RECEIVED
APR 12 2005
Department of Water Resources

WHITE PETERSON

ATTORNEYS AT LAW

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KEVIN E. DINIUS
JULIE KLEIN FISCHER
CHRISTOPHER D. GABBERT
WM. F. GIGRAY, III
T. GUY HALLAM **
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WHITE PETERSON, P.A.
CANYON PARK AT THE IDAHO CENTER
5700 E. FRANKLIN RD., SUITE 200
NAMPA, IDAHO 83687-7901
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CHRISTOPHER S. NYE
PHILIP A. PETERSON
TODD A. ROSSMAN
TERRENCE R. WHITE ***

* Also admitted in CA
** Also admitted in OR
*** Also admitted in WA

April 12, 2005

Hand Delivery

Peter Anderson
c/o Victoria Wigel
Department of Water Resources
322 E. Front Sreet
Boise, ID 83720

Re: Permit Application Nos. 65-13912 and 65-13913

Dear Peter:

Pursuant to the scheduling order, attached are the exhibits that were exchanged with the opposing party on April 8, 2005. If you should have any questions please don't hesitate to call.

Sincerely,

WHITE PETERSON, P.A.

Ruth Hyde

Ruth Hyde, Legal Assistant to
Julie Klein Fischer

cc: Client

Julie K. Fischer
Idaho State Bar No. 4601
John R. Kormanik
Idaho State Bar No. 5850
WHITE PETERSON, P.A.
5700 East Franklin Road, Suite 200
Nampa, Idaho 83687
Telephone: (208) 466-9272
Facsimile: (208) 466-4405
jkf@whitepeterson.com
jkormanik@whitepeterson.com

BEFORE THE IDAHO DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF APPLICATION FOR PERMIT NOS. 65-13912; 65-13913 and 65-13986 IN THE NAME OF CAROL LYNN MACGREGOR	**APPLICANT'S EXHIBIT INDEX AND WITNESS LIST**

EXHIBIT INDEX

DOCUMENT NAME	EXHIBIT NO.	Admitted
MacGregor File 65-13912	1	
Protest to 65-13912	2	X
MacGregor File 65-13913	3	
Protest to 65-13913	4	
MacGregor File 65-13986	5	
Protest to 65-13986	6	X
MacGregor Application 65-13978	7	X
Protest to 65-13978	8	X

Partial Decree 65-01973	9		X
Partial Decree 65-01972	10		X
Pancheri File 65-12891	11		X
Pancheri File 65-13332	12		X
Pancheri File 65-13458	13		X
Reserved	14		
Reserved	15		
MacGregor Deed	16		X
Photographs	17A		X
Maps	18		X
Drawings of Project	19		X
Project Cost Estimate	20		X
Financial Assurance Document	21		X
Agreement for Specifications and Locations of Flow Meters	22		X
IDWR Staff Memo dated February 4, 2005	23		
ERO Resources Letter dated 5/20/03	24	X	X
ERO Resources Letter dated 10/01/03	25	X	X
ERO Resource Letter dated 11/05/02 to Gary Spackman	26		
ERO Resource Letter to Gary Spackman dated 4/17/01 with attached geothermal monitoring plan	27		
IDWR Letter to Jeffrey Fereday dated 5/29/01	28		
Ringel Test Well Materials from IDWR	29		
IDWR Administrators Memo dated 9/08/80 re: rate of flow for hearing use	30		X

		Adm.
Reserved	31	
Reserved	32	
Geologica Report dated 2/14/05	33	X
Illustrative Exhibits for Geoligica	34A 34B	X X
Reserved	35	
Reserved	36	
February 8, 2005 SPF letter with Belvidere Hot Springs Monitoring Data attached	37	X
Scanlan Report dated July 1, 1999 with attachments	38	X
Scanlan Draft Report Dated August 4, 2003 with attachments	39	
Scanlan Report Dated September 2, 2003 with attachments	40	X
Scanlan Engineering Letter to Jo Beeman dated 1/26/03	41	
Illustrative Exhibits for SPF	42	X
Examination and Evaluation of Geothermal Sites in the State of Idaho with Emphasis Given to Potential for Electrical Generation or Direct Use Dated September 2002	43	X
Geothermal Investigations in Idaho	44	
IDWR Letter dated 11/12/03	45	X

WITNESS LIST

Dr. Carol Lynn MacGregor

Terry Scanlan

Jill Haizlip

Chad Slichter

Suzanne Ambers

Daniel L. Tomich

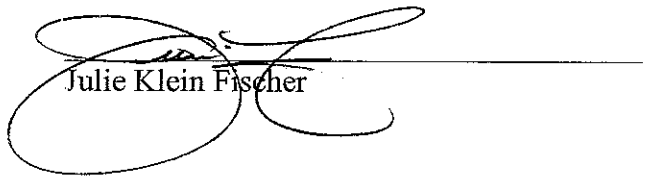
John Westra

Protestants

Any witnesses identified by Protestants

Petitioner reserves the right to amend this disclosure to add additional exhibits and/or witnesses at any time prior to the start of the hearing set for April 21, 2005.

DATED this 8th day of April 2005

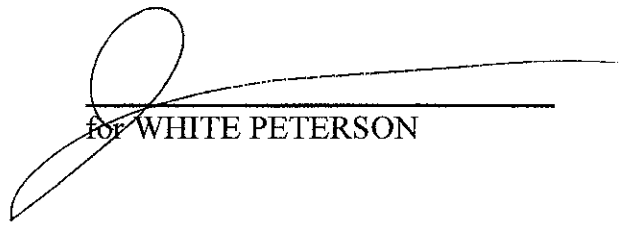


Julie Klein Fischer

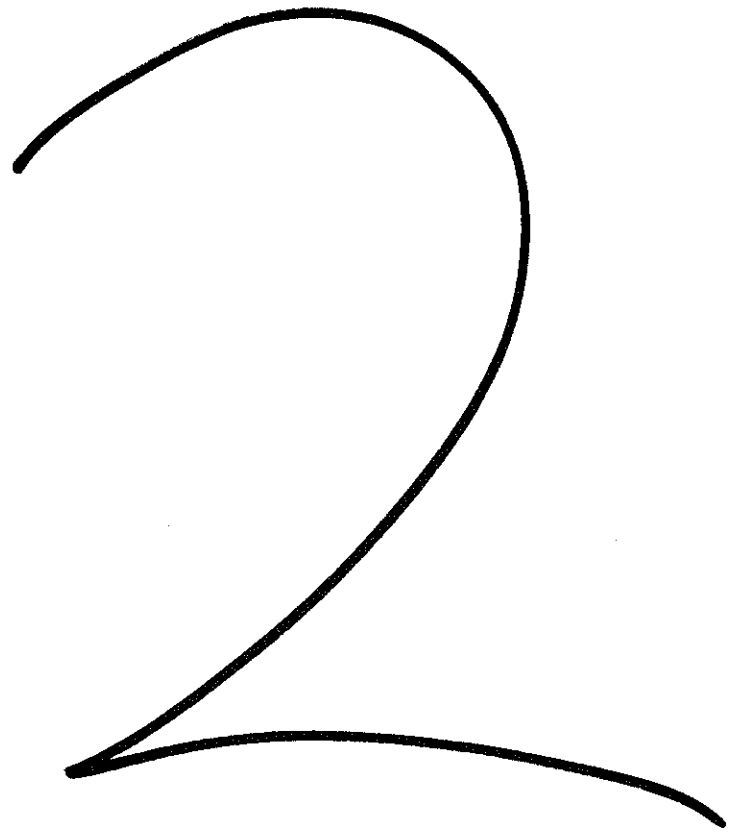
CERTIFICATE OF SERVICE

I hereby certify that on this 8th Day of April, 2005, I caused to be served a true and correct copy of the foregoing document by the method indicated below to the following:

_____	US Mail	Scott L. Campbell
_____	Overnight Mail	Moffatt Thomas
__X__	Hand Delivery	101 S. Capitol Blvd. 10th Floor
_____	Facsimile No. 385-5384	Boise, Idaho 83701



for WHITE PETERSON



7/94

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
NOTICE OF PROTEST

This form may be used to file a protest with the department under sections 42-108B, 42-203A, 42-203C, 42-211, 42-222 and 42-224, Idaho Code. The department will also accept a timely protest not completed on this form if it contains all necessary information.

1. Matter being protested # 65-13912
2. Name of protestant Duane & Darwin Panchers
3. Protestant's representative for service (If different than protestant)

4. Service mailing address 19010 Le Cam-Ada Rd Melba 83641
5. Service telephone no. 495-2513
6. Basis of protest (including statement of facts and law upon which the protest is based) Protecting our Senior Water Rights

(additional pages may be attached to describe the nature of the protest)

7. What would resolve your protest?

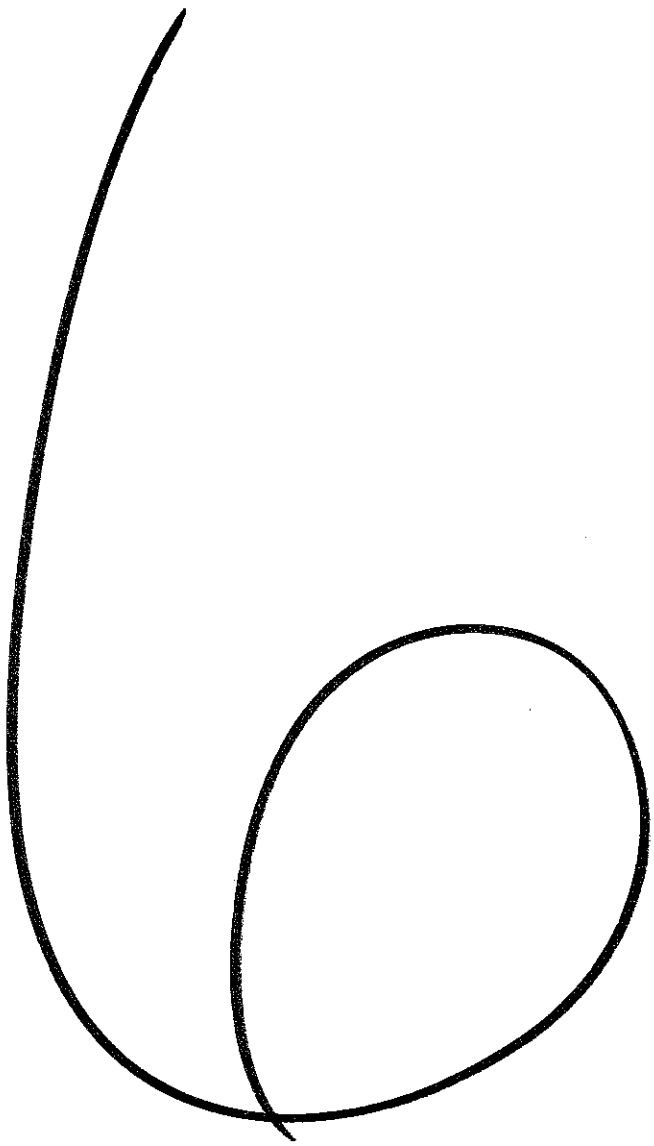
I hereby, acknowledge that if I, or my designated representative, fails to appear at any regularly scheduled conference or hearing in the matter of which I have been notified at the address above, the department may issue a notice of proposed default against me in this matter for failure to appear. I also verify that I have served a copy of this protest upon the applicant.

Signed this 20 day of Dec, 19 99.

Darwin Panchers
PROTESTANT

PROTESTANT'S REPRESENTATIVE

EXHIBIT 2



Scott L. Campbell
Angela D. Schaer
ELAM & BURKE, P.A.
Key Financial Center
702 West Idaho, 10th Floor
Post Office Box 1539
Boise, Idaho 83701-1539
Telephone: (208) 343-5454
Facsimile: (208) 384-5844
Campbell - ISB #2251
Schaer - ISB #5436

Attorneys for Respondents
Duane, Laura, Darwin, and Joan Pancheri

RECEIVED
DEC 21 2000
Department of Water Resources

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

IN THE MATTER OF APPLICATION FOR PERMIT NO. 65-13986 IN THE NAME OF CAROL LYNN MACGREGOR.	)))))	NOTICE OF PROTEST TO APPLICATION FOR PERMIT NUMBER 65-13986

Duane and Laura Pancheri and Darwin and Joan Pancheri ("Pancheris"), by and through their attorneys of record Elam & Burke, P.A., hereby file this notice of protest to Application for Permit Number 65-13986, filed in the name of Carol Lynn MacGregor. This Notice is brought in accordance with Idaho Code § 42-203A and IDAPA 37.01.01.250.

The Pancheris possess water rights and have points of diversion located in the same township, range, and section as the point of diversion for Application for Permit 65-13986. (See Exhibit A to Affidavit of Counsel, filed concurrently herewith and also with the Notice of Protest to Application for Permit Number 65-13978). In fact, one of the points of diversion listed in Application for Permit 65-13986 is in the same township, range, section and quarter quarter section

EXHIBIT 6

(T13N R03E § 13, SENE) as the Pancheris' water right number 65-11250. *Id.* Essentially, the Pancheris are concerned that the permits, if approved, will cause injury to their already-existing senior water rights.

The Pancheris also note that the same point of diversion for MacGregor's Application for Permit 65-13986 is located in the same quarter quarter section and has the same source (groundwater) as MacGregor's already-pending Application for Permit Number 65-19313. The Pancheris have also protested that Application for Permit, and are concerned about the potential overlap between Application for Permit 65-19313 and 65-13986.

In order to resolve the Pancheris' protest, the Pancheris respectfully request that the Idaho Department of Water Resources either deny Application for Permit 65-13986 in its entirety, or else place any and all conditions upon approval of that Permit that will insure that the Pancheris' water rights are not injured by approval of Application for Permit 65-13986.

DATED this 21st day of December, 2000.

ELAM & BURKE, P.A.

By _____
Angela D. Schaer, Of the Firm

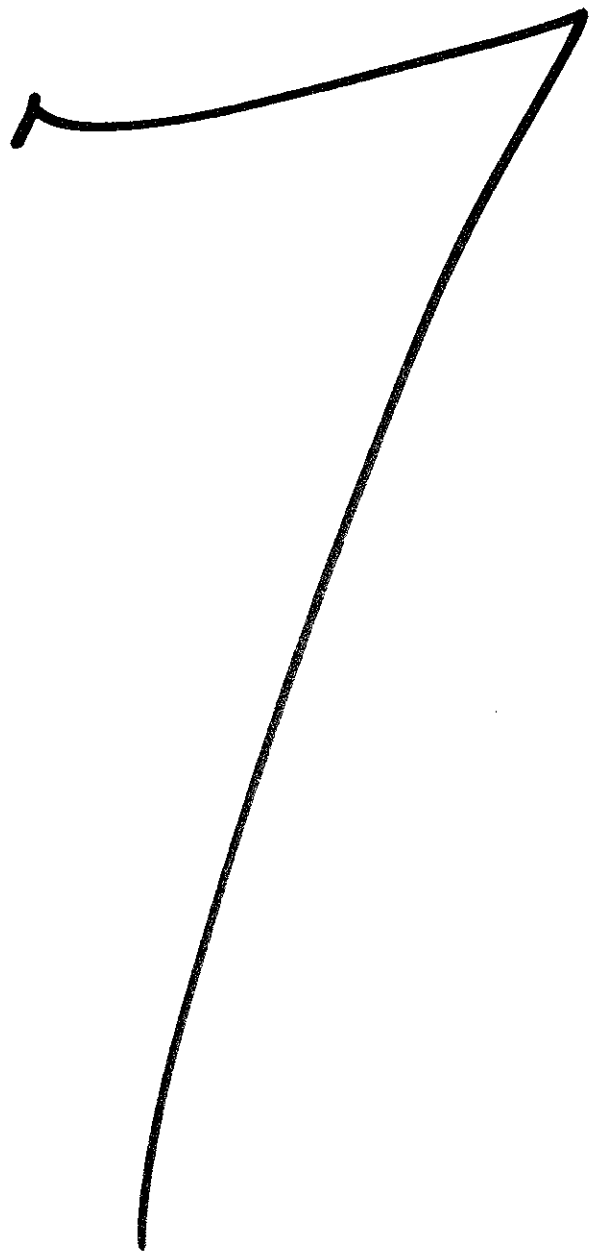
By _____
Scott L. Campbell, Of the Firm
Attorneys for Duane and Laura Pancheri
and Darwin and Joan Pancheri

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 21st day of December, 2000, I caused a true and correct copy of the above and foregoing instrument to be served upon the following individuals in the manner indicated below:

[✓]	U.S. Mail	Josephine P. Beeman
[ ]	Hand Delivery	BEEMAN & HOFSTETTER, P.S.
[ ]	Federal Express	608 W. Franklin Street
[ ]	Via Facsimile	Boise, Idaho 83701-1427
[✓]	U.S. Mail	Sherl Chapman
[ ]	Hand Delivery	ERO RESOURCES
[ ]	Federal Express	1106 North Cole Road, Suite C
[ ]	Via Facsimile	Boise, Idaho 83704-8661
[✓]	U.S. Mail	Terry Scanlan
[ ]	Hand Delivery	SCANLAN ENGINEERING
[ ]	Federal Express	600 East River Park Lane, Suite 105
[ ]	Via Facsimile	Boise, Idaho 83706

Scott L Campbell



FORM 202
2/96

RECEIVED
SEP 19 2000
WATER RESOURCES
WESTERN REGION

Ident. No. 65-13928

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name of Applicant Carol Lynn MacGregor Phone 208-386-9494
   Mailing address 1109 Warm Springs Avenue, Boise, ID 83702
2. Source of water supply Janelle Spring which is a tributary of Moores Creek
3. Location of point of diversion is Township 13N Range 3E Sec. 14, in the NW 1/4, SW 1/4, NW 1/4, Govt. Lot _____, B.M., Valley County;
   additional points of diversion if any: _____
4. Water will be used for the following purposes:
   Amount 0.04 (cfs or acre-feet per annum) for domestic purposes from 1/1 to 12/31 (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
5. Total quantity to be appropriated is (a) 0.04 cubic feet per second and/or (b) _____ acre feet per annum
6. Proposed diverting works:
   a. Describe type and size of devices used to divert water from the source spring box, 2-inch diameter pipe from spring box to house
   b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet
   c. Proposed well diameter is _____ inches; proposed depth of well is _____ feet
   d. Is ground water with a temperature of greater than 85°F being sought? _____
   e. If well is already drilled, when? _____; Drilling firm _____;
   Well was drilled for (well owner) _____; Drilling Permit No. _____
7. Time required for completion of works and application of water to proposed beneficial use is 5 years (*minimum 1 year*)
8. Description of proposed uses (*if irrigation only, go to item 9*):
   a. Hydropower; show total feet of head and proposed capacity in KW. _____
   b. Stockwatering; list number and kind of livestock. _____
   c. Municipal; show name of municipality. _____
   d. Domestic; show number of households. one home with shop
   e. Other; describe fully. _____

EXHIBIT 7

Description of place of use:

a. If water is for irrigation, indicate acreage in each subdivision in the tabulation below.

b. If water is used for other purposes, place a symbol of the use (*example: D for Domestic*) in the corresponding place of use below. See instructions for standard symbols.

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
13N	3E	14					D												

Total number of acres to be irrigated _____

10. Describe any other water rights used for the same purposes as described above. _____

11. a. Who owns the property at the point of diversion? applicant

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: _____

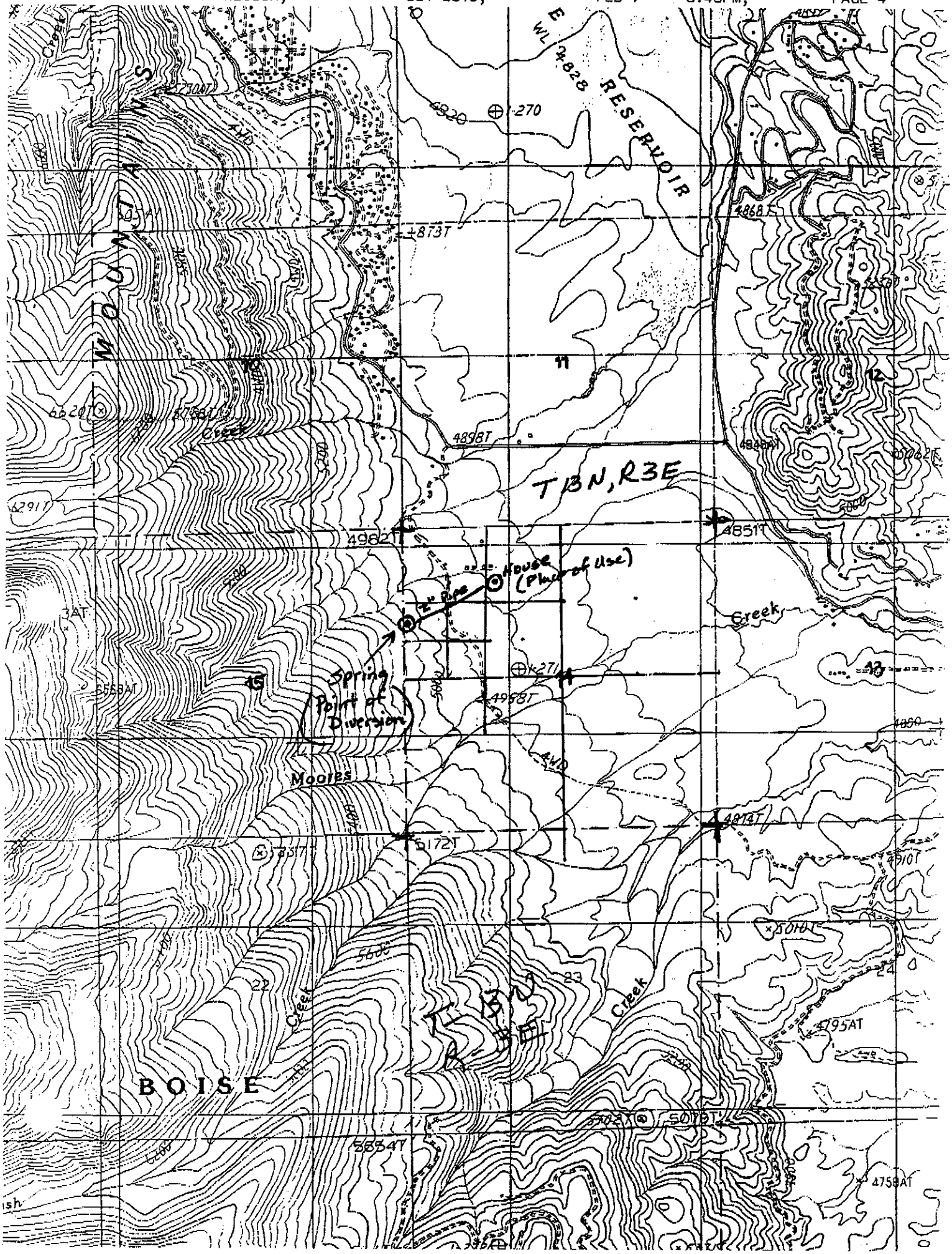
12. Remarks: _____

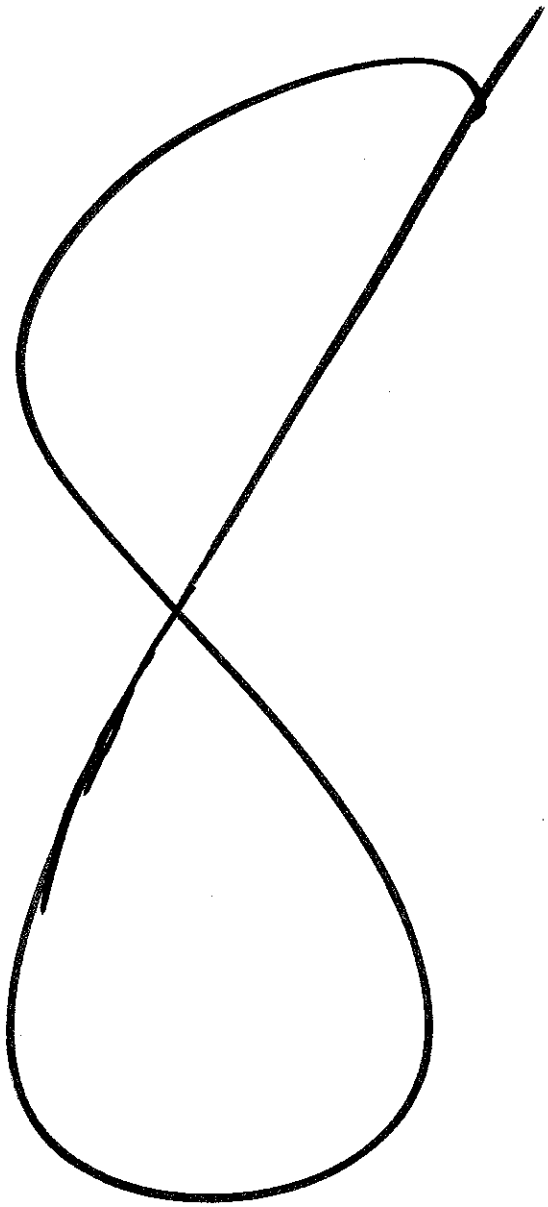
13. **MAP OF PROPOSED PROJECT REQUIRED** - Attach an 8½"x11" map clearly identifying the proposed point of diversion, place of use, section #, township & range. (A photocopy of a USGS 7.5 minute topographic quadrangle map is preferred.)

BE IT KNOWN that the undersigned hereby makes this application for permit to appropriate the public waters of the State of Idaho as herein set forth.

Signature of Applicant (and title, if applicable)

Received by KJ Date 9/19/00 Time 10:00 Preliminary check by DAN
Fee 1000 Receipted by KJ # D0026939 Date 9/19/00
Publication prepared by _____ Date 11/30/00 Published in _____
Publication approved _____ Date 1-16-01 LONG VALLEY ADVOCATE
12/6 & 13/00


WL 4,828 RESERVOIR
T 8 N, R 3 E
House (Place of Use)
1" Pipe
Spring
Point of Diversion
Moores
Creek
BOISE
4851T
4898T
4968T
5172T
4795AT
5070T
5654T
4759AT



Scott L. Campbell
Angela D. Schaer
ELAM & BURKE, P.A.
Key Financial Center
702 West Idaho, 10th Floor
Post Office Box 1539
Boise, Idaho 83701-1539
Telephone: (208) 343-5454
Facsimile: (208) 384-5844
Campbell - ISB #2251
Schaer - ISB #5436

Attorneys for Respondents
Duane, Laura, Darwin, and Joan Pancheri

RECEIVED
DEC 21 2000
Department of Water Resources

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

IN THE MATTER OF APPLICATION FOR PERMIT NO. 65-13978 IN THE NAME OF CAROL LYNN MACGREGOR.	))))	NOTICE OF PROTEST TO APPLICATION FOR PERMIT NUMBER 65-13978

Duane and Laura Pancheri and Darwin and Joan Pancheri ("Pancheris"), by and through their attorneys of record Elam & Burke, P.A., hereby file this notice of protest to Application for Permit Number 65-13978, filed in the name of Carol Lynn MacGregor ("MacGregor"). This Notice is brought in accordance with Idaho Code § 42-203A and IDAPA 37.01.01.250. MacGregor's Application for Permit 65-13978, is located in Township 13 North, Range 3 East, Section 14, which is adjacent to the section which contains the points of diversion for two of the Pancheris' rights. (Exhibit A to Affidavit of Counsel, filed concurrently herewith and with the Notice of Protest to Application for Permit Number 65-13986). Given that close proximity, the Pancheris are concerned

EXHIBIT 8

about the potential injury Application for Permit 65-13978, if approved, might cause to the Pancheris' already existing senior water rights.

In order to resolve the Pancheris' protest, the Pancheris respectfully request that the Idaho Department of Water Resources either deny Application for Permit 65-13978 in its entirety, or else place conditions upon approval of that Permit that will insure that the Pancheris' water rights are not injured by approval of Application for Permit 65-13978.

DATED this 21st day of December, 2000.

ELAM & BURKE, P.A.

By _____
Angela D. Schaer, Of the Firm

By _____
Scott L. Campbell, Of the Firm
Attorneys for Duane and Laura Pancheri
and Darwin and Joan Pancheri

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 21st day of December, 2000, I caused a true and correct copy of the above and foregoing instrument to be served upon the following individuals in the manner indicated below:

[✓]	U.S. Mail	Josephine P. Beeman
[ ]	Hand Delivery	BEEMAN & HOFSTETTER, P.S.
[ ]	Federal Express	608 W. Franklin Street
[ ]	Via Facsimile	Boise, Idaho 83701-1427

[✓] U.S. Mail
[ ] Hand Delivery
[ ] Federal Express
[ ] Via Facsimile

Sherl Chapman
ERO RESOURCES
1106 North Cole Road, Suite C
Boise, Idaho 83704-8661

[✓] U.S. Mail
[ ] Hand Delivery
[ ] Federal Express
[ ] Via Facsimile

Terry Scanlan
SCANLAN ENGINEERING
600 East River Park Lane, Suite 105
Boise, Idaho 83706

Scott L. Campbell

State of Idaho
DEPARTMENT OF WATER RESOURCES
2735 Airport Way, Boise, Idaho 83705
Phone: (208) 334-2190 FAX: (208) 334-2348 www.idwr.state.id.us/idwr/idwrhome.htm

DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

FAX TRANSMITTAL COVER SHEET

FAX # (208) 334-2348

DATE: _____

TO: Jo Beeman

388-8400

FROM: Rob Whitney

DOCUMENT DESCRIPTION: Carol Lynn MacGregor info.

TOTAL PAGES SENT: 6 **+ COVER SHEET**

CONTACT: _____

Scott L. Campbell
Angela D. Schaer
ELAM & BURKE, P.A.
Key Financial Center
702 West Idaho, 10th Floor
Post Office Box 1539
Boise, Idaho 83701-1539
Telephone: (208) 343-5454
Facsimile: (208) 384-5844
Campbell - ISB #2251
Schaer - ISB #5436

Attorneys for Respondents
Duane, Laura, Darwin, and Joan Pancheri

RECEIVED
JUN 13 2001
BEEMAN & ANDERSEN, P.C.
ATTORNEYS AT LAW

COPY

BEFORE THE DEPARTMENT OF WATER RESOURCES

OF THE STATE OF IDAHO

IN THE MATTER OF APPLICATION FOR PERMIT NO. 65-13978 IN THE NAME OF CAROL LYNN MACGREGOR.	WITHDRAWAL OF PROTEST TO APPLICATION FOR PERMIT NUMBER 65-13978

Duane and Laura Pancheri and Darwin and Joan Pancheri ("Pancheris"), by and through their attorneys of record Elam & Burke, P.A., hereby file this notice of withdrawal of their protest to Application for Permit Number 65-13978, duly filed on or about December 21, 2000.

DATED this 12th day of June, 2001.

ELAM & BURKE, P.A.

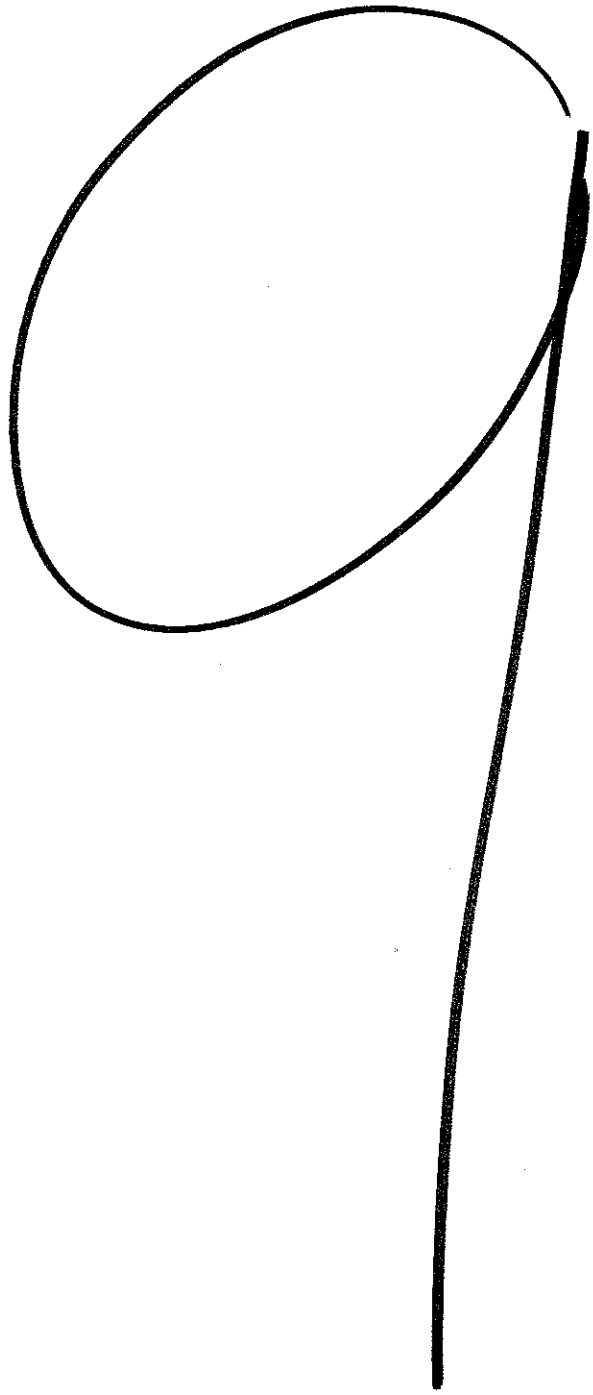
By _____
Scott L. Campbell, Of the Firm
Attorneys for Duane and Laura Pancheri
and Darwin and Joan Pancheri

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 12th day of June, 2001, I caused a true and correct copy of the above and foregoing instrument to be served upon the following individuals in the manner indicated below:

[X]	U.S. Mail	Josephine P. Beeman
[ ]	Hand Delivery	BEEMAN & HOFSTETTER, P.S.
[ ]	Federal Express	608 W. Franklin Street
[ ]	Via Facsimile	Boise, Idaho 83701-1427
[X]	U.S. Mail	Sherl Chapman
[ ]	Hand Delivery	ERO RESOURCES
[ ]	Federal Express	1106 North Cole Road, Suite C
[ ]	Via Facsimile	Boise, Idaho 83704-8661
[X]	U.S. Mail	Terry Scanlan
[ ]	Hand Delivery	SCANLAN ENGINEERING
[ ]	Federal Express	600 East River Park Lane, Suite 105
[ ]	Via Facsimile	Boise, Idaho 83706

Scott L. Campbell



1998 AUG 28 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	)	PARTIAL DECREE PURSUANT TO
	)	I.R.C.P. 54(b) FOR
Case No. 39576	)	
_____	)	Water Right 65-01973

NAME AND ADDRESS: EASTERN WESTERN CORP
MICHAEL E MC GINLEY PRESIDENT
1505 SE GIDEON ST
PO BOX 3228
PORTLAND, OR 97208-3228

SOURCE: SPRING TRIBUTARY: MOORES CREEK

QUANTITY: 0.01 CFS
1.20 AFY

THE QUANTITY OF WATER UNDER THIS RIGHT SHALL NOT EXCEED 13,000 GALLONS PER DAY.

PRIORITY DATE: 05/01/1901

POINT OF DIVERSION: T13N R03E S13 SENE Within Valley County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
Domestic	01-01 TO 12-31	0.01 CFS
		1.20 AFY

PLACE OF USE: Domestic Within Valley County
T13N R03E S13 SENE

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

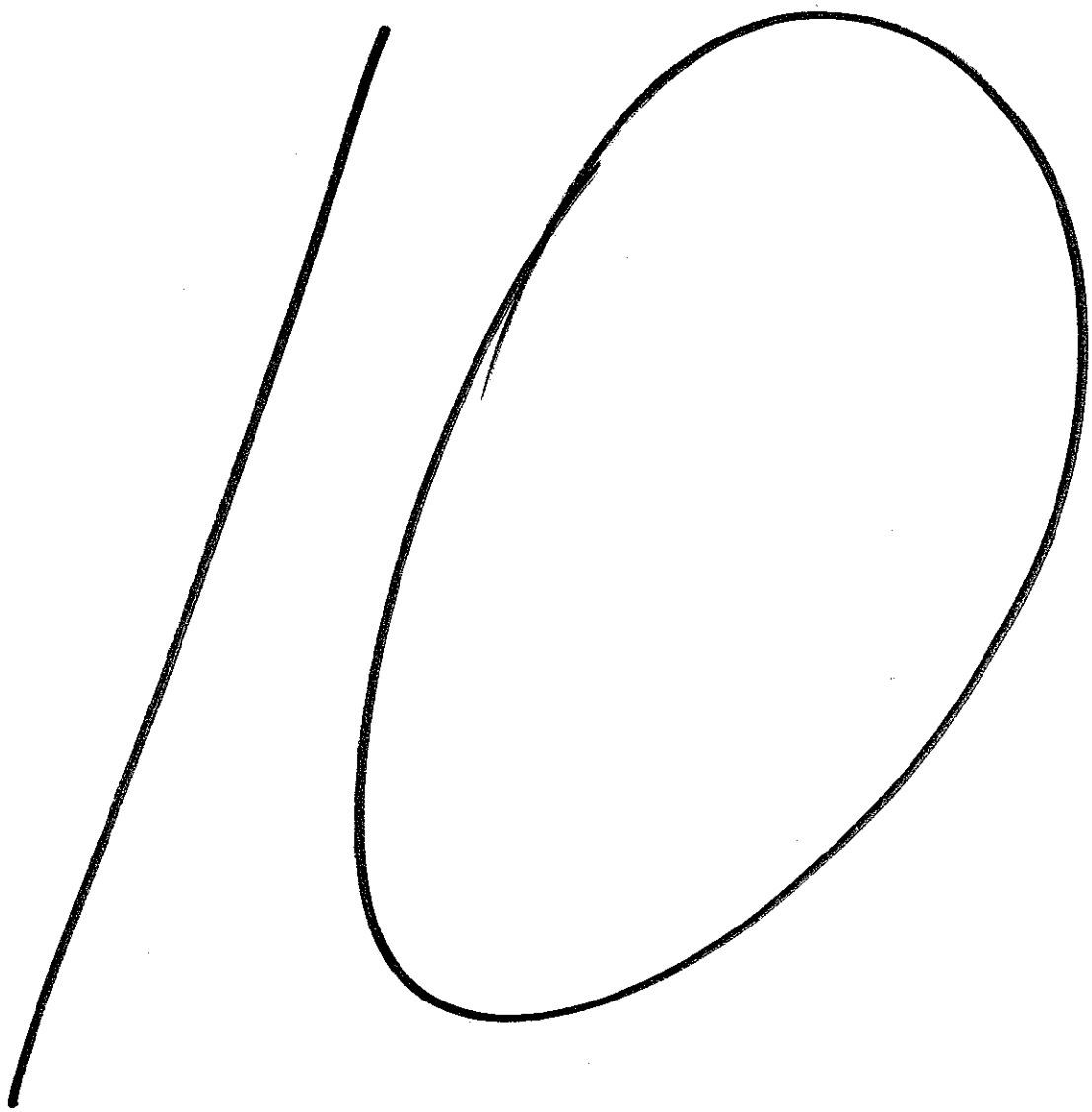
THE QUANTITY OF WATER DECREED FOR THIS WATER RIGHT IS NOT A DETERMINATION OF HISTORICAL BENEFICIAL USE.

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

EXHIBIT 9



1998 AUG 28 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	)	PARTIAL DECREE PURSUANT TO
	)	I.R.C.P. 54(b) FOR
Case No. 39576	)	
	)	Water Right 65-01972

NAME AND ADDRESS:
EASTERN WESTERN CORP
MICHAEL E MC GINLEY PRESIDENT
1505 SE GIDEON ST
PO BOX 3228
PORTLAND, OR 97208-3228

SOURCE: SPRING TRIBUTARY: MOORES CREEK

QUANTITY: 0.04 CFS
1.20 AFY

THE QUANTITY OF WATER UNDER THIS RIGHT SHALL NOT EXCEED 13,000 GALLONS PER DAY.

PRIORITY DATE: 05/01/1901

POINT OF DIVERSION: T13N R03E S13 SENE Within Valley County

PURPOSE AND PERIOD OF USE:

PURPOSE OF USE	PERIOD OF USE	QUANTITY
Domestic	01-01 TO 12-31	0.04 CFS 1.20 AFY

PLACE OF USE: Domestic Within Valley County
T13N R03E S13 SENE

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

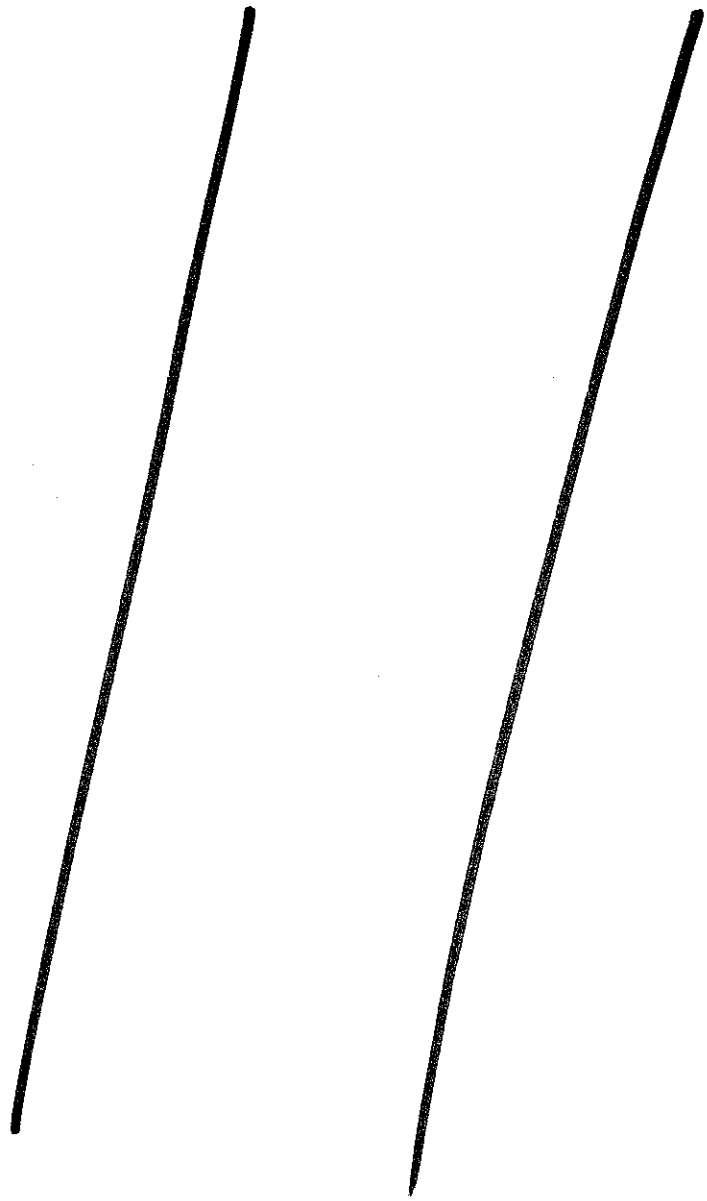
THE QUANTITY OF WATER DECREED FOR THIS WATER RIGHT IS NOT A DETERMINATION OF HISTORICAL BENEFICIAL USE.

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

EXHIBIT 10



State of Idaho
Department of Water Resources

RECEIVED
DEC 23 2003
Department of Water Resources

WATER RIGHT LICENSE

WATER RIGHT NO. 65-12891

Priority: October 19, 1988

Maximum Diversion Rate: 0.44 CFS
Maximum Diversion Volume: 51.3 AF

This is to certify, that DUANE PANCHERI
DARWIN PANCHERI
RT 1 BOX 48
MELBA ID 83641 has complied with the terms and conditions of the permit, issued pursuant to Application for Permit dated October 19, 1988; and has submitted Proof of Beneficial Use on August 21, 1989. An examination indicates that the works have a diversion capacity of .440 cfs of water from:

SPRING tributary to **MOORES CREEK**

source, and a water right has been established as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION	ANNUAL VOLUME
HEATING	01/01 to 12/31	0.40 CFS	47.7 AF
DOMESTIC	01/01 to 12/31	0.04 CFS	3.6 AF
	Totals	0.44 CFS	51.3 AF

LOCATION OF POINT(S) OF DIVERSION: NESENE , Sec. 13, Township 13N, Range 03E
SENENE , Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC			
13N	04E	18	SESW	NWSE	SWSE

PLACE OF USE: DOMESTIC, same as HEATING use

CONDITIONS/REMARKS:

1. The maximum diversion volume is defined as the maximum allowable volume of water that may be diverted annually from the source under this right. The use of water confirmed by this right is limited to the amount which can actually be beneficially used. The maximum diversion volume may be adjusted to more accurately describe the beneficial use or to implement accepted standards of diversion and use efficiency.
2. This water right is appurtenant to the described place of use.
3. This right is subject to all prior water rights and may be forfeited by five years of non-use.
4. Modifications to or variance from this license must be made within the limits of Section 42-222, Idaho Code, or the applicable Idaho law.

SCANNED JAN 18 2005

...MED
JAN 24 1992

State of Idaho
Department of Water Resources

WATER RIGHT LICENSE

WATER RIGHT NO. 65-12891

CONDITIONS/REMARKS:

5. Use of water under this water right will be regulated by the watermaster of State Water District No. 65.
6. Domestic use is for 3 homes and a shop.

This license is issued pursuant to the provisions of Section 42-219, Idaho Code. Witness the seal and signature of the Director, affixed at Boise, this 5 day of January, 1992.

for R. Keith Higginson, Director

MICROFILMED
JAN 24 1992

APPROVED

State of Idaho
Department of Water Resources

APPLICATION FOR AMENDMENT
(For Licensing Purposes)
WATER RIGHT NO. 65-12891

Date of Priority: October 19, 1988 Maximum Diversion Rate: 0.44 CFS
Maximum Diversion Volume:[1] 51.3 AF

Comes now DUANE PANCHERI
DARWIN PANCHERI

RT 1 BOX 48
MELBA ID 83641 and represents to the Director of the

Idaho Department of Water Resources:

That he is the owner and holder of Permit to Appropriate the Public Waters of the State of Idaho No. 65-12891, and requests that the permit be changed as follows:

Source: **SPRING** tributary to **MOORES CREEK**

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION	ANNUAL VOLUME
HEATING	01/01 to 12/31	0.40 CFS	47.7 AF
DOMESTIC	01/01 to 12/31	0.04 CFS	3.6 AF
	Totals	0.44 CFS	51.3 AF

LOCATION OF POINT(S) OF DIVERSION: NESENE , Sec. 13, Township 13N, Range 03E
SENENE , Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC			
13N	04E	18	SESW	NWSE	SWSE

PLACE OF USE: DOMESTIC, same as HEATING use

RECEIVED
JAN 24 1992

Permit holder asserts 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, this 28 day of Oct, 1991.

Duane Pancheri
(Signature)

State of Idaho
Department of Water Resources

APPLICATION FOR AMENDMENT
(For Licensing Purposes)
WATER RIGHT NO. 65-12891

****

#C022151

FOR DEPARTMENT USE ONLY

Preliminary check by SC Fee ✓ $20.00 Receipted by SC Date 10/28/91

ACTION OF THE DEPARTMENT OF WATER RESOURCES

I, R. Keith Higginson, of the Department of Water Resources hereby approve the above Application for Amendment for Permit No. 65-12891 with the following;

CONDITIONS/REMARKS:

1. The maximum diversion volume is defined as the maximum allowable volume of water that may be diverted annually from the source under this right. The use of water confirmed by this right is limited to the amount which can actually be beneficially used. The maximum diversion volume may be adjusted to more accurately describe the beneficial use or to implement accepted standards of diversion and use efficiency.
2. This water right is appurtenant to the described place of use.
3. This right is subject to all prior water rights and may be forfeited by five years of non-use.
4. Modifications to or variance from this license must be made within the limits of Section 42-222, Idaho Code, or the applicable Idaho law.
5. Use of water under this water right will be regulated by the watermaster of State Water District No. 65.
5. Domestic use is for 3 homes and a shop.

Witness my hand this 5 day of January, 1992

for R. Keith Higginson, Director

FILED

JAN 24 1992

State of Idaho

Department of Water Resources

ASSIGNMENT OF PERMIT

I, Darwin &/or Duane Pancheri, hereby assign to Duane Pancheri

of 19010 S. Can-Ada Melba 83641
Address

All my right, title, and interest in and to Permit No. 65-12891 to appropriate the public waters of the State of Idaho.

The following described portion of my right, title, and interest in and to Permit No. _____ to appropriate the public waters of the State of Idaho. (Describe that portion of the permit being assigned by listing the acreage within each 40 acre subdivision, the point of diversion and the amount of water in cubic feet per second for direct diversion, or acre feet for storage)

_____

_____

Made this 28th day of Octobes, 19 91.

X Duane Pancheri
Permit Holder

_____
Spouse of Permit Holder

State of Idaho)
ss
County of Gem)

On this 28th day of Octobes, 19 91, personally appeared before me the signer(s) of the above instrument, who duly acknowledged to me that he (she) (they) executed the same.

Sharla R Curtis

Notary Public residing at

Emmett Idaho

s e a l

y commission expires:

10-6-96

JAN 24 1992

State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 65-12891

Proposed Priority: October 19, 1988 Maximum Diversion Rate: 0.44 CFS

This is to certify, that **DUANE PANCHERI**
DARWIN PANCHERI
RT. 1 BOX 48
MELBA, ID 83641
has applied for a permit to appropriate water from:

SPRING tributary of **MOORES CREEK**

and a permit is **APPROVED** for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
HEATING	01/01 to 12/31	0.40 CFS
DOMESTIC	01/01 to 12/31	0.04 CFS
	Totals	0.44 CFS

LOCATION OF POINT(S) OF DIVERSION: LOT 2(NESWNW), Sec. 18, Township 13N, Range 04E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC			
13N	04E	18	SESW	NWSE	SWSE

PLACE OF USE: DOMESTIC, same as HEATING use

CONDITIONS/REMARKS:

1. Proof of construction of works and application of water to beneficial use shall be submitted on or before **August 1, 1990.**
2. Subject to all prior water rights.
3. Use of water under this permit is subject to control by the watermaster of State Water District No. 65.
4. Domestic use is for 3 homes and a shop.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code.
Witness the seal and signature of the Director, affixed at Boise, this
26th day of July, 1989.

for R. Keith Higginson, Director

MICROFILMED
SEP 22 1989

Ident. No. 65-12891

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name: DUANE PANCHERI 208-495-2513
   Address: RT. 1 BOX 48
   MELBA, ID 83641
   AND/OR
   Name: DARWIN PANCHERI 208-467-1348
   Address: RT. 4 BOX 4261
   NAMPA, ID 83651

2. Source: SPRING Trib. to: MOORES CREEK

3. Location of point of diversion:

Township	Range	Section	1/4 of 1/4 of 1/4	Lot	County
13N	04E	18	NE SW NW	2	VALLEY

4. Water will be used for the following purposes:

Purpose	From	To	CFS	(or)	AFA
HEATING	01/01	12/31	0.400		
DOMESTIC	01/01	12/31	0.040		

5. Total quantity appropriated is:
   0.440 CFS (and/or) AFA

6. Proposed diverting works:
   a. Description of ditches, flumes, pumps, headgates, etc.
   BURIED PIPE DRAIN SYSTEM, 10" & THEN 4" PIPE TO PLACE OF USE.
   b. Height of storage dam feet; active reservoir capacity acre-feet; total reservoir capacity acre-feet; period of year when water will be diverted to storage: to inclusive.
   c. Proposed well diameter is inches; proposed depth of well is feet.
   d. Is groundwater with a temperature greater than 90F being sought? NO

7. Time required for the completion of the works and application of the water to the proposed beneficial use is 1 years.

MICROFILMED

SEP 22 1989

7. Time required for the completion of the works and application of the water to the proposed beneficial use is 1 years.

8. Description of proposed uses:
HEATING AND DOMESTIC (3 homes & 1 shop, domestic use includes up to 1/2 AC.)

DATA ENTRY SL 10/19/88

9. Description of place of use:

Township	Range	Section	1/4 of 1/4		Lot	Use	Acres
13N	04E	18	SE	SW		HEAT	
			SE	SW		DOMEST	
			NW	SE		HEAT	
			NW	SE		DOMEST	
			SW	SE		HEAT	
			SW	SE		DOMEST	

10. Describe any other water rights used for the same purposes.
NONE.

11. a. Who owns the property at the point of diversion?
APPLICANTS
b. Who owns the land to be irrigated or place of use?
APPLICANTS
c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing.

12. Remarks:
SYSTEM IN PLACE AND USED SINCE 1978. TOTAL IRRIGATION OF YARDS DOES NOT EXCEED 1/2 ACRE.

13. Map of proposed point of diversion and place of use attached? [Y]

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.

Darwin Pancheri
Applicant

MICROFILMED
SEP 22 1989

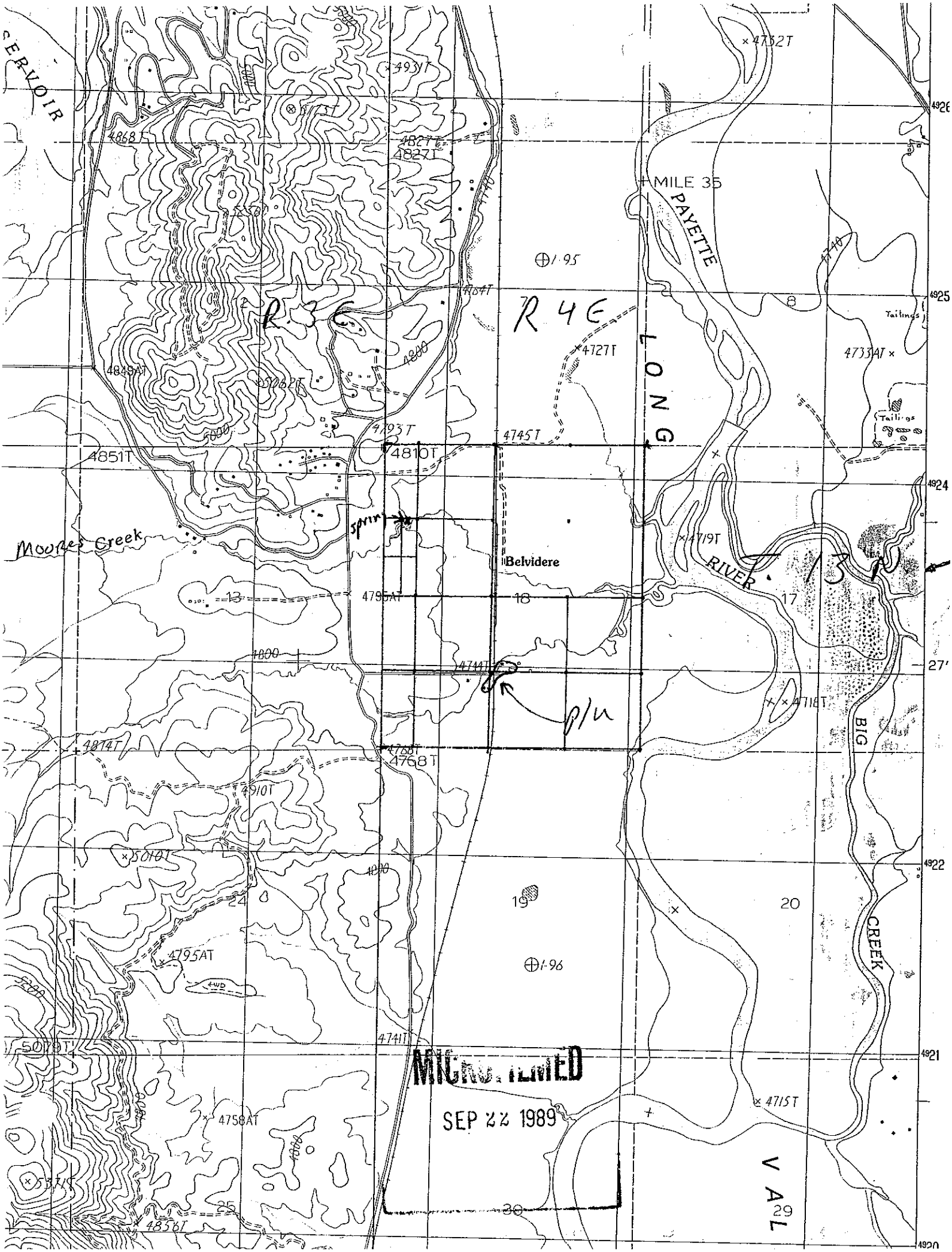
Received by SL Date 10/19/88 Time 11:30 Preliminary check by SL

Fee $ 45.00 Receipted by SL # W 001140 Date 10/19/88

Publication prepared by GG Date 10-26-88 Published in The Advocate 11/2 & 11/9/88

Publication approved SL 6/6/89 Date

MICROFILMED
SEP 22 1989


R.36
R 4E
LONG
PAYETTE
MILE 35
Belvidere
Mowrer Creek
RIVER
BIG
CREEK
VAL
R/W
4851T
4810T
4745T
4795AT
4768T
4741T
4910T
5010T
4795AT
5079T
4758AT
4856T
4727T
4719T
4718T
4715T
4733AT
4827T
4868T
4849AT
5062T
4804T
4793T
4874T
1-95
1-96
4WD
Tailings
MICROFILMED
SEP 22 1989

PUBLIC NOTICES

NOTICE OF APPLICATION FOR WATER RIGHT

The following application(s) have been filed to appropriate the public waters of the State of Idaho:

65-12878
CASH, EDWARD O.
CASH, MARIE I.
10784 OSWEGO WAY
BOISE, ID 83709

Source: UNNAMED STREAM
Tributary: DUCK CREEK

Diversion Pt: NWSE Sec 18 T 15N R 03E.
SWSE Sec 18 T 15N R 03E

Use: DOMESTIC (.040 CFS)

Date Filed: 10/11/1988

In: T15N R03E S18 SWSE

65-12891
PANCHERI, DUANE
PANCHERI, DARWIN
RT. 1, Box 48
MELBA, ID 83641

Source: SPRING

Tributary: MOORES CREEK
Diversion Pt: LOT 2 (NESWNW) Sec 18 T 13N R 04E

Use: HEATING (.400 CFS)
DOMESTIC(.040 CFS)

Date Filed: 10/19/1988

In: T13N R04E S18 SESW NWSE SWSE

65-12894
JJJJ WATER USERS ASSN.
C/O J.V. or JUNE S. OTTER
906 Houston Rd.
Boise, Id. 83706

Source: UNNAMED STREAM

Tributary: CASCADE RESERVOIR

Diversion Pt: SWSWNE Sec 19 T 15N R 03E

Use: IRRIGATION (.060 CFS)
DOMESTIC (.060 CFS)

Date Filed: 10/20/1988

In: T15N R03E S19 SWNE NWSE

2.7 ACRES TOTAL

The permit(s) will be subject to all prior water rights. Protests must be filed with the Director, Dept of Water Resources, Western Region, 2735 Airport Way, Boise, Idaho 83705 on or before NOVEMBER 21, 1988.

R. KEITH HIGGINSON, Director

Published 11/02/1988 a[illegible]

MICROFILMED
SEP 22 1989

Affidavit of publication

RECEIVED
STATE OF IDAHO
JUN 6 1989
Department of Water Resources
Western Regional Office

COUNTY OF VALLEY

I, Fred K. O'Brien, being duly sworn deposes and says, I am the Publisher of *The Advocate*, a weekly newspaper published at Cascade, in Valley County, Idaho; and having a general circulation therein and of legal status in said county.

The Notice of Application No. 63-12178, a copy of which is attached hereto; was published in said newspaper once a week for _____ consecutive weeks in the regular and entire issue of every number thereof during the period and time of publication, and was published in the newspaper proper and not in a supplement; and that publication of such notice began:

11-2, 1988

and ended 11-9, 1989

Fred K O'Brien

Subscribed and sworn before me, this the

5th day of June, 1989

MICROFILMED
SEP 22 1989

On this 5th day of June, 1989

I, a Notary Public in and for the State of Idaho, state that said person, Fred O Brien, did in fact present me with this document and I did witness his signature on the document.

Rayola Jarvis

Rayola Jarvis, Notary Public residing at Cascade, Idaho

RECEIVED
DEC 23 2003
Department of Water Resources

RECEIVED
SEP 17 1998
Department of Water Resources

INTER-DEPARTMENT MEMO--1

FROM Steve L. DATE 9/15/98

TO Karilynn T. 65-12891 (They have Bs. 63 + Bs. 65 rights, maybe others too?)

SUBJECT Change in Address

Recently I sent letter to Darwin P. c/ 57 Sycamore Rd. address but it was returned w/ P.O. c/ "forward; address expired" language. I re-sent letter to new address as shown. I rec'd the attached from Darwin on c/ 9/10/98.

