Report (Fiscal Years 1972 - 1989).
Production based on fiscal year (July 1 - June 30) sales in Rangen's monthly Hatchery Reports, spreadsheets, and sales summaries from 1990 - 2011.
Fiscal year annual flow computed from total Rangen flow reported by Rangen.

Notes: *Potential additional fish production computed as the difference between assumed production at 20,000 lbs/cfs and 15,000 lbs/cfs minus the actual reported historical production.

Figure 4-4

Monthly Fish Sales and End-of-Month Inventory in Pounds
Rangen Hatchery
1987 - July 2012

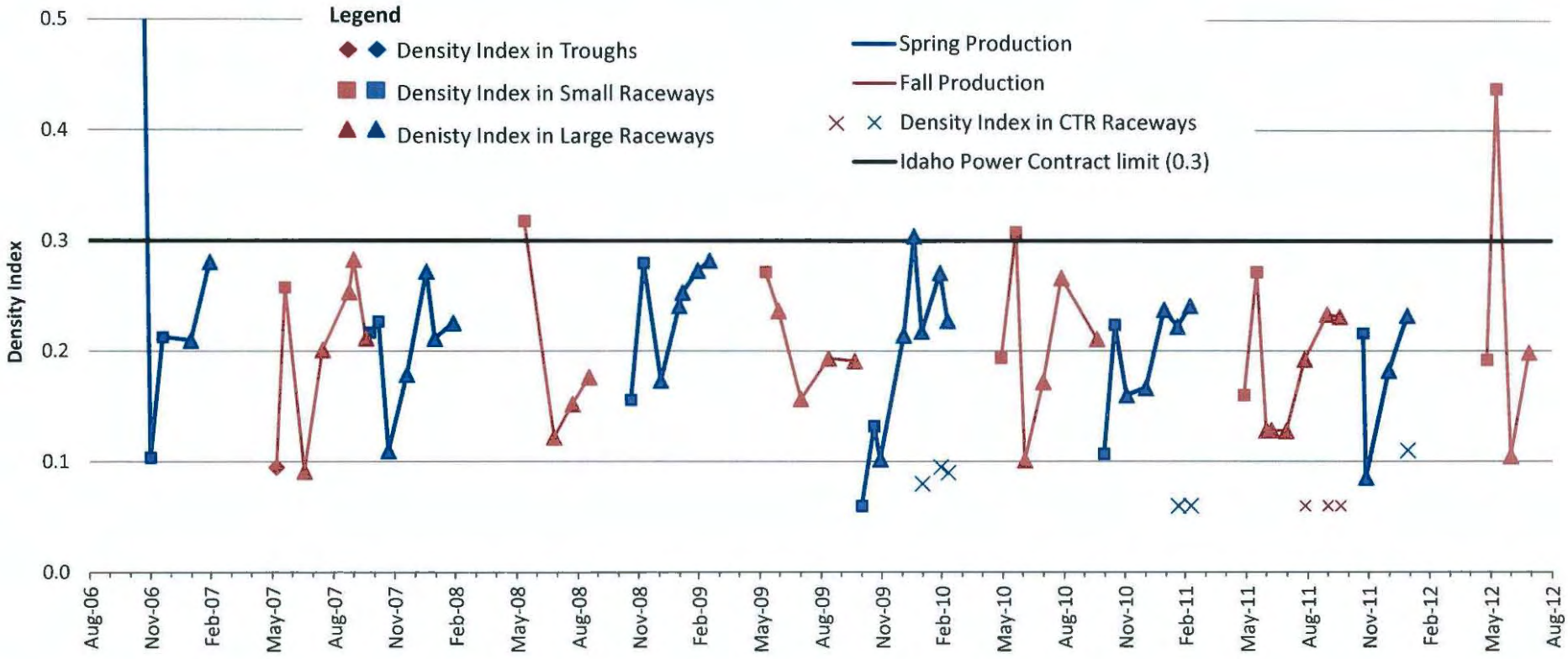


Sources: End-of-month inventory, flow, and sales are from monthly Hatchery Reports and Sales Summaries provided by Rangen.
Rangen monthly flow data reported by Rangen (1966-1970) and IDWR reported flow data (March 1995-2011).

Notes: Bars are stacked. The sum of the end-of-month inventory and the monthly fish sales is assumed to represent the total monthly fish weight in the facility.
There are no end-of-month inventory data available for 1993 and 2004 and there are missing months of data in 1992 and 2002 - 2003.
There are no Idaho Power Company (IPC) sales data in 1987 - 1993 and 2012. No IPC sales occurred in 1996 - 1997 and 2004.

Figure 4-5

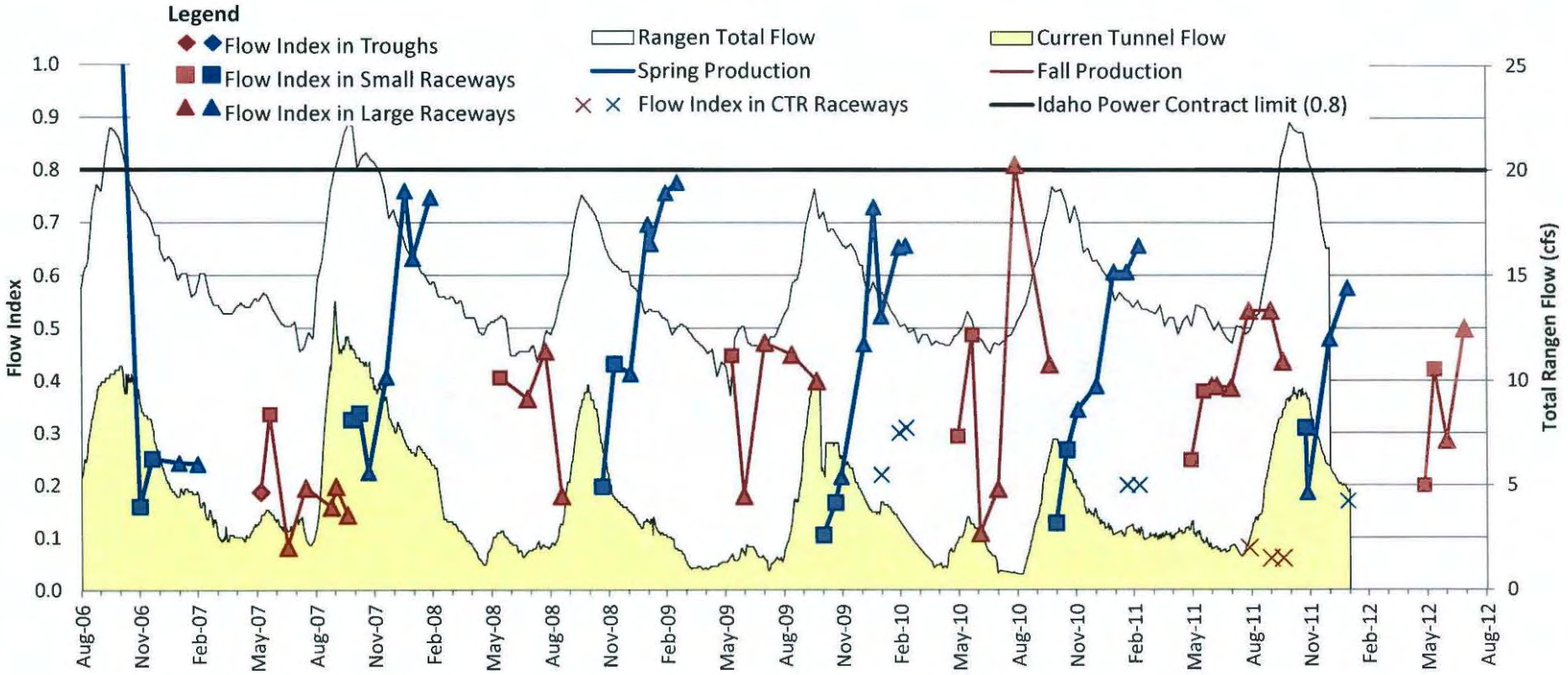
Reported Density Index
Idaho Power Hatchery Production Summaries
Rangen Hatchery
2006 - 2012



Source: Average of the Density Index values by structure type contained in the Idaho Power Hatchery Production Summaries.
Notes: Density Index = Fish Weight (lbs) / (Length of Fish (in) x Volume of Raceway or Container (cubic feet))
Density Index limit in Idaho Power Contract = 0.3.
In October 2006, the reported average density index in Troughs is 2.1.

Figure 4-6

Reported Flow Index
Idaho Power Hatchery Production Summaries
Rangen Hatchery
2006 - 2012

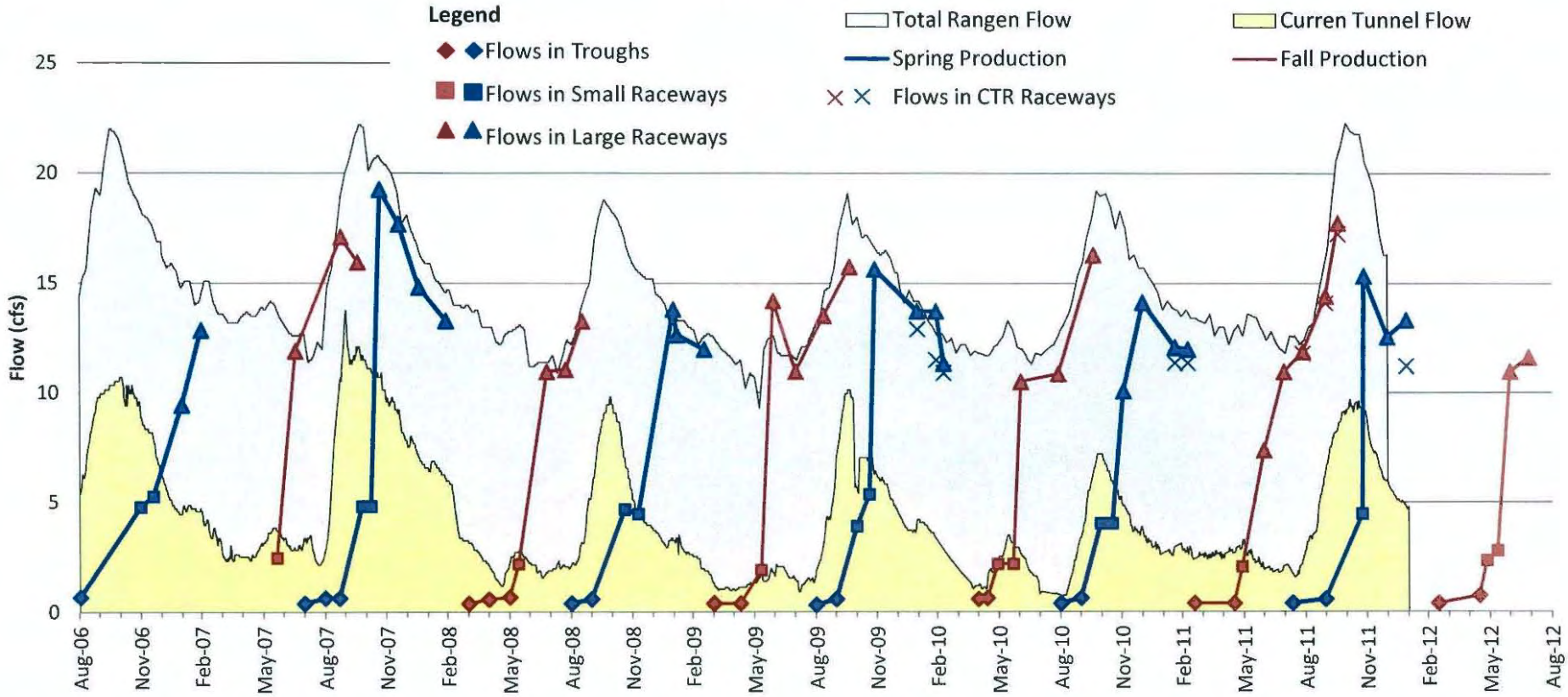


Sources: Average of the Flow Index values by structure type contained in the Idaho Power Hatchery Production Summaries.
Daily Total Rangen flow and daily Curren Tunnel flow data reported by IDWR.

Notes: Flow Index (FI) = Fish Weight (lbs) / (Length of Fish (in) x Flow rate (gallons per minute))
Flow Index limit in Idaho Power Contract = 0.8.
The reported average flow index in the Troughs is 1.2

Figure 4-7

Daily Flow (cfs)
Idaho Power Hatchery Production Summaries
Rangen Hatchery
2006 - 2012

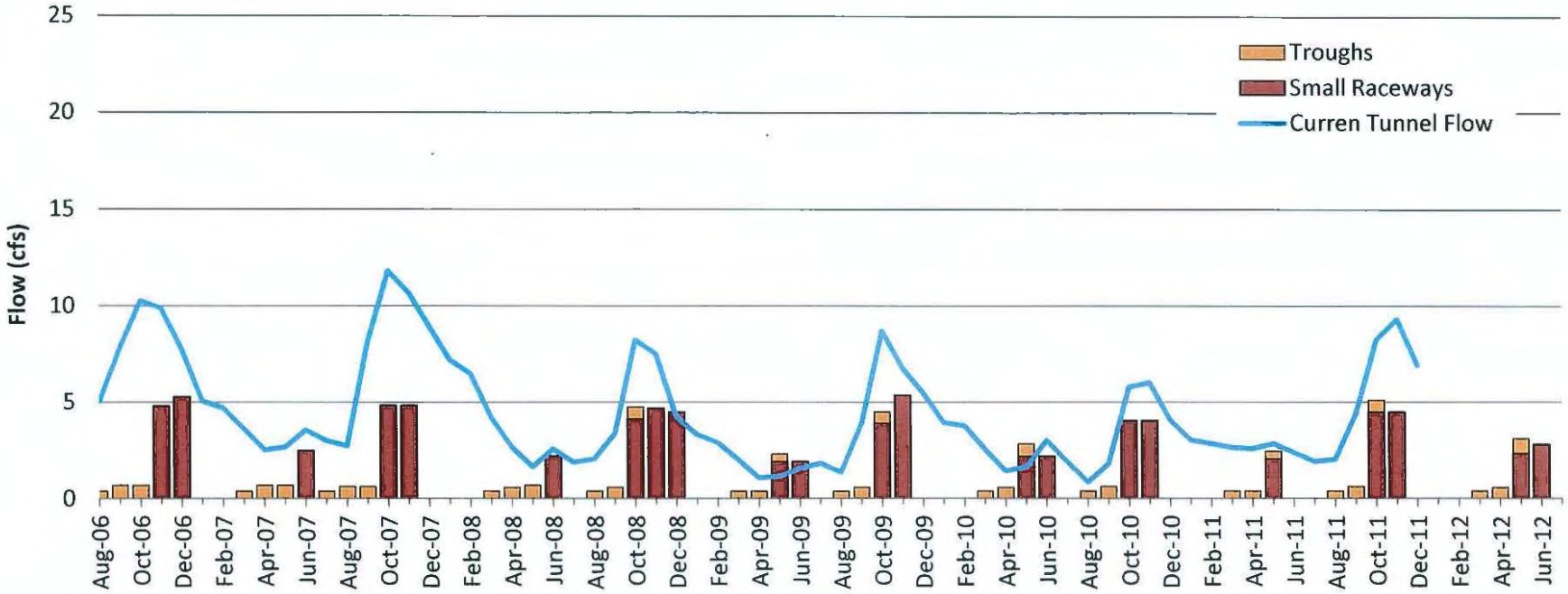


Sources: Structure flow data based on the sum of the daily flows contained in the Idaho Power Hatchery Production Summaries.
Daily Total Rangen flow and daily Curren Tunnel flow data reported by IDWR.

Note: Missing data for Troughs in March to May 2007.

Figure 4-8

Trough and Small Raceway Flows vs. Curren Tunnel Flows
Idaho Power Hatchery Production Summaries
Rangen Hatchery
August 2006 - July 2012
Values in CFS

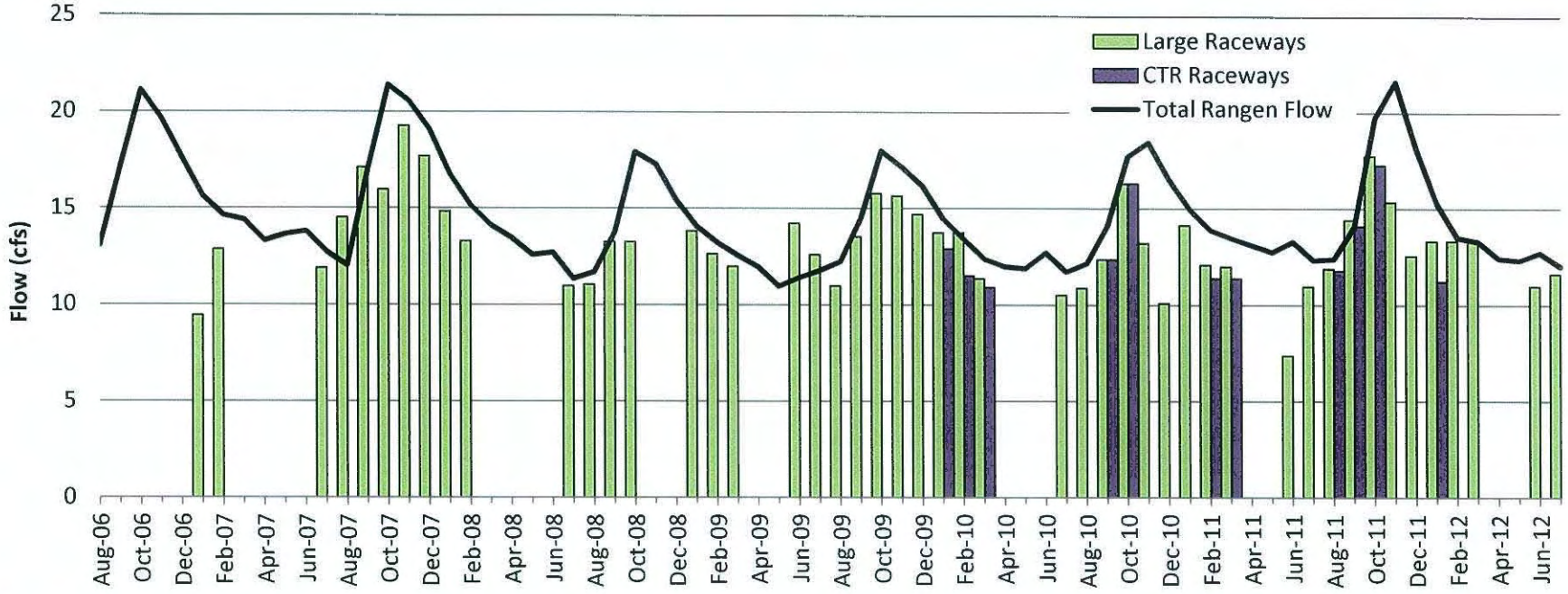


Sources: Daily Trough and Small Raceway reported flow values from the Idaho Power Hatchery Production Summaries are shown in month of occurrence. Monthly Curren Tunnel flow from IDWR. No data are available for 2012.

Notes: Missing Trough flow data filled in with average values in 8/2006, 10/2006, 10/2009, 10/2011, and 5/2012.
Monthly flows during a production cycle without daily Small Raceway flow data in that month were estimated by averaging flows in the previous and subsequent months (5/2009 and 10/2011).
There did not appear to be information in the Idaho Power Hatchery Production Summaries regarding the production of fish for the 8,000 pounds of fish that are delivered to Rangen in late May or early June for release at American Falls Reservoir. As a result, this chart does not reflect the presence of these fish in the hatchery.

Figure 4-9

Large and CTR Raceway Flows vs. Total Rangen Flow
Idaho Power Hatchery Production Summaries
Rangen Hatchery
August 2006 - July 2012
Values in CFS

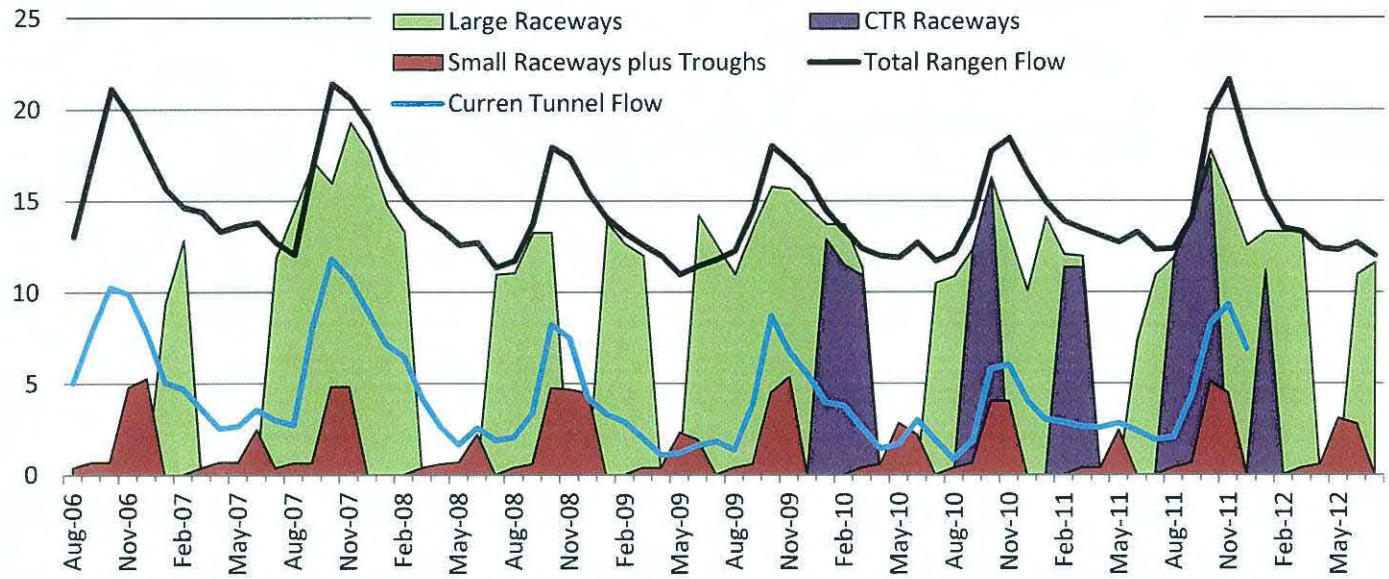


Sources: Daily Large Raceway and CTR Raceway reported flows from Idaho Power Hatchery Production Summaries. The reported daily values are shown in month of occurrence.
Monthly average total Rangen flow reported by Rangen.

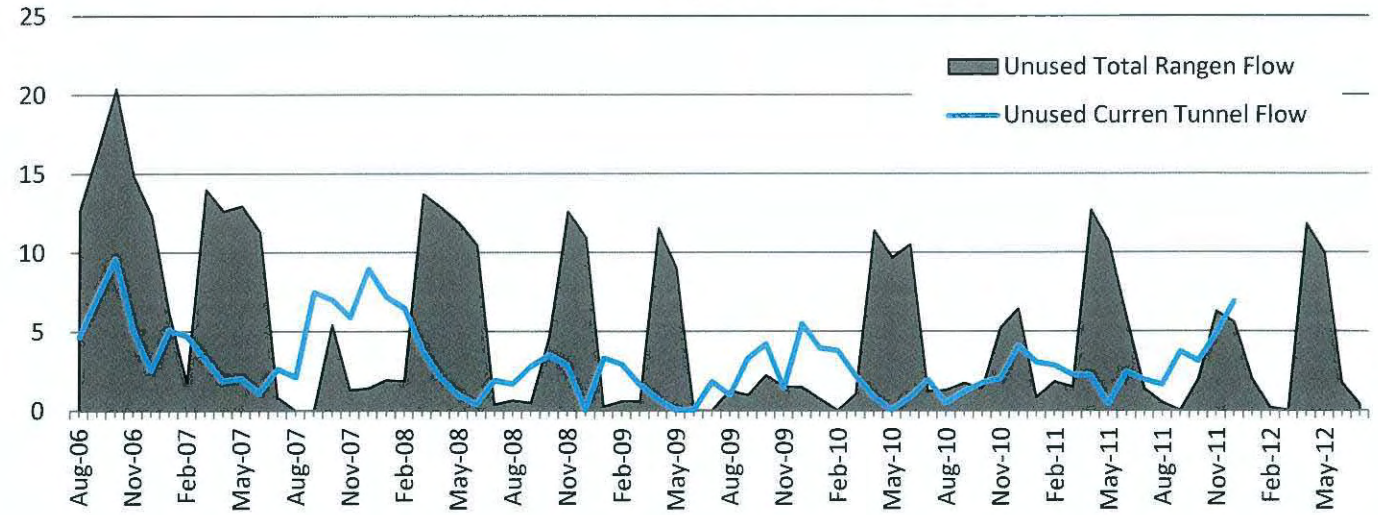
Notes: Monthly flows during a production cycle without daily flow data were estimated by averaging flows in the previous and subsequent months (8/2007, 10/2008, 9/2010, and 3/2012 for the Large Raceways and 9/2010 and 10/2010 for the CTR Raceways).
There did not appear to be information in the Idaho Power Hatchery Production Summaries regarding the production of fish for the 8,000 pounds of fish that are delivered to Rangen in late May or early June for release at American Falls Reservoir. As a result, this chart does not reflect the presence of these fish in the hatchery.

Figure 4-10

Monthly Flow Through Raceways vs. Total Rangen Flow and Curren Tunnel Flow
Rangen Hatchery
August 2006 - July 2012
Values in CFS



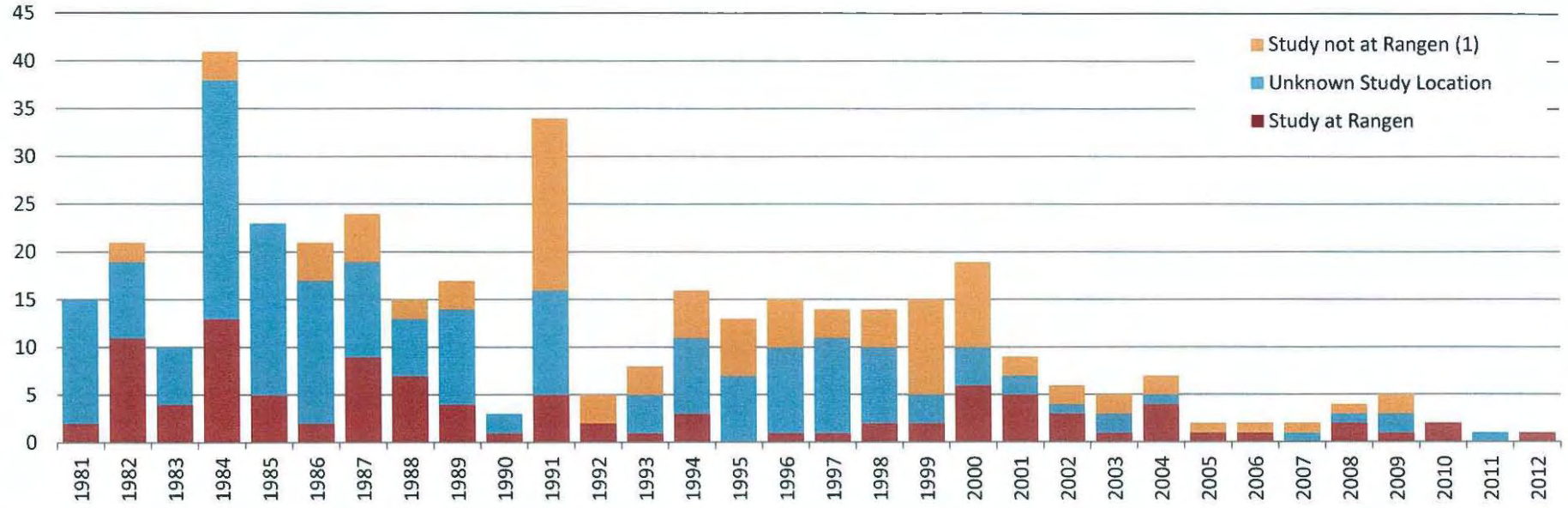
Total Unused Rangen Hatchery Flows



Sources: Raceway flows in the monthly Idaho Power Hatchery Production Summaries.
Total Rangen flow reported by Rangen and Curren Tunnel flow reported by IDWR.

Notes: Unused Curren Tunnel Flow is the Curren Tunnel flow minus the sum of the flows in Troughs and Small Raceways.
Unused Total Flow is the Total Rangen Flow minus the greater of the flows measured in the (Troughs plus Small Raceways), Large Raceways, or CTR Raceways.
There did not appear to be information in the Idaho Power Hatchery Production Summaries regarding the production of fish for the 8,000 pounds of fish that are delivered to Rangen in late May or early June for release at American Falls Reservoir. As a result, this chart does not reflect the presence of these fish in the hatchery.