Looks like can show new address for Darwin/Joan P. per attached. Does not appear can add sons name based on this, however (?).

Thanks, -SL
SIGNATURE

cc → Western SRBA staff for claims

MICROFILMED
FEB 24 2004

SCANNED
JAN 18 2005

9/8/98 –

New address: 9325 Missouri Ave.
Nampa, ID 83686

Names: Darwin Pancheri
Joan Pancheri

if possible add our son's name –
Joseph Kurt Pancheri

Phone: 467-1348

Wells: Valley Co. Idaho

Fax – 467-1348

MICROFILMED
FEB 2 4 2004

State of Idaho
DEPARTMENT OF WATER RESOURCES
Western Region, 2735 Airport Way, Boise, Idaho 83705-5082 - (208) 334-2190
FAX (208) 334-2348

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

August 27, 1998

9325 Missouri Ave
Nampa 83686
per US west Directory 1998
9/2/98

MR DARWIN PANCHERI
~~15501 STAGECOACH~~
NAMPA ID 83686

RE: LICENSING OF WATER RIGHT PERMITS

Dear Darwin:

After your call a few days ago, I checked the status of all your water rights in the Cabarton area. All of your permits for that site have been field examined in the last several years. The permits are now in the licensing process.

A perennial problem at this agency is not having the resources to complete everything in a timely manner. More often than not, completion of the licensing process is forced to take a back seat to more urgent work. This is regrettable but unavoidable given the present realities.

I hope that the licenses can be issued soon. The good news is that the beneficial use developed under the permits has been verified. The rights remain fully protected by completion of that verification.

Please let me now if you have any questions about this subject.

Sincerely,

Steve Lester

Steve Lester
Water Rights Supervisor

MICROFILMED
FEB 2 4 2004

January 12, 1992

DUANE PANCHERI
DARWIN PANCHERI
RT 1 BOX 48
MELBA ID 83641

RE: WATER RIGHT NO. 65-12891

Dear Water Right Holder(s):

Enclosed herewith is a copy of the Water Right License issued on the above referenced permit along with a copy of your approved application for amendment.

Should you have any questions regarding these documents, please feel free to contact our office.

Sincerely,

SHARLA CURTIS
Water Resource Agent

SC:blm

Enclosure

MICROFILMED
JAN 24 1992

October 15, 1991

DUANE PANCHERI
DARWIN PANCHERI
RT 1 BOX 48
MELBA ID 83641

RE: WATER RIGHT NO. 65-12891

Dear Water Right Holder(s):

The above referenced water right is in the process of being licensed. However, before a license can be issued, your permit must be amended to correspond with the findings of the Department's field examiner.

The enclosed application for amendment contains information that will be included on the license when it is issued. Please review carefully and if you concur, sign the amendment and return with the $20.00 filing fee within 15 days.

If you do not concur with these findings or if you have any questions, please contact us within the 15-day period.

Sincerely,

SHARLA CURTIS
Technical Records Specialist

SC:blm

Enclosure

MICROFILMED

JAN 24 1992

LICENSE REVIEW CHECKLIST

Permit No. 65-12891

Name/Address — change? ____ ok ✓

Priority date — Advance? yes ____ no ✓
Memo to advance ____
Order to reinstate needed? yes ____ no ✓

Total cfs — Limited by fee ok
Limited by capacity ____

Total volume — Limited by flow ____
Chart checked for AF rate/ac N/A

Capacity — Actual measurement checked ____
Theoretical checked ____
If greater than permit, check for other rts ____

Source — Changed? yes ____ no ✓
If so, is memo needed to clarify? ____

P/D — Verify with map ✓ permit ✓ amendment needed
More than one per ¼¼? Remember remark ____
Check p/d overlap N/A

Uses — Check irrigation period of use w/ chart N/A

P/U — Verify with map ✓ permit ✓
> 5 acres irrigated, run overlap N/A

Remarks — More than one p/d in ¼¼ ____
Description of non-irrig uses ✓
Special overlap condition ____

Conditions –
Measuring device 804
W.Master control ____
Overlap ____
Water quality ____
Other ____

Dates/Misc. –
Water Dist ✓
App Rec'd ✓
Proof Rec'd ✓

CHECK FOR ADJ. CLAIM — Needed according to proof filed
Filed - needs amended ____
Add'l fee required ____
Not filed - ____
Not needed ____

FILED
SEP 24 1992

Comments/Changes to Examiner's Recommendations:
Volume for heating: 180 gpm (.40 cfs) X 8 hrs/day X 180 days/yr ÷ 325,850 = 44.7 AF

License ____ 10-day ____ 30-day ✓

Back of field report signed? ____
Reviewer S. Curtis Date 9/3/97 Review time 10 min.

CONVERSATION MEMORANDUM

DATE 8/7/91

FILE 65-12891

NAME OF PARTY Diane Pancheri

EMPLOYEE Jan Shute

RE: Additional pro-rata fee paid.

On 8/6/91 Ms Pancheri phoned requesting an update on 65-12891. On reviewing the file I informed her the field exam had been done and the recommended amount would be limited to .20 cfs per the $50 exam fee paid rather than the .44 cfs on the permit. The exam does indicate that the system could deliver .44 cfs & now therefore, I did tell Ms. Pancheri about paying the additional pro-rata fee plus the penalty in order to license the permit for .44 cfs. She opted to pay the fee and come in the next day to do so. She paid the additional $50 fee plus a $25 penalty fee for up to 1.0 cfs. She requested that the licensing be expedited at this time. I informed her I would request the expediting of the license for her.

RECEIVED

JAN 24 1992

$75.00 - Receipt #WD13564

P/D 13N 4E 5.18 NE SW NW

P/U SESW
NWSE
SWSE

9-S.A.
86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

Perm. No. 65-12891

RECEIVED
JUL 22 1991
Department of Water Resources

Staff Analysis Sheet
for
Beneficial Use Field Report

A. Prior to Conducting the Exam, the File Contains:

- ☑ Blank Field Report Form
- ☑ Copy of Permit
- ☑ Copies of any Amendments/Orders with conditions of approval
- ☐ Computer Data Proof Report
- ☑ Copy of U.S.G.S. Quad
- ☑ Check for Government Lots. If so, make a copy of Government Plat

Check of P/D index SL 10/16/89 (Initial and date)

Overlap? ☐ yes ☑ no If yes: ☐ copy of exam(s) attached? N/A
Type of Overlap? ☐ Add acres or uses to existing system
☐ Increase rate of flow or volume
☑ Other: other sources

yes - 4/25/91 but none significant

Check of P/U index SL 10/16/89 (Initial and date)

Overlap? ☑ yes ☐ no If yes: ☐ copy of water right(s) attached? N/A
Type of Overlap? ☐ Increase rate of flow or volume
☐ Add P/D's
☐ Increase number of acres within tracts
☑ Other: other uses

Aerial Photo

Required? ☐ yes ☑ no If yes: ☐ copy attached?

Scheduling Letter sent? N/A (Initial and date)

☑ Appointment made and telephone conversation memo attached

B. After Conducting the Exam, the File Contains:

- ☑ Fully completed and signed Field Report Form
- ☑ Photographs of Point of Diversion and Place of Use
- ☐ Corrected Computer Data Proof Report with recommended license information, and data and signature of examiner.

☑ Proof filed 8-18-89, SRBA claim not required and not filed.

C. Review and Processing:

Exam Completed Steve Lester 4/25/91 (Signature of examiner and date)

Exam Reviewed by Senior Water Resource Agent LW 5/2/91 (Initial and date)

Exam Reviewed by Manager of Regional Office DR 6/27/91 (Initial and date)

Exam Date Entered in Computer 7-2-91 st (Initial and date)

Exam sent to State Office 7-2-91 st (Initial and date)

Copy of Staff Analysis Sheet sent to Manager of Regional Office and Original Refiled in White File _____ (Initial and date)

Form 219
3/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No. 65-12891

1. Owner: Darwin and/or Duane Pancheri Phone No. 467-1348 or 495-2513
   Current Address: 15501 Stagecoach Rd. Nampa Id, 83686
2. Accompanied by: Joan Pancheri EXAM. DATE: 10/17/89
   Address: as above Phone No. as above
   Relationship to Permit Holder: Spouse of Darwin Pancheri
3. Source: Spring tributary to Moores Creek

B. OVERLAP REVIEW

1. Other water rights with same place of use: 65-06628 -02696 -11250
   ☐ Copies Attached N/A
2. Other water rights with same point of diversion: 65-01972 -01973 -11250 -08430 -12127 -01988
   ☐ Copies Attached ☐ Copies of Field Exam's Attached N/A

C. SYSTEM DESCRIPTION

1. **Diversion System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe i.d. as applicable. ☑ Alternative diagram attached

See topo & alternative diagram

MICROFILMED
JAN 24 1992

Scale: 1" = NOT TO SCALE

2. ☑ Copy of U.S.G.S. Quadrangle Attached
   Showing location(s) of point(s) of diversion and place(s) of use (required).
   ☐ Aerial Photo Attached N/A
   (required for irrigation of 10 acres or more).
   ☑ Photo of Diversion and System Attached
   (required for all but single household domestic groundwater, and stockwater.

Do not use this space

D. FLOW MEASUREMENTS

☐ Additional Data Sheets Attached

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
N/A						

2. **Measurements:**

Flow - no measurements possible

For sq. ft. of heating areas & other details, see Attachment #1.

E. FLOW CALCULATIONS

☑ Additional Computation Sheets Attached

1. Measured Method: None

2. Alternate Method for Checking Purposes: See additional pg., Attachment #1

F. PUMP EFFICIENCY DATA (Optional) N/A

Discharge Pressure: _____ psi x 2.31 = _____ ft (1); Dynamic pumping level: _____ ft (2)

Total Head: (1) + (2) = _____ (3) ; Flow rate: _____ cfs (4)

Water HP: (3) x (4) ÷ 8.8 = _____ (5)

Meter Input KW: 3.6 x _____ KH x _____ CTR or _____ MULT x _____ PTR x _____ N/ _____ T = _____ (6)

Meter Input HP: (6) x 1.34 = _____ (7)

Panel Input KW: _____ Ave PF x _____ Ave Volts x _____ Ave Amps x .001732 = _____ (6)

Panel Input HP: (6) x 1.34 = _____ (7) Efficiency: (5)/(7) x 100 = _____ %

V. (.20)(365)(1.9835) = 144.8 afa

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation: N/A

V_{IR} = (Acres Irrigated) x (Irrigation Requirement) = _____

V_{DR} = [Diversion Rate (cfs)] x (Days in Irrigation Season) x 1.9835 = _____

V = Smaller of V_{IR} and V_{DR} = _____

MICROFILMED JAN 24 1992

2. Volume Calculations for Other Uses:

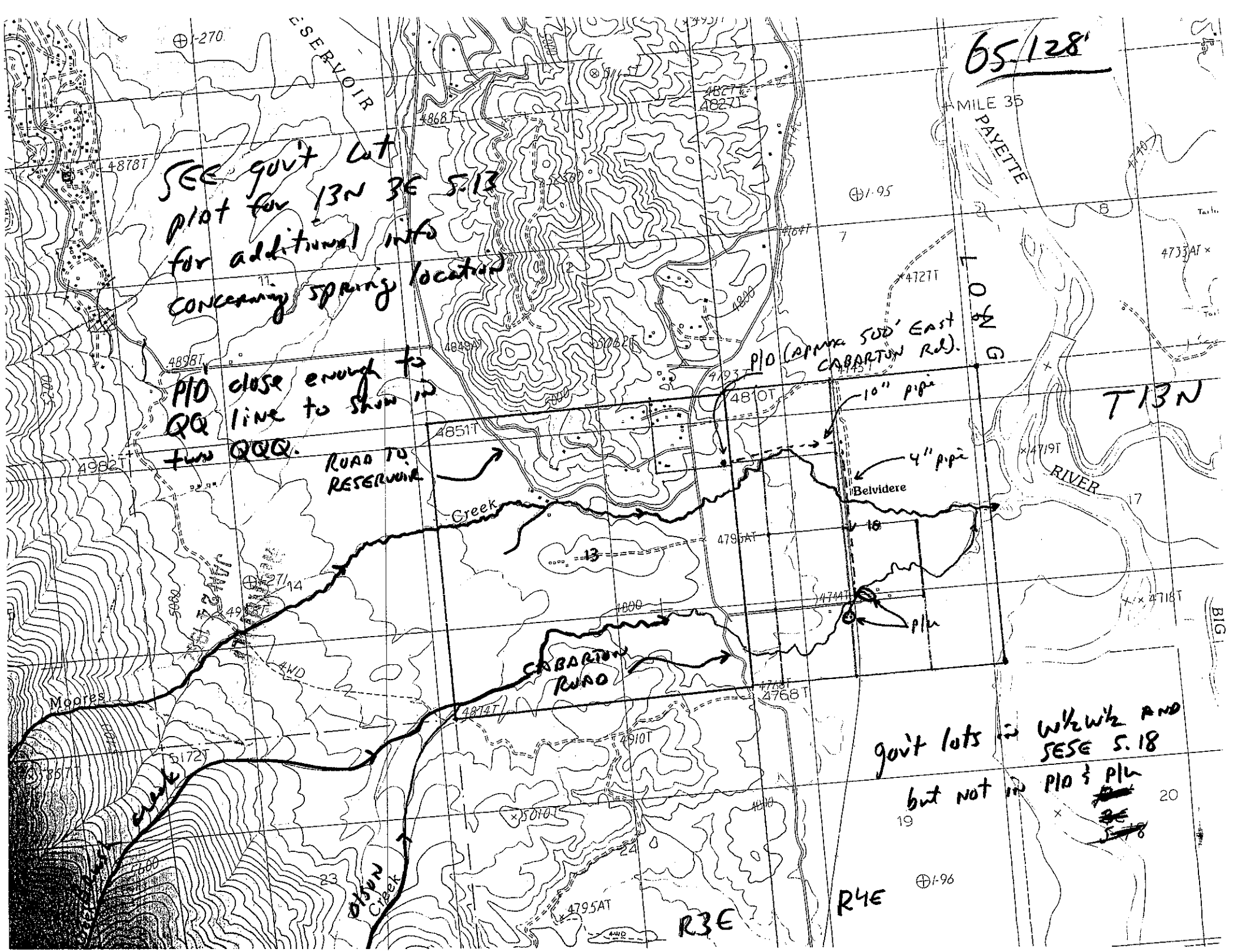
Domestic 3 Homes, 1 shop: 2 homes int only = (2)(.6) = 1.2 afa; 1 home & shop, int + ext = (2)(1.2) = 2.4 afa; (3.6)

V. (.14)(365)(1.9835) = 72.4 afa

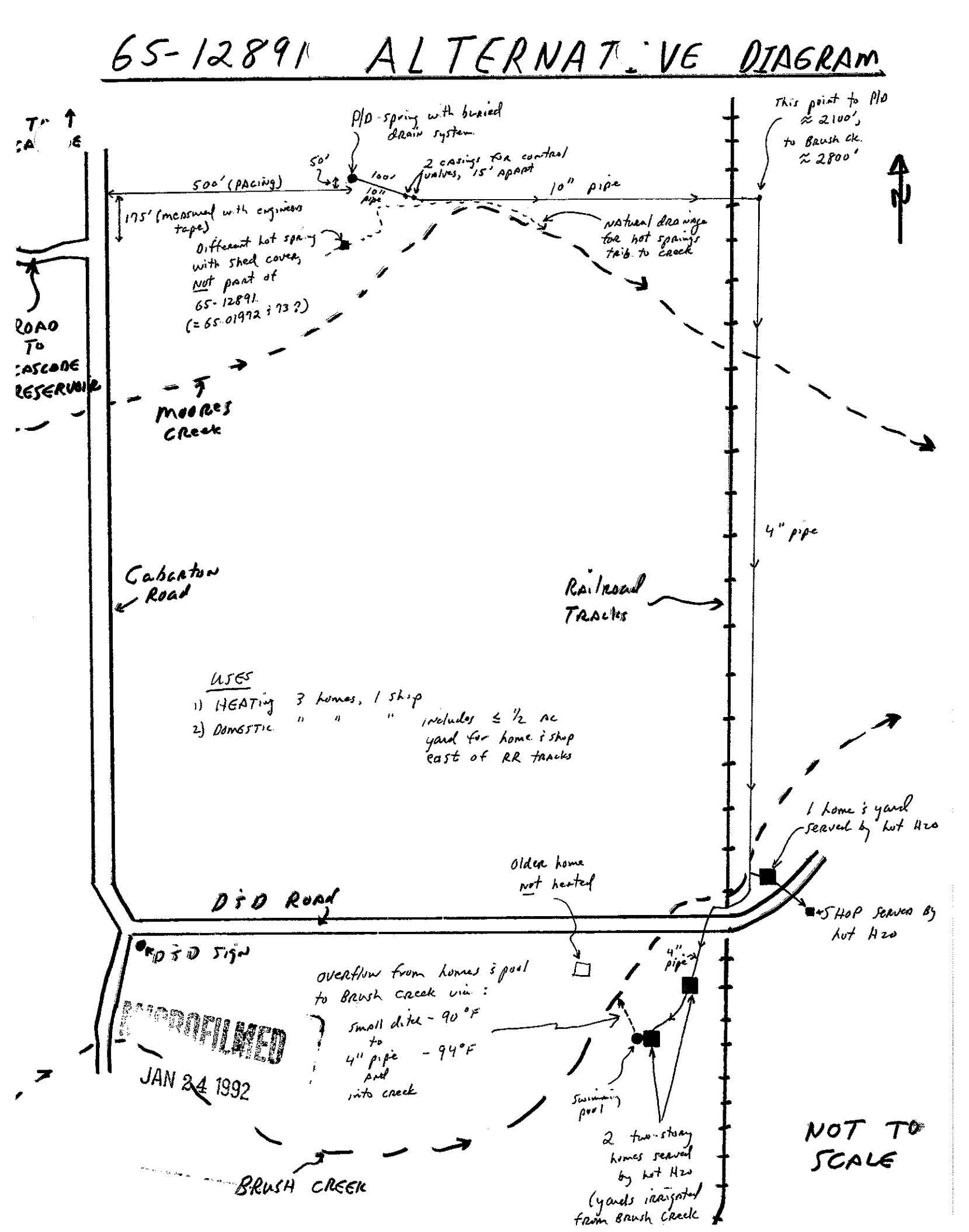
HEATING Although Hot Area runs continuously since also used for domestic, estimate Heat heat needed x 12 hrs/day, 80% of year for that area (292 days).

[20 cfs x 448.8 gpm/cfs x 60 min/hr x 12 hr/day x 292 days/yr] ÷ 325850 = (57.9 afa)

continued


65.128
SEE govt Lot plat for 13N 3E 5.13 for additional info concerning spring location
P10 close enough to QQ line to show in two QQQ.
P10 (approx 500' East CABARTON Rd).
10" pipe
4" pipe
ROAD TO RESERVOIR
CABARTON ROAD
P11
govt lots in Wk wk AND SESE 5.18
but not in P10 & P11
T13N
R4E
R3E
LOG
RIVER
BIG
Belvidere
Moores
Creek
Olson Creek
RESERVOIR
PAYETTE
MILE 35
I-270
I-95
I-96
4WD

65-12891 ALTERNATIVE DIAGRAM



MICROFILMED
JAN 24 1992

CONVERSATION MEMORANDUM

DATE 10/19/88

FILE 65-12891

NAME OF PARTY Pancheri

EMPLOYEE Steve Lester

RE: Estimating flow for heating gen Palmi. permit 23 :

3 2-story homes, 1 shop

sq. ft. = 2200 + 1000 + 1800 + 720 = 5720, round to 5800 since area estimates may be low.
(← homes → shop)

source temp = 101° F

t_1 = 70° F (assumed)

t_0 = -8° F (assumed ≈ Pocatello)

efficiency is average.

→ for 2-story units

$E = [e \cdot \Delta T][.8A]$ where $\Delta T = t_1 - t_0 = 70 - (-8) = 78$ and e extrapolated

$E = [(52.6)(78)][(.8)(5800)] = 19,036,992$

$W = \frac{Q}{500(\Delta T_s)}$ where $Q = E$ and $\Delta T_s = (.6)(101-70) = 18.6$

$W = \frac{19,036,992}{(500)(18.6)} = 2047$ gpm = 4.56 cfs

Applicants want to use .40 cfs for heating purposes within the suggested range.

MICROFILMED

JAN 24 1992

ALLOW FOR LICENSING:

.20 cfs ($50 proof paid)

↓

Domestic (4 units) = .10 cfs

Heating = .20 cfs

TOTAL .20 cfs

MICROFILMED

SEP 22 1989

Attachment #1
65-12891 Exam

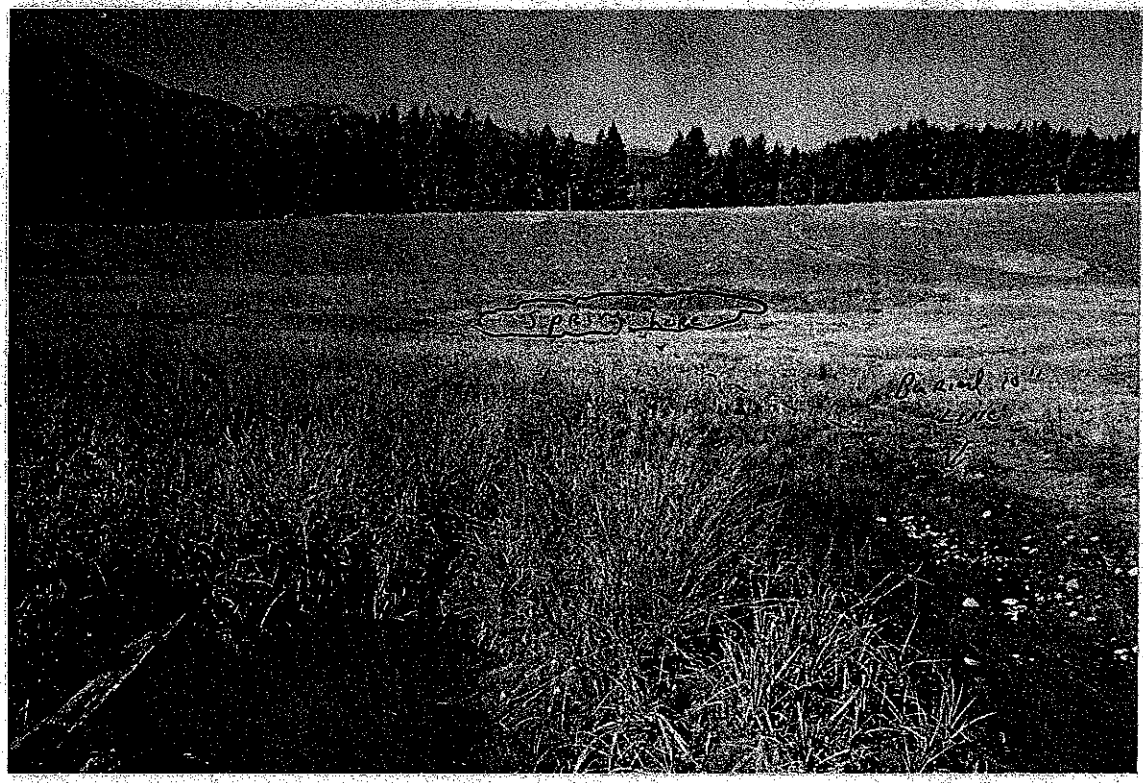


PHOTO ONE- Looking NW at spring area



PHOTO TWO- Not a well casing - this is a cover for 1 of 2 valves on 10" buried pipe from pld. This valve is about 100' SE of pld. Natural drainage for hot water is seen in photos #1 & 2.

PROCESSED JAN 24 1992

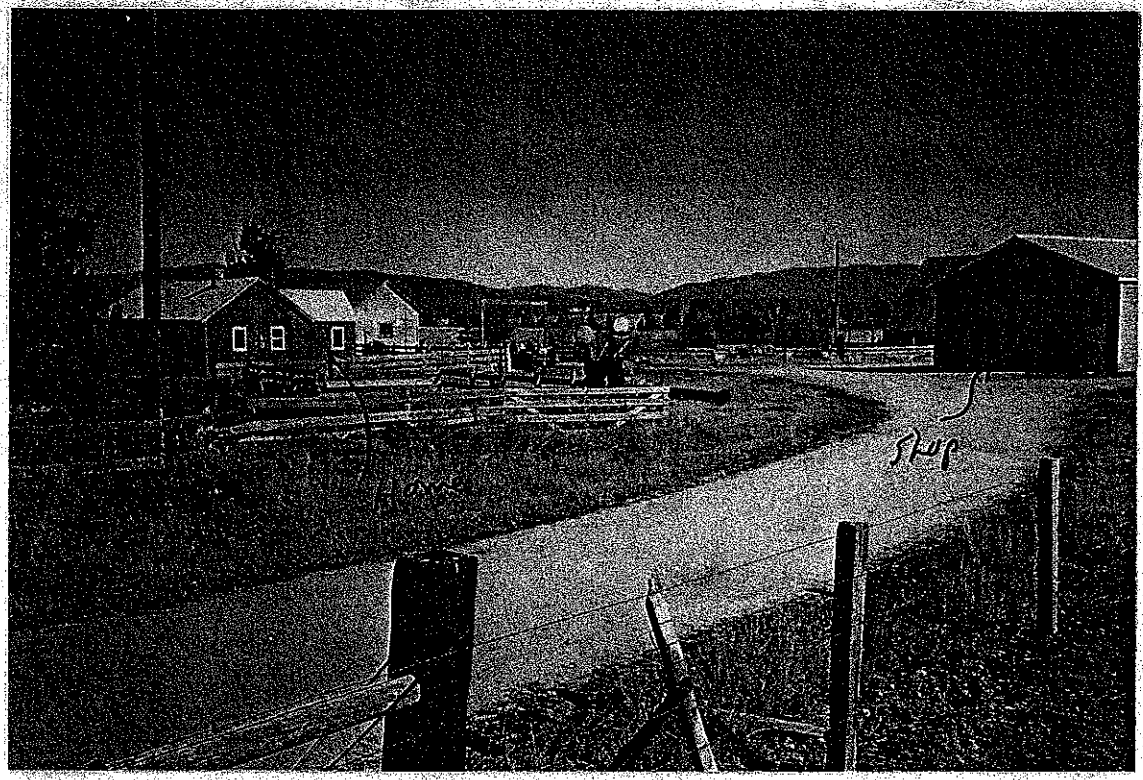


PHOTO THREE- P/u Looking NE at home & shop on east side of Railroad tracks.

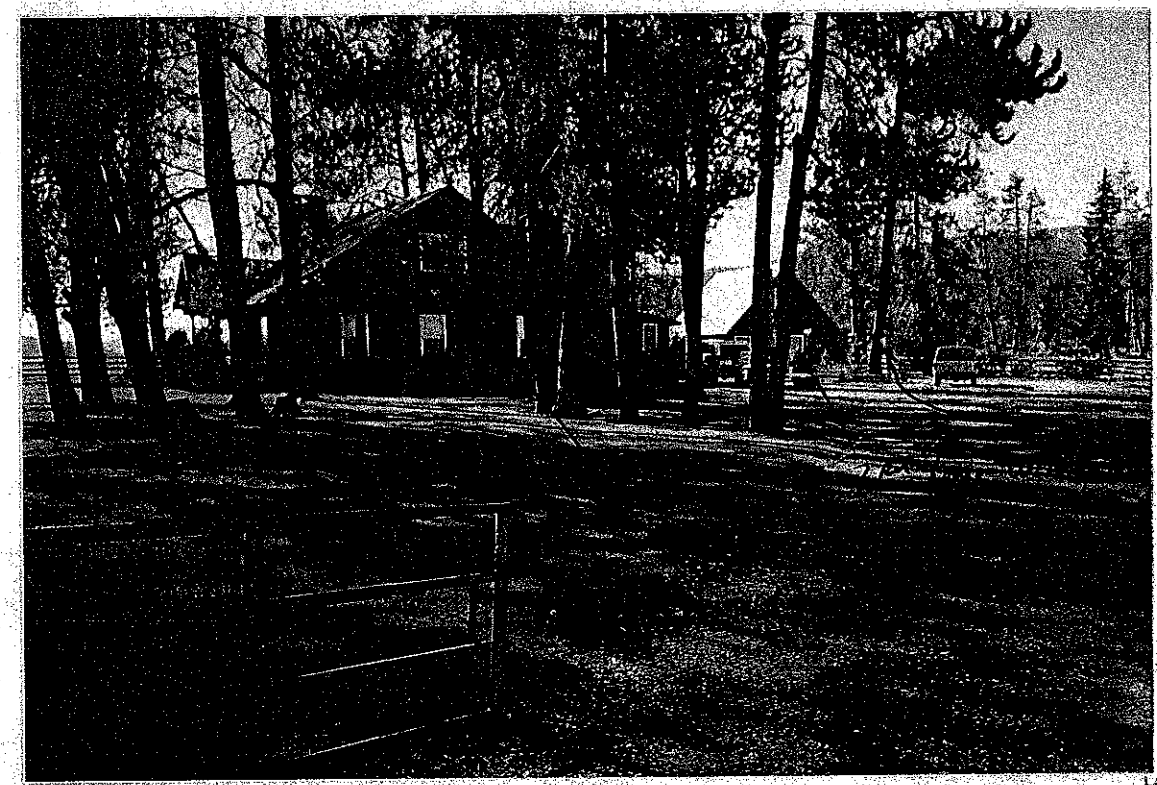


PHOTO FOUR- P/u, 2 other homes between RR tracks & Brush creek. View is SW. Yards here are irrigated with Brush ck water (65-06628).

MICROFILMED JAN 24 1992



PHOTO FIVE- 4" Return flow pipe from swimming pool to Brush Creek. Measured 94°F at this pipe.

RECEIVED
JAN 24 1992

1/88

PROOF OF BENEFICIAL USE

ANALYSIS SHEET

Permit No. 65-12891 Date: 8/25/89

General Considerations:
- Y Name same as permit
- Y Signature the same as permit holder
- Y Address change _____ If yes, prepare a data entry
- Y Proof received timely
- N Reinstated

Source of Water:
- Y Surface water
- Y Groundwater
  - _____ 1. well log in file
  - _____ 2. drilling permit
  - N/A A. amount of drilling fee paid for proposed uses

Extent of Use and Rate of Diversion:
- Y Rate of diversion appropriate for uses
- Y Is rate or volume and fee appropriate?
- _____ Has permit holder indicated when water was first put to a beneficial use?

Measuring Device:
- Y Is a measuring device or access port required?
- N/A Has one been installed?
- N/A Waiver or modification of measuring device requested

Remarks: Address change - Proof ACCEPTABLE

_____ Priority Calculation:

Date proof received	_____	_____
Date proof due	_____	-_____
No. of days late		=_____
Priority date	_____	+_____
NEW PRIORITY DATE	_____	=_____

SEND FILES TO DATA ENTRY AND THEN TO MICROFILM

Form 217
03/86

RECEIVED
AUG 21 1989

For Office Use Only
Fee Received 50.00
Date 8/22/89
Receipt # C00020
Receipt by CP
Reviewed by [illegible] 9/13/89
Sent to region ___

STATE OF IDAHO Department of Water Resources

DEPARTMENT OF WATER RESOURCES

PROOF OF BENEFICIAL USE

The Idaho Department of Water Resources will consider this form as a statement that the permit holder(s) has completed all development that will occur under this permit and that water has been applied according to the provisions of the permit for the beneficial use(s) described below. This form must be accompanied by a license examination fee or a completed field examination report prepared by a certified water right examiner who has been appointed by the department.

Permit No. 65-12891

Name(s) of Permit Holder: DARWIN PANCHERI AND DUANE PANCHERI

Post Office Address: 15501 STAGECOACH RD.

NAMPA, ID 83686 Telephone No. 467-1348

Source of Water: SPRING Tributary of MooresCreek

Extent of Use:

Domestic 3 (number of households) Stockwater 300 head cattle (number and type of stock)

Irrigation none (acres) Other/Remark ___

Total rate and/or volume for which proof is submitted 0.44CFS cfs ___ acre-feet

Show the date water was first diverted and beneficially used under this permit: ~~11/89~~ * 1978

Measuring Device: Required? ___ Yes X No
Installed? ___ Yes X No

Fee enclosed $ $50.00
(See License Examination Fee Schedule)

Flow Measurement Port: Required? X Yes ___ No
Installed? ___ Yes X No

* See item 12-remarks on application.

Person to contact to accompany the Department representative during the field examination:

DARWIN ....467-1348 or DUANE...4952513
(Name) (Telephone Number)

15501 STAGECOACH RD NAMPA, ID 83686
(Address)

The above information is my true statement of the extent to which the above numbered permit has been developed and I relinquish any undeveloped portion of the permit to the state of Idaho.

IMAGED FILMED
SEP 22 1989

Aug 18 1989
Date

Darwin Pancheri Owner
Signature of Permit Holder (and title, if appropriate)

S T A T E O F I D A H O

DEPARTMENT OF WATER RESOURCES

Statehouse
Boise, Idaho 83720
(208) 334-7900
July 26, 1989

DUANE PANCHERI
DARWIN PANCHERI
RT. 1 BOX 48
MELBA, ID 83641

PERMIT APPROVAL NOTICE

RE: PERMIT NO. 65-12891

Dear Permit Holder:

Enclosed is a copy of your approved application for permit. We direct your attention to the conditions of approval on the final page.

We have enclosed a form entitled "Instructions for Proof of Beneficial Use". Please read the instructions carefully since you must take further action to develop this permit. Also enclosed for your convenience is a form entitled "Proof of Beneficial Use" that must be submitted to the Department when your project is completed. If development is complete, you may submit proof of beneficial use immediately.

Sincerely,

GARY SPACKMAN, Supervisor
Water Right Permits Section

GS: SC
Enclosures

MICROFILMED

SEP 22 1989

PP 13N 4E S. 18 NE SW NW 6.2

PW " SESW
NWSE
SWSE

Form No. 202a.
4/87

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPROPRIATION APPLICATION ANALYSIS SHEET

INITIAL REVIEW BY: SL DATE: 10/24/88 APPLICATION: 65-12891

REQUIRED INFORMATION

- ✓ Name: (If applicant is a corporation or partnership, names must be provided for the director,officers, and other partners.)
- ✓ Address:
- ✓ Source: (See USGS Quad for names of water sources)
- ✓ Point of Diversion: (10 acres for spring, lot & block descriptions for Subdivisions, local name)
- ✓ County:
- ✓ Quantity: (flow and/or volume)
- ✓ Period of use:
- ✓ Nature of proposed use: (Include description of use)
- ✓ Description of diverting works:
- ✓ Time required for beneficial use of water:
- ✓ Place of use or acres irrigated:
- ✓ Map:
- ✓ Signature: (If applicant is corp., partnership, or municipality title of signator is required)
- ✓ Fee:
- ✓ yes ___ No* In form to receipt:

ADDITIONAL INFORMATION

YES	NO	
✓	___	Overlapping place of use: (Describe source & relationship to present application on the back.)
___	✓	Overlapping point of diversion:
___	✓	Field check required: Field check by: _____
___	✓	Field report attached:
___	✓	Critical groundwater area:
___	✓	Groundwater management area:
___	✓	Send dam safety information:
___	✓	Send power requirement letter:
___	✓	Send fish farm requirement letter:
___	✓	Power residency affidavit:
___	✓	Power efficiency form:
___	✓	Within trust water boundry: (If yes, attach Trust Water Supplementary Analysis Sheet.)
___	✓	Diversion greater than 5 cfs or 500 af: (If yes, attach Large Diversion supplementary analysis sheet.)
___	___	*REQUEST ADDITIONAL INFORMATION FROM THE APPLICANT

DATE REQUESTED: _____

✓ ___ Additional information on reverse side:

RECEIVED
JUN 12 1989
Department of Water Resources

PROCESSING

YES NO
✓ ___ In form for advertising:
___ ✓ Statewide advertising:
✓ ___ Fee amount, receipt number and date recorded on application:

SEND COPIES TO

YES NO
___ ✓ I.D. Health and Welfare
___ ✓ I.D. Fish and Game
___ ✓ I.D. Lands
___ ✓ Adjudication Bureau

YES NO
___ ✓ U.S. BLM
___ ✓ U.S. Forest Svc.
___ ✓ Water District #_____
___ ✓ Other _____

FINAL REGIONAL PROCESSING REVIEW

YES NO
✓ ___ Affidavit of publication received: Rec'd 6/6/89 See attached phone memo dated 5/15/89
✓ ___ Application published correctly: If not, record action taken.

✓ ___ Publication dates and paper recorded on application:
___ ✓ Protests received, Final date for protest November 21, 1988
___ ✓ Protests, dates, resolution of protest recorded on application:
___ ✓ Recommendations attached: Approve DAR
___ ✓ Measuring device required:
___ ✓ Measuring port required:
0 ✓ Water delivered by water master? District # 65
___ ✓ Special conditions of approval or cover letter: (see additional info. below)
___ ✓ See Below For Additional Information

Recomended Date of Priority 10/19/1988 ✓
Recomended by: DAR Date 5/18/89

STATE OFFICE REVIEW P16 05 (65, Payette River)

___ See below for additional information. By KW Date 6/14/89

ADDITIONAL INFORMATION

OVERLAP: ALL ON APPLICANTS' LAND AND DIFFERENT AREAS AROUND HOMES & SHOP:
P/m - 65-06628 Brush Ck., irrigation, SESW
65-11250 Moores Ck., -02696 N. Fk. Payette, -06628 Brush Ck., irrigation in NWSE.
65-02696 & 06628 as above, irrigation in SWSE.

RECEIVED
JUN 6 1989
Department of Water Resources
Western Region Office

Published in
Cascade
Serving
Valley County

The Advocate

P.O. Box 1079 Cascade, Idaho 83611 (208) 382-3233

June 2, 1989

Dear Steve,

As requested in your telephone call this week, enclosed is an Affidavit of Publication for your Notice of Application for Water Right which was published November 2 & 9, 1988.

The bill for this application has been paid. We do appreciate your business, thank you.

Elzo

Elzo O'Brien

MICROFILMED
SEP 22 1989

CONVERSATION MEMORANDUM

DATE 5/15/89

FILE 65-1289

NAME OF PARTY Darwin Daneberi 467-1348

EMPLOYEE Stan Lester

RE: D.P. called about status of application appears that ~~delay~~ delay has been related in part to newspaper (no affadavit sent). Told him I would look into this.

5/16 called Newspaper 382-3233. Elgo O'Brien is new contact for legal notices.
Their records show affd. mailed but she will mail another one today (attention to me at Western).

6/1 Haven't received reply from newspaper. Called to inquire, Elgo gone but left message for her.

6/2 Spoke with Elgo. Said she mailed affd. 5/16. Will mail again. Stated has mailed to W. office at current address. This will be 3rd mailing.

6/6 Received affd. & letter from Elgo today.

MICROFILMED
SEP 22 1989

CONVERSATION MEMORANDUM

DATE 10/19/88

FILE 65-12891

NAME OF PARTY Pancheri

EMPLOYEE Steve Lester

RE: Estimating flow for heating geo. Holmes. Memo 23 :

3 2-story homes, 1 shop

sq. ft. = 2200 + 1000 + 1800 + 720 = 5720, round to 5800 since area estimates may be low.
(2200, 1000, 1800: ← homes →; 720: shop)

Source temp. = 101° F

t_1 = 70° F (assumed)

t_o = -8° F (assumed ≈ Pocatello)

efficiency is average.

→ for 2-story units

$\epsilon = [e \cdot \Delta T][.8A]$ where $\Delta T = t_1 - t_o = 70 - (-8) = 78$ and e extrapolated

$\epsilon = [(52.6)(78)][(.8)(5800)] = 19{,}036{,}992$

$W = \frac{Q}{500(\Delta T_s)}$ where $Q = \epsilon$ and $\Delta T_s = (.6)(101-70) = 18.6$

$W = \frac{19{,}036{,}992}{(500)(18.6)} = 2047$ gpm = 4.56 cfs

Applicants want to use .40 cfs for heating, well within the suggested range.

MICROFILMED
SEP 22 1989

TA

65-12891

PANCHERI, DUANE
PANCHERI, DARWIN
RT. 1 Box 48
MELBA, ID 83641

Source: SPRING Tributary: MOORES CREEK

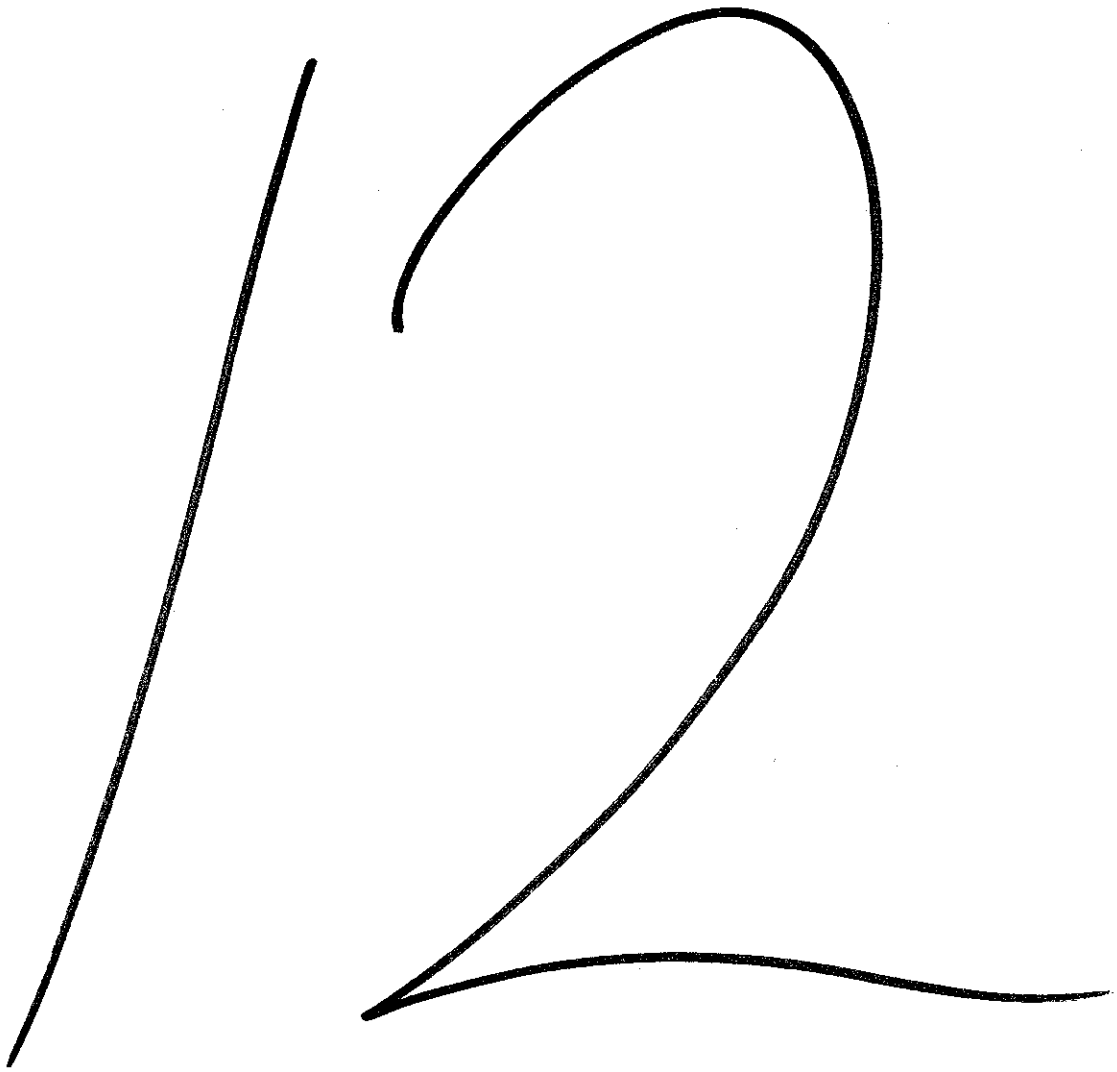
Diversion Pt: LOT 2 (NESWNW) Sec 18 T 13N R 04E

Use: HEATING (.400 CFS)
DOMESTIC (.040 CFS)

Date Filed: 10/19/1988

In: T13N R04E S18 SESW NWSE SWSE

MICROFILMED
SEP 22 1989



State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 65-13332

Proposed Priority: July 2, 1991 Maximum Diversion Rate: 0.10 CFS

This is to certify, that **JOAN PANCHERI**
DARWIN PANCHERI
15501 STAGECOACH RD.
NAMPA, ID 83686

has applied for a permit to appropriate water from:

SPRING tributary of **MOORES CREEK**

and a permit is **APPROVED** for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
HEATING	01/01 to 12/31	0.10 CFS

LOCATION OF POINT(S) OF DIVERSION: NESENE Sec. 13, Township 13N, Range 03E
SENENE Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC	
13N	03E	13	NENE

CONDITIONS/REMARKS:

1. Proof of construction of works and application of water to beneficial use shall be submitted on or before **September 1, 1992.**
2. Subject to all prior water rights.
3. Use of water under this permit is subject to control by the watermaster of State Water District No. 65.
4. A lockable device, subject to the approval of the Department, shall be installed on the diverting works in a manner that will provide the watermaster suitable control of the diversion prior to diversion of water under this permit.
5. Use of water under this permit shall be non-consumptive.
6. Single point of diversion on or near line between SENENE and NESENE, S13, T13N, R03E.
7. Heating use is for 1 home and 1 shop.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the seal and signature of the Director, affixed at Boise, this 27th day of August, 1991.

R. Keith Higginson, Director
for

SEP 04 1991

EXHIBIT 12

Form 202
6/85

Ident No. 65-13332

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1 Name of applicant Darwin &/or Joan Pancheri Phone 467-1348

Post office address 15501 Stagecoach Rd. Nampa Id. 83686

2 Source of water supply Spring which is a tributary of Moores Creek

3 Location of point of diversion is SE ¼ of NE ¼ of NE ¼, Govt Lot —

Sec 13 Township 13N Range 3E B.M. Valley County; additional

points of diversion if any: NESENE S.13 T13N R3E

4 Water will be used for the following purposes:

Amount .10 (cfs or acre-feet per annum) for heating purposes from 1/1 to 12/31 (both dates inclusive)

Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

5 Total quantity to be appropriated is (a) .10 cubic feet per second and/or (b) _____ acre feet per annum

6 Proposed diverting works:

a Description of ditches, flumes, pumps, headgates, etc drain system & collection pipe, 3/4 hp. pump & 1½" mainline to buildings.

b Height of storage dam — feet; active reservoir capacity — acre-feet; total reservoir capacity — acre-feet; period of year when water will be diverted to storage: — to — inclusive

c Proposed well diameter is — inches; proposed depth of well is — feet.

d Is ground water with a temperature of greater than 90°F being sought? —

7 Time required for the completion of the works and application of the water to the proposed beneficial use is 1 years (*minimum 1 year*)

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SEP 04 1991

8 Description of proposed use: (*irrigation only, go to item 9*):

a Hydropower; show total feet of head and proposed capacity in KW. _____

b Stockwatering; list number and kind of livestock. _____

c Municipal; show name of municipality _____

d Domestic; show number of households. _____

e Other; describe fully heating of
1 home 2600 ft² (See 7/1/91
1 Shop 1400 ft² conv. memo)

9 Description of place of use:

a If water is for irrigation, indicate acreage in each subdivision in the tabulation below.

b If water is used for other purposes, place a symbol of the use (*example: D for Domestic*) in the corresponding place of use below. See instructions for standard symbols

TWP	RANGE	SEC	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
13N	3E	13	G																

Total number of acres to be irrigated _____

10 Describe any other water rights used for the same purposes as described above. 65-12891 is same source but other ~~Domestic~~ buildings

11 a Who owns the property at the point of diversion? Applicant

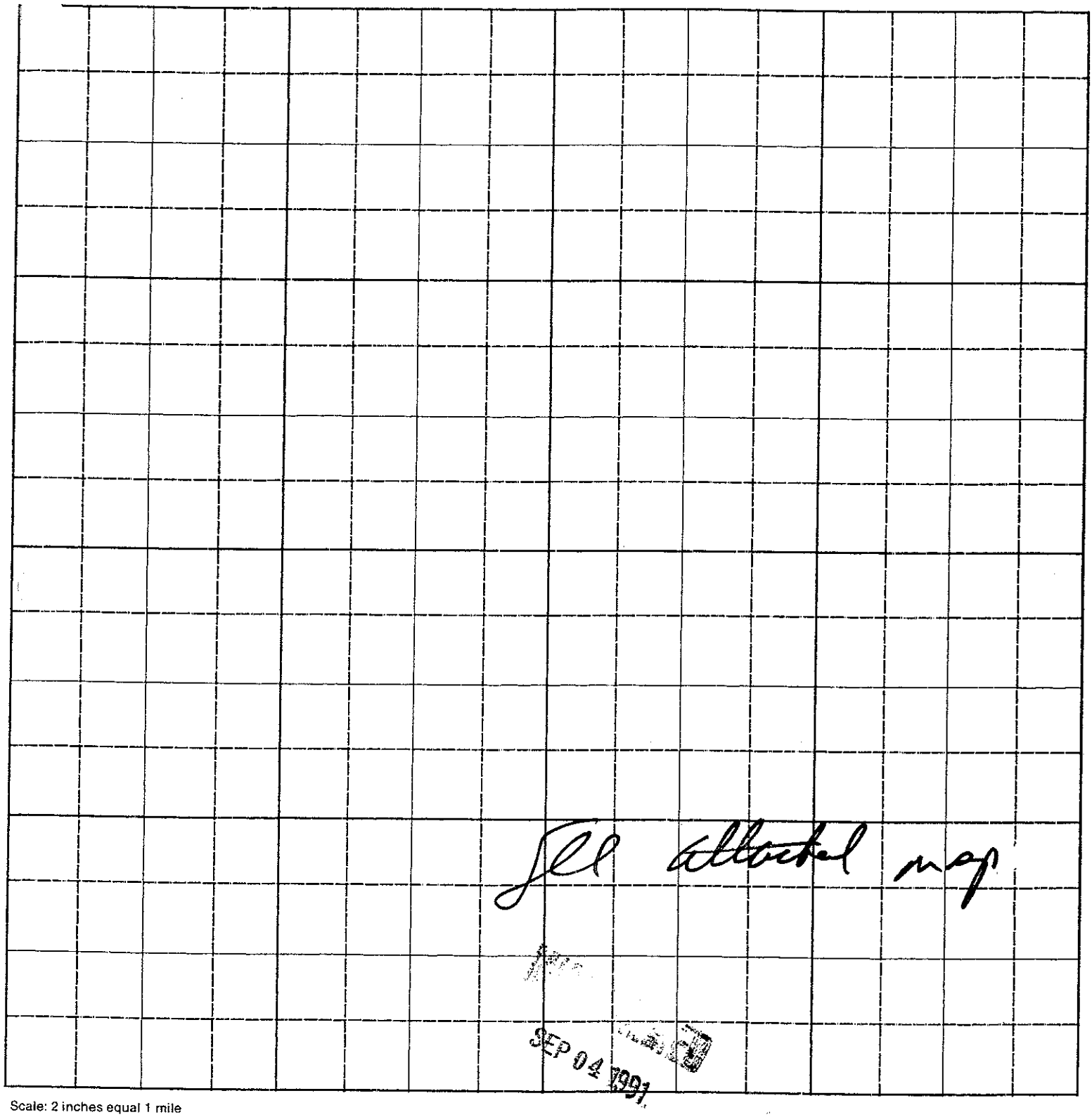
b Who owns the land to be irrigated or place of use? Applicant

c If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing. _____

12 Remarks: Single point of diversion on line between SENENE and NESENE, S13, T13N, R03E. Heating is for 1 home and 1 shop.

RECEIVED
SEP 04 1991

13. 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.

X _____
(Applicant)

Received by SR Date 7/2/91 Time 8:24 Preliminary check by LW

Fee $ 30 00 Receipted by SR # W013455 Date 7/2/91

Publication prepared by GG Date 7-10-91 Published in Star News 7/17 & ~~7/10/91~~ 7/24/91 - SR

Publication approved [signature] Date 8-5-91

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. _____, and said application is hereby _____

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 _____, 19____.

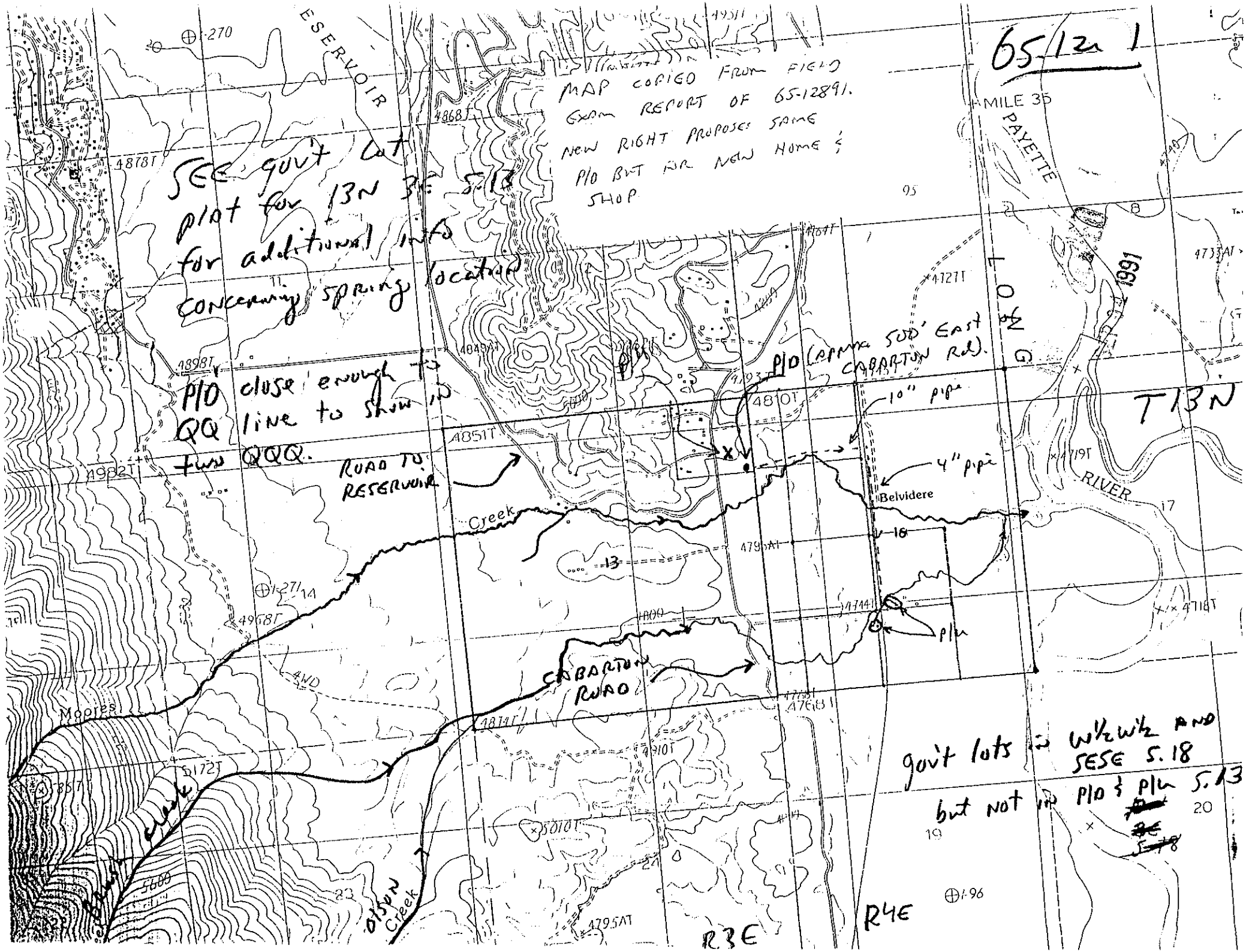
   c. The rate of diversion, if water is to be used for irrigation under this permit, when combined with all other water rights for the same land shall not exceed 0.02 cubic feet per second for each acre of land.

   d. The water right acquired under this permit if 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 permit 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 permit.

   e. Other:

MICROFILMED

SEP 04 1991


65-12n 1
MAP COPIED FROM FIELD EXAM REPORT OF 65-12891. NEW RIGHT PROPOSED SAME P/D BUT FOR NEW HOME & SHOP
SEE govt Lot plat for 13N 3E 5.18 for additional info concerning spring located
P/D close enough to QQ line to show in two QQQ.
P/D (approx 500' East CABARTON Rd).
10" pipe
4" pipe
ROAD TO RESERVOIR
Belvidere
Creek
CABARTON ROAD
P/Ln
Moores
Olson Creek
govt lots 1-4 W1/2W1/2 and SESE 5.18
but not P/D & P/Ln 5.13
MILE 35
PAYETTE
RIVER
LONG
1991
T13N
R3E
R4E
ESERVOIR
4WD

Publisher's Affidavit of Publication

STATE OF IDAHO }
} .ss
County of Valley }

I, Bobette S. Steffler, being duly sworn and say, I am the receptionist of The Central Idaho Star-News, a weekly newspaper published at McCall, in the County of Valley, State of Idaho; that said newspaper is in general circulation in the county of aforesaid and is a legal newspaper; that the NOTICE OF APPLICATION FOR WATER RIGHT, a copy of which is enclosed hereto and is a part hereof, was published in said newspaper once a week for two consecutive weeks in the regular and entire issue of every number there of during the period of time of publication, and was published in the newspaper proper and not in a supplement; and that publication of such notice began July 18, 1991 and ended July 25, 1991.

Subscribed and sworn before me this the 25th day of July, 1991.

STATE OF IDAHO }
COUNTY OF VALLEY }

On this 25th day of July, in the year of 1991, before me, a Notary Public, personally appeared Bobette S. Steffler, known or identified to me to be the person whose name subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that she executed the same.

Tom Grote
Notary Public for Idaho
Residing at McCall, Idaho
Commission Expires: 1993

RECEIVED
JUL 29 1991
Department of Water Resources

RECEIVED
JUL 30 1991
Department of Water Resources
Western Regional Office

SEP 04 1991

NOTICE OF APPLICATION FOR WATER RIGHT

The Following application(s) have been filed to appropriate the public waters of the State of Idaho:

65-13330
JAMES, JON, P.O. BOX 84, DONNELLY, ID 83615.
Source: GROUNDWATER
Diversion Pt: NWSW Sec 27 T 17N R 03E
Use: IRRIGATION (.150 CFS)
Total Diversion: (.150 CFS)
Date Filed: 7/8/1991
In: T17N R03E S27 NWSW
5.0 ACRES TOTAL

65-13332
PANCHERI, JOAN, PANCHERI, DARWIN, 15501 STAGECOACH RD., NAMPA, ID 83686.
Source: SPRING, Tributary MOORES CREEK
Diversion Pt: SENENE Sec 13 T 13N R 03E, NESENE Sec 13 T 13N R 03E
Use: HEATING (.100 CFS)
Total Diversion: (.100 CFS)
Date Filed: 7/2/1991
In: T13N R03E S13 NENE

The permit(s) will be subject to all prior water rights. Protests must be filed with the Director, Dept. of Water Resources, Western Region, 2735 Airport Way, Boise, Idaho 83705 on or before AUGUST 5, 1991.

R. KEITH HIGGINSON, Director
2t7/25

RECEIVED

SEP 17 1998

INTER-DEPARTMENT MEMO--1

FROM Steve L. Department of Water Resources DATE 9/15/98

TO Karilynn T. 65-13332 (THEY HAVE Bs. 63 + Bs. 65 Rights, maybe others too?

SUBJECT Change in Address

Recently I sent ltr to Darwin P. @ 57th Legrand Rd. address but it was returned w/ P.O. box @ "forward expired" language. I re-sent ltr to new address as shown. I received the attached from Darwin on @ 9/10/98.

Looks like can show new address for Darwin/Joan P. per attached. Does not appear can add Joan's name based this, however (?).

Thanks, -SL
SIGNATURE

cc → Northern BRBA staff for claims

9/8/98 –

New address: 9325 Missouri Ave.
Nampa, ID 83686

Names: Darwin Pancheri
Joan Pancheri

If possible add our son's name –
Joseph Kurt Pancheri

Phone: 467-1348

Wells: Valley Co. Idaho

Fax – 467-1348

State of Idaho
DEPARTMENT OF WATER RESOURCES
Western Region, 2735 Airport Way, Boise, Idaho 83705-5082 - (208) 334-2190
FAX (208) 334-2348

August 27, 1998

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

9325 Missouri Ave
Nampa 83686
per CIS event Inventory 1998
9/2/98

MR DARWIN PANCHERI
~~15501 STAGECOACH~~
NAMPA ID 83686

RE: LICENSING OF WATER RIGHT PERMITS

Dear Darwin:

After your call a few days ago, I checked the status of all your water rights in the Cabarton area. All of your permits for that site have been field examined in the last several years. The permits are now in the licensing process.

A perennial problem at this agency is not having the resources to complete everything in a timely manner. More often than not, completion of the licensing process is forced to take a back seat to more urgent work. This is regrettable but unavoidable given the present realities.

I hope that the licenses can be issued soon. The good news is that the beneficial use developed under the permits has been verified. The rights remain fully protected by completion of that verification.

Please let me now if you have any questions about this subject.

Sincerely,

Steve Lester

Steve Lester
Water Rights Supervisor

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

CECIL D. ANDRUS
GOVERNOR

R. KEITH HIGGINSON
DIRECTOR

October 29, 1991

JOAN PANCHERI
DARWIN PANCHERI
15501 STAGECOACH RD.
NAMPA ID 83686

PROOF ACKNOWLEDGMENT LETTER

RE: PERMIT NO. 65-13332

Dear Permit Holder:

The department acknowledges receipt of the proof of beneficial use form submitted for the above referenced permit. The next step in the process of developing a water right is for the department to conduct a field examination to determine and confirm the use being made of the water.

I note that the permit issued to you by the department requires the installation of a lockable device to allow the department to determine the rate of diversion. The proof which you submitted does not show that you have installed this equipment.

The installation of the lockable device must be complete by the time the department representative conducts the examination of your system unless the department has rescinded the requirement prior to the field examination. In some cases, the equipment requirement can be rescinded because the equipment cannot be physically installed, is not appropriate or can be accommodated with other measuring methods.

If you have questions concerning this matter, please feel free to contact the WESTERN Regional Office in Boise at (208)334-2190.

Sincerely,

Nina Shields
Secretary/Records Manager

c: IDWR - Region

NOV 20 1991

Form 217
07

RECEIVED
SEP 27 1991
Department of Water Resources
Western Regional Office

For Office Use Only
Amt of Fee $ 50.00
Date 9-27-91
Receipt No W013720
Received by KN

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

PROOF OF BENEFICIAL USE

The Idaho Department of Water Resources will consider this form as a statement that the permit holder(s) has/have completed all development that will occur under this permit and that water has been applied according to the provisions of the permit for the beneficial use(s) described below. This form must be accompanied by a license examination fee or a completed field examination report prepared by a certified water right examiner who has been appointed by the department.

1. Permit No. 65-13332 Telephone No. 467-1348

2. Name(s) of Permit Holder(s): DARWIN & JOAN PANCHERI

3. Post Office Address: 15501 STAGECOACH RD. NAMPA, ID 83686

4. Source of Water: HOT WATER SPRING

   a. If ground water, well driller's name: _____ Date drilled: _____

   b. Pump horsepower: 1 hor Pressure (psi): 65 Dynamic pumping level (ft.): _____

5. Extent of Use: HEATING OF ONE HOUSE AND SHOP

   Domestic _____ (No. of households) Irrigation _____ (No. of acres)

   Stockwater _____ (No. and type of stock) Other _____

6. Total rate and/or volume for which proof is submitted .10 cfs _____ acre/feet

7. Refer to the approval conditions on your permit and respond accordingly: As per PERMIT

   ~~Measuring~~ Lockable device: Required? X Yes ___ No Installed? ___ Yes ___ No

   OR

   Flow Measurement Port: Required? ___ Yes ___ No Installed? ___ Yes ___ No

8. Fee Enclosed: $ 50.00 (See License Examination Fee Schedule)

9. Person to contact to accompany the Department representative during the field examination:

   DARWIN PANCHERI 467-1348
   Name Telephone No

   15501 STAGECOACH RD NAMPA, ID 83686
   Address

10. The above information is my true statement of the extent to which the above numbered permit has been developed and I relinquish any undeveloped portion of the permit to the state of Idaho

RECEIVED
NOV 20 1991

Sept. 26 Darwin Pancheri
Date Signature (and title if on behalf of a company or organization)

ANALYSIS SHEET
for
PROOF OF BENEFICIAL USE

Permit No. 65-13332 Date 10-8-91

GENERAL CONSIDERATIONS
- ✓ Name same as permit?
- ✓ Address same as permit? If no, indicate below.
- ✓ Proof timely received? If no, complete priority advancement below.

SOURCE OF WATER
- ✓ Surface water source
- ___ Ground water source
  - NA Drill permit req'd?
  - ___ Copy in file? Drill permit no. ___
  - ___ Amt paid for drilling permit? ___ Correct?
  - ___ Well log in file?

LICENSE EXAMINATION FEE
- ✓ Required?
- 50.00 Amount submitted?
- ✓ Correct amount?

MEASURING DEVICE
- ✓ Measuring device or access port required?
- NO Installed?
- ___ Waiver requested or needed?

DEFICIENCIES OR ACTION ITEMS

needs lockable device

PRIORITY CALCULATION

Date proof received	NA		___
Date proof due	___	-	___
No. of days late		=	___
Priority date	___	+	___
NEW PRIORITY DATE	___	=	___

FB

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

CECIL D. ANDRUS
GOVERNOR

R. KEITH HIGGINSON
DIRECTOR

August 29, 1991

JOAN PANCHERI
DARWIN PANCHERI
15501 STAGECOACH RD.
NAMPA ID 83686

PERMIT APPROVAL NOTICE

RE: PERMIT NO. 65-13332

Dear Permit Holder:

Enclosed is a copy of your approved application for permit. We direct your attention to the conditions of approval on the final page.

Enclosed is a form entitled "Instructions for Proof of Beneficial Use". Please read the instructions carefully since you must take further action to develop this permit. Also enclosed is a form entitled "Proof of Beneficial Use". If your project is already completed you should complete and submit this form immediately.

Be sure to note the special condition requiring you to install a lockable device that will provide the watermaster control on your diversion.

Sincerely,

PAMELA SKAGGS
Technical Records Specialist

PS:blm

Enclosures

MICROFILMED

SEP 04 1991

APPLICATION FOR PERMIT REVIEW

Application #: 65-13332 Reviewer: Pam Skaggs PS
Date: 8-21-91

✓Existing:
✓ No - 26A-P17
✓Complete in 1 year - P16
Yes
Proof not submitted - P16
Proof submitted - N/A
Groundwater:
GT. 0.2 cfs - 01G-P03, 01C-P03(existing well)
LT. 0.2 cfs - N/A
Drilling Permit:
Approved w/permit - P99
Not included - 046-P23(All GW, even existing wells)
✓Location:
✓Water Districts - WD No. 65
✓Surface water - 005, 005-01H-P01(LT.2 w/pump)
005-01J-P08(GT.2)
Groundwater - P05
Irrigation Districts - 023
Canal Co. Areas - 023
Drainage Districts - 024
Boise Front (63) - 058 (Groundwater)
✓Swan Falls Flag - ____ (1, Blank or Other)
Trust - 051-052-053-P74(Consumptive Uses)
Non Trust - 048-049
✓River Basins:
(Surface Water) Water District Control Condition &....
Boise (63) - 05A & 11E
✓Payette (65) - 047-P04, 059-P71
Snake (01, 02 & 03) - 11A-P04(01), 061-P07(02/03 No W.D.Cond.)
✓Use:
Fish Propagation - 06A, 09E-P10 & 010 (WQ/Choose One), 042(req.), 002-P06(MD), 07A(Spec.), 044(Policy 5G)
Power - _____ Use Power Review
Mining - 06A or 010, 09E-P10 & 054(req.)
Storage - 18A-for multiple measuring devices(In WD), 18B-P09(Size)
✓Heat Rec. & Aesthetic - 027(Non-Consumptive)
Domestic - 021(restricted areas)
Ownership:
Non land owner - 004
Protested:
Agreement - 020

RECEIVED
SEP 04 1991

✓Beneficial Use Due Date: - 09-01-1992
Other Conditions Recommended _____

Form No. 202a.
10/90

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPROPRIATION APPLICATION ANALYSIS SHEET

INITIAL REVIEW BY: LW DATE: 7/9/91 APPLICATION: 65-13332

REQUIRED INFORMATION

- ✓ Name: (If applicant is a corporation or partnership, names and addresses for the director, officers, and other partners must be included.)
- ✓ Address:
- ✓ Source: (See USGS Quad for names of water sources)
- ✓ Point of Diversion: (10 acres for spring, lot & block descriptions for Subdivisions, local name)
- ✓ County:
- ✓ Quantity: (flow and/or volume)
- ✓ Period of use:
- ✓ Nature of proposed use: (Include description of use)
- ✓ Description of diverting works:
- ✓ Time required for beneficial use of water:
- ✓ Place of use or acres irrigated:
- ✓ Map:
- ✓ Signature: (If applicant is corp., partnership, or municipality, title of signatory is required)
- ✓ Fee:
- ✓ Yes ____ No* In form to receipt:

Gov't. Lots:
- ✓ P/D
- ✓ P/U

ADDITIONAL INFORMATION

YES	NO	
✓		Overlapping place of use: (Describe source & relationship to present application on the back.)
✓		Overlapping point of diversion:
		Field check required: Field check by: _____
		Field report attached:
	✓	Critical groundwater area:
	✓	Groundwater management area:
	✓	Diversion within interim protected river area
	✓	Send dam safety information:
	✓	Send power requirement letter:
	✓	Send fish farm requirement letter:
	✓	Power residency affidavit:
	✓	Power efficiency form:
	✓	Within trust water boundary: (If yes, attach Trust Water Supplementary Analysis Sheet.)
	✓	Diversion greater than 5 cfs or 500 af or irrigation greater than 200 acres: (If yes, attach Large Diversion supplementary analysis sheet.)
	✓	*REQUEST ADDITIONAL INFORMATION FROM THE APPLICANT

DATE REQUESTED: _____

✓ ____ Additional information on reverse side:

RECEIVED
AUG 16 1991
Department of Water Resources

PROCESSING

APPLICATION NO. 65-13332

YES	NO	
✓		In form for advertising:
	✓	Statewide advertising:
✓		Fee amount, receipt number and date recorded on application:

SEND COPIES TO

YES	NO		YES	NO	
	✓	I.D. Health and Welfare		✓	U.S. BLM
	✓	I.D. Fish and Game		✓	U.S. Forest Svc.
	✓	I.D. Lands		✓	Water Dist. #
	✓	Adjudication Bureau		✓	Other

FINAL REGIONAL PROCESSING REVIEW

YES	NO	
✓		Affidavit of publication received:
✓		Application published correctly: If not, record action taken.
✓		Publication dates and paper recorded on application:
	✓	Protests received. Final date for protest August 5, 1991
	✓	Protest dates, resolution of protest recorded on application:
	✓	Recommendations attached: Approve, DRT
	✓	Measuring device required:
	✓	Measuring port required:
	✓	Water delivered by water master? District #
✓		Special conditions of approval or cover letter:

027

	✓	See below for additional information

Recommended Date or Priority 7/2/1991

Recommended by: DRT Date 8/6/91

STATE OFFICE REVIEW

___ See below for additional information. By _____ Date _____

ADDITIONAL INFORMATION

overlaps P/D : 65-08430 Pond
- 12127 GW
- 01972 Spr
- 01973 Spr
- 01988 GW
- 11250 Mound CR

P/U 65-08430 Pond
- 12127 GW

CONVERSATION MEMORANDUM

DATE 7-1-91

FILE New Application
65-13332

NAME OF PARTY Darwin Panetere 467-1348

EMPLOYEE Steve Lester

RE:

Mr. Panetere called to answer the survey examined on 10/17/89 for Permit 65-12891. (exam copy attached) Proposes to use same diversion for a new home and shop in NWNW 5-18-W.11 use 3/4 hp. pump with 1 1/2" line to heat shop & home.

Home ≈ ~~4000~~ 2600 ft²
Shop ≈ 1400 ft² } total 4000 ft²

Per 10/19/88 conv. memo in 65-12891, substitute 1-story structures @ 4000 ft² in equation:

$E = (52.6)(78)(4000) = 16,411,200$

$W = E/[(500)(18.6)] = 1764.6$ gpm = 3.93 cfs

However -

a) for 1 1/2" line with pump expect @ 5 fps velocity:

$Q = \pi r^2 V = (3.1416)[(\frac{1.5}{12})/2]^2(5) = .06$ cfs

b) assume hp eq. where hp = 3/4 eff = .7 psi = 20
z = 20'

$Q = \frac{(8.8)(.75)(.7)}{(2.31)(20)+20} = .07$ cfs

SEP 04 1991

Reasonable flow rate to expect is ≤ .07 cfs, recommend .10 cfs to allow margin of error.

Form 219
6/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No 65-12891

1. Owner: Darwin and/or Duane Pancheri Phone No. 467-1348 or 495-25
   Current Address: 15501 Stagecoach Rd. Nampa Id, 83686
2. Accompanied by: Joan Pancheri EXAM. DATE: 10/17/89
   Address: as above Phone No. as above
   Relationship to Permit Holder: Spouse of Darwin Pancheri
3. Source: Spring tributary to Moores Creek

B. OVERLAP REVIEW

1. Other water rights with same place of use: 65-06628 -02696 -11250
   ☐ Copies Attached N/A
2. Other water rights with same point of diversion: 65-01972 -01973 -11250 -08430 -12127 -01988
   ☐ Copies Attached ☐ Copies of Field Exam's Attached N/A

C. SYSTEM DESCRIPTION

1. **Diversion System Diagram:** Indicate all major components and distances between components Indicate weir size/ditch size/pipe i d. as applicable ☑ Alternative diagram attached

See top of alternative diagram.

SEP 04 1991

Scale: 1" = NOT TO SCALE

2. ☑ Copy of U S G S Quadrangle Attached
   Showing location(s) of point(s) of diversion and place(s) of use (required)
   ☐ Aerial Photo Attached N/A
   (required for irrigation of 10 acres or more)
   ☑ Photo of Diversion and System Attached
   (required for all but single household domestic groundwater, and stockwater

System Description (continued)

3. **Narrative:** Description (As operating at time of measurement. Indicate pressure, number of sprinklers, etc.)

A hot spring (approx. 101 °F) is utilized via a drain system and approx. 2100 ft. of 10" pipe & then [redacted] ft. of 4" pipe. Two control valves for this gravity system are found with 115' of source. Water is used to heat 3 homes & 1 shop as well as to irrigate ≤ 1/2 acre of yard (external domestic use). The hot water is used in a swimming pool at one home. Discharged water (measured discharge temps. of 90 & 94 °F) is returned to Bench Creek via 4" overflow pipes and a small ditch paralleling one of the discharge pipes. The system has been operating since 1978.

☐ See Remarks on page 4 for continuation

4

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
		N/A	(gravity	system)	

*Code to correspond with No. on map and aerial photo

5 Point(s) of Diversion:

Ident No.	Gov't Lot	1/4	1/4	1/4	Sec.	Twp.	Rge.	County	Method of Determination/Remarks
		SE	NE	NE	[redacted]	13N	3E	Valley	USGS 7 1/2' quad. Also
		NE	SE	NE	13				obtained TS & R and Sec. Used compass,
									engineers 100' tape, and pacing to
									plot site.

Simple on QQQ line

6 Place(s) of Use: Indicate Method of Determination USGS 7 1/2' quad

Twp.	Rge.	Sec.	NE1/4				NW1/4				SW1/4				SE1/4				Totals
			NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	NE1/4	NW1/4	SW1/4	SE1/4	
13N	4E	18												D		D	D		
														G		G	G		

SEP 04 1991

Do not use this space

Do not use this space

D. FLOW MEASUREMENTS

☐ Additional Data Sheets Attached

1

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
N/A						

2 **Measurements:**

Flow - no measurements possible

For sq. ft. of heating areas & other details, see Attachment # 1.

E. FLOW CALCULATIONS

☑ Additional Computation Sheets Attached

1 Measured Method: None

2 Alternate Method for Checking Purposes: See additional pg., Attachment # 1

F. PUMP EFFICIENCY DATA (Optional) N/A

Discharge Pressure: _____ psi x 2 31 = _____ ft (1); Dynamic pumping level: _____ ft (2)

Total Head: (1) + (2) = _____ (3) ; Flow rate: _____ cfs (4)

Water HP: (3) x (4) ÷ 8 8 = _____ (5)

Meter Input KW: 3 6 x _____ KH x _____ CTR or _____ MULT x _____ PTR x _____ N/ _____ T = _____ (6)

Meter Input HP: (6) x 1 34 = _____ (7)

Panel Input KW: _____ Ave PF x _____ Ave Volts x _____ Ave Amps x .001732 = _____ (6)

Panel Input HP: (6) x 1 34 = _____ (7) Efficiency: (5)/(7) x 100 = _____ %

V. (.20)(365)(1.9835) = 144.8 afa

G VOLUME CALCULATIONS

1 Volume Calculations for Irrigation: N/A

V_{IR} = (Acres Irrigated) x (Irrigation Requirement) = _____

V_{DR} = [Diversion Rate (cfs)] x (Days in Irrigation Season) x 1 9835 = _____

V = Smaller of V_{IR} and V_{DR} = _____

2 Volume Calculations for Other Uses:

Domestic 3 Homes, 1 Shop

2 homes int only = (2)(.6) = 1.2 afa
1 home & shop, int + ext = (2)(1.2) = 2.4 afa } 3.6

V (.10)(365)(1.9835) = 72.4 afa

HEATING Although Hot Hen runs continuously since also used for domestic, estimate that heat needed x 12 hrs/day, 80% of year for that area (292 days).

[.20 cfs x 448.8 gpm/cfs x 60 min/hr x 12 hrs/day x 292 days] ÷ 325850 = 579 afa

continued

H. REMARKS AND OVERLAP REVIEW ANALYSIS

P/D would have to be approx. 1000' E. of Cabarton Rd. to be in QQQ shown on permit. Using NE corner of intersection of Cabarton & Roseman Rds. A measured 175' N. & paced 500' East, then paced 50' N. to spring area.
NO method of measurement was available for the diversion. The return flow from swimming pool (terminal use end of 4" delivery line) via a very small ditch & 4" pipe (see photograph #5) did not allow a flowmeter or 5 gal. bucket measurement. However, see attached copy of 10/19/88 conv. memo from original application. This supports flow rate in permit.
Limit rec'd flow to .20 cfs per *50 Power Fee pmt (Receipt C0100020). Increased rate for 0/4 but still within permit & proof of b.u. limits.
Overlap - see attachment # 2.

I. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use From	Period of Use To	Rate of Diversion Q (cfs)	Annual Volume 57.9 V (afa)
Heating	1/1	12/31	.20	~~[illegible]~~
Domestic	1/1	12/31	.10	3.6
		Totals:	.20	61.5

2. Recommended Amendments

☑ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

J. AUTHENTICATION

Field Examiner's Name Steven M. Lester

Signature Steven M. Lester SML LW 5/2/91

Certification Date

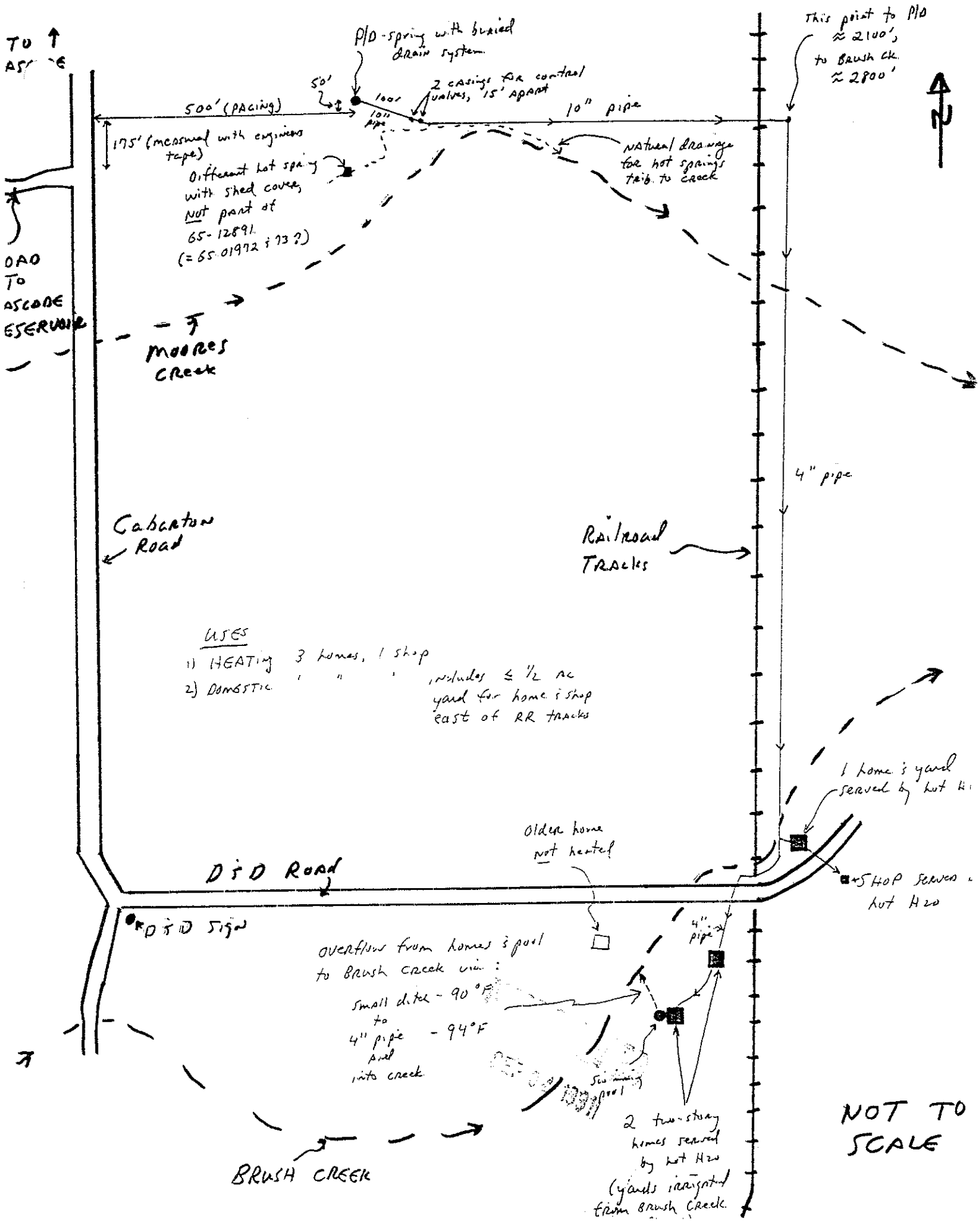
Field Report Preparation Date 10/17/89

CONSULTANT SEAL

PROFESSIONAL ENGINEER REGISTERED 3909 STATE OF IDAHO DAVID R. TUTHILL, JR.
David R. Tuthill 5/2/91

K. **Licensing recommendation shall be prepared by an Idaho Department of Water Resources employee on a computer printout attached hereto.**

65-12891 ALTERNATIVE DIAGRAM



CONVERSATION MEMORANDUM

DATE 10/19/88

FILE 65-12891

NAME OF PARTY Pancheri

EMPLOYEE Steve Lestie

RE: Estimating flow for heating per Aplomi. memo 23 :

3 2-story homes, 1 shop

sq. ft. = 2200 + 1000 + 1800 + 720 = 5720, round to 5800 since area estimates may be low.
(homes) (shop)

Source temp. = 101° F

t_1 = 70° F (assumed)

t_o = -8° F (assumed ≈ Pocatello)

efficiency is average.

→ for 2-story units

$E = [e \cdot \Delta T][.8A]$ where $\Delta T = t_1 - t_o = 70 - (-8) = 78$ and e extrapol.

$E = [(52.6)(78)][(.8)(5800)] = 19{,}036{,}992$

$W = \frac{Q}{500(\Delta T_s)}$ where $Q = E$ and $\Delta T_s = (.6)(101-70) = 18.6$

$W = \frac{19{,}036{,}992}{(500)(18.6)} = 2047$ gpm = 4.56 cfs

Applicants intent to use .40 cfs for heating, well within the suggested range.

ALLOW FOR LICENSING.

.20 cfs (750 pivot point)

↓

Domestic (4 units) = .10 cfs

Heating = .20 cfs

TOTAL .20 cfs

MICROFILMED
SEP 22 1989

Attachment #1
65-12891 Exam

65-13332

PANCHERI, JOAN
PANCHERI, DARWIN
15501 STAGECOACH RD.
NAMPA, ID 83686

Source: SPRING Tributary: MOORES CREEK

Diversion Pt: SENENE Sec 13 T 13N R 03E
NESENE Sec 13 T 13N R 03E

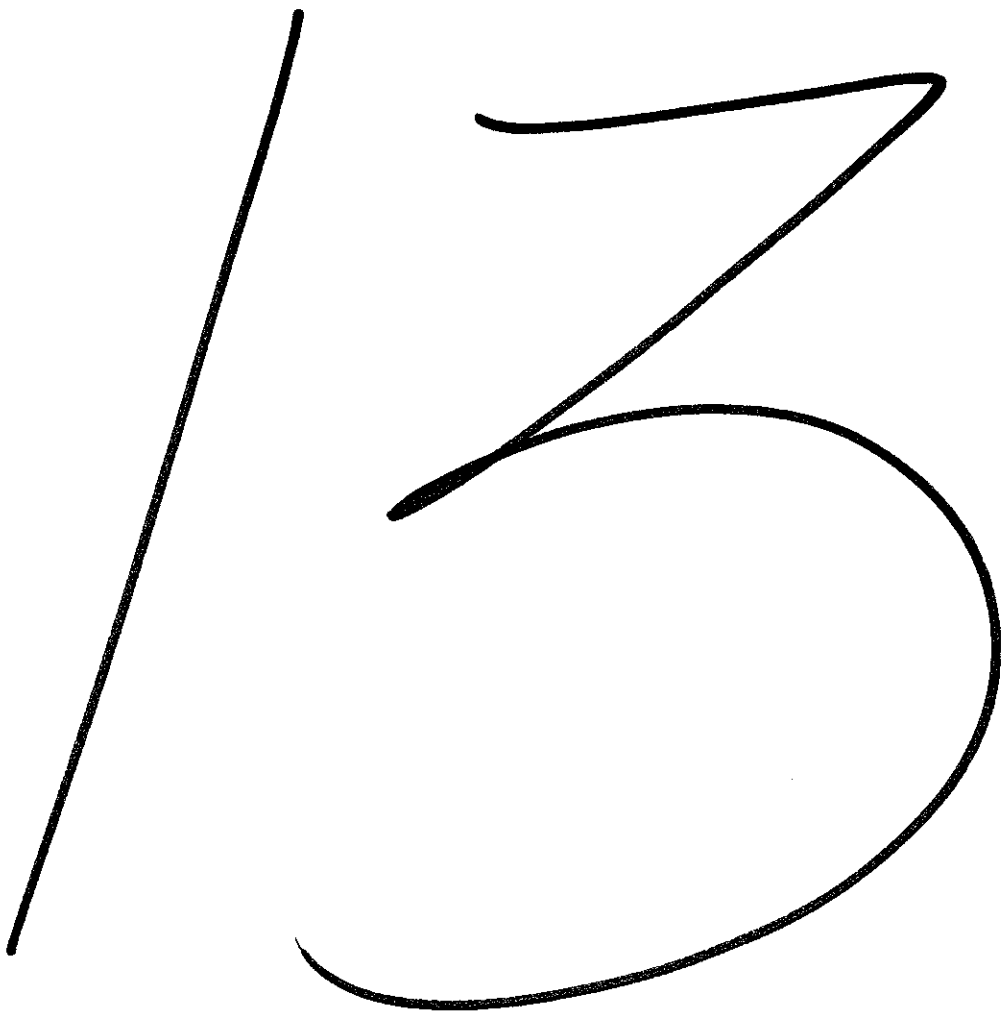
Use: HEATING (.100 CFS)
Total Diversion: (.100 CFS)

Date Filed: 7/ 2/ 1991

In: T13N R03E S13 NENE

MICROFILMED

SEP 04 1991



State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 65-13458

Proposed Priority: June 22, 1993 Maximum Diversion Rate: 0.15 CFS

This is to certify, that **DARWIN PANCHERI**
JOAN PANCHERI
15501 STAGECOACH RD
NAMPA ID 83686
has applied for a permit to appropriate water from:

SPRING tributary of **MOORES CREEK**

and a permit is **APPROVED** for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
IRRIGATION	04/15 to 10/15	0.15 CFS

LOCATION OF POINT(S) OF DIVERSION: SENENE , Sec. 13, Township 13N, Range 03E
NESENE , Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: IRRIGATION

TWN	RGE	SEC		ACRES	ACRES	ACRES	TOTAL
13N	03E	13	NENE	5			5

Total number of acres irrigated: 5

CONDITIONS/REMARKS:

1. Proof of construction of works and application of water to beneficial use shall be submitted on or before **October 1, 1996.**
2. Subject to all prior water rights.
3. Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which permit holder had no control.
4. Use of water under this right is subject to control by the watermaster of State Water District No. 65.
5. A lockable device, subject to the approval of the Department, shall be installed on the diverting works in a manner that will provide the watermaster suitable control of the diversion prior to diversion of water under this right.
6. When water is not available to fill this right, the right holder shall cease diversion or shall rent water from the Payette River Rental Pool.
7. The right holder shall use the full allotment of his surface water right, to the extent it is available, in conjunction with groundwater diverted pursuant to this right.
8. The rate of diversion of water for irrigation under this right and all other water rights on the same land shall not exceed 0.03 cubic feet per second for each acre of land.

MICROFILMED
OCT 25 1993

EXHIBIT 13

State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 65-13458

CONDITIONS/REMARKS:

9. Single point of diversion located on or near line between SENENE and NESENE, S13, T13N, R03E.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Boise, this 18th day of October, 1993.

R. Glen Saxton
for R. Keith Higginson, Director

MICROFILMED
OCT 25 1993

RECEIVED
AUG 04 1993
Department of Water Resources

Ident. No. **65-13458**

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name: DARWIN PANCHERI 208-467-1348
   Address: 15501 STAGECOACH RD
   NAMPA ID 83686
   AND/OR
   Name: JOAN PANCHERI 208-467-1348
   Address: 15501 STAGECOACH RD
   NAMPA ID 83686

2. Source: SPRING Trib. to: MOORES CREEK
3. Location of Point of Diversion: SENENE Sec. 13, Township 13N, Range 03E
   NESENE Sec. 13, Township 13N, Range 03E
   VALLEY County

4. Water will be used for the following purposes:

Purpose	From	To	CFS	(or)	AF
IRRIGATION	04/15	10/15	0.150		

5. Total quantity to be appropriated is:
   0.150 CFS (and/or) AF

6. Proposed diverting works:
   a. Description of ditches, flumes, pumps, headgates, etc.
   PUMP & PIPELINE FOR SPRINKLER IRRIGATION
   b. Height of storage dam feet; active reservoir capacity acre-feet; total reservoir capacity acre-feet; period of year when water will be diverted to storage: to inclusive.
   c. Proposed well diameter is inches; proposed depth of well is feet.
   d. Is groundwater with a temperature greater than 85F being sought? NO

7. Time required for the completion of the works and application of the water to the proposed beneficial use is 3 year(s).

8. Place of Use: IRRIGATION

TWN	RGE	SEC		ACRES	ACRES	ACRES	TOTAL
13N	03E	13	NENE	5			5

Total number of acres irrigated: 5

MICROFILMED

OCT 25 1993

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:
Single point of diversion located on or near line between SENENE and NESENE, S13, T13N, R03E.

11. Map of proposed point of diversion and place of use attached? X

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.

Darwin Panaheri
Applicant

Received by SC Date 6/22/93 Time 9:08 Preliminary check by GJ

Fee $ 30 Receipted by SC # W0164/9 Date 6/22/93

Publication prepared by AT Date 7-93 Published in the Advocate

Publication approved AT Date 7-27-93

MICROFILMED
OCT 25 1993

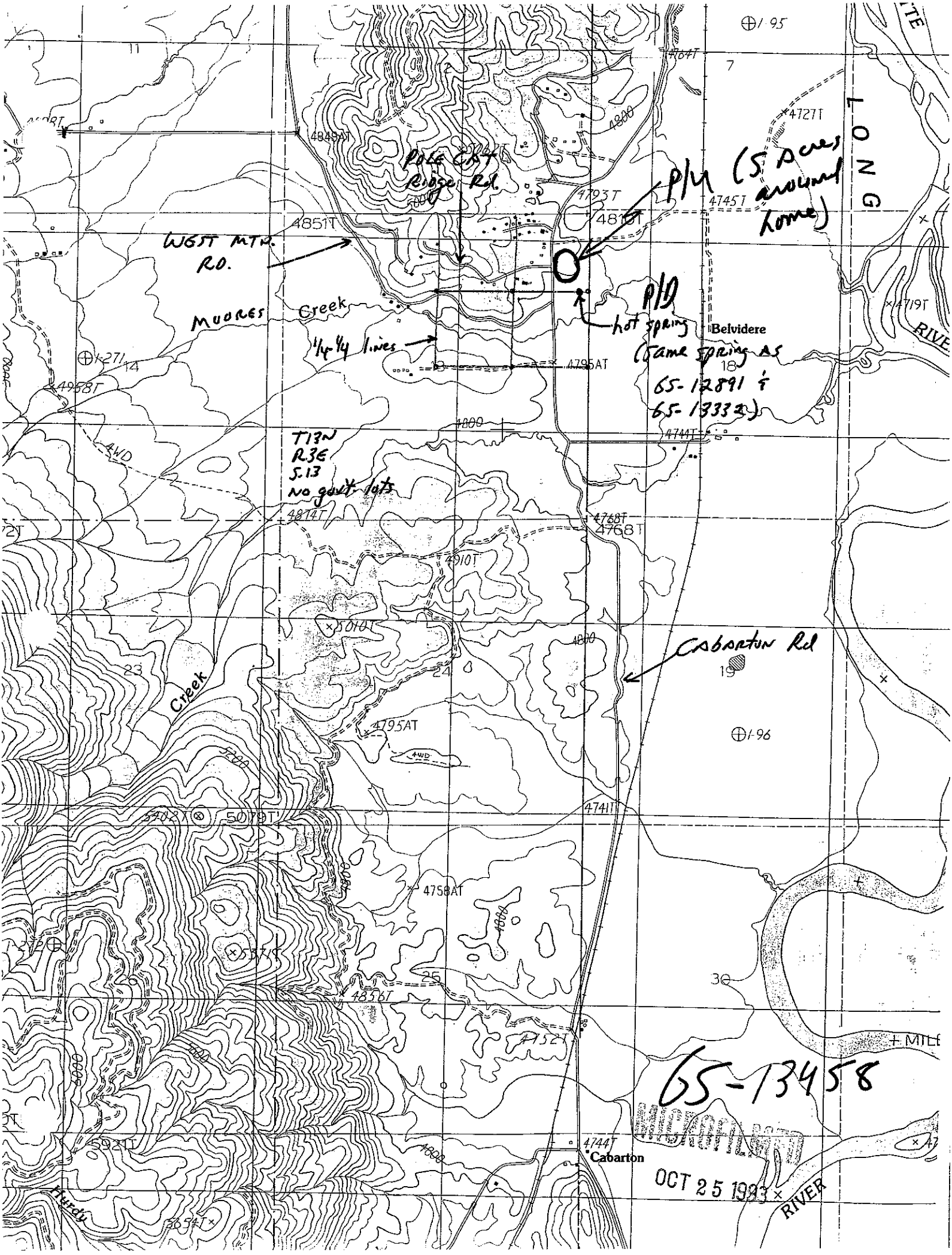
Comments: Date: 6/22/1993 User-ID: LESTER

Subject:
OVERLAP

This is same spring as 65-12891 used for Pancheri property about 3/4 mile SE in S. 18 and 65-13332 used for new Pancheri home associated with proposed 5 acres irrigation. Also, a new appl. is being filed on a cold well near spring, and well will irrigate about 100 acres, including 5 acres in this application.

MICROFILMED

OCT 25 1993


P/M (5 acres around home)
Pole Cat Ridge Rd.
WEST MTN. RD.
P/D
hot spring
Belvidere
(same spring as 65-12891 & 65-13332)
Moores Creek
1/4-1/4 lines
T13N
R3E
S.13
No govt lots
Cabarton Rd
Creek
LONG
RIVER
Cabarton
Hurdy
65-13458
RECEIVED
OCT 25 1983

RECEIVED

SEP 17 1998

Department of Water Resources

INTER-DEPARTMENT MEMO--1

FROM Steve L. DATE 9/15/98

TO Kathryn T.

SUBJECT Change of Address 65-13458

They have Bs. 63 + Bs. 65 Rights, maybe others too?

Recently I sent letter to Darwin P. @ 57 Sycamore Rd. address but it was returned w/ P.O. "Forwarding address expired" language. I re-sent letter to new address as shown. I received the attached from Darwin on @ 9/10/98.

Looks like can show new address for Darwin/Joan P. per attached. Does not appear can add Joan's name based on this, however (?).

Thanks, -SL
SIGNATURE

cc → Western SRBA Staff for claims

SCANNED
JAN 26 2005

This right needs to be reviewed for licensing at the same time as 65-13459.

well that covers all 5 ac @ 1"/ac, no reason to amend 65-13458 to gw it should be relinquished if 65-13459 covers it

9/8/98 –

New address: 9325 Missouri Ave.
Nampa, ID 83686

Names: Darwin Pancheri
Joan Pancheri

If possible add our son's name –
Joseph Kurt Pancheri

Phone: 467-1348

Wells: Valley Co. Idaho

Fax – 467-1348

State of Idaho
DEPARTMENT OF WATER RESOURCES
Western Region, 2735 Airport Way, Boise, Idaho 83705-5082 - (208) 334-2190
FAX (208) 334-2348

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

August 27, 1998

9325 Missouri Ave
Nampa 83686
per AS west
Inventory 1998
9/2/98

MR DARWIN PANCHERI
~~15501 STAGECOACH~~
NAMPA ID 83686

RE: LICENSING OF WATER RIGHT PERMITS

Dear Darwin:

After your call a few days ago, I checked the status of all your water rights in the Cabarton area. All of your permits for that site have been field examined in the last several years. The permits are now in the licensing process.

A perennial problem at this agency is not having the resources to complete everything in a timely manner. More often than not, completion of the licensing process is forced to take a back seat to more urgent work. This is regrettable but unavoidable given the present realities.

I hope that the licenses can be issued soon. The good news is that the beneficial use developed under the permits has been verified. The rights remain fully protected by completion of that verification.

Please let me now if you have any questions about this subject.

Sincerely,

Steve Lester

Steve Lester
Water Rights Supervisor

Form No. 217
7/94

FOR OFFICE USE ONLY
Amt of Fee $: 50
Receipt No W021339
Receipt By: MW
Date Receipted: 8/12/96

RECEIVED
AUG 12 1996
WATER RESOURCES
WESTERN REGION

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED
AUG 13 1996
Department of Water Resources

PROOF OF BENEFICIAL USE

The Idaho Department of Water Resources considers this form a statement that the permit holder(s) has/have completed all development that will occur under this permit and that water has been applied according to the provisions of the permit for the beneficial use(s) described below. This form must be accompanied by a license examination fee, when necessary, or be accompanied by a completed field examination report prepared by a certified water right examiner who has been appointed by the department.

1. Permit No. 65-13458 Telephone No. 467-1348

2. Name(s) of Permit Holder(s): Darwin Pancheri

3. Mailing Address: 9325 Missouri Rd Nampa 83686

4. Source of Water: Spring If **GROUNDWATER** (well), Date Drilled: mo. _____ / yr. _____

a. Well Driller: N/A Drilling Permit Number: ____ - ____ - ____ - ____

b. ***OPTIONAL:***
Pump Horsepower: 2x 1hp Pressure (psi): _____ Dynamic pumping level (ft): _____

5. Use(s) (as authorized by the water right permit):

Domestic (No. of households): _____ Stockwater (No. and type of stock): _____

Irrigation (No. of acres): 5 Other: _____

6. Total rate of diversion and/or volume for which proof is submitted: .15 cfs **OR** _____ acre feet

7. Measuring Device Requirement: **(refer to the approval conditions on your permit and respond accordingly)**
*(This question is **not optional**. Please check either yes or no. Proofs returned not checked accordingly, will be considered incomplete)*

Measuring Device: Is a measuring device required? Yes ____ **or** No ____
Has the measuring device been installed? Yes ____ **or** No ____

Flow Measurement Port: Is a flow measurement port required? Yes ____ **or** No ____
Has the measurement port been installed? Yes ____ **or** No ____

8. Fee Enclosed: $ 50.00 (See Fee Schedule on back of the instructions for filing proof of beneficial use)

9. Person to contact to accompany the Department representative during field examination of the water system.

Name: Same Telephone Number: 467-1348

Address: Same

10. The information given on this form is my true statement of the extent to which the above numbered permit has been developed and I relinquish any undeveloped portion of the permit to the State of Idaho.

Signature of permit holder: Darwin Pancheri Date: 8-12-96
(include your title, if on behalf of company, or organization)

SCANNED JAN 26 2005

OCT 10 1996

Form 219
6/92

RECEIVED
FEB 18 1997
Department of Water Resources

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No. 65-13458

1. Owner: Darwin & Joan Pancheri Phone No. (208) 467-1348

Current Address: 9325 Missouri Rd., Nampa, ID 83686

2. Accompanied by: Darwin Pancheri EXAM DATE: 9-24-96

Address: (Same) Phone No. (Same)

Relationship to Permit Holder: (Same)

3. Source: Groundwater tributary to

B. OVERLAP REVIEW (Spring in Permit)

1. Other water rights with the same place of use: None

2. Other water rights with the same point of diversion: None

C. DIVERSION AND DELIVERY SYSTEM

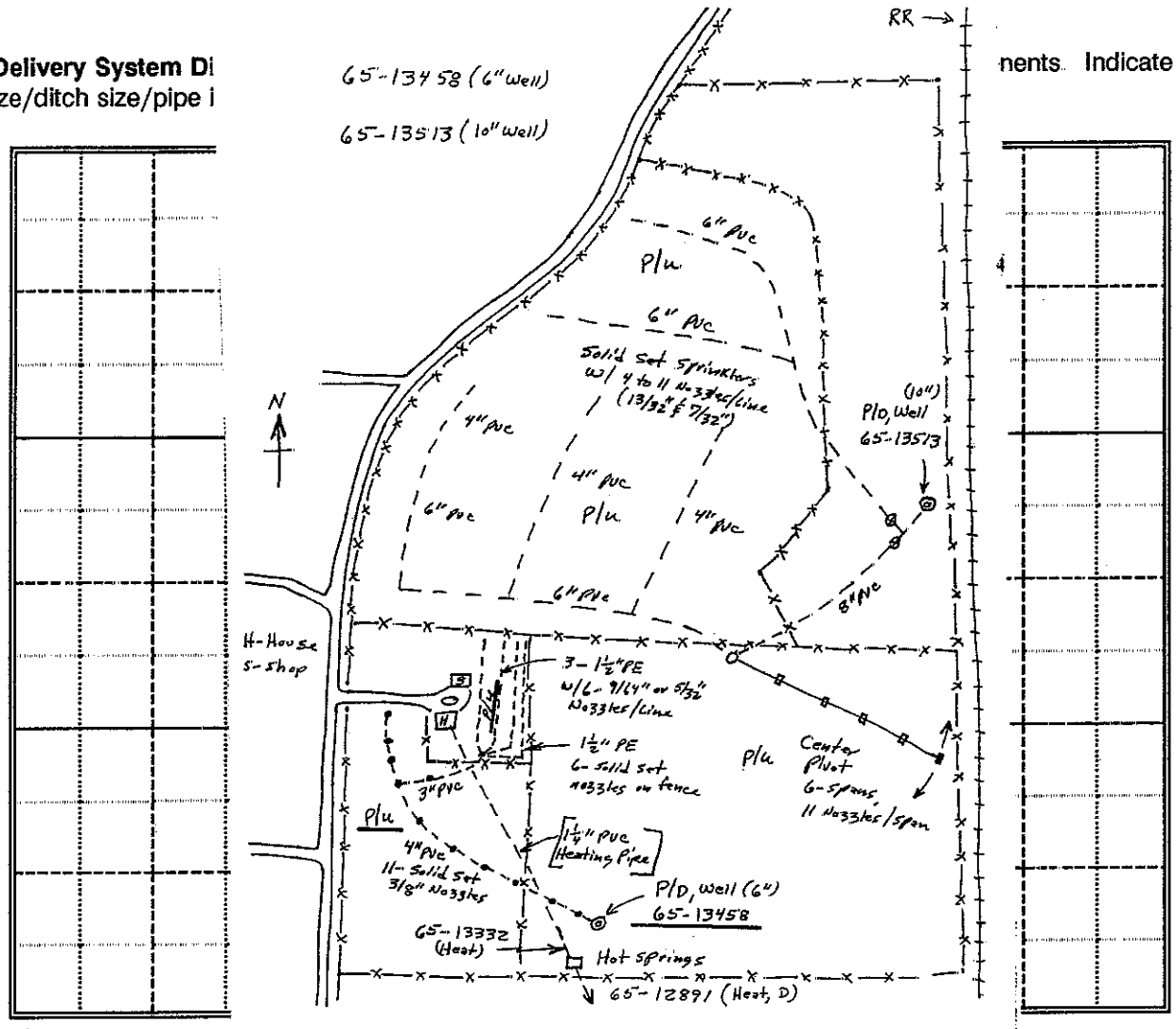
1. **Point(s) of Diversion:**

Ident No.	Gov't Lot	¼	¼	¼	Sec.	Twp.	Rge.	County	Method of Determination/Remarks
		SE	NE	NE	13	13N	3E	Valley	Site Visit, Map

2. **Place(s) of Use:** Indicate Method of Determination Site Visit, Map

TWP	RGE	SEC	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
13N	3E	13	5																5.0

3. **Delivery System Di** nents. Indicate weir
size/ditch size/pipe i



Scale: 1" = No Scale

✓ Copy of USGS Quadrange Attached Showing location(s) of point(s) of diversion and place(s) of use (required)

___ Aerial Photo Attached ✓ (required for irrigation of 10+ acres)

___ Photo of Diversion and System Attached ✓

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
6" well	Franklin	5		Ste-Bite	set @ 25'

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date

2. **Measurements:** None- operating pressure is 50 PSI @ well.

E. NARRATIVE/REMARKS/COMMENTS

1. The water source for this permit is a 99' well, not a spring as shown in the permit. The owner drilled the well in June, 1991 near a developed hot springs with the intent to have a hot well for heating purposes. When the well water was found to be cold - 52°F - he decided to use it for irrigation.

2. The well pumps water through a 4" PVC buried mainline with 11 solid set sprinklers to irrigate a pasture. A 3" PVC pipeline off the 4" line supplies water to 4 sprinkler laterals that irrigate the lawn and yard around the house.

3. The developed hot springs near the well supplys hot water to the house for heating, WR 65-13332, and another pipeline to the south, WR 65-12891, also used for heating by the owner's brother.

4. This water system is a separate system from the other systems on the property.

5. For Condition 5, the power panel box can be locked.

6. There is no surface water available for this land, or any being used - Condition 7. The land irrigated is above the lower flood plain area.

Have conditions of permit approval been met? ✓ yes ___ no

F. FLOW CALCULATIONS _____ Additional Computation Sheets Attached

Measured Method: None - Theoretical Cal. -

$$Q_{max} = \frac{(8.8)(5Hp)(70\%)}{28' + (50 psi)\left(\frac{34'}{14.7 psi}\right)} = 0.21 \text{ cfs} > 0.15 \text{ cfs}$$

$Q_{Allowed} = \left(0.03 \frac{cfs}{Ac.}\right)(5 Ac.)$

$= 0.15$ cfs

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$V_{I.R.}$ = (Acres Irrigated) x (Irrigation Requirement) = $(5.0 Ac.)\left(2.0 \frac{AFA}{Ac.}\right) = 10.0$ AFA

$V_{D.R.}$ = [Diversion Rate (cfs)] x (Days in Irrigation Season) x 1.9835 = $(0.15)(184)(1.9835) = 54.7$

V = Smaller of $V_{I.R.}$ and $V_{D.R.}$ = 10.0 AFA

2. Volume Calculations for Other Uses:

Irrigated Acres = [(400')(852') - 5000 ft² House - (20')(352') Road - (200')(40') Tract across Cane]

= 7.35 Ac., Allow the 5.0 Ac.

(66)(66)(10)

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use From	Period of Use To	Rate of Diversion Q (cfs)	Annual Volume V (afa)
Irrigation	04/15	10/15	0.15	10.0
		Totals:	0.15	10.0

2. Recommended Amendments

✓ Change P.D. as reflected above ___ Add P.D. as reflected above ___ None

___ Change P.U. as reflected above ___ Add P.U. as reflected above ✓ Other

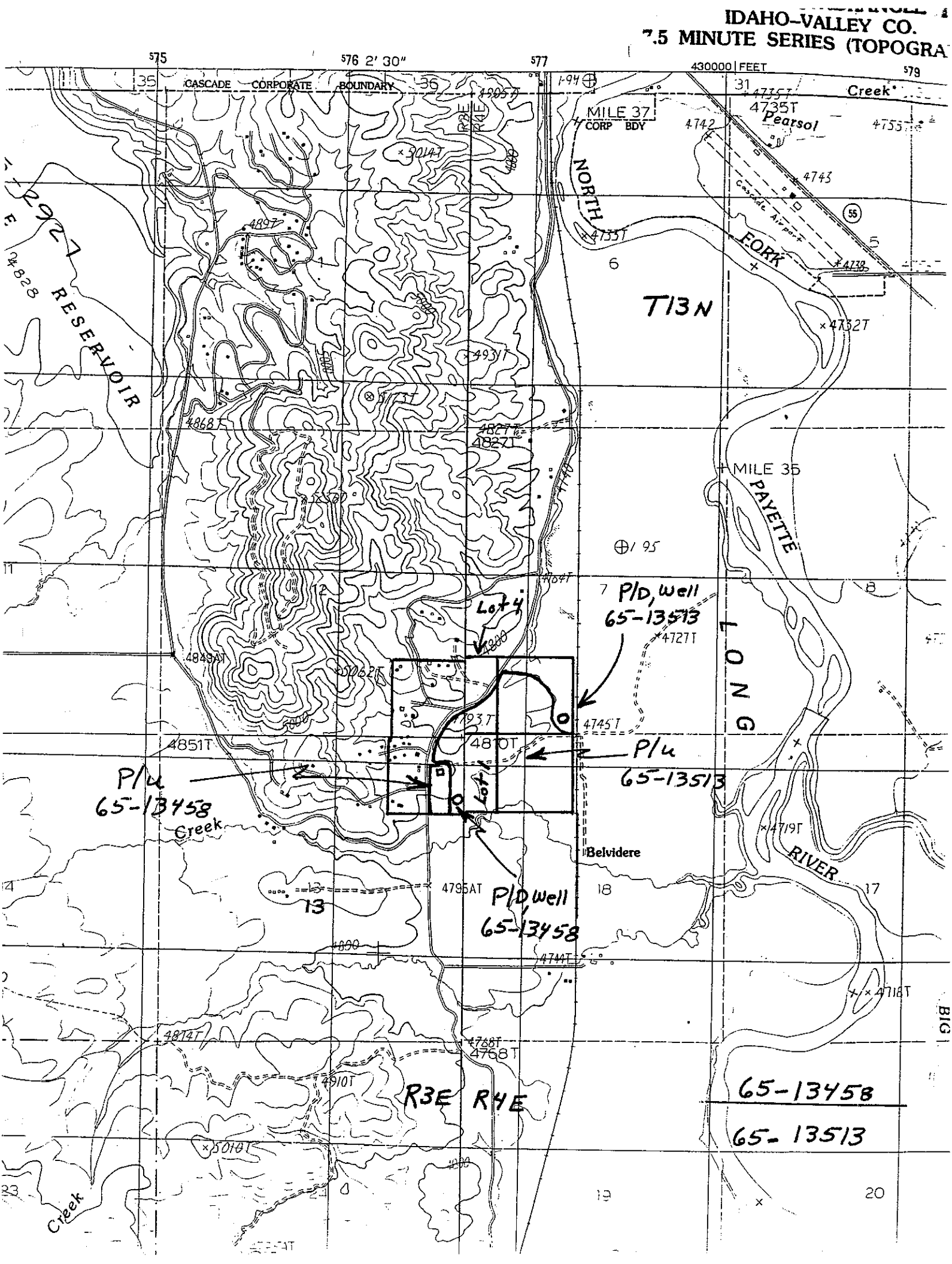
1) No NESENE in P/D

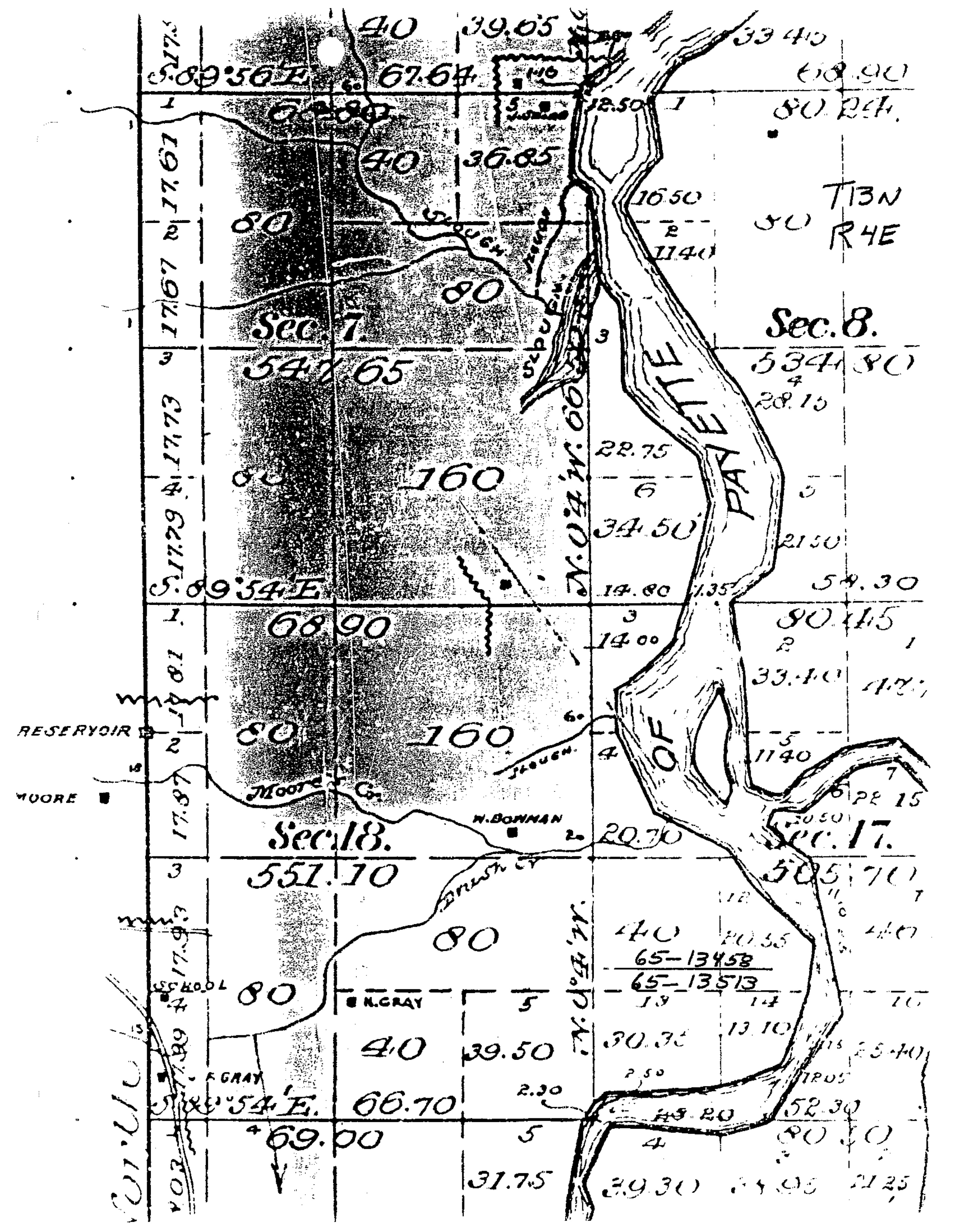
2) This water source is a well, not a spring.