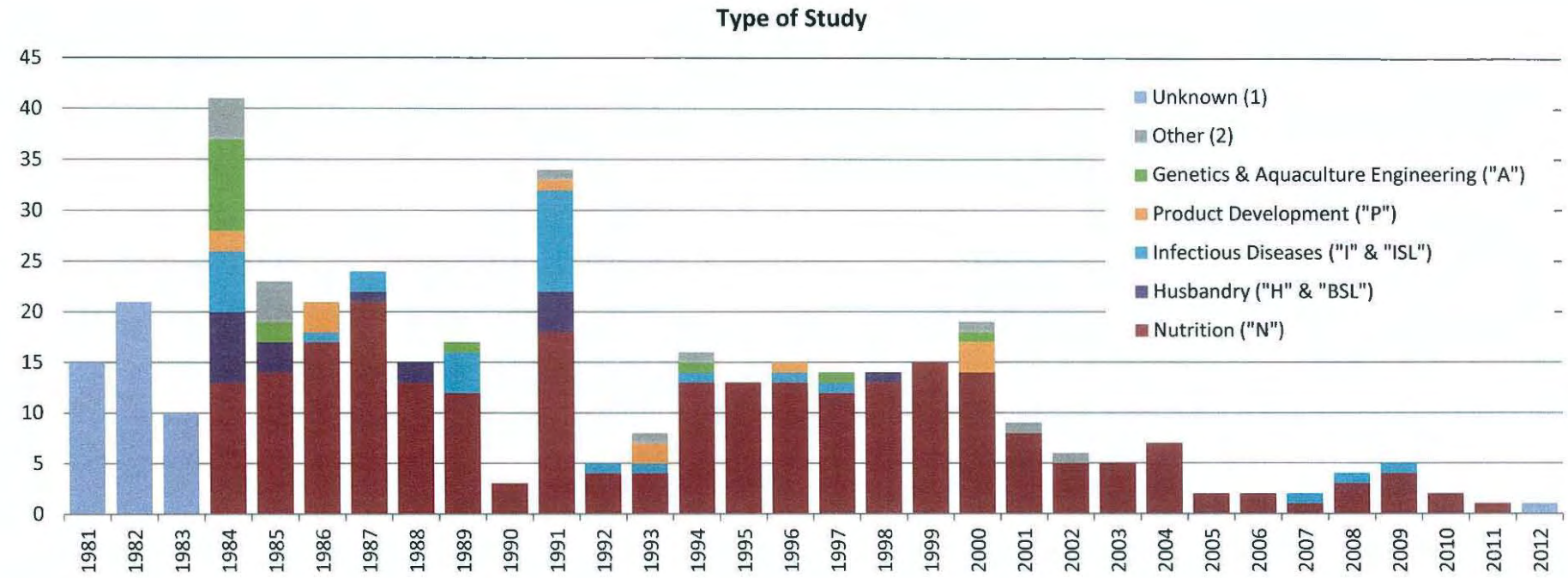
Figure 5-1a
Summary of Research Index Work Units
All Species
Rangen Hatchery
1981 - 2012



Notes:

*Documentation or study names indicated that the research was conducted at a different site. Tilapia and other warm water fish research was assumed to be done off-site.

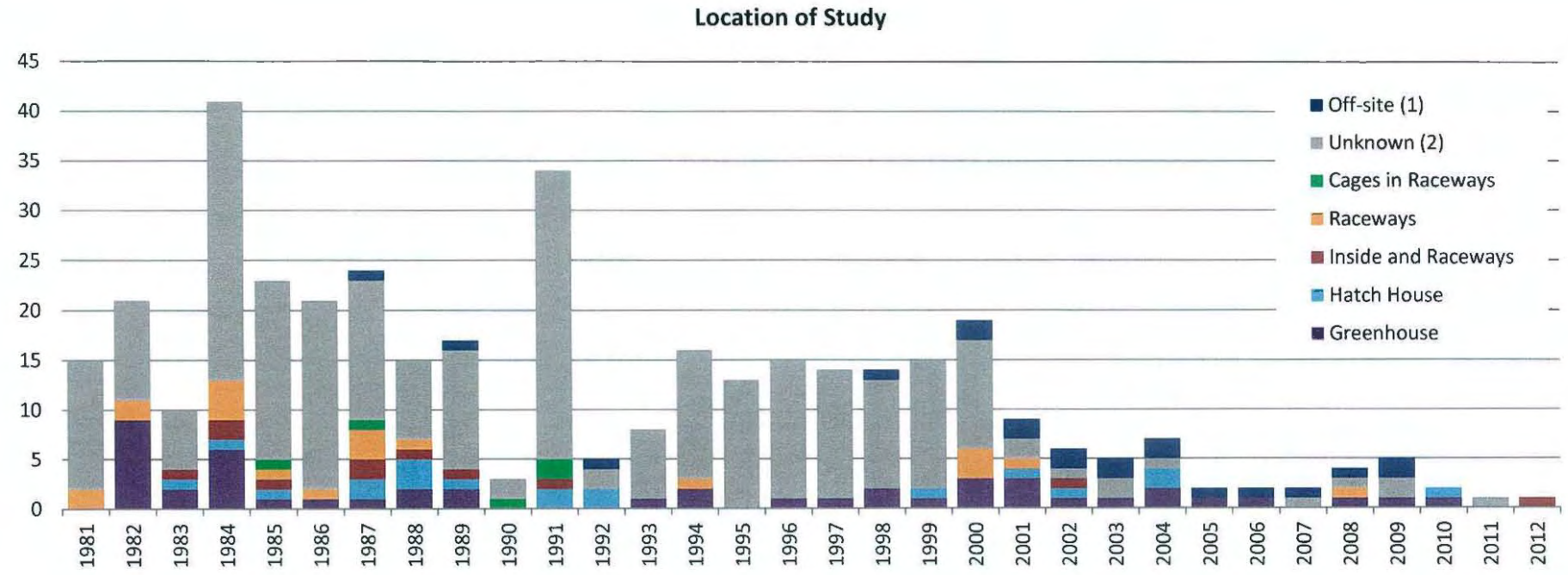
Figure 5-1b
Summary of Research Index Work Units
All Species
Rangen Hatchery
1981 - 2012



(1) Unknown types include pre-1984 studies. Nature of pre-1984 studies cannot be determined based on numbering system in index.

(2) Other types include physiology/biology/analytical chemistry ("B"), toxicology ("T"), extension service ("E"), and other ("O").

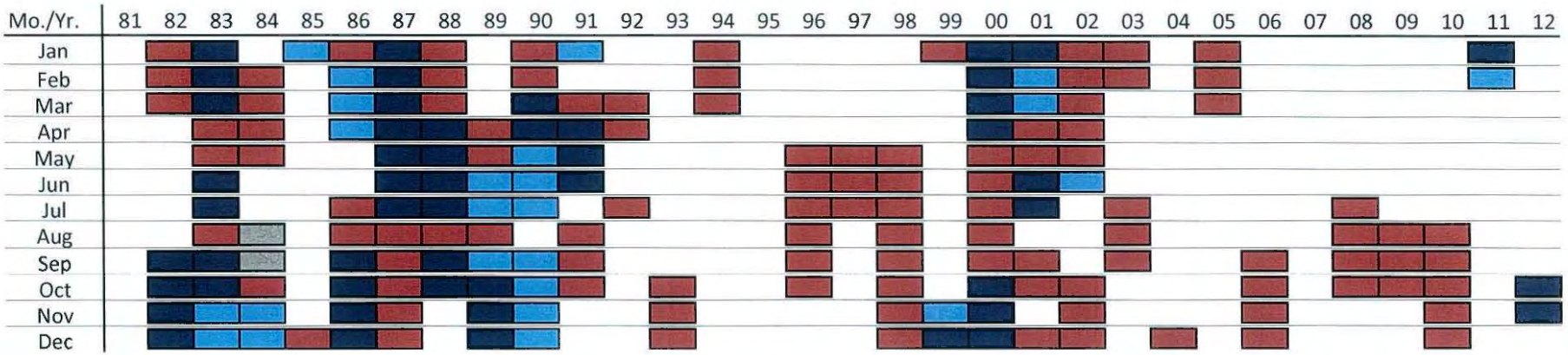
Figure 5-1c
Summary of Research Index Work Units
All Species
Rangen Hatchery
1981 - 2012



(1) Off-site means that the location of the study is known and is not at Rangen. Off-site locations include Rangen's warm water facility in Buhl, Clear Springs, etc.

(2) Unknown means location is not known. Warm water species assumed to not be at Rangen, but are included in this unknown category.

Figure 5-2
Summary of Research Documentation Obtained
Rangen Hatchery
1981 - 2012



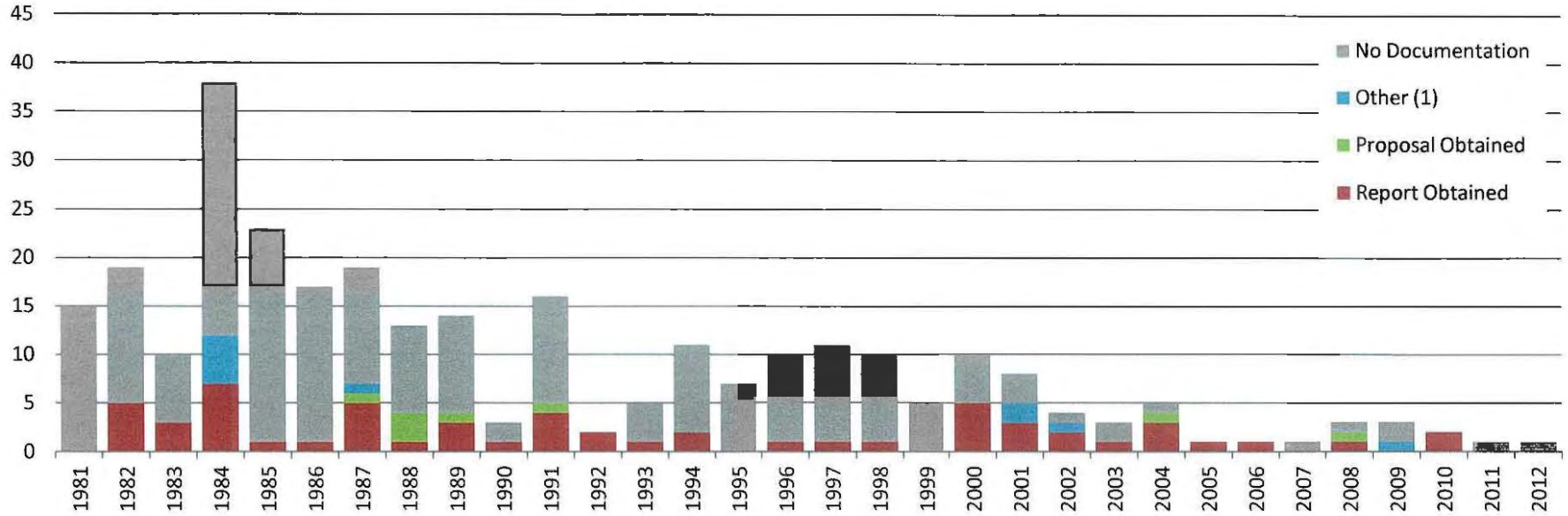
Source: Rangen's research proposals and documents obtained on October 16, 2012 and research documentation disclosed by Rangen.

Note: There are additional research proposals and documents that do not have dates and are not listed in the above chart.

Code:
- Research conducted in outside raceways.
- Research conducted in indoor facilities.
- Research conducted in both indoor and outdoor facilities.
- Research dates listed, but there are no location data.

Figure 5-3a
Summary of Research Index Work Units
Cold Water or Unknown Species
Rangen Hatchery
1981 - 2012

Type of Documentation



(1) Other documentation includes spreadsheets, data tables, mid-year reports, indices with start/end dates, or other documentation indicating research took place.

Figure 5-3b
Summary of Research Index Work Units
Cold Water or Unknown Species
Rangen Hatchery
1981 - 2012

Information Contained in Documentation

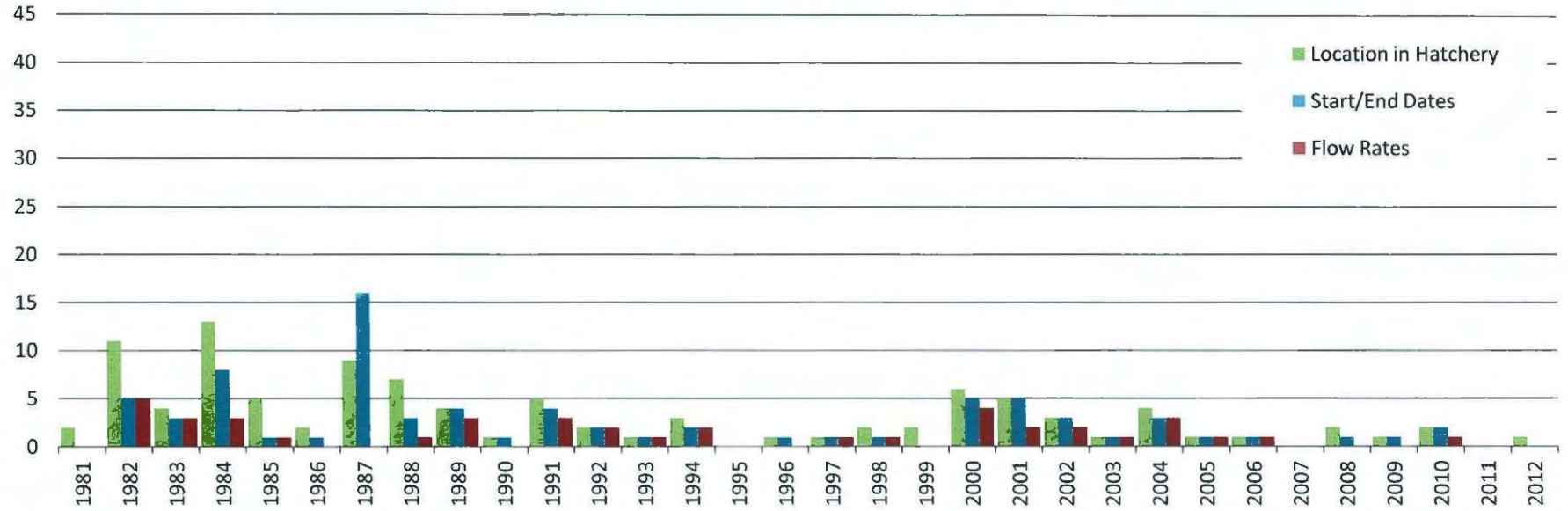
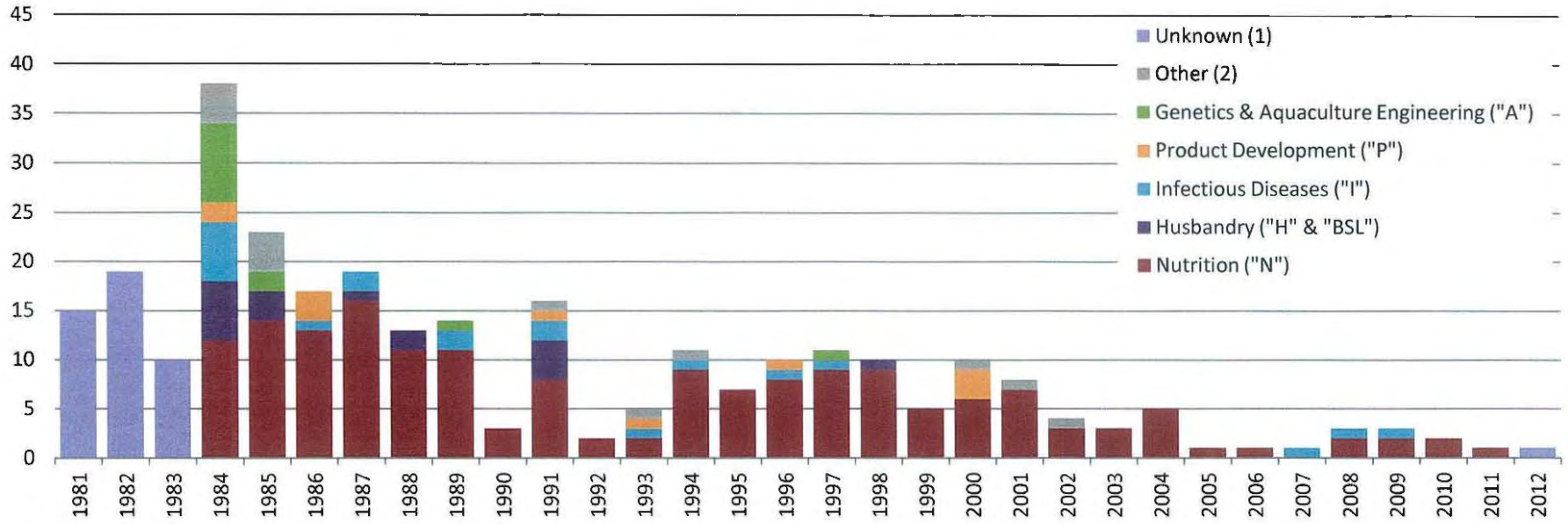


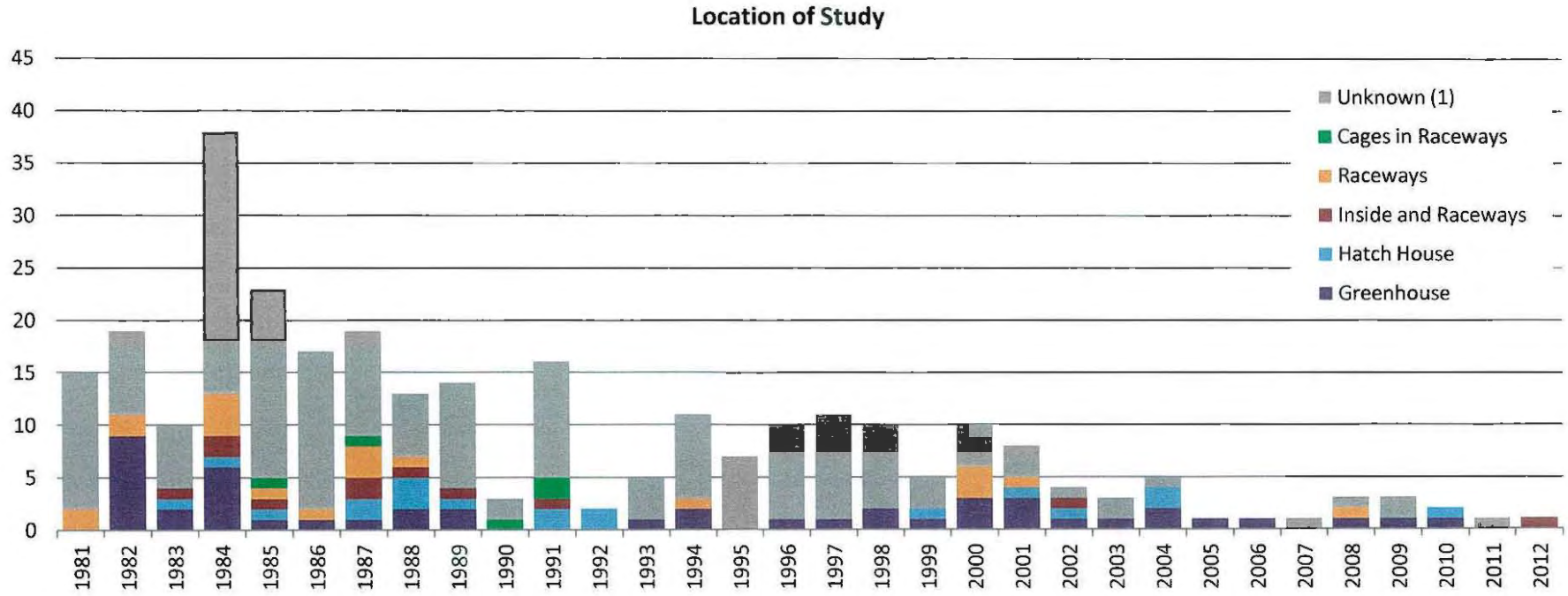
Figure 5-3c
Summary of Research Index Work Units
Cold Water or Unknown Species
Rangen Hatchery
1981 - 2012

Type of Study



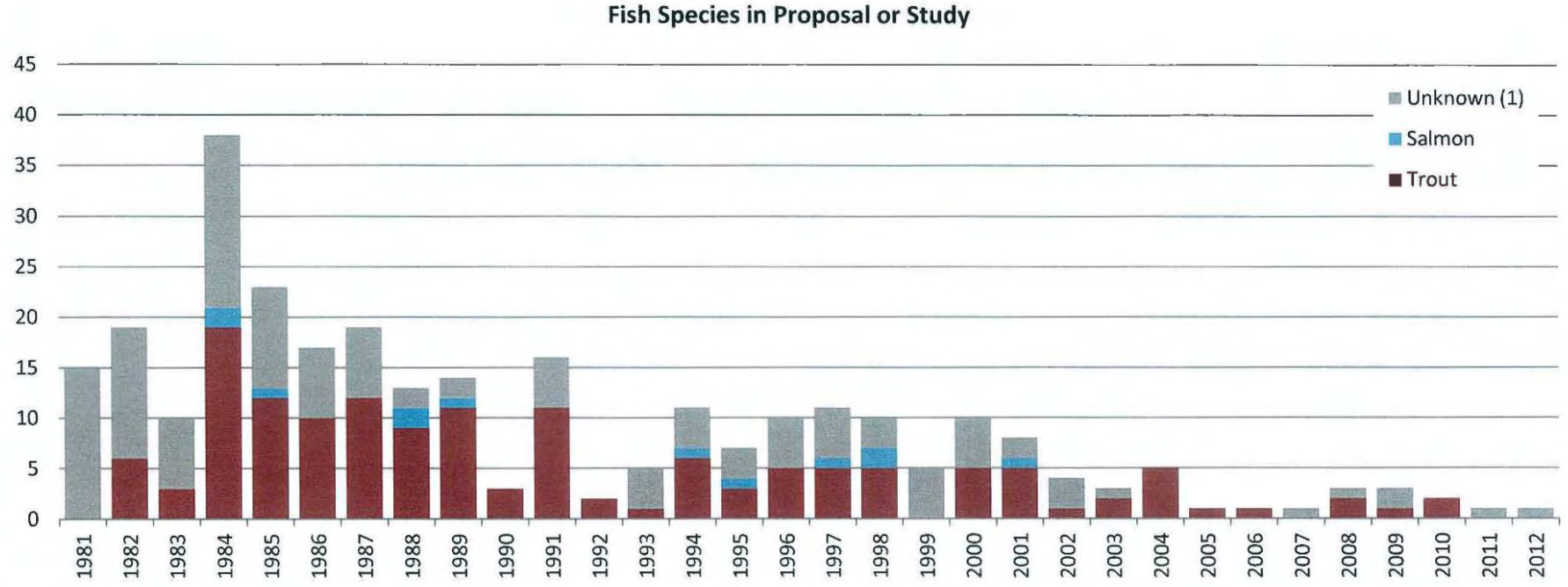
(1) Unknown include pre-1984 studies. Nature of pre-1984 studies cannot be determined based on numbering system in index.
(2) Other types include physiology/biology/analytical chemistry ("B"), toxicology ("T"), extension service ("E"), and other ("O").

Figure 5-3d
Summary of Research Index Work Units
Cold Water or Unknown Species
Rangen Hatchery
1981 - 2012



(1) Unknown means that there is not enough information to determine where the study took place (inside, outside, or off-site).

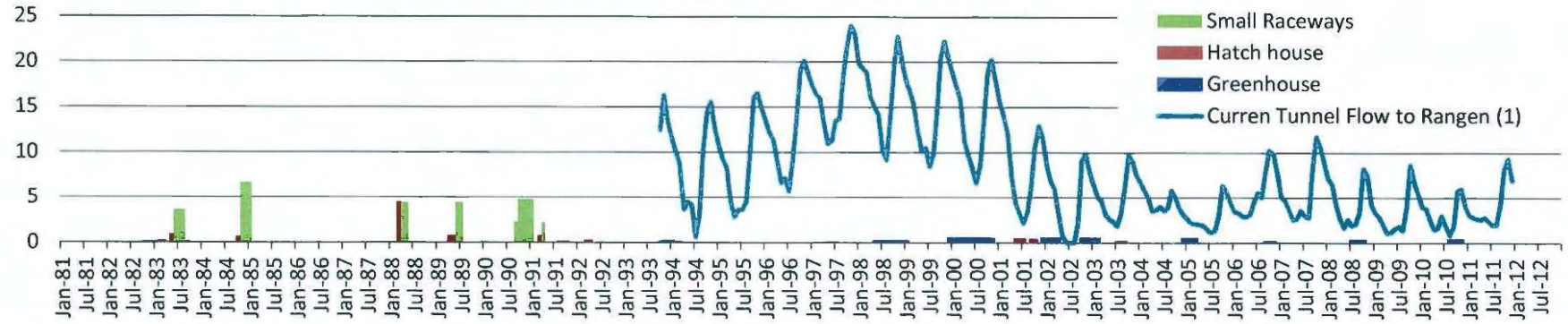
Figure 5-3e
Summary of Research Index Work Units
Cold Water or Unknown Species
Rangen Hatchery
1981 - 2012



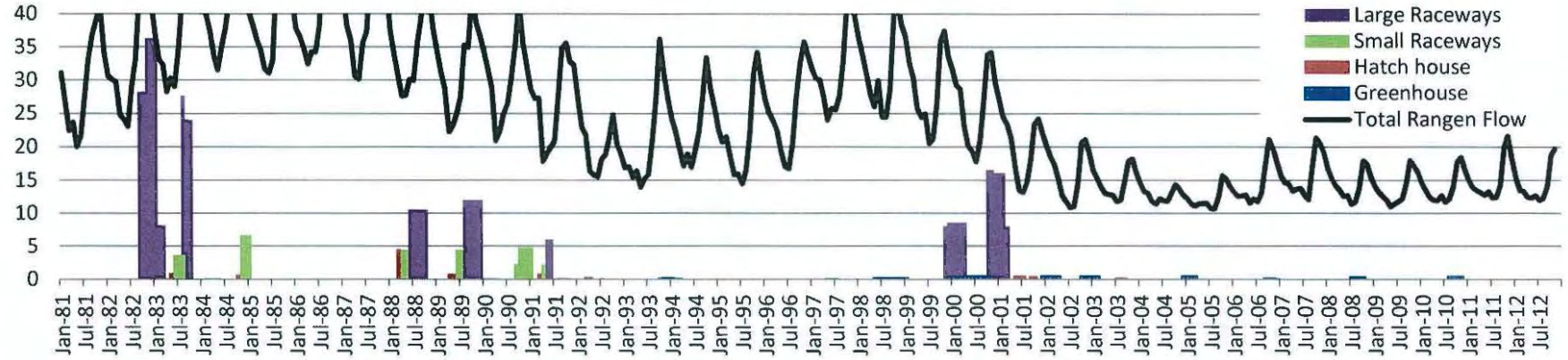
(1) Unknown means that there is not enough information to determine species type. Species could be warm water or cold water species.

Figure 5-4
Summary of Reported Flows in Research Documents
Rangen Hatchery
1981 - 2012
Values in CFS

Inside Facilities and Small Raceway Research Flows vs. Curren Tunnel Flow
(Stacked Bar Chart)



All Research Flows vs. Total Rangen Flow
(Stacked Bar Chart)



Note: This summary only shows the flows that were reported. There were other research experiments conducted during this period that did not have reported flow data.

It was conservatively assumed that only first use water was used in the experiments and the flows in simultaneous experiments were additive.

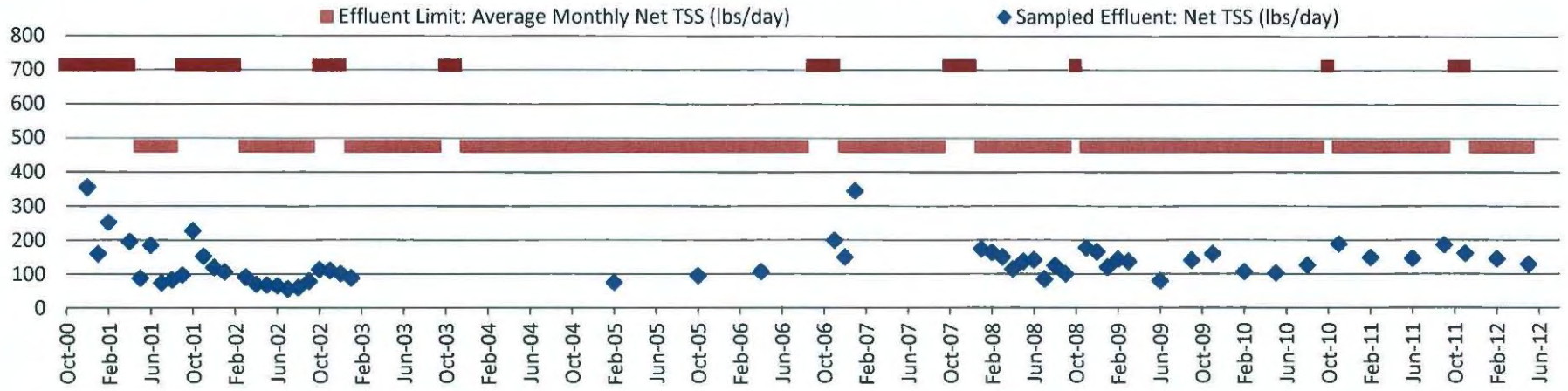
(1) Total Curren Tunnel flow to Rangen is total Curren Tunnel flow reported by the IDWR (1993 - 2011) minus diversions to irrigation from 1993 - 2002.

Total Rangen flow reported by Rangen (1981 - Feb 1995 and Jan 2012 - Nov 2012) and total Rangen flow reported by IDWR (Mar 1995 - 2011).

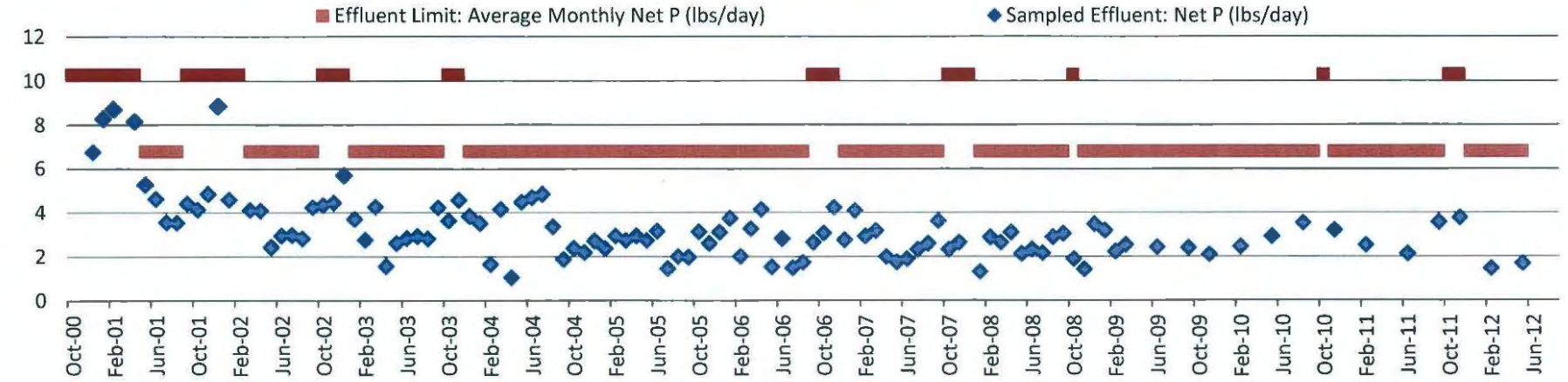
Figure 6-1

Discharge Monitoring Report
Rangen Hatchery (NPDES Permit #IDG130015)
Values in Pounds per Day

Total Suspended Solids



Total Phosphorus



Notes: Net effluent values and Rangen flow data from monthly discharge monitoring reports (DMRs) online (http://www.epa.gov/enviro/facts/pcs-icis/index.html).
Effluent limits from NPDES Permit (General Permit for Aquaculture Facilities in Idaho; IDG-130000 Table 4).

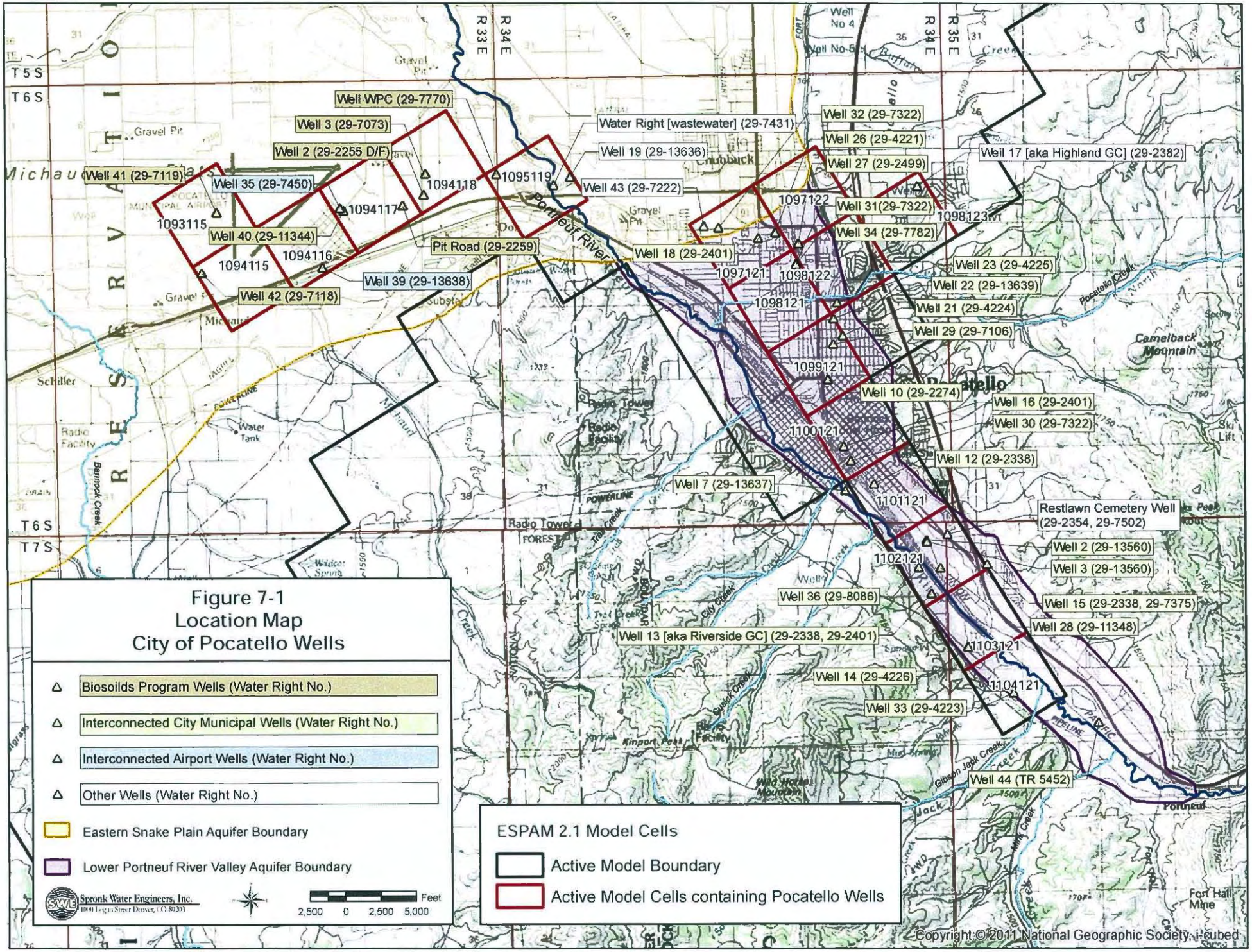
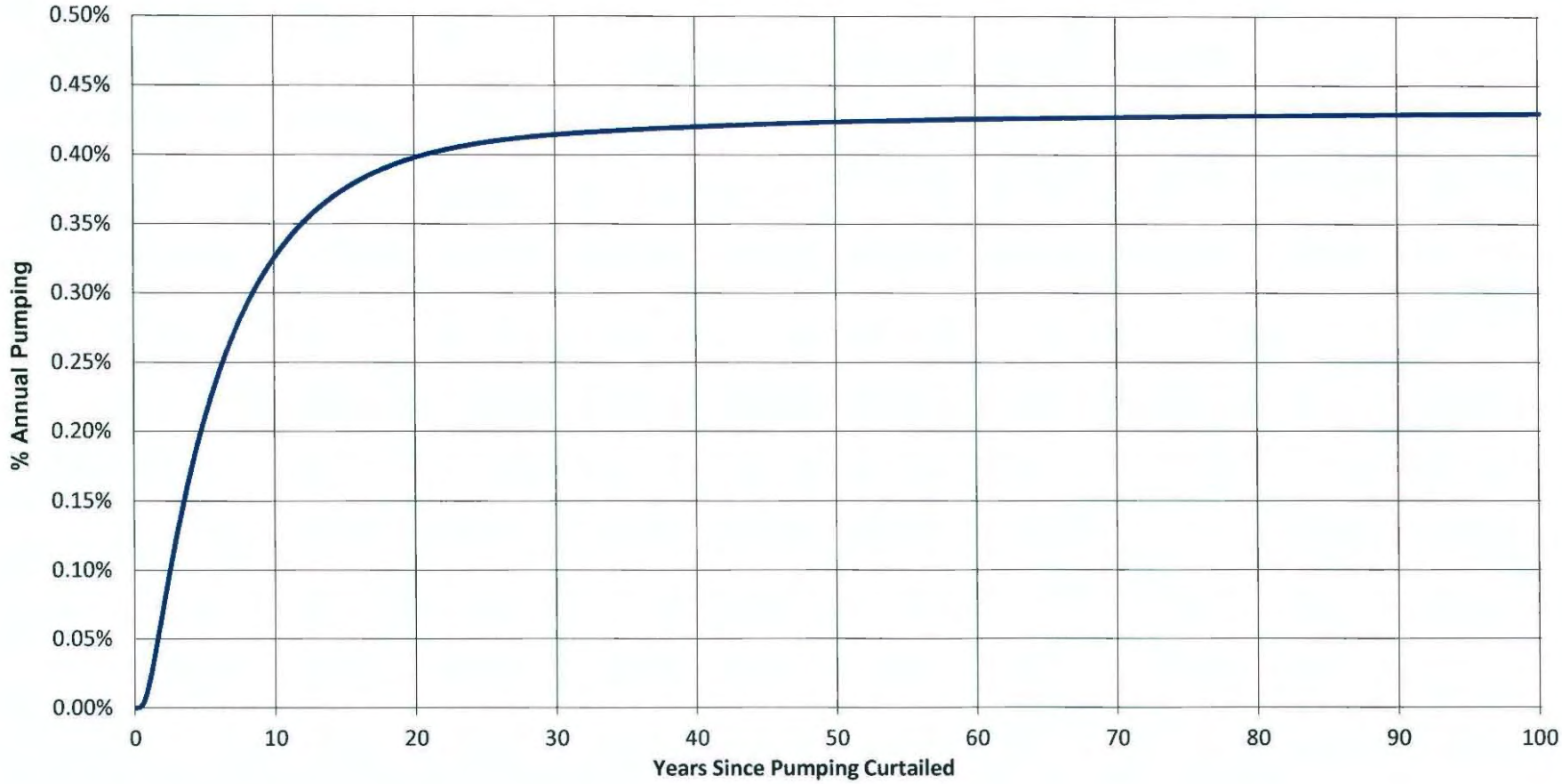

Well WPC (29-7770)
Well 3 (29-7073)
Well 2 (29-2255 D/F)
Well 41 (29-7119)
Well 35 (29-7450)
Well 40 (29-11344)
Well 42 (29-7118)
Well 39 (29-13638)
Pit Road (29-2259)
Water Right [wastewater] (29-7431)
Well 19 (29-13636)
Well 43 (29-7222)
Well 18 (29-2401)
Well 32 (29-7322)
Well 26 (29-4221)
Well 27 (29-2499)
Well 31(29-7322)
Well 34 (29-7782)
Well 17 [aka Highland GC] (29-2382)
Well 23 (29-4225)
Well 22 (29-13639)
Well 21 (29-4224)
Well 29 (29-7106)
Well 10 (29-2274)
Well 16 (29-2401)
Well 30 (29-7322)
Well 12 (29-2338)
Well 7 (29-13637)
Restlawn Cemetery Well (29-2354, 29-7502)
Well 2 (29-13560)
Well 3 (29-13560)
Well 36 (29-8086)
Well 15 (29-2338, 29-7375)
Well 28 (29-11348)
Well 13 [aka Riverside GC] (29-2338, 29-2401)
Well 14 (29-4226)
Well 33 (29-4223)
Well 44 (TR 5452)
1094118
1095119
1094117
1093115
1094116
1094115
1097122
1098123
1097121
1098122
1098121
1099121
1100121
1101121
1102121
1103121
1104121
T5S
T6S
T7S
R33E
R34E
R35E
Figure 7-1
Location Map
City of Pocatello Wells
Biosoilds Program Wells (Water Right No.)
Interconnected City Municipal Wells (Water Right No.)
Interconnected Airport Wells (Water Right No.)
Other Wells (Water Right No.)
Eastern Snake Plain Aquifer Boundary
Lower Portneuf River Valley Aquifer Boundary
Spronk Water Engineers, Inc.
Feet
2,500 0 2,500 5,000
ESPAM 2.1 Model Cells
Active Model Boundary
Active Model Cells containing Pocatello Wells
Copyright © 2011 National Geographic Society, i-cubed

Figure 8-1

Summary of Transient Response of Curren Spring to Pocatello ESPA Wells [1]

Eastern Snake Plain Aquifer Model Version 2.1

Annual Impact on Curren Spring as % Annual Pocatello Well Pumping



Note: (1) Wells within the ESPA Area of Common Ground Water Supply.

Spronk Water Engineers, Inc.

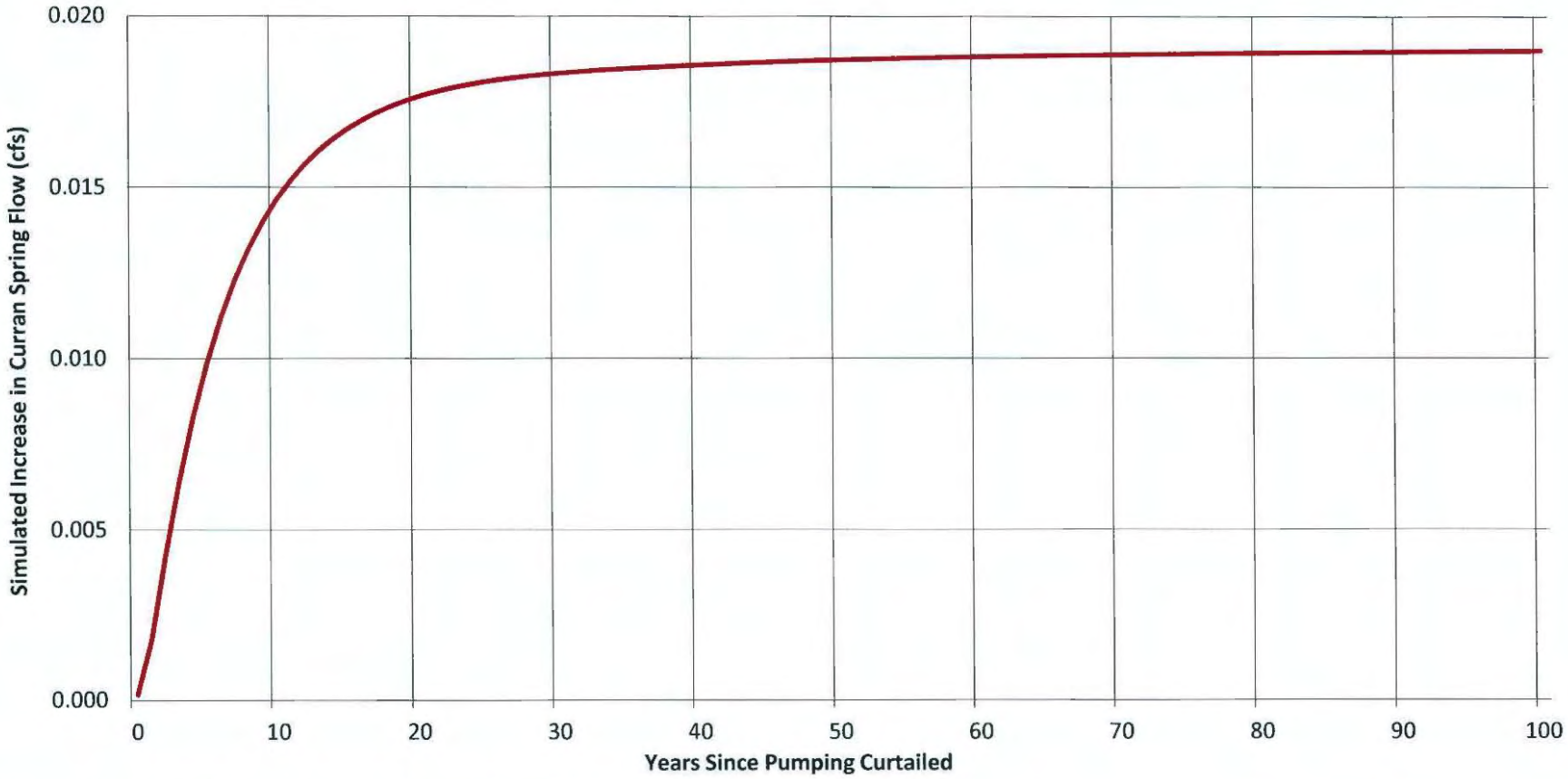
12/21/2012

Figure 8-2

Summary of Transient Response of Curren Spring to Curtailment of Pocatello's ESPA Wells (1) with Priority Dates Junior to July 13, 1962

Eastern Snake Plain Aquifer Model Version 2.1

Increase in Curren Spring Flow (cfs)



Notes: (1) Wells within the ESPA Area of Common Ground Water Supply.
(2) The response from curtailment assumes that the impact of Pocatello's current level of pumping had reached steady state prior to curtailment. In actuality, Pocatello's current level of pumping has not reached steady-state and therefore, the transient response to curtailment would be less than the amounts shown.

Spronk Water Engineers, Inc. 12/21/2012

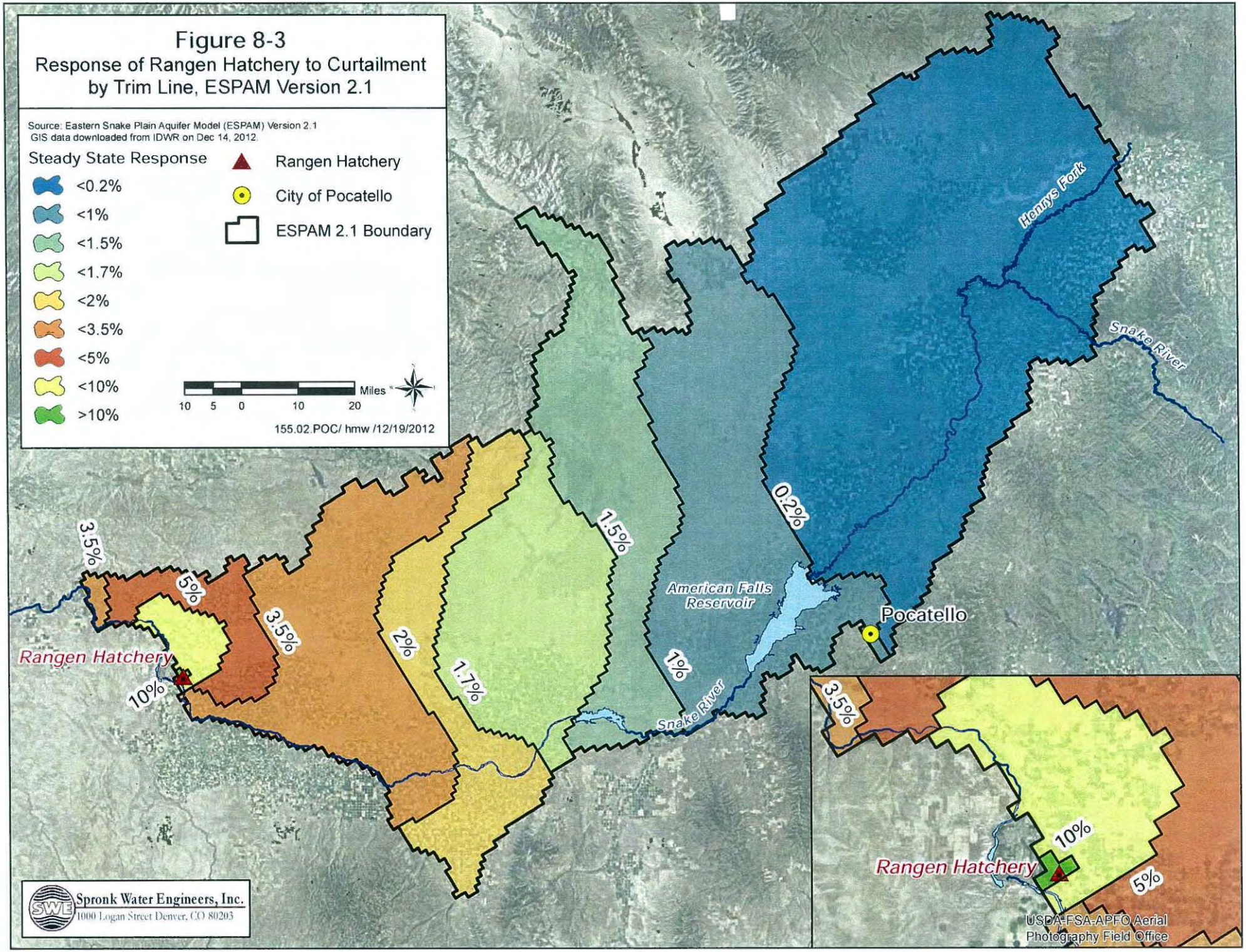
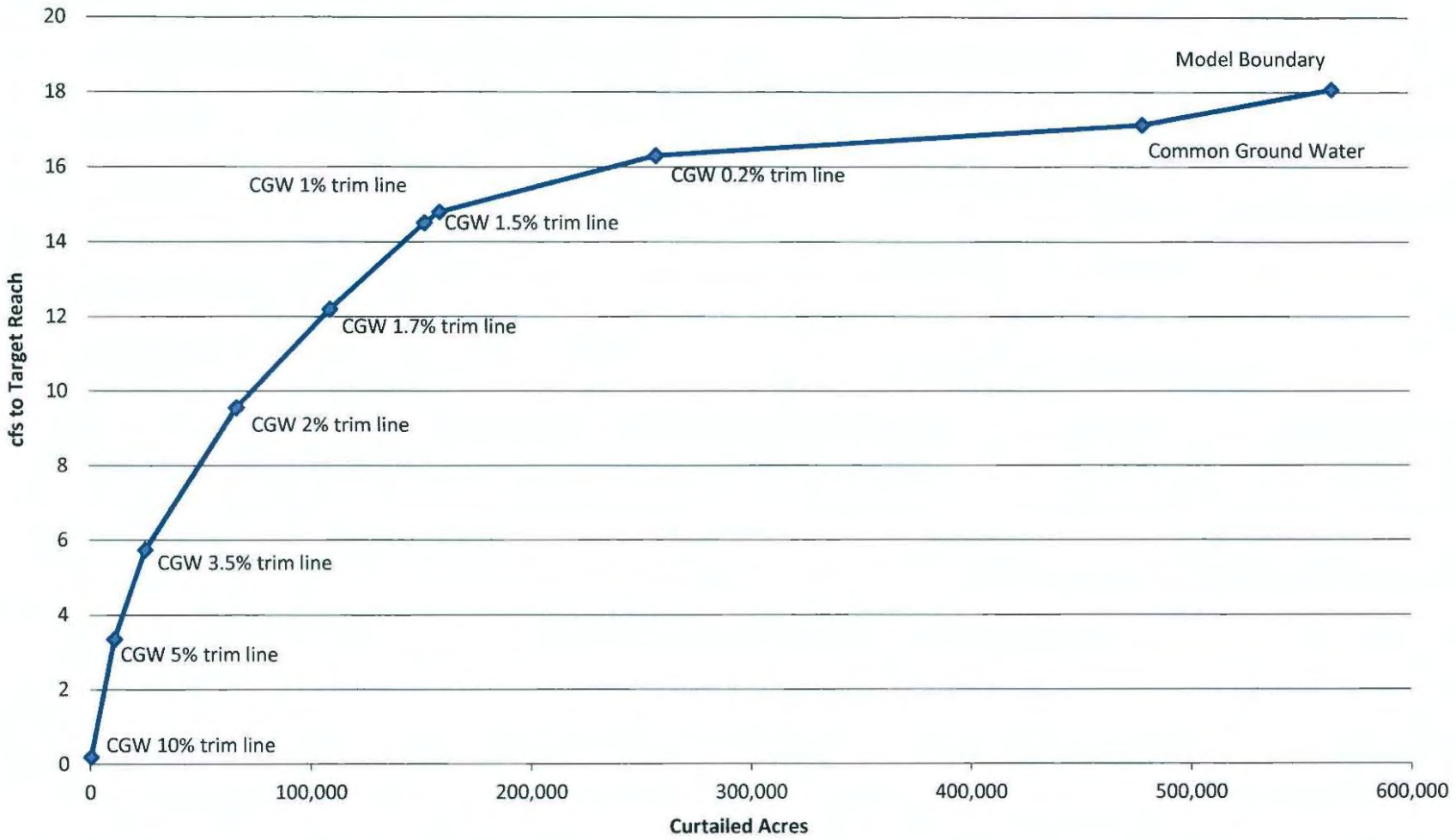


Figure 8-3
Response of Rangen Hatchery to Curtailment by Trim Line, ESPAM Version 2.1
Source: Eastern Snake Plain Aquifer Model (ESPAM) Version 2.1
GIS data downloaded from IDWR on Dec 14, 2012.
Steady State Response
<0.2%
<1%
<1.5%
<1.7%
<2%
<3.5%
<5%
<10%
>10%
Rangen Hatchery
City of Pocatello
ESPAM 2.1 Boundary
10 5 0 10 20
Miles
155.02.POC/ hmw /12/19/2012
Henrys Fork
Snake River
American Falls Reservoir
Pocatello
Rangen Hatchery
0.2%
1.5%
3.5%
5%
3.5%
2%
1.7%
1%
10%
Snake River
3.5%
10%
Rangen Hatchery
5%
USDA-FSA-APFO Aerial Photography Field Office
Spronk Water Engineers, Inc.
1000 Logan Street Denver, CO 80203

Figure 8-4

Response of Curran Spring to Curtailment within Various Trim Lines
Eastern Snake Plain Aquifer Model Version 2.0



Source: IDWR 7/17/2012 Rangen Scoping Calculations.

Tables

Table 2-1

Summary of Water Rights
Martin-Curren Tunnel [1]

Rangen Hatchery Water Rights

Water Right No.	36-00134B	36-00135A	36-15501	36-02551	36-07694
Source:	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel	Martin-Curren Tunnel
Priority Date:	October 9, 1884	April 1, 1908	July 1, 1957	July 13, 1962	April 12, 1977
Beneficial Use:	Irrigation (0.09 cfs) and Domestic (0.07 cfs)	Irrigation (0.05 cfs) and Domestic (0.05 cfs)	Fish Propagation	Domestic (0.10 cfs) and Fish Propagation (48.54)	Fish Propagation
Diversion Rate (cfs):	0.09	0.05	1.46	48.54	26.00
Period of Use:	Jan. 1 - Dec. 31 (Domestic) Feb. 15 - Nov 30 (Irrigation)	Jan. 1 - Dec. 31 (Domestic) Feb. 15 - Nov 30 (Irrigation)	Jan. 1 - Dec. 31	Jan. 1 - Dec. 31	Jan. 1 - Dec. 31

Other Martin-Curren Tunnel Water Rights

Water Right No.	Owner	Diversion Rate (cfs)	Priority Date	Beneficial Use
36-134A	Margaret Candy	0.49	10/09/1884	Domestic and Irrigation
36-134D	Alvin Musser	1.58	10/09/1884	Irrigation and Stockwater
36-134E	Alvin Musser	0.82	10/09/1884	Irrigation and Stockwater
36-102	Alvin Musser	4.10	4/01/1892	Domestic, Irrigation and Stockwater
36-135B	Margaret Candy	0.51	04/01/1908	Irrigation
36-135D	Howard Morris	1.58	04/01/1908	Irrigation and Stockwater
36-135E	Howard Morris	0.82	04/01/1908	Irrigation and Stockwater
36-10141A	Howard Morris	0.82	12/01/1908	Irrigation and Stockwater
36-10141B	Howard Morris	0.43	12/01/1908	Irrigation and Stockwater
	Total	**11.15**		

Note: [1] Source of above water rights is the "Martin-Curren Tunnel" which is also known as "Curren Tunnel".