I. AUTHENTICATION

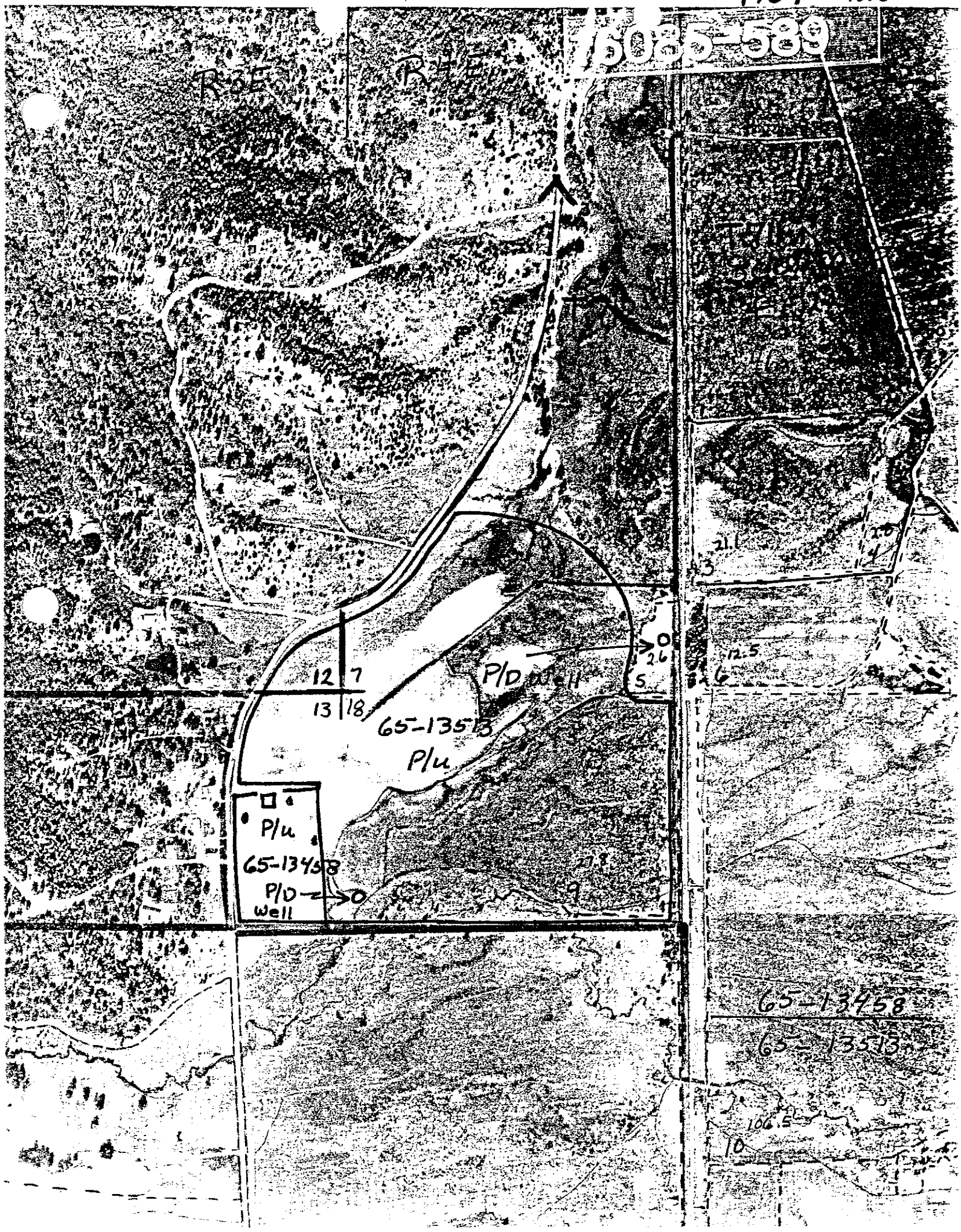
Field Examiner's Name Dan Tomich Date 2-17-98

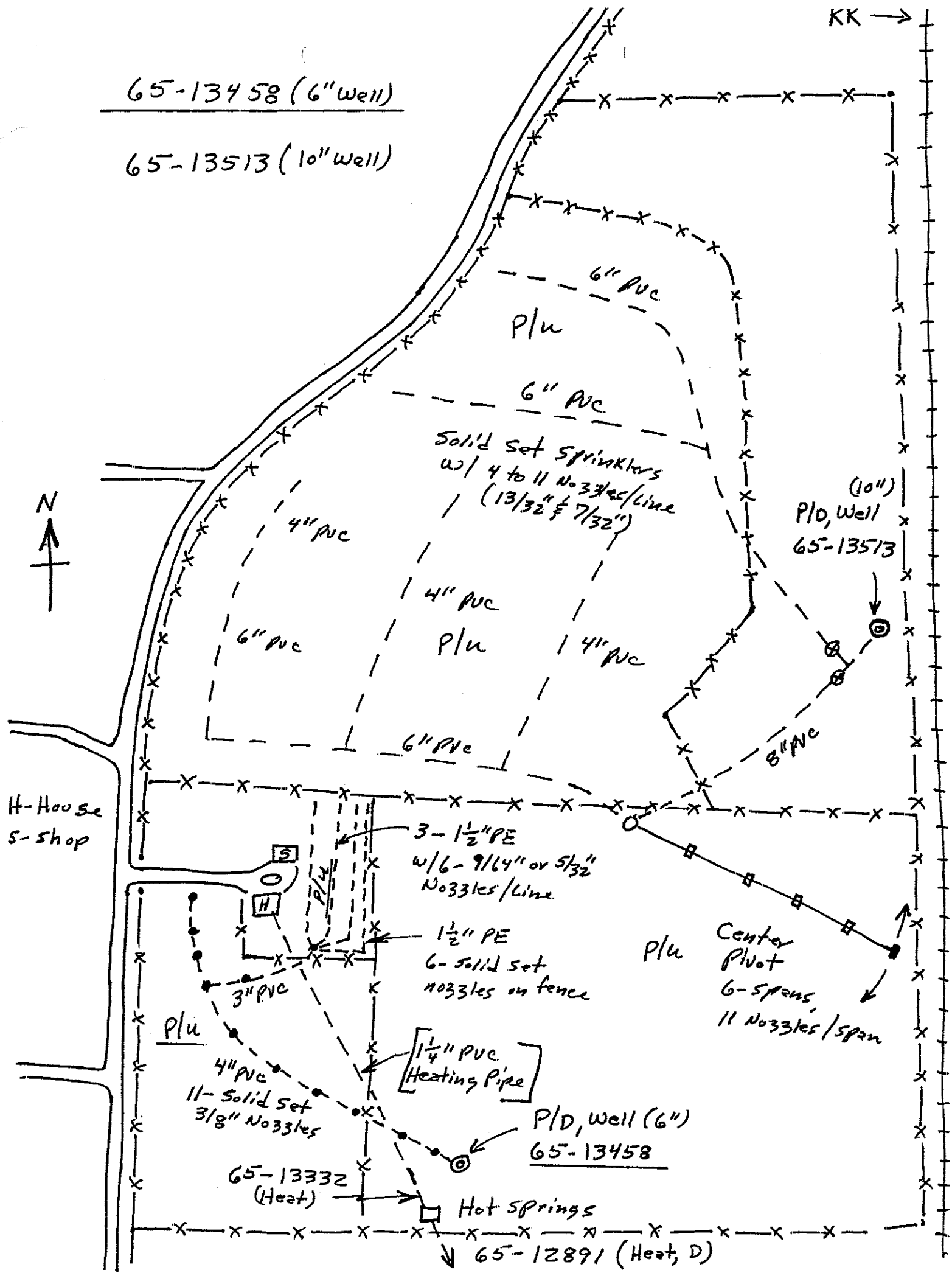
Reviewer _____ Date _____ SEAL


IDAHO-VALLEY CO.
7.5 MINUTE SERIES (TOPOGRA
575
576 2' 30"
577
430000 FEET
579
CASCADE CORPORATE BOUNDARY
MILE 37
CORP BDY
Pearsol
Creek
NORTH FORK
Cascade Air port
MILE 35
PAYETTE
LONG
RIVER
Belvidere
Creek
T13N
R3E R4E
RESERVOIR
P/D, well
65-13513
P/u
65-13513
P/u
65-13458
P/D well
65-13458
Lot 4
Lot 1
65-13458
65-13513


T13N
R4E
Sec. 7.
Sec. 8.
Sec. 18.
Sec. 17.
S. 89°56'E. 67.64
S. 89°54'E.
S. 89°54'E. 66.70
N. 0°04'W. 60
547.65
534.80
551.10
505.70
160
68.90
69.00
OF PAYETTE
SLOUGH
MOORE'S CR.
BRUSH CR.
RESERVOIR
MOORE
W. BOWMAN
SCHOOL
N. GRAY
F. GRAY
65-13458
65-13513

1989 Photo


R5E
R4E
T7N
T6N
12
7
13
18
P/D well
11
5
65-13513
P/u
P/u
65-13458
P/D
well
9
65-13458
65-13513
106.5
10
21
3
12.5
6
2.6


65-13458 (6" Well)
65-13513 (10" Well)
KK
6" PVC
P/u
6" PVC
Solid set Sprinklers
w/ 4 to 11 Nozzles/Line
(13/32" & 7/32")
4" PVC
4" PVC
P/u
4" PVC
6" PVC
6" PVC
8" PVC
(10")
P/D, Well
65-13513
N
H-House
S-Shop
S
H
3 - 1½" PE
w/ 6 - 9/64" or 5/32"
Nozzles/Line.
P/u
1½" PE
6 - Solid set
Nozzles on fence
P/u
Center
Pivot
6-Spans,
11 Nozzles/Span
3" PVC
P/u
1¼" PVC
Heating Pipe
4" PVC
11 - Solid set
3/8" Nozzles
P/D, Well (6")
65-13458
65-13332
(Heat)
Hot Springs
65-12891 (Heat, D)

238(4)-1
5/93

IDAHO DEPARTMENT OF WATER RESOURCES

WELL INSPECTION FORM

1. DRILLING PERMIT NO: 65-91-2-018 OTHER APPLICABLE NO: 65-13458

2. OWNER: Darwin + Joan Pancheri Phone: (208) 467-1348
Address: 9325 Missouri Rd., Nampa, ID 83686

3. WELL LOCATION: Twp 13N, Rge. 3E, Sec. 13, NE 1/4 NE 1/4
County Valley (Provide sketch map and photo on reverse.)

4. DRILLER: Gestrin Well Drilling Lic. No. 408
When Drilled? 6-3-91 to 6-7-91

5. WELL CONSTRUCTION:
Casing Diameter 6 inches Water tight cap? [X] Yes [ ] No Access Port: [ ] Yes [X] No
Casing ≥ 12 inches above ground? [X] Yes [ ] No - Describe
Depth of Casing 99 ft. Method Drilled Air - Rotary
Condition of Well Casing: [ ] Good [X] Fair [ ] Poor Describe
Control Valve? [X] Yes [ ] No Pressure Gauge: [ ] Yes [X] No
Condition of Piping and Valving Good
Auger to a depth of ft. Evidence of Annular Seal [X] Yes [X] No
Are there obvious constuction problems that may be a source for contamination or waste of water?
[ ] Yes [X] No (Describe in Remarks and Attach Photo - On Reverse)

6. HYDROLOGIC INFORMATION:
Depth to Static Water 28 ft. Water Temperature 52 °F
Flowing Artesian [ ] Yes [X] No Pressure: (psi)
Water Sample Taken? [ ] Yes [X] No If yes, describe purpose
Water Quality Measurements/Observations (Describe)

7. WELL USE:

[ ] Domestic	[X] Irrigation	[ ] Stock
[ ] Test	[ ] Municipal	[ ] Industrial
[ ] Abandoned	[ ] Waste Disposal/Injection	[ ] Not Used

[ ] Other:

8. **POSSIBLE CONTAMINATION SOURCES:**

Is there evidence of Chemigation? [ ] Yes [X] No

If yes, is there a check-valve present? [ ] Yes [ ] No

Is there a possible source of contamination nearby? [ ] Yes [X] No

If yes, what Type? _____

How far away from the well is this source? _____

9. **REMARKS:** This well was drilled near a hot springs development with the intent of getting a hot well for heating. When the well was determined to be cold - 52°F - they developed it for irrigation instead.

Dan Zemick Water Rights Examiner — 9-24-96

Signature of Dept. Representative & Title — Inspection Date

PHOTOS, DRAWINGS, OTHER ATTACHMENTS:

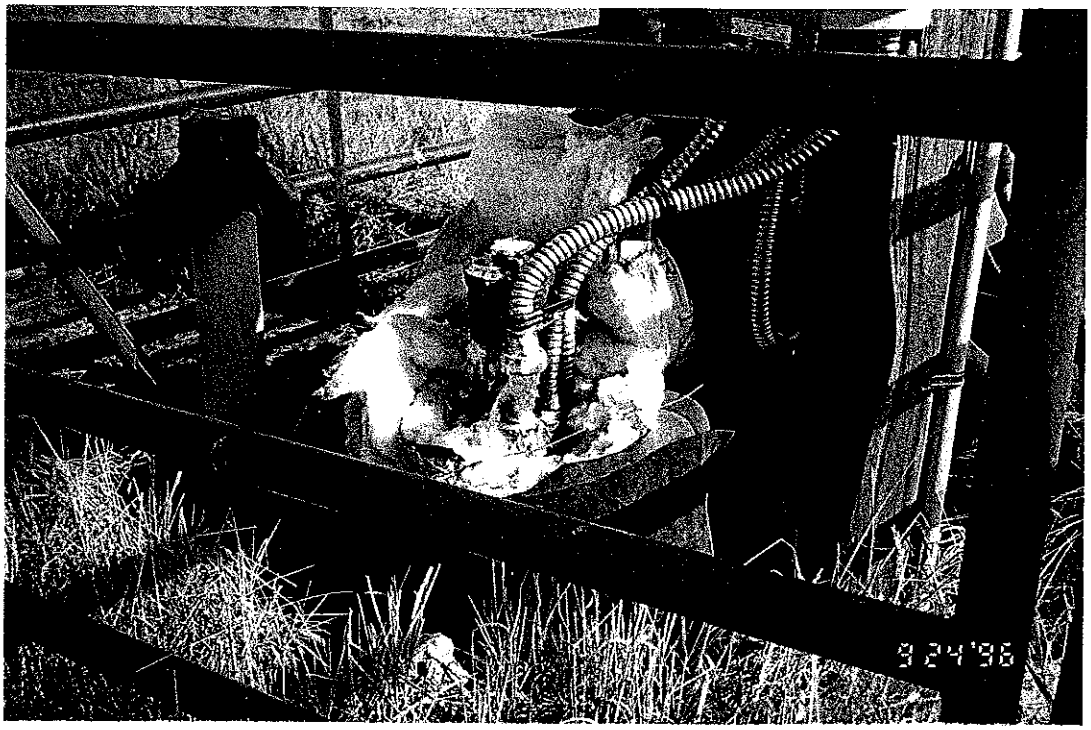




View Looking Southwest.

P/D
6" well in green rack enclosure.

Hot Springs Development in small shed – rack enclosure at left Center.



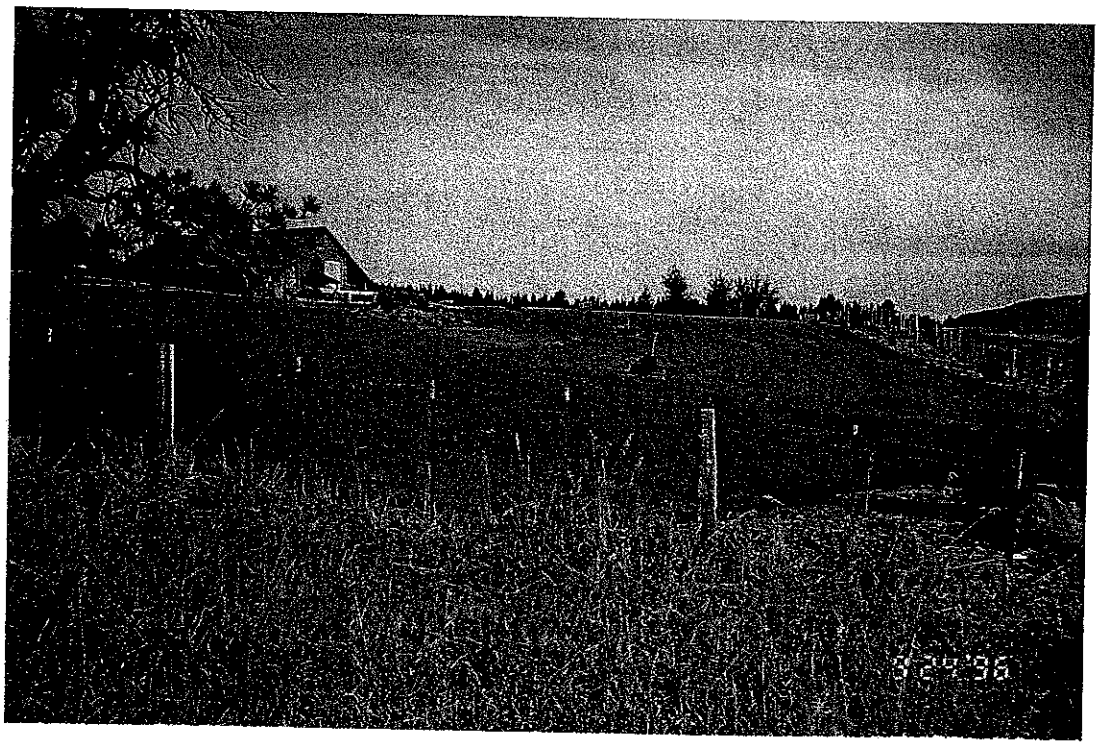
P/D
6" well

65-13458



P/u irrigated yard.

View Looking Northwest-



P/u irrigated pasture— foreground, and yard— background.

View Looking North.

65-13458

ANALYSIS SHEET
FOR
PROOF OF BENEFICIAL USE

Permit No. 65-13458 Reviewed by [signature] Date 9-4-96

GENERAL CONSIDERATIONS

Yes Name same as permit?

no Address same as permit?

Yes Proof timely received? Correct Uses? Yes
If not, complete calculation below

TYPES OF USE

Irr

SOURCE OF WATER

✓ Surface water source

_____ Ground water source
_____ Drilling permit required?
_____ Copy in the file? Drilling Permit No. _____
_____ Amount paid for permit _____ Correct?
_____ Well log in the file?

LICENSE EXAMINATION FEE

Yes Required?

50 Amount Submitted

Yes Correct?

MEASURING DEVICE

Yes Required?

no Installed?

_____ Waiver requested?

PRIORITY CALCULATION

Date proof received	_____	_____
Date proof due	_____	- _____
No. of days late	_____	= _____
Priority Date	_____	+ _____
New Priority Date	_____	_____

DEFICIENCIES OR ACTION ITEMS

Inform of lockable device requirement
Proof acceptable

DATA ENTRY

New Address 9325 Missouri Rd Proof Made 8-12-96
Nampa, Id. 83686

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

PHILIP E. BATT
GOVERNOR

KARL J. DREHER
DIRECTOR

September 9, 1996

DARWIN & JOAN PANCHERI
9325 MISSOURI RD
NAMPA ID 83686

PROOF ACKNOWLEDGEMENT LETTER

RE: PERMIT NO. 65-13458

Dear Permit Holder:

The department acknowledges receipt of the proof of beneficial use form submitted for the above referenced permit. The next step in the process of developing a water right is for the department to conduct a field examination to determine and confirm the use being made of the water.

One of the conditions of your water right permit requires that the permit holder install and maintain a lockable controlling device on the diverting works (refer to condition #5 of your permit.) This condition must be complied with before the license examination.

Please be advised that Section 42-248, Idaho Code, which became affective on July 1, 1996, requires you or the owner of this water right to maintain current ownership and address records on file with the department. Please contact any office of the department for the proper form to file a change of ownership of a water right and/or a change in the address of the owner. Failure to maintain current records with the department could result in the assessment of a monetary penalty.

If you have questions concerning the field examination or lockable device requirement, please contact the **WESTERN** Regional Office in Boise, at (208)334-2190.

Sincerely,

Julie L. Yarbrough

JULIE L. YARBROUGH
Senior Secretary

c: IDWR - Region

RECEIVED
OCT 10 1996

July 31, 1996

DARWIN PANCHERI
JOAN PANCHERI
15501 STAGECOACH RD
NAMPA ID 83686

PROOF DUE NOTICE

RE: PERMIT NO. 65-13458

Dear Permit Holder:

One of the conditions of approval of the above referenced water permit was that proof of the extent of your beneficial use must be submitted to this office on or before October 1, 1996. (See last page of your approved permit or your last approved extension request.) Enclosed is a form which when accompanied by the license examination fee or a complete field examination report prepared by a certified water right examiner may be used to submit the required proof.

If you have not fully completed your project, and you or a previous owner of this permit have not received a prior extension of time, you may request an extension of time if the delay is for reasonable cause as provided in Section 42-204, Idaho Code. If you have been prevented from proceeding by a governmental agency or by litigation which might bring title to the water in question, more than one extension of time can be granted. An extension of time request form is enclosed for your convenience.

Either an acceptable proof of beneficial use submittal or an acceptable request for an extension of time must be received by this department on or before the above described proof due date. If neither is received, the department will send you a lapse notice. Within sixty (60) days of the mailing of the lapse notice, the permit will no longer be of any force nor effect.

SINCERELY,

JULIE L. YARBROUGH
Senior Secretary

Enclosures

MICROFILMED
OCT 10 1996

CERTIFIED MAIL
NO 142872

State of Idaho
DEPARTMENT OF WATER RESOURCES
1301 North Orchard Street, Statehouse Mail, Boise, Idaho 83720-9000
Phone: (208) 327-7900 FAX: (208) 327-7866

CECIL D. ANDRUS
GOVERNOR

R. KEITH HIGGINSON
DIRECTOR

October 19, 1993

DARWIN PANCHERI
JOAN PANCHERI
15501 STAGECOACH RD
NAMPA ID 83686

PERMIT APPROVAL NOTICE

RE: PERMIT NO. 65-13458

Dear Permit Holder:

Enclosed is a copy of your approved application for permit. Please be sure to thoroughly review the "CONDITIONS/REMARKS:" listing on the permit.

As a permit owner you must commence the excavation or construction of the diverting works within one year of the date the permit was issued, and you must proceed diligently until the project is completed. The date shown under condition no. 1 is the date when the project must be completed. You will receive a "Proof Due Notice" from this Department approximately 60 days prior to the completion date requiring you to file either a Proof of Beneficial Use form stating that the project has been completed or file a Request for an Extension of Time in which to file the proof statement.

Be sure to note the special condition requiring you to install a lockable device that will provide the watermaster control on your diversion.

Sincerely,

for JIM JOHNSON
Water Rights Supervisor

JJ:dc

Enclosures

RECEIVED
OCT 25 1993

APPLICATION FOR PERMIT
STATE OFFICE REVIEW

Application #: 65-13458 Date: 9/21/93 Reviewer: *Cindy Zimmerman*

AREA OF CONCERN? - No/Yes _____
SYSTEM COMPLETED:
  No - 26A-~~P17~~
    Complete in 1 year - **P16**
  Yes
    Proof not submitted - **P16**
    Proof submitted - N/A
GROUNDWATER:
    + 0.2 cfs <flo-ch> - 01G-**P03**, 01C-**P03** (existing), NMR
    - 0.2 cfs - NMR <flow chart>
  Drilling Permit:
    Included w/permit - **P99** Permit No. _____
    Existing well - N/A (if drilled before 7/1/87)
    No WD permit? - 046-46A<Irr>-46B-**P23** (if drilled after 7/1/87)
SURFACE WATER: not in WD - 01C-**P03** (+.2 w/pump), NMR <flow chart>
LOCATION:
    Water District - WD No. 65
      Surface water - 005 or 005-01J-**P08** (+.2)
        or 005-01H-~~P01~~ (-.2 w/pump); NMR
      Groundwater - **P05** (if well has not been drilled)
    In stream channel - 030
    Irrigation Dist. - 023
    Canal Co. Areas - 023
    Drainage Districts - 024
    Flood Control Dist. - 063
    Boise Front (63) - 058 (Groundwater temperature)
    Swan Falls Flag - 13 <See condition code chart>
      Trust - 051-052-053-**P74** (Consumptive Uses)
      Non Trust <1> - 048-049
RIVER BASINS (Surface): *Water District Control Condition (005) &....*
    Boise (63) - 05A (req), 11E (non-domestic use)
    Payette (65) - ~~047-P04~~, 064(all consumptive use)
    Snake (01, 02 & 03) - 11A-**P04** (01), 061-**P07** (*02/03 No W.D.Cond.*)
USE:
    Fish Propagation - 06A or 09E-**P10** (WQ) & 010-042 (req),
      002-**P06** (MD), 07A (Special), 044 (N 1000 Spr)
    Irrigation - ~~803~~(in WD use SW 1st)(~~15~~*A in WD do P/U compare*)
    Power - 08A-17K-025-027 (req); 01F-**P19**; 09E-**P10**;
      +25 cfs-**P18**; 17G(FERC) or 17M(~~FERC~~); 18B-**P09**
    Mining - 06A or 010 or 09E-**P10** & 054 (req)
    Storage(✓ *3 compo.*) - 18A-for multi MD in WD, 18B-**P09** (+10'Size)
    Domestic (*surface*) - 021(Boise R ↑ L Peak), 27A(Payette R)
OWNERSHIP:
    Non land owner - 004
PROTESTED:
    Hearing agreement - 020
OTHER CONDITIONS: -
REMARKS: - ① Single P/D located on/near line between SE NENE & NESENE, S13 T13N R3E
BENEFICIAL USE DUE: - 10-1-1996
COMMENTS: - ① DW Desc.

WR5809NP
65-13458

IDAHO DEPARTMENT OF WATER RESOURCES
WATER RIGHT PROFILE REPORT

DATE: 10/13/93
PAGE: 1

OWNER CODE	NAME & ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	DIVERSION RATE	DIVERSION VOLUME
C	DARWIN PANCHERI	06/22/1993	IRRIGATION	04-15	10-15	0.15 CFS	
C	JOAN PANCHERI						
	15501 STAGECOACH RD				TOTAL DIVERSION:	0.15 CFS	
	NAMPA ID 83686						
	(208) 467-1348						

Water Source: SPRING Tributary to: MOORES CREEK Stage: PERMIT

Point(s) of Diversion: T13N R03E S13 SE NE NE NE SE NE

Place of use Legal Description for: IRRIGATION

			NE				NW				SW				SE				
			NENE	NWNE	SWNE	SENE	NENW	NWNW	SWNW	SENW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE	
T	R	S	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	Lt Ac	SUM
13N	03E	13	05																5.0
																		TOTAL ACRES	5.0

Pou County: VALLEY

Other Water Rights with Same Point(s) of Diversion and Source:
65-01972 65-01973 65-12891 65-13332 65-13458

Other Water Rights Listing Overlapping Place(s) of use:
65-13458 65-13459

Conditions of Approval:

26A - Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which permit holder had no control.

005 - Use of water under this right is subject to control by the watermaster of State Water District No. 65.

01H - A lockable device, subject to the approval of the Department, shall be installed on the diverting works in a manner that will provide the watermaster suitable control of the diversion prior to diversion of water under this right.

064 - When water is not available to fill this right, the right holder shall cease diversion or shall rent water from the Payette River Rental Pool.

803 - The right holder shall use the full allotment of his surface water right, to the extent it is available, in conjunction with groundwater diverted pursuant to this right.

057 - The rate of diversion of water for irrigation under this right and all other water rights on the same land shall not exceed 0.03 cubic feet per second for each acre of land.

Remarks: Single point of diversion located on or near line between SENENE and NESENE, S13, T13N, R03E.

Dates: App. Received: 06/22/1993 Priority Date: 06/22/1993
Proof Due Date: 10/01/1996 Proof Made Date:
Exam Made Date: Exam Sent to S.O.:
Licensed Date:

Misc: Water District Number: 65 Field Exam Fee:

Comments: Date: 06/22/1993 User-ID: LESTER Subject: OVERLAP
This is same spring as 65-12891 used for Pancheri property about 3/4 mile SE in S. 18 and 65-13332 used for new Pancheri home associated with proposed 5 acres irrigation. Also, a new appl. is being filed on a cold well near spring, and well will irrigate about 100 acres, including 5 acres in this application.

Date: 09/21/1993 User-ID: ZIMMERMA Subject: DIVERSION DESCRIPTION
Pump & pipeline for sprinkler irrigation.

Audit: 09/21/93 ZIMMERMA 10/12/93 ZIMMERMA

WR5810NP
(OD-138)

IDAHO DEPARTMENT OF WATER RESOURCES
PLACE OF USE 1/4 1/4 COMPARISON REPORT

DATE: 09/21/93
PAGE: 1

(WATER RIGHT NUMBERS THAT BEGIN WITH AN '*' ARE ADJUDICATION CLAIMS)

WR-NUMBER	SOURCE	NE				NW				SW				SE				SUM
		NE Lt Ac	NW Lt Ac	SW Lt Ac	SE Lt Ac	NE Lt Ac	NW Lt Ac	SW Lt Ac	SE Lt Ac	NE Lt Ac	NW Lt Ac	SW Lt Ac	SE Lt Ac	NE Lt Ac	NW Lt Ac	SW Lt Ac	SE Lt Ac	
6513458	T13N R03E S13	SPRING																
		05																
6501979	BRUSH CREE			05	16													5
A6501979	BRUSH CREE			05	16					29	39	26	06	37	21	04	13	196
6503418	SPRING								02	29	39	26	06	37	21			179
A6503418	SPRING								02									2
6503419	HOUSE CREE			03			30											2
A6503419	HOUSE CREE						30	03										33
6503420	MOORES CRE							36	09									33
A6503420	MOORES CRE							36	09									45
6513459	GROUNDWATE	22																45
	C85Q-U 10	07		30	35	07	40	40	37	38	41	22	04	39	39	08	28	22
																		415

Form No. 202a.
4/93

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPROPRIATION APPLICATION ANALYSIS SHEET

INITIAL REVIEW BY: CJ4 DATE: 6/28/93 APPLICATION: 65-13458

REQUIRED INFORMATION

- Name: (If applicant is a corporation or partnership, names and addresses for the director, officers, and other partners must be included.)
- Address:
- Source: (See USGS Quad for names of water sources)
- Point of Diversion: (10 acres for spring, lot & block descriptions for Subdivisions, local name)
- County:
- Quantity: (flow and/or volume)
- Period of use:
- Nature of proposed use: (Include description of use)
- Description of diverting works:
- Time required for beneficial use of water:
- Place of use or acres irrigated:
- Map:
- Signature: (If applicant is corp., partnership, or municipality, title of signatory is required)
- Fee:
- Yes ____ No* In form to receipt:

Gov't. Lots:
P/D
P/U

ADDITIONAL INFORMATION

YES	NO	
\		Overlapping place of use: (Describe source & relationship to present application on the back.)
\		Overlapping point of diversion:
		Field check required: Field check by: _____
		Field report attached:
		Critical groundwater area:
		Groundwater management area:
		1992 moratorium
		Copy to SCA staff (perennial stream, non-pump diversion):
		Send dam safety information:
		Send power requirement letter:
		Send fish farm requirement letter:
		Power residency affidavit:
		Power efficiency form:
		Within trust water boundary: (If yes, attach Trust Water Supplementary Analysis Sheet.)
		Diversion greater than 5 cfs or 500 af or irrigation greater than 200 acres: (If yes, attach Large Diversion supplementary analysis sheet.)
		*REQUEST ADDITIONAL INFORMATION FROM THE APPLICANT

DATE REQUESTED: _____

\ Additional information on reverse side:

RECEIVED
AUG 04 1993
Department of Water Resources

PROCESSING APPLICATION NO. _____

YES	NO	
✓		In form for advertising:
	✓	Statewide advertising: (> 10 cfs &/or 1000 af)
✓		Fee amount, receipt number and date recorded on application:

SEND COPIES TO

YES	NO		YES	NO	
	✓	I.D. Health and Welfare		✓	U.S. BLM
	✓	I.D. Fish and Game		✓	U.S. Forest Svc.
	✓	I.D. Lands		✓	Water Dist. # _____
	✓	Adjudication Bureau		✓	Other _____

FINAL REGIONAL PROCESSING REVIEW

YES	NO	
✓		Affidavit of publication received:
✓		Application published correctly: If not, record action taken.
		Publication dates and paper recorded on application:
	✓	Protests received. Final date for protest July 26, 1993
	✓	Protest dates, resolution of protest recorded on application:
	✓	Recommendations attached: Approve, Dar
	✓	Measuring device required:
	✓	Measuring port required:
	✓	Water delivered by water master? District # Not delivered by WD65
✓		Special conditions of approval or cover letter:

26A (Allow 3 yrs)

	✓	See below for additional information

Recommended Date or Priority 6/22/1993

Recommended by: Dar Date 7/27/1993

STATE OFFICE REVIEW

___ See below for additional information. By _____ Date _____

ADDITIONAL INFORMATION

Same Springs as 65-12891 & 65-13332, used for heating & domestic uses by applicant. P/u overlaps are also other uses &/or other owners, except for new ap 65-13459, for irrigation of same acres from groundwater.

65-13458

PANCHERI, DARWIN
PANCHERI, JOAN
15501 STAGECOACH RD
NAMPA, ID 83686

Source: SPRING Tributary: MOORES CREEK

Diversion Pt: SENENE Sec 13 T 13N R 03E in VALLEY County.
NESENE Sec 13 T 13N R 03E in VALLEY County.

Use: IRRIGATION (.150 CFS)
Total Diversion: (.150 CFS)

Date Filed: 6/22/1993

In: VALLEY County
T13N R03E S13 NENE

5.0 ACRES TOTAL

MICROFILMED

OCT 25 1993

NOTICE OF APPLICATION
FOR WATER RIGHT

The Following applications have been filed to appropriate the public waters of the State of Idaho:

5-
PANCHERI, DARWIN
PANCHERI, JOAN
5501 STAGECOACH RD
NAMPA, ID 83686

Source: SPRING
Tributary: MOORES CREEK
Diversion Pt: SENENE Sec 13 T 3N R 03E in VALLEY County
NESENE Sec 13 T 3N R 03E in VALLEY County
Use: IRRIGATION (.150 CFS)
Total Diversion: (.150 CFS)
Date Filed: 6/22/1993
In: VALLEY County
T13N R03E S13 NENE
.0 ACRES TOTAL

5-13459
ANCHERI, DARWIN
ANCHERI, JOAN
5501 STAGECOACH RD
AMPA, ID 83686

ource: GROUNDWATER
iversion Pt: SENENE Sec 13 T
3N R 03E in VALLEY County
Use: IRRIGATION (2.000 CFS)
Tot version (2.000 CFS)
ate 6/22/1993
: VALLEY County
T13N R03E S12 SESE
S13 NENE
204E S07 Lot 4 (SWSW)
ESW S18 NENW Lot 1
WNW)
0.0 ACRES TOTAL

-13461
AYNE, JESS
O BOX 1008
ALDWELL, ID 83606

urce: UNNAMED STREAM
ibutary: CASCADE RESER
OIR
version Pt: SESW Sec 24 T
N R 03E in VALLEY County
WSE Sec 24 T 15N R 03E in
ALLEY County
e: AESTHETIC (.020 CFS)
AESTHETIC STORAGE
(.10 AF)
otal Diversion: (.020 CFS)
te Filed: 6/8/1993
VALLEY County
15N R03E S24 SESW SWSE

mi be subject to all prior
ter . Protests may be sub-
ted based on the criteria of Sec.
203A, Idaho Code. protests
st be filed with the Director,
pt. of Water Resources, Western
gion, 2735 Airport Way, Boise,
ho 83705 on or before JULY 26,
3

Affidavit of Publication

RECEIVED
JUL 26 1993
Department of Water Resources
Western Regional Office

STATE OF IDAHO
COUNTY OF VALLEY

I, Michael C. Stewart, being duly sworn deposes and says, I am the Publisher of The Advocate, a weekly newspaper published at Cascade, in Valley County, Idaho; and having a general circulation therein and of legal status in said county.

The application for H2O rights, a copy of which is attached hereto; was published in said newspaper once a week for 2 consecutive weeks in the regular and entire issue of every number thereof during the period and time of publication, and was published in the newspaper proper and not in a supplement; and that publication of such notice began 7-7, 19 93, and ended 7-14, 19 93

Michael C. Stewart

Michael C. Stewart

Signed this the 22nd day of July, 19 93

STATE OF IDAHO)
: ss.
COUNTY OF VALLEY)

On this the 22 day of July, 19 93, before me, a Notary Public in and for said State, personally appeared Michael C. Stewart, known or identified to me to be the person whose name is subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that he executed the same.

Linda S. Flesner
Notary Public State of Idaho
Residing at: Cascade
Commission Expires: 10/24/95

LINDA S. FLESNER
NOTARY PUBLIC
STATE OF IDAHO

FILED
OCT 25 1993

FORM 202
96

Ident. No. _____

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name of Applicant DARWIN +/or JOAN PANCHERI Phone 467-1348
   Post Office address 9325 Missouri Ave. NAMPA, ID 83686
2. Source of water supply ground water which is a tributary of _____
3. Location of point of diversion is _____ 1/4 of SE 1/4 of NW 1/4, Govt. Lot 9
   Sec. 6 Township 13N Range 4E B.M. Valley County; additional points of diversion if any: _____
4. Water will be used for the following purposes:
   Amount .80 (cfs or acre-feet per annum) for IRRIGATION purposes from 4/15 to 10/31 (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)
5. Total quantity to be appropriated is (a) .80 cubic feet per second and/or (b) _____ acre feet per annum
6. Proposed diverting works:
   a. Description of ditches, flumes, pumps, headgates, etc. well, pump + sprinklers
   b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet; period of year when water will be diverted to storage: _____ to _____ inclusive.
   c. Proposed well diameter is 8 inches; proposed depth of well is 125 feet.
   d. Is ground water with a temperature of greater than 85°F being sought? NO
   e. If well is already drilled, when? N/A; Drilling firm _____
   Well was drilled for (well owner) _____
7. Time required for completion of works and application of water to proposed beneficial use is 5 years (*minimum 1 year*)
8. Description of proposed uses (*if irrigation only, go to item 9*):
   a. Hydropower; show total feet of head and proposed capacity if KW. _____
   b. Stockwatering; list number and kind of livestock. _____
   c. Municipal; show name of municipality. _____
   d. Domestic; show number of households. _____
   e. Other; describe fully. _____

9. Description of place of use:

a. If water is for irrigation, indicate acreage in each subdivision in the tabulation below.

b. If water is used for other purposes, place a symbol of the use (*example: D for Domestic*) in the corresponding place of use below. See instructions for standard symbols.

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
13N	46	6								10	18			10			2		40
										2.9									

Total number of acres to be irrigated 40

10. Describe any other water rights used for the same purposes as described above. NONE

11. a. Who owns the property at the point of diversion? } Applicants

b. Who owns the land to be irrigated or place of use? }

c. If the property is owned by a person other than the applicant, describe the arrangement enable the applicant to make this filing:

12. Remarks: Applicant Agrees to mitigate consumptive use in the future as needed.

13. MAP OF PROPOSED PROJECT ATTACHED ✓ Show clearly the proposed point of diversion, place of use, section number, township and range number.

BE IT KNOWN that the undersigned hereby makes this application for permit to appropriate the public waters of the State of Idaho as herein set forth.

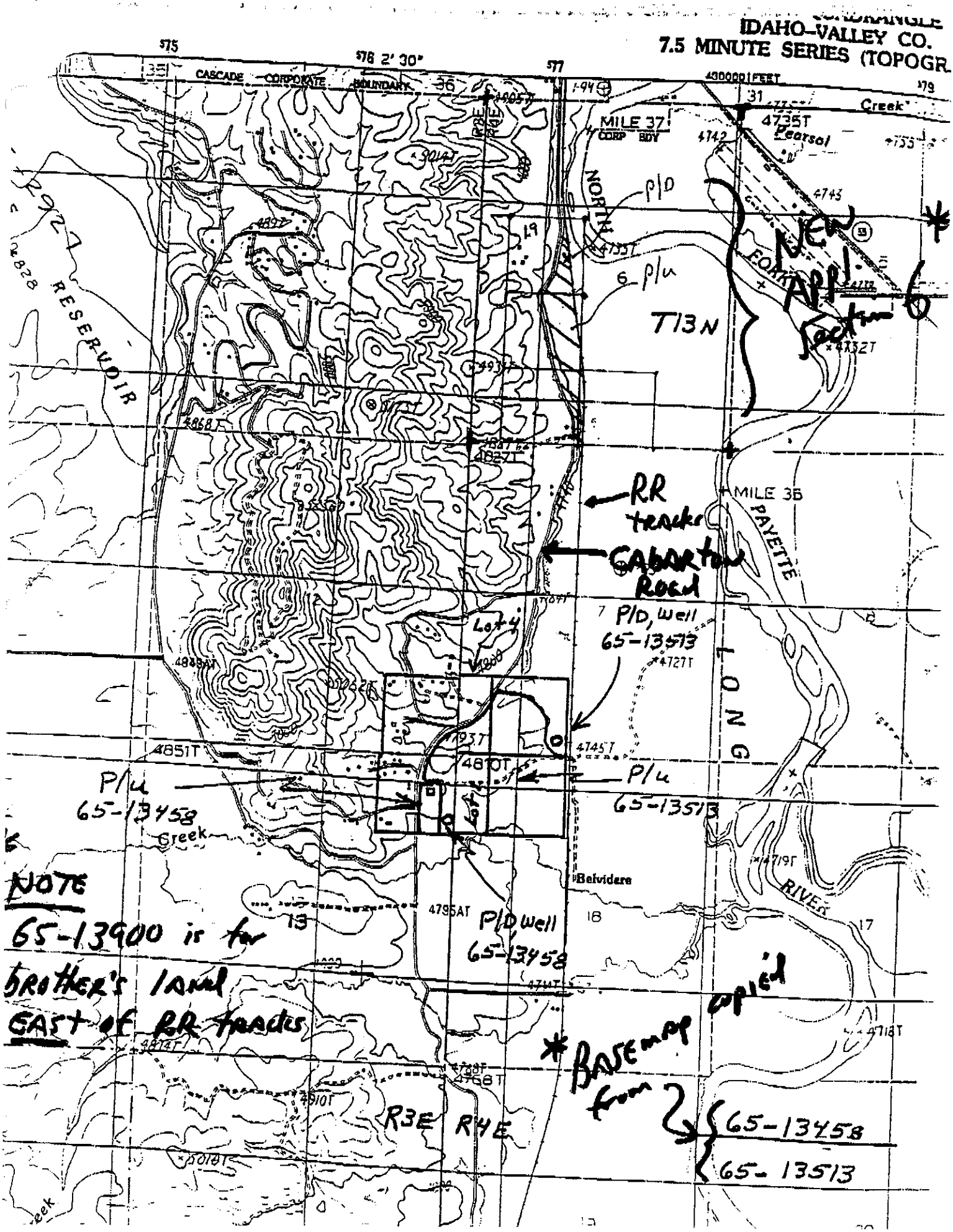
Darwin Pancheri
(Applicant)

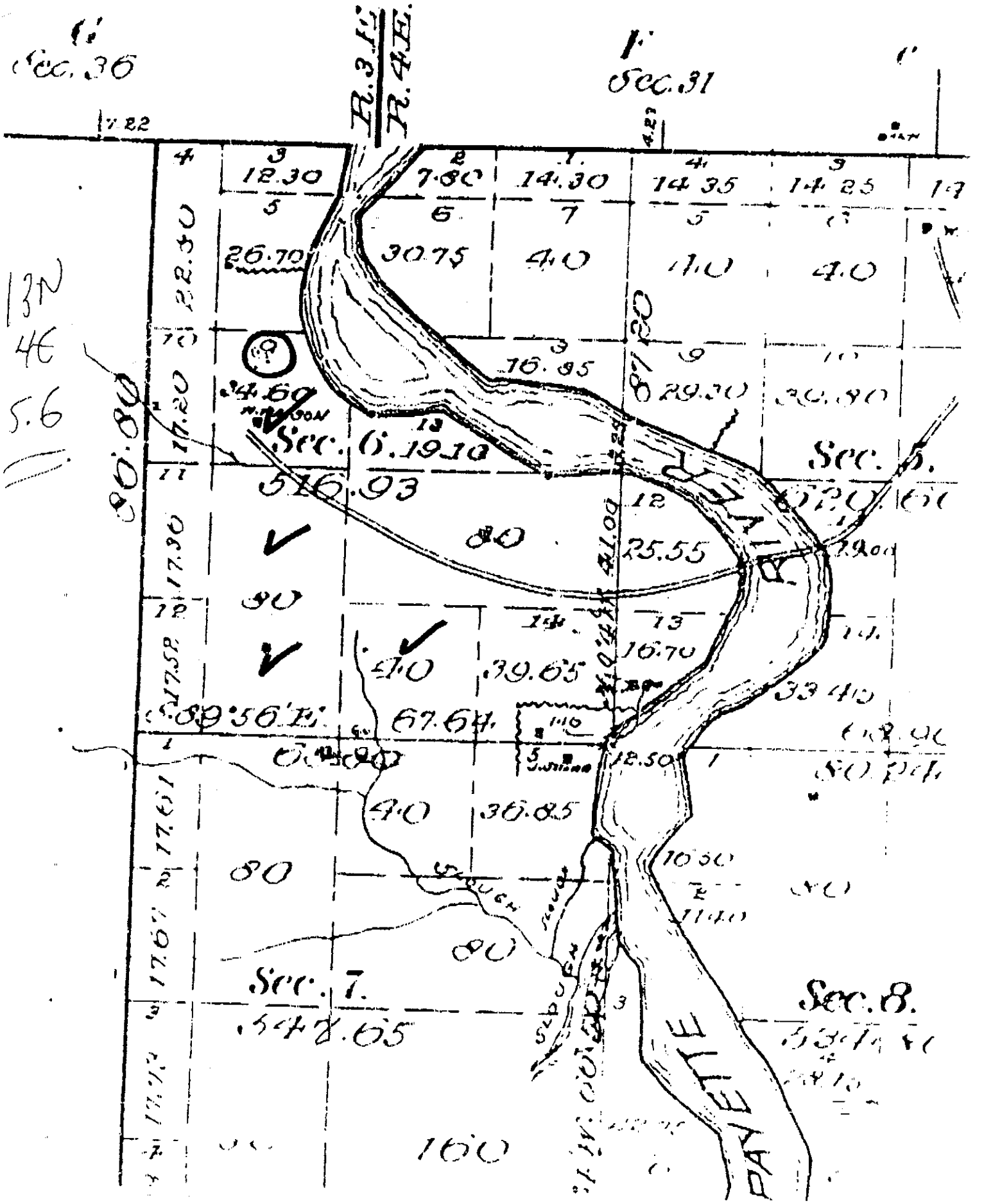
Received by SL Date 8/17/00 Time 11:15 Preliminary check by

Fee $ 250.00 Receipted by SL # WW 26860 Date 8/17/00

Application prepared by Date Published in

Application approved Date


IDAHO-VALLEY CO.
7.5 MINUTE SERIES (TOPOGR
CASCADE CORPORATE BOUNDARY
MILE 37
CORP BDY
MILE 36
MILE 35
Pearsol
Creek
NORTH FORK
PAYETTE
RIVER
LONG
RESERVOIR
T13N
R3E
R4E
Belvidere
P/D
6 P/u
NEW APP. Section 6
RR tracks
Cabarton Road
P/D, well
65-13513
P/u
65-13513
P/u
65-13458
P/D well
65-13458
NOTE
65-13900 is for
BROTHER'S land
EAST of RR tracks
*Basemap copied from
65-13458
65-13513


T. 22
R.3 E.
R.4 E.
Sec. 36
Sec. 31
Sec. 6.
Sec. 5.
Sec. 7.
Sec. 8.
13N
4E
5.6
S 89°56' E
67.64
PAYETTE

REQUEST TO PROCESS

COMPLETE REQUEST IF YOU WANT YOUR APPLICATION TO BE PROCESSED USING ONE OF THE THREE ALTERNATIVES BELOW

Name of Applicant: David d/a Juan Pancheri

Mailing Address: 9325 Missouri Ave.
Nampa ID 83686

Application No. (if known): _____

____ IN LOCAL PUBLIC INTEREST

Yes, I want my application processed and before it is advertised, I will amend my application to demonstrate that the proposed appropriation is in the local public interest including the need to preserve flows in the Snake River during the migration periods of anadromous fish.

____ PROPOSE MITIGATION NOW

Yes, I want my application processed and before it is advertised, I will amend my application to include proposed mitigation to offset anticipated depletions in the Snake River during periods of anadromous fish migration.

✓ WILL AGREE TO MITIGATION IN THE FUTURE IF NECESSARY

Yes, I want my application processed at this time, and I will accept a condition of approval that will require mitigation should the Director of the Idaho Department of Water Resources determine that mitigation is necessary to offset depletions from this appropriation to flows in the Snake River during periods of anadromous fish migration. I understand that mitigation is not required now but may be needed in the future. I also understand that the Director will not require mitigation until I have an opportunity to review the process by which the need for mitigation is established and the amount of water required is quantified.

Signature: David Pancheri

Date: 8-17-00

Please return this form to:

Idaho Dept. of Water Resources
Western Regional Office
2735 Airport Way
Boise, ID 83705-5082

16

ACCOMMODATION
Deed to Beloraine

A Pioneer Company

PIONEER TITLE COMPANY
OF ADA COUNTY
8151 W Rifleman Ave / Boise Idaho 83704 / (208) 377-2700

READ AND APPROVED BY

WARRANTY DEED
(INDIVIDUAL)

FOR VALUE RECEIVED TOM NICHOLSON A MARRIED PERSON AS HIS SOLE AND SEPARATE PROPERTY

Grantor , does hereby grant, bargain, sell and convey unto CAROL LYYN MACGREGOR A MARRIED PERSON AS HER SOLE AND SEPARATE PROPERTY

the Grantee , whose current address is: 1109 WARM SPRINGS BOISE, ID 83712
the following described real property in VALLEY County State of Idaho more particulary described as follows, to-wit:
SEE EXHIBIT "A", ATTACHED HERETO AND MADE A PART THEREOF BY REFERENCE AND WHICH IS COMPRISED OF ONE (1) PAGE.

MOUNTAIN TITLE & ESCROW

2305917

TO HAVE AND TO HOLD the said premises with their appurtenances unto the said Grantee and Grantee heirs and assigns forever And the said Grantor does hereby covenant to and with the said Grantee , the Grantor is the owner in fee simple of said premises; that said premises are free from all encumbrances EXCEPT those to which this conveyance is expressly made subject and those made suffered or done by the Grantee and subject to reservations restrictions, dedications, easements rights of way and agreements, (if any) of record, and general taxes and assessments (includes irrigation and utility assessments, (if any) for the current year, which are not yet due and payable and that Grantor will warrant and defend the same from all lawful claims whatsoever

Dated: January 15, 1998

Tom Nicholson
TOM NICHOLSON

STATE OF IDAHO, County of ADA ss

On this 16 day of January in the year of 1998 before me DIANNE L. STORK a notary public personally appeared TOM NICHOLSON known or identified to me to be the person whose name is subscribed to the within instrument, and acknowledged to me that he executed the same

NOTARY PUBLIC STATE OF IDAHO

Residing at Meridian, ID
Commission Expires 01/23/2002

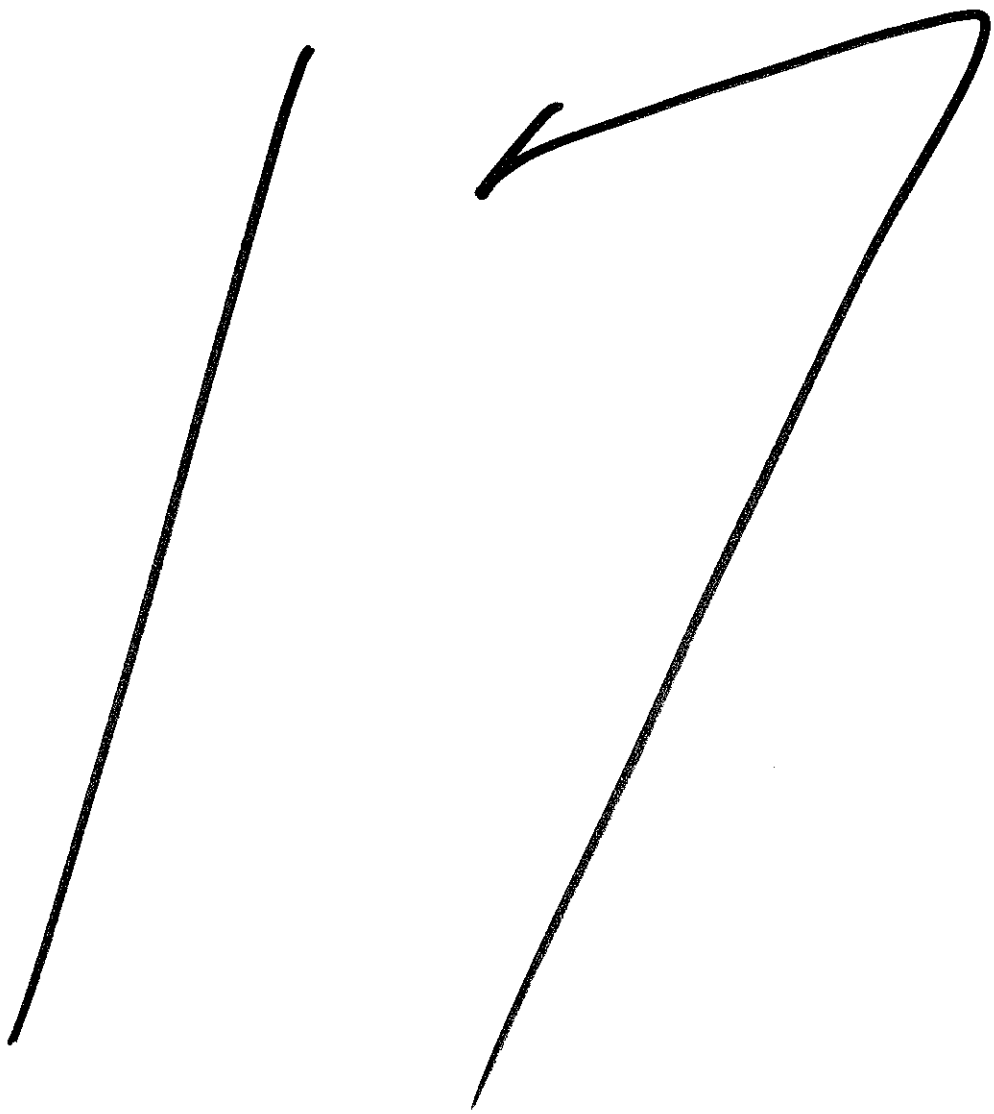
Notary Public:
Residing at: MERIDIAN, IDAHO
My Commission Expires: JANUARY 23 2002

EXHIBIT 16

EXHIBIT A

LEGAL DESCRIPTION OF THE PROPERTY

A parcel of land situate in Valley County, Idaho, more particularly described as follows: Township 13 North, Range 3 East, Boise Meridian, Valley County, Idaho; Section 13: S1/2NE1/4 lying South of the county road, SW1/4, N1/2SE1/4, SW1/4SE1/4, SE1/4SE1/4 lying West of the county road, Section 14: S1/2 Township 13 North, Range 4 East, Boise Meridian, Valley County, Idaho; Section 18, Government Lot 2 and 3; SE1/4NW1/4; NE1/4SW1/4, reserving therefrom a parcel of land in the NE corner of SE1/4NW1/4 of said Section 18 as deeded to the Oregon Shortline Railroad Company in Book 9 of Deeds at page 189 as Instrument No. 19169.



#1



#2



EXHIBIT 17 A

#3



#4



#5



#6



#7



#8



#9



#10



#11



#12



#13



#14



#15

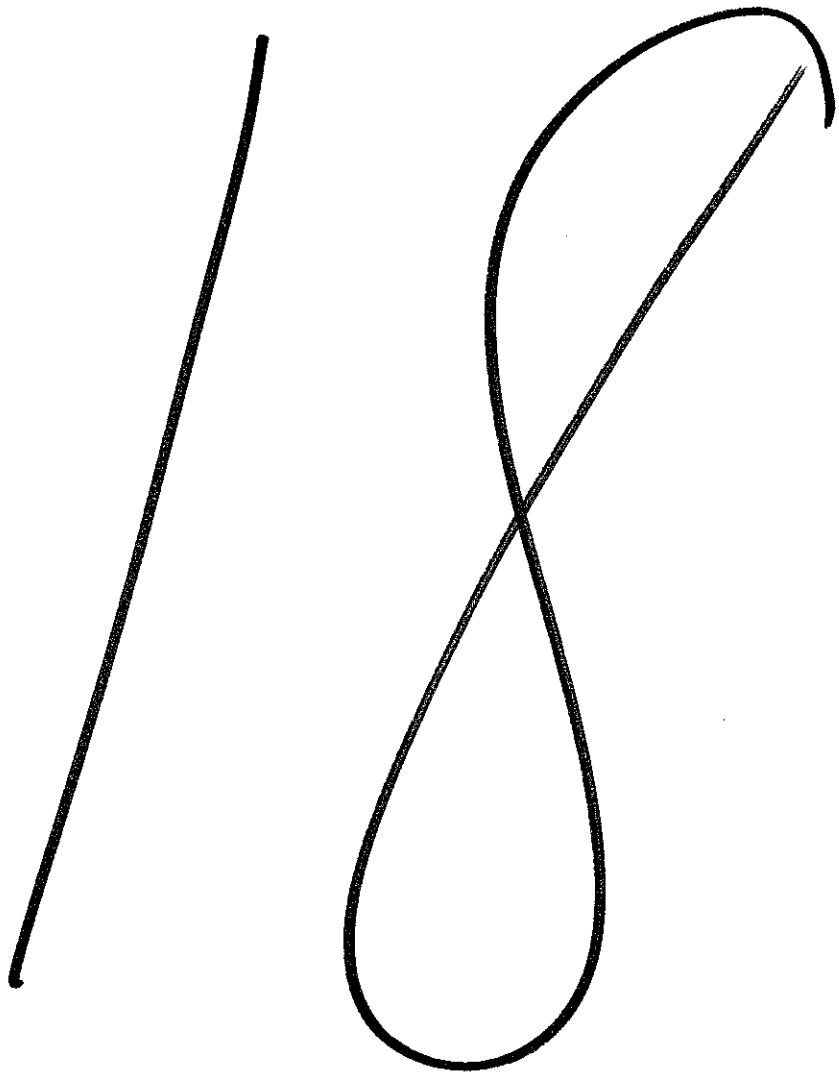


#16





#17



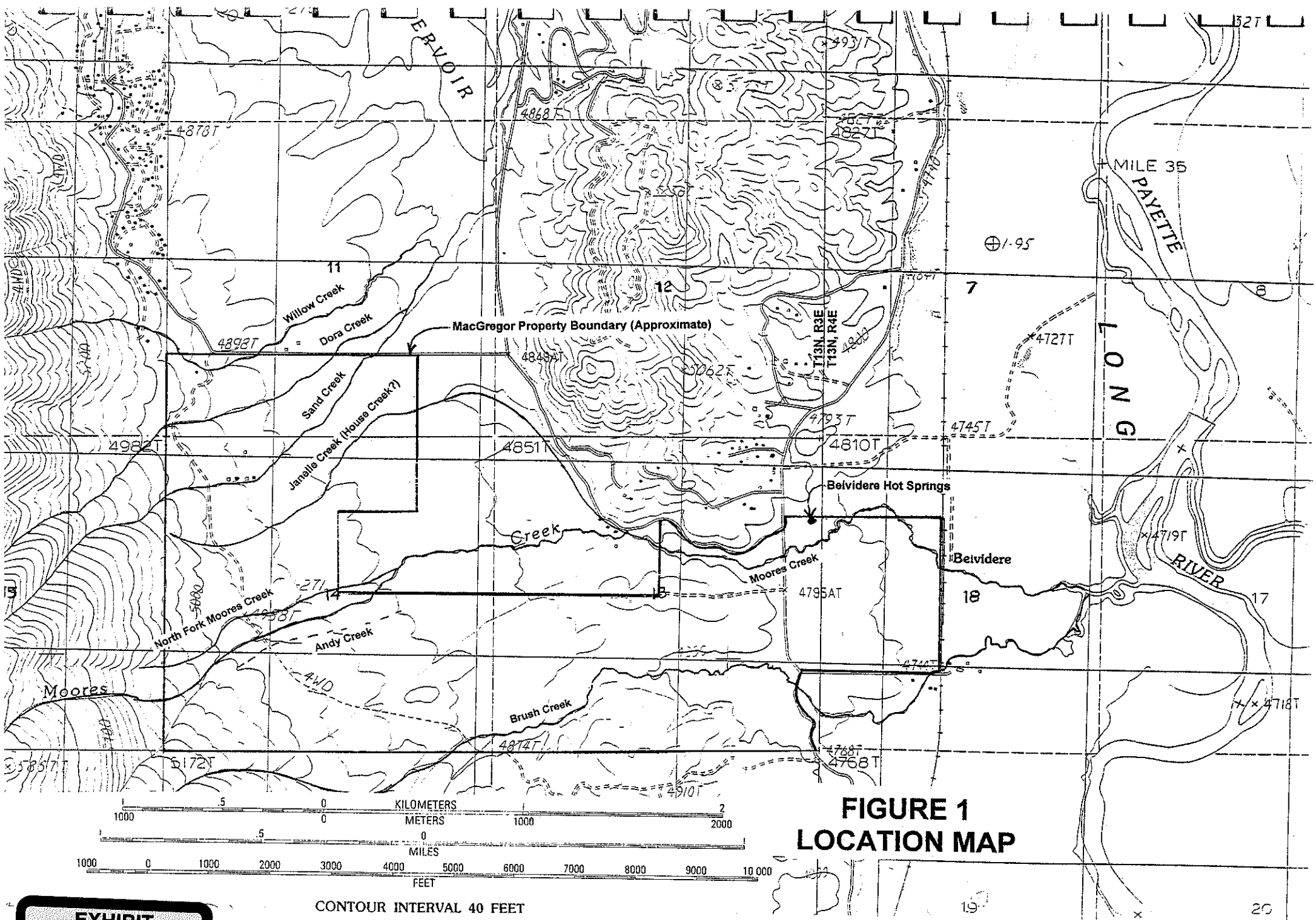
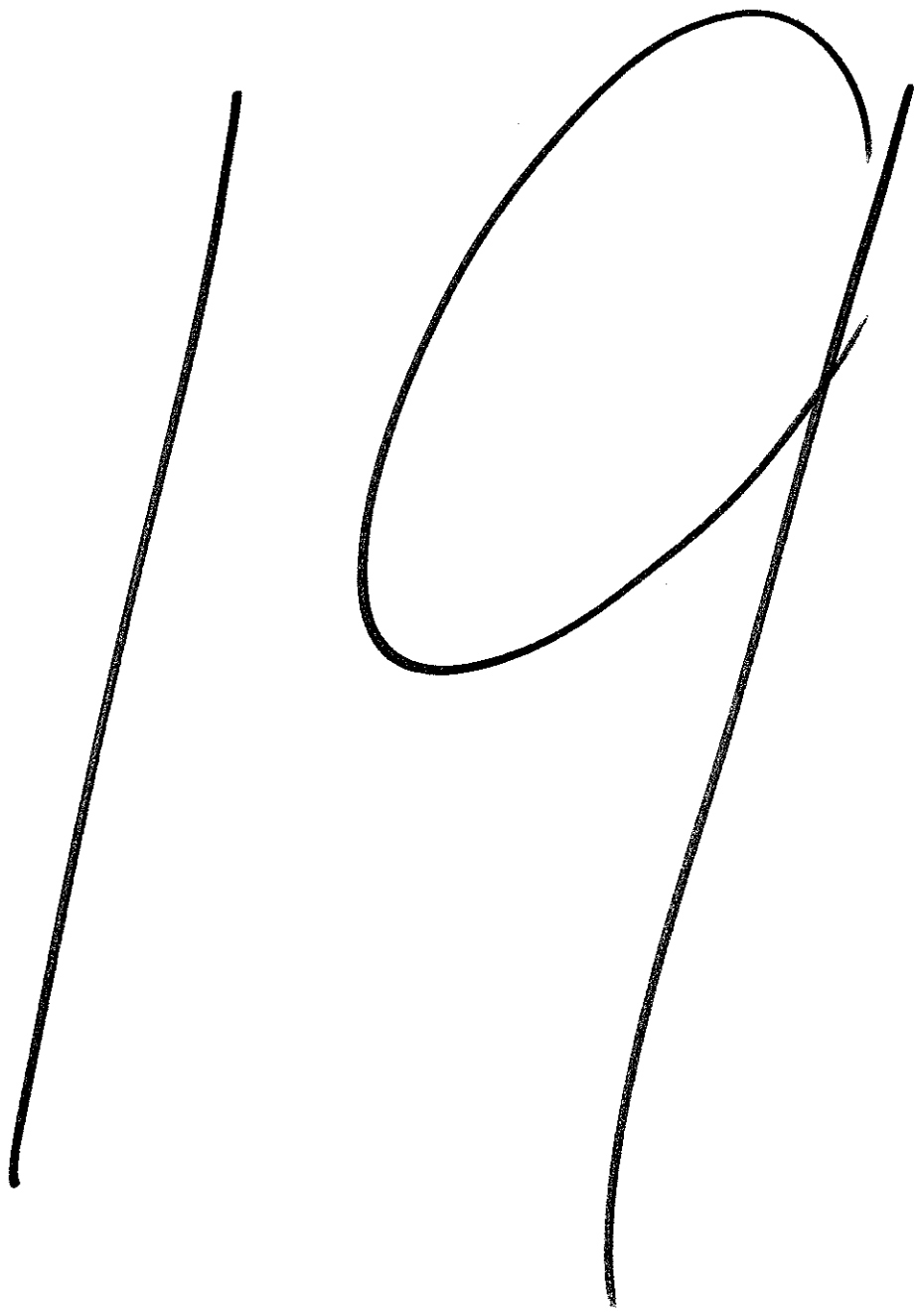
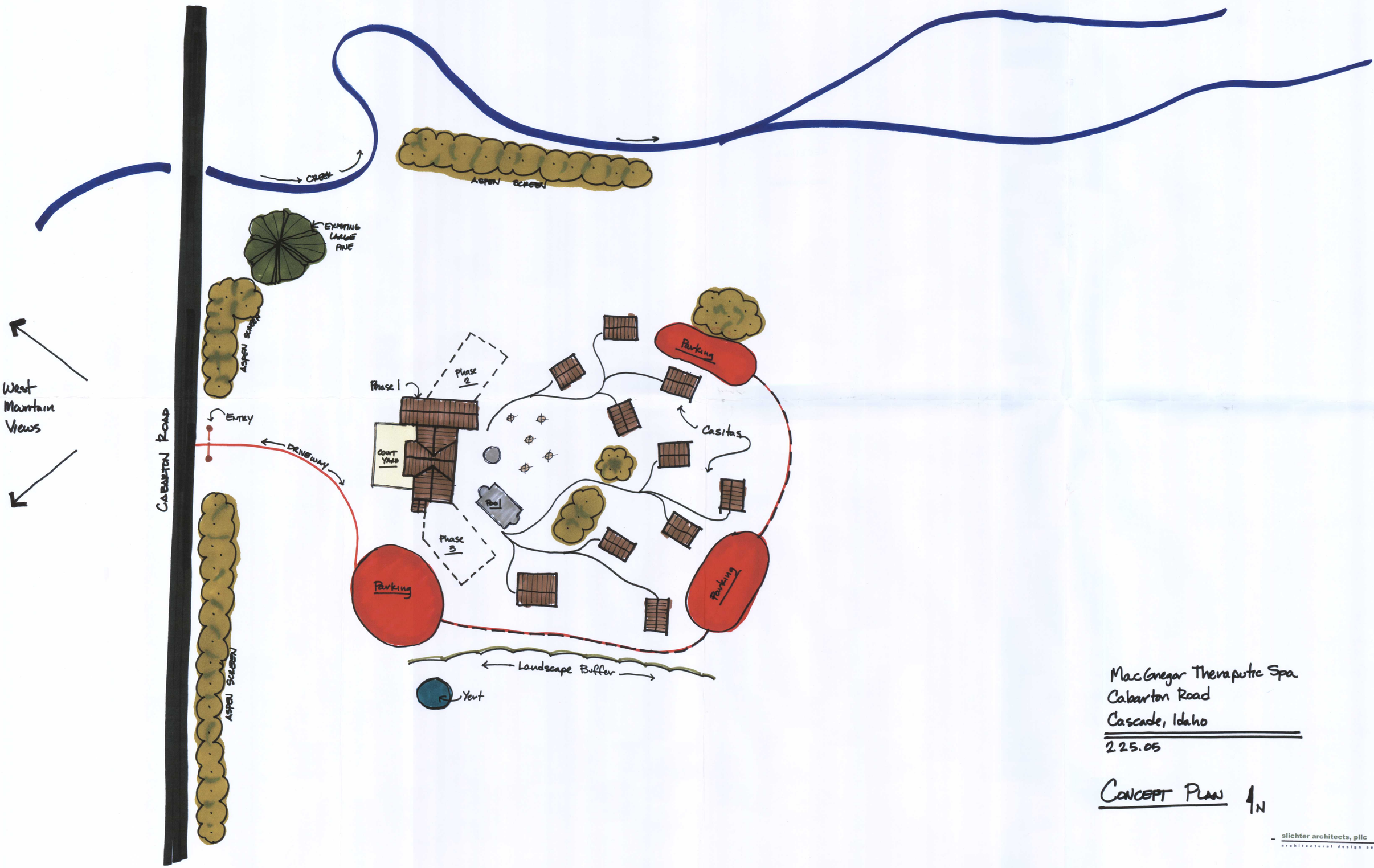


FIGURE 1
LOCATION MAP

EXHIBIT
18



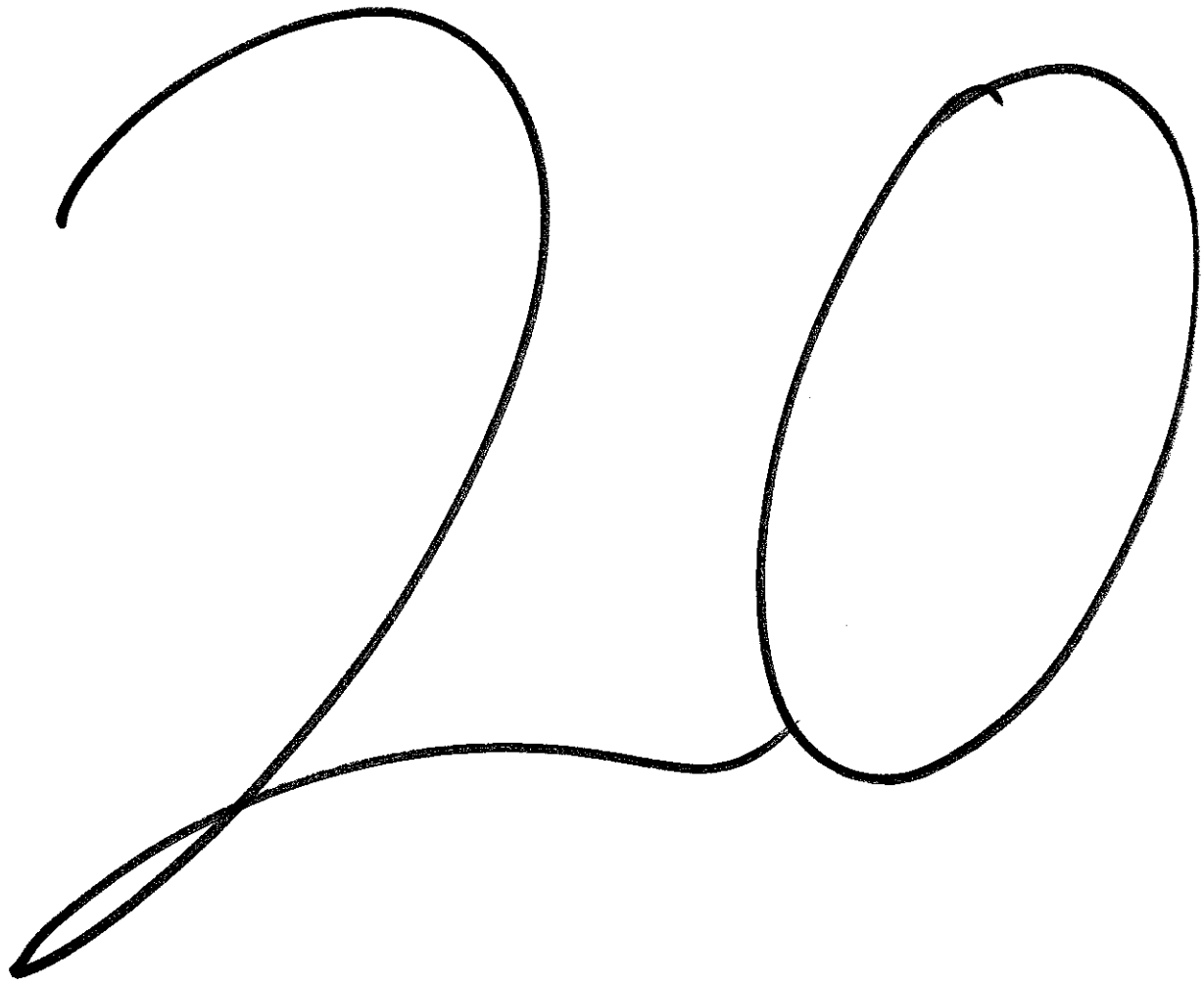


MacGregor Therapeutic Spa
Cabarton Road
Cascade, Idaho

225.05

CONCEPT PLAN 1/N

slichter architects, plic
architectural design services



SCANLAN ENGINEERING

Groundwater and Environmental Engineering

June 6, 2000

Carol Lynn MacGregor
1109 Warm Springs Avenue
Boise, ID 83712

Subject: Drilling Cost Estimate for Geothermal Exploration Well

Dear Carol:

Attached for your information is a list of unit prices for well drilling received from Gestrin Well Drilling.