Table 2-2

Monthly Average Flow
Rangen Hatchery
1966 - November 2012

Values in CFS

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann Avg	Max	Min	Ann Total (af)
1966	52.2	48.2	44.9	38.5	34.2	45.4	51.3	53.2	62.4	69.9	58.4	49.2	50.7	69.9	34.2	36,680
1967	43.9	39.3	33.4	36.6	37.6	47.4	49.0	52.9	58.9	69.4	67.4	64.3	50.0	69.4	33.4	36,248
1968	52.8	45.8	41.2	36.0	36.8	45.0	50.5	58.9	68.2	68.2	65.5	63.1	52.7	68.2	36.0	38,253
1969	50.8	43.4	38.2	33.4	34.3	45.5	49.6	58.5	65.9	66.9	64.7	57.2	50.7	66.9	33.4	36,736
1970	49.8	42.7	42.0	34.7	34.5	42.5	50.3	59.4	66.0	69.3	63.3	60.0	51.2	69.3	34.5	37,121
1971	50.2	41.2	39.1	37.2	40.5	43.4	51.0	60.5	64.8	73.7	70.2	63.4	52.9	73.7	37.2	38,385
1972	55.1	48.1	43.0	40.6	45.9	58.1	61.0	67.3	73.9	76.1	68.2	66.7	58.7	76.1	40.6	42,619
1973	57.9	49.1	46.2	37.6	39.6	42.1	53.1	55.1	57.8	65.8	61.6	55.3	51.8	65.8	37.6	37,510
1974	44.1	46.5	41.1	35.8	34.4	43.4	47.1	55.0	59.2	69.6	62.8	57.9	49.7	69.6	34.4	36,027
1975	43.0	39.9	32.8	33.5	37.3	39.5	43.2	51.9	55.6	57.9	56.2	58.3	45.8	58.3	32.8	33,159
1976	50.0	44.3	41.1	33.1	35.9	38.0	39.5	47.2	56.4	61.6	58.7	53.0	46.6	61.6	33.1	33,815
1977	47.1	39.5	37.7	35.2	32.6	37.0	34.9	33.9	37.9	38.9	42.4	37.6	37.9	47.1	32.6	27,421
1978	33.3	29.4	30.1	28.3	27.6	27.3	27.9	33.6	49.9	42.8	40.3	36.5	33.9	49.9	27.3	24,562
1979	34.4	30.3	29.3	24.5	20.3	25.4	27.1	36.1	47.8	47.7	42.2	38.3	33.6	47.8	20.3	24,347
1980	34.6	31.7	27.5	25.8	22.7	30.9	32.7	34.5	37.8	47.4	41.1	34.9	33.5	47.4	22.7	24,299
1981	31.1	26.7	22.4	23.7	20.0	21.5	27.5	33.3	37.0	39.1	41.0	34.1	29.8	41.0	20.0	21,573
1982	30.6	30.1	29.7	24.7	24.1	23.0	29.0	33.1	42.8	46.7	47.6	41.9	33.6	47.6	23.0	24,345
1983	37.0	33.1	32.3	28.2	30.3	29.0	35.1	43.1	47.5	51.9	48.6	46.7	38.6	51.9	28.2	27,956
1984	41.0	40.1	37.4	33.6	31.5	35.0	37.9	42.1	42.9	47.6	45.8	44.1	39.9	47.6	31.5	28,982
1985	40.2	38.3	36.1	34.5	31.7	31.0	32.9	45.3	48.9	52.0	49.1	42.5	40.2	52.0	31.0	29,116
1986	37.8	36.5	34.8	32.4	34.3	34.2	38.2	49.6	52.6	55.6	51.5	48.9	42.2	55.6	32.4	30,582
1987	43.3	38.2	36.1	30.7	30.1	35.5	37.2	45.2	45.6	52.3	47.4	45.3	40.6	52.3	30.1	29,396
1988	37.6	33.9	30.8	27.6	27.7	30.1	29.9	35.8	39.7	47.5	43.1	37.9	35.1	47.5	27.6	25,510
1989	34.4	31.3	28.7	22.2	23.2	25.0	27.5	35.3	34.9	42.9	38.7	36.7	31.7	42.9	22.2	22,989
1990	34.3	31.7	28.8	20.9	22.3	24.9	26.5	30.4	35.2	41.9	35.6	32.1	30.4	41.9	20.9	21,999
1991	28.6	27.2	27.3	17.8	18.9	19.9	20.8	27.5	34.8	35.6	32.8	32.3	27.0	35.6	17.8	19,521
1992	27.4	22.9	21.8	16.4	15.7	15.5	18.1	18.8	21.3	24.8	20.4	18.9	20.2	27.4	15.5	14,643
1993	16.8	17.0	15.4	16.4	13.9	15.2	15.8	21.0	27.3	36.2	31.2	27.5	21.1	36.2	13.9	15,320
1994	24.3	22.3	19.8	17.1	18.9	16.9	19.4	22.3	27.6	33.4	28.8	25.8	23.1	33.4	16.9	16,696
1995	22.5	20.7	21.5	18.4	15.8	15.9	14.4	16.5	22.0	30.7	34.2	30.3	21.9	34.2	14.4	15,870
1996	27.1	25.0	23.8	22.4	19.3	17.0	16.7	20.5	27.4	32.7	35.8	33.7	25.1	35.8	16.7	18,235
1997	31.8	30.2	30.0	27.5	24.0	25.8	25.5	27.5	32.7	41.3	43.3	39.8	31.6	43.3	24.0	22,898
1998	36.2	33.7	30.9	27.8	26.0	29.9	24.5	24.4	28.6	39.6	41.8	38.4	31.8	41.8	24.4	23,023
1999	36.6	32.6	30.4	25.8	24.4	24.9	20.5	21.2	26.4	35.7	37.4	33.4	29.1	37.4	20.5	21,062
2000	31.6	29.2	28.6	23.0	20.1	19.3	17.7	20.9	26.8	33.9	34.2	29.6	26.2	34.2	17.7	19,047
2001	27.1	24.4	23.3	21.2	16.8	13.4	13.1	14.6	18.0	23.4	24.2	22.1	20.1	27.1	13.1	14,561
2002	20.3	18.6	17.3	15.3	12.7	11.7	10.8	11.0	14.3	20.6	21.1	19.1	16.1	21.1	10.8	11,626
2003	16.4	15.2	13.9	13.0	12.9	12.7	11.7	12.0	14.7	17.9	18.2	16.1	14.6	18.2	11.7	10,537
2004	14.6	13.3	13.0	11.8	11.4	12.2	11.9	11.8	13.1	14.3	13.7	12.8	12.8	14.6	11.4	9,304
2005	12.2	11.4	11.1	11.4	11.5	11.5	10.7	10.7	12.4	15.7	15.2	14.0	12.3	15.7	10.7	8,919
2006	13.2	12.6	12.7	12.8	11.5	12.2	11.7	13.0	17.2	21.1	19.6	17.6	14.6	21.1	11.5	10,571
2007	15.6	14.6	14.4	13.3	13.6	13.8	12.7	12.0	17.0	21.4	20.6	19.1	15.7	21.4	12.0	11,358
2008	16.7	15.2	14.1	13.5	12.6	12.7	11.3	11.7	13.7	17.9	17.3	15.4	14.3	17.9	11.3	10,413
2009	14.1	13.2	12.6	12.0	11.0	11.4	11.8	12.2	14.5	18.0	17.1	16.2	13.7	18.0	11.0	9,893
2010	14.5	13.4	12.4	12.0	11.9	12.7	11.7	12.1	14.1	17.7	18.4	16.5	13.9	18.4	11.7	10,098
2011	15.0	13.9	13.5	13.1	12.7	13.3	12.3	12.4	14.1	19.7	21.6	18.1	15.0	21.6	12.3	10,842
2012	15.3	13.5	13.3	12.4	12.3	12.7	11.9	12.3	14.1	18.8	19.7					

Source: Rangen monthly flow data reported by Rangen (1966-1970) and IDWR reported flow data (March 1995-2011).

Table 4-1

Summary of Spring and Fall Fish Sales to Idaho Power
Rangen Hatchery
Spring 2007 - Spring 2012

Idaho Power Hatchery Production Summaries						Fish Sales Summaries		
Cycle	Date	# Fish	Weight (lbs)	Mean Length (in.)	Mean Fish Per lb	Weight Sold to IPC (lbs)	Approx. No. of Fish (1)	Annual Approx. No. of Fish Sold
Spring 2007	2/28/2007	116,456	36,321	8.72	3.25	27,126	88,099	148,968
Fall 2007	10/19/2007	72,593	34,431	10.40	2.10	28,985	60,869	
Spring 2008	2/27/2008	95,356	44,511	10.03	2.15	38,915	83,505	153,531
Fall 2008	10/11/2008	72,162	25,849	9.93	2.81	24,930	70,026	
Spring 2009	3/18/2009	95,157	41,933	10.11	2.27	38,870	88,149	151,025
Fall 2009	10/21/2009	62,946	28,374	10.04	2.21	28,465	62,876	
Spring 2010	3/10/2010	100,671	42,072	10.26	2.19	37,680	82,595	145,373
Fall 2010	10/20/2010	98,446	45,107	10.47	2.19	28,640	62,779	
Spring 2011	3/9/2011	97,156	44,017	9.65	2.21	36,665	81,063	143,257
Fall 2011	10/19/2011	88,912	40,594	10.34	2.22	27,965	62,194	
Spring 2012	3/7/2012	72,508	32,360	9.95	2.25	ND	ND	
Average		88,397	37,779	9.99	2.35	31,824	74,215	148,431
Spring		96,217	40,202	9.79	2.39	35,851	84,682	
Fall		79,012	34,871	10.24	2.31	27,797	63,749	
Annual		179,971	76,642	19.99	4.72	63,648	148,431	

Sources: Number of fish, weight of fish, mean length of fish, and mean fish per pound contained in the Idaho Power Hatchery Production Summaries nearest to the time of the sale.
Weight of fish sold to Idaho Power Company from monthly Sales Summaries provided by Rangen.

Notes: (1) Weight sold to IPC (lbs) multiplied by mean fish per pound.
ND = No sales data for 2012.

Table 7-1

Summary of Water Rights
City of Pocatello

Water Right	Water Rights			Historical Well No. or Source	AKA/Name	Aquifer
	Priority Date (1)	Diversion Rate (cfs)	Cum Rate (cfs)			
SURFACE WATER RIGHTS						
29-271	2/26/1869	3.22	3.22	Mink Creek		N/A
29-4222	6/16/1898	5.00	8.22	Gibson Jack Creek		N/A
29-272	10/1/1901	0.56	8.78	Mink Creek		N/A
29-273	10/1/1917	1.218	10.00	Mink Creek		N/A
CITY INTERCONNECTED WELLS AND WATER RIGHTS						
29-13558	7/16/1924	1.34	1.34	Alameda 1		LPRVA
29-13559	12/31/1925	0.96	2.30	Alameda 2		LPRVA
29-13560	12/31/1926	9.13	11.43	1(5)		LPRVA
			11.43	2 (2.45 cfs)		LPRVA
			11.43	3 (4.23 cfs)		LPRVA
29-13561	8/31/1931	4.23	15.66	4		LPRVA
29-13562	12/31/1936	2.45	18.11	6		LPRVA
29-13637	12/31/1940	4.46	22.57	7		LPRVA
29-4221	6/1/1943	2.67	25.24	26	PIP	LPRVA
29-2274	6/15/1948	9.69	34.93	8		LPRVA
			34.93	9		LPRVA
			34.93	10		LPRVA
Tr 5452			34.93	44		LPRVA
29-11348	8/31/1951	4.90	39.83	28	20/Turner	LPRVA
29-13639	10/21/1952	3.68	43.51	22	Alameda 3	LPRVA
29-2338	9/1/1953	9.53	53.04	12		LPRVA
			53.04	13	17	LPRVA
			53.04	15		LPRVA
29-4224	9/15/1955	3.89	56.93	21	Alameda 4	LPRVA
29-4226	12/31/1955	0.22	57.15	14	Cree	LPRVA
29-4225	8/15/1956	4.44	61.59	23	Alameda 5	LPRVA
29-2401	10/16/1958	12.22	73.81	13	17	LPRVA
			73.81	16		LPRVA
			73.81	18		LPRVA
29-11339	12/31/1961	3.36	77.17	Alameda 6		LPRVA
			77.17	Alameda 7		LPRVA
29-4223	10/1/1962	0.21	77.38	33	Call	LPRVA
29-2499	12/10/1964	4.10	81.48	27		LPRVA
29-7106	11/6/1972	3.90	85.38	29		LPRVA
29-7322	4/25/1976	17.06	102.44	30 (5.58 cfs)		LPRVA
			102.44	31(8.03 cfs)		LPRVA
			102.44	32 (3.46 cfs)		ESPA
29-7375	2/24/1977	2.23	104.67	15		LPRVA
29-7782	1/18/1985	7.00	111.67	34		LPRVA
29-8086	3/26/1992	4.00	115.67	36		LPRVA

Table 7-1

Summary of Water Rights
City of Pocatello

Water Right	Water Rights			Historical Well No. or Source	AKA/Name	Aquifer
	Priority Date (1)	Diversion Rate (cfs)	Cum Rate (cfs)			
AIRPORT INTERCONNECTED WELLS AND WATER RIGHTS						
29-13638	12/31/1940	2.20		39	Phillips 1	ESPA
29-7450	6/13/1978	3.34		35	Phillips 3	ESPA
BIOSOLIDS PROGRAM WATER RIGHTS						
29-2255D	5/22/1939	0.482		2	A0007741	ESPA
29-11344	12/31/1942	1.92		40	Phillips 2 Fortress A0007550	ESPA
29-2259	6/20/1944	2.60		Pit Road	Swanson A0007773	ESPA
29-2255F	9/16/1949	0.40		2	A0007741	ESPA
29-7073	9/30/1971	1.49		3	A0008708	ESPA
29-7118	4/11/1973	4.01		42	Airport 1 South Smith A0007545	ESPA
29-7119	4/11/1973	6.00		41	Airport 2 North Smith 007547	ESPA
29-7770	5/21/1984	4.46		WPC	City Pivot A0007549	ESPA
OTHER WATER RIGHTS						
29-2354	8/27/1954	0.28		Restlawn Cemetery		LPRVA
29-2382	12/21/1956	3.82		17	Highland GC	LPRVA
29-13636	10/16/1958	0.80		19		ESPA
29-7502	7/6/1979	0.10		Restlawn Cemetery		LPRVA
29-7222	8/22/1974	1.00		43	Ward Park	ESPA
29-7431	12/29/1977	9.28		Wastewater		N/A
STORAGE RIGHTS						
01-2068	7/28/1939	50,000 AF		Palisades Reservoir		

TOTALS FOR GROUND WATER RIGHTS	**Diversion Rate (cfs)**
Total	148.57
Total in ESPA Aquifer	28.70
Total in LPRVA Aquifer	119.87
Total junior to July 13, 1962	58.90
Total junior to July 13, 1962 in ESPA Aquifer	20.30
Total junior to July 13, 1962 in LRPVA Aquifer	38.6

Table 7-2

Annual Pumping
City of Pocatello
2007 - 2011
Values in Acre-Feet

City Wells

		Total Junior to July 13, 1962	
Year	Total	Total	ESPA
2007	15,110	6,086	256
2008	15,060	6,012	757
2009	12,413	4,798	523
2010	13,577	5,240	622
2011	13,063	4,811	369
Avg	13,845	5,389	505

Airport Wells

		Total Junior to July 13, 1962	
Year	Total	Total	ESPA
2007	2,972	2,096	2,096
2008	3,968	2,864	2,864
2009	2,466	1,832	1,832
2010	4,447	3,414	3,414
2011	4,088	3,239	3,239
Avg	3,588	2,689	2,689

Total

		Total Junior to July 13, 1962	
Year	Total	Total	ESPA
2007	18,082	8,182	2,351
2008	19,028	8,876	3,621
2009	14,879	6,631	2,355
2010	18,024	8,654	4,036
2011	17,151	8,049	3,608
Avg	17,433	8,078	3,194

Note: All wells within the ESPAM 2.1 active model boundary (excludes Well 44).

Table 8-1

Summary of Steady-State Response of Curren Spring to Pocatello ESPA Well Pumping

Model Cell ID	% Impact to Rangen
Airport Wells	
SP093115	0.464%
SP094115	0.466%
SP094116	0.458%
SP094117	0.446%
SP094118	0.431%
SP095119	0.412%
City Wells	
SP097121	0.379%
Average	0.437%

Source: http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/model_files/Version_2.1_Current/. Downloaded on November 12, 2012.

APPENDIX A
APPENDIX B
APPENDIX C
APPENDIX D
APPENDIX E
APPENDIX F
APPENDIX G
APPENDIX H

pages of confidential information

removed due to

Protective Order

EXHIBIT M

Rocky Mountain ENVIRONMENTAL ASSOCIATES, INC.

October 3, 2012

RECEIVED
OCT 09 2012
DEPARTMENT OF
WATER RESOURCES

Gary Spackman
Director
Idaho Department of Water Resources
PO Box 83720
Boise ID 83720-0098

Re: Technical Report in behalf of Fremont-Madison Irrigation District, in the Matter of Distribution to Water Right Nos. 36-02251 and 36-07694 (Rangen, Inc.), Case CM-DC-2011-004.

Dear Director Spackman:

Please find enclosed the report "Technical Report on ESPAM2.0 Modeling Issues," prepared by Rocky Mountain Environmental Associates, Inc., in behalf of Fremont-Madison Irrigation District in the above-referenced matter. Please also find a DVD computer disk containing the data and modeling files supporting the technical work reported. Appendix E of the report lists the contents of the DVD. The DVD also includes an electronic (*.pdf) copy of the report in full resolution.

This report is submitted pursuant to the September 11, 2012 "Order Designating Fremont-Madison a Respondent," the "Amended Scheduling Order" of the same date, and the 12 August, 2012 "Fremont-Madison Irrigation District's Expert Witness Disclosure."

Please accept the enclosed materials and enter them into the case record. If there are difficulties with the data DVD please contact us so that we can provide the files in another manner.

Thank you,

Bryce A. Contor

Bryce A. Contor
Senior Hydrologist

cc: Jerry Rigby, counsel for Fremont-Madison Irrigation District

482 Constitution, Idaho Falls, Idaho 83402-3537 • (208) 524-2353 •
FAX (208) 524-1795 • www.rockymountainenvironmental.com

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OCT 09 2012
DEPARTMENT OF
WATER RESOURCES

Rocky Mountain ENVIRONMENTAL ASSOCIATES, INC.

Technical Report on ESPAM2.0 Modeling Issues

Bryce A. Contor, Senior Hydrologist
October 1, 2012

INTRODUCTION

Topics

This report addresses eight technical issues that relate to the use of Eastern Snake Plain Aquifer Model version 2.0 (ESPAM2.0) for water-right administrative decisions. These are general issues with broad applicability, presented in the context of the Rangen delivery call. The issues addressed are:

1. Technical considerations of Deminimus effects and Trim Line;
2. Technical considerations of Futile Call;
3. Reach discretization for model use;
4. Temporal discretization for model use;
5. Temporal uncertainty of model representation of propagation of pumping effects;
6. Spatial uncertainty of model representation of propagation of pumping effects;
7. General sources of model uncertainty, with qualitative and quantitative discussion of uncertainty;
8. Temporal delay in propagation of effects of curtailment.

Definitions

The following terms will be italicized or capitalized when used in this report, with definitions specific to this report as follows:

a	Horizontal distance from a well or recharge site to a hydraulically-connected surface water body.
Administrative Reach	A group of Model Cells which would be grouped

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	together for summarizing ESPAM2.0 model results for administrative purposes.
Calibration	The process of adjusting the mathematical representation of the model, and sometimes its input data. Typically Calibration is performed by comparing model results for key output values with measured or estimated Targets.
Calibration Reach	A group of Model Cells in ESPAM2.0 which are grouped together for calculating flows to or from the Snake River and tributary springs, for model Calibration.
Calibration Period	A period of time for which input data and Targets have been gathered and prepared for model use.
Capture Fraction	The portion of pumping at a well which propagates to a given surface water body or surface water reach. It is expressed as a ratio or a percentage. A Capture Fraction of 0.25 would be equivalent to a Capture Percentage of 25%. If a well pumped 100 acre feet with a Capture Fraction of 0.25 to a specific surface-water body, eventually the supply available from that surface water body would be reduced by 25 acre feet. Capture can also apply to recharge or other positive aquifer impacts, in which case it represents the increase in supply made available at the surface-water body.
Deminimus	A level of relief administratively deemed to be small enough that regulatory action or mitigation requirements are not warranted.
ESHMC	Eastern Snake Hydrologic Modeling Committee
ESPAM1.1	Eastern Snake Plain Aquifer Model Version 1.1
ESPAM2.0	Eastern Snake Plain Aquifer Model Version 2.0
Futile Call	An administrative determination that curtailment of a given junior will not provide enough relief to the calling senior to justify the administrative action.
GIS	Global Information Systems software and procedures for mapping and performing spatial analysis.

IDWR	Idaho Department of Water Resources
IWRRI	Idaho Water Resources Research Institute
Model Cell	The smallest spatial volume in MODFLOW for which calculations are performed and from which results may be extracted. All inflows and outflows for a particular Model Cell are represented as if they occurred exactly at the center of the cell. In ESPAM2.0, Model Cells are one mile by one mile square at land surface and extend to the depth of the aquifer.
Model Water Budget	In general a water budget refers to the accounting of all inflows and outflows of water to a hydrologic system. In this report Model Water Budget or Water Budget refers to all the data describing flows into and out of the aquifer during the Calibration Period, except for flows represented as Targets.
MODFLOW	The USGS groundwater flow modeling software with which SRPAM, ESPAM1.1 and ESPAM2.0 are represented.
Pilot Point	A location in ESPAM1.1 and ESPAM2.0 modeling where an aquifer property is estimated. This technique is used because current computing power does not allow unique estimation at every Model Cell. Pilot Point estimates are interpolated to individual Model Cells.
Predictive Uncertainty	This term is used in this report both to describe the general concept of assessing the expected uncertainty associated with individual model predictions, and in reference to a specific IDWR modeling activity given the name "Predictive Uncertainty Analysis."
Range	An expression of the expected values that a value might take on. In this report it is defined to include virtually all expected values and so statistically corresponds to four standard deviations (two above the mean, two below). It can be expressed in terms of percentages or values; a Range of "500 plus or minus ten percent" is an equivalent Range to "450 to 550."
S	Storage Coefficient. Unitless.

SRPAM	Snake River Plain Aquifer Model. The IDWR/University of Idaho model which preceded ESPAM1.1.
Steady State	A model run that does not consider the timing of propagation of effects. It requires input data of only the magnitude and location of aquifer stress, and produces estimates of the spatial propagation of effects.
Storage Coefficient, Storage	The ratio between the change in volume of water in aquifer storage and the change in aquifer head. In this report, it is applied both to unconfined effects resulting from filling or draining of pore space, and to confined effects resulting from elastic properties of water and the aquifer matrix.
Stress Period	A period of time during which flows in the model input are held at a constant, average level. Stress Period length can be equal to Time Steps, or can be equal to the sum of a whole number of Time Steps.
Targets	Measured or estimated values for various quantities that the model is used to predict. Target values are provided for the period of time for which the Model Water Budget is prepared and are used to test the ability of the model to reproduce known results.
T	Transmissivity. Ft^2 per day
Time to Half	The number of months required for arrival of half of the volume effect that will eventually reach a particular surface water body.
Time Step	The time frequency at which MODFLOW performs calculations and produces output values.
Transient	A model run that includes a timing component. It requires information on the timing of aquifer stress and produces estimates of both the timing and location of the propagation of stress.
Transmissivity	The ability of aquifer materials to convey or transport water, per unit width of flow path.

Trim Line	A geographic representation of Deminimus concepts. Points of diversion within a Trim Line are subject to administration and points without are not. Each different administrative action can conceptually have a unique Trim Line.

DEMINIMUS EFFECTS AND TRIM LINE

The determination and application of a Deminimus effect is a policy question that will not be addressed in this report. The concept of uncertainty may be considered in making this policy determination, and uncertainty will be addressed.

A Deminimus policy could be defined in terms of Capture Fraction, specifying a threshold fraction below which propagating effects are considered Deminimus. This is essentially the definition of a Trim Line which has been applied in administration of water calls using ESPAM1.1. The policy could also specify a threshold total volume or volume per time, below which effects are considered Deminimus. This is the concept that has been applied in use of ESPAM1.1 for water-right transfers.

ESPAM2.0 can be operated to calculate either of these potential Deminimus thresholds. The results will be subject to the inherent limitations of the model.

FUTILE CALL

The Futile Call is closely related to the concept of Deminimus effects, and shares the technical aspects of Capture Fraction and total magnitude of benefit received. It could also have a temporal component; if relief is not expected to arrive within some specified time frame, the action could be considered futile. The timing of relief can be considered in the context of the needs of "crops... in progress, being green" (Fifth District Court for Idaho, case CV-2005-0000600, p. 93).

ESPAM2.0 can be used to estimate timing, Capture Fraction and total magnitude of benefit. For illustration, it has been applied to a hypothetical curtailment of groundwater rights in the Egin Bench area of Fremont Madison Irrigation District, shown in Figure 1. Appendix A provides details of the modeling exercise.

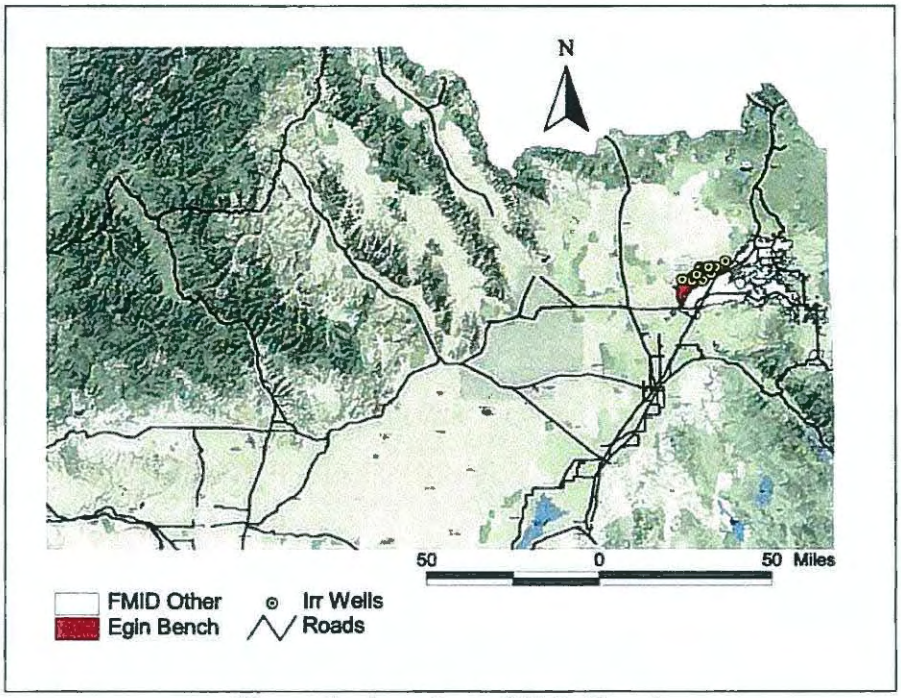

Figure 1. Location of Egin Bench

Many of these wells have priority dates junior to July 13, 1962. Curtailing these junior wells would reduce pumping by an estimated 4,730 acre feet per year. Table 1 shows the benefits that a one-year curtailment would produce for the reach that contains the Rangen diversion, as modeled by ESPAM2.0. It is acknowledged that there are other users in that reach, and there may be discharges that do not sustain any water rights. However, no attempt has been made to apportion these benefits to individual diversions. Because of the coarseness of the curtailed-volume estimates, Table 2 is most reliably interpreted in terms of benefit relative to curtailment.

Table 2
ESPAM2.0 Indication of Benefits to the Rangen Reach
from One-year Curtailment of Egin Bench GW Irrigation
Junior to July 13, 1962

Time Period	Cumulative Benefit to Reach	Benefit Relative to Curtailed Volume
First Year	24 gallons	1.5×10^{-6} %
First Five Years	0.11 acre feet	0.002%
150 Years	1.90 acre feet	0.04%

REACH DISCRETIZATION

General Technical Principles

The modeling software MODFLOW can be configured to produce flux results for any combination of Model Cells that the user desires. In this report, these will be called "Administrative Reaches." The Calibration of the model was constrained by Target measurements and/or estimates of flux to aggregated reaches which in some cases are much larger than individual Model Cells. In this report these will be called "Calibration Reaches." It is technically valid to construct Administrative Reaches that are combinations of whole Calibration Reaches. In Figure 2, Administrative Reach A1 would be a valid combination of Calibration Reaches C1 and C2. It is not technically valid to construct Administrative Reaches that are subsets of Calibration Reaches, or that combine subsets of reaches. Reaches A2 through A4 in Figure 2 are all technically invalid.

The reason that subdividing a Calibration Reach is not technically warranted is that the Calibration process can be successful no matter where in a reach the model indicates flows occur, without any constraint to produce the correct within-reach spatial distribution. For instance, in Figure 2 it may be that Calibration Reach C4 is a uniform gaining reach. However, the model Calibration could have been successful if it had represented all the gains as accruing in the portion of the reach that lies within Administrative Reach A2. Even though the model was well-Calibrated and produced correct results for Reach C4 as a whole, using the model with the illustrated Administrative Reaches would result in overestimation of C4's effects on Reach A2 and underestimation of its effects on Reach A3.

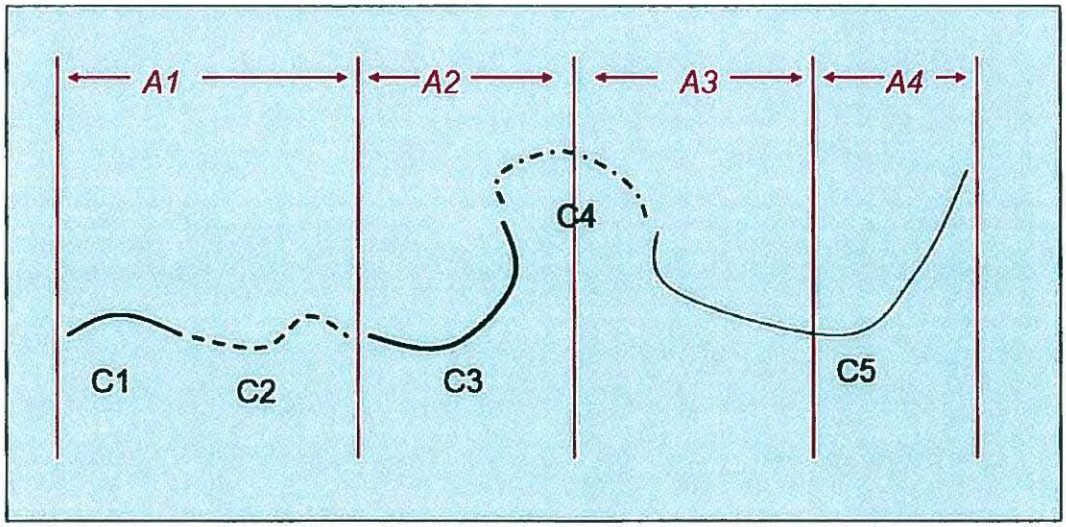

Figure 2. Illustration of hypothetical partition of Calibration Reaches.

Integration with Surface Water Administration

Surface-water priority and delivery above Milner are defined by the reaches in the Water District 01 accounting program. Defining model Administrative Reaches with reference to Water District 01 accounting reaches creates the technical ability for administrative actions to be assessed with reference to their effect on surface-water delivery.

Recommendation

It is recommended that Administrative Reaches be comprised of combinations of entire Calibration Reaches. As described below, uncertainty will be greatly reduced if Administrative Reaches are no smaller than the distance between nearby Transmissivity Pilot Points. Above Milner, Administrative Reaches should correspond to Water District 01 accounting reaches to the extent possible, given the configuration of Calibration Reaches.

TEMPORAL DISCRETIZATION

Concepts

There are two important concepts for time discretization of MODFLOW aquifer models. The first is the Stress Period, which is the period of time during which all inputs to the model are held at a constant rate. The second is the Time Step, which is the frequency of modeling calculations and model output. It is generally desirable to have Stress Periods short enough to capture any important temporal character of the input data for question being asked. For instance, if a question relates to pumping that occurs at a steady rate for a number of months, that typical pumping period could be an appropriate Stress Period. Time steps can be made shorter than Stress Periods to allow more temporally refined output. Technical considerations include the following:

1. Greatest confidence is obtained when Stress Periods for model use are about the same length or longer than for Calibration. ESPAM1.1 was Calibrated with six-month Stress Periods. It has been deployed by IDWR using six-month and four-month Stress Periods, and by University of Idaho using one-month periods. ESPAM2.0 was Calibrated using calendar-month Stress Periods varying in length from 28 to 31 days.
2. The native temporal resolution of the underlying data should also inform Stress Period length. Most data for both ESPAM1.1 and ESPAM2.0 had a native temporal resolution of one month. However, in both cases, tributary underflow was estimated on a long-term average basis and artificially partitioned to Calibration-period Stress Period lengths.

3. The ability of the model to reproduce temporal signals in the Calibration data set is affected by Time Step length. If the Stress Periods are defined so that they correspond approximately to the seasonal variation in aquifer inflows and outflows, the use of time steps shorter than Stress Periods can allow a model to predict flows at a finer temporal resolution than the model Stress Period. ESPAM2.0 was Calibrated using two time steps per Stress Period, giving output every 14 to 15.5 days.
4. While Time Step length can be selected to produce useful results, the confidence in short-term differences in output should be constrained by the ability of the model to match short-term changes in Target data during model Calibration. Both ESPAM1.1 and ESPAM2.0 were able to do a reasonable job of representing short-term changes in some springs and river reaches, but not in others.
5. Uncertainty in temporal representations of model output should temper the reliance on short-term model results. Temporal uncertainty is discussed later in this report.

Recommendation

It is recommended that ESPAM2.0 generally be configured with one-month Stress Periods, either actual calendar days per month or (365.25/12) days per month. If appropriate to the time frame of the question at hand, it is acceptable to have Stress Periods longer than one month. The selection of Time Steps may be left to the user, with the understanding that the fine output discretization resulting from short Time Steps does not imply precision of knowledge of the timing of output.

In any case, from a technical standpoint it is vital for administrative decision that hinges on the timing of arrival of effects to be strongly informed by both the short-term temporal performance of the model in Calibration and the temporal aspects of uncertainty that are discussed below. As a general rule of thumb it is recommended that great caution be exercised whenever the administrative outcome is sensitive to timing differences shorter than approximately four months.

TEMPORAL UNCERTAINTY

The propagation of temporal signals to a stream segment can be expressed by the ratio $(a^2 S/T)$[1], where a is geometric distance, S is aquifer storage, and T is aquifer Transmissivity. The output of the equation is in the time units of the Transmissivity value, and is the amount of time for half of the rate of pumping or recharge to be

[1] C.T. Jenkins, 1968. *Computation of Rate and Volume of Stream Depletion By Wells,* Techniques of Water Resources Investigation of the United States Geological Survey, Book 4 Chapter D1

expressed at the Target river reach.[2] The uncertainty of *a*, *S* and *T* can be estimated from the Ranges of each, and various statistical equations employed to approximate the uncertainty of the product $(a^2 S/T)$.

In this report, the Range has been defined to include virtually all expected values, equivalent to four standard deviations. Table 2 provides values generally compatible with typical Snake Plain values, for an illustrative calculation. The Range for parameter *a* is estimated based on the fact that in MODFLOW, all wells are represented at the center of the Model Cell. Since the distance from the center of the cell to the diagonal corner is 3,733 feet, it is expected that all wells will be represented within that distance of their actual locations. Estimation of the Range for *T* is described below in the uncertainty section of this report. Uncertainty for *S* is assumed to be similar to *T*.

Table 2
Estimated Uncertainty of Input Data
for Temporal Calculations

Component	Value	+/- Range (value)	+/- Range (%)
a (distance)	528,000 ft (100 miles)	3,733 feet	0.71%
S (storage)	0.05 (unitless)	0.0075	15%
T (Transmissivity)	250,000 ft^2/day	37,500 ft^2/day	15%

Using these input data and the assumptions and procedures described in Appendix B, the estimated value of $(a^2 S/T)$ is 153 years +/- 23 years, or +/- 15%. Repeating the exercise with a distance of 52,800 feet (ten miles) produces somewhat larger uncertainty on a percentage basis.

SPATIAL UNCERTAINTY

The spatial distribution of pumping effects is best represented by Steady State model results. These are controlled by geometric distance and aquifer Transmissivity, but not by aquifer Storage Coefficient. There are two major components of spatial uncertainty. The first is the uncertainty arising from the ability to measure and estimate distances and Transmissivity. The second arises from the fact that the aquifer is more heterogeneous than can be represented in the modeling software.

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[2] This is different from the Time to Half defined in this report; Time to Half is the time for half the *volume effect* to arrive from a one-time event, while $(a^2 S/T)$ is time for half the *rate effect* to arrive from a continuous process.

Estimation of Distance and Transmissivity Effects

Using ESPAM1.1, IWRRI estimated the Water Budget uncertainty of ESPAM1.1 at approximately +/- 17% (Snake River Plain Aquifer Model Scenario Update: Hydrologic Effects of Continued 1980-2002 Water Supply and Use Conditions Using Snake Plain Aquifer Model Version 1.1 "Base Case Scenario" http://www.if.uidaho.edu/~johnson/ifiwrri/projects.htm#model). Given that the ESPAM2.0 Water Budget was based on similar conceptual models and underlying data, it is reasonably expected that its uncertainty is also in this range.

To propagate the water-budget uncertainty into an indication of the uncertainty of Transmissivity, Darcy's law is applied. It relates the quantity of groundwater flow (in our case, the Water Budget) and the aquifer Transmissivity as follows:

$$Q = T w \, dh/dl$$

where	$Q =$	rate of flow through the aquifer
	$T =$	aquifer Transmissivity
	$w =$	width of flow tube considered
	$dh/dl =$	gradient along the length of flow

This can be rearranged to express T as a function of the Water Budget (represented by Q):

$$T = Q * (1/w \, dh/dl)$$

The variance of a product[3] can be calculated from the variances of the factors and the covariance between them. Relative to the Water Budget (Q), the width and gradient are very well known. If we assume they are perfectly known and their measurement methods are independent of the measurements of the Water Budget, then the variance of Transmissivity is driven entirely by the variance of the Water Budget. Hence, its uncertainty will also be on the order of 17%.

Effect of Heterogeneity

The second component of spatial uncertainty is based on the fact that the aquifer is actually a highly heterogenous combination of fractured basalts, dense basalts, and sediments of varying permeability and Transmissivity. Even if data were available to allow each of the 11,000 active Model Cells to be represented by a uniquely-estimated Transmissivity value, each would be a gross simplification of the heterogeneity with the

[3] A.J. Clemens and C.J. Burt, 1997. *Accuracy of Irrigation Efficiency Estimates,* Journal of Irrigation and Drainage Engineering.

Model Cell. However, the model representation of Transmissivity is actually based on unique estimates at fewer than 300 locations known as Pilot Points, with the value at each Model Cell based on interpolation between Pilot Points. Hence, it is not only impossible for the model to capture heterogeneity that exists within a single Model Cell, it is impossible to fully capture heterogeneity at a scale smaller than the distance between Pilot Points.

Appendix C contains a description of Monte-Carlo steady-state modeling representing a small hypothetical aquifer. The Monte-Carlo variable was spatial distribution of Transmissivity values within aquifer zones, honoring the +/- 15% uncertainty in Transmissivity estimated above. The specific results apply to that simulation, but the general principle demonstrated is that the finer the Reach discretization, the more variability in results. When the Reach length was 1/5 the equivalent distance between Pilot Points, the largest predicted result exceeded the smallest by two to seven times (i.e. was 200% to 700% of the smaller value). When Reach length was approximately equal to the inter-Pilot-Point distance, the larger values were approximately 110% to 250% of the smaller. This underestimates the potential effect of heterogeneity, because only a single geometric representation was used and because temporal and Storage Coefficient effects were ignored.

GENERAL DISCUSSION OF UNCERTAINTY

Effect of Uncertainty

The modeled magnitude of relief addresses the policy question of how much benefit will derive from a contemplated action, and the modeled timing of relief addresses the question of whether it occurs soon enough to be meaningful. From a technical standpoint, the general concept of uncertainty is an attempt to address the policy question, "How confident are we that the administrative action *will* provide the relief indicated?"

Potential Sources of Uncertainty

Context of Sources of Uncertainty

A groundwater flow model is a simplification of a complex physical system which cannot be described fully, due to limitations in knowledge of subterranean structures, lack of data, and limitations in computing power. The blue background in Figure 3 represents the infinite number of simplifications that could be made. Selection of an overall conceptual model puts some bounds on the possibilities, illustrated by the yellow irregular shape. Three existing eastern Snake Plain models (SRPAM, ESPAM1.1 and ESPAM2.0) are simplifications that share the conceptual model of single-layer

representation with time-constant Transmissivity, without faults or other discontinuities. The heavy black line represents models that honor the Water Budget data, and the dotted line represents a subset which includes only models that are deemed to be Calibrated. Calibrated means that given the input data representing the Water Budget during a Calibration Period, the model does an acceptable job of reproducing observed measurements called Target values, from the same period. The three different X marks in the figure represent three different models that meet all criteria; they are consistent with the chosen conceptual model, they honor the Water Budget, and they are Calibrated in that they reasonably reproduce the Target data. Conceptually, the X marks could represent the three existing models mentioned.

Some sources of uncertainty relate to the various regions within Figure 3. For instance, conceptual model uncertainty refers to the fact that different conceptual assumptions could reasonably have been made for the eastern Snake plain, which would have changed the shape of the mapped "conceptual model" area in Figure 3. This would have changed the nature of model output for at least some specific questions. Other sources of uncertainty refer to different possibilities within the various regions. All three points marked "X" are within the same conceptual model and Water Budget, and all three are Calibrated. Differences between them can represent the concepts of internal Calibration uncertainty, mathematical uncertainty, parameter uncertainty and Predictive Uncertainty listed below.

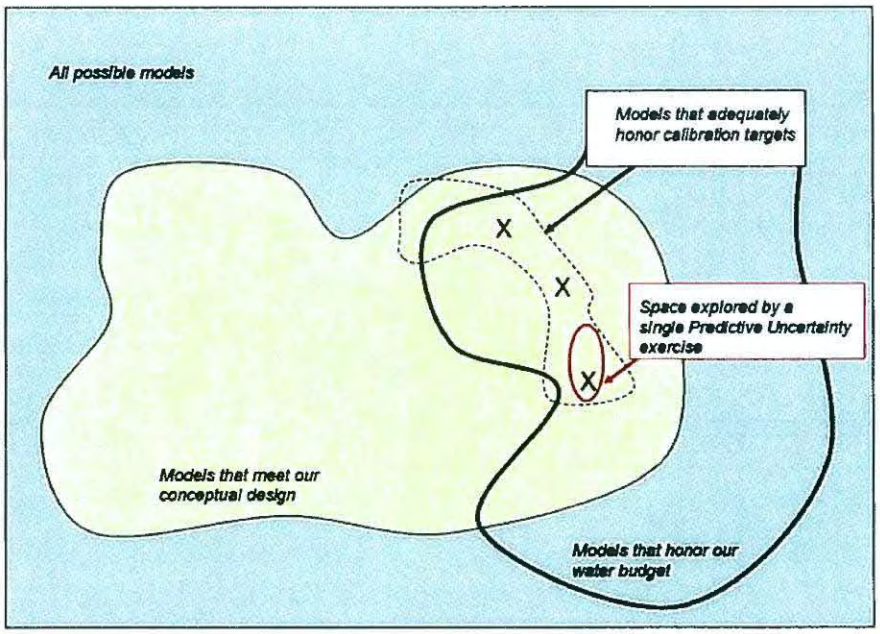

Figure 3. Cartoon of the range of possible models that could be considered.

Listing of Potential Sources of Uncertainty

Dr. Charles E. Brockway et al[4] offer a good listing of the potential sources of model uncertainty. These include:

- Conceptual Uncertainty
- Mathematical Uncertainty
- Parameter Uncertainty
- Internal Calibration Uncertainty
- Calibration Target Uncertainty
- Predictive Uncertainty

This report treats these sources qualitatively, with quantitative estimates made for some components of uncertainty.

Conceptual Uncertainty

Model Layers. Figure 4 shows a hypothetical aquifer that is somewhat analogous to the eastern Snake Plain aquifer. Geologic and well data provide strong indications of locations where there are indeed impermeable layers that separate the aquifer into distinct vertical zones, as shown in Panel A. There are two schools of thought in the proper modeling of such systems. One school of thought is represented by Panel B, that since we are reasonably certain the feature exists, it should be represented. This approach is exemplified by the Spokane Valley Rathdrum Prairie Aquifer model,[5] which represented a multiple layer system in an area where very few data were available to characterize the lower layer. The authors acknowledged the lack of data and provided cautions describing the resulting limitations.

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[4] C.E. Brockway, Jim Brannon, John Koreny, Willem Schreuder, Dave Colvin, Dave Blew and Jon Bowling. February, 2012. Uncertainty Analysis and Utilization of ESPAM2 for Water Rights Administration. http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/meetings/2012_ESHMC/02_27_2012/Uncertainty Analysis and Utilization of ESPAM2 for Water.pptx

[5] Paul A. Hsieh, Michael E. Barber, Bryce A. Contor, Md. Akram Hossain, Gary S. Johnson, Joseph L. Jones, and Allan H. Wylie. 2007. Ground-water Flow Model for the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho. Scientific Investigations Report 2007-5044, US Geological Survey.

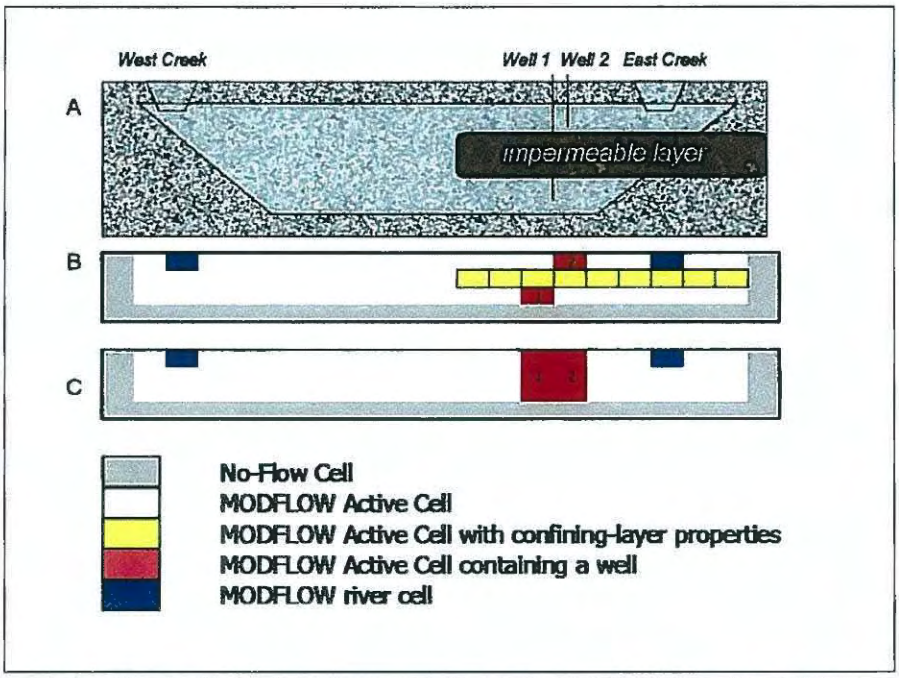

Figure 4. Illustration of differences in conceptualization of model layers.

The other school of thought is represented in the three Snake Plain models, that it is technically irresponsible to represent more detail than can be supported in Calibration by available data. This is illustrated by Panel C. Clearly, the existence of such different conceptual alternatives produces large uncertainty in representation of the effects that pumping Well 1 would have upon East Creek.

Faults. Figure 5 shows a hypothetical aquifer in fairly Transmissive materials, with a fault that is expected to be an impediment to groundwater flow. This is somewhat analogous to the Rexburg Bench area of the eastern Snake plain, which is included in ESPAM1.1 and ESPAM2.0. Figure 6B shows a conceptual representation from the school of thought that the knowledge of the fault's existence and expectations of its effect justifies including it in the model; it is the assertion that representing the fault incorrectly is "less wrong" than omitting it entirely. Figure 6C illustrates the school of thought taken in ESPAM1.1 and ESPAM2.0, that the fault should be omitted since there are limited head data to constrain Calibration of its properties. Both approaches are justifiable, but produce markedly different model representations of propagation of effects from the well to South Creek. This illustrates another large potential uncertainty associated with choice of conceptual model.

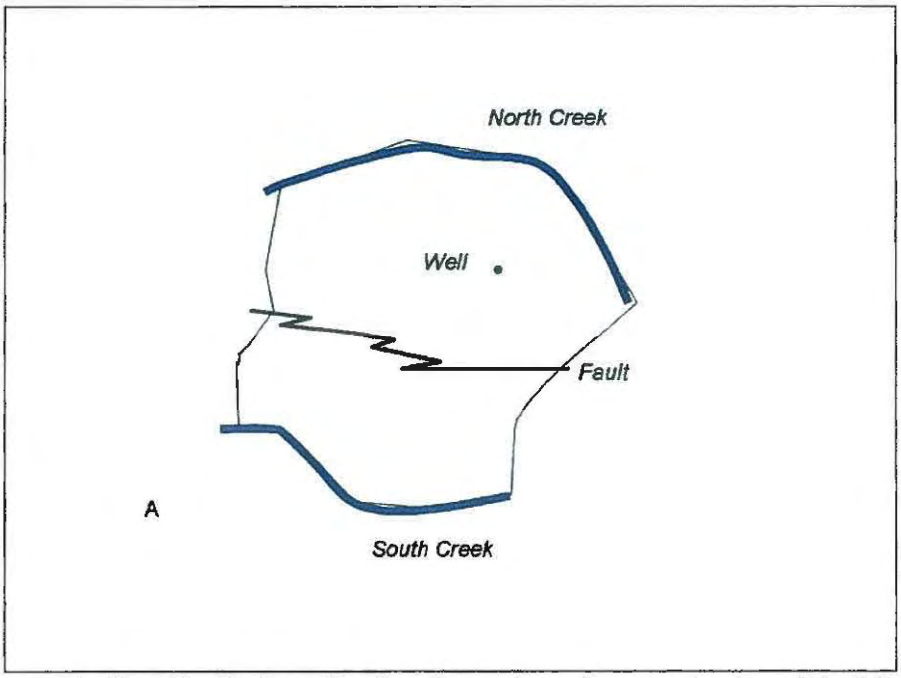

Figure 5. Hypothetical aquifer for discussion of conceptual model of fault representation.

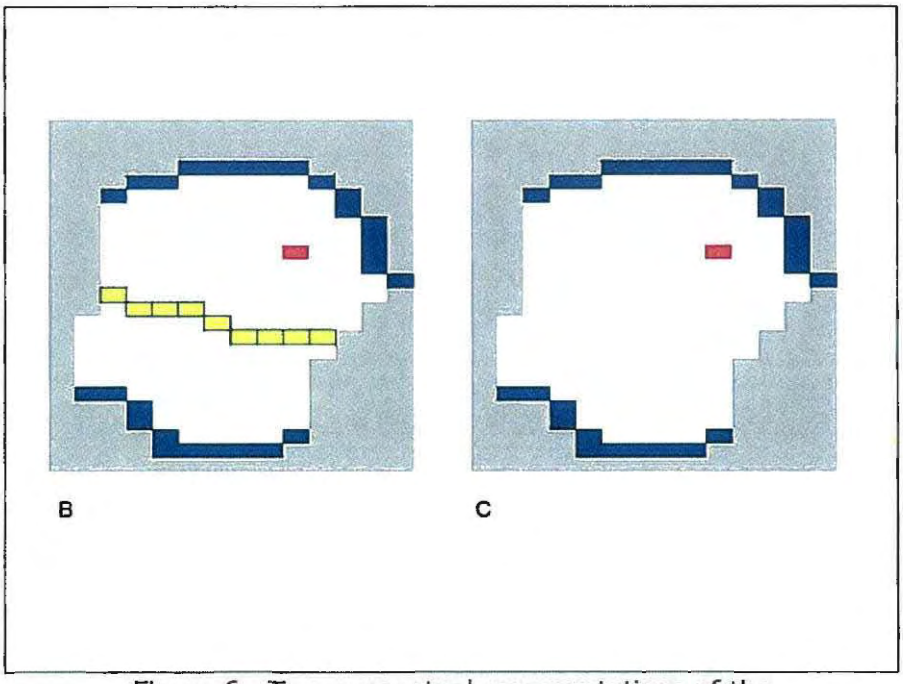

Figure 6. Two conceptual representations of the faulted aquifer shown in Figure 5.

Effect of Conceptual Uncertainty. This report does not quantify the uncertainty implied by these two conceptual model decisions, nor others such as the decision to use a time-constant Transmissivity. Nevertheless, it is important to understand that this is a legitimate part of overall uncertainty, because other conceptual decisions may be as reasonable as the ones taken in ESPAM2.0. The two illustrations provided suggest that this component of uncertainty can be large.

Mathematical Uncertainty

This report does not address mathematical uncertainty.

Parameter Uncertainty

The discussion above of the effect of uncertainty in Transmissivity is a discussion of parameter uncertainty. Later in this report is a discussion of the effect of heterogeneity at a scale finer than the inter-Pilot-Point distance, which is also a parameter uncertainty topic. Uncertainty in the Water Budget, estimated above at approximately 17%, is another example of parameter uncertainty.

Internal Calibration Uncertainty

This is related to the fact that within a given conceptual model, Water Budget and Target data set, there are multiple ways to Calibrate the model. Many of these may give reasonable results relative to the Calibration Targets, but may give different results for a given estimate or prediction made by the model. Further, the questions asked of the model are often different than the ones implicit in the Water Budget data used in Calibration.

A crude example might be a situation where it is known that two integers must add up to 15, but there are few other data to further inform the selection. Many pairs of integers can be identified that satisfy the Target value of 15, but they will give markedly different results for other questions, such as the difference between the two integers. This type of uncertainty is a component of the Predictive Uncertainty discussed below.

The example is not entirely far-fetched. The Calibration Water Budget data represent spatially-distributed recharge to the entire plain, and Targets represent total discharges or changes in discharge at various springs and river reaches. There are no Target data that explicitly relate a change in pumping at a specific well to a change in discharge at a specific spring or river reach. Yet this is the very question that must be asked of the model for evaluating a conjunctive administration water call.

Calibration Target Uncertainty

The model is Calibrated to match the Target data as closely as possible. However, no Target values are known with absolute precision. Some estimates of Target uncertainty are:

- Changes in aquifer head can be measured to approximately 0.01 foot, for changes that range from a few feet to a few tens of feet;
- Calculation of Target river gains and losses relies heavily on measurements of river flow and diversions. These are generally measured to a precision of 5% to 10%. Measured river flows are usually large relative to the gains/losses estimated with this technique, and hence the imprecision can exceed the magnitude of the calculated gains or losses. Gain/loss calculations also rely on estimates of surface return flows from irrigation, which are generally less precisely known than river flows or diversions.
- Some Target spring discharges are measured with standard measuring devices, likely having precision within a Range of plus or minus 3%. Others are measured with non-standard devices or rated sections, with accuracy perhaps of a Range of plus or minus 10% to 20%. Still other spring Targets are based on one-time measurements or estimates, with uncertainty likely greater than 20% to 30%.

Though the relationship is not quantified in this report, conceptually it is clear that the precision of the Target data also limits the ultimate certainty of model results. A model that exactly reproduces incorrect data is not as useful as Calibration statistics would suggest.

Predictive Uncertainty

Predictive Uncertainty is a concept related to parameter uncertainty and internal Calibration uncertainty discussed above. In this report, it is considered by comparing the SRPAM, ESPAM1.1 and ESPAM2.0 models. Predictive Uncertainty is also considered by reporting on IDWR work based upon recalibrating ESPAM2.0 while honoring Calibration constraints, specifically called a "Predictive Uncertainty Analysis" by IDWR and the ESHMC. Both considerations only explore part of the possible range, because in both cases the models compared share many similarities.

Existing Model Comparison. In Figure 3, the dotted line represents models that could be considered to be Calibrated. The X marks represent a sample of three, out of an infinite number of Calibrated models that could be discovered within that space. The three Snake Plain models (SRPAM, ESPAM1.1 and ESPAM1.2) provide one look into the potential magnitude of this type of uncertainty and could be considered to represent three X marks within the domain of Calibrated models.

Figure 7 shows three geographical locations selected to coincide approximately with the centroids of both an SRPAM Model Cell and an ESPAM Model Cell (SRPAM cells are approximately 3 miles square and ESPAM cells are one mile square). Figure 8 shows the estimates made by these three models, in magnitude and timing of effect to the combined Milner to King Hill reach, for the three different locations. The heavy black lines on the Time to Half bars indicate that SRPAM and ESPAM1.1 were set up to produce output every four months, so the represented Time to Half is only known to the level of a four-month trimester. The midpoint of the period is selected for charting in the red bar. The modeling files for this exercise are described in Appendix E and accompany this report.

It is acknowledged that ESPAM1.1 was designed to be an improvement over SRPAM, and ESPAM2.0 similarly is expected to be an improvement over ESPAM1.1. Nevertheless, all three are carefully Calibrated models based on a common conceptual model, and were each in their time the best available science.

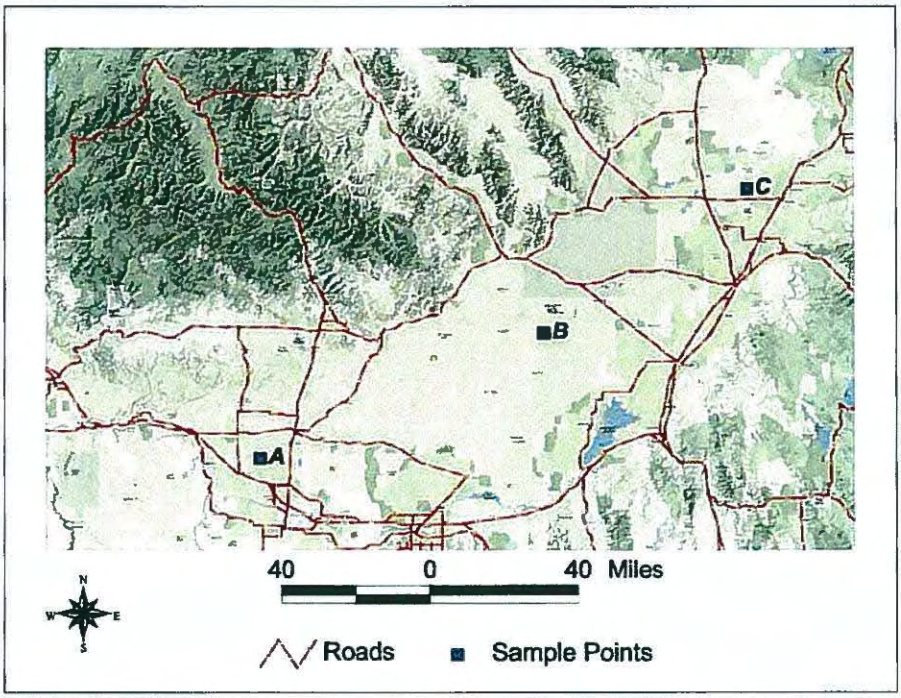

Figure 7. Sample points used to compare SRPAM, ESPAM1.1 and ESPAM2.0.