Cost for well construction will depend on the conditions encountered. At this time, we do not know how deep we will have to drill and case the well. However, assuming that we are required to extend 8-inch casing to 150 feet and we drill to about 300 feet total depth, total costs for the well will be approximately $16,000. The estimate also assumes that 40 feet of 12-inch casing is cemented in place at the surface.

Item	Units	Unit Price	Estimated Quantity	Total
15-inch drilling	per foot	~~$20.00~~ 50.00	40	~~$800.00~~ 2000.00
12-inch surface casing if left in place	per foot	$17.50	40	$700.00
pull temporary surface casing	per foot	$7.00	0	$0.00
12-inch drilling	per foot	$40.00	150	$6,000.00
8-inch casing (0.250 wall)	per foot	$10.00	150	$1,500.00
8-inch drilling below 8-inch casing	per foot	$22.00	150	$3,300.00
8-inch drive shoe	each	$110.00	1	$110.00
well seal	each	$235.00	1	$235.00
bentonite chips	per sack	$9.00	0	$0.00
bentonite 200 mesh	per sack	$9.00	50	$450.00
cement	per sack	$10.00	75	$750.00
pressure grout	per hour	$100.00	12	$1,200.00
rig time	per hour	$150.00	8	$1,200.00
drilling permit	each	$200.00	1	$200.00
Total				$16,445.00
				$17,645.00

I have told Gestrin that we would like to drill in early July if we can get the water right issue resolved. Since this is his busy time of year, we should try to get scheduled with him at least two weeks in advance.

Sincerely,

Terry M. Scanlan

Terry M. Scanlan

600 East River Park Lane, Suite 105
Boise, Idaho 83706

Telephone (208) 383-4140
Facsimile (208) 383-4156

GESTRIN well drilling
LICENSED - BONDED
ROBERT GESTRIN
1 (208) 325-8637
#3 Plant Lane
Donnelly, Idaho 83615



SCANLAN ENGINEERING
• 600 E RIVERPARK LN.
BOISE, ID. 83706

FAX 383-4156

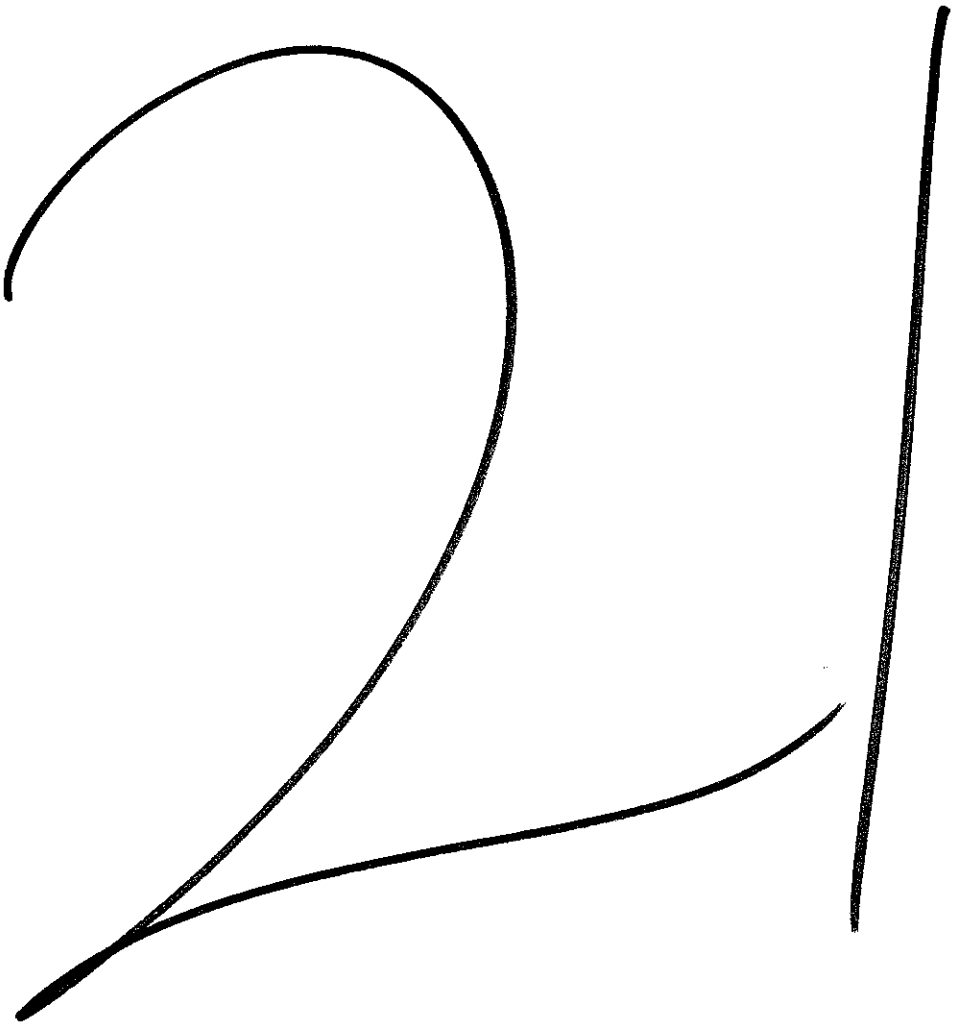
DATE: 5-22-00

YOUR ORDER NO.

TERMS:

ESTIMATE FOR GEOTHERMAL WELL ON CABARTON Rd. CASCADE, ID.

QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
20'	15" DRILLING FOR TEMP. SURFACE CASING	50.00/FT.	
20'	12" SURFACE CASING .375 WALL, IF LEFT IN PLACE	17.50/FT.	
20'	PULL TEMP SURFACE CASING IF NEEDED.	7.00/FT.	
	12" DRILLING FOR 8" CASING	40.00/FT.	
	8" x .250 WALL CASING	10.00/FT.	
	8" DRILLING BELOW 8" CASING	22.00/FT.	
	8" DRIVE SHOE (IF NEEDED)		110.00
	8" WELL SEAL - 8W BAKER - (IF NEEDED)		235.00
	3/8" CHIP BENTONITE	9.00/SACK	
	INDUSTRAL 200 BENTONITE	9.00/SACK	
	CEMENT	10.00 PER SACK	
	PRESSURE GROUT 8" CASING	100.00/HR	
	RIG TIME FOR DEVELOPMENT	150.00/HR	
	DRILLING PERMIT NOT INCLUDED		



Melinda Sander, CFP®
Senior Vice President
Financial Advisor
Retirement Planning Specialist

1087 West River Street
Suite 300
P.O Box 3
Boise, ID 83707

toll-free 800 733 5231
tel 208 338 6900
direct 208 338 6973
fax 208 338 6933

Morgan Stanley

Monday, April 18, 2005

Julie Cline Fischer
FAX# 466-4405

Re: *Statement of Financial Ability*

Dear Julie:

This letter is to validate that my client Carol Lyn MacGregor, PhD does without doubt have the ability to cover in excess of $700,000 to fund any development she desires.

Should you have any questions please don't hesitate to call my Associate Veronica Mira or me at the phone number listed above

Respectfully,

Melinda Sander, CFP®certificant
Senior Vice President,
Financial Advisor

Investments and services are offered through Morgan Stanley DW Inc., member SIPC

EXHIBIT 21



AGREEMENT FOR
SPECIFICATIONS AND LOCATIONS FOR FLOW METERS

1. Flow meter for water right 65-12891 (Laura and Duane Pancheri):
   Model (or equal): Water Specialties ML-03 (low velocity, 50 to 500 gpm flow range); Specifications attached.

   Location of installed flow meter for 65-12891:
   4-inch pipeline on south side of Brush Creek (See attached map):
   Easting: 338646.50; Northing: 375210.42
   (GPS coordinates, Scanlan Engineering, Arcview aerial photograph)
   Point of Diversion for 65-12891 ("Pancheri Spring Source" on map identifies the infiltration gallery which is the common point of diversion for 65-12891 and 65-13332):
   Easting: 338016.00; Northing: 375783.14
   (GPS coordinates, Rob Whitney, IDWR field exam, June 2003)

2. Flow meter for water right 65-13332 (Joan and Darwin Pancheri):
   Model (or equal): 1-inch Niagara MTX Model 122 (2 to 50 gpm flow range); Specifications attached show this model has a 1-1/4 inch connection.

   Location of installed flow meter for 65-13332:
   Discharge pipe in pump house (See attached map)
   Easting: 338047.09; Northing: 375770.70
   (GPS coordinates, Rob Whitney, IDWR field exam, June 2003)
   Point of Diversion for 65-13332 ("Pancheri Spring Source" on map identifies the infiltration gallery which is the common point of diversion for 65-12891 and 65-13332):
   Easting: 338016.00; Northing: 375783.14
   (GPS coordinates, Rob Whitney, IDWR field exam, June 2003)

COSTS

1. Dr. MacGregor will pay for the meters and installation at each location. The meters will be in place for at least one year, following installation, but no longer than three years following installation. At any time after one year, Dr. MacGregor may remove either or both meters, but will remove both meters at the end of three years. Dr. MacGregor will be responsible for maintenance while either or both meters are in place.

2. The Pancheris may add continuous dataloggers to the totalizing flow meters, if they wish at their expense. The Pancheris do not choose to add a continuous datalogger at the time the flow meters are installed, but may later.

INSTALLATION

1. Installation of both flow meters is to be completed by July 30, 2004. Both installation sites are on Pancheri property.

2. The contractor for the installations will be Interwest Supply.

3. The Pancheris may assist, if they wish.

4. Sheri Chapman will be contacted so that he may be present at the installation.

5. Dr. MacGregor will make arrangements to complete the installations by July 30, 2004.

6. Following July 30, 2004, if the Pancheris want to add a continuous datalogger to either or both flow meters, Terry Scanlan must review and agree to the datalogger specifications; and Mr. Scanlan must be contacted so that he may be present at the installation.

DATA COLLECTION

1. Once installed, the totalizing flow meters can be read by Terry Scanlan, or Sheri Chapman, or a mutual designee of Mr. Chapman and Mr. Scanlan, or IDWR staff, including Water District 65 personnel.

2. The totalizing flow meters installed on the Pancheri properties can be accessed for purposes of reading on Monday between the hours of 12:00 noon and 3:00 p.m. every two weeks following execution of this agreement. Access to the Pancheri properties for reading the totalizing flow meters may occur on a more frequent basis as agreed in writing by the parties.

3. The flow meters are to be monitored for a minimum of a year.

Date: June _____, 2004

_____
Laura or Duane Pancheri

Date: June _____, 2004

_____
Joan or Darwin Pancheri

Date: June 16, 2004

_____
Carol MacGregor

Z:\2102\61241 (Final)

INSTALLATION

1. Installation of both flow meters is to be completed by July 30, 2004. Both installation sites are on Pancheri property.

2. The contractor for the installations will be Interwest Supply.

3. The Pancheris may assist, if they wish.

4. Sherl Chapman will be contacted so that he may be present at the installation.

5. Dr. MacGregor will make arrangements to complete the installations by July 30, 2004.

6. Following July 30, 2004, if the Pancheris want to add a continuous datalogger to either or both flow meters, Terry Scanlan must review and agree to the datalogger specifications; and Mr. Scanlan must be contacted so that he may be present at the installation.

DATA COLLECTION

1. Once installed, the totalizing flow meters can be read by Terry Scanlan, or Sherl Chapman, or a mutual designee of Mr. Chapman and Mr. Scanlan, or IDWR staff, including Water District 65 personnel.

2. The totalizing flow meters installed on the Pancheri properties can be accessed for purposes of reading on Monday between the hours of 12:00 noon and 3:00 p.m. every two weeks following execution of this agreement. Access to the Pancheri properties for reading the totalizing flow meters may occur on a more frequent basis as agreed in writing by the parties.

3. The flow meters are to be monitored for a minimum of a year.

Date: June _____, 2004

_____
Laura or Duane Pancheri

Date: June 18, 2004

Darwin Pancheri
Joan or Darwin Pancheri

Date: June _____, 2004

_____
Carol MacGregor

Z:\2102\6124F (Final)

INSTALLATION

1. Installation of both flow meters is to be completed by July 30, 2004. Both installation sites are on Pancheri property.

2. The contractor for the installations will be Interwest Supply.

3. The Pancheris may assist, if they wish.

4. Sherl Chapman will be contacted so that he may be present at the installation.

5. Dr. MacGregor will make arrangements to complete the installations by July 30, 2004.

6. Following July 30, 2004, if the Pancheris want to add a continuous datalogger to either or both flow meters, Terry Scanlan must review and agree to the datalogger specifications; and Mr. Scanlan must be contacted so that he may be present at the installation.

DATA COLLECTION

1. Once installed, the totalizing flow meters can be read by Terry Scanlan, or Sherl Chapman, or a mutual designee of Mr. Chapman and Mr. Scanlan, or IDWR staff, including Water District 65 personnel.

2. The totalizing flow meters installed on the Pancheri properties can be accessed for purposes of reading on Monday between the hours of 12:00 noon and 3:00 p.m. every two weeks following execution of this agreement. Access to the Pancheri properties for reading the totalizing flow meters may occur on a more frequent basis as agreed in writing by the parties.

3. The flow meters are to be monitored for a minimum of a year.

Date: June 19, 2004

Duane Pancheri
Laura or Duane Pancheri

Date: June _____, 2004

_____
Joan or Darwin Pancheri

Date: June _____, 2004

_____
Carol MacGregor

Z:\2102\6124F (Final)

24

ERO Resources Corp.
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Boise ID 83704-8661
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eroboise@eroresources.com

RECEIVED
MAY 21 2003
Moffatt, Thomas, Barrett Rock and

May 20, 2003

Scott Campbell
Moffatt Thomas Barrett Rock & Fields
P.O. Box 829
Boise, ID 83701-0829

Dear Mr. Campbell:

Based on our previous conversations, this letter is to provide you with my thoughts regarding a potential test-drilling program by Ms. Carol MacGregor near the Belvidere Springs in the NE1/4, SE1/4, NE1/4, Section 13, Township 13 North, Range 3 East. As I understand it, Ms. MacGregor has proposed to drill test wells at this location, which is immediately adjacent to Belvidere Springs. I have reviewed the geologic and hydrologic data collected from this area over the past year and a half and the proposed drilling prospectus provided by Terry Scanlan of Scanlan Engineering in June 2000 with the assumption that the new proposal is about the same as their previous prospectus.

The north trending Cascade valley fault from which Belvidere Springs, Cabarton Springs, and the warm wells near Cascade all appear to issue from has been previously mapped and is clearly a source of hot water to the springs in the Cascade / Long Valley area. However, numerous efforts have been initiated over the years to further exploit thermal water from the springs and fault. At least four wells have been drilled between Belvidere Springs and Cabarton Springs in an effort to withdraw additional geothermal water and at least two wells have been drilled north of Belvidere Springs along the Payette River in an effort to develop geothermal water for space heating. All of these wells have been unsuccessful with regard to the exploitation of thermal water. The fault appears to cut significant areas of granitic rocks of the Idaho batholith and is capped by a shallow veneer of valley fill. Since several wells have attempted to develop hot water from the fault and have been unsuccessful, it is clear that the fault is only vented to the surface at a few locations, which creates a highly sensitive geothermal system. Generally, geothermal systems are artesian in nature since they discharge water to the surface from great depths and are very sensitive to exploitation and withdrawal. Examples of the sensitivity of thermal systems and their reaction to stress through withdrawal are evident along the Boise front, at Ingram hot springs near Challis, the Foreman well/Backman hot springs issue in Owyhee County, and the geothermal system along the Mount Bennett Hills north and east of Mountain Home (Walker-Hall issue). All of these systems have been subject to exploitation and have reacted with significant drawdowns, drying up of springs, and other adverse impacts. As you are aware, Belvidere hot springs has been developed by Duane and Darwin Pancheri and both have licensed water rights for the geothermal water. This water is developed at a fairly shallow depth and is delivered to the homes through either a pumping system or

Consultants in
Natural Resources
and the Environme

gravity flow with the source of water the near surface discharge from Belvidere Springs and development of an infiltration gallery.

Ms. MacGregor suggests that test drilling will provide her an opportunity to determine the viability of development of the springs, while at the same time protecting the Pancheri's water rights. This assumption I believe to be incorrect. In order for Ms. MacGregor to determine the viability of development of her application for water right from the springs, test wells would have to be pumped to determine their potential yield. This in itself could significantly alter the flow pattern in the springs and dry up the surface discharge from Belvidere Springs or decrease the temperature thus injuring the Pancheri's water rights. Additionally, drilling in and of itself is an invasive, violent procedure. If drilling is allowed to penetrate the "plumbing system" of the springs in the granitic rocks it could collapse some of the fractures that are providing water to the surface, provide a cross connection to other fractures that are presently dry and divert the water in the subsurface away from the surface discharge, or modify the entire vent system due to the drilling activity. Additionally, if caving zones are found in the granitic rocks and the driller needed to provide drilling mud to hold the hole open or put casing in the hole, fractures presently providing water to the surface discharge could be cut off or filled by drilling mud permanently. Even if test drilling were to occur and the wells were abandoned, consistent with existing well abandonment procedures, fractures could be filled with cement, mud, bentonite, or other materials that could permanently alter the vent complex. Since Ms. MacGregor's intent is to penetrate the vent complex, the potential for damage and injury to the Pancheri water rights is extremely high. Ms. MacGregor has repeatedly rejected any proposal that would indemnify the Pancheri's against injury and seems to assume that she has a "right" to conduct test drilling. Given the history of geothermal systems as I have worked with them over the last 30 years throughout the state and their typical sensitivity, it is my opinion that the potential for economic and water right injury to the Pancheri's is extremely high if Ms. MacGregor is allowed to test drill into the Belvidere Springs system. At the present time the springs discharge less than the amount of the Pancheri's water rights and any effort to intercept geothermal water before it gets to the Pancheri systems will create significant injury. If you have any questions or need additional information please don't hesitate to call me.

Sincerely yours,

Sheri L. Chapman

SLC:sw

cc: Duane Pancheri
Darwin Pancheri



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1106 N Cole Rd., Suite C
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boise@eroresources.com

RECEIVED
OCT 0 2 2003
Moffatt, Thomas Barrett Rock and Fields

October 1, 2003

Scott Campbell
Moffatt Thomas Barrett Rock & Fields
P.O. Box 829
Boise, ID 83701-0829

Dear Scott:

Pursuant to our previous discussions, I am providing you with my analysis and suggestions relating to the September 2, 2003 letter and document prepared by Terry Scanlan. This document apparently is in response to an information request by IDWR relating to the MacGregor proposal to drill test wells into the heart of Belvidere Springs. The following is a summary of my opinions and recommendations regarding the proposal:

Page 2

Mr. Scanlan suggests in his opening paragraph that the spring trends in a N60E direction and because of that surface trend there is a possible subsurface fault trending in the same direction. He appears to be trying to make the case that Belvidere Springs may be on a fault separate from the rest of the hot springs in the valley. No evidence exists of this fault and the spring trend is probably the result of directional deposition and reworking of sediments by earlier stream drainage. The existing stream flow pattern in this area parallels the N60E trend pointed out by Scanlan. This directional deposition could also explain the resistivity anomaly referenced later in his document.

The January 27, 2001 measurement was made in a bucket marked for a 4 gallon capacity. Scanlan did not check the calibration, but I did. The January 27, 2001 measurement was higher than later ones but we were just heading into a day cycle and thermal systems generally react more slowly than cold water systems, which could explain the later, lower measurements.

Page 3

Scanlan proposes a totalizing flow meter on the Duane Pancheri pipeline. We agreed to installation of the meter months ago and volunteered to use Duane's equipment for the excavation and backfill. It was my understanding that MacGregor had agreed to pay for the meter and its maintenance. Apparently MacGregor had second thoughts because the next I heard she had reneged. I believe Duane is still willing to allow the flow meter under the original agreement. However, since he feels MacGregor is attacking his water right for her financial gain, he feels it would be inappropriate to require him to pay the cost.

Scanlan refers to the Cascade Valley fault and states it lies 2000 feet east of Belvidere Springs, again I believe to suggest somehow the spring is not associated with the other hot springs and structure in the valley. The map referred to, Figure D, from USGS Bulletin 1311-A shows the fault on the map east of the spring. However, for several

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miles both north and south of Belvidere Springs, the fault is shown as "inferred" which means that its location, dip and strike are unknown but only estimated using professional judgment. Typically, these estimates are made when the surface trace of a fault or structure is so obscured that only a few points can be found.

Scanlan refers to "mapping" done under contract by Eastern-Western Corporation. The document provided does not include any maps but only references by a Mr. Smith that "the actual number of faults is unknown but surface conditions indicate that at least two are present, both more or less parallel to a larger fault near the county road intersection located a short distance to the northwest." This statement was included in a letter to Eastern-Western Corporation urging them to hire a geographical team from Boise State University to locate a drilling site. No mention was made of any study, report or mapping. If such mapping exists we should be allowed to review it and its background database.

The resistivity survey commissioned by Eastern-Western Corporation identified an anomaly of low resistivity about 300 feet wide south of Belvidere Springs. The report states "It should be noted that the anomalies are quite subtle and do not suggest a strong contrast in resistivity with the surrounding material. Best judgment based on these results would be to recommend exploratory drilling within this trend, if such is planned."

These statements suggest to me that the research personnel were unsure of the geologic reason for the anomaly. As mentioned earlier, it could be nothing more than sedimentation from earlier streams and it certainly does not confirm the presence of a fault structure carrying thermal water.

Page 4

Scanlan's supposition in paragraph 1 about the location of Belvidere Spring at the intersection of the Cascade Valley fault and an "unmapped" fault is not supported by existing data or the material provided. It appears to me that he is tying to make the case that the intersection might produce large amounts of water as opposed to just being located on the Cascade Valley fault from which it has been difficult to produce high yields to wells.

The drilling techniques proposed could cause significant problems. Air rotary or clean water fluid drilling pose the least threat to the spring matrix. Mud rotary drilling, proposed by Scanlan, does carry a high risk. Unless drilling fluid (mud) composition and balance are carefully calculated and monitored baking, intrusion and other destruction actions can occur in the aquifer. All of these have the potential to permantly alter the flow and temperature of the springs and cause injury to the Pancheri's.

Page 5

While Scanlan Engineering should have oversight of the project, no allowance is made for the Pancheri's representative if the project is authorized. If the test drilling program is allowed the Pancheri's or their representative should have access to the site and all data as it is obtained. Otherwise, severe problems could occur without disclosure.

Page 6

Monitoring of spring discharge with v notch weirs has been tried and failed. No monitoring program should be approved without a demonstrated successful way of monitoring surface water outflow.

Nothing in the monitoring plan provides for a cessation of testing if the flow or temperature of water being delivered to the Pancheri's is affected. If allowed to test, the procedure must immediately cease if any deleterious impact occurs. To continue could permanently damage the Pancheri's.

Page 7

The mitigation portion of the proposal is unacceptable. Pancheri's have already told MacGregor what level of bonding is necessary to protect the value of their property should there be a long term or permanent impact to spring flows and their water rights. Pancheri's are not willing to trust the largess and good will of the applicant or her heirs with the value of their property. Even potentially short term impact causes grave concern.

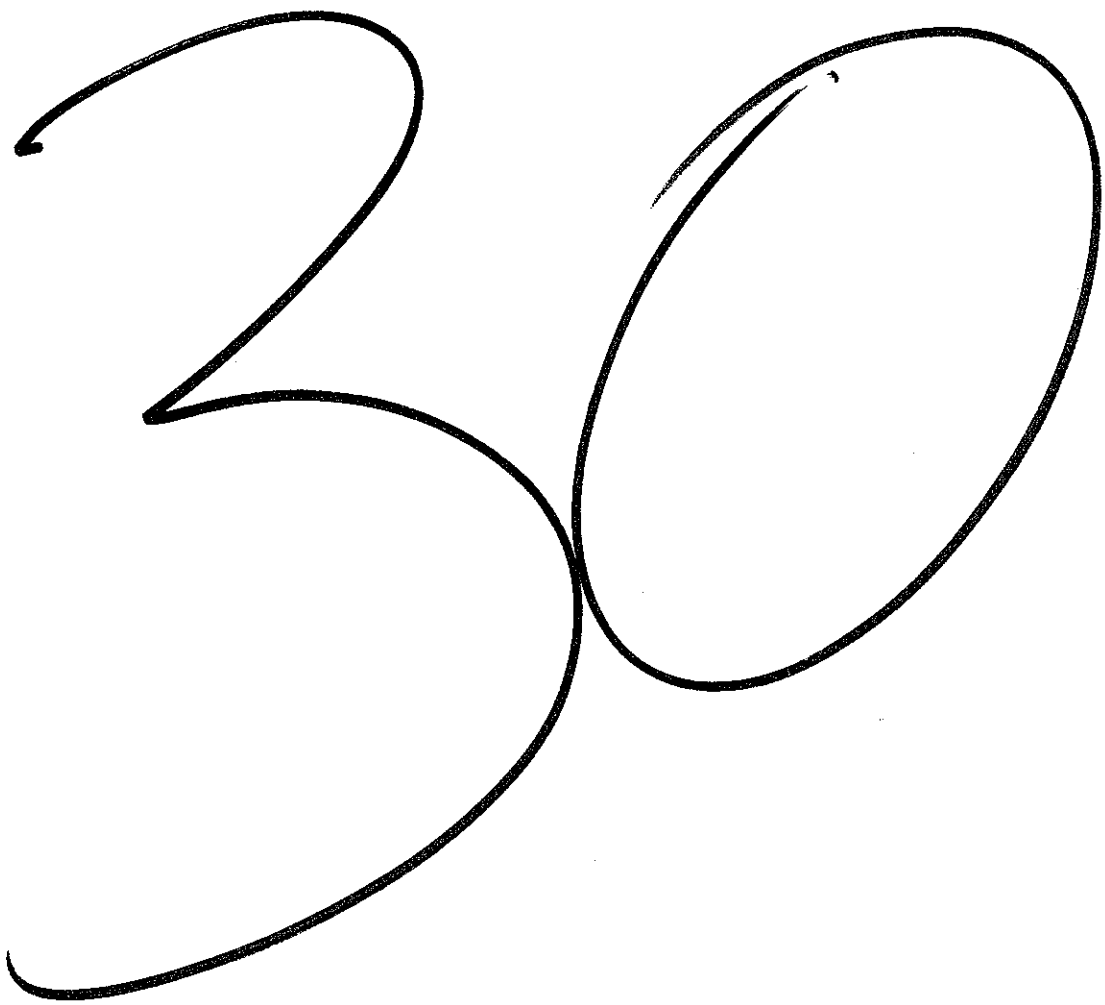
In summary, it appears that the entire proposal seeks to convince the Department that there has been significant study of the geology and hydrology of the area and that Belvidere Spring lies at the intersection of two or more faults. No confirmation of this scenario has been made. The proposal lays out a drilling program that could possibly have long term adverse affects to spring flow and temperature without providing any real protection to the Pancheri's property values or water rights. Thermal springs are notorious for their sensitivity to outside stresses and it is inconceivable that MacGregor believes that drilling into the central matrix of the spring will not have major adverse consequences. The test drilling program should not be allowed.

Sincerely,

Sherl L. Chapman

SLC:sw

cc: Duane Pancheri
Darwin Pancheri



State of Idaho
DEPARTMENT OF WATER RESOURCES
STATE OFFICE, 450 W. State Street, Boise, Idaho

JOHN V. EVANS
Governor

C. STEPHEN ALLRED
Director

Mailing address:
Statehouse
Boise, Idaho 83720
(208) 334-4440

ADMINISTRATOR'S MEMORANDUM

TO: Regional Offices and Water Allocation Section

FROM: Norman C. Young NCY

DATE: September 8, 1980

RE: Rate of Flow for Heating Use

The recent increase in applications for permit to appropriate water for heating purposes has created a need for a determination of a reasonable rate of flow. To provide a general guideline, the engineering section has prepared the attached summary entitled "Geothermal Water Requirements for Residential Space Heating".

Note that Figure 1 is a nomograph which enables the calculation of rate of flow based on (1) the BTU per hour heating requirement, and (2) the temperature of the geothermal water. Estimates of values (1) and (2) should be made in a manner that will allow the applicant an ample flow when his system is developed.

This summary is intended to be used as a guide for evaluating reasonableness of rate of flow on new applications. Rates of flow much greater or less than those indicated by the summary are acceptable if they can be justified by the applicant to the satisfaction of the Department.

Amended

EXHIBIT 30

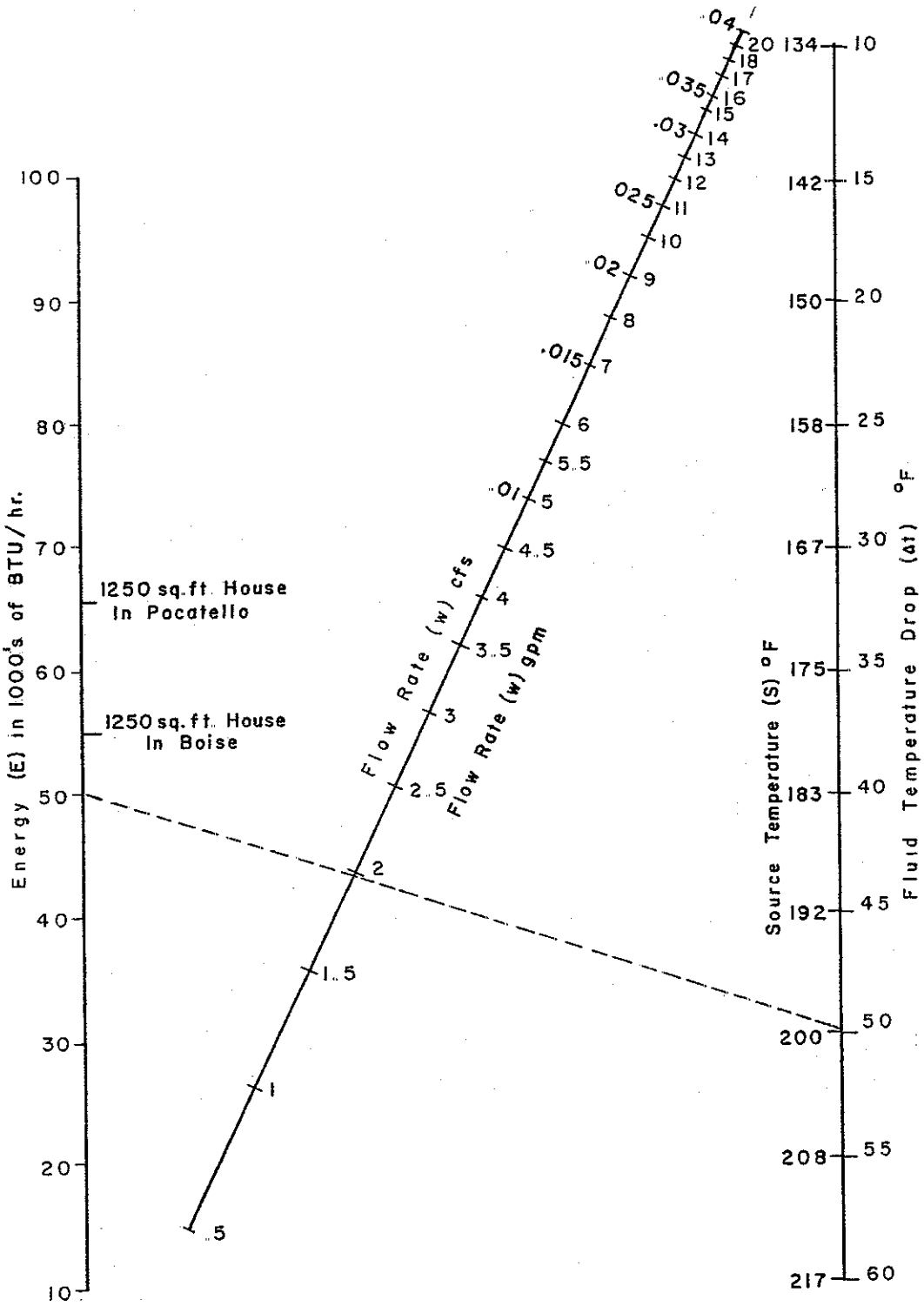

Energy (E) in 1000's of BTU/hr.
100
90
80
70
60
50
40
30
20
10
1250 sq.ft. House
In Pocatello
1250 sq.ft. House
In Boise
Flow Rate (w) cfs
Flow Rate (w) gpm
.04
.035
.03
.025
.02
.015
.01
20
18
17
16
15
14
13
12
11
10
9
8
7
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
.5
Source Temperature (S) °F
134
142
150
158
167
175
183
192
200
208
217
Fluid Temperature Drop (Δt) °F
10
15
20
25
30
35
40
45
50
55
60

FIGURE 1

GEOTHERMAL WATER REQUIREMENTS

FOR

RESIDENTIAL SPACE HEATING

The flow needed from the geothermal heat source varies according to the following factors:

1) Design Heat Load

This varies for Idaho from a low of 25 BTU/hr./sq.ft. for a well insulated home in Boise to a high of 75 BTU/hr./sq.ft. for an average insulated home in Soda Springs. These values are appropriate for a single story house. If the house is two stories then 5% should be added to the BTU/sq.ft. value.

A more precise determination of the BTU's required for a given house can be determined from the formula:

$E = [e \cdot T] A$ where

E = BTU/hr. required

e = House efficiency factor

A = Area of livable floor space in the house in square feet

T = Design temperature difference (ti-to) in degrees Fahrenheit

where

ti = the inside design temperature (approximately 70°F)

to = the outside design temperature

Suggested Outside Design Temperatures *

Boise	4°F
Lewiston	6°F
Pocatello	-8°F

---

* From (Amer. Soc. of Heating, Refrigeration & Air Conditioning Engineers), Handbook of Fundamentals, 1972.

Values for (e) are as follows:

.28 = Best energy efficiency -

Insulation in addition to that found in the average house, walls are now R 19 (5 inches of blanket insulation in a 6 inch wallspace), ceilings are R 33 (approximately 9 inches of blanket insulation), all windows and doors are caulked and weather stripped.

.44 = Better energy efficiency -

All windows and doors caulked and weather stripped, no additional insulation above the average residence.

.67 = Average residence -

Modern home with no weatherproofing and the following insulation: walls R 13 (3 1/2 inches of blanket insulation), ceiling R 25 (6 inches of blanket insulation), double pane windows, or single pane with storm windows, concrete floor or concrete block basement wall.

1.11 = Poor energy efficiency -

Older home with the following insulation: walls are approximately R 6 (typical frame construction with no insulation between the studs), ceiling R 10 (3 inches of loose fill insulation), single pane windows with no storm windows and no weather stripping of the doors and windows.

Table 1 shows some typical BTU's/sq.ft/ hr. for the four types of house efficiencies at a variety of design temperatures.

TABLE 1

eT = BTU's/Sq.Ft./ hr. for Different House Efficiencies.

House Efficiency	Best e = .28	Better e = .44	Average e = .67	Poor e = 1.11
Design Temperature Difference T = (ti-to)				
50°	14	22	33	56
60°	17	26	40	67
70°	20	31	47	78
80°	22	35	54	89
90°	25	40	60	100
100°	28	44	67	111

Note: Per geothermal space heating brochure attached at here is the maximum economical temperature drop for a std heat exchanger (commercial). This value will be different for non-standard systems.
DRG 2/10/82
(Min temp for the formula = 117°)

2) Temperature Drop Across the System

This is calculated from the formula:

$\Delta t = (.6S) - 70^{o}$ where

Δt = Temperature drop, ^{o}F

S = Geothermal source temperature, ^{o}F

The flow needed from a geothermal heat source can be determined from the nomograph shown in Figure 1 or from the formula:

$$W = \frac{E}{(500\,\Delta t)}$$ where

W = Flow rate in gallons per minute

E = Design heat load in BTU/hr.

Δt = Temperature drop, ^{o}F

The minimum source temperature with which you can use the nomograph shown in Figure 1 is $134^{o}F$. If the temperature of the geothermal source is less than $134^{o}F$, the formula must be used to determine the flow requirements.

These calculations should not be used to design a geothermal heating system, but will give an indication of the approximate flow needed from a geothermal resource when applying for a water right from this Department. An engineer who is knowledgeable in the design of heating systems should be consulted for the actual design.

Example:

The following is an example problem to determine the flow needed from a geothermal well with water at $200^{o}F$. The house is a single story house with 1250 $ft.^{2}$ of floor space located in Hailey. An average house located in this part of the state would take approximately 40 BTU/hr./sq.ft. for a design heat load of 50,000 BTU/hr.

40 BTU/hr./sq.ft. X 1250 sq.ft. = 50,000 BTU/hr.

The temperature drop for the system would be:

$\Delta t = (.6S) - 70^{o}$

$\Delta t = (.6 \times 200) - 70^{o}$

$\Delta t = 50^{o}F$

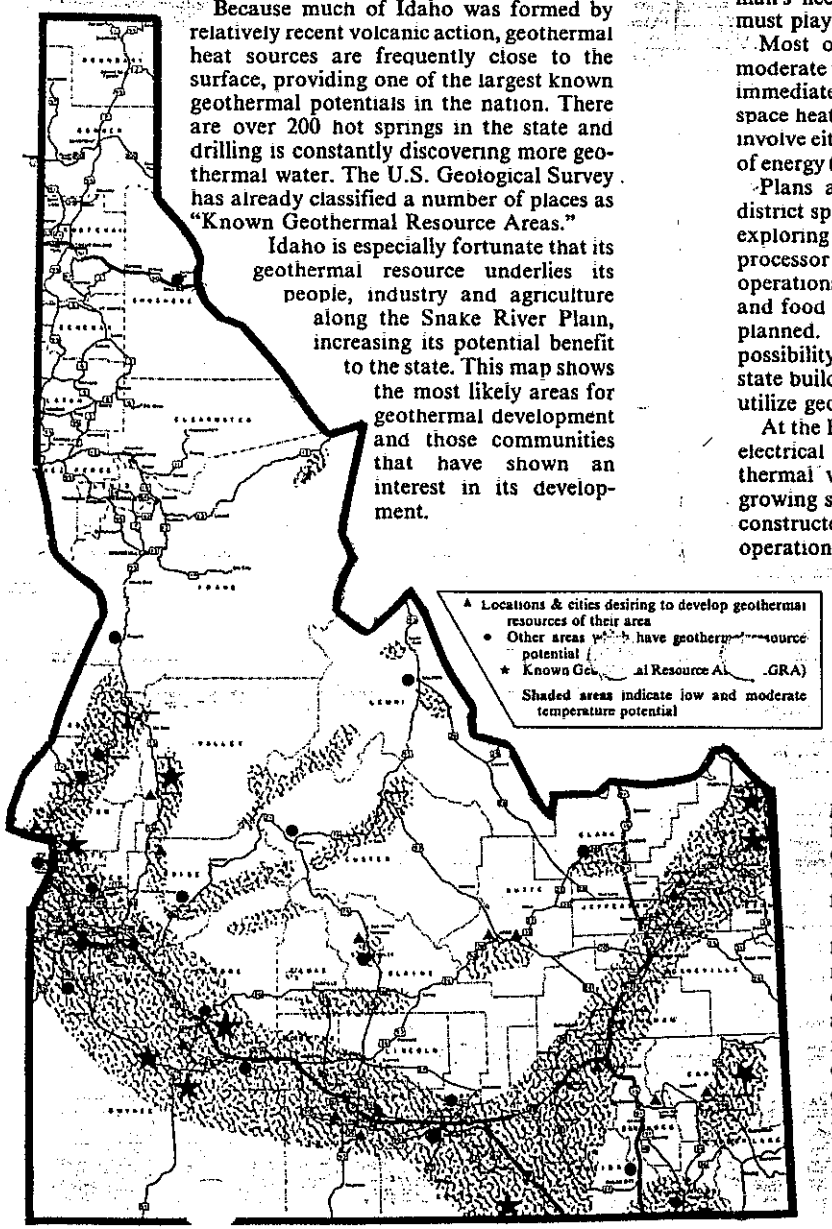
Going to the nomograph in Figure 1, place a straight edge between the points 50,000 BTU/hr. on the left side and $50^{o}F$ on the right side to obtain the flow rate of approximately 2 gallons/minute from the center line - this is shown by the dashed line in Figure 1.

Geothermal Energy for Idaho. . .

the potential

Because much of Idaho was formed by relatively recent volcanic action, geothermal heat sources are frequently close to the surface, providing one of the largest known geothermal potentials in the nation. There are over 200 hot springs in the state and drilling is constantly discovering more geothermal water. The U.S. Geological Survey has already classified a number of places as "Known Geothermal Resource Areas."

Idaho is especially fortunate that its geothermal resource underlies its people, industry and agriculture along the Snake River Plain, increasing its potential benefit to the state. This map shows the most likely areas for geothermal development and those communities that have shown an interest in its development.



the uses

Where heat is needed geothermal energy can be used. As man's needs for energy expand, geothermal energy can and must play an increasing role in meeting these needs.

Most of Idaho's known geothermal resources consist of moderate to intermediate temperature hot waters. Their greatest immediate use appears to be in residential and commercial space heating and as industrial process heat. Those uses would involve either direct use of piped geothermal fluids or extraction of energy through heat exchangers or other forms of technology.

Plans are currently underway to enlarge the geothermal district space heating area of Boise, and other communities are exploring district heating possibilities. One major Idaho food processor will soon begin using geothermal heat in a number of operations. Geothermal greenhouses, fish farming enterprises and food dehydration facilities are also in operation or being planned. Several Idaho school districts are exploring the possibility of geothermally heated buildings and a number of state buildings in Boise are being retrofitted and constructed to utilize geothermal energy.

At the Raft River site, in addition to an advanced technology electrical generation system, other experiments are using geothermal waters for crop irrigation thereby lengthening the growing season. The first geothermal air conditioner has been constructed and a dryer for wastes from food processing is in operation.

the benefits

All Idaho's petroleum products, natural gas and coal are imported from other states and nations. The power of falling water for electrical generation, the power of the sun, and geothermal heat for its many uses are this state's major native energy sources. Much of the hydroelectric potential in Idaho has already been developed, leaving geothermal energy Idaho's greatest resource in America's quest for energy self-sufficiency and conservation. Every unit of geothermal energy utilized is a unit of energy from scarce and expensive fossil fuel sources that does not have to be used, helping keep costs down for both business and consumers and aiding in the fight against inflation.

Because industry is Idaho's greatest energy consumer it has the greatest benefits to be obtained from geothermal development. Twenty of the thirty largest industries in Idaho are food processing plants located on the Snake River Plain near areas with potential geothermal resources. All of those plants require hot water and could utilize geothermal energy to replace a part of their 3 million barrels of oil per year total energy requirement. In some cases the energy of geothermal waters may be used for a number of applications, giving off a portion of its heat with each use. The same waters used for industrial processes can go on for space heating applications and finally be used for low temperature purposes.

the costs

The cost of geothermal installations will vary greatly depending on their intended use and complexity. In most cases a cost benefit analysis over the life of the system shows the initial investment to be worthwhile because of constantly increasing conventional fuel prices.

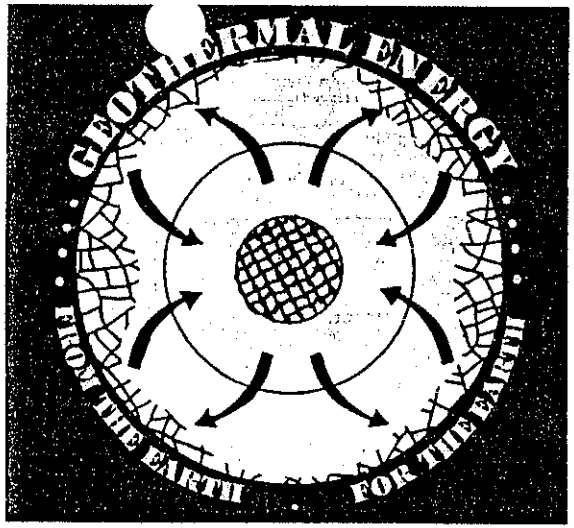
A major geothermal installation for industrial facilities may cost as much as several million dollars, including wells, equipment and plant refitting. In cases where a supply of geothermal water is already available, converting existing commercial buildings may cost considerably less. The expense of geothermal conversion for residences will be extremely variable depending on the water source and the existing heating system. For households, the greatest cost effectiveness will undoubtedly come through district heating systems. Professional engineers and architects can provide specific cost estimates for proposed installations and evaluate exchange cost/benefit comparisons.

the difficulties

The obstacles to geothermal development are institutional requirements and restrictions and the limited amount of public and private funding available.

Geothermal developers must meet a number of requirements imposed by the State and other levels of government. If a high heat well is anticipated a Geothermal Resources Permit must be obtained from the Idaho Department of Water Resources. For low temperature wells only the usual water and drilling permits are necessary. Environmental requirements of both federal and state agencies must be complied with, and these requirements may present some difficulties with waste water disposal. In some cases a geothermal space heating installation must also be combined with a back-up system.

Although there are problems and obstacles in the development of geothermal energy, they have been and can be overcome. The citizens of Boise, Ketchum, and Hagerman are today realizing its potentials. Around the world, the earth's heat is serving in Iceland, Italy, Hungary and New Zealand. It can happen elsewhere.



Inside the earth a great energy resource is waiting to be used. . .

Deep inside the earth radioactive materials are constantly decaying, creating temperatures of over 6,000 degrees. That heat travels from the core to the surface in slow, cooling convection currents. When it is used by man it is known as geo (earth) thermal (heat) energy. It is an almost limitless potential to meet our future energy needs that is just beginning to be understood.

The most common forms of geothermal energy are hot springs and geysers. They occur when natural underground waters come in contact with heated rock formations. As early as 1904 geysers were used in Italy to generate electricity and The Geysers project north of San Francisco will meet much of that city's electrical need in the future. Since 1892 water from hot wells has been used for space heating in a section of Boise. During the era of abundant and inexpensive fossil fuels little was done to further geothermal energy development. But that interest has been rekindled by rising fuel costs and the desire to conserve our finite fossil fuel resources.

Today many exciting projects are going on in Idaho and across the nation to explore and utilize the potential of geothermal energy. At Raft River in south central Idaho a federal demonstration project will generate 50 megawatts of electrical energy from moderate temperature geothermal waters. A number of cities in other areas have expressed interest in district heating systems. In parts of the nation where pockets of dry heat can be reached by drilling, innovative experimentation is ongoing. In the Gulf Coast area highly pressurized geothermal waters may be used for both mechanical and thermal energy.

Idaho's state government has recognized the potential of geothermal energy to serve our citizens. In 1972 the Idaho Legislature passed the Geothermal Resources Act stating:

"It is the policy and purpose of this state to maximize the benefits to the entire state which may be derived from the utilization of our geothermal resources. . ."

In 1979 the Legislature restated that commitment by allowing Idaho's cities to issue revenue bonds or geothermal space heating systems. As with the earth's heat, these benefits from geothermal energy are also almost limitless.

. . .Idahoans can use it!

For more Informati

The publications included in this list are examples of a large number of materials on geothermal energy that have recently been produced. Others are available from local libraries, educational institutions, and federal and state agencies.

- **Energy Alternatives for Idaho,** published by and available from the Idaho Office of Energy, Statehouse, Boise, Idaho 837
- **Geothermal Energy Factsheet,** by John and Kathryn Fowler, National Science Teachers Association, available from DOE-Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 35830.
- **Rules of Thumb for Geothermal Direct Applications,** available from the Idaho Office of Energy and DOE-Idaho Operations Office, Geothermal Program, 550 2nd St., Idaho Falls, Idaho 83401.
- **Geothermal Space Heating,** available from DOE-Idaho Operations Office.
- **Idaho Geothermal Project,** available from EG&G, Idaho, Inc., Box 1625, Idaho Falls, Idaho 83401.
- **Geothermal Energy,** DOE Office of Public Affairs, available from DOE-Technical Information Center.
- **Drilling for Geothermal Resources, Rules and Regulations and Minimum Well Construction Standards,** by and available from the Idaho Department of Water Resources, Statehouse, Boise, Idaho 83720.
- **Geothermal Handbook** by C.S. Leffel, Jr. and R.A. Eisenberg, The Johns Hopkins University, Applied Physics Laboratory, Johns Hopkins Road, Laurel, Maryland 20810.

For Assistance

The following individuals and agencies may be able to provide additional geothermal energy information and assist with the development of projects or compliance with appropriate regulations:

- Geothermal Energy Programs, Idaho Office of Energy, Statehouse, Boise, Idaho 83720. Telephone (208) 384-3800.
- Idaho Department of Water Resources, State Office, 373 West Franklin Street, Boise, Idaho 83720. Telephone (208) 384-2215.
  Western Regional Office, 92 S. Cole Rd., Boise, Idaho 83705. Telephone (208) 384-2190.
  Southern Regional Office, 1041 Blue Lake Blvd. N., Twin Falls, Idaho 83301. Telephone (208) 934-3578.
  Eastern Regional Office, 1515 Lincoln Rd., Idaho Falls, Idaho 83401. Telephone (208) 523-7186.
  Northern Regional Office, Rt. 5, Box 203, 4055 Government Way, Coeur d'Alene, Idaho 83814. Telephone (208) 667-6484.
- U.S. Department of Energy, Idaho Operations Office, Geothermal Office, 550 2nd St., Idaho Falls, Idaho 83401. Telephone (208) 526-1668.
- EG&G, Idaho, Inc., Energy Technology Programs, Box 1625, Idaho Falls, Idaho 83401. Telephone (208) 526-9668.
- U.S. Department of Energy, Division of Geothermal Energy, 3122-C, 20 Massachusetts Ave. N.W., Washington, D.C. 20545.
- Geothermal land leasing information can be obtained from: Idaho Department of Lands, Statehouse, Boise, Idaho 83720. Telephone (208) 384-3280.
- Bureau of Land Management, Division of Technical Services, Land and Minerals Branch, 550 W. Fort Street, Boise, Idaho 83724. Telephone (208) 384-1417.

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John V. Evans, Governor
State of Idaho

L. Kirk Hall, Director
Idaho Office of Energy

Geothermal ENERGY for Idaho

An exciting potential to meet the growing needs of a growing state.

JOHN V. EVANS
Governor

I. KIRK HALL
Director

State Of Idaho
OFFICE OF ENERGY
STATEHOUSE
BOISE IDAHO 83720
(208) 384-3800

May 4, 1979

M E M O R A N D U M

TO: Keith Anderson, Department of Water Resources

FROM: Dave McClain, Geothermal Program Coordinator

SUBJECT: Geothermal Water Flow Needs For Space Heating

Design Criteria:
1800 ft^2 home, modern, well-insulated
-10°F minimum outside design temperature
t_i = 70°F designed inside temperature
4500 DD for the locality
25% overdesign
Δt = 15°F

Maximum Heat Load on t_o -10°F day:

HL max. = 500 $(t_i - t_o)$ = 500 [70 - (-10)] =

= 500 (80)

= 40,000 Btu/hr

Delivered Heat + 25% = 50,000 Btu/hr

Fluid flow rates: Water temperature approx. 150°F

$w = H/500\ (\Delta t) = 50{,}000/500\ (15) = 6.67$ gpm

1) Fluid flow rates will vary according to type of heating system employed and the temperature of the geothermal fluid.

2) Using the same design criteria as outlined above, the fluid flow rates will vary according to Table I.

TABLE I

Geothermal Fluid Temperature	Water Flow Requirements	
	Forced Air	Convector and Radiant Heating Syst
70°F	6 gpm/heat pump assisted	-0- won't work
120°F	11.2 gpm	-?-* very high 15-20 g
140°F	9.3 gpm	-?-* very high 12-14 g
160°F	4.5 gpm	5.6 gpm
180°F	3.2 gpm	4.0 gpm

* No calculation available, estimated

ESTIMATING GEOTHERMAL WATER REQUIREMENTS FOR RESIDENTIAL SPACE HEATING OR RESIDENTIAL SUBDIVISIONS

Without specific information concerning expected heat loads, type of heating systems, and resource temperature, it is difficult to estimate the geothermal flow required to service a residential or subdivision heat load.

In order to accurately estimate the peak volumetric flow of geothermal water to satisfy the space heating load for a subdivision, it is necessary to determine the total heat load which must be satisfied, the temperature drop of the water across the system at design-operating conditions and system losses. The system heat load is dependent on climatological conditions and net heat loss from the heated space and transmission lines. The water temperature drop across the system is dependent on system design and initial geothermal water temperature.