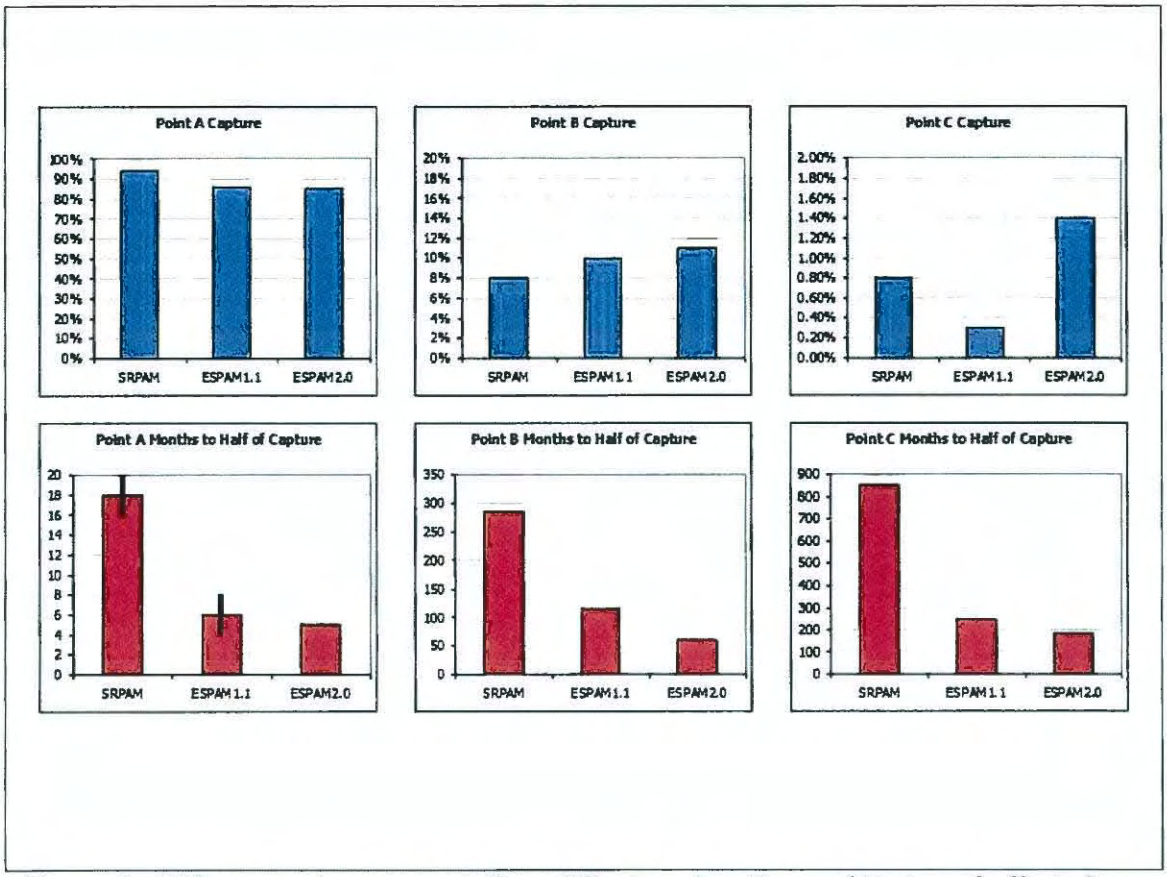

Figure 8. Differences in representation of Capture Fraction and timing of effect, from applying three Calibrated models to the points shown in Figure 7.

At Point A, Capture differences between the three models are within about 10% to 15%. At Point B the largest Capture is approximately 30% greater than the smallest, and at Point C the largest exceeds the smallest by a multiple of about five. Differences in timing are large (on a percentage basis) at all three points.

IDWR Predictive Uncertainty analysis. Another approach to test the range of Predictive Uncertainty is to set the model Calibration procedure to produce a pair of models that are both Calibrated, one maximizing and one minimizing some particular prediction. Conceptually, each such test could be considered an exploration of the red zone within Figure 3. With 11,000 Model Cells and over 60 reaches at which predictions could be assessed, there are a very large number of possible tests that could be run. With input from the ESHMC, IDWR has selected and run 17 Predictive Uncertainty analyses to explore the kinds of differences that might be observed.[6] This is not a statistical sample, but was focused on particular questions of interest. Figure 9 shows the range

[6] E-mail from Dr. Allan Wylie, included as Appendix D.

of results that were obtained, with the reported percentage defined as [(Maximum Effect/Minimum Effect) x 100].

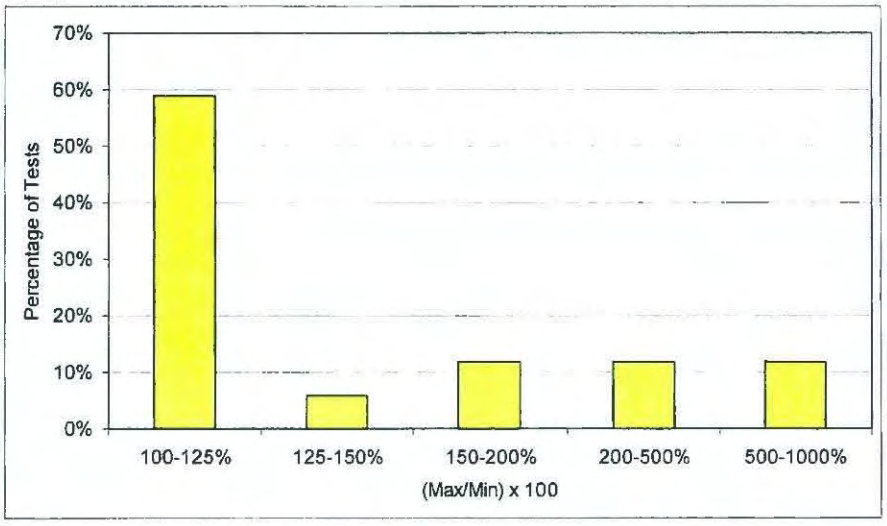

Figure 9. Results of IDWR Predictive Uncertainty tests.

Each test was comprised of a pair of Calibration runs, one configured to maximize and one to minimize the Steady State Capture to a particular reach from a particular location, while maintaining a Calibrated model. Calibration was maintained by requiring that overall match to Targets be within specific criteria, discussed with the ESHMC. The figure indicates that most of the time, the greatest ratio that could be forced while maintaining a pair of Calibrated models was approximately 125% (i.e. the largest estimate is 1.25 times the lowest). However, for more than 10% of the tests, the larger estimate was more than 500% of the lower. Almost a quarter of tests showed ratios of 200% or more. The variability of these results shows that the degree of uncertainty is highly sensitive to the particular question asked.

Each of the IDWR tests explores the potential uncertainty of a single estimate, within the ESPAM2.0 framework of a single conceptual model and a single set of Water Budget and Target data. Expanding the exercise to consider other conceptual models or alternate Water Budget representations would certainly have increased the range of results obtained.

Discretization

Spatial and temporal uncertainties are strongly influenced by the discretization of results required. If the question is "how much of curtailment at point X will benefit the river or springs someday, somewhere?" the answer can be determined with nearly 100% precision and confidence. If the question is "how much benefit will arrive to this particular river reach," uncertainty is introduced. If the question is, "How much will

arrive in this reach on the 17th of August, 2018," uncertainty is compounded.

Assessing Overall Uncertainty

The concepts and measures described above are not competing methodologies for addressing the same question. They are descriptions of different parts of the question. The fact that Water Budget analysis indicates 17% uncertainty does not contradict the IDWR finding of much greater uncertainty in some of the Predictive Uncertainty tests; they are approximations of different parts of the larger uncertainty picture.

Because of some overlap or interdependence between various uncertainty estimates, and because extreme differences are generally less likely than small differences, total uncertainty is not simply the sum of estimates of various components. It is, however, certainly greater than indicated by any single estimate of uncertainty.

TEMPORAL DELAY OF EFFECTS

The ESPAM2.0 model run presented in Appendix A indicates that it would take approximately 197 months, or about 16 years, for half of the volume of relief from Egin curtailment to accumulate at the Rangen reach. Table 2 above reports the one-year and five-year arrival of relief. Uncertainty in temporal representations is described earlier in the report.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Trim Line

The technical content of Diminimus considerations is in the determination of whether curtailment of a given point of diversion meets a predetermined threshold. The Trim Line is one approach to establish a Deminimus cutoff. It is a spatial approach which classifies individual model cells as being either Deminimus or non-Deminimus, based on the expected quantity of relief from curtailment within the cell. The quantity threshold could be defined in terms of percentages of total curtailment volume, or of volume of relief per unit time. ESPAM2.0 can perform either calculation, subject to uncertainty. This uncertainty can be substantial. For instance, IDWR's tests indicate that the estimate of total relief to one reach, from curtailment in one particular region, could range anywhere from 3% to 29% of the curtailed consumptive use.[7]

[7] See Appendix D.

Establishing the Trim Line threshold itself is a policy question, which may in part consider uncertainty. The quantity uncertainty arising from the Water Budget and its effect on Transmissivity is likely at a minimum 15% to 20%. Overall uncertainty exceeds this single-component estimate, especially when questions are asked for small reaches and at small time scales.

Futile Call

Futile Call considers quantity effects described above, and also could have a component related to the timing of relief. Aquifer models can only estimate timing; for instance, Figure 8 suggests that for a test point above the springs in Magic Valley, the Time to Half (arrival of half the relief) is somewhere between five and 20 months. For a point in the center of the plain, it is between five and 20 years and for a point in the northeast it is 15 to 70 years.

Reach Discretization

From a technical standpoint, Administrative Reaches should not subdivide Calibration Reaches. Combining Calibration Reaches into larger Administrative Reaches is technically desirable when Calibration Reaches are smaller than the distances between nearby Pilot Points. Above Milner, reach discretization should further be constrained by considerations of the WD01 accounting process.

Temporal Discretization

Modeling using one-month Stress Periods is acceptable, but great caution should be exercised in reliance on administrative decisions that hinge on temporal representations at periods shorter than approximately four months. Great attention should be paid to the ability of the model to match temporal signals in the reach(es) important to the administrative decision, as shown by Calibration results. Temporal reliance on the model should also be tempered by a realization that the model was Calibrated to spatially-distributed Water Budget data, but will be administratively applied assuming that temporal results are valid for a single user at a single point.

Model Uncertainty

The uncertainties expressed here can be considered as expressions of the probability that a given administrative action will produce the benefits to seniors that the model says it will. Combined with the magnitude of benefit to the senior, model uncertainty should be viewed in context of the magnitude and absolute certainty that of the effect that the junior *will* undergo. For any proposed action, a large, rapid and highly probable benefit is more justifiable than a small, delayed and uncertain benefit.

- For any particular question, quantity uncertainty is probably at least in the range of the 17% result obtained from water-budget analysis.
- Additional uncertainty is introduced from conceptual model limitations and from the parameter estimation process. The IDWR Predictive Uncertainty work indicates that the difference between two Calibrated ESPAM2.0-framework models can exceed 500% for some questions, though it is generally much smaller.
- Uncertainty will always decrease as questions are asked on larger spatial scales and longer cumulative time scales.
- Work presented here suggests the lower limit of temporal uncertainty may generally be in the range of 15%.
- Uncertainties from various sources are not strictly additive but they do combine. Overall uncertainty will always be greater than the estimate from any particular source of uncertainty.

Timing of Effects

ESPAM2.0 estimates that half of the volume of benefit eventually arriving at the Rangen reach from Egin curtailment will have accrued during the 16-year period following a one-time curtailment event. Some of this benefit would accrue to Rangen, some to other users within the reach, and perhaps some to springs without water rights.

Overall Recommendation

ESPAM2.0 is a good tool. It is only a tool, and is but one of many. It should be used with careful attention to the limitations described above. Great caution should be used whenever results depend on spatial discretization smaller than the inter-Pilot-Point distance or temporal discretization shorter than approximately four months. In no case should it be relied upon where critical administrative turning points hinge on differences smaller than the Ranges of uncertainty explored in this document and revealed by the IDWR Predictive Uncertainty work.

APPENDICES

Appendix A: Modeling of Egin Bench curtailment.

Appendix B: Calculations of temporal uncertainty estimates.

Appendix C: Monte Carlo exploration of heterogeneity of Transmissivity

Appendix D: IDWR Predictive Uncertainty (e-mail from Dr. Wylie)

Appendix E: List and description of accompanying data files.

APPENDIX A
MODELING OF EGIN BENCH CURTAILMENT

APPROACH

The approach taken to model Egin Bench curtailment was to identify water-right points of diversion with source "ground water" and use "irrigation" within the portion of the Fremont Madison Irrigation District identified as Egin Bench. Points of diversion were selected from IDWR water-right data using GIS processing. All points of diversion with priority date equal or senior to July 13, 1962 were removed from calculations.

The equivalent reduction in consumptives use was calculated from the water-right diversion rate and applied to the appropriate model cells by application of response functions from ESPAM2.0. Results were summarized and data processed in Microsoft Excel.

DETAILS OF GIS PROCESSING

Data set "irrigation_companies.shp"[1] was downloaded from website http://www.idwr.idaho.gov/ftp/gisdata/GISScripts/downloadform.asp?path=Spatial/Irrigation/IrrigationCompanies&package=irrigation_companies.pkg on August 31, 2012. The Fremont Madison Irrigation District was extracted as "fmid_simple.shp," included within the data folder "Modeling_Egin_Bench_Curtail" provided with this document. The District lands were manually partitioned into Egin Bench lands and other lands as identified in the attribute table and in Figure A1 below.

Groundwater irrigation points of diversion within Egin Bench were extracted from data sets "Wrpod.shp" and "Wrpou.dbf" downloaded from http://www.idwr.idaho.gov/GeographicInfo/GISdata/water_rights.htm on July 16, 2012. The selected lands and junior wells are shown in Figure A1.

[1] In all the appendices, the notation "<xxxx>.shp" will be used as shorthand for the suite of files that comprise an ESRI shapefile.

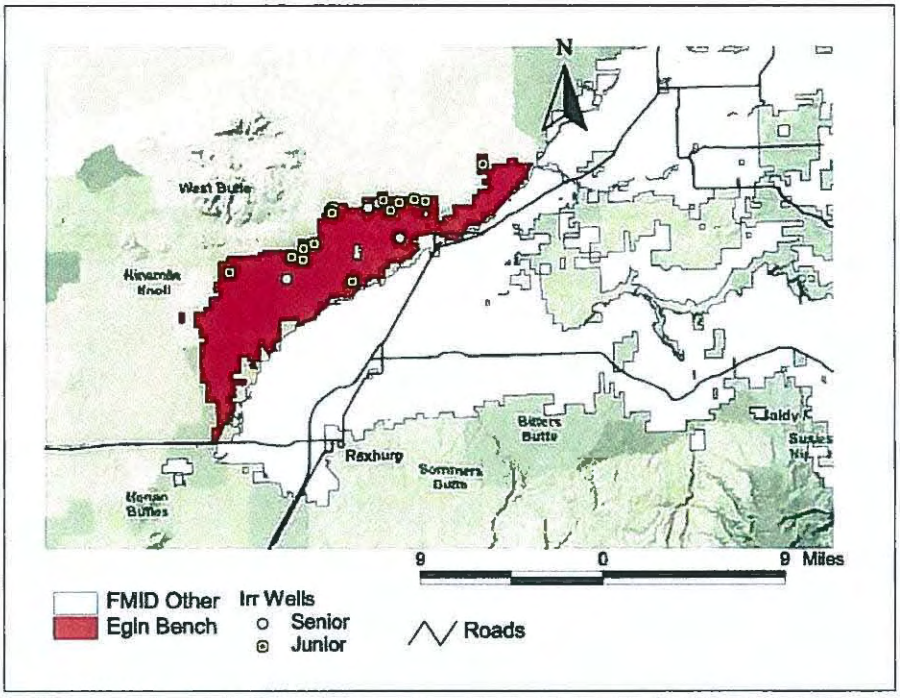

Figure A1. Egin Bench service area and groundwater irrigation points of diversion.

Points of diversion were saved as shapefile "wr_pod_egin_gw_irr_bycell_nodups.shp," included in the data files transmitted with this Appendix. Attribute table fields CALC_PDRATE, CALC_ACRES, CALC_CU and CALC_DIV were manually added and populated. Diversion rate for multiple wells was uniformly apportioned to the wells under the water right. Acres were calculated assuming fifty acres per each cubic foot per second of water right, consumptive use was estimated at two feet per acre, and diversion volume was calculated assuming 80% consumed fraction of field applied groundwater. Model cells were identified using GIS processing with data set "ESPAM2_ModelGrid_06092011.shp," downloaded from http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/model_files/Version_2.0_Development/Current_Data/ on August 31, 2012. Because of the coarseness of the assumption used, the modeling results are best interpreted in terms of the ratio or percentage of benefit to curtailed volume.

DETAILS OF AQUIFER MODELING

Aquifer modeling was performed by generating transient aquifer response functions using the transient superposition ESPAM2.0 model provided by IDWR. The extraction of response functions was performed using a batch process. The

response functions were further processed by a small utility to produce model output, which was summarized in a Microsoft Excel spreadsheet.

Accompanying folder "Modeling_Egin_Bench_Curtail" contains all the files used. Specific files and folders within this folder are further described here:

Folder "BATCHMAKER" contains the utility and source code used to generate the files for the batch processing. It also contains folder "OUTPUT_OF_BATCHMAKER," whose contents were used with the MODFLOW files described below. MODFLOW output of the batch process is presented in folder "RESPONSE_FUNCTIONS."

Accompanying data folder "MODFLOW_AND_ASSOC_FILES" contains the modeling files that were used along with the batch files. The model was set up to run monthly stress periods with one time step per stress period. Months were defined with equal lengths of approximately (365.25/12) days. This folder also includes the MODFLOW executable file and the utility "bud2smp.exe." Source code was not obtained for these executables and therefore cannot be submitted with this document.

Folder "VB_CONVOLUTOR_II" contains the utility (executable and source code) used to extract modeling results from the response functions. It was applied to input file "jr_summary_bycell.csv" and produced output "jr_summary_bycell_OUT.csv." In turn, this output was processed in file "jr_summary_bycell_OUT.xls" to calculate the estimates presented in Table 2 in the report.

APPENDIX B
ESTIMATION OF TEMPORAL UNCERTAINTY

APPROACH

Temporal uncertainty was estimated using the *Jenkins Stream Depletion Method,*[1] a standard analytical calculation method for estimating the time for arrival of pumping effects to a hydraulically-connected stream. As stated in the body of the report, "The propagation of temporal signals to a stream segment can be expressed by the ratio $(a^2 S/T)$, where a is geometric distance, S is aquifer storage, and T is aquifer Transmissivity. The output of the equation is in the time units of the Transmissivity value, and is the amount of time for half of the rate of pumping or recharge to be expressed at the target river reach." This ratio has units of time and is one way to represent the temporal propagation of a pumping effect.

The *Jenkins Stream Depletion Method* was populated with values for distance, transmissivity and aquifer storage which are compatible with the eastern Snake River plain. Input Uncertainty was expressed in terms of the expected range that all estimates for a single input value would fall within (approximately equivalent to four standard deviations). That is, a statement that "We can measure X to a precision of plus or minus 5%" we mean that if X were repeatedly measured with the instruments and methods at hand, all the measured values would fall in the range of 0.95 X to 1.05 X.

The approximation that the range is equivalent to four standard deviations allowed the variance to be estimated as the square of the estimated standard devation. Statistical calculation equations were used to propagate the variances of the input values to an expected of the calculated ratio, and using the same assumptions of the range being equal to four standard deviations, the expected range of uncertainty of the time of arrival of effects was derived from the calculated variance.

STATISTICAL EQUATIONS USED

Two basic statistical equations were used; an equation for the variance of a product, and an equation for the variance of a ratio. The product equation was applied to estimate the variance of the product $(a * a)$ or (a^2), then the ratio

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[1] C.T. Jenkins, 1968. *Computation of Rate and Volume of Stream Depletion By Wells,* Techniques of Water Resources Investigation of the United States Geological Survey, Book 4 Chapter D1

equation was applied to estimate the variance of the ratio *(S/T)*. In turn, these estimated variances were used to approximate the variance of the product [*(a2)* * *(S/T)*].

The equation for the variance of a product was obtained from Clemens & Burt, *Accuracy of Irrigation Efficiency Estimates*, Journal of Irrigation and Drainage Engineering, Nov/Dec 1997 (notation altered):

$$s^2 = m_2^2\ s_1^2 + m_1^2\ s_2^2 + s_1^2\ s_2^2 + 2\ m_1\ m_2\ s_{12} \quad (1)$$

where:

s^2 = estimated variance of product
m_2 = expected value of second factor
s_1^2 = estimated variance of first factor
m_1 = expected value of first factor
s_2^2 = estimated variance of second factor
s_{12} = estimated covariance between the factors

The variance of the ratio *(S/T)* is estimated using an equation from http://stats.stackexchange.com/questions/19576/variance-of-the-reciprocal-ii (notation altered):

$$s_r^2 = (m_1/m_2)^2\ (s_1^2/m_1^2 + s_2^2/m_2^2 - 2\ s_{12}/m_1\ m_2) \quad (2)$$

where:

s_r^2 = estimated variance of the ratio (m_1/m_2)

Both equations require an estimate of the covariance (s_{12}). It is estimated here from the expected correlation coefficient using Equation 3, obtained from Snedecor and Cochrane, Statistical Methods Seventh Edition, Iowa State University Press, 1980, p 180 (notation altered):

$$r = s_{12} / (s_1\ s_2) \quad (3)$$

where

s_x = estimated standard deviation of variable x = square root of estimated variance of variable x
r = correlation coefficient between the two variables.

This can be rearranged to express covariance in terms of correlation coefficient:

$$s_{12} = r\, s_1\, s_2 \qquad (4)$$

Correlation coefficients range between -1 and +1. A correlation coefficient of -1 indicates that the two factors are 100% interdependent and that when one increases the other decreases. Correlation of zero means the factors are fully independent, and correlation of +1 indicates that the factors are fully interdependent and move together when changes occur.

Obviously the correlation of *a* with itself is +1. For this exercise it was assumed that *T* and *S* have positive correlation, since the temporal component of target data constrains the ratio *S/T* and can accommodate an over-estimate in one with a compensating overestimate of the other. However, spatial distribution of gains constrains *T* without the ability for offsetting errors in *S*. Hence, the correlation was estimated at +0.5 for use in Equation (4).

The final calculation also used an equation which adjusts the product for the variances of the terms, also from Clemens and Burt (cited above):

$$m = m_1\, m_2 + s_{12} \qquad (5)$$

where

m = expected value of the product

This made only trivial differences in the calculated value of $(a^2\, S/T)$.

CALCULATIONS

Temporal uncertainty calculations are in file "TravelTimeCalcs.xls" in folder "Travel_Time_Uncert_Calcs." The folder also contains the full Internet page from which Equation (2) was obtained.

The equations were applied to the values in the table in the body of the report, and to a hypothetical location with a shorter distance but the same storage and transmissivity characteristics. The results of the calculations were approximate temporal uncertainties of 15% and 21% for the further and nearer locations, respectively. This includes only temporal uncertainty associated with imprecision in the three input values; it cannot include temporal uncertainty associated with other sources such as the choice between alternate conceptual models.

APPENDIX C
MONTE-CARLO INVESTIGATION OF HETEROGENEITY EFFECTS

APPROACH

To assess the potential effect of heterogeneity at spatial scales smaller than the inter-pilot-point distance, a simple steady-state aquifer model was constructed. It included two Transmissivity zones that were subdivided into smaller subzones. The larger zones were assumed to represent the inter-pilot-point distance, while the subzones were intended to represent heterogeneity at a sub-pilot-point scale. The aquifer interacted with a stream that had been subdivided into two reaches each of length equal to the zone size, analogous to the inter-pilot-point distance. Each reach was further divided into subreaches of length equivalent to one-fifth the inter-pilot-point distance. Two wells were installed, one at just less than the inter-pilot-point distance from the stream and another nearer the stream.

A hypothetical "calibrated" Transmissivity was specified for each zone. Random suites of Transmissivity values were generated for the sub zones, and those which produced reasonable approximations (i.e. within the expected precision of Calibrated Transmissivity estimates) of Transmissivity in both large zones were retained as candidates for evaluation. This approach implicitly includes the combined effects of uncertainty in Transmissivity estimates and of spatial heterogeneity.

The concept of the test is that there is a single underlying spatial distribution of Transmissivity, but that it is unknown and unknowable. Each of the tested parameterizations represents a distribution that is possible given the data at hand, and each could therefore represent the "truth." The output is a description of how many different underlying "true" configurations could be compatible with a single calibrated result. The calibrated result is represented with a uniform Transmissivity of 20,000 ft^2/day in the west zone and uniform Transmissivity of 100,000 ft^2/day in the east. Because this is a steady-state model, aquifer storage is not estimated nor applied in calculations.

When the suite of parameterizations was assembled, each was evaluated in its steady-state partition of effects to the ten sub-reaches and to the two aggregated reaches, from each of the two wells. The results were presented graphically, to allow some visualization of what the underlying probability distribution may look like. No formal statistical analyses were performed, though basic summary statistics were assembled.

DESCRIPTION OF MODEL

The model is constructed in Microsoft Excel with the option for iterative calculations enabled. The model domain is illustrated in Figure C1. The model has ten vertical columns and four horizontal rows. Wells are represented in Row 1 column 3 and row 3 column 3. Ten river cells border the south side of the model domain.

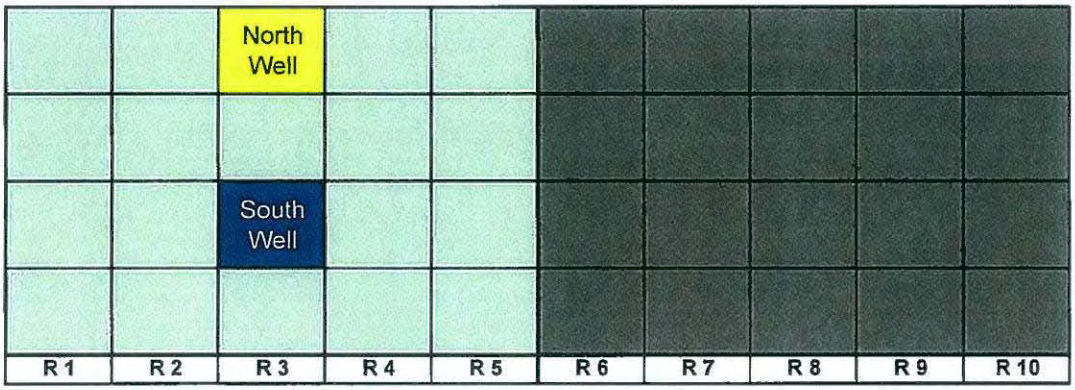

Figure C1. Model domain for a test with two zones representing the inter-pilot-point distance.

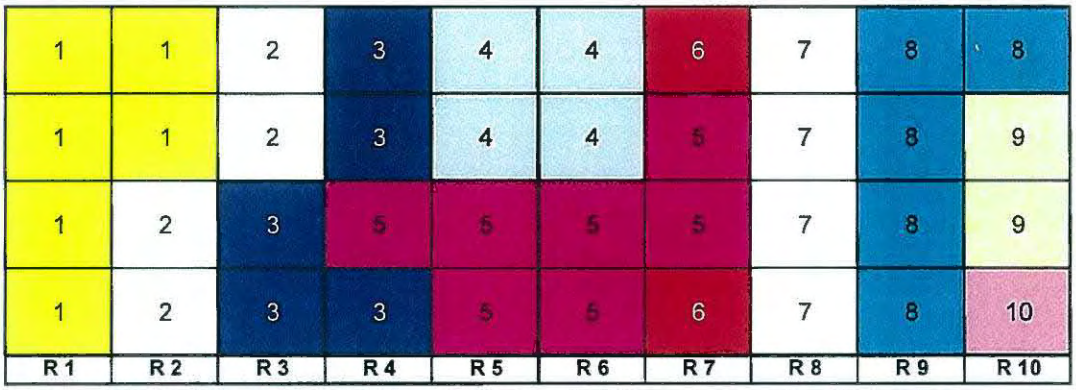

Figure C2. Discretization of transmissivity zones and sub reaches.

This representation does not explore the full range of heterogeneity, due both to the large size of the individual transmissivity zones and to the fact that all the simulations assume the same geometric configuration of zones. It also fails to represent any heterogeneity or uncertainty in the nature of the connection between the river cells and the aquifer cells.

Because well-to-river distances are small relative to the inter-pilot-point distance, this test does not explore the effects that heterogeneity at this scale might have upon more distant wells.

Data folder "MONTE_CARLO" accompanies this appendix. In it are subfolders "NORTHSOUTH_R1C3" and "NORTHSOUTH_R3C3," containing the forty individual representations of the model and summary spreadsheets for the respective well locations.

GENERATION OF AQUIFER PROPERTIES

The aquifer properties were generated using a VB6 utility run in developer mode, with no executable ever being produced. The source code is contained in subfolder "VB_TESTMAKER_II." The utility relies upon a pseudo random number generator. Hence, if run again it may not reproduce the twenty realizations used in this simulation. However, it would be expected to produce a suite of twenty realizations which do honor the constraints.

In reality there is a single geometric configuration of the aquifer, which is unknown and unknowable. There is a single assignment of properties to this configuration, also unknown and unknowable. There are a nearly infinite number of simplified representations which could be made. This test assumes a single simplified geometric configuration and explores the implications of 20 different potential underlying suites of Transmissivity values which could actually populate the given simplified representation. The simulation requires conformance with the large-zone Transmissivity values, within an uncertainty range.

Spreadsheet "Aquifer_Property_Summary.xls" in the main folder summarizes the aquifer properties generated. Figure C3 shows that the simulations indeed resulted in the geometric means of the east and west model zones corresponding to approximately +/- 15% of the target values. Though no formal statistical test was performed on the distributions, from the figure it appears that the distributions are more or less centered and are centrally weighted. This corresponds to the assumptions of the techniques used to estimate the uncertainty of Transmissivity estimates.

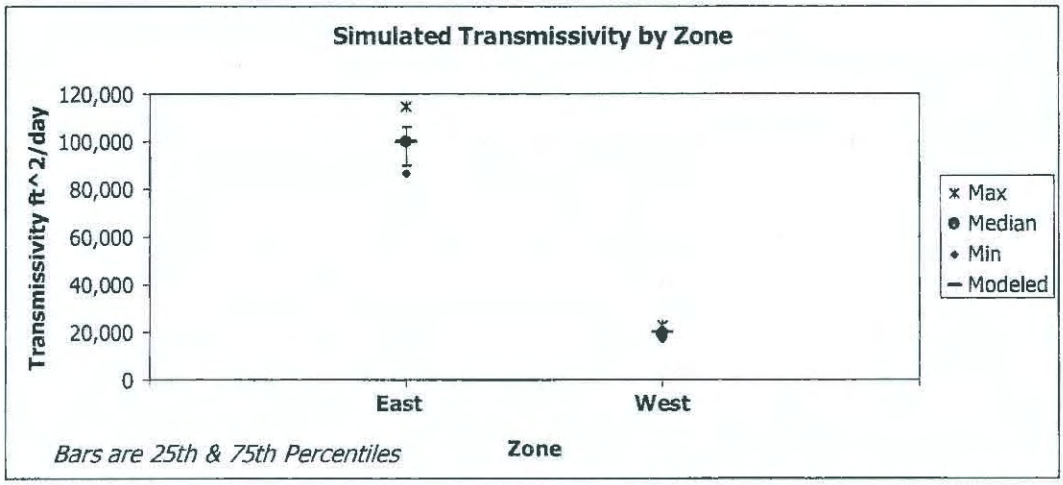

Figure C3. Simulated Transmissivity by zone.

Figure C4 shows the wide range of variability achievable across the ten sub zones while honoring the large-zone constraints. The utility was allowed to vary each zone by five orders of magnitude (less than the range of Transmissivity in the calibrated ESPAM2.0 model). The figure shows that many of the reaches explored this full range. Of course in order to meet the larger zone requirements, when any sub zone was at an extreme value, other sub zone(s) had to be set to offsetting values in the other direction.

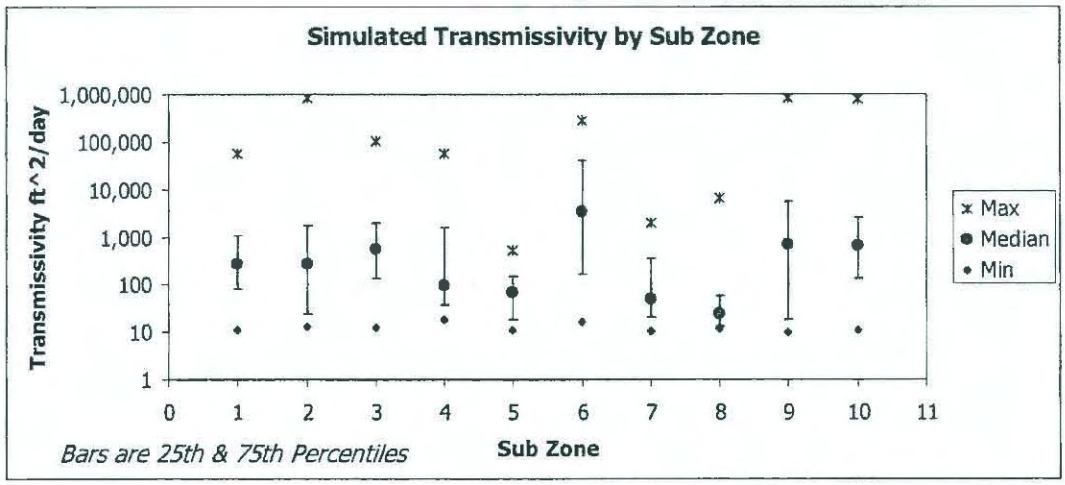

Figure C4. Simulated Transmissivity by sub zone.

RESULTS OF SIMULATIONS

From each simulation, steady-state partition of flux was recorded for each of the ten sub reaches and for the two modeled reaches. Figures C5 illustrates results

for the north well (more distant from the stream) and figures C6 shows the south well results.

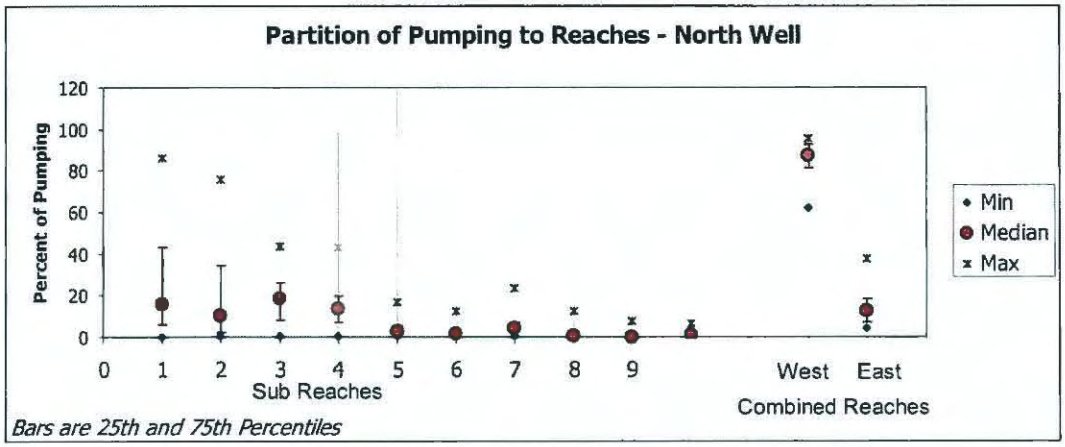

Figure C5. Simulation results for north well.

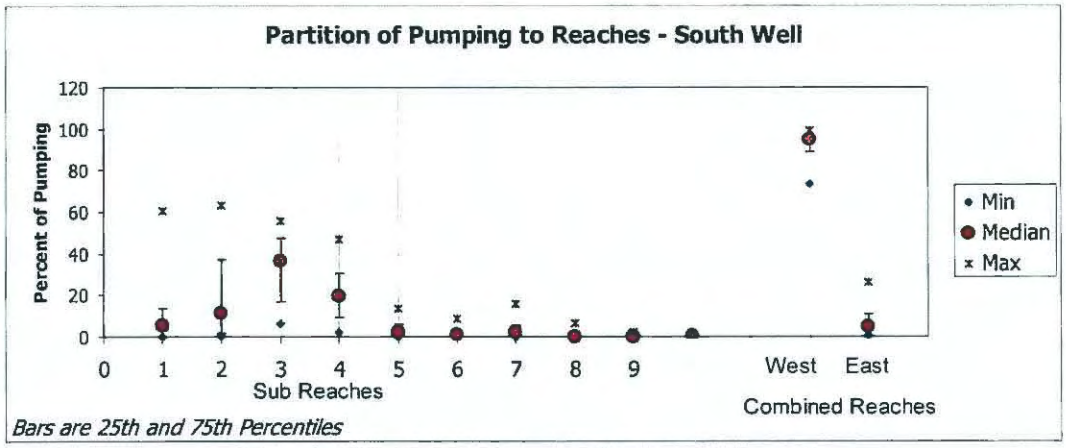

Figure C6. Simulation results for south well.

The meaning of these results is somewhat difficult to articulate. The conceptual model of the test is not an exploration of the range of calibrated results that could be obtained from a single true configuration; it is an exploration of a suite of potential true configurations that are compatible with a single calibrated result. In this light, the subreach-one results from the north well could be described as follows:

> "Given this calibration result, it is possible that the true propagation of north well effects to reach one could be as low as essentially zero, or as much as 85% of pumping."

Two observations arise from Figure C5 and Figure C6:

1. For individual reaches smaller than the inter-pilot-point distance, the range of uncertainty is very large;
2. The uncertainty is much smaller when reach size is approximately equal to the inter-pilot-point distance.

LIMITATIONS OF TEST

The limitations of this test include the following:

1. This test only considers wells whose proximity to the river is within the inter-pilot-point distance;
2. Only one configuration of Transmissivity zones is considered;
3. It is a steady-state test and therefore does not inform temporal considerations of heterogeneity;
4. It actually tests zones as a proxy for pilot points;
5. It does not test heterogeneity or uncertainty in representation of the connection between the aquifer and springs or streams;
6. Only twenty configurations were tested.

The implication of the first limitation is that this analysis is most valid for wells near the river or springs. The implication of the second, third and fifth is that actual uncertainty arising from heterogeneity is expected to be greater than indicated here. The fourth limitation suggests that there is some imprecision in these results. More sophisticated analysis explicitly representing pilot points could show somewhat more or somewhat less uncertainty. This is partially addressed by constraining the test to a narrower range of Transmissivity values than were used in ESPAM2.0 and narrower than expected to actually occur. The sixth limitation applies to the ability to fully describe the probability distributions suggested by the graphical results, or to perform formal statistical tests.

A reader may be tempted to add a seventh criticism, that ESPAM2.0 was calibrated to individual small reaches and therefore some of the more poorly performing simulations should be dropped from this comparison. However, ESPAM2.0 was calibrated to a data set of spatially distributed recharge and discharge across the plain. It can be argued that the calibrated Transmissivity represented by the smoothed surface between pilot points in ESPAM2.0 and the uniform Transmissivity zones represented in this simulation primarily represent calibration response to the large flux entering the zones from the broader plain beyond. Demonstrating the ability to respond to this large, diffuse, distant flux does not at all guarantee that the model can correctly respond to a small, concentrated, nearby stress.

The observed response to the calibration conditions could arguably have been obtained with a number of different localized heterogeneity distributions, since all preferred flow paths essentially will eventually tap the same broad, spatially diffuse pattern of recharge. Even if one assumes that the primary driver is nearby irrigation and canals, their effect is still large and diffuse relative to the effects of a single well at a discrete location, and relative to the inter-pilot-point distance. Further, even a suite of nearby localized stresses that show the same general temporal pattern will not inform the calibration process whether all springs are responding generally to all stresses, or whether specific springs are responding uniquely to individual point stresses.

If the model had been calibrated to known responses at small reaches, from unique, known, nearby point stresses, the seventh criticism would be appropriate. However, that is not the condition the model was calibrated to.

CONCLUSIONS

For wells within the inter-pilot-point distance, this analysis suggests the following:

1. For reaches of length approximately 1/5 the inter-pilot-point distance, actual pumping response can range from essentially zero to more than 80% of pumping, given Transmissivity uncertainty in the range of +/- 15%;
2. The uncertainty is greatly reduced when reach length is at least as great as the inter-pilot-point distance. In this test, half the simulated values for aggregated reaches fell within approximately the same range of uncertainty as was represented for the underlying Transmissivity estimates.

It is recommended that great caution be used whenever administrative decisions hinge on spatial discretization of results at scales finer than the inter-pilot-point distance.

APPENDIX D
IDWR PREDICTIVE UNCERTAINTY ANALYSIS

This appendix provides an e-mail from Dr. Allan Wylie describing the results of the IDWR predictive uncertainty analysis. The penciled notes in the margin are manual calculations of the ratio (Max / Min) x 100.

APPENDIX E
DESCRIPTION OF FILES ACCOMPANYING REPORT

This appendix provides a list and description of the files that accompany the report.

1. Folder "3-Model_Comparison" contains files used for the analysis of uncertainty associated with three different models, applied to three different points on the plain.

   1.1. Subfolder "BatchFile_Input_Files_ResponseFiles" contains files uniquely associated with running ESPAM2.0 for this analysis, using the procedures described in Appendix C and the MODFLOW files described in 2.3 below.

   1.2. Subfolder "BATCHMAKER" contains the source code, executables and output of the batch-file process used to operate MODFLOW to generate response functions.

   1.3. Subfolder "ESPAM_XFR_TOOL" contains the IDWR/University of Idaho groundwater right transfer tool based upon ESPAM1.1, and the three applications of that tool to the points in the comparison. These files were prepared by University of Idaho or generated by the transfer tool, with the exception of the following:
      1.3.1. "Point_A.xls," "Point_B.xls" and "Point_C.xls" are copies of the transfer spreadsheets as run for the three locations in the analysis.
      1.3.2. "Point_A_Effects_ESPAM1.1.xls," "Point_B_Effects_ESPAM1.1.xls" and "Point_C_Effects_ESPAM1.1.xls" contain summaries of the results from the three transfer-tool spreadsheets.

   1.4. Subfolder "SRPAM_XFR_TOOL" contains the IDWR/University of Idaho ground water rights transfer tool based upon SRPAM, and the three applications of that tool to the points in the comparison. These files were prepared by University of Idaho or generated by the transfer tool, with the exception of the following:
      1.4.1. "Point_A.xls," "Point_B.xls" and "Point_C.xls" are copies of the transfer spreadsheets as run for the three locations in the analysis.
      1.4.2. "Point_A_Effects_SRPAM.xls," "Point_B_Effects_SRPAM.xls" and "Point_C_Effects_SRPAM.xls" contain summaries of the results from the three transfer-tool spreadsheets.

1.5. Eight files "1x1_for_budget_analysis.*" are the ESPAM1.1 model grid GIS shapefile.

1.6. Seven files "espam2_gridcenters_20110609.*" are the centroids of the ESPAM2.0 model grid shapefile.

1.7. Two files "LOCATION_MAP_SAMPLE_POINTS.*" are maps of the three sample points chosen.

1.8. Three files "old_grid_centroids.*" are the centroids of the SRPAM model grid shapefile.

1.9. Seven files "old_mdl_grd.*" are the SRPAM model grid GIS shapefile.

1.10. File "proj1.apr" is an ArcView3.3 project file for the GIS setup used to define the sample points.

1.11. Three files "sample_points.*" are the GIS shapefile for the three selected sample points.

1.12. File "3-Model_Compare.xls" summarizes the results and generates the figure describing this test.

2. Folder "Modeling_Egin_Bench_Curtail" contains the files used for the analysis described in Appendix C.

2.1. Subfolder "BATCHMAKER" contains the source code, executables and output of the batch-file process used to operate MODFLOW to generate response functions.

2.2. Subfolder "Model_Grid_06092011" contains files associated with the ESPAM2.0 model grid GIS shapefile.

2.3. Subfolder "MODFLOW_AND_ASSOC_FILES" contains the MODFLOW setup used to generate response functions.

2.4. Subfolder "RESPONSE_FUNCTIONS" contains the response functions for the locations treated in this analysis.

2.5. Subfolder "VB_CONVOLUTOR_II" contains the source code and executable used to apply the response functions to the modeled stress, along with a sample input file.

2.6. File "Data sources.doc" contains URLs for various data downloads associated with the Appendix C modeling and the report in general.

2.7. Files "EGIN_MAP.*" and "EGIN_MAP_II.*" are illustrations of the Egin Bench service area.

2.8. File "export_podtable.txt" is an intermediate text file.

2.9. Files "fmid.*" and "fmid_simple.*" are files associated with GIS shapefiles of the Fremont Madison Irrigation District service area.

2.10. Files "irrigation_companies.*" are files associated with the IDWR shapefile of canal company and irrigation district service areas.

2.11. File "jr_summary_bycell.csv" is the input file that was used by utility "VB_CONVOLUTOR_II."

2.12. Files "jr_summary_bycell.txt" and "jr_summary_bycell.xls" are intermediate processing files.

2.13. Files "jr_summary_bycell_OUT.*" are the output of the convolution utility and further processing of that output.

2.14. Files "PODRATE.*" are intermediate processing files.

2.15. File "proj1.apr" is an ArcView3.3 project file.

2.16. File "Screeshots.ppt" is a log of ArcView processing.

2.17. Files "wr_pod_egin_gw_irr_bycell_nodups.*" are files associated with a shapefile of processed Egin Bench groundwater points of diversion.

2.18. Files "wr_pod_gw_irr_egin.*" and "wrpod_egin_irr_gw.*" are intermediate processing files.

2.19. Files "wrpod.*" are files associated with the IDWR water right points of diversion shapefile.

2.20. File "wrpou.dbf" is the attribute table from the IDWR water rights place of use shapefile, used to identify water use for the points of diversion in "wrpod.*"

3. Folder "MONTE_CARLO" contains the files used for the analysis described in Appendix C.

   3.1. Subfolder "NORTHSOUTH_R1C3" contains the twenty model runs and summary worksheet for the north well in the simulation.

   3.2. Subfolder "NORTHSOUTH_R3C3" contains the twenty model runs and summary worksheet for the south well in the simulation.

   3.3. Subfolder "VB_TESTMAKER_II" contains the source code for the utility used to generate transmissivity arrays. No executable was generated for this utility; it was run in developer mode.

   3.4. File "Aquifer_Property_Summary.xls" contains the results of "VB_TESTMAKER_II," along with summary statistics of transmissivity across the 20 realizations of the model.

4. File "Predictive_Histogram.xls" contains the calculations used to generate Figure 9, using the hand calculations appearing in the margin of Appendix D.

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Supplement to Technical Report on ESPAM2.0 Modeling Issues

Bryce A. Contor, Senior Hydrologist
December 13, 2012

INTRODUCTION

On October 1, 2012, Rocky Mountain Environmental Associates, Inc. (RMEA) prepared a document titled "Technical Report on ESPAM2.0 Modeling Issues" (Report). It was submitted to IDWR in behalf of Fremont Madison Irrigation District as an expert report in the Rangen case. Subsequently, Idaho Department of Water Resources (IDWR) discovered a mistake in the input data to ESPAM2.0. IDRW has since withdrawn ESPAM2.0 and replaced with ESPAM2.1, which was calibrated after correcting the mistake.

This document is supplementary to the original Report. It has two purposes:

1. It presents comparisons between ESPAM2.0 and ESPAM2.1, to show that the modeling results in the Report are not substantially affected by the differences induced by correcting the mistake;
2. It presents an additional illustration supporting an assertion on page C6 of Appendix C of the original Report.

Comparisons Between ESPAM2.0 and ESPAM2.1

Dr. Allan Wylie of Idaho Department of Water Resources presented a slide presentation entitled "ESPAM2.0 – E121025A001" at the Eastern Snake Hydrologic Modeling Committee (ESHMC) meeting on November 9, 2012.[1] Figure 1 shows the comparison

1 http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/meetings/2012_ESHMC/11_9_2012/Wylie_ESPAM2_ESPAM21_Nov2012.pdf

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of ESPAM2.0, ESPAM2.1 and target data for the Ashton to Rexburg reach, which is the reach nearest Fremont Madison Irrigation District. Figure 2 shows the comparison for the Rangen reach, which includes the Rangen diversion among others. In the figures, ESPAM2.1 is referenced as E121025A001. The blue line represents the target data, the green line represents ESPAM2.0, and the red line represents ESPAM2.1. Where the red line is not visible, it is obscured by the green ESPAM2.0 line.

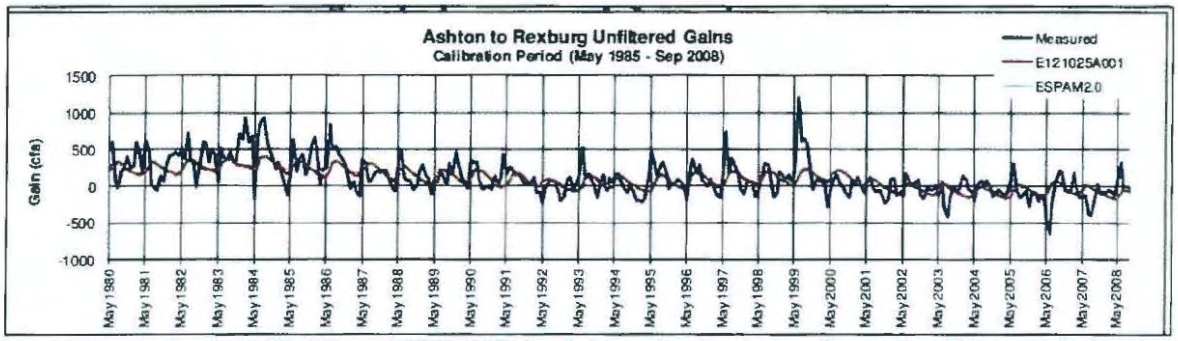


Figure 1. ESPAM2.0 and ESPAM2.1, Ashton to Rexburg, from Dr. Allan Wylie's presentation slide 4.

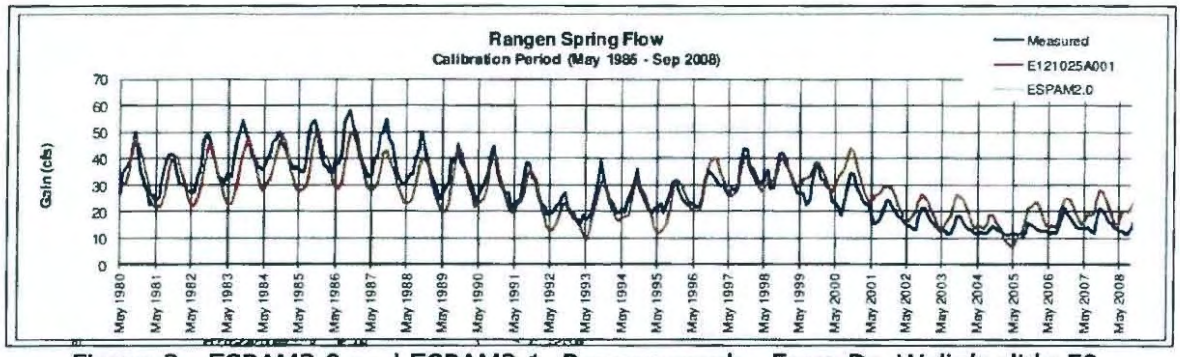


Figure 2. ESPAM2.0 and ESPAM2.1, Rangen reach. From Dr. Wylie's slide 59.

These figures and the other slides in Dr. Wylie's presentation indicate that the differences between ESPAM2.0 and ESPAM2.1 representations are small relative to the ESPAM2.0 results relied upon in the Report. It is my professional judgment that ESPAM2.0 modeling in the Report is adequately representative of expected ESPAM2.1 results, for the context of the Report.

Additional Illustration

The Report asserts on page C6 of Appendix C that that "Demonstrating the ability to respond to this large, diffuse, distant flux does not at all guarantee that the model can correctly respond to a small, concentrated, nearby stress." Figure 3 below illustrates a hypothetical geometric arrangement of two springs (1 and 2), two wells (B and C) and

a distant large area that also affects the springs (A). The single most important feature of the hypothetical aquifer is that there is a region of low-permeability materials between Well C and Spring 1, or alternately, that there are preferential flow pathways between the vicinity of Well B and Spring 1, and between the vicinity of Well C and Spring 2.

The analysis assumes that distant region A includes irrigation, wells, springs, water bodies, recharge sources and other features not explicitly represented in the Figure. Figure 4 shows the time series of the hydraulic signal from the combined hydraulic effects in region A, while Figure 5 shows the time series of pumping at the two wells. Accompanying file "Supplemental_Figures.xls" contains all the calculations underlying the figures and the example.

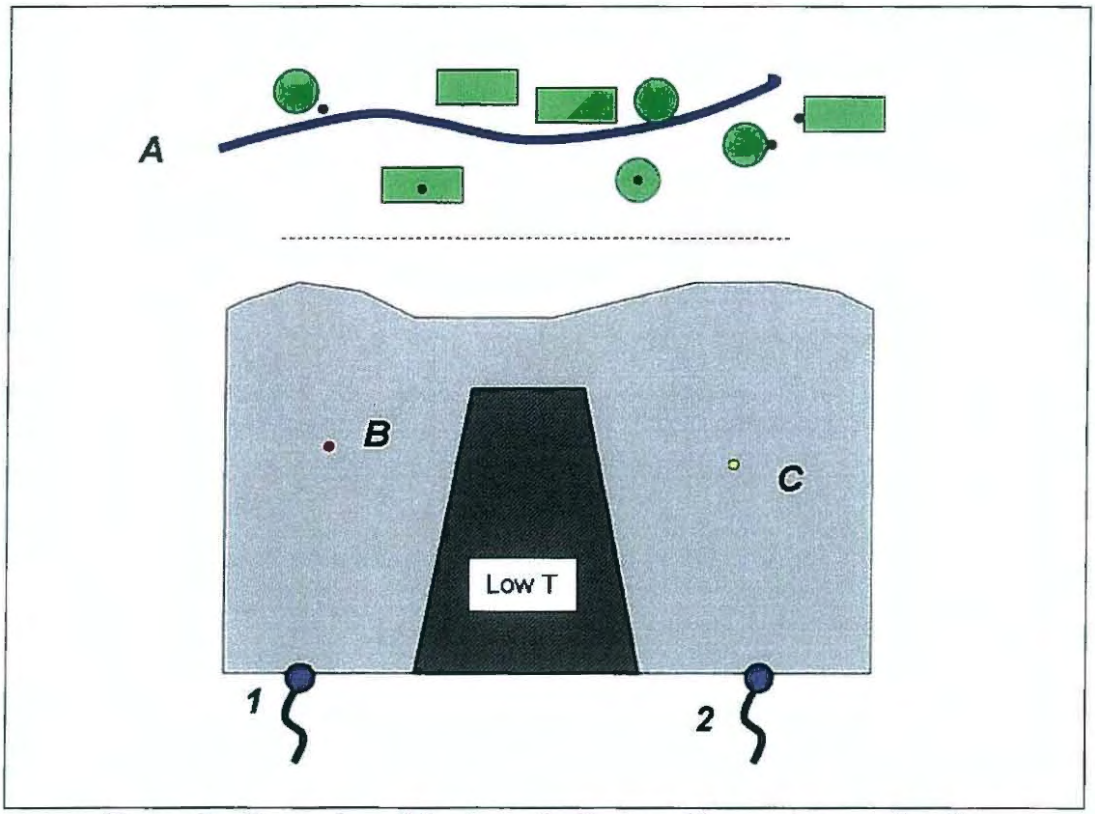


Figure 3. Geometry of the hypothetical aquifer, springs and wells.

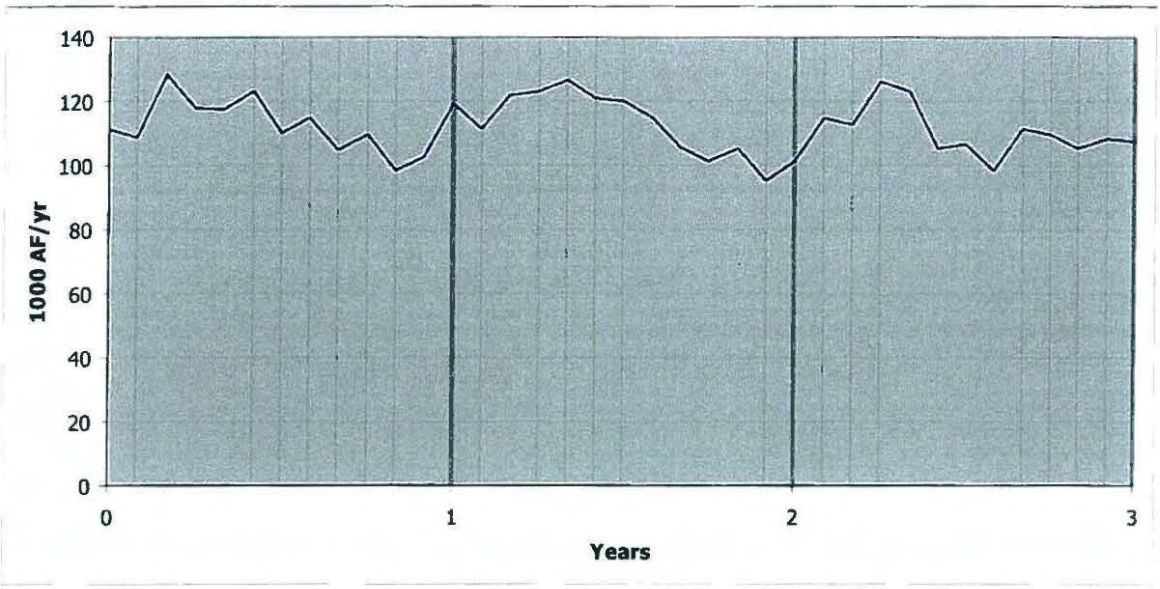


Figure 4. Time series of hypothetical net effect from region A.