Geothermal water temperatures below about 120°F probably limit choices of heating systems to heat pump and hydronic radiant floor panel designs. Higher water temperatures would allow consideration of hot water coil forced-air and hydronic convection systems as well.

Review of water source heat pump specifications and manufacturers' guidelines shows that several manufacturers can provide ground water heat pump systems suitable for operation with ground water at temperatures down to 40°F or less. As water temperature is reduced the coefficient of performance (COP) and the unit amount of heat extracted from the water are reduced such that greater amounts of water and electricity are required to service a given heat load. Representative examples are shown in Table I.

Based on these data, at design operating conditions, a home with a 50,000 Btu/hr heat load could be heated with a water source heat pump system requiring about 7.5 gpm of 80°F water with electrical consumption near 3.7 kw. A 200 home subdivision would require peak production and disposal of 1500 gpm of geothermal water, under these conditions.

A zoned radiant floor panel residential heating system, using 105°F geothermal water, might be designed to effect an average temperature drop as high as 10°F and thereby would require 10 to 12 gal/min to provide 50-60,000 Btu/hr heating; two hundred such homes would then require up to 2,400 gal/min of geothermal water.

Resource temp − 80° air temp − 10° approach temp
= estimated ΔT →

$$\frac{\text{Heat load (BTU/hr)}}{(500 \times \Delta T)} = \text{gpm water required}$$

ESTIMATING GEOTHERMAL WATER REQUIREMENTS FOR RESIDENTIAL SPACE HEATING OR RESIDENTIAL SUBDIVISIONS

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120 80 10 30

Resource temp − 80° air temp − 10° approach temp
= estimated ΔT

$$\frac{\text{Heat load (BTU/hr)}}{(500 \times \Delta T)} = \text{gpm water required}$$

Availability of geothermal water at higher temperatures would allow consideration of other heating system designs, using lower flow rates in most instances. Examples of estimated water temperature and flow required to service a 50-60,000 Btu/hr heat load are shown below:

	Water Temp °F	Water Δt °F	Flow gal/min
Hot water coil - forced air	120	10	11.2
	140	12	9.3
	160	25	4.5
Baseboard convector (zoned)	140	12	9.3
	160	20	5.6
	180	28	4.0

Total geothermal water flow required for subdivision heating will depend on available geothermal water temperature, and the mix of heating system designs employed in the development. If the chemical constituency of the water should require use of heat exchange equipment to isolate the heating systems, additional flow may be required. Due to the temperature loss at

Estimation of geothermal water flow required to heat a subdivision could be based on an average residential design heat load and a representative mix of heating system designs, together with the most probably available geothermal water temperature. An estimate of transmission heat losses also should be included.

TABLE I

ESTIMATED WATER AND ELECTRICAL CONSUMPTION

FOR GROUND WATER HEAT PUMP SYSTEMS

Water Temp. (°F)	Water Flow Rate (gpm/10^5 Btuh)	Water Δt (°F)	Electrical Consumption * (Kw/10^5 Btu)	COP*
80	15	10	7.3	4.0
60	16.5	9	7.9	3.7
55	16.6	8.5	8.6	3.4
50	17.8	7.5	9.8	3.0
45	19.8	6.5	10.5	2.8
40	24.0	5.0	11.7	2.5

* Does not include power for production or distribution pumping.



geologica
Innovative Strategies for Environmental and
Natural Resource Management

February 14, 2005

VIA E-MAIL

Ms. Julie Fischer
WHITE PETERSON
5700 E. Franklin Rd., Suite 200
Nampa, Idaho 83687
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jkf@whitepeterson.com

Letter Report
Potential Impacts of Geothermal Exploration Drilling on
Belvidere Hot Spring
Cascade, Idaho

Dear Ms Fischer:

Introduction & Background

This report addresses comments provided by Sherl Chapman regarding potential impacts related to drilling and testing of one or two exploration wells located near Belvidere Hot Springs in Cascade, Idaho. Mr. Chapman's comments are were presented as letters dated May 20, 2003 and October 1, 2003 in response to a proposal by Dr. Carol MacGregor to Idaho Department of Water Resources (DWR) to drill geothermal exploration wells near the Hot Spring that is located on her ranch as part of an application for additional geothermal and cold water rights. Mr. Chapman's comments were prepared on behalf of Dr. MacGregor's neighbors, Duane and Darwin Pancheri, who currently use surface thermal waters discharging from the Hot Spring area. GEOLOGICA INC (GEOLOGICA) has prepared this response on behalf of Dr. Carol MacGregor.

The character of Belvidere Hot Springs and most hydrothermal systems are only generally understood prior to development. Dr. MacGregor proposes to drill test wells in the vicinity of Belvidere Hot Springs. The well(s) will be drilled to intersect and evaluate the hydrothermal system that discharges at the Hot Springs. The Pancheris, neighbors of Dr. MacGregor, have developed surface outflow from the Hot Springs and use approximately 60-80 gpm of water at approximately 112 to 113°F. The proposed drilling, flow testing and monitoring of nearby wells and other hydrological features is a well established method for assessing the hydrologic connections between features and the potential impacts related various levels of withdrawal. Dr. MacGregor intends use

EXHIBIT 33

these techniques to evaluate the hydrologic characteristics of the Belvidere Hot Spring system and evaluate a level of development that would protect pre-existing use of the waters. Scanlan Engineering presented this proposal in a series of documents to the Idaho Department of Water Resources (DWR) the most recent of which was dated September 2, 2003.

Current exploitation of the Springs includes a well drilled by the Pancheris to approximately 99 feet deep, within a few hundred feet of the spring area in 1991, and another well drilled in 2002 to 160 feet within approximately 700 feet of the spring area. These wells have been drilled with standard water well drilling technology in the area including the use of bentonite mud and cement as a well seal without reported damage to the springs. They reportedly produce warm but not hot (<100°F) water.

This report is based on GEOLOGICA's review of readily available published data on Belvidere Hot Springs, letter reports from Scanlan Engineering dated July 1, 1999 and August 4, 2003, letters dated May 20, 2003 and October 1, 2003 from Mr. Chapman as well as our combined fifty years of experience in geothermal exploration and development. This report addresses the two primary issues identified by Mr. Chapman summarized as follows:

a. Belvidere Hot Spring as discharge from the Cascade Valley fault, and the hot springs along this fault are dispersed or limited in flow and therefore are potentially "sensitive" to exploitation
b. The proposed drilling and testing are sufficiently invasive to produce "permanent" adverse impact

Belvidere Hot Spring

General Characteristics

Belvidere Hot Springs discharges approximately 110 to 180 gpm over a one-acre area at a maximum temperature of approximately 120°F and an average temperature of 112-113°F. The Hot Springs occur in a region of surface manifestations extending south to Carbarton and north above Cascade Reservoir. The region and Belvidere Hot Springs have been described by Terry Scanlan in correspondence with DWR as well as in published literature (e.g. Wilson and others, 1976, USGS, 1980, Idaho DWR, 2002). Although the Belvidere Hot Springs system has not been extensively investigated, there are characteristics that we have observed or can reasonably deduce that suggest that these hot springs are not particularly sensitive to impacts from drilling or testing.

The Belvidere springs appear to be the surface manifestation of a typical Idaho and/or Basin and Range-type hydrothermal system with deeply circulating water heated by the natural geothermal gradient in granitic basement rocks controlled by a range-front normal fault system with recharge primarily from higher elevations in the mountain ranges. Discharge typically occurs as a hot spring either where the fault intersects the surface or as a result of lateral flow within a more permeable zone in the subsurface.

Fractured Discharge Zone

The Belvidere Hot Springs appear to discharge along a range front fracture system, but the exact nature of this zone is poorly defined. While Wilson et al (1976) suggest that the hydrothermal systems in the area are related to the north-south trending Cascade Valley Fault (USGS Bulletin 1311A); others suggest that spring occurances are related to intersections with a northeast trending east-southeast dipping fault (DWR, 2002). Scanlan Engineering observed a northeast trend in the discharge locations in the hot springs, but did not clearly identify the nature of the trend. Further defining the discharge zone would require additional work, but it does not affect the basic conceptual model of the Hot Springs based on its regional setting and similarity to other more thoroughly investigated geothermal systems.

The diffuse nature and multiple locations of surface discharge at Belvidere Hot Springs as well as the presence of warm waters (>50°F) at depths greater than 25 feet in wells located within a few to several hundred feet of the surface discharge suggests that flow is controlled by multiple fractures in the subsurface as suggested by Wilson et al (1976) and/or that there is significant discharge to sedimentary zones in the valley fill or fractured upper zones in the underlying granitic basement or both. Flow along multiple fractures and into permeable valley sediments is typical of a diffuse robust system that would be more difficult to impact through withdrawal at a single point (ie. a well). This conceptual model fits data from regional water well logs that document wells penetrating into the weathered upper surface of the Idaho Batholith that underlie the Cascade Valley and produce from either open stable fractures in the granite or the weathered granite.

In most Idaho and Basin and Range-type hydrothermal systems including Belvidere Hot Springs, total thermal flow is probably greater than surface discharge because some hot water flows out into along other permeable zones rather than directly to the surface. Many fault related hydrothermal systems do not discharge to the surface at all if all the flow enters the permeable valley fill sediments. For example, there are as many as eleven thermal wells completed in granite in the vicinity of the town of Cascade in a region where almost no surface manifestations occur (IDWR 2002). Where natural subsurface discharge is significant, and the surface outflow occurs at a limited number of points, additional subsurface extraction of thermal waters is less likely to impact surface manifestations.

Mixing

The Hot Spring and nearby cold water chemistry data from conductivity measurements (by Scanlan Engineering, personal communication, 2/05) and the USGS (1980, 1986); suggest that the Hot Spring waters are mixtures of cold and warmer waters (Figure 1). Although there appears to be some disagreement about the maximum temperature of the deep hot component of the water (176°F (USGS, 1980) - 325°F (Wilson et al., 1976), a mixing relationship is clear from the linear correlation of conductivity/total dissolved

solids and temperature at various discharge points. Mixing of cold and hot water at the Hot Springs suggest that at least 35% and up to 65% of the flow is cold water. Flow from mixed thermal springs such as these are is typically affected by the hydrostatic head in the shallow (relatively) coldwater systems. Although the Hot Spring monitoring data were not consistent enough to produce a clear pattern, it appears that spring flow rates may be affected by both thermal and coldwater recharge and therefore even more difficult to impact by drilling a single well deeper into the thermal system. Regardless of the depth of mixing or the maximum deep temperature, mixing relationships suggest that a) the cold water hydrology has a significant influence on the springs and spring flow, and b) there is at least some deep permeability within the system.

In summary, the primary local influences to the flow and temperature of surface discharge at Belvidere Hot Springs are the controlled by: a) hydrostatic head difference produced by coldwater recharge + geothermal recharge, b) shallow mixing between cold and hot water systems, and c) the rate of natural subsurface discharge. These processes are unlikely to be affected by drilling and testing of one or two wells. Furthermore, well testing will provide information to evaluate an appropriate level of development for the Belvidere Hot Spring hydrothermal systems.

Potential Drilling and Testing Impacts

Geothermal Drilling Experience

Direct impacts from drilling around hot springs are rare in geothermal exploration. Evaluating temperature gradients by drilling and logging temperatures in drill holes is a fundamental part of geothermal exploration and numerous gradient holes have been drilled in and around hot springs across the western United States with no significant impacts. Similar objections about the violence of the drilling process and the potential for drilling impacts on surface manifestations have been repeatedly raised when exploration companies or government researchers request permits to drill test wells on sensitive federal lands such as National Parks, Wilderness Areas and National Scenic Areas. Despite objections and dire predictions, many research and exploration gradient holes have been drilled and completed in and around sensitive hot spring areas in nearly every Known Geothermal Resource Area (KGRA) in the US without significant impacts to the surface springs. Successful drilling programs have been executed within even in extremely sensitive hot spring areas such as Yellowstone National Park, Newberry Crater, Mono Craters National Scenic Area, Long Valley Caldera and Golden Trout Wilderness without adverse effects on local springs.

The accepted conceptual models of the Cascade Valley Hot Springs suggest recharge from the adjacent mountain range, deep circulation along existing faults and fractures, deep heating at an elevated geothermal gradient and discharge through fault controlled fractures at the surface or beneath the mixed glacial till in the adjoining valleys. The fracture system within the Cascade Valley is diverse and apparently includes penetrative joints and the "weathered rind of the (Idaho) batholith" noted by Wilson et al (1976) as

"suitable aquifer material for groundwater storage and development." Assuming this fracture model applies to Belvidere Hot Springs, a multiple fracture source most likely controls the diffuse multiple spring discharge. A successful MacGregor well would intersect fractures in a limited well area. Multiple flow paths make it less likely that a single well would affect the entire discharge of the hydrothermal system.

Drilling Plan and Drilling Mud

The objective of the well is to intersect and produce from fractures and or permeable zones not plug them up or prevent flow. Geothermal drilling methods have been developed over several decades to minimize plugging productive zones or damaging productive fractures. To achieve that objective, the lower portion of the well could be drilled entirely with air-rotary techniques or with plain water to minimize any potential damage to productive fractures. Local drilling reports note good production of clear or clean water after well completion indicating minimal impacts water quality related to air-rotary drilling. While completion practices have varied from open hole to perforated liners in the Cascade Valley, none of the regional well reports include any notation of wellbore collapse or problems with fracture zones in granite. The MacGregor well plans include slotted liner to total depth to assure reasonable production to the wellbore while minimizing the potential of spalling or collapse in the sediments or weathered portion of the fractured granite.

A reasonable drilling program is critical to safely completing a geothermal well at Belvidere Hot Springs. As planned, the MacGregor well would penetrate the valley fill and run casing to seal off upper sedimentary zones before drilling forward into either valley fill or fractured granite. Based on local well logs, wells commonly produce cold and thermal water from permeable valley fill sediments and the fractured upper portion of Idaho Batholith granite. Water levels listed on regional well logs range from 6' to 150' below ground surface (bgs) and very few are artesian (Wilson et al, 1976). None of the local wells around Belvidere Hot Springs record artesian flow or have artesian pressures. Consequently, there is no requirement for heavy clay-based drilling mud to control artesian pressures during drilling of the proposed MacGregor well and all of the surface drilling could be done with air-rotary equipment or if necessary plain water as a circulating fluid.

Therefore the potential for damage to the fracture zones feeding the surface discharge of the Belvidere Hot Spring from drilling mud is minimal and that minimal potential mitigated with selection of an appropriate drilling fluid. If mud were required, a wide variety of polymer (starch) based drilling fluids have been developed for the geothermal industry to avoid the facture clogging properties of clay based muds at high temperatures. Polymer drilling fluids have been used in geothermal environments exceeding 300°C without significant formation damage

Casing and Cement

Cementing casing is a critical step in the early stages of drilling to maintain the integrity of the well as drilling progresses and after completion, during production tests. The potential pressures exerted during cementing are related to the density of the fluid cement ~~in the wellbore plus any pump pressures required to return the cement to the surface and~~ seal the wellbore annulus between the casing and the drilled hole. Driller's logs indicate that local wells generally use a shallow (<50') bentonite well seal while modern wells are sealed with various combinations of neat Portland cement and bentonite. None of the logs reviewed reported cement or fluid losses during the casing process. If necessary, cement compositions can be tailored to avoid exceeding the strength of the surrounding rock to maintain cement in the well annulus rather than force cement into the sediments and waste excessive amounts of materials. Cement additives such as perlite may decrease the hydrostatic pressure of the cement column to prevent cement loss and minimize potential damage to the existing fracture permeability.

Existing Wells Nearby Belvidere Hot Springs

The MacGregor well plans follow a similar well design for wells drilled and producing on the the Pancheri's property. Darwin Pancheri drilled to 160' and tested at 8 gallons per minute (gpm) in 2002 and an earlier well drilled to 99' in 1991 produced 10 gpm of 52 °F ~~water with no reported adverse effects on Belvidere Hot Springs. Drilling and~~ testing of the MacGregor well would follow a similar program of short-term testing with comparatively low production volumes. Effects on surface spring flow are generally related to extended high volume production rates that reduce the hydrologic drive for the surface springs. The potential effect of a short-term test is minimal based on the Pancheri's experience. The eventual production from the MacGregor well would depend on a reasonable evaluation of sustainable flow that would not impact the surface springs. The potential effects of carefully managed production would be minimal given the extent and diversity of the hydrothermal system in the Cascade Valley.

Summary and Conclusions

GEOLOGICA presents the following summary and conclusions:

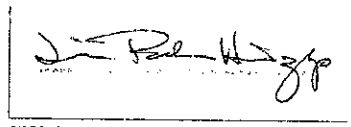
1. Belvidere Hot Springs represents a 110-180 gpm surface discharge of deeply circulating warm water mixed with cold water at 110-120°F water in a diffuse fractured area which may be related to the Cascade Valley Fault.
2. Additional discharge into valley fill sediments probably disperses the thermal waters away from the range front.
3. Hot spring flow and temperature are controlled by both cold water and warm water hydrology, including subsurface discharge and shallow mixing
4. ~~The potential for effecting the hot spring flow and temperature from the drilling~~ and testing of one or two wells is very low, particularly if the wells are drilled

with less invasive methods and completed with proper cementing techniques that minimize risk of plugging or diverting thermal flow.

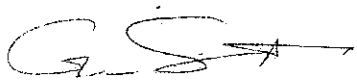
5. Numerous Cascade Valley wells have been drilled and completed with similar techniques including wells on the Pacheri property immediately adjacent to the Belvidere Hot Springs with no recorded detrimental effect on either water quality or spring flow volume.
6. Drilling and testing MacGregor wells will evaluate the potential impacts of producing additional geothermal fluids from the Belvidere Hot Spring System
7. Long-term production rates would depend on maintaining the current spring flow
8. The diffuse nature of the Belvidere Hot Springs potentially mitigates the long term risk of further withdrawals.

Sincerely,

GEOLOGICA



Jill R. Haizlip
Principal and Senior Geochemist



Gene A Suemnicht, R.G.
Senior Geologist

References

Report: "Draft Response to IDWR Regarding Test Well Proposal", by Scanlan Engineering, dated 8/4/2003.

Letter from Sherl L. Chapman to Scott Campbell (Moffatt Thomas Rock & Fields), dated 5/20/2003.

Letter from Sherl L. Chapman to Scott Campbell (Moffatt Thomas Rock & Fields), dated 10/1/2003.

Report: "MacGregor - Belvedere and Rasberry Ranches", by Scanlan Engineering, dated 7/1/1999.

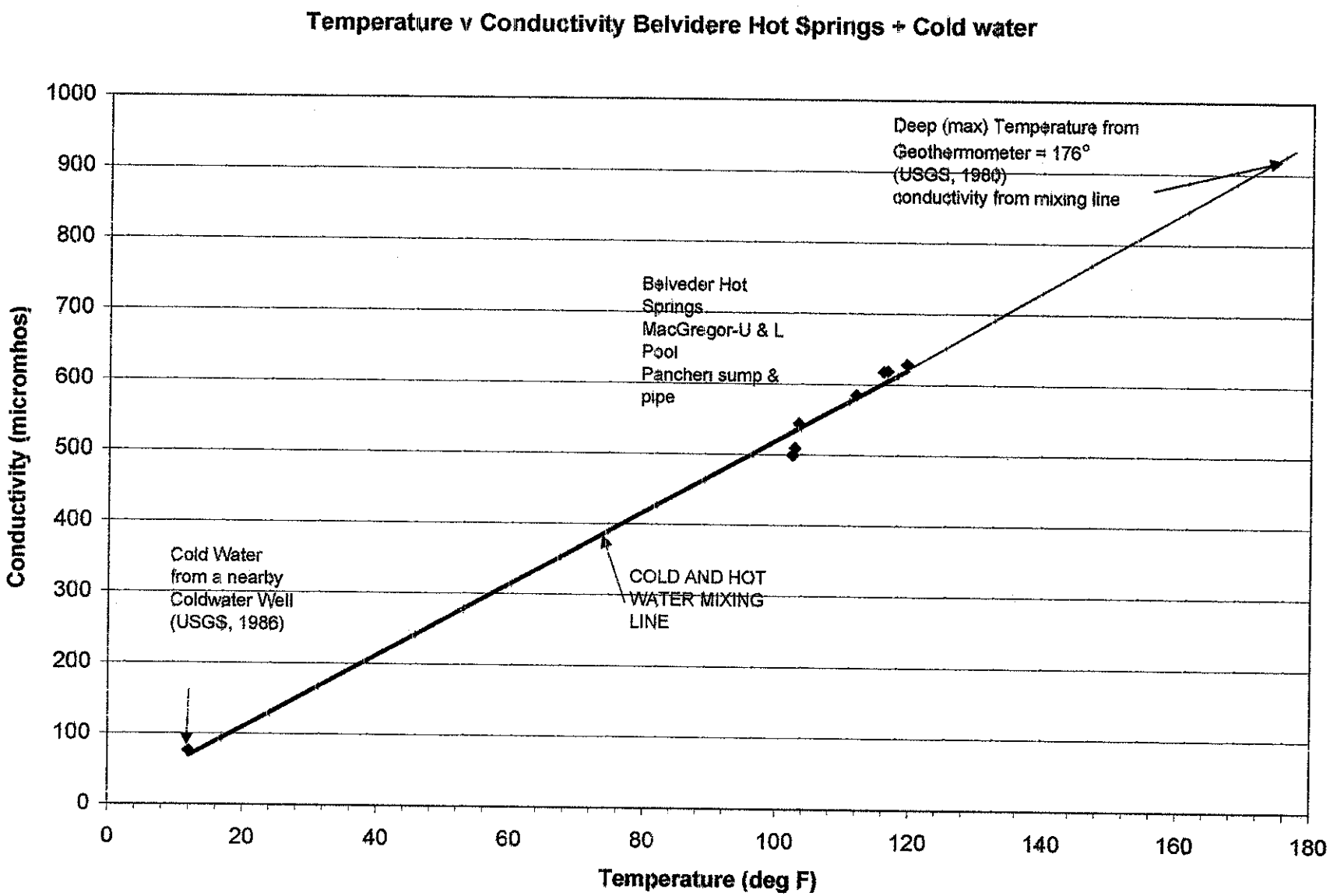
Report: "MacGregor Test Well Proposal", by Scanlan Engineering, dated 9/2/2003.

Wilson, Monte D., James K. Applegate, Sherl L. Chapman, Paul R. Donaldson, "Geothermal Investigation of the Cascade, Idaho Area", 1976.

Lewis, R.E., H.W. Young, "Thermal Springs in the Payette River Basin, West-Central Idaho", U.S.G.S. W.R.I. Report 80-1020, 1980.

Parliman, D.J., "Quality of Ground Water in the Payette River Basin, Idaho", USGS W.R.I. Report 86-4013, 1986.

St. Marie, Jim, Leland L. "Roy" Mink, Kenneth W. Neely, "Examination of Geothermal Sites in the State of Idaho with Emphasis Given to Potential for Electrical Generation or Direct Use", Idaho DWR, 2002.


Temperature v Conductivity Belvidere Hot Springs + Cold water
Conductivity (micromhos)
1000
900
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
160
180
Temperature (deg F)
Deep (max) Temperature from Geothermometer = 176° (USGS, 1980) conductivity from mixing line
Belveder Hot Springs MacGregor-U & L Pool Panchen sump & pipe
Cold Water from a nearby Coldwater Well (USGS, 1986)
COLD AND HOT WATER MIXING LINE

34

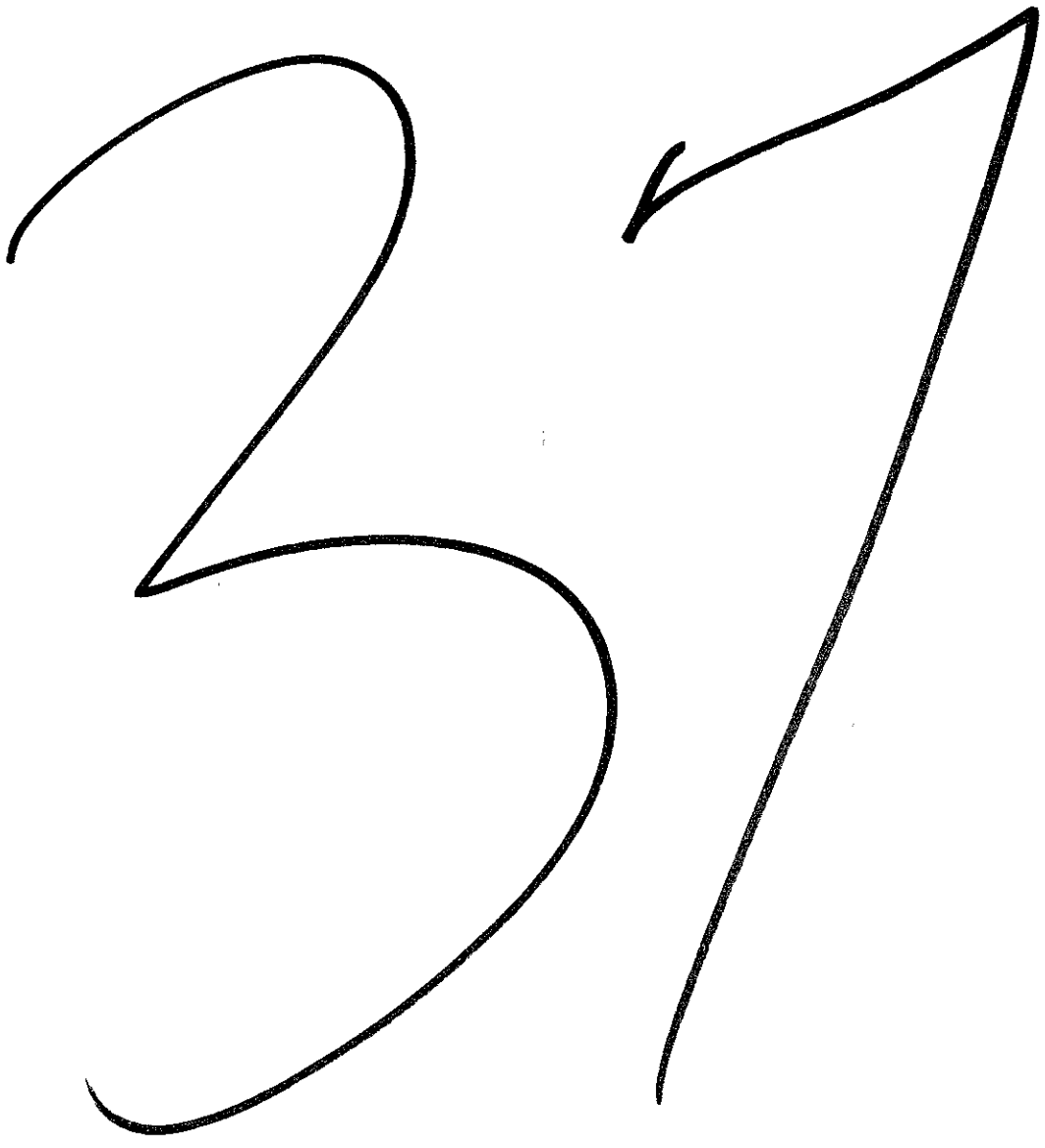
Please See

Exhibits 34A & 34B
(Large Maps)

In Docs As

Stand Alone

Documents



SPF Water Engineering, LLC
water resource consultants

February 8, 2005

Julie Klein Fischer
White Peterson
5700 East Franklin Road, Suite 200
Nampa, ID 83687-7901

Subject: Monitoring Update - Belvedere Hot Springs

Dear Julie:

Enclosed for your files are monitoring data for Belvedere Hot Springs. The most recent measurement event was Monday, February 7, 2005.

Please contact me with any questions.

Sincerely,

Terry M. Scanlan, P.E., P.G.

Cc: Carol MacGregor

EXHIBIT 37

total into Duarnes prop.

Belvedere Hot Springs - Flow Meter Monitoring Data

Duane Pancheri Meter				
Date	Time	Inst. Flow	Total Flow	Average Flow
8/2/2004	11:13	66	249800	
8/16/2004	14:41	60	1619700	67.3
9/20/2004	14:47	76	5213600	71.3
11/22/2004	14:30	75	12003700	74.9
12/27/2004	14:49	79	15780700	74.9
2/7/2005	14:37	76	20305400	74.8

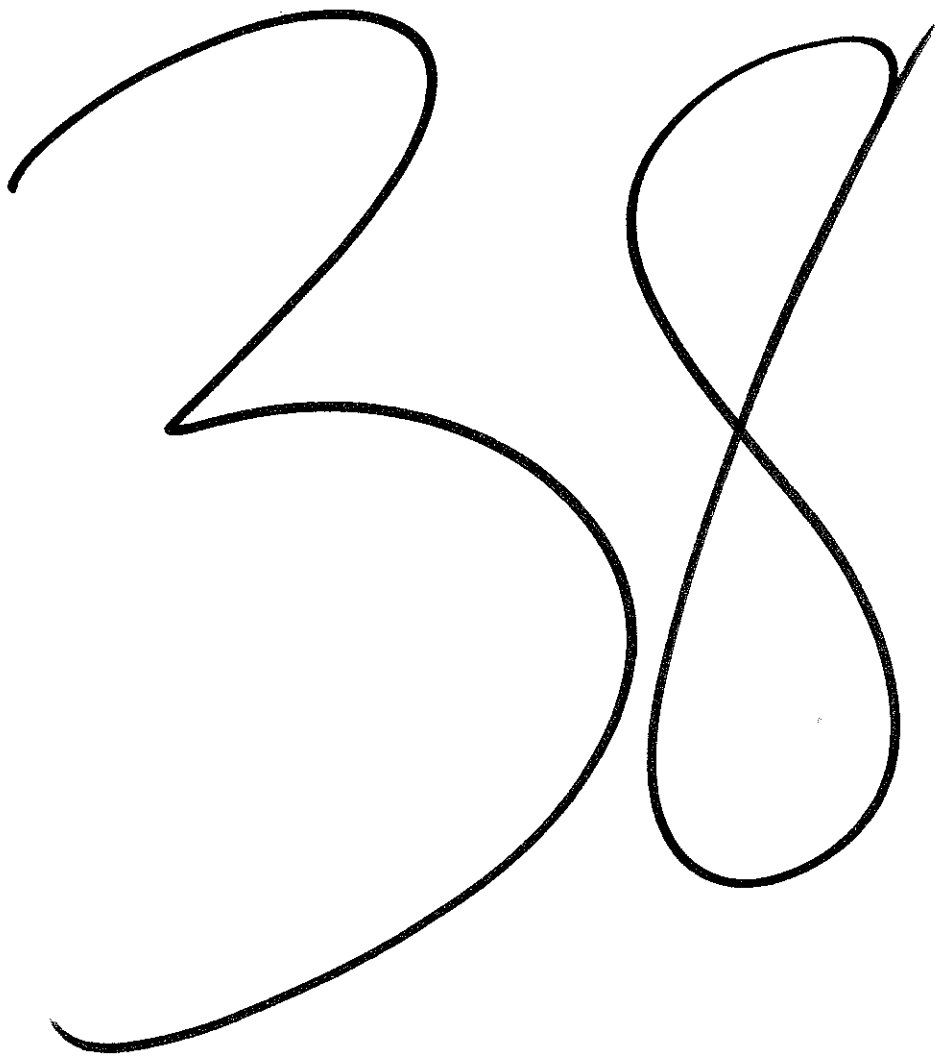
Darwin Pancheri Meter				
Date	Time	Inst. Flow	Total Flow	Average Flow
8/16/2004	14:30	0	1299	0.0
9/20/2004	14:47	14	63732	1.2
11/22/2004	13:48	12.2	1221400	12.8
12/27/2004	14:34	12	1832800	12.1
2/7/2005	14:55	12	2558870	12.0

	MacGregor					Darwin Pancheri							
Date	Upper Pool temp	Seep S. of Upper Pool temp	Lower Po temp	MacGregor Weir temp	flow	pipe vent temp	DTW (ft)	Pancheri Weir temp	flow	Pump Sump Sump temp	Inlet temp	pump return temp	flow
6/7/1999	104		121										
8/3/2000	102.4		119.5										
9/1/2000	92.0		116.0										
10/18/2000													
1/27/2001													
5/5/2001	102.7		116.6	100.2		111.9	2.96			104		88	16.6
7/7/2001	100.8		118.0			112.6	3.19			103.3	106.5		0
7/21/2001	104.5		118.9	106.2	54	112.6	3.18	99.7	7		108.1		0
8/8/2001	100.0		119.1	104.2	45	113.5	2.56	91.4+/-	8		104.4		0
9/26/2001	101.5	111.8	118.4	106.3	45	112.8	3.30	93.8	13	106.3	107.1		0
11/2/2001	98.8	112.1	117.1	flooded		111.9	3.05	86+/-	13	107.4	108.1		
2/16/2002	95.9	112.6	117.5	96.6	54	111.0	2.72	88+/-	13	104.7	106.9		0
3/9/2002	93.2	112.6	117.3	88	54	110.8	2.75	80+/-	15	105.3		86.2	7.3
6/1/2002	101.8	112.3	118.8	flooded		108.7	2.01	flooded		104.5		85.6	7.2
7/18/2002	102.4	111.7	120.6	103.8	45	113.2	3.22	97.2	8	59.7	flooded		0
10/9/2002	100.8	110.8	117.0	101.5		112.6	3.18	85.8	11	106.2	108		0
8/2/2004										104.7			0
8/16/2004		111.9	118.2			113.9							
9/20/2004	103.1	113.0	119.3			111.9							14
11/22/2004	100.9	113.0	120.6			111.4				102.7		90.1	12.2
12/27/2004	100.6	112.6	121.5			111.4				100.4	106.7		12
2/7/2005	101.1	113.0	120.6	97.7		111.6				101.1	106.3	86.9	12

Flow is gallons per minute
Temperature is degrees F

	Duane Pancheri									
				Tomato Can In			Tomato Can Out			
Date	Shop temp	House temp	Pool temp	Shop flow	House flow	Pool flow	Shop flow	House flow	Pool flow	Total
6/7/1999										
8/3/2000										
9/1/2000										
10/18/2000										
1/27/2001	88		95	7.6				1	89	97
5/5/2001	87.3	87.4	97.9	6.2	4.1	62.5	5.2	1	73.1	79.3
7/7/2001										
7/21/2001										
8/8/2001	92.5		101.8				5.4	0.5	54	59.9
9/26/2001										
11/2/2001	88.0	88.7	98.6	6.0	3.7	58.9		<1	70.2	76+/-
2/16/2002										
3/9/2002	80.8			6.2						
6/1/2002	88.9	89.2	95.9	6.3	4.6	63.5	5.0	<1	74	80+/-
7/18/2002										
10/9/2002	90.3	86	101.5	5.2	2.1	60.6		1	62.3	68
8/2/2004										66
8/16/2004										60
9/20/2004										76
11/22/2004										75
12/27/2004										79
2/7/2005										76

Flow is gallons per minute
Temperature is degrees F



SCANLAN ENGINEERING

Groundwater and Environmental Engineering

July 1, 1999

Jo Beeman
Beeman & Hofstetter
608 West Franklin Street
Boise, ID 83702-5509

Subject: MacGregor - Belvidere and Raspberry Ranches

Dear Jo:

This letter report provides a summary of information developed following my visit to the above referenced properties with Carol MacGregor on June 7, 199. Figure 1 shows the location of the properties and associated water features. Details follow.

BELVIDERE HOT SPRINGS

Location

Based on my review of map data and measured distances during my site visit, the hot springs are located in the NESENE of Section 13, T13N, R3E. This location assumes that that the fence line between the Pancheri and MacGregor properties follows, or is slightly south of, the 1/16th section line. The fence line is 170 feet north of the centerline of West Mountain Road. The lower bathhouse is approximately 470 feet east of the centerline of the County Road and 50 feet south of the fence line between the Pancheri and MacGregor properties. The upper bathhouse is approximately 400 feet from the County Road and 80 feet south of the fence.

As additional confirmation of the spring location, IDWR's field exam for water right 65-12891 and USGS Water Resources Investigations Open File Report 80-1020 both indicate that the spring is located in the NESENE of Section 13, T13N, R3E.

Description of Belvidere Hot Springs

Belvidere Hot Springs consists of an area of at least one acre with diffuse geothermal discharge The spring area is concentrated within a fenced area approximately 120 feet by 75 feet on the MacGregor property, although evidence of geothermal discharge also is visible outside of the fenced area on both the MacGregor and Pancheri properties. The spring area trends in a North 60 East direction, suggesting the possible presence of a geologic structure (i.e., fault) or other subsurface feature trending N60E.

Within the fenced portion of the MacGregor property, two main areas of discharge are visible. Both of these spring vents historically had been developed with bathhouses, although only remnants of these structures are currently visible. At the time of my visit, the discharge from the

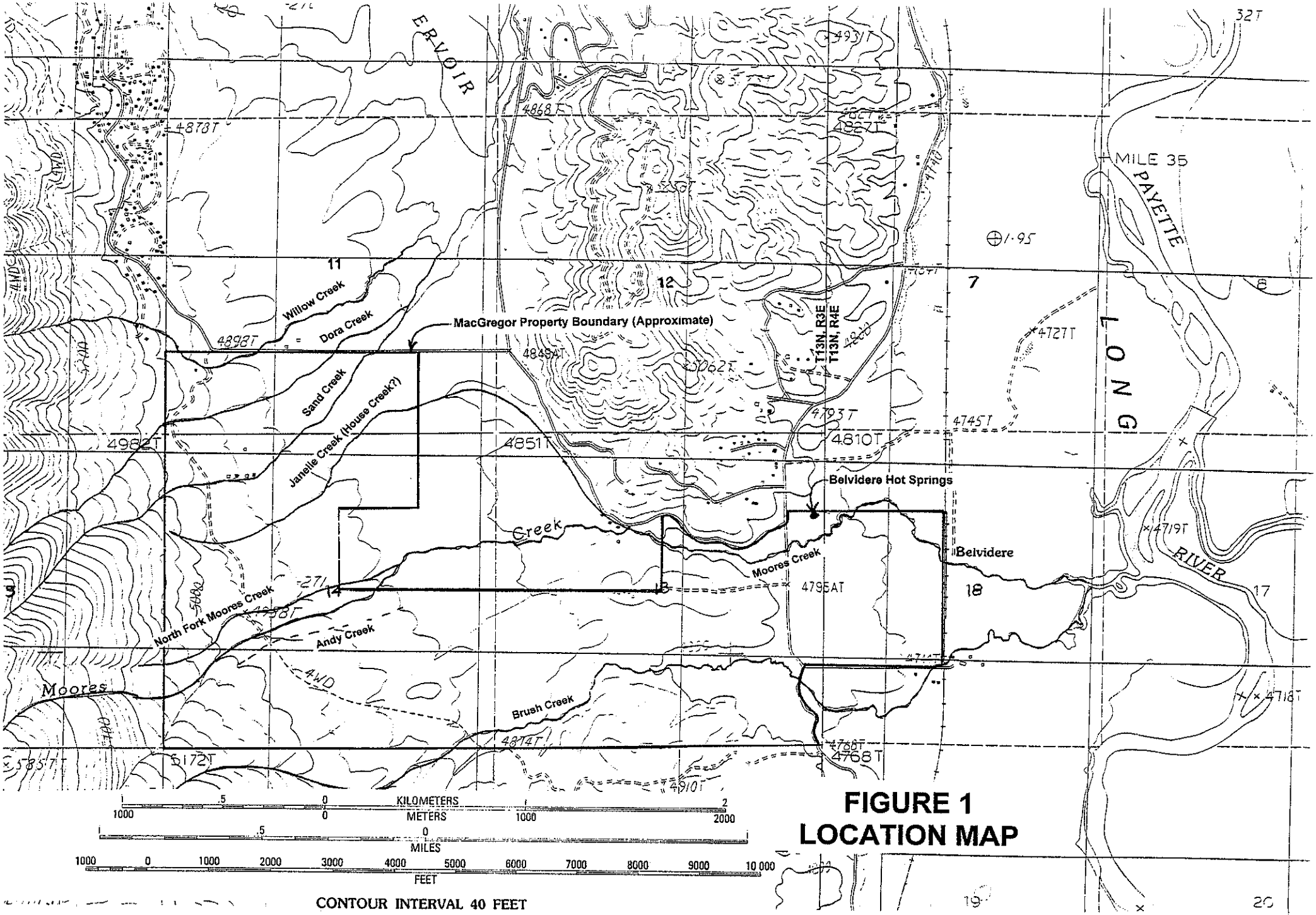


FIGURE 1
LOCATION MAP

upper bathhouse vent was visually estimated at approximately 20 gpm (gallons per minute) Surface temperature was 104 degrees F. The discharge from the lower bathhouse vent was visually estimated at approximately 50 gpm. Surface temperature was 121 degrees F. East of the fence surrounding the spring area, total combined discharge from the spring area was estimated at 100 to 150 gpm with a temperature of 92 degrees F.

Data for Belvidere Hot Springs is mentioned in several publications. Excerpts are copied and attached. The best description is found in "Geothermal Investigation of the Cascade Area", July 1976, by Boise State University. The report indicates that the hot spring is located along the north-trending Cascade Valley Fault. A series of hot springs are found along this fault, including (from south to north) Cabarton, Belvidere, Cascade, Flat Creek, and Gold Fork. (Although not mentioned in the report, it is possible that the Belvidere Hot Spring is located at the intersection of the north-trending Cascade Valley Fault and an unmapped fault trending N60E.) The discharge temperature for Belvidere hot springs was reported to be 121 degrees F. Based on silica concentration in the water and a mixing model, the authors estimated that the temperature of the hot spring source could be as high as 325 degrees F.

A chemical analysis in USGS Water Resources Investigations Open File Report 80-1020 indicates that the spring has a temperature of 120 degrees F and a discharge of 20 gpm. The water is a sodium bicarbonate type with total dissolved solids of 256 mg/l. Based on various geochemical methods, the USGS report estimated that the temperature of the aquifer source ranges from 117 to 232 degree F. Based on these geochemical models, a source temperature of approximately 180 degrees F appears to be likely.

For comparison purposes, the surface water temperatures at other hot springs along the Cascade Valley Fault range from 100 degrees F at Flat Creek to 160 degrees F at Cabarton.

6/24/99
65 134 28 Belvidere
DFT Pumped

Existing Water Rights for Belvidere Hot Springs

Based on information provided by your office, I understand that the following water rights are recorded or claimed for Belvidere Hot Springs on the MacGregor property.

- **65-01972.** Eastern Western Corporation holds a decreed water right for 0.04 cfs (18 gpm) and 1.2 afy for domestic use from a spring tributary to Moores Creek. Priority date is May 1, 1901. The diversion point and place of use are located in the NESE of Section 13.

- **65-01973.** Eastern Western Corporation holds a decreeed water right for 0.01 cfs (4.5 gpm) and 1.2 afy for domestic use from a spring tributary to Moores Creek. Priority date is May 1, 1901. The diversion point and place of use are located in the NESE of Section 13.

- **A65-17557.** Eastern Western Corporation filed a claim in the SRBA for 0.02 cfs from a hot spring believed to be Belvidere Hot Springs, but it appears that the point of diversion and place of use was listed incorrectly one-quarter mile to the east in Section 18. In any event, the claim will not be recommended by IDWR because it was not claimed in the previous decree of the Payette River Basin.

The following water rights owned by the Pancheris are related to Belvidere Hot Springs.

- **65-12891.** Duane and Darwin Pancheri hold a licensed water right for 0.40 cfs (180 gpm) and 47 7 afy for heating purposes from a spring with the point of diversion listed as the SENENE and NESENE of Section 13. Places of use are SESW, NWSE, and SWSE Section 18, T13N, R4E. Priority date is October 19, 1988.

  Review of the license file for 65-12891 shows that the spring is developed by a buried drain system located approximately 50 feet north of the fence between the MacGregor and Pancheri properties. From the buried drain system, water flows by gravity through 10-inch pipe approximately 2100 feet east, and then 4-inch pipe for 2800 feet to the south side of Brush Creek. Two buried valves along the pipeline are accessed through steel pipes that look like well casings. The system serves three homes, one swimming pool, and one shop located on the south side of Brush Creek.

- **65-13332.** Joan and Darwin Pancheri hold a permit for 0.10 cfs (45 gpm) for heating purposes from a spring with a point of diversion listed as SENENE Section 13. Place of use is the NENE Section 13. Use is described as heating of one home and one shop. Priority date is July 2, 1991.

  This water right uses the spring source for heating the home and shop located north of the springs. A ¾ hp pump with 1.5-inch diameter pipe was proposed as the means to deliver water to the house.

Based on the rights described above, it appears that MacGregor has the senior water right to the hot water source, but only for a small portion of the available flow. The majority of the spring discharge (in terms of both flow rate and acre feet) and the related heat value is covered by water rights owned by the Pancheris.

Potential for Additional Geothermal Development

There is potential for additional development of the geothermal water source at Belvidere Hot Springs provided that steps are taken to prevent injury to existing water rights. At least two options could be considered.

- The first option would be to develop the hot springs by collecting the natural discharge. This option might be similar to the previous spring development by Pancheri, and consist of one or more collection pipes routed to a pump sump. The water could then be pumped to a place of use. The advantage of this option is that there is less chance to impact existing water rights. Development would take advantage of flow that naturally discharges from the spring and is not currently diverted by others. The disadvantage of this option is that the natural discharge rate and surface temperature will limit the extent to which the spring can be developed.

- The second option would be to drill one or more wells at the hot spring location to develop hotter water that can be pumped on demand. This option would seek to intersect geothermal

water that is believed to be flowing upward through fractured granite bedrock. An advantage of this option is that the water can be intersected prior to mixing with cooler shallow groundwater. In addition, the water can be pumped as needed, using the geothermal aquifer for storage. Therefore, water (and heat) would not be lost by natural discharge at the spring. The disadvantage of this option is that there is significant potential to impact the flow rate or temperature at the spring developed by the Pancheris. Also, geothermal drilling is costly, due to requirements for multiple casing strings to be cemented in place.

Regardless of which option is selected, I would recommend that temperatures and discharge rates from the spring area on both the Pancheri and MacGregor properties be monitored and documented before the spring is developed. This monitoring should be used to document natural flow (including seasonal variations) and actual use of the water. Based on this monitoring, mitigation (if necessary) can be established in the future.

Cold Groundwater at Belvidere and Little Ranch House

Carol asked about the potential to develop a cold groundwater source at the Belvidere property for domestic use and for temperature moderation at the hot springs. She is also interested in the existing well at the Little ranch house. The following information was found.

Potential for Development of Cold Groundwater Wells at Belvidere Hot Springs. Drilling by the Pancheris on their property to the north of the hot springs provides an indication of cold groundwater potential in this area. The Pancheris drilled two wells in June 1991 in the area north of the MacGregor property. The first well was located in the NENE Section 13, probably in the vicinity of the house. This 99-foot deep well produced 10 gpm of 52 degree F water, and had a static water level of 28 feet. A second well was drilled in the NWNW Section 18, probably somewhere north and east of the hot springs. This well produced more than 100 gpm of 60 degree F water from sand and gravel zones between 38 and 47 feet. The well is slightly artesian, and flows at 0.5 gpm.

Based on the drill log for the second Pancheri well, there is good potential for developing cold groundwater in the general vicinity of Belvidere Hot Springs. The best location for a cold water well will be south and east of the hot spring, where the depth to granite bedrock will be several hundred feet. In that area, it is possible that sand and gravel aquifers yielding 100 gpm or more of cold groundwater could be developed with properly constructed wells.

Drilling Log for Well at Little Ranch House. IDWR well log files were searched by legal description for a log of the well at the Little ranch house. Carol thought that the well was drilled by Eastern-Western Corporation within the past few years. However, no log could be located for the quarter-quarter section where the well is located (NESW or SENW of Section 13). The closest recorded well that has been constructed in recent years (based on location description) was drilled in 1989 for Gulf Pacific Cattle Company in the SWNE of Section 13. This well produced 4.7 gpm. An older well, drilled for Frank Bilbao in 1974, is described as located in the NWSE of Section 13. The Bilbao well produced 12 gpm.

The data base was also searched by owner's name for any wells drilled for Eastern-Western Corporation. Two wells were located. These wells were drilled for Eastern-Western in 1994, but at a location approximately 15 miles north of Belvidere.

IRRIGATION WATER RIGHT SUMMARY - RASPBERRY AND BELVIDERE RANCHES

I did not conduct a formal water right search for these properties. However, based on information provided by your office, the irrigation water rights associated with the Raspberry and Belvidere Ranches are summarized in Table 1.

Table 1 – Irrigation Water Rights
Raspberry and Belvidere Ranches

Water Right No.	Owner	Stage	Source	Priority	rate (cfs)	acres
65-03406	MacGregor	decree	House Creek, NF Moores Cr	April 1, 1897	1.56	78
65-03407	MacGregor	decree	Dora Creek	April 1, 1897	1	50
65-03408	MacGregor	decree	House Creek, Sand Cr	April 1, 1897	0.72	46
65-01979	A.L. Cattle, Inc.	decree	Brush Creek	June 1, 1918	6.24	312
65-11280	A.L. Cattle, Inc.	decree	Andy Creek, SF Moores Cr	June 1, 1902	1.06	53

The water rights authorize diversion of 10.58 cfs for irrigation of 539 acres. Each water right is for one miners inch per acre, except for 65-03408 which is for 0.78 miners inches per acre.

A water right map is provided as Figure 2. The water right map should be studied to determine if the existing place of use has adequate water rights. For instance, there are only 8 acres of authorized irrigation in the area west of the existing Raspberry Ranch house, and no authorized irrigation in the 240-acre area (i.e., six ¼- ¼ sections) south of the Raspberry Ranch house. Although this area is mostly timbered, there may be some irrigation occurring. If so, a new application for permit should be submitted to allow irrigation of this area when adequate water is available.

Points of diversion for each water right are listed on the table attached to Figure 2. The points of diversion are described by 40-acre tract, and most of the rights have multiple diversion points which provide good flexibility for water use. The tracts authorized for diversion should be reviewed to confirm that existing diversion points are described.

A copy of a stipulation regarding some of these rights is attached. The stipulation indicates that although water right 65-11280 is junior to Pancheri's right 65-11250, it will be considered as a prior right for distribution purposes as long as the following conditions are met.

1. Use of water under right 65-11280 shall not be expanded to new lands.
2. The method of irrigation under 65-11280 cannot be changed.
3. The place of use or point of diversion for water right 65-11280 cannot be changed without written consent from the Pancheris.

I note that the water right information received from your office included a permit for irrigation in the name of Davis Cattle Company. This permit lists a place of use for irrigation on both

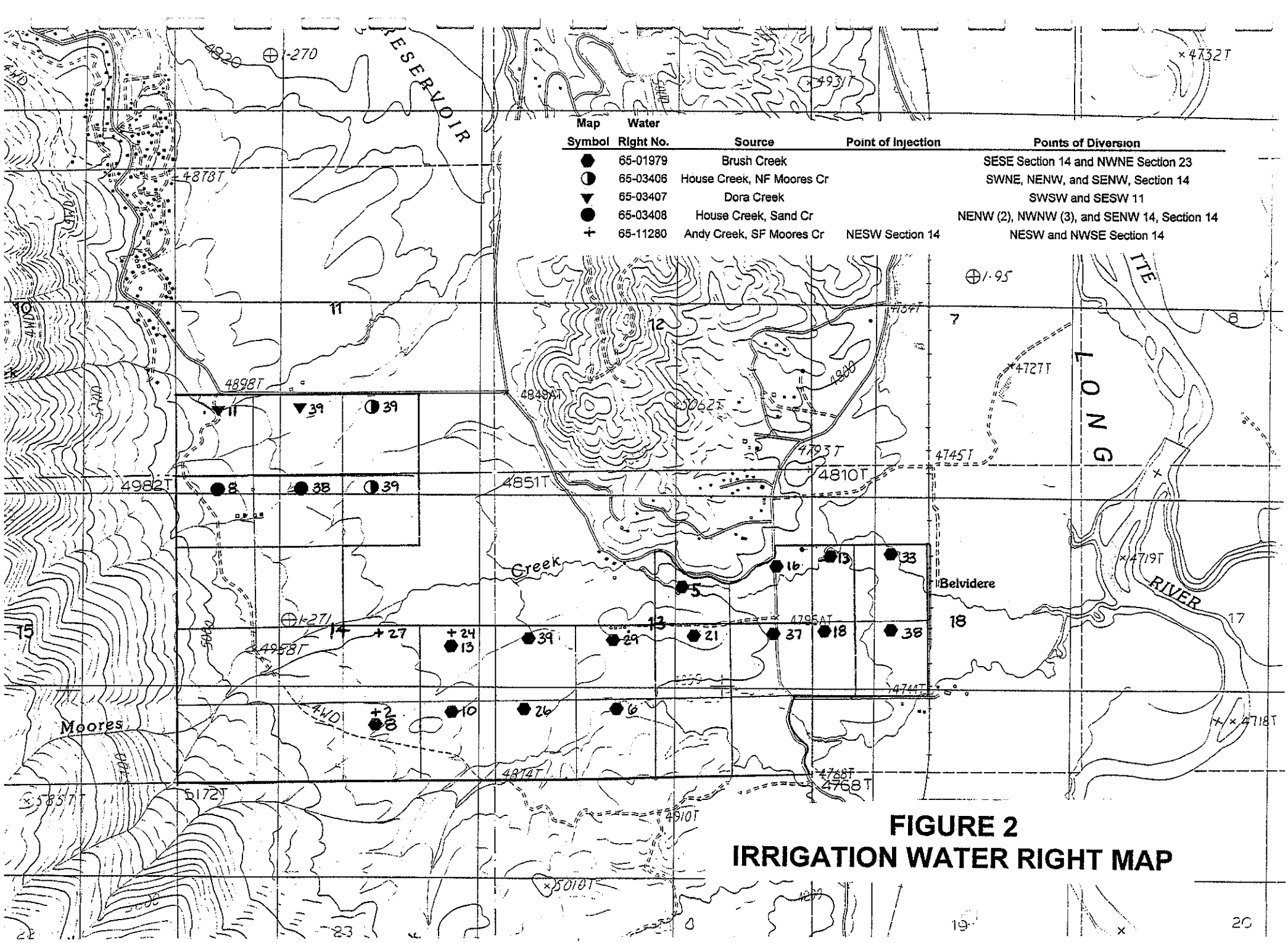


FIGURE 2
IRRIGATION WATER RIGHT MAP

MacGregor and Pancheri lands. I suspect that the place of use listed on this permit is a typographical error. The actual place of use is probably six miles north (i.e., one township) in Township 14 North

WATER SUPPLY FOR NEW HOME AT RASPBERRY RANCH

While on site, Carol and I discussed options for water supply to a proposed new home at the property. The new home would be located near Janelle Creek (House Creek?), south of the existing ranch house. Carol indicated that previous well drilling for domestic use at the Raspberry Ranch had been disappointing, due to low yields and poor water quality. A 400-foot well that was recently drilled yielded only 4 gpm. We then discussed the alternative of developing a spring near the head of Janelle Creek. At the time of my visit, springs were flowing at the property boundary, approximately 120 feet in elevation above the ranch house. This elevation would supply a static pressure of approximately 52 psi to a new home. Water quality (in terms of taste) should be excellent, although there is always potential for bacterial or giardia contamination from such a shallow source.

As a first step to develop the spring, a source area should be identified in late summer or early fall when seasonal springs have dried up. Once located, the selected spring area can be excavated. Perforated pipe in a drain rock filled trench could be used to develop the spring. The drain rock should be encased in geotextile filter fabric. Buried 2-inch diameter pipe could then extend approximately 1500 feet from the developed spring to the house. A water right application should be submitted for the spring.

It is interesting to note that a well located approximate 1 mile to the north of the ranch house reportedly encountered artesian flow with a shut in pressure of approximately 97 psi at depth of 300 feet. It is possible that such a zone could be present at Raspberry, although previous drilling would indicate that the zone would have to be at depths of more than 400 feet.

RECOMMENDATIONS

The following additional work items are recommended.

Hot Springs

1. Determine the level of development desired at the springs. If the level of development requires a heat source equivalent to, or less than, the existing spring discharge, then assume that the spring can be developed at the surface. If more heat is required than currently discharges from the springs, well drilling will be required.
2. Submit an application for water right permit. The desired level of development will influence the rate of flow requested by the application.
3. Carol should meet with the Pancheris to discuss the proposed water use prior to advertisement of the application. She should request permission to monitor the temperature and discharge from their spring source for one full year before additional development takes place.

Well at Little Ranch House

1. Test pump the well using the installed pump or a test pump to determine if the existing well can supply adequate flow for a new home.

Irrigation Water Rights

1. Conduct a water right search to determine if additional water rights are appurtenant to these properties.
2. Examine the water right map and compare the authorized acres to actual irrigated acres.
3. Compare the authorized points of diversion to the actual points of diversion.
4. Apply for additional water rights as needed to irrigate any areas that lack adequate water rights (in terms of authorized acres).

Water Supply for New Well at the Raspberry Ranch

1. Apply for a water right to develop a spring at the head of Janelle Creek. However, Carol must realize that a spring source is not necessarily protected from contamination by giardia or other pathogens. If a protected water source is required, then she should consider a deep well.

Please contact me with any questions. We should set up a meeting with Carol I to discuss these findings.

Sincerely,

Terry M. Scanlan, P.E., P.G.

Cc: Carol MacGregor

Attachments: Excerpts from "Geothermal Investigation of the Cascade, Idaho Area"
Excerpts from "Thermal Springs in the Payette River Basin, West-Central Idaho"
Well Logs – Belvidere Area
Pertinent File Data – Water Right 63-12891
Pertinent File Data – Water Right 63-13332
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Boise, Idaho July, 1976

GEOTHERMAL INVESTIGATION OF THE CASCADE, IDAHO AREA

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through the Cascade damsite. Geomorphic evidence suggests left lateral movement along one or both of these faults. Microseismic monitoring indicates continued activity along faults in this immediate area.

Fault Controlled Hot Springs

Eleven hot springs are located within, or immediately adjacent to, the area mapped in this project (Plate I); all of them are within twelve miles of Cascade and all are fault controlled. In addition, one former hot spring on Little Pearsol Creek, about four miles east of Cascade, has dried up in the last 20 years and several former hot springs on the fault trace about one mile northwest of Cascade are now flooded by the reservoir. Silica analysis and projected temperatures at depth were done on seven of these springs. The four hot springs near the Boiling Springs Guard Station, just off the south-western portion of the map, were not included in these analyses.

Silica analyses were done by the standard molybdosilicate method (Taras and other, 1971, p.303) using a Bausch and Lomb Spectronic 20 spectrophotometer. The mixing model used to project temperatures at depth is the one established by Fournier and Truesdell (1974). For the purposes of establishing a mixing model, a temperature of $10^{o}C$ and a silica content of 25 ppm was used for all cold water mixes based on analyses of representative samples collected near hot springs.

From Table 1 it can be seen that surface temperatures of hot springs range from $36^{o}C$ to $71^{o}C$, while silica contents range from 42.9 ppm to 68 ppm. A mixing model using these hot spring temperatures and silica contents along with a cold water temperature of $10^{o}C$ and silica content

Hot Springs	Location	Silica ppm	Temperature °C Surface	Mixing Model
Cabarton	SW¼, Sec. 31, T13N, R4E	68.0	71.0°	147°
Arling	NW¼, Sec. 13, T15N, R3E	56.6	40.0	179
Gold Fork	SW¼. Sec. 35, T16N, R4E	62.3	50.5	165
Flat Creek	SW¼. Sec. 21, T15N, R4E	47.5	38.0	158
Cascade	NE¼, Sec. 36, T14N, R3E	42.9	38.5	140
Little Creek	NE¼, Sec. 5, T14N, R5E	48.6	36.0	168
Belvidere	NE¼, Sec. 13, T13N, R3E	60.0	49.5	163

TABLE 1: Silica analyses and mixing model temperatures of hot springs near Cascade

of 25 ppm predicts temperatures at depth ranging from 140°C to 179°C (Figures 2-8).

It should be noted that five of these hot springs are located on or near the Cascade Valley fault which marks the western edge of Cascade Valley and extends northward through Little Valley. These hot springs, from south to north are Cabarton, Belvidere (also called Sky Ranch), Cascade, Flat Creek and Gold Fork.

Hydrothermal Alteration Zones

Zones of rock alteration exist along several faults in the Cascade area. In an attempt to determine the extent to which hydrothermal solutions were responsible for this rock alteration, eleven samples were collected for powder analysis by x-ray diffraction techniques.