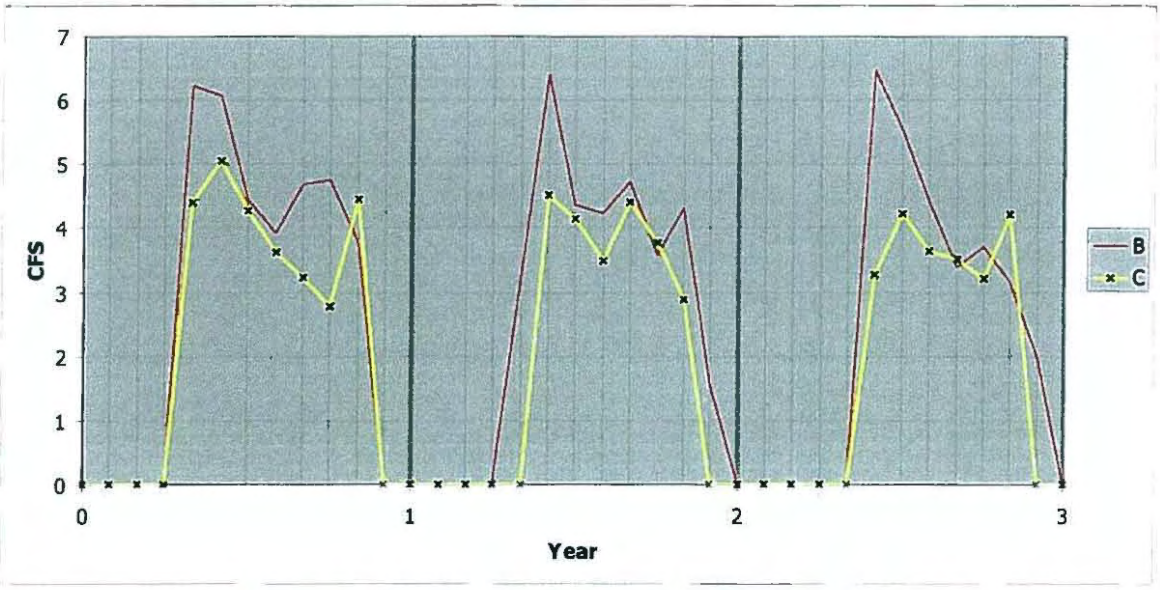


Figure 5. Hypothetical time series of well pumping.

Equation 1 is the hypothetical true expression of the relationships between net effect from region A, the pumping at the two wells, and the discharge at Spring 1.[2]

$$Q1 = 0.33\ A - 0.95\ B - 0.01\ C + 0 \qquad (1)$$

[2] For simplicity, temporal delays are omitted from the illustration.

where Q1 = Discharge at Spring 1, cubic feet per second
A = net recharge in region A, 1000 acre feet per year
B = pumping at well B, cubic feet per second
C = pumping at well C, cubic feet per second

The steady-state response function for Well B is 0.95, indicating that 95% of curtailment at well B would benefit Spring 1. However, the steady-state response function for Well C is only 0.01, or one percent.

Figure 2 illustrates the geometry that would of necessity be represented if the distance between the wells and the springs were smaller than the inter-pilot-point distance. It differs from Figure 1 in omitting the low-permeability region, or alternately, in omitting the preferential flow pathways. The entire region containing the wells and springs would be considered a uniform porous medium, perhaps with a smooth gradation of aquifer properties across the region.

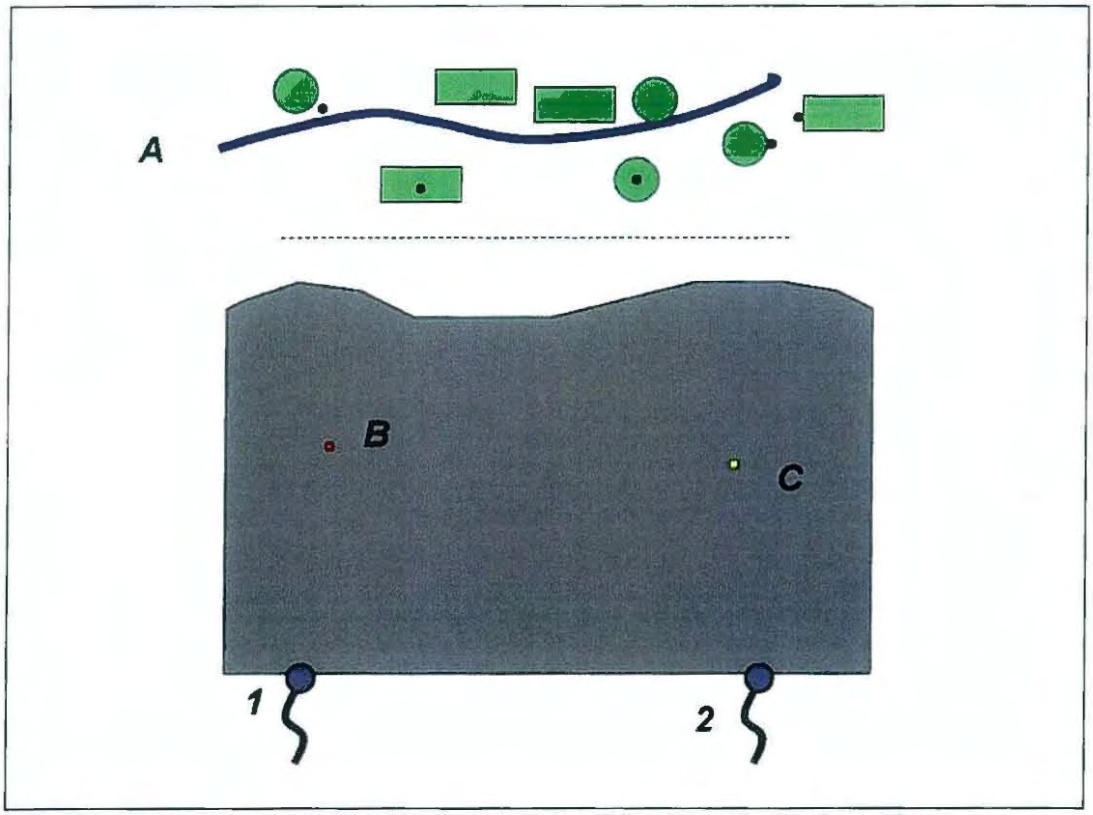


Figure 6. Model representation of the hypothetical aquifer.

Equation 2 is a calibrated equation compatible with the representation of Figure 6; the relative effects of Well B and Well C are constrained by distances and a uniform

representation of aquifer properties. All parameters are manually calibrated to minimize the sum of differences between estimated (i.e. produced by the estimated parameters in Equation 2) and observed (i.e. produced by the correct parameters in Equation 1) values, with an attempt to visually match the seasonal amplitude. The coefficient for parameter A was purposely made different from the actual to represent practical limitations of modeling and to illustrate that calibration can often overcome such imprecision with compensation elsewhere.

$$Q1 = 0.2\,A - 0.5\,B - 0.2\,C + 13.7 \qquad (2)$$

The response function for Well B is 0.50 and the response function for Well C is 0.20.

Figure 7 shows the calibration results. Visually, the fit is arguably better than the actual ESPAM2.1 results illustrated in Figure 1 and Figure 2. The calibration statistics are also reasonable; the mean error is less than one percent of the spring discharge and the root mean square error is approximately four percent. Nevertheless, the calibrated response functions differ greatly; the calibrated steady-state response fraction for Well B is approximately half the "true" value, while the calibrated response fraction for Well C is twenty times the "true" value.

This means that this illustrative model is capable of correctly reproducing results when both Well B and Well C are operating in their customary fashion, but it is not capable of correctly representing the isolated effects of either well.

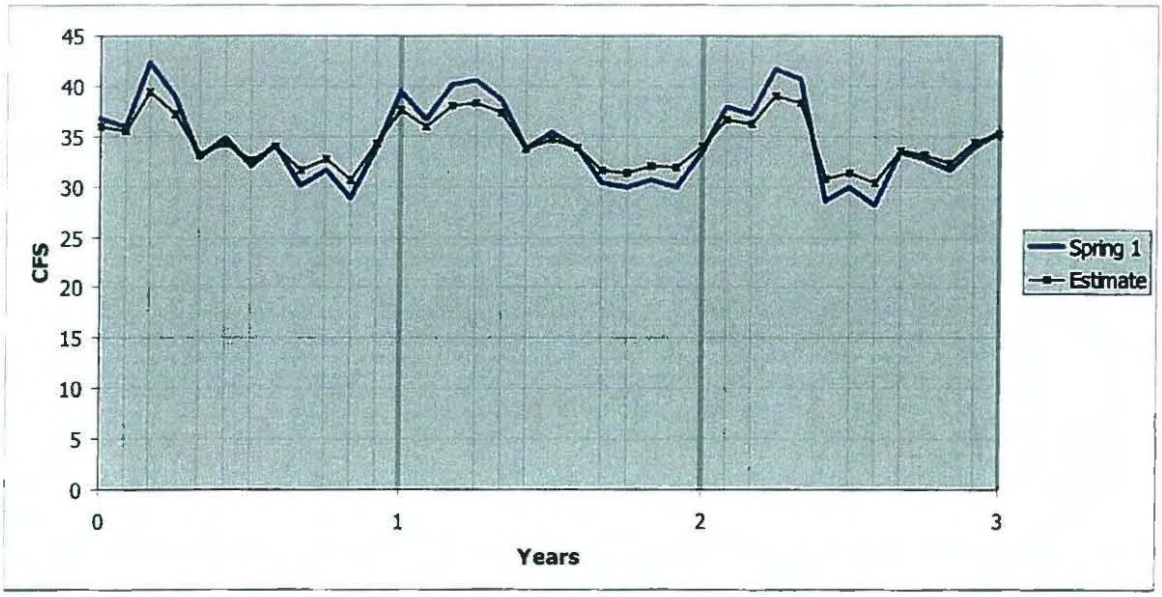


Figure 7. Hypothetical calibration match. "Spring 1" shows the results of Equation 1, while "Estimate" represents the results of manually-fitted Equation 2.

This result is consistent with characteristics that the illustration shares with ESPAM2.1:

1. The hydrologic features near the springs share temporal characteristics of discharge or recharge (i.e. the temporal water-use pattern of Well B is similar to that of Well C) during the calibration period;
2. An important influence on spring discharge propagates from a distant, broad region;
3. A local geological feature exists at a finer spatial scale than can be represented with the available distribution of pilot points.

The illustration demonstrates that a good calibration to good local data can still fail to produce an accurate representation of response functions to single springs. While we cannot assert that this occurs in all cases within the ESPAM2.1 model, we have no available tools to demonstrate that it does *not* occur in any particular case or location. We only know that the conceptual model of a uniform porous medium with gradual gradation in properties is consistent with an expectation of a broad, uniform seepage face and inconsistent with the observation of large, individual springs separated by expanses of dry canyon wall.

Given the tools, data and resources available, representation as a uniform porous medium was a defensible modeling choice. However, that choice should temper expectations of the spatial scale of applicability of modeling estimates.

CONCLUSION

This supplement offers two important conclusions. First, the differences between ESPAM2.0 and ESPAM2.1 do not appear to substantially change the model results relied upon in the Report. Second, an illustration provides clarification and support of the statement in the Report that "Demonstrating the ability to respond to this large, diffuse, distant flux does not at all guarantee that the model can correctly respond to a small, concentrated, nearby stress."

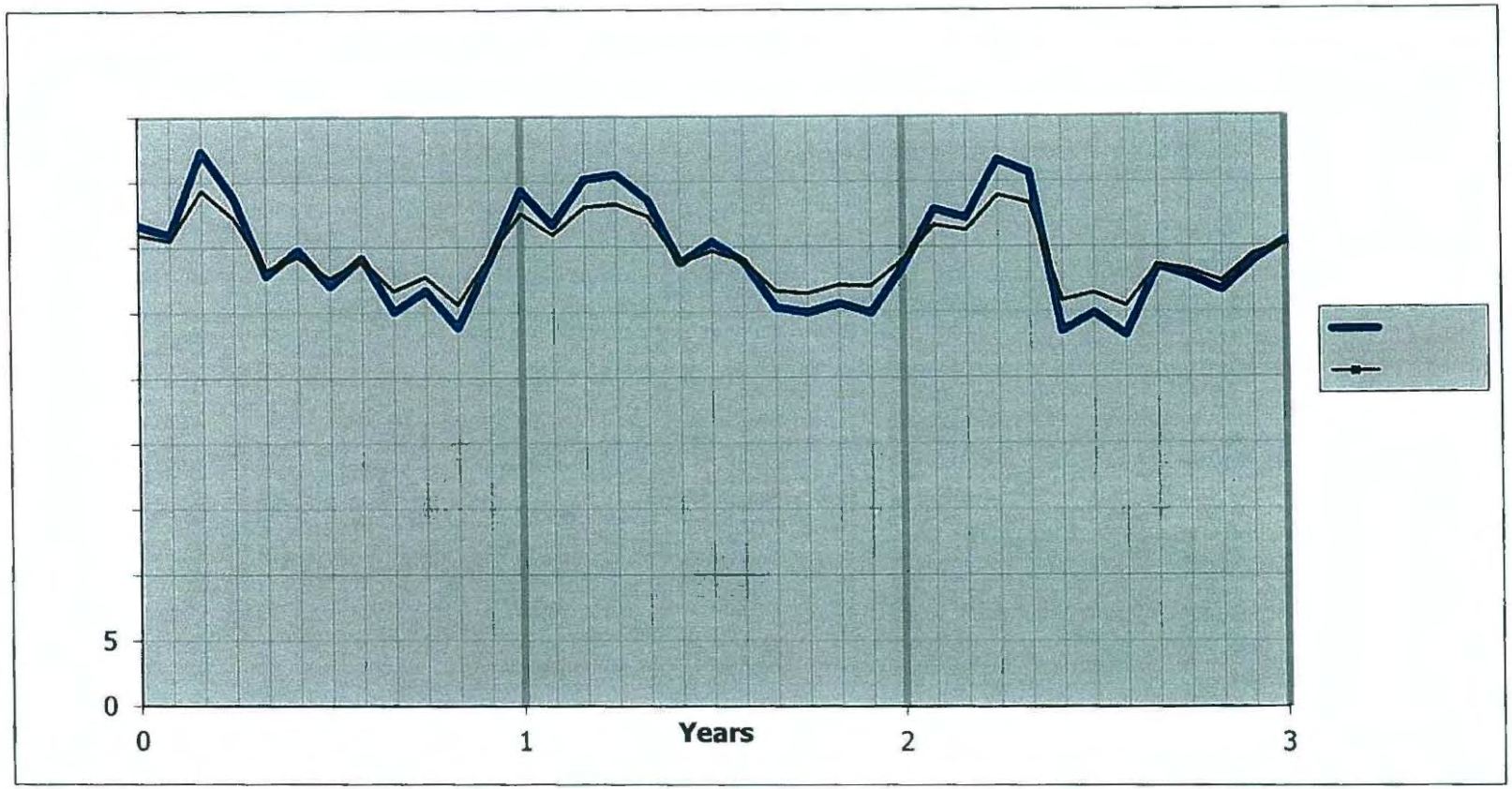
Calib_Para	13.7
Mean Err	-0.0727
Mean Err %	-0.00211
RMSE	1.416279
RMSE %	0.041072

(Months)	Time	A	B	C	Spring 1	Estimate	Err	Err2
0	0	111.293	0	0	36.72668	35.95859	-0.76808	0.589954
1	0.083333	108.8266	0	0	35.91279	35.46533	-0.44746	0.200223
2	0.166667	128.3572	0	0	42.35788	39.37144	-2.98644	8.918808
3	0.25	117.6753	0	0	38.83284	37.23505	-1.59779	2.552919
4	0.333333	117.478	6.221354	4.401573	32.81345	33.20461	0.391166	0.153011
5	0.416667	123.0174	6.068063	5.049706	34.78059	34.25951	-0.52108	0.271525
6	0.5	109.9296	4.452054	4.265903	32.00465	32.60671	0.602058	0.362474
7	0.583333	114.9909	3.916821	3.614133	34.18986	34.01693	-0.17293	0.029904
8	0.666667	104.6769	4.691565	3.236152	30.05402	31.64236	1.588342	2.522829
9	0.75	109.7369	4.747665	2.766845	31.67521	32.72017	1.044957	1.091935
10	0.833333	98.36459	3.772334	4.449309	28.83211	30.59689	1.764785	3.114464
11	0.916667	102.7901	0	0	33.92073	34.25802	0.337289	0.113764
12	1	119.2742	0	0	39.36049	37.55484	-1.80565	3.260369
1	1.083333	111.1078	0	0	36.66557	35.92156	-0.74401	0.553554
2	1.166667	121.7515	0	0	40.178	38.0503	-2.1277	4.527089
3	1.25	122.8547	0	0	40.54205	38.27094	-2.27111	5.157936
4	1.333333	126.3064	3.255187	0	38.58869	37.33369	-1.255	1.575027
5	1.416667	120.8021	6.394574	4.517931	33.74468	33.75956	0.014873	0.000221
6	1.5	119.8893	4.345269	4.130953	35.39417	34.67904	-0.71513	0.511404
7	1.583333	114.8631	4.225298	3.493131	33.85585	33.86134	0.005491	3.02E-05
8	1.666667	105.666	4.730072	4.392706	30.3323	31.58963	1.257333	1.580886
9	1.75	101.2156	3.576582	3.781424	29.96559	31.39855	1.432962	2.053379
10	1.833333	105.4028	4.304759	2.884398	30.66456	32.0513	1.386741	1.92305
11	1.916667	95.17052	1.569265	0	29.91547	31.94947	2.034002	4.137162
12	2	101.3258	0	0	33.4375	33.96515	0.52765	0.278415

1	2.083333	114.767	0	0	37.87312	36.6534	-1.21971	1.487698
2	2.166667	112.7802	0	0	37.21745	36.25603	-0.96142	0.924331
3	2.25	126.2373	0	0	41.65832	38.94746	-2.71085	7.34872
4	2.333333	123.2039	0	0	40.6573	38.34079	-2.31651	5.366229
5	2.416667	105.1649	6.468929	3.279955	28.52613	30.84252	2.316391	5.365669
6	2.5	106.5881	5.516977	4.234155	29.89061	31.41231	1.521694	2.315553
7	2.583333	98.3231	4.420862	3.642705	28.21038	30.42565	2.215271	4.907427
8	2.666667	111.2748	3.388723	3.5031	33.46638	33.55998	0.093609	0.008763
9	2.75	109.7506	3.698718	3.203744	32.67187	33.16	0.488138	0.238279
10	2.833333	105.0556	3.167577	4.205447	31.61711	32.28625	0.66914	0.447749
11	2.916667	108.4239	2	0	33.87987	34.38477	0.504898	0.254922
12	3	107.4294	0	0	35.45169	35.18588	-0.26582	0.07066

Rand_A	Rand_B	Rand_C	Rand_1
0.564648	0.886059	0.003829	0.716484
0.191332	0.809466	0.681525	0.926255
0.984848	0.268294	0.121591	0.514212
0.383764	0.624047	0.414695	0.50015
0.440889	0.677664	0.017774	0.680288
0.900871	0.784032	0.524853	0.438121
0.496478	0.226027	0.382952	0.380596
0.999543	0.208411	0.307067	0.494166
0.666856	0.778795	0.301088	0.1375
0.986843	0.873832	0.133422	0.04305
0.351242	0.31918	0.907667	0.379753
0.389504	0.977178	0.50621	0.412451
0.963711	0.025629	0.424333	0.92018
0.305389	0.855262	0.168582	0.455396
0.654563	0.093816	0.091572	0.772572
0.642734	0.389348	0.847375	0.201548
0.882308	0.822174	0.601024	0.866816
0.790107	0.947287	0.258965	0.193665
0.994467	0.172635	0.315476	0.703655
0.993153	0.362649	0.246565	0.096525
0.716315	0.798049	0.879366	0.275545
0.560781	0.288291	0.640712	0.657846
0.703153	0.585392	0.125211	0.919967
0.008526	0.865442	0.907135	0.785203
0.066288	0.373345	0.18226	0.685491

0.488351	0.417754	0.480149	0.779456
0.205996	0.412324	0.295193	0.842377
0.811866	0.761583	0.549846	0.10663
0.727184	0.956719	0.767045	0.296711
0.008244	0.984465	0.342825	0.676583
0.329406	0.758489	0.367078	0.164038
0.166155	0.460431	0.321352	0.403636
0.996754	0.127374	0.434563	0.056977
0.987528	0.349359	0.351872	0.381901
0.685795	0.016801	0.785736	0.369773
0.671193	0.393167	0.382184	0.410939
0.371469	0.634129	0.659045	0.973298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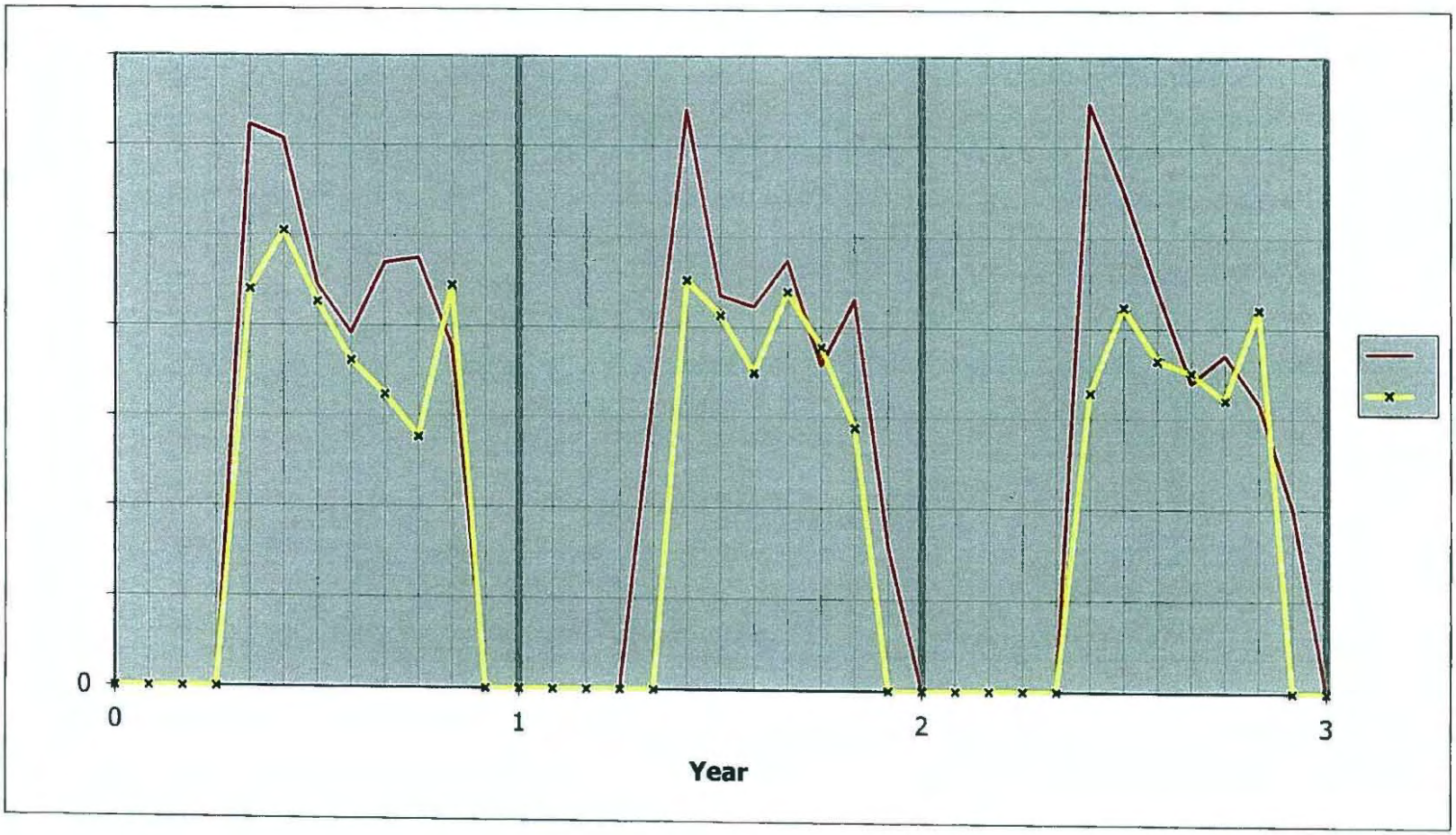
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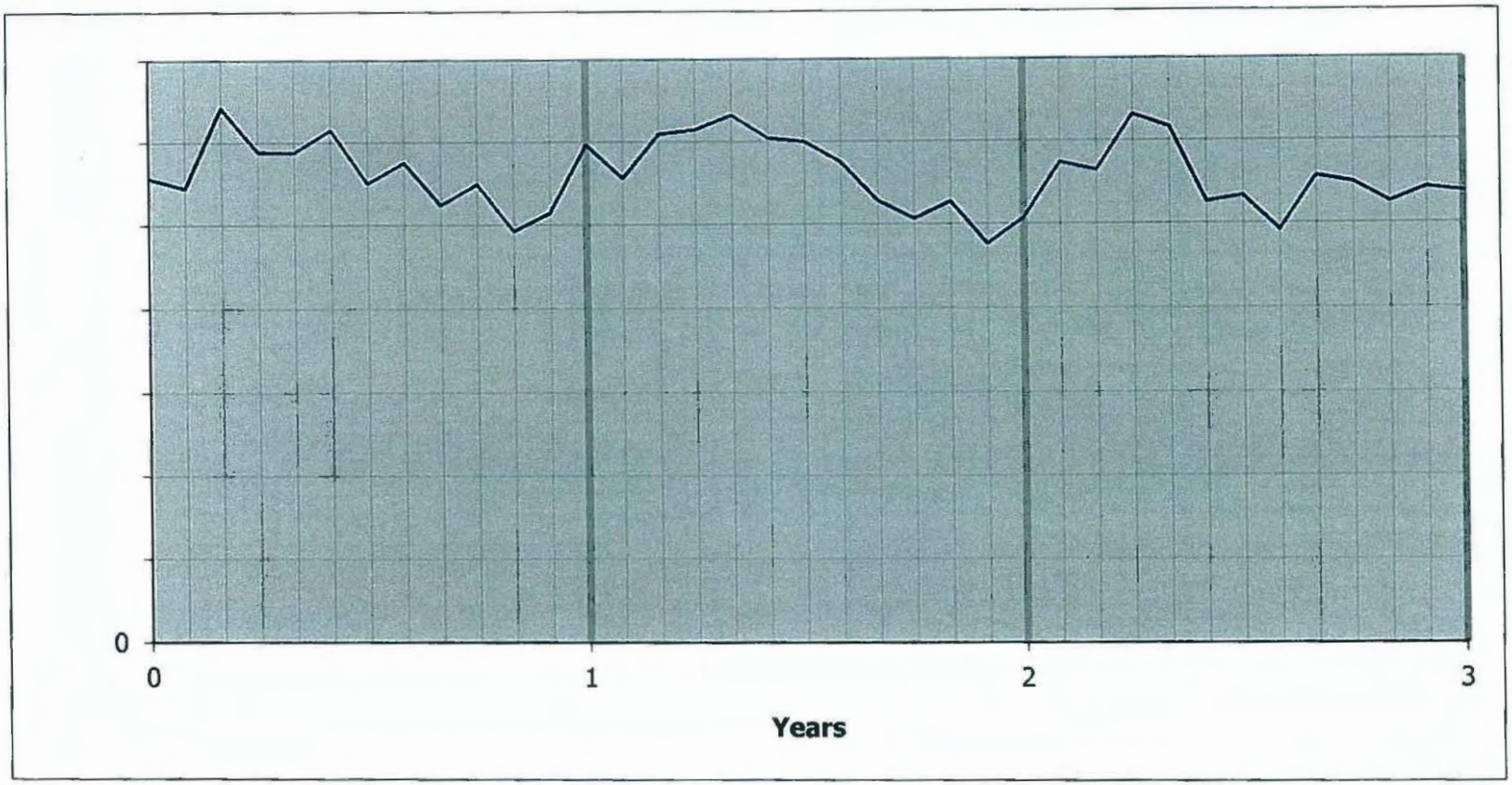
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