Table II shows the locations of samples collected and results of the x-ray analyses. In fault zones where hydrothermal alteration has occurred kaolinite is usually found. Such fault zone kaolinite, however, may have been formed at depth because hot waters flowing out at the surface tend to deposit silica rather than alter rock (Clayton R. Nichols, personal communication, 1975). Kaolinite was found in significant amounts in two of the alteration zones and it was found in minor amounts in three others. Zeolite minerals are often found where there has been extensive fracturing and mylonitization of rock and they are usually associated with illite and montmorillonite (Clayton R. Nichols, personal communication, 1975).

The basalt is fractured and well jointed at the surface and, where encountered below the water table in extensive occurrences, it is permeable enough to provide adequate yields for nearly all domestic or stock requirements for individual wells.

Valley Fill and Surficial Deposits - The valley fill materials and surficial deposits are the most extensively developed aquifers in the valley. This silt, sand and gravel provides ground water for over 90% of all homes in the Cascade-Long Valley area. Most wells are quite shallow, less than 100 feet in depth, and have poor yields. Locally some wells produce up to 30 gpm, but most are in the 2-5 gpm range.

Artesian zones are present in several areas. These areas of artesian pressure are the result of clay lenses lying above permeable sands. The pressure generated is generally quite low with water levels rising only a foot or two upon penetration of the confining layer. One very significant anomoly occurs near the south end of Cascade Reservoir. A well in the NW/4, NW/4, Sec 11, T13N, R3E penetrates 260 feet of white clay and boulders below a soil and clay overburden. White sand was encountered at 300 feet which contained water under 220 feet of artesian head. This is by far the highest artesian pressure noted in the valley and is probably the result of ground water entering the sand from the granitic rocks on the sides of the valley and being trapped beneath a thick layer of clay.

This occurrence and other weak artesian pressures in the valley strongly indicate that recharge to the aquifer beneath the valley floor is occurring at a multitude of levels from the granitic rocks adjacent to the valley. As the water moves laterally away from the mountains, it becomes

THERMAL SPRINGS IN THE PAYETTE RIVER BASIN, WEST-CENTRAL IDAHO

By R. E. Lewis and H. W. Young

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ILLUSTRATIONS

PLATE 1. Map showing locations of sampled thermal springs and selected nonthermal springs, Payette River basin, west-central Idaho--in pocket

2. Map showing generalized geology of the Payette River basin, west-central Idaho--in pocket

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common ions, silica, and the minor elements arsenic, boron, lithium, and mercury, are given in table 1. In addition, chemical analyses of water from three thermal springs sampled by Young and Mitchell (1973) and five thermal springs for which only partial analyses are available are included. Spring locations are shown on plate 1.

Chemical Character

All the thermal springs discharge fresh water (less than 600 mg/L dissolved solids) of a sodium bicarbonate type, at temperatures between 34° and 86°C. These waters are slightly alkaline--pH ranges from 8.0 to 9.6. Generally, the higher pH values are associated with waters having lower concentrations of dissolved solids. Concentrations of chloride and fluoride are variable and show no definite correlation with temperature. Concentration of boron is low compared with other thermal waters in Idaho, and is, to a degree, correlative with water temperature.

Nonthermal spring waters are either a calcium or sodium bicarbonate type. Water temperature measured in these springs is 7.0°C or less and, generally, is representative of local, ambient conditions. Concentrations of dissolved solids in these near-neutral waters (pH ranges from 6.2 to 7.3) are 90 mg/L or less.

Chemical Geothermometers

Aquifer temperatures in the Payette River basin were estimated using the silica geothermometer (Fournier and Rowe, 1966) and the Na-K-Ca geothermometer (Fournier and Truesdell, 1973). Temperatures estimated by these chemical geothermometers are valid only for hot-water systems and only if the following basic assumptions are met (Fournier, White, and Truesdell, 1974): (1) The chemical reactions at depth are temperature dependent; (2) an adequate supply of chemical constituents used for the thermometry is present in the aquifer; (3) chemical equilibrium is established at depth between the hot water and the specific aquifer minerals; (4) there is negligible reequilibration of the chemical composition of the hot water as it rises to the surface; and (5) hot water rises rapidly to the surface with no dilution or mixing of hot and cold waters.

Dissolved silica (SiO_2) reported in chemical analyses is actually present as silicic acid (H_4SiO_4) and various dissociated species, particularly $H_3SiO_4^-$. In neutral to slightly acid waters, dissolved silica ($H_4SiO_4 + H_3SiO_4^-$) consists mostly of H_4SiO_4, and, under these conditions,

[Chemical constituents in milligrams per liter, except where noted]

-- = Constituent not analyzed for.
< = Less than.

Spring no.	Date of collection	Flow rate[1] (gal/min)	Specific conductance (umhos)	pH	Water temperature[2] (°C)	Hardness as $CaCO_3$	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Percent sodium	Sodium-adsorption ratio (SAR)	Potassium (K)	Bicarbonate[3] (HCO_3)	Carbonate[3] (CO_3)	Alkalinity as $CaCO_3$	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Silica (SiO_2)	Dissolved solids (calculated)	Nitrite plus nitrate as N (NO_2+NO_3)	Phosphorus, total as P	Arsenic (As) (ug/L)	Boron (B) (ug/L)	Lithium (Li) (ug/L)	Mercury (Hg) (ug/L)
Nonthermal																											
17N- 2E-15BAB1S	6-28-79	2	85	7.3	7.0	31	0	7.8	2.9	3.9	20	0.3	1.8	51	0	42	2.6	0.4	<.1	45	90	0.11	0.02	0	2	<4	<0.01
15N- 5E-23DAC1S	6-27-79	2	20	6.2	4.0	5	1	1.7	.2	2.4	53	.6	.3	12	0	10	.7	.3	.2	17	29	<.01	.02	1	0	<4	<.01
13N- 5E-21CAA1S	6-26-79	4	21	6.2	6.5	9	0	1.1	.1	1.9	58	.5	.2	7	0	6	1.4	.4	<.1	13	22	<.01	.02	0	0	<4	<.01
9N- 9E-32BAD1S	8-31-79	2	52	6.6	4.5	17	0	3.8	1.9	3.1	27	.3	.6	29	0	24	1.9	.4	.1	14	42	.13	.02	0	10	10	<.01
Thermal																											
16N- 4E-35CCB1S	6-27-79	94	304	9.5	50.0	3	0	1.1	<.1	70	98	18	.7	49	36	100	12	11	9.0	63	215	<.01	.01	11	50	30	<.01
15N- 3E-13BBC1S	8- 2-72	798	279	--	34.0	4	0	1.3	.1	60	97	14	.6	17	45	89	43	16	2.6	60	210	--	--	--	--	--	--
15N- 4E-21DCC1S	6-27-79	31	206	9.6	36.0	4	0	1.3	.1	43	96	9.8	.5	32	34	84	7.8	2.5	3.1	48	146	<.01	.01	3	10	8	<.01
13N- 3E-13ADA1S	6-26-79	20	433	9.3	49.0	3	0	1.2	<.1	85	98	21	1.0	56	34	102	24	28	5.3	61	256	<.01	.01	21	310	40	<.01
13N- 4E-31CAB1S	6-26-79	70	514	9.0	71.0	4	0	1.5	<.1	110	97	25	2.1	68	25	97	43	40	11	72	329	<.01	.01	39	400	60	.1
13N- 6E-29DAB1S	7- 7-79	50	334	9.5	53.0	4	0	1.6	.1	64	96	13	1.3	32	36	86	31	7.8	15	80	240	<.01	.01	6	50	30	<.01
12N- 5E- 2CCC1S	7- 8-79	12	--	--	46.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2DAC1S	7- 8-79	10	337	9.3	50.0	3	0	1.3	<.1	65	97	16	1.1	34	34	84	16	6.5	16	73	219	<.01	<.01	6	60	60	<.01
10DDD1S	7- 8-79	22	--	--	66.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22BBC1S	6- 5-79	134	331	8.9	86.0	4	0	1.4	.1	74	96	16	1.9	95	18	108	12	11	12	86	259	<.01	.01	10	90	80	.2
36DBA1S	8- 8-79	334	266	8.9	38.0	7	0	2.8	<.1	54	94	8.9	.9	77	5	71	26	5.8	12	54	196	.03	.02	5	50	50	<.01
11N- 5E-29CDB1S	8- 8-79	50	293	8.8	49.0	8	0	3.1	<.1	97	96	4.8	.9	99	4	88	24	9.6	13	74	277	<.01	.01	6	70	90	<.01
11N- 7E-16AAB1S	7-24-79	90	315	9.3	65.0	5	0	1.8	.1	65	95	13	1.8	13	35	69	36	3.9	15	82	236	.02	.03	14	50	80	<.01
10N- 4E-33CBD1S	11-27-78	500	402	8.4	75.0	5	0	1.9	.1	90	96	17	3.2	130	2	110	27	19	13	110	331	.01	<.01	9	120	100	<.01
10N-10E-31BCC1S	3-13-79	360	378	9.3	84.0	4	0	1.5	<.1	77	96	17	3.2	18	38	78	50	8.0	17	91	282	<.01	<.01	1	70	110	.2
10N-11E-31ADD1S	5- 7-79	75	381	9.6	67.0	5	0	1.9	.1	77	95	15	2.6	1	45	76	46	9.5	15	82	267	.02	<.01	2	90	110	.1
9N- 3E-25BAC1S	11-22-78	32	622	8.0	79.5	16	0	6.1	.1	120	92	13	5.3	160	0	131	88	39	12	120	470	.01	<.01	5	240	150	<.01
9N- 7E-35AAA1S	5- 7-79	3	287	9.3	37.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9N- 8E-31ACA1S	3-13-79	20	369	9.2	63.5	4	0	1.4	<.1	79	97	18	1.8	40	31	84	39	5.7	20	83	270	<.01	<.01	2	20	120	<.01
32CBA1S	2-27-79	350	321	9.1	64.0	5	0	1.9	<.1	70	96	14	1.3	29	29	72	39	3.9	16	67	232	.02	<.01	2	50	110	<.01
9N- 9E-22DCA1S	7-29-79	13	--	--	54.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8N- 5E- 1BCC1S	6- 8-72	1.5	317	--	40.0	6	0	2.4	.1	66	95	11	.9	85	1	71	42	5.1	3.1	48	216	--	--	--	--	--	--
6DCB1S	11-23-78	14	359	9.0	42.0	8	0	2.9	.1	77	95	12	1.2	67	20	88	37	7.3	15	75	262	.01	<.01	6	110	120	<.01
6DCC1S	2-26-79	75	343	9.1	51.0	12	0	5.0	<.1	72	92	8.9	1.3	61	22	87	36	7.8	15	63	245	.01	<.01	6	110	130	<.01
10ADD1S	11-22-78	10	344	9.0	54.0	5	0	2.0	<.1	76	96	15	1.2	59	19	80	40	5.7	14	78	259	.01	<.01	4	90	80	<.01
10BDD1S	11-27-78	90	345	9.2	54.5	5	0	2.0	.1	75	96	14	1.0	40	23	78	38	5.7	14	74	249	.01	<.01	4	70	70	<.01
11BAA1S	2-26-79	35	352	9.1	60.0	5	0	1.8	<.1	78	96	16	1.4	49	28	87	41	5.4	17	66	254	.01	<.01	5	90	160	<.01
11BAC1S	7-25-79	5	346	9.2	56.5	--	--	--	--	--	--	--	--	43	26	79	--	--	--	--	--	--	--	--	--	--	--
8N- 6E- 1ADB1S	2-27-79	175	343	9.2	59.5	5	0	2.0	<.1	75	96	15	1.1	39	29	80	38	6.7	17	63	242	.01	<.01	6	80	100	<.01
7N- 1E- 8DDA1S	9- 5-79	50	780	8.0	64.0	22	0	8.4	.2	160	92	15	8.0	180	0	148	120	61	16	110	573	<.01	<.01	10	710	220	<.01
9CDC1S	8- 4-72	20	529	--	45.0	47	0	15	2.4	99	80	6.3	5.3	169	0	139	57	30	8	94	397	--	--	--	--	--	--

[1]Flow rate is for entire spring complex.
[2]Water temperature is highest temperature at spring vents or temperature of sampled vent.
[3]Total alkalinity distributed as carbonate and bicarbonate at the spring temperature and pH.
[4]Analyses taken from Young and Mitchell (1973).
[5]Temperature may be higher because vents were underwater.
[6]Shown in Young and Mitchell (1973) as 8CB1S.

silica geothermometers give good estimates of reservoir temperatures. In alkaline waters, hydroxide (OH^-) reacts with silicic acid to reduce the proportion of silicic acid to total dissolved silica. The total concentration of dissolved silica measured in the laboratory (H_4SiO_4 + $H_3SiO_4^-$) must therefore be reduced by the concentration of $H_3SiO_4^-$ occurring at the pH level of the spring water, to obtain an accurate estimate of the reservoir temperature.

For thermal waters having pH greater than 8.2, reported values for dissolved silica were corrected for dissociation of silicic acid at the spring temperature, and reservoir temperatures were estimated assuming equilibrium with both quartz and chalcedony (table 2). The pH of water in the thermal aquifer would be slightly lower than the pH measured at the spring, and calculation of aquifer pH might increase the $H_3SiO_4^-$-corrected quartz temperature by 5° or 10°C (R. H. Mariner, written commun., 1980). Calculation of aquifer pH requires consideration of acid-base equilibria, distribution of acidic gases between steam and water, and the effect of temperature on the equilibria (Ellis and Mahon, 1977). Most of the calculations are time consuming and require computer methods, such as those presented by Truesdell and Singers (1973).

Concentration of magnesium in thermal waters sampled generally was 0.1 mg/L or less, so corrections for magnesium in the Na-K-Ca geothermometer suggested by Fournier and Potter (1979) were not applied. Applying the magnesium correction to the Na-K-Ca geothermometer for one thermal spring having a magnesium concentration of 2.4 mg/L increased the estimated reservoir temperature by 6° to 90°C.

Reservoir temperatures calculated from water analyses for 26 thermal springs in the Payette River basin are given in table 2, along with selected chemical reaction coefficients. In applying the $H_3SiO_4^-$-corrected silica geothermometer for thermal springs having water temperature at the land surface generally greater than 65°C, best estimates were obtained by assuming that quartz was controlling the SiO_2 concentration. For springs having temperatures at the surface generally less than 65°C, better estimates of reservoir temperature were obtained by assuming that chalcedony was controlling the SiO_2 concentration. If, however, the calculated free energy of formation showed the waters were unsaturated with chalcedony; or, if the estimated temperature was less than the temperature of the spring, then quartz was assumed to be controlling the SiO_2 concentration.

Using a plot of reservoir temperatures estimated by the silica and the Na-K-Ca geothermometers, Fournier, Sorey, Mariner, and Truesdell (1979) showed waters that plot on or

Table 2. Estimated aquifer temperatures and free energy of formation for selected thermal springs

Spring No.	Water temperature at the surface (°C)	Estimated aquifer temperatures based on geothermometers					Free energy of formation[1]				Reference No. (fig. 2)
		Silica quartz-conductive (°C)	Silida quartz-conductive $H_3SiO_4^-$ corrected (°C)	Sodium-potassium-calcium (°C)	Silica-chalcedony (°C)	Silica-chalcedony $H_3SiO_4^-$ corrected (°C)	Aragonite	Calcite	Chalcedony	Quartz	
16N- 4E-35CCB1S	50.0	113	69	71	84	37	0.1	0.2	-0.2	0.3	1
15N- 3E-13BBC1S	34.0	110	61	61	81	28	-.1	0	-.1	.5	2
15N- 4E-21DCC1S	36.0	100	62	53	70	30	0	.1	-.1	.5	3
13N- 3E-13ADA1S	49.0	111	79	83	82	47	0	.1	0	.5	4
13N- 4E-31CAB1S	71.0	120	91	117	91	61	.1	.2	-.1	.3	5
13N- 6E-29DAB1S	53.0	125	76	82	97	45	.2	.3	-.1	.4	6
12N- 5E- 2DAC1S	50.0	120	86	81	92	55	0	0	.1	.6	7
22BBC1S	86.0	129	101	100	101	71	.3	.4	.2	.2	8
36DBA1S	38.0	105	93	57	76	62	-.3	-.2	.3	.9	9
5E-29CDB1S	49.0	121	107	61	93	77	-.1	0	.4	.9	10
11N- 7E-16AAB1S	65.0	126	84	91	99	52	.3	.4	-.2	.3	11
10N- 4E-33CBD1S	75.0	143	132	138	116	105	.3	-.2	.4	.8	12
10N-10E-31BCC1S	84.0	132	81	145	105	50	.5	.6	-.5	.1	13
10N-11E-31ADD1S	67.0	126	63	134	99	31	.6	.7	-.5	-.1	14
9N- 3E-25BAC1S	79.5	148	143	144	122	116	.1	.2	.5	.9	15
9N- 8E-31ACA1S	63.5	127	90	99	99	60	.1	.2	0	.4	16
32CBA1S	64.0	116	86	79	87	55	.2	.3	-.1	.4	17
8N- 5E- 1BCC1S	40.0	100	89	62	70	59	.5	.4	.3	.8	18
6DCB1S	42.0	122	104	69	94	74	.1	.1	.4	1.0	19
6DCC1S	51.0	113	88	60	84	58	.6	.7	.1	.6	20
10ADD1S	54.0	124	101	76	96	71	-.1	0	.2	.8	21
10BDD1S	54.5	121	89	70	93	58	.1	.2	.1	.6	22
11BAA1S	60.0	115	87	84	86	56	.2	.2	0	.4	23
8N- 6E- 1ADB1S	59.5	113	80	74	84	49	.3	.3	-.1	.3	24
7N- 1E- 8DDA1S	64.0	143	138	152	116	112	0	.1	.6	1.1	25
9CDC1S	45.0	134	133	[2]90	107	106	-.5	-.4	.8	1.3	26

[1]Values are departure from theoretical equilibrium in kilocalories; (+) values indicate supersaturation, (-) values indicate unsaturated. Calculations from computer program SOLMNEQ (Kharaka and Barnes, 1973).
[2]Magnesium corrected (Fournier and Potter, 1979).

near the equal-temperature line ($T°_{SiO_2} = T°_{Na-K-Ca}$; slope = 1) are likely to be unmixed waters or waters that have reequilibrated with the aquifer minerals after mixing. Waters that plot significantly above the equal-temperature line probably contain anomalous concentrations of silica, owing to evaporation or to dissolving amorphous silica from the aquifer material. The Na-K-Ca geothermometer uses ratios of constituents and is less sensitive to concentration changes that occur during evaporation than is the silica geothermometer.

Waters that plot significantly below the equal-temperature line may be due to: (1) Mixing with another type water without sufficient time to equilibrate with the surrounding rock (in mixed waters, silica-estimated temperatures are generally decreased more than Na-K-Ca estimated temperatures); (2) precipitation of silica during cooling, whereas Na-K-Ca proportions remain unchanged; or (3) precipitation of calcite or aragonite due to loss of carbon dioxide without adjustment of sodium and potassium through reaction with clays, zeolites, or other minerals (Fournier and others, 1979).

Figure 2 is a plot of reservoir temperatures estimated using silica and Na-K-Ca geothermometers for thermal springs in the Payette River basin. Most thermal springs plot on or near the equal-temperature line. As suggested by Fournier and others (1979), these waters are probably unmixed waters that have lost some heat through conduction or are mixed waters that have had time to reequilibrate. Several springs (samples 5, 7, 13, and 14) plot significantly below the equal-temperature line and may indicate a mixed water or water from which calcite and aragonite have precipitated. Table 2 shows that, with the exception of sample 7, waters from these springs are supersaturated with calcite or aragonite, which may indicate a possible loss of calcium without an adjustment of the sodium and potassium concentrations. For these samples, the silica geothermometer probably gives the better estimate of reservoir temperature.

Only two springs (samples 10 and 26) plot significantly above the equal-temperature line in figure 2. These waters are thought to have dissolved amorphous silica from the aquifer materials (calculated free energy of formation of amorphous silica is 0, which indicates equilibrium with this phase). For these springs, the Na-K-Ca geothermometer probably gives the better estimate of reservoir temperature.

Estimated reservoir temperatures determined from the silica and Na-K-Ca geothermometers are highly variable and range from 53° to 143°C. Along the North Fork of the

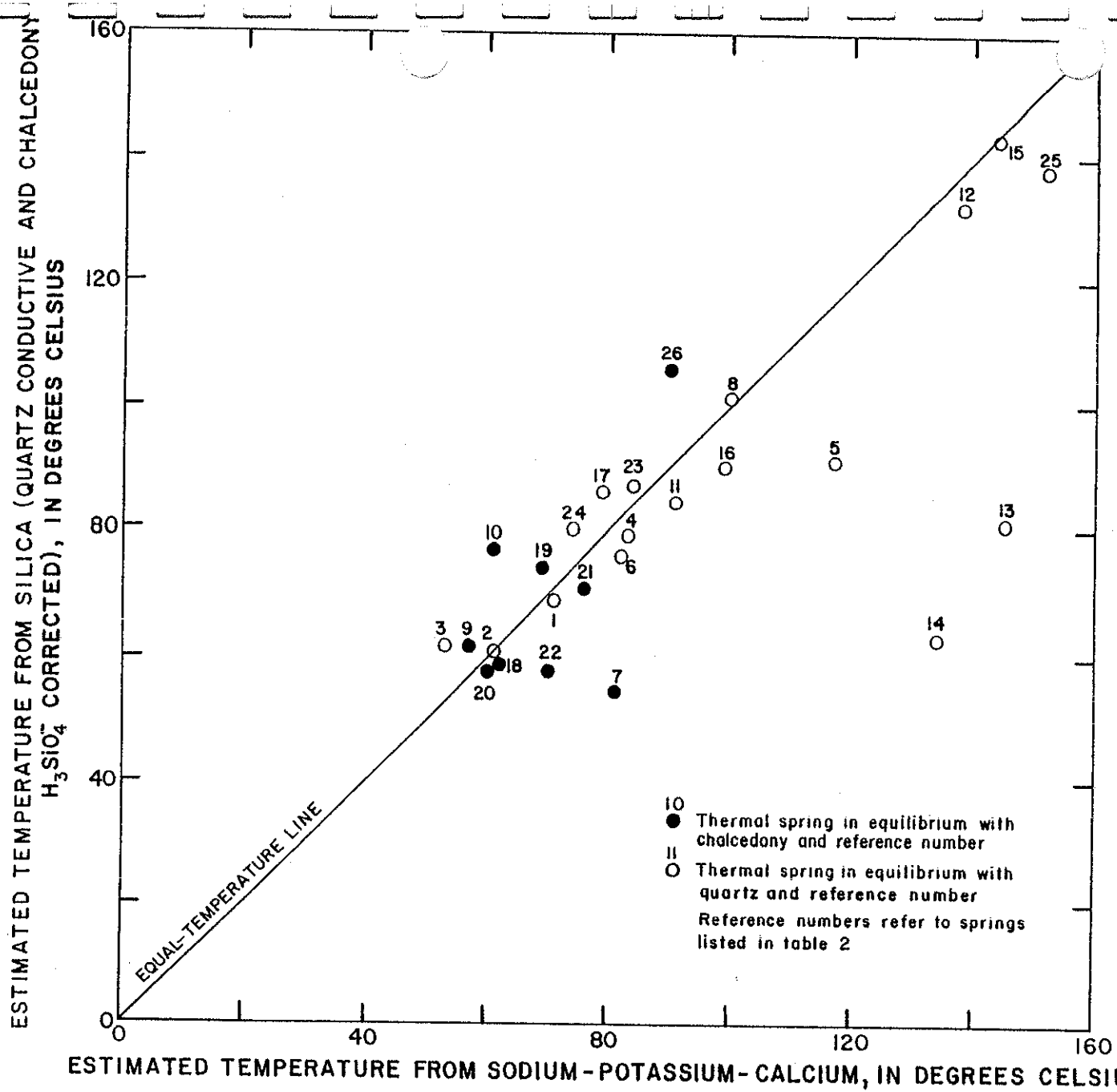


Figure 2.--Comparsion of reservoir temperatures estimated by the silica and sodium-potassium-calcium geothermometers

Payette River, estimated reservoir temperatures range from 53° to 91°C. Along the Middle and South Forks of the Payette River, estimated reservoir temperatures range from 57° to 138°C and 58° to 99°C, respectively. Estimated reservoir temperatures along the Payette River from Banks, Idaho, range from 90° to 143°C.

Assuming conductive heat loss, reservoir temperatures for six thermal springs were estimated using the sulfate-water isotope geothermometer described by McKenzie and Truesdell (1977): 16N-4E-35CCB1S, 71°C; 13N-4E-31CAB1S, 75°C; 13N-6E-29DAB1S, 71°C; 9N-3E-25BAC1S, 139°C; 9N-8E-32CBA1S, 88°C; and 8N-5E-10BDD1S, 76°C. Additional temperatures of 89° and 94°C were estimated for thermal springs 12N-5E-22BBC1S and 10N-10E-31BCC1S, respectively, by Nehring and others (1979).

Isotopes

Samples of thermal and nonthermal water from selected springs in the Payette River basin were collected for analyses of oxygen-18, deuterium, and tritium. In this report, isotope data are presented in tabular and graphical format (tables 3 and 4 and fig. 3); interpretations concerning age or relation of the various waters are offered only insofar as they apply to the Payette River basin and are considered preliminary. A discussion of the isotopic composition and possible relations of thermal waters in the Payette, Salmon, and Boise River basins will be presented in a final report.

Tritium

Tritium (H^3) is produced naturally in small quantities in the upper atmosphere during bombardment by subatomic particles. The tritium, incorporated in water molecules, enters the water cycle in rain and snow. Having a half life of about 12.3 years, tritium can be used to determine how long a particular water may have been stored out of contact with the atmosphere. The transit or residence time can be determined from the concentration of tritium in the discharge water, if the amount of tritium in the recharge water and the nature of the subsurface flow regime are known.

Before extensive thermonuclear testing began in 1954, tritium in the atmosphere ranged from 10 to 20 TU (tritium unit). One TU equals a $^3H/H$ ratio of about 10, or about 3.2 picocuries per liter. By 1963, worldwide tritium levels had increased several orders of magnitude. Tritium levels in precipitation have since declined and now (1980) average about 50 TU.

Well Log Search for 13N 03E 13

NOTE: The data you are looking at may not be all of the data available. In the Northern Region all data that is available has been entered into the computer. In all other regions no data before July 1, 1987 has been entered. From July 1, 1987 to July 1, 1992 only partial data has been entered for the Western, Southern, and Eastern regions. From July 1, 1992 to the present all data for all regions has been entered and will show on this report only if the well log has been received. If you cannot locate well log information through our web search queries that you know exists, please contact your regional office. See our region map to determine regional boundaries. This data was last updated on 06/26/99.

NAME(S)	TWN	RNG	SC	TRACT	LT	A	DIA	DEPTH
BOEHM, IRLE W	13N	03E	13	NE NW	28	L	6"	265ft
BROWN, LOU	13N	03E	13	SE SE		L	6"	77ft
CHASE, KEVIN	13N	03E	13	NW NE		L	6"	99ft
DAVIS, GARY	13N	03E	13	NW NW		L	6"	160ft
GORCZYCA, JIM	13N	03E	13	NW NE			6"	361ft
GORCZYCA, ROBIN	13N	03E	13	NW NE			6"	361ft
GULF PACIFIC CATTLE CO	13N	03E	13	SW NE		L	6"	140ft
KYLE, MIKE	13N	03E	13	NE NW		L	6"	207ft
LEWIS, TED	13N	03E	13	NW NE			6"	118ft
PANCHERI, DARWIN	13N	03E	13	NE NE		L	6"	99ft
PANCHERI, JOAN	13N	03E	13	NE NE		L	6"	99ft
PEGAN, CHARLES M	13N	03E	13	NE NW			6"	182ft
SPARKS, JEFF	13N	03E	13	NW NE		L	6"	99ft
SWANBY, GREG	13N	03E	13	NW SW			6"	140ft
WOODARD, WARREN	13N	03E	13	NE NE			6"	124ft
WORTHEN, SCOTT	13N	03E	13	NE NW		P	0"	0ft

16 record(s) found.
Note: the number of records found is not necessarily the number of unique

Legend/key

FORM WD8001NP

Well Log Search for Eastern Western

NOTE: The data you are looking at may not be all of the data available. In the Northern Region all data that is available has been entered into the computer. In all other regions no data before July 1, 1987 has been entered. From July 1, 1987 to July 1, 1992 only partial data has been entered for the Western, Southern, and Eastern regions. From July 1, 1992 to the present all data for all regions has been entered and will show on this report only if the well log has been received. If you cannot locate well log information through our web search queries that you know exists, please contact your regional office. See our region map to determine regional boundaries. This data was last updated on 06/26/99.

NAME (S)	TWN	RNG	SC	TRACT	LT	A	DIA	DEPTH	GPM
EASTERN WESTERN CORPORATION	16N	03E	25	SW NW			6"	39ft	13gpm
EASTERN WESTERN CORPORATION	16N	03E	25	SW SE			6"	49ft	18 gpm

2 record(s) found.
Note: the number of records found is not necessarily the number of unique

Legend/key

FORM WD8001NP

Casing	SWL	date
40	19	7/20/94
50	5	7/20/94

...30 days after the completion or abandonment of the well.

Department of Water Resources

1 WELL OWNER

Name Gulf Pacific Cattle Co.
RT 1 Box 35
Address Payette ID 83661

Owner's Permit No. 65-89-2-049

7 WATER LEVEL

Static water level 35' feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 52 °F. Quality clear
Describe artesian or temperature zones below

2 NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as material used, plug depths, etc. in lithologic log)

8 WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
47	140	1

3 PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

9 LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0	3	Top Soil		X
8"	3	18	Decomp granite		X
6"	18	20	Solid Granite		X
6"	20	60	" "		X
6"	60	140	" "	X	

4 METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other

5 WELL CONSTRUCTION

☐ Threaded ☐ Welded ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.156 inches	6 inches	+ 1 feet	19 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation inches by inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

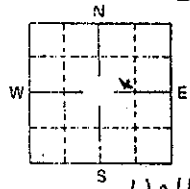
Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel
Placed from feet to feet
Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port SANITARY WELL SEAL

10

Work started 6-9-89 finished 6-12-89

6 LOCATION OF WELL

Sketch map location must agree with written location



Subdivision Name
Lot No Block No.
County Valley
SW ¼ NE ¼ Sec. 18, T. 13 ☒N ☐S, R. 3 ☒W.

11 DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed

Firm Name Menasco Drilling Firm No. 391
Address McCall, Id. Date 6-12-89
Signed by (Firm Official)
and
(Operator)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

Frank Bilbao
South Cascade Idaho

WELL TEST DATA

Pump ☒ Bailer ☐ Air

Discharge G.P.M.	Draw Down	Hours Pumped
12 gal	23.-48	2

3. WATER USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)
☐ Municipal ☐ Industrial ☐ Stock ☐ Waste disposal or injection

4. METHOD DRILLED

☒ Rotary ☐ Dug ☐ Other

7. WELL CONSTRUCTION

Casing: 6 inches Total depth 74 feet
Type: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.025 inches	6 inches	0 feet	74 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing shoe used? ☐ Yes ☐ No
Was casing welded? ☒ Yes ☐ No
How was casing perforated? ☐ Factory ☒ Knife ☐ Torch
Perforations: inches by inches

		From	To
24	perforations	62 feet	68 feet
	perforations	feet	feet
	perforations	feet	feet

Was screen installed? ☐ Yes ☒ No
Screen manufacturer's name
Type Model No.
Slot size Set from feet to feet
Slot size Set from feet to feet

Gravel packed? ☐ Yes ☒ No Size of gravel
Placed from feet to feet

Surface seal depth 20 Material used in seal ☐ Cement grout ☒ Puddling clay ☐ Well cuttings
Sealing procedure used ☐ Slurry pit ☐ Temporary surface casing ☒ Overbore to seal depth

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
6	0	10	topsoil		X
	10	32	clay		X
	32	42	sand		X
	42	60	clay		X
	60	69	sandy gravel	X	
	69	74	gravel		X

10. Work started 7-19-74 finished 7-25-74

6. LOCATION OF WELL

Sketch map location must agree with written location.

N W E S

Subdivision Name
Lot No. Block No.
County Valley
NE¼ SE¼ Sec. 13 T. 17 N/S R. 3 E/W

11. DRILLERS CERTIFICATION

Firm Name H & H drilling Firm No. 281
Address 327 - S. 9th st gooding Date
Signed by (Firm Official) Jason Holloway
and (Operator) Brian Holloway

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name DARWIN R JOHN PANCHERI

Address 15501 STAGE COACH RD NAMPA, ID.

Drilling Permit No 65-91-2-018

Water Right Permit No

2. NATURE OF WORK

X New well Deepened Replacement

Well diameter increase

Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal

☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

☐ Other (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary

☐ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	99 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☒ Yes ☐ No

How perforated? ☐ Factory ☒ Knife ☐ Torch ☐ Gun

Size of perforation 1/8 inches by 1 inches

Number		From	To
570	perforations	46 feet	84 feet
	perforations	feet	feet
	perforations	feet	feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name

Type Model No.

Diameter Slot size Set from feet to feet

Diameter Slot size Set from feet to feet

Gravel packed? ☒ Yes ☐ No ☒ Size of gravel 1/4 TO 1/2

Placed from 25 feet to 92 feet

Surface seal depth 25 Material used in seal: ☒ Cement grout ☒ Bentonite ☐ Puddling clay ☐

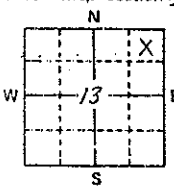
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☐ Overbore to seal depth

Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata

Describe access port SANITARY WELL SEAL

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name

Lot No Block No.

County VALLEY

NE ¼ NE ¼ Sec. 13, T. 13 N ☒ S ☐, R. 3 E ☒ W ☐

7. WATER LEVEL

Static water level 28 feet below land surface.

Flowing? ☐ Yes ☒ No G.P.M. flow

Artesian closed-in pressure p.s.i.

Controlled by: ☐ Valve ☐ Cap ☐ Plug

Temperature 52 °F. Quality good

Describe artesian or temperature zones below

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
10	98	2

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	2	TOP SOIL		X
10	2	7	BROWN CLAY		X
10	7	15	BROWN SANDY CLAY		X
10	15	17	CEMENTED SAND + GRAVEL		X
10	17	19	BROWN CLAY		X
10	19	45	BROWN + GRAY SAND W/CLAY STREAKS		X
10	45	47	BROWN CLAY		X
10	47	92	BROWN DECOMPOSED GRANITE W/FRACTURES	X	
6	92	99	BROWN DECOMPOSED GRANITE		X

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JUL 05 1991
Department of Water Resources

10. Work started 6-3-91 finished 6-7-91

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name GOSTRIN WELL DRILLING Firm No. 408

Address Rt 38 Box 10 Donnelly, Id. Date 6-7-91

Signed by (Firm Official)

and

(Operator)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1 WELL OWNER
Name: Owner or John Pinciari
Address: 15501 Stagecoach Rd. Nampa, Id
Drilling Permit No: 65-91-2-042
Water Right Permit No:

2 NATURE OF WORK
X New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3 PROPOSED USE
☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

4 METHOD DRILLED
☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Casing schedule: ☒ Steel ☐ Concrete ☐ Other

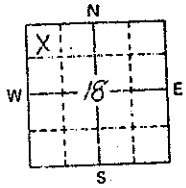
Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	66 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☒ Knife ☐ Torch ☐ Gun
Size of perforation 1/8 inches by 1 inches

Number		From	To
80	perforations	38 feet	42 feet
200	perforations	47 feet	57 feet
	perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name:
Type: Model No:
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel
Placed from feet to feet
Surface seal depth 18 Material used in seal: ☒ Cement grout
☐ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing
☐ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port: Sanitary well seal

6 LOCATION OF WELL
Sketch map location must agree with written location.



Subdivision Name:
Lot No: Block No:
County: Valley
NW ¼ NW ¼ Sec. 18, T. 13 N ☒ S ☐, R. 3 E ☒ W ☐

7 WATER LEVEL
Static water level feet below land surface
Flowing? ☒ Yes ☐ No G.P.M. flow 1/2
Artesian closed in pressure 1 p.s.i.
Controlled by: ☐ Valve ☒ Cap ☐ Plug
Temperature 60 °F. Quality good
Describe artesian or temperature zones below

8 WELL TEST DATA
☐ Pump ☐ Bailer ☒ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
100 +	65	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	2	TOP Soil		X
10	2	4	Brown Sandy clay		X
10	4	12	Brown Sandy gravel		X
10	12	14	Blue Sandy clay		X
10	14	17	Brown Sand + gravel	X	
10	17	18	Blue green Sand	X	
6	18	19	Blue green Sand	X	
6	19	22	Brown Sand w/ clay streaks	X	
6	22	25	Brown clay w/ Sand streaks		X
6	25	27	Blue clay		X
6	27	32	Brown Sand + gravel	X	
6	32	38	Brown + gray Sand	X	
6	38	42	Brown Sand + gravel	X	
6	42	44	Brown clay		X
6	44	45	Blue clay		X
6	45	57	Blue green + gray Sand	X	
6	57	63	Brown Sand w/ clay streaks	X	
6	63	70	Brown clay w/ Sand streaks		X
6	70	130	Brown Decomposed granite	X	
			Well Backfilled From 130' To 65' well drill cuttings + 1/4 to 1/2" gravel		

RECEIVED
JUL 05 1991
Department of Water Resources

10. Work started 6-5-91 finished 6-6-91

11. DRILLERS CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name: Gestrin Well Drilling Firm No. 408
Address: Hc 38 Box 10 Donnelly, Id. Date 6-6-91
Signed by (Firm Official) Robert Gestrin
and
(Operator) Robert Gestrin

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

State of Idaho
Department of Water Resources

WATER RIGHT LICENSE

WATER RIGHT NO. 65-12891

Priority: October 19, 1988 — Maximum Diversion Rate: 0.44 CFS
Maximum Diversion Volume: 51.3 AF

This is to certify, that DUANE PANCHERI
DARWIN PANCHERI
RT 1 BOX 48
MELBA ID 83641 has complied with the terms and conditions of the permit, issued pursuant to Application for Permit dated October 19, 1988; and has submitted Proof of Beneficial Use on August 21, 1989. An examination indicates that the works have a diversion capacity of .440 cfs of water from:

SPRING tributary to MOORES CREEK

source, and a water right has been established as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION	ANNUAL VOLUME
HEATING	01/01 to 12/31	0.40 CFS	47.7 AF
DOMESTIC	01/01 to 12/31	0.04 CFS	3.6 AF
	Totals	0.44 CFS	51.3 AF

LOCATION OF POINT(S) OF DIVERSION: NESENE , Sec. 13, Township 13N, Range 03E
SENENE , Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC			
13N	04E	18	SESW	NWSE	SWSE

PLACE OF USE: DOMESTIC, same as HEATING use

CONDITIONS/REMARKS:

1. The maximum diversion volume is defined as the maximum allowable volume of water that may be diverted annually from the source under this right. The use of water confirmed by this right is limited to the amount which can actually be beneficially used. The maximum diversion volume may be adjusted to more accurately describe the beneficial use or to implement accepted standards of diversion and use efficiency.
2. This water right is appurtenant to the described place of use.
3. This right is subject to all prior water rights and may be forfeited by five years of non-use.
4. Modifications to or variance from this license must be made within the limits of Section 42-222, Idaho Code, or the applicable Idaho law.

RECORDED

JAN 24 1992

State of Idaho
Department of Water Resources

WATER RIGHT LICENSE

WATER RIGHT NO. 65-12891

CONDITIONS/REMARKS:

5. Use of water under this water right will be regulated by the watermaster of State Water District No. 65.
6. Domestic use is for 3 homes and a shop.

This license is issued pursuant to the provisions of Section 42-219, Idaho Code. Witness the seal and signature of the Director, affixed at Boise, this 5 day of January, 1992.

for R. Keith Higginson, Director

RECEIVED
JAN 24 1992

Form 219
8/86

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No. 65-12891

1. Owner: DARWIN and/or Duane Pancheri Phone No. 467-1348 OR 495-25.
   Current Address: 15501 Stagecoach Rd. Nampa Id, 83686
2. Accompanied by: JOAN Pancheri EXAM. DATE: 10/17/89
   Address: as above Phone No. as above
   Relationship to Permit Holder: Spouse of DARWIN Pancheri
3. Source: Spring tributary to Moores Creek

B. OVERLAP REVIEW

1. Other water rights with same place of use: 65-06628 -02696 -11250
   ☐ Copies Attached N/A
2. Other water rights with same point of diversion: 65-01972 -01973 -11250 -08430 -12127 -01988
   ☐ Copies Attached ☐ Copies of Field Exam's Attached N/A

C. SYSTEM DESCRIPTION

1. **Diversion System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe i.d. as applicable. ☑ Alternative diagram attached

See topo & alternative diagram

SEP 04 1991

Scale: 1" = NOT TO SCALE

2. ☑ Copy of U.S.G.S. Quadrangle Attached
   Showing location(s) of point(s) of diversion and place(s) of use (required).
   ☐ Aerial Photo Attached N/A
   (required for irrigation of 10 acres or more).
   ☑ Photo of Diversion and System Attached
   (required for all but single household domestic groundwater, and stockwater.

System Description (continued)

3. **Narrative:** Description (As operating at time of measurement. Indicate pressure, number of sprinklers, etc.)

A hot spring (approx. 101 °F) is utilized via a drain system and approx. 2100 ft. of 10" pipe & then 3900 ft. of 4" pipe. Two control valves for this gravity system are found with 115' of source. Water is used to heat 3 homes & 1 shop as well as to irrigate ± 1/2 acre of yard (external domestic use). The hot water is used in a swimming pool at one home. Discharged water (measured discharge temps. of 90 & 94 °F) is returned to Branch Creek via 4" overflow pipes and a small ditch paralleling one of the discharge pipes. The system has been operating since 1978.

☐ See Remarks on page 4 for continuation

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
		N/A	(gravity	system)	

*Code to correspond with No. on map and aerial photo

5. **Point(s) of Diversion:**

Ident. No.	Gov't. Lot	1/4	1/4	1/4	Sec.	Twp.	Rge.	County	Method of Determination/Remarks
		SE	NE	NE	[redacted]	13N	3E	Valley	USGS 7½' quad AND
		NE	SE	NE	13				ORTHOPHOTO quad. Used compass,
									engineers 100' tape, and pacing to
									plot pod.

mylar

QQ line

6. **Place(s) of Use:** Indicate Method of Determination USGS 7½' quad

Twp.	Rge.	Sec.	NE¼				NW¼				SW¼				SE¼				Totals
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
13N	4E	18												D		D	D		
														G		G	G		

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Do not use this space

Do not use this space

D. FLOW MEASUREMENTS

☐ Additional Data Sheets Attached

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib Date
N/A						

2. **Measurements:**

Flow - No measurements possible

For sq. ft. of heating areas & other details, see Attachment #1.

E. FLOW CALCULATIONS

☑ Additional Computation Sheets Attached

1. Measured Method: None

2. Alternate Method for Checking Purposes: See additional pg., Attachment #1

F. PUMP EFFICIENCY DATA (Optional) N/A

Discharge Pressure: _____ psi x 2.31 = _____ ft (1); Dynamic pumping level: _____ ft (2)

Total Head: (1) + (2) = _____ (3) ; Flow rate: _____ cfs (4)

Water HP: (3) x (4) ÷ 8.8 = _____ (5)

Meter Input KW: 3.6 x _____ KH x _____ CTR or _____ MULT x _____ PTR x _____ N/ _____ T = _____ (6)

Meter Input HP: (6) x 1.34 = _____ (7)

Panel Input KW: _____ Ave PF x _____ Ave Volts x _____ Ave Amps x .001732 = _____ (6)

Panel Input HP: (6) x 1.34 = _____ (7) Efficiency: (5)/(7) x 100 = _____ %

V. (.20)(365)(1.9835) = 144.8 afa

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation: N/A

V_{IR} = (Acres Irrigated) x (Irrigation Requirement) = _____

V_{DR} = [Diversion Rate (cfs)] x (Days in Irrigation Season) x 1.9835 = _____

V = Smaller of V_{IR} and V_{DR} = _____

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2. Volume Calculations for Other Uses:

Domestic 3 Homes, 1 shop: 2 homes int. only = (2)(.6) = 1.2 afa

1 home & shop, int + ext = (2)(1.2) = 2.4 afa

3.6

V (.10)(365)(1.9835) = 72.4 afa

Annual

HEATING Although Hot Air runs continuously since also used for domestic, estimate that heat needed ≈ 12 hrs/day, 80% of year for that area (292 days).

1 cfs = 448.8 gpm 60 min 12 hrs 292 days 1 ac-ft/325851 gal = 157.9 afa

H. REMARKS AND OVERLAP REVIEW ANALYSIS

P/D would have to be approx. 1000' E. of Cabanton Rd. to be in QQQ shown on permit. Using NE corner of intersection of Cabanton & Roseworn Rds., A measured 175' N. & paced 500' East, then paced 50' N, to spring area. NO method of measurement was available for the diversion. The return flow from swimming pool (terminal use end of 4" delivery line) via a very small ditch & 4" pipe (see photograph #5) did not allow a flowmeter or 5 gal. bucket measurement. However, see attached copy of 10/19/88 conv. memo from original application. This supports flow rate in permit.

Limit rec'd flow to .20 cfs per $50 Proof fee paid (Receipt C0100020). Increased rate for 0/4 but still within permit & proof of b.u. limits.

Overlap - see attachment #2.

I. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use From	Period of Use To	Rate of Diversion Q (cfs)	Annual Volume 57.9 V (afa)
Heating	1/1	12/31	.20	~~Non-Consumptive~~
Domestic	1/1	12/31	.10	3.6
		Totals:	.20	61.5

2. Recommended Amendments

☑ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

J. AUTHENTICATION

Field Examiner's Name Steven M. Lester

Signature Steven M. Lester DSL LW 5/2/91

Certification Date

Field Report Preparation Date 10/17/89

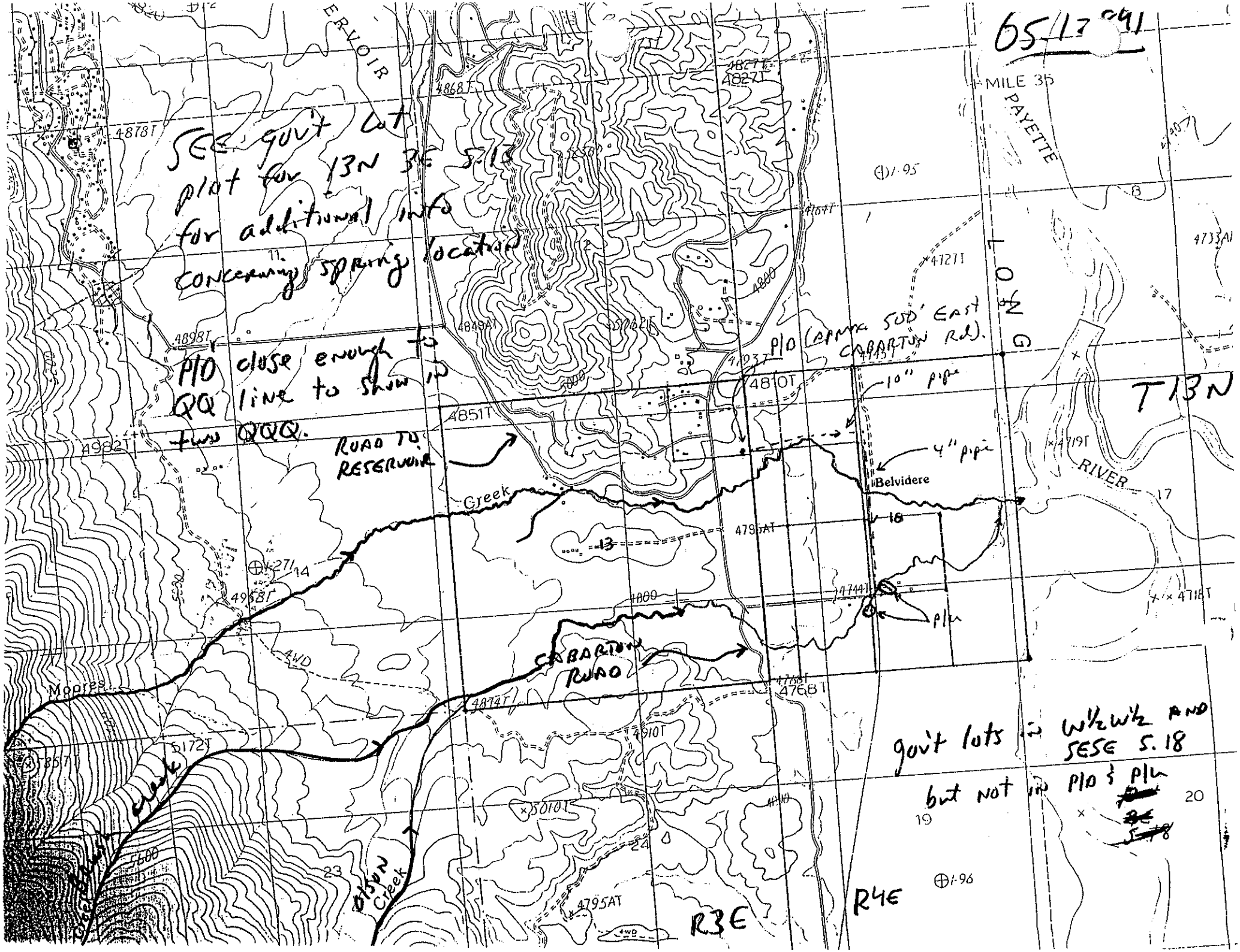
CONSULTANT SEAL

K. **Licensing recommendation shall be prepared by an Idaho Department of Water Resources employee on a computer printout attached hereto.**

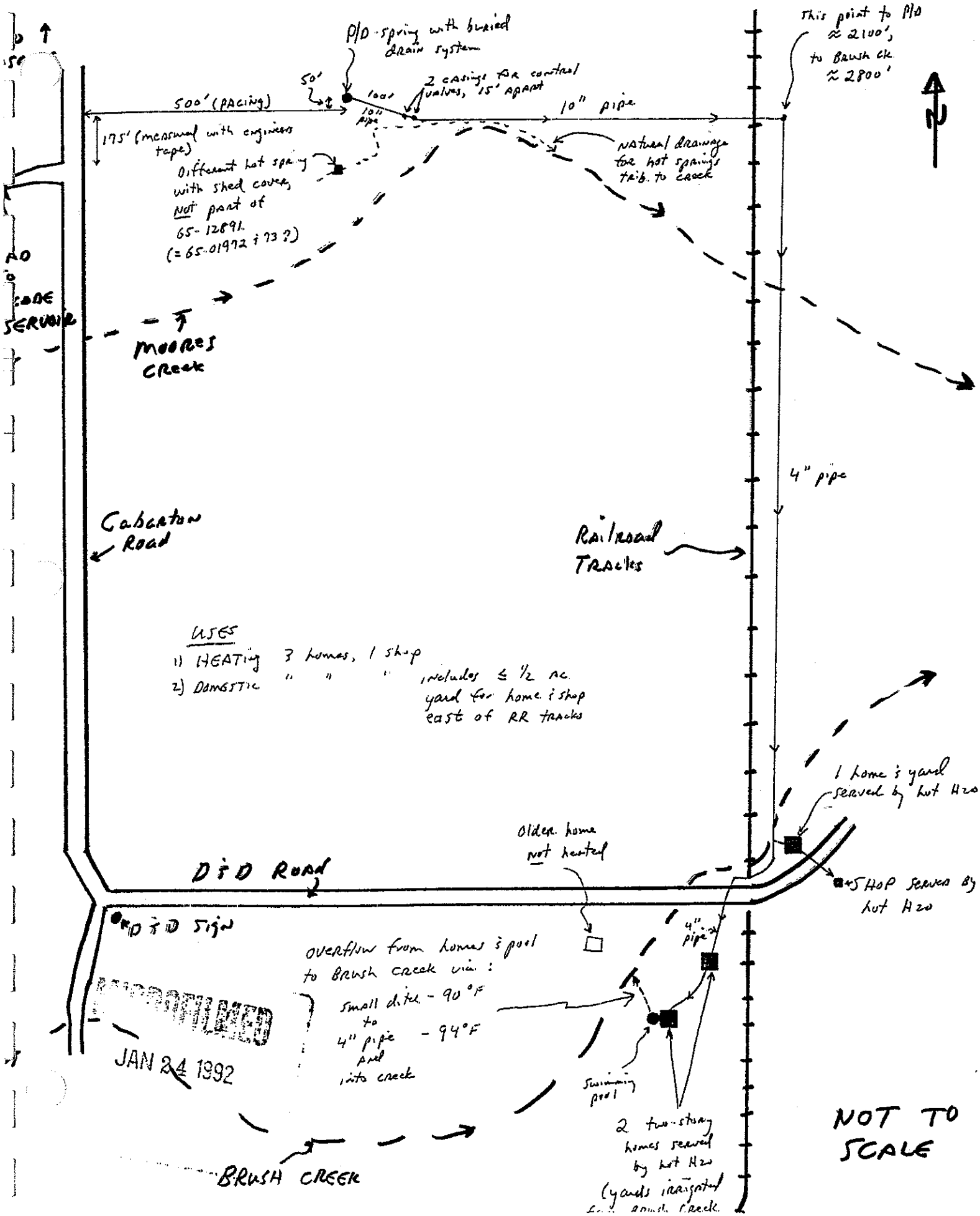
PROFESSIONAL ENGINEER REGISTERED 3909 STATE OF IDAHO DAVID R. TUTHILL, JR.

David R. Tuthill 6/27/91

JA


05-17-91
SEE govt Lot plat for T3N R5E for additional info concerning spring location
P/O close enough to QQ line to show in two QQQ.
P/O (approx 500' East CARBARTON Rd).
10" pipe
4" pipe
ROAD TO RESERVOIR
Belvidere
Creek
CARBARTON ROAD
P/L
Moores
Bison Creek
govt lots 1 thru 4 and SESE S. 18
but not P/O & P/L
T3N
R4E
R3E
LONG
RIVER
PAYETTE
MILE 35
4WD

65-12891 ALTERNATIVE DIAGRAM



CONVERSATION MEMORANDUM

DATE 10/19/88 ✕ Calculated

FILE 65-12891

NAME OF PARTY Pancheri

EMPLOYEE Steve Lester

RE: Estimating flow for heating gen. Palmi. memo 23:

3 2-story homes, 1 shop

sq. ft. = 2200 + 1000 + 1800 + 720 = 5720, round to 5800 since area estimates may be low.
(← homes → shop)

source temp. = 101° F

t_1 = 70° F (assumed)

t_0 = -8° F (assumed ≈ Pocatello)

efficiency is average.

→ for 2-story units

$E = [e \cdot \Delta T][.8A]$ where $\Delta T = t_1 - t_0 = 70 - (-8) = 78$ And e extrapola

$E = [(52.6)(78)][(.8)(5800)] = 19{,}036{,}992$

$W = \frac{Q}{500(\Delta T_s)}$ where $Q = E$ and $\Delta T_s = (.6)(101-70) = 18.6$

$W = \frac{19{,}036{,}992}{(500)(18.6)} = 2047$ gpm = 4.56 cfs

Applicant limit to use .40 cfs for heating; well is within the suggested range.

JAN 24 1992

ALLOW FOR LICENSING:

.20 cfs ($50 proof paid) extended

↓

Domestic (4 units) = .10 cfs

Heating = .20 cfs

TOTAL .20 cfs

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Attachment #1
65-12891 Exam



PHOTO ONE- Looking NW at spring area



PHOTO TWO- Not a well casing - this is a cover for 1 of 2 valves on 10" buried pipe from pld. This valve is about 100' SE of pld. Natural drainage for hot water is seen in photos #1 & 2.

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PHOTO THREE- P/u Looking NE at home & shop on east side of Railroad tracks.



PHOTO FOUR- P/u, 2 other homes between RR tracks & Brush creek. View is SW. Yards here are irrigated with Brush ck. water (65-06628).

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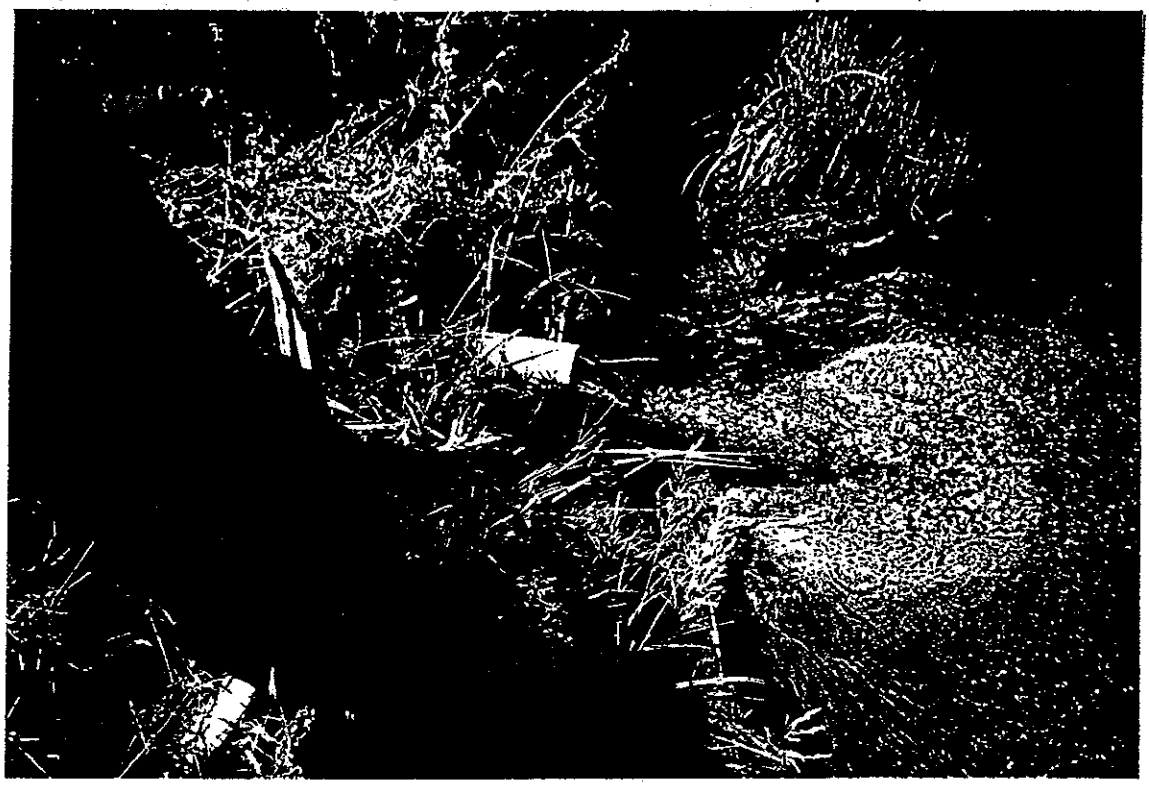


PHOTO FIVE- 4" return flow pipe from swimming pool to Brush Creek. Measured 94°F at this pipe.

JAN 24

State of Idaho
Department of Water Resources

Permit To Appropriate Water

NO. 65-13332

Proposed Priority: July 2, 1991 Maximum Diversion Rate: 0.10 CFS

This is to certify, that JOAN PANCHERI
DARWIN PANCHERI
15501 STAGECOACH RD.
NAMPA, ID 83686

has applied for a permit to appropriate water from:

SPRING tributary of MOORES CREEK

and a permit is APPROVED for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
HEATING	01/01 to 12/31	0.10 CFS

LOCATION OF POINT(S) OF DIVERSION: NESENE Sec. 13, Township 13N, Range 03E
SENENE Sec. 13, Township 13N, Range 03E
VALLEY County

PLACE OF USE: HEATING

TWN	RGE	SEC	
13N	03E	13	NENE

CONDITIONS/REMARKS:

1. Proof of construction of works and application of water to beneficial use shall be submitted on or before September 1, 1992.
2. Subject to all prior water rights.
3. Use of water under this permit is subject to control by the watermaster of State Water District No. 65.
4. A lockable device, subject to the approval of the Department, shall be installed on the diverting works in a manner that will provide the watermaster suitable control of the diversion prior to diversion of water under this permit.
5. Use of water under this permit shall be non-consumptive.
6. Single point of diversion on or near line between SENENE and NESENE, S13, T13N, R03E.
7. Heating use is for 1 home and 1 shop.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the seal and signature of the Director, affixed at Boise, this 27th day of August, 1991.

for R. Keith Higginson, Director

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SEP 04 1991

Form 202
6/85

Ident. No. 65-13332

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name of applicant Darwin &/or Joan Panckeri Phone 467-1348

   Post office address 15501 Stagecoach Rd. Nampa Id. 83686

2. Source of water supply Spring which is a tributary of Moores Creek

3. Location of point of diversion is SE ¼ of NE ¼ of NE ¼, Govt. Lot —

   Sec. 13 Township 13N Range 3E B.M. Valley County; additional

   points of diversion if any: NESENE S.13 T13N R3E

4. Water will be used for the following purposes:

   Amount .10 (cfs or acre-feet per annum) for heating purposes from 1/1 to 12/31 (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

   Amount _____ (cfs or acre-feet per annum) for _____ purposes from _____ to _____ (both dates inclusive)

5. Total quantity to be appropriated is (a) .10 (cubic feet per second) and/or (b) _____ (acre feet per annum)

6. Proposed diverting works:

   a. Description of ditches, flumes, pumps, headgates, etc. drain system & collection pipe, 3/4 hp pump & 1½" mainline to buildings.

   b. Height of storage dam — feet; active reservoir capacity — acre-feet; total reservoir capacity — acre-feet; period of year when water will be diverted to storage: — to — inclusive.

   c. Proposed well diameter is — inches; proposed depth of well is — feet.

   d. Is ground water with a temperature of greater than 90°F being sought? —

7. Time required for the completion of the works and application of the water to the proposed beneficial use is 1 years (*minimum 1 year*).

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SEP 04 1991

8. Description of proposed uses (*if irrigation only, go to item 9*):

a. Hydropower; show total feet of head and proposed capacity in KW. _____

b. Stockwatering; list number and kind of livestock. _____

c. Municipal; show name of municipality. _____

d. Domestic; show number of households. _____

e. Other; describe fully. heating of
1 home 2600 ft² (See 7/1/91 conv. memo)
1 Shop 1400 ft²

9. Description of place of use:

a. If water is for irrigation, indicate acreage in each subdivision in the tabulation below.

b. If water is used for other purposes, place a symbol of the use (*example: D for Domestic*) in the corresponding place of use below. See instructions for standard symbols.

TWP	RANGE	SEC.	NE¼				NW¼				SW¼				SE¼				TOTALS
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
13N	3E	13	G																

Total number of acres to be irrigated _____

10. Describe any other water rights used for the same purposes as described above. 65-12891 is same source but other ~~build~~ buildings

11. a. Who owns the property at the point of diversion? Applicant

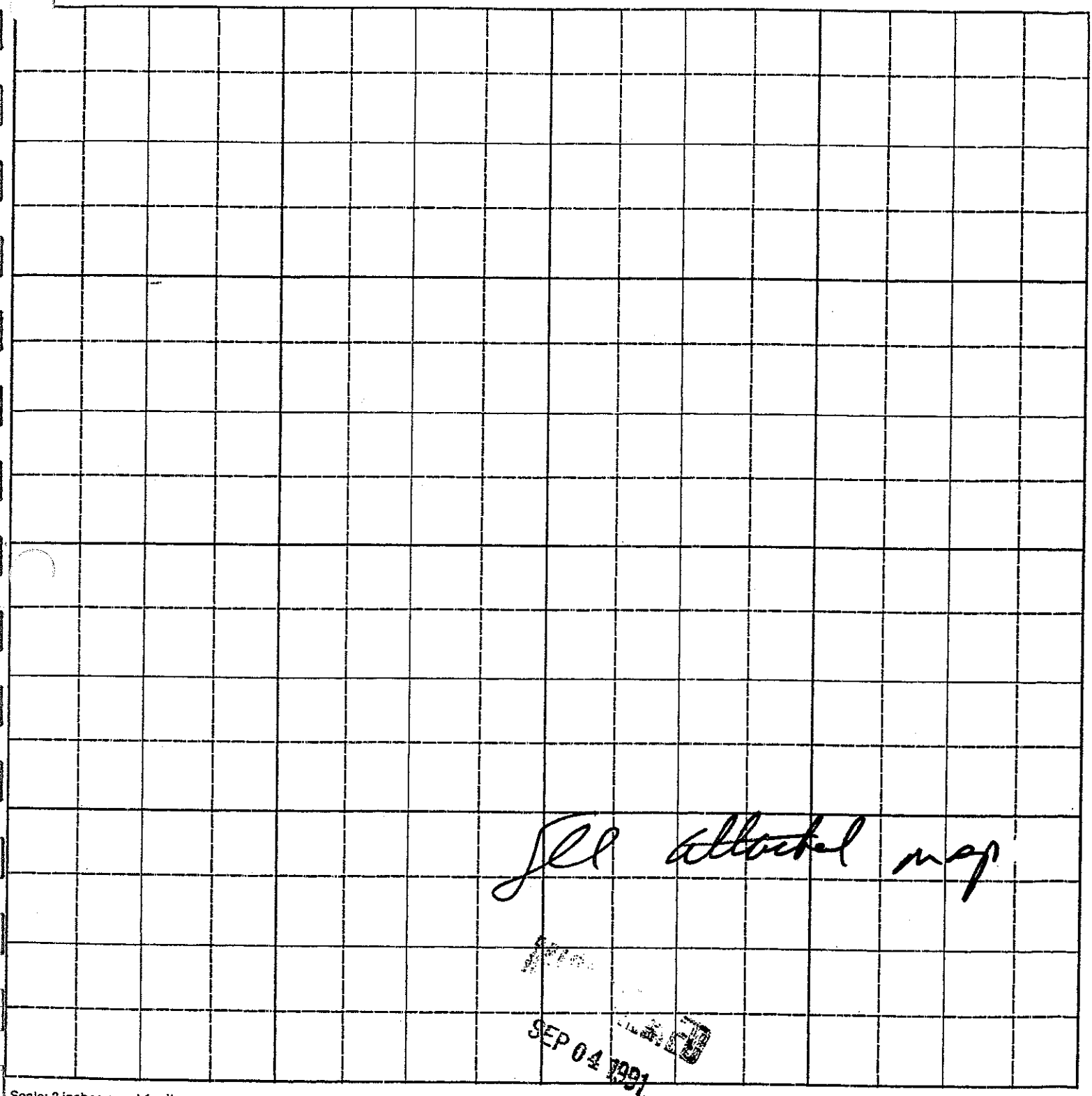
b. Who owns the land to be irrigated or place of use? Applicant

c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing. _____

12. Remarks: Single point of diversion on line between SENENE and NESENE, S13, T13N, R03E
Heating is for 1 home and 1 shop.

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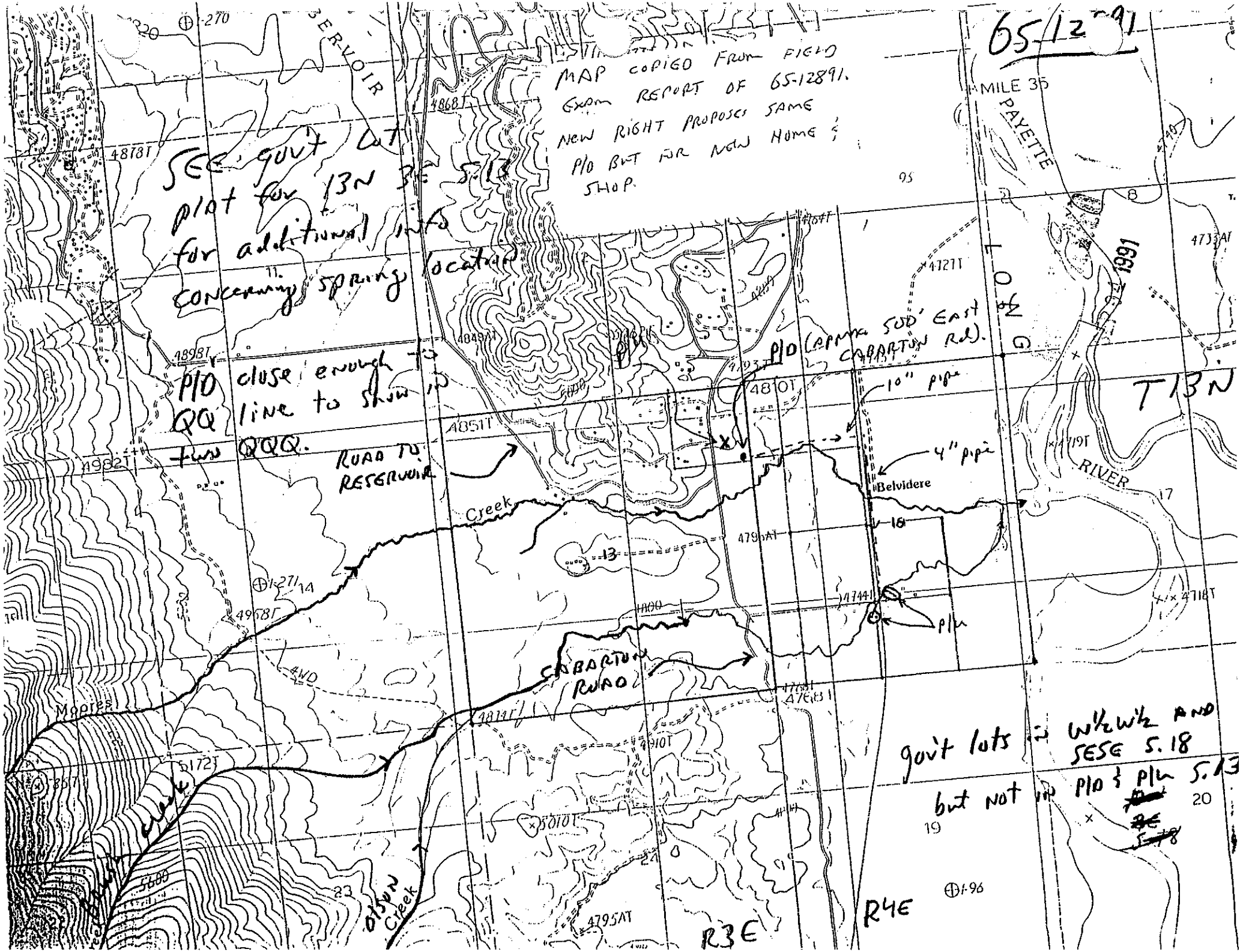
13. Map of proposed project: show clearly the proposed point of diversion, place of use, section number, township and range number.



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.

X _____
(Applicant)


65-12891
MAP COPIED FROM FIELD EXAM REPORT OF 65-12891. NEW RIGHT PROPOSES SAME P/D BUT FOR NEW HOME & SHOP.
SEE GOVT LOT 1 PLAT FOR T3N R5E FOR ADDITIONAL INFO CONCERNING SPRING LOCATED
P/D CLOSE ENOUGH TO QQ LINE TO SHOW IN TWO QQQ.
P/D (APPROX 500' EAST CARBARTON RD).
10" PIPE
4" PIPE
ROAD TO RESERVOIR
Belvidere
RIVER
Creek
CARBARTON ROAD
P/U
MILE 35
PAYETTE
LONG
1991
T3N
R4E
R3E
govt lots 1, W½W½ AND SESE 5.18
but NOT P/D & P/U 5.13

16

COPY

I hereby certify that the foregoing is a true and correct copy of the original Stipulation and Order filed in this cause on the 31st day of December, 19 at 1:43 p.m.

Juan R. Donicel
District Judge

JIM JONES
Attorney General
State of Idaho
Statehouse, Room 210
Boise, Idaho 83720
Telephone: (208) 334-2400

PHILLIP J. RASSIER
JOSEPHINE P. BEEMAN
Deputy Attorneys General
Department of Water Resources
450 West State Street
Boise, ID 83720
Telephone: (208) 334-4448

IN THE DISTRICT COURT OF THE THIRD JUDICIAL DISTRICT OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF GEM

IN THE MATTER OF THE GENERAL DETERMINATION OF THE RIGHT TO THE USE OF SURFACE AND GROUND-WATER OF THE PAYETTE RIVER DRAINAGE BASIN	Civil No. 3667 STIPULATION AND ORDER: PANCHERIS/LITTLES/ A. L. CATTLE INC.

The director of the Idaho Department of Water Resources, Darwin Pancheri and Joan L. Pancheri, Duane Pancheri and Laura Pancheri ("Pancheris" herein), the estate of Myrn H. Little, and A. L. Cattle, Inc. stipulate to the following water rights for the Pancheris, the estate of Myrn H. Little, and A. L. Cattle, Inc. within the Brush Creek drainage which is tributary to the North Fork of the Payette River. All of these water rights are listed in complete detail in the attached Exhibit A, but are listed in an abbreviated form here.

JUL 24 199[illegible]

1. Brush Creek, tributary to North Fork, Payette River

65-6628 (Pancheris): 12.56 cfs for irrigation with a priority date of 4/1/1912;

65-1979 (A. L. Cattle, Inc.): 6.24 cfs for irrigation with a priority date of 6/1/1918;

2. Moores Creek, tributary to Brush Creek

65-11250 (Pancheris): 4.86 cfs for irrigation with a priority date of 5/1/1899;

3. Andy Creek, tributary to South Fork Moores Creek, and South Fork Moores Creek, tributary to Moores Creek

65-11280 (A. L. Cattle, Inc.): 1.06 cfs for irrigation with a priority date of 6/1/1902.

With respect to right 65-11280 (in the name of A. L. Cattle, Inc.), the Pancheris and A. L. Cattle, Inc. agree as follows. Although right 65-11280 on Andy Creek is junior in priority to the Pancheri's downstream right 65-11250 on Moores Creek, it will be considered for distribution purposes to be a prior right as long as the following conditions are satisfied:

a. The use of water by A. L. Cattle, Inc., its successors and assigns under right 65-11280 will not be expanded to lands not shown to be irrigated on the attached Exhibit A. That is if the Exhibit shows a given number of acres irrigated in a quarter section, A. L. Cattle, Inc. will not increase the number of acres being irrigated in that fractional section.

b. A. L. Cattle, Inc. agrees, for and on behalf of itself, successors and assigns, not to change the method of irrigating under 65-11280 even though the method of irrigating can be changed without increasing the consumptive use, such as changing from the present method of irrigating, flood irrigation, to sprinklers.

JIM JONES
Attorney Ge
State of Ida
Statehouse, Room 210
Boise, Idaho 83720
Telephone: (208) 334-2400

JUL 24 1996

c. A. L. Cattle, Inc. agrees for and on behalf of itself, its successors and assigns not to change either the place of use of the water or the points of diversion without first obtaining the written consent of the Pancheris or the Pancheris' successors and assigns.

d. A. L. Cattle, Inc. agrees, for and on behalf of itself, its successors and assigns to use the water in such a manner that all water not needed for the propagation of crops will either be left in the natural drainage or will be returned back to Moores Creek upstream from the Pancheris' point of diverison as it presently exists.

e. The enforcement of those conditions which occur after the water is diverted from the natural channel will be the responsibility of the private parties, except that Water Resources may also exercise its authority under Title 42, Idaho Code.

4. Springs, tributary to Moores Creek

65-1972 (estate of Myrn H. Little): .04 cfs for domestic purposes with a priority date of 5/1/1901;

65-1973 (estate of Myrn H. Little): .01 cfs for domestic purposes with a priority date of 5/1/1901.

The Pancheris, the estate of Myrn H. Little and A. L. Cattle, Inc. further agree, based upon this stipulation, to withdraw the objections that each had filed affecting their respective rights on Brush Creek, Moores Creek and Andy Creek.

Dated this 30th day of December, 1986.

RINGERT, CLARK, HARRINGTON, REID, CHRISTENSON & KAUFMAN, CHARTERED

By: WFRingert 12-30-86
William F. Ringert, a member of the firm
Attorneys for Darwin Pancheri, Joan L. Pancheri, Duane Pancheri, and Laura Pancheri

JIM JONES
Attorney General
State of Idaho
Statehouse, Room 210
Boise, Idaho 83720
Telephone: (208) 334-2400

JUL 24 1996

Louie Gorrono 29 December 198

Louie Gorrono, Attorney for
Claimant Agnes Brailsford,
Personal Representative of the
Estate of Myrn H. Little,
Deceased and for Claimant
A. L. Cattle, Inc.

JIM JONES
Attorney General

Josephine P. Beeman 26 Decembe

Josephine P. Beeman
Deputy Attorney General
Idaho Department of Water
Resources

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JUL 24 19

PHILLIP J. RASSIER
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IN THE DISTRICT COURT OF THE THIRD JUDICIAL DISTRICT OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF GEM

IN THE MATTER OF THE GENERAL DETERMINATION OF THE RIGHT TO THE USE OF SURFACE AND GROUNDWATER OF THE PAYETTE RIVER DRAINAGE BASIN	Civil No. 3667 ORDER

The foregoing stipulation having come duly and regularly before the court and good cause appearing therefore,

IT IS HEREBY ORDERED that the objections filed by the Pancheris as to their rights 65-6622, 65-6629, 65-6628, and 65-11250 be dismissed with prejudice; further that the objections to and protests filed against Pancheris' water rights by A. L. Cattle, Inc. and the estate of Myrn H. Little and against the water rights of A. L. Cattle, Inc. and the estate of Myrn H. Little by Pancheris be dismissed with prejudice and without attorneys fees and costs to any party.

IT IS FURTHER ORDERED that A. L. Cattle, Inc.'s water rights 65-1979, 65-11280 and the estate of Myrn H. Little's water rights 65-1972 and 65-1973 listed in the attached Exhibit A are deemed admitted and conceded by the Pancheris, their heirs,

JUL 24 1996

successors and assigns as true and accurate, and subject to the conditions stated on pages 2 and 3 of the Pancheris/Littles/A. L. Cattle Inc. stipulation.

IT IS FURTHER ORDERED that the Pancheris' water rights 65-6628 and 65-11250 listed in the attached Exhibit A are deemed admitted and conceded by A. L. Cattle, Inc. and the estate of Myrn H. Little and their successors and assigns as true and accurate, and subject to the conditions stated on pages 2 and 3 of the Pancheris/Littles/A. L. Cattle Inc. stipulation.

DATED this 30 day of December, 1986.

/s/
JIM R. DOOLITTLE
District Judge

JUL 24 1996

I certify that this is a true and correct copy of the original stipulation and order filed in this cause on the 30th day of December 1986, at 1:50 p.m.
Jerri R Doolittle
District Judge

JIM JONES
Attorney General
State of Idaho
Statehouse, Room 210
Boise, Idaho 83720
Telephone: (208) 334-2400

PHILLIP J. RASSIER
JOSEPHINE P. BEEMAN
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Department of Water Resources
450 West State Street
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IN THE DISTRICT COURT OF THE THIRD JUDICIAL DISTRICT OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF GEM

IN THE MATTER OF THE GENERAL DETERMINATION OF THE RIGHT TO THE USE OF SURFACE AND GROUND-WATER OF THE PAYETTE RIVER DRAINAGE BASIN	Civil No. 3667 STIPULATION AND ORDER: PANCHERIS AND LESLIE

The director of the Idaho Department of Water Resources, Darwin Pancheri and Joan L. Pancheri, Duane Pancheri and Laura Pancheri ("Pancheris" herein), and William John Leslie ("Leslie" herein) stipulate to the following water rights for the Pancheris and Leslie, and A. L. Cattle, Inc. within the Brush Creek drainage which is tributary to the North Fork of the Payette River. All of these water rights are listed in complete detail in the attached Exhibit A, but are listed in an abbreviated form here.

JUL 24

1. Andy Creek, tributary to South Fork Moores Creek
65-3420 (Leslie): 2.08 cfs for irrigation with a priority date of 4/1/1894;

2. House Creek, tributary to North Fork Moore's Creek

65-3419 (Leslie): 2.62 cfs for irrigation with a priority date of 4/1/1894;

3. Moores Creek, tributary to Brush Creek

65-11250 (Pancheris): 4.86 cfs for irrigation with a priority date of 5/1/1899;

4. North Fork Moores Creek, tributary to Moores Creek

65-3419 (Leslie): 2.62 cfs for irrigation with a priority date of 4/1/1894;
65-3420 (Leslie): 2.08 cfs for irrigation with a priority date of 4/1/1894;

5. South Fork Moores Creek, tributary to Moores Creek

65-3420 (Leslie): 2.08 cfs for irrigation with a priority date of 4/1/1894;

6. Springs, tributary to Moores Creek

65-3418 (Leslie): 0.04 cfs for irrigation with a priority date of 4/1/1910.

With respect to rights 65-3418, 65-3419, 65-3420 (in the name of Leslie), the Pancheris and Leslie agree as follows. Although right 65-3418 on springs tributary to Moores Creek is junior in priority to the Pancheris' downstream right 65-11250 on Moores Creek, it will be considered for distribution purposes to be a prior right as long as the following conditions are satisfied:

a. The use of water by Leslie, his successors, heirs and assigns under rights 65-3418, 65-3419, and 65-3420 will not be expanded to lands not shown to be irrigated on the attached Exhibit A. That is if the Exhibit shows a given number of acres irrigated in a quarter section, Leslie will not increase the number of acres being irrigated in that fractional section.

JUL 24 199

b. Leslie agrees, for and on behalf of himself, his successors, heirs and assigns, not to change the method of irrigating under rights 65-3418, 65-3419, and 65-3420 even though the method of irrigating can be changed without increasing the consumptive use, such as changing from the present method of irrigating, flood irrigation, to sprinklers.

c. Leslie agrees for and on behalf of himself, his successors, heirs and assigns not to change either the place of use of the water or the points of diversion without first obtaining the written consent of the Pancheris or the Pancheris' successors, heirs and assigns. A replacement to a damaged headgate will not constitute a change in point of diversion where the point of diversion is not substantially changed.

d. Leslie agrees, for and on behalf of himself, his successors, heirs and assigns to use the water in such a manner that all water not needed for the propagation of crops will either be left in the natural drainage or will be returned back to Moores Creek upstream from the Pancheris' point of diverison as it presently exists. The parties to this stipulation acknowledge the existence of a rotation agreement between Leslie and MacGregor which is attached as Exhibit B.

e. The enforcement of those conditions which occur after the water is diverted from the natural channel will be the responsibility of the private parties, except that Water Resources may also exercise its authority under Title 42, Idaho Code.

The Pancheris and Leslie further agree, based upon this stipulation, to withdraw the objections that each had filed affecting their respective rights on Andy Creek, House Creek, Moores Creek, North Fork Moores Creek and South Fork Moores Creek.

JIM JONES
Attorney General
State of Idaho
Statehouse, Room 210
Boise, Idaho 83720
Telephone: (208) 334-2400

DRAFT
JUL 24 1996

Dated this 29th day of December, 1986.

RINGERT, CLARK, HARRINGTON,
REID, CHRISTENSON & KAUFMAN,
CHARTERED

By: W F Ringert
William F. Ringert, a member
of the firm
Attorneys for Darwin Pancheri,
Joan L. Pancheri, Duane
Pancheri, and Laura Pancheri

COLLINS & MANLY

By: [signature] 26 December, 198
William D. Collins,
Attorneys for William John
Leslie

JIM JONES
Attorney General
Josephine P. Beeman 26 December 1
Josephine P. Beeman
Deputy Attorney General
Idaho Department of Water
Resources

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JUL 24 1996

PHILLIP J. RASSIER
JOSEPHINE P. BEEMAN
Deputy Attorneys General
Department of Water Resources
450 West State Street
Boise, ID 83720
Telephone: (208) 334-4448

IN THE DISTRICT COURT OF THE THIRD JUDICIAL DISTRICT OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF GEM

IN THE MATTER OF THE GENERAL DETERMINATION OF THE RIGHT TO THE USE OF SURFACE AND GROUNDWATER OF THE PAYETTE RIVER DRAINAGE BASIN	Civil No. 3667 ORDER

The foregoing stipulation having come duly and regularly before the court and good cause appearing therefore,

IT IS HEREBY ORDERED that the objections filed by the Pancheris as to their rights 65-6622, 65-6629, 65-6628, and 65-11250 be dismissed with prejudice; further that the objections to and protests filed against Pancheris' water rights by Leslie and against the water rights of Leslie by Pancheris be dismissed with prejudice and without attorneys fees and costs to any party.

IT IS FURTHER ORDERED that Leslie's water rights 65-3418, 65-3419 and 65-3420 listed in the attached Exhibit A are deemed admitted and conceded by the Pancheris, their heirs, successors and assigns as true and accurate, and subject to the conditions stated on pages 2 and 3 of the Pancheris and Leslie stipulation.

IT IS FURTHER ORDERED that the Pancheris' water right 65-11250 listed in the attached Exhibit A is deemed admitted and

JUL 24 1986

conceded by Leslie, his successors, heirs and assigns as true and accurate, and subject to the conditions stated on pages 2 and 3 of the Pancheris and Leslie stipulation.

DATED this 30 day of December, 1986.

/s/
JIM R. DOOLITTLE
District Judge

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PANCHERI/LITTLE/A.L. CATTLE STIPULATION
PANCHERI/LESLIE STIPULATION
EXHIBIT A - LISTING OF WATER RIGHTS

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JUL 24 1995

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE
	SOURCE: ANDY CREEK		TRIBUTARY: MOORES CREEK, SOUTH FORK				
65-3420	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702	04-01-1894	IRRIGATION	04-15	10-15	2.08 CFS	BENEFICIAL USE
	OTHER RIGHTS: 65-3418 REMARKS: 2 P/D IN SWNE, S14, T13N, R3E. SOURCES ARE MOORES CREEK, NORTH FORK AND MOORES CREEK, SOUTH FORK TRIB. MOORES CREEK AND ANDY CREEK TRIB. MOORES CREEK, SOUTH FORK. PT. OF INJECTION INTO ANDY CREEK IN NESW S14 T13N R 3E. PT. OF REDIVERSION IN SWNE S14 T13N R 3E. POINT OF DIVERSION: T13N R03E S14 SWNE NESW PLACE OF USE: IRRIGATION T13N R03E S13 SWNW 36 SENW 9 S14 NENE 1 SWNE 20 SENE 38 104 ACRES TOTAL						
65-11280	A. L. CATTLE, INC. C/O AGNES BRAILSFORD P.O. BOX 180 HAGERMAN, ID 83332	06-01-1902	IRRIGATION	04-15	10-15	1.06 CFS	BENEFICIAL USE
	REMARKS: PT. OF INJECTION INTO ANDY CREEK IN NESW, S14, T13N, R3E. PT. OF REDIVERSION IN NWSE, S14, T13N, R3E. SOURCES FOR THIS RIGHT ARE MOORES CREEK, SOUTH FORK TRIB. MOORES CREEK AND ANDY CREEK TRIB. MOORES CREEK, SOUTH FORK. POINT OF DIVERSION: T13N R03E S14 NESW NWSE PLACE OF USE: IRRIGATION T13N R03E S14 NESE 24 NWSE 27 SWSE 2 53 ACRES TOTAL						

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE
	SOURCE: BRUSH CREEK		TRIBUTARY: PAYETTE RIVER, NORTH FORK				
65-6628	PANCHERI, DARWIN PANCHERI, JOAN L. PANCHERI, DUANE PANCHERI, LAURA MELBA, ID 83641 OTHER RIGHTS: 65-2696. REMARKS: 2 P/D IN SESW, S18, T13N, R4E. POINT OF DIVERSION: T13N R03E S13 SWSE T13N R04E S18 SESW PLACE OF USE: IRRIGATION T13N R04E S17 LT04(SWNW) 3 NWSW 18 LT13(SWSW)15 LT14(SESW) 6 S18 LT04(SWSW) 5 SESW 19 NESE 15 NWSE 6 SWSE 39 LT05(SESE)38 S19 LT05(NENE)32 NWNE 40 SWNE 40 LT06(SENE)22 NENW 12 SENW 27 NESW 38 SESW 32 NESE 40 NWSE 40 SWSE 40 SESE 40 S20 LT11(NWSW)17 LT12(SWSW)20 S29 LT04(NWNW) 1 S30 LT05(NENE)23 628 ACRES TOTAL	04-01-1912	IRRIGATION	04-15	10-15	12.56 CFS	BENEFICIAL
65-1979	A. L. CATTLE, INC. C/O AGNES BRAILSFORD P.O. BOX 180 HAGERMAN, ID 83338 OTHER RIGHTS: 65-11280 POINT OF DIVERSION: T13N R03E S14 SESE S23 NWNE PLACE OF USE: IRRIGATION T13N R03E S13 SWNE 5 SENE 16 NESW 29 NWSW 39 SWSW 26 SESW 6 NESE 37 NWSE 21 S14 NESE 13 SWSE 8 SESE 10 T13N R04E S18 LT02(SWNW)13 SENW 33 NESW 38 LT03(NWSW)18 312 ACRES TOTAL	06-01-1918	IRRIGATION	04-15	10-15	6.24 CFS	BENEFICIAL USE

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE
	SOURCE: DORA CREEK		TRIBUTARY: SAND CREEK				
65-3407	MACGREGOR LAND & LIVESTOCK CO. INC. P.O. BOX 5128 BOISE, ID 83705 OTHER RIGHTS: 65-11411 REMARKS: 2 P/D IN SWSW, S11, T13N, R3E AND 3 P/D IN SESW, S11, T13N, R3E. POINT OF DIVERSION: T13N R03E S11 SWSW SESW PLACE OF USE: IRRIGATION T13N R03E S11 SWSW 11 SESW 39 50 ACRES TOTAL	04-01-1897	IRRIGATION	04-15	10-15	1.00 CFS	DECREE
	SOURCE: HOUSE CREEK		TRIBUTARY: MOORES CREEK, NORTH FORK				
65-3419	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702 REMARKS: SOURCES ARE HOUSE CREEK, TRIB. MOORES CREEK, NORTH CREEK AND MOORES CREEK, NORTH FORK, TRIB. MOORES CREEK. POINT OF DIVERSION: T13N R03E S11 SESE S13 NWNW S14 SWNE PLACE OF USE: IRRIGATION T13N R03E S11 SESE 39 S12 SWSW 12 S13 NWNW 30 SWNW 3 S14 NENE 39 SWNE 8 131 ACRES TOTAL	04-01-1894	IRRIGATION	04-15	10-15	2.62 CFS	BENEFICIAL USE

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JUL 24 1996

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM TO	MAXIMUM DIVERSION	STAGE
	SOURCE: HOUSE CREEK		TRIBUTARY: MOORES CREEK, NORTH FORK			
65-3406	MACGREGOR LAND & LIVESTOCK CO. P.O. BOX 5128 BOISE, ID 83705	04-01-1897	IRRIGATION	04-15 10-15	1.56 CFS	DECREE
	REMARKS: 2 P/D FROM HOUSE CREEK IN NENW, S14, T13N, R3E. SOURCES ARE MOORES CREEK, NORTH FORK, TRIB. MOORES CREEK: HOUSE CREEK, TRIB. MOORES CREEK, NORTH FORK. POINT OF DIVERSION: T13N R03E S14 SWNE NENW SENW PLACE OF USE: IRRIGATION T13N R03E S11 SWSE 39 S14 NWNE 39 78 ACRES TOTAL					
65-3408	MACGREGOR LAND & LIVESTOCK CO. INC. P.O. BOX 5128 BOISE, ID 83705	04-01-1897	IRRIGATION	04-15 10-15	.72 CFS	DECREE
	REMARKS: 2 P/D IN NENW, S14, T13N, R3E AND 3 P/D IN NWNW, S14, T13N, R3E FROM SAND CK., TRIB. WILLOW CREEK. SOURCES ARE SAND CK., TRIB. WILLOW CK.: HOUSE CR., TRIB. MOORES CK., NORTH FORK. POINT OF DIVERSION: T13N R03E S14 NENW NWNW SENW PLACE OF USE: IRRIGATION T13N R03E S14 NENW 38 NWNW 8 46 ACRES TOTAL					

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JUL 24 1996

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE
	SOURCE: MOORES CREEK		TRIBUTARY: BRUSH CREEK				
65-11250	PANCHERI, DARWIN PANCHERI, JOAN L. PANCHERI, DUANE PANCHERI, LAURA MELBA, ID 83641 OTHER RIGHTS: 65-2534, 65-2696. POINT OF DIVERSION: T13N R03E S13 SENE PLACE OF USE: IRRIGATION T13N R04E S07 SWSE 16 SESE 9 S17 LT04(SWNW) 8 S18 NENE 27 NWNE 38 SWNE 38 SENE 39 NENW 22 LT01(NWNW) 9 NESE 13 NWSE 24 243 ACRES TOTAL	05-01-1899	IRRIGATION	04-15	10-15	4.86 CFS	BENEFICIAL USE
	SOURCE: MOORES CREEK, NORTH FORK		TRIBUTARY: MOORES CREEK				
65-3419	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702 REMARKS: SOURCES ARE HOUSE CREEK, TRIB. MOORES CREEK, NORTH CREEK AND MOORES CREEK, NORTH FORK, TRIB. MOORES CREEK. POINT OF DIVERSION: T13N R03E S11 SESE S13 NWNW S14 SWNE PLACE OF USE: IRRIGATION T13N R03E S11 SESE 39 S12 SWSW 12 S13 NWNW 30 SWNW 3 S14 NENE 39 SWNE 8 131 ACRES TOTAL	04-01-1894	IRRIGATION	04-15	10-15	2.62 CFS	BENEFICIAL USE

JUL 24 1996

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM TO	MAXIMUM DIVERSION	STAGE
	SOURCE: MOORES CREEK, NORTH FORK TRIBUTARY: MOORES CREEK					
65-3420	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702	04-01-1894	IRRIGATION	04-15 10-15	2.08 CFS	BENEFICIAL USE
	OTHER RIGHTS: 65-3418 REMARKS: 2 P/D IN SWNE, S14, T13N, R3E.. SOURCES ARE MOORES CREEK, NORTH FORK AND MOORES CREEK, SOUTH FORK TRIB. MOORES CREEK AND ANDY CREEK TRIB. MOORES CREEK, SOUTH FORK. PT. OF INJECTION INTO ANDY CREEK IN NESW S14 T13N R 3E. PT. OF REDIVERSION IN SWNE S14 T13N R 3E. POINT OF DIVERSION: T13N R03E S14 SWNE NESW PLACE OF USE: IRRIGATION T13N R03E S13 SWNW 36 SENW 9 S14 NENE 1 SWNE 20 SENE 38 104 ACRES TOTAL					
65-3406	MACGREGOR LAND & LIVESTOCK CO. P.O. BOX 5128 BOISE, ID 83705	04-01-1897	IRRIGATION	04-15 10-15	1.56 CFS	DECREE
	REMARKS: 2 P/D FROM HOUSE CREEK IN NENW, S14, T13N, R3E. SOURCES ARE MOORES CREEK, NORTH FORK, TRIB. MOORES CREEK: HOUSE CREEK, TRIB. MOORES CREEK, NORTH FORK. POINT OF DIVERSION: T13N R03E S14 SWNE NENW SENW PLACE OF USE: IRRIGATION T13N R03E S11 SWSE 39 S14 NWNE 39 78 ACRES TOTAL					

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RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM TO	MAXIMUM DIVERSION	STAGE
	SOURCE: MOORES CREEK, SOUTH FORK TRIBUTARY: MOORES CREEK					
65-3420	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702	04-01-1894	IRRIGATION	04-15 10-15	2.08 CFS	BENEFICIAL USE
	OTHER RIGHTS: 65-3418 REMARKS: 2 P/D IN SWNE, S14, T13N, R3E. SOURCES ARE MOORES CREEK, NORTH FORK AND MOORES CREEK, SOUTH FORK TRIB. MOORES CREEK AND ANDY CREEK TRIB. MOORES CREEK, SOUTH FORK. PT. OF INJECTION INTO ANDY CREEK IN NESW S14 T13N R 3E. PT. OF REDIVERSION IN SWNE S14 T13N R 3E. POINT OF DIVERSION: T13N R03E S14 SWNE NESW PLACE OF USE: IRRIGATION T13N R03E S13 SWNW 36 SENW 9 S14 NENE 1 SWNE 20 SENE 38 104 ACRES TOTAL					
65-11280	A. L. CATTLE, INC. C/O AGNES BRAILSFORD P.O. BOX 180 HAGERMAN, ID 83332	06-01-1902	IRRIGATION	04-15 10-15	1.06 CFS	BENEFICIAL USE
	OTHER RIGHTS: 65-1979 REMARKS: PT. OF INJECTION INTO ANDY CREEK IN NESW, S14, T13N, R3E. PT. OF REDIVERSION IN NWSE, S14, T13N, R3E. SOURCES FOR THIS RIGHT ARE MOORES CREEK, SOUTH FORK TRIB. MOORES CREEK AND ANDY CREEK TRIB. MOORES CREEK, SOUTH FORK. POINT OF DIVERSION: T13N R03E S14 NESW NWSE PLACE OF USE: IRRIGATION T13N R03E S14 NESE 24 NWSE 27 SWSE 2 53 ACRES TOTAL					

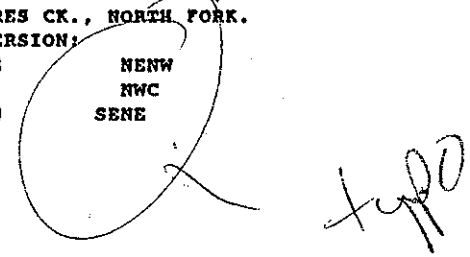
JUL 24 1996

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE
	SOURCE: SAND CREEK		TRIBUTARY: WILLOW CREEK				
65-3408	MACGREGOR LAND & LIVESTOCK CO. INC. P.O. BOX 5128 BOISE, ID 83705	04-01-1897	IRRIGATION	04-15	10-15	.72 CFS	DECREE

REMARKS: 2 P/D IN NENW, S14, T13N, R3E AND 3 P/D IN NWNW, S14, T13N, R3E FROM SAND CK., TRIB. WILLOW CREEK.
SOURCES ARE SAND CK., TRIB. WILLOW CK.: HOUSE CR., TRIB. MOORES CK., NORTH FORK.

POINT OF DIVERSION:

T13N R03E S14 NENW
NWC
T13N R03E S13 SENE



JUL 24 1996

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM TO	MAXIMUM DIVERSION	STAGE
	SOURCE: SPRING		TRIBUTARY: MOORES CREEK			
65-1972	LITTLE, MYRN M. C/O AGNES BRAILSFORD P.O. BOX 180 HAGERMAN, ID 83332 POINT OF DIVERSION: T13N R03E S13 SENE PLACE OF USE: T13N R03E S13 SENE	05-01-1901	01-01 12-31 DOMESTIC		.04 CFS 1.20 AFA	BENEFICIAL USE
65-1973	LITTLE, MYRN M. C/O AGNES BRAILSFORD P.O. BOX 180 HAGERMAN, ID 83332 POINT OF DIVERSION: T13N R03E S13 SENE PLACE OF USE: T13N R03E S13 SENE	05-01-1901	01-01 12-31 DOMESTIC		.01 CFS 1.20 AFA	BENEFICIAL USE
65-3418	LESLIE, WILLIAM JOHN 2404 NORTH 21ST BOISE, ID 83702 OTHER RIGHTS: 65-3420 POINT OF DIVERSION: T13N R03E S13 SENW PLACE OF USE: IRRIGATION T13N R03E S13 SENW 2 2 ACRES TOTAL	04-01-1910	IRRIGATION	04-15 10-15	.04 CFS	BENEFICIAL USE

JUL 24 19

RIGHT NUMBER	NAME AND ADDRESS	PRIORITY DATE	WATER USE	USE PERIOD FROM	USE PERIOD TO	MAXIMUM DIVERSION	STAGE

DISALLOWED CLAIMS

65-6622 PANCHERI, DARWIN
PANCHERI, JOAN L.
PANCHERI, DUANE
PANCHERI, LAURA
MELBA, ID 83641
REMARKS: NO BENEFICIAL USE FOUND-USE FORFEITED OR ABONDONED.

65-6629 PANCHERI, DARWIN
PANCHERI, JOAN L.
PANCHERI, DUANE
PANCHERI, LAURA
MELBA, ID 83641
REMARKS: RECOMMENDED AS RT. 65-11250.

40

SCANLAN ENGINEERING

Groundwater and Environmental Engineering

September 2, 2003

Mr Rob Whitney
Idaho Department of Water Resources
2735 Airport Way
Boise, ID 83705

RECEIVED SEP - 4 2003

Subject: MacGregor Test Well Proposal

Dear Rob:

In response to your email of July 1, 2003, and Gary Spackman's letter of June 5, 2003, this letter provides additional information related to Carol MacGregor's proposal for test well drilling at Belvidere.

The following items were requested

1. Data gathered from well logs, interviews with driller's in the area, and geological surveying in the area that will better describe the formations that will be encountered, and the nature of the low temperature geothermal aquifer sought to be appropriated including the venting system through which the aquifer is discharging. The data should be summarized and conclusions about the data should be written.

2. A detailed description of the method of construction that will protect the low temperature geothermal system and minimize risk of injury to other water rights The description should contain both a diagram of the proposed well and a narrative of the proposed construction.

3. A detailed description of the test that will be performed on the well and any other water sources, and what data will be gathered. The detail must include methods and timing of measurement and data gathering.

4. Provide monitoring information collected to date, and an indication of whether the parties intend to collect any additional flow and temperature measurement and/or install flow and totalizing meters.

5. A proposed monitoring plan for the well and springs if the well is completed as a production well.

6. A proposed bond amount and mitigation plan sufficient enough to insure proper abandonment of the well or test hole and to protect existing water right holders from injury due to losses in temperature, pressure, or quantity.

600 East River Park Lane, Suite 105
Boise, Idaho 83706

Telephone (208) 383-4140
Facsimile (208) 383-4156

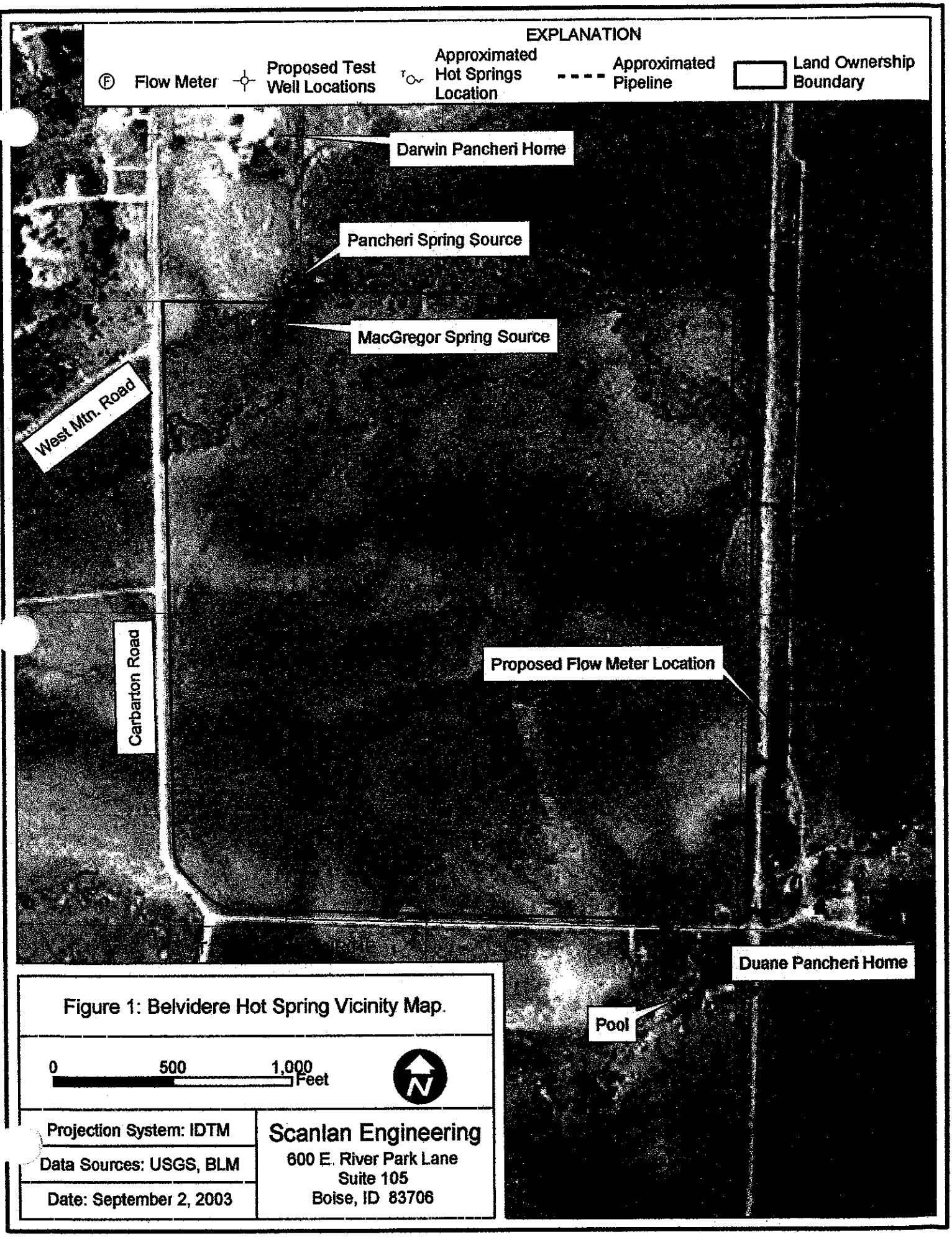


Figure 1: Belvidere Hot Spring Vicinity Map.

Projection System: IDTM	Scanlan Engineering
Data Sources: USGS, BLM	600 E. River Park Lane Suite 105
Date: September 2, 2003	Boise, ID 83706

These items are addressed below. A map of the project area is provided as Figure 1.

SPRING CHARACTERIZATION

Description of Belvidere Spring. Belvidere Hot Spring consists of an area of approximately one acre in size with diffuse geothermal discharge. The spring area is concentrated within a fenced area approximately 120 feet by 75 feet on the MacGregor property, although evidence of geothermal discharge also is visible outside of the fenced area on both the MacGregor and Pancheri properties. The spring area trends in a North 60 East direction, suggesting the possible presence of a geologic structure (i.e., fault) or other subsurface feature trending N60E.

Within the fenced portion of the MacGregor property, two main areas of discharge are visible. Both of these spring vents historically had been developed with bathhouses (65-1972 and 65-1973), although only remnants of these structures are currently visible.

- The measured temperature at the upper bathhouse pool has ranged from 93 to 105 degrees F over the past few years. A seep adjacent to the upper pool has a temperature of 110 to 113 degrees F. The discharge rate from the upper pool vicinity is probably 10 to 20 gpm.

- The maximum surface temperature at the lower bathhouse pool has ranged from 116 to 121 degrees F over the past few years. Estimated discharge rate from the lower pool area is 10 to 30 gpm.

Combined flow rate from the upper and lower bathhouse areas is probably about 60 gpm, based on weir measured flows of approximately 50 gpm east of the bathhouses, plus approximately 10 gpm of unmeasured flow that discharges toward the Pancheri property.

On the Darwin Pancheri property, geothermal discharge from the spring has been developed with an infiltration gallery. According to the field examination for water right 65-12891, the infiltration gallery discharges by gravity flow through a buried 10-inch diameter PVC pipe that extends eastward for 2100 feet. The 10-inch pipe then reduces to 4-inch diameter and extends 3000 feet to the south to the Duane Pancheri house and shop (water right 65-12891). A pump station near the infiltration gallery diverts water from the 10-inch pipe to the Darwin Pancheri home (water right 65-13332). Flow rate in the pipeline (as measured at the Duane Pancheri home with the Darwin Pancheri pump off) has ranged from 60 to 80 gpm in five measurements since May 2001. Note that a measurement of 114 gpm (i.e., 17 gpm pumped to Darwin Pancheri plus 97 gpm by gravity flow through the pipeline) was made on January 27, 2001. The bucket used for volumetric measurement on January 27, 2001 was reportedly marked for a 4-gallon capacity, but this calibration was not verified by Scanlan Engineering. Measured temperature at the upper end of the pipeline has ranged from 109 to 113 degrees F, with temperatures typically of about 112 to 113 degrees F.

Based on flow monitoring since 2001, the combined surface discharge from the spring vicinity on both the MacGregor and Pancheri properties is probably in the range of 110 to 180 gpm, with an estimated average temperature of approximately 112 degrees F.

Monitoring Data Collected at Belvidere Hot Spring. Monitoring data collected by Scanlan and/or Chapman are provided as Attachment A. In order to adequately monitor spring discharge, a totalizing flow meter on the Pancheri pipeline is needed. The flow meter should be installed as soon as possible. A meter location near the lower end of the 4-inch diameter portion of the pipeline is proposed in order to provide an easily accessible location. Any assistance that your Department can provide to expedite installation of this meter would be appreciated.

Published Data Related to the Hot Spring. Data for Belvidere Hot Spring is found in several publications. Excerpts are copied and attached.

Perhaps the most detailed published description of the springs is found in "Geothermal Investigation of the Cascade Area", July 1976, by Monte Wilson, James Applegate, Sherl Chapman, and Paul Donaldson (Boise State University). The report indicates that the Belvidere Hot Spring is located along the north-trending Cascade Valley Fault. A series of hot springs are found along this fault, including (from south to north) Cabarton, Belvidere, Cascade, Flat Creek, and Gold Fork. The discharge temperature for Belvidere hot springs was reported to be 121 degrees F. Based on silica concentration in the water and a mixing model, the authors estimated that the temperature of the hot spring source could be as high as 325 degrees F. See Attachment B.

A chemical analysis in USGS Water Resources Investigations Open File Report 80-1020 (Lewis, R.E., and H.W. Young, 1980, Thermal Springs in the Payette River Basin, West Central Idaho) indicates that the spring has a temperature of 120 degrees F and a discharge of 20 gpm. The water is a sodium bicarbonate type with total dissolved solids of 256 mg/l. Based on various geochemical methods, the USGS report estimated that the temperature of the aquifer source ranges from 117 to 232 degree F. See Attachment C.

Geologic mapping of the local area is provided in USGS Bulletin 1311-A (Schmidt, D.L. and J.H. Mackin, 1970, Quaternary Geology of Long and Bear Valleys, West-Central Idaho). The mapping shows the spring site as overlain by glacial outwash. Cretaceous bedrock of the Idaho Batholith is present in the high elevation areas on the westerly side of Cabarton Road. The bedrock is part of the upthrown Cascade fault block. The fault block is bounded on the east by the Cascade Valley fault. The geologic map shows the fault approximately 2000 feet east of the spring. See Attachment D.

Unpublished Reports. An investigation of the Belvidere Hot Spring was commissioned by a previous property owner (Eastern Western Corporation) in the mid 1990s for purposes of selecting a geothermal test well site. The investigation apparently included surface geologic mapping and resistivity survey. The mapping located a fault scarp 150 yards to the west of the hot spring, and suggested that a fault zone striking N70E extended close to the spring area. The resistivity investigation suggested drilling at a location 400 to 450 feet southeast of the bathhouses. The geologist that directed the study estimated that the depth to the fault zone was 800 feet in that area. A copy of the report and related correspondence from that study are provided as Attachment E.

Well Driller's Reports. Well driller's reports on file at the Idaho Department of Water Resources were collected for the area surrounding the spring. The search area consisted of Section 18, T13N, R4E and Section 13, T13N, R3E. No logs were located in Section 19. The well driller's reports are compiled in Attachment F.

Summary and Conclusions Related to Spring Geology and Hydrology. Based on personal observations and a review of published and unpublished data, the following conclusions are provided related to the geology and hydrology of Belvidere Hot Spring.

1. The source of hot water is probably upward flow through fractures in the granitic rock of the Idaho Batholith. It is possible that Belvidere Hot Spring is located at or near the intersection of the north-trending Cascade Valley Fault and an unmapped fault trending in a northeasterly direction.

2. The spring area is overlain by alluvial and glacial deposits. Depth to bedrock in the vicinity of the spring vents is unknown. Bedrock is found at the surface within a few hundred feet to the west of the spring vents.

3. It is unknown whether a significant portion of the geothermal water moving upward through the fractured rock is lost as subsurface flow through the valley fill, or if the majority of the geothermal flow reaches the surface and discharges from the spring.

4. The temperature of the geothermal water at depth is probably greater than the temperature at the discharge point. Maximum surface temperature is approximately 121 degrees F.

DRILLING PROSPECTUS

Given the unknown subsurface conditions in the vicinity of the spring, it is difficult to prepare a definitive drilling plan.

Anticipated geologic conditions in the near vicinity of the hot springs consist of between 10 and 150 feet of sand, gravel, and clay sediments overlying granitic bedrock. Depth to bedrock likely increases to the south and east. Shallow groundwater with a temperature in the range of 45 to 120 degrees F is anticipated in the overburden materials above the bedrock. Water temperatures of 45 to 180 degrees are anticipated in the bedrock.

Two well sites are initially proposed. One well site will be at the location suggested by the resistivity survey, approximately 450 feet southeast of the MacGregor spring vents. The other well will probably be located approximately 200 feet south from the MacGregor spring vents. These sites are approximately 300 to 600 feet from Pancheri spring source. The actual well sites will be staked prior to drilling contractor mobilization.

Well Construction. Drilling depths and casing lengths will be adjusted based on subsurface conditions. The drilling method utilized will probably be air rotary, although mud rotary will be

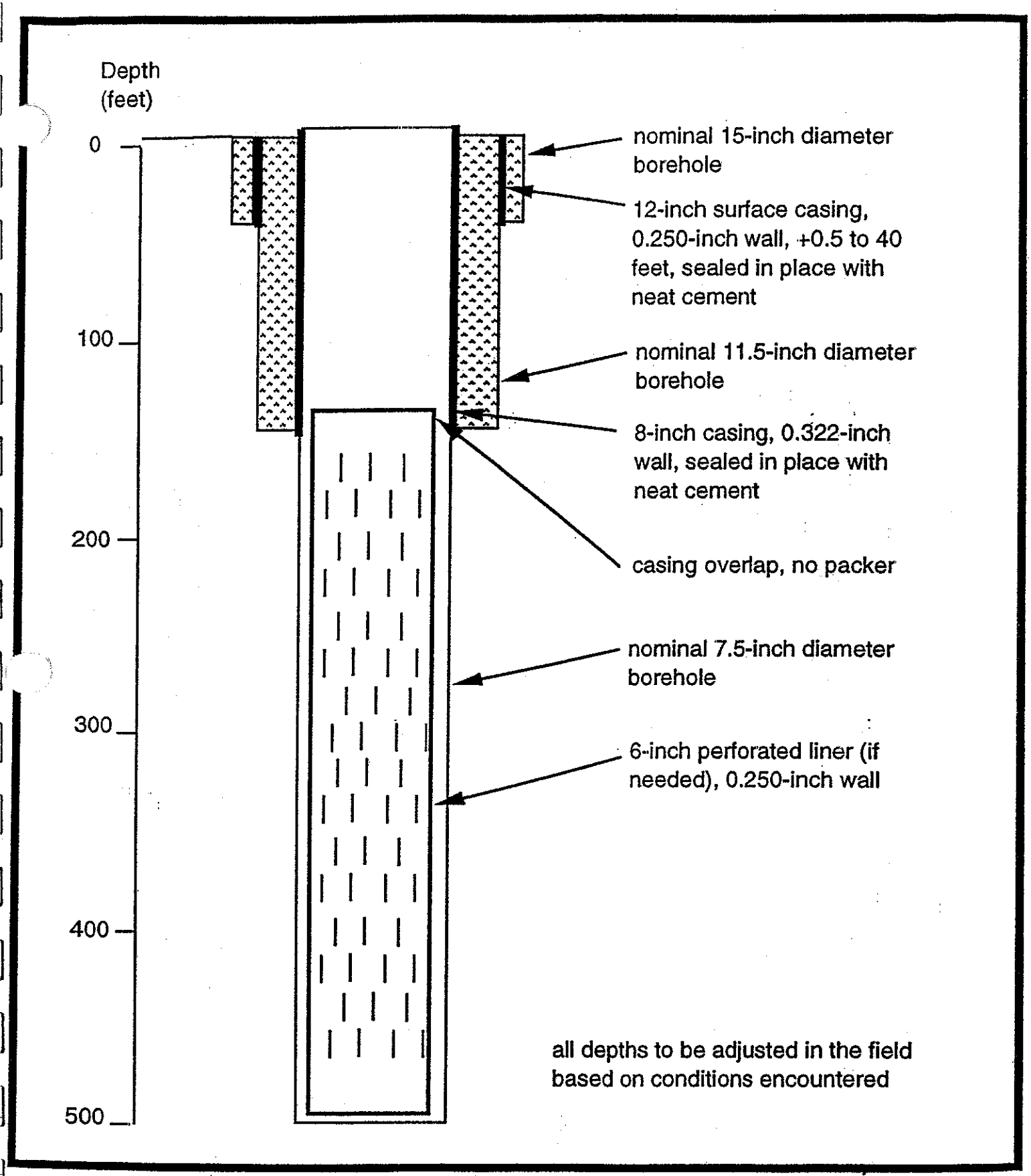


FIGURE 2

MACGREGOR GEOTHERMAL TEST WELL CONCEPT

used for open-hole drilling through unconsolidated or unstable materials. Initially, we anticipate that well construction will include the following.

1. A 12.25-inch I.D. surface casing (0.250-inch wall, 12.75-inch O.D.) shall be set and sealed to a depth of approximately 40 feet, unless bedrock or a substantial clay layer are encountered first. The 12-inch casing will be installed within a minimum 15-inch diameter hole. The casing shall be sealed with neat cement installed from the bottom of the annular space to the surface. The top of the 12-inch casing shall be equipped with a flange.

2. Below the surface casing, a nominal 12-inch diameter borehole will be drilled to bedrock using open hole drilling techniques appropriate for the formation. Following drilling, geophysical surveys (resistivity, natural gamma, temperature) will be run to document stratigraphy and temperature. If drilling characteristics and temperatures suggest the presence of geothermal aquifer zones, then an attempt will be made to develop a well for test purposes. If there are no indications of significant geothermal water-bearing zones, a 7.981-inch I.D. (0.322-inch wall, 8.625-inch O.D.) well casing shall be set and sealed a minimum of 20 feet into bedrock. The casing shall be sealed with neat cement installed from the bottom to the surface. The top of the 8-inch casing shall be equipped with a flanged tee.

3. Below the 8-inch casing, an open borehole (nominal 7.5-inch) will be advanced. If caving conditions are encountered, the borehole may be lined with 6-inch (0.250-inch wall) perforated liner pipe. Target depth for the each shall be 500 feet, but actual well depth may be adjusted up or down depending on conditions encountered.

A conceptual well design is provided as Figure 2. Note that bentonite chips may be used for well seals if warranted by formation conditions (the presence of open fractures) or borehole conditions (large annulus). Based on the results of the first test well, additional wells may be drilled as necessary to (1) better assess the geothermal resource, (2) develop the resource, and (3) assure continued delivery of the resource to senior water rights.

The proposed drilling contractor is Gestrin Drilling. Mr. Gestrin has drilled many of the existing wells in the local area, including wells on the Pancheri property both north and south of the MacGregor property. He has reviewed the proposed well design.

Drilling Oversight. Scanlan Engineering will provide oversight of drilling activities, including final design placement of casings and seals. The Department of Water Resources will be notified in the event of a significant change from the design contemplated by this drilling prospectus.

The drilling contractor will collect drill cuttings at 10-foot intervals and at each formation change. Bottom-hole temperatures will be measured using a maximum reading thermometer whenever drilling tools are removed from the borehole.

TESTING AND MONITORING PLAN

Monitoring. Discharge rate and temperature at the MacGregor spring vents and from the Pancheri infiltration gallery will be monitored before, during, and after drilling and testing. Flow will be monitored with V-notch weirs set in the stream channels below the springs. A totalizing flow meter on the Duane Pancheri pipeline will also be monitored. Monitoring of the totalizing flow meter on the Pancheri pipeline should be conducted for several weeks or months prior to drilling and testing in order to document any trends in flow rate. The flow meter should installed as soon as possible.

Temperature should be monitored at the existing measuring points (upper bathouse vent, lower bathhouse vent, MacGregor weir, Pancheri weir, Pancheri pipeline vent, Pancheri pump sump).

Monitoring frequency shall vary depending on the type of activity that is taking place. For instance, monitoring of flow and temperature is recommended on a weekly basis for at least four weeks prior to and following drilling. During active drilling periods, monitoring should take place on a daily basis.

Monitoring frequency following development of a successful well shall be at monthly intervals for the first year of operation, and quarterly intervals thereafter during the permit period.

Testing. The test well, if successful, will be tested by pumping or by artesian flow. Temperatures and flows from the spring will be monitored during any well tests.

We anticipate that the test pumping or artesian flow testing would be conducted for a minimum of 24 hours, and potentially as long as several weeks. A definitive test plan is difficult to prepare until the well is drilled and estimates of production rate and temperature are obtained. However, for purposes of this plan, we propose the following test procedure.

1 Shut the well in (if flowing artesian) or allow water level to stabilize (if not flowing) for a minimum of 24 hours before pump testing or flow testing. During this period, monitor both temperature and flow at the existing monitoring locations described above.

2 Flow or test pump the well using typical well testing protocol. For instance, water level, pressure, or well flow rate measurements should be collected on a log-time scale during constant rate (or constant flow), with measurement intervals of approximately 1 minute for the first 10 minutes, 5 minutes from 10 to 100 minutes, 20 minutes from 100 to 500 minutes, and one hour intervals from 500 to 1500 minutes, 6-hour intervals from 1500 to 3000 minutes, and 12 or 24-hour intervals after 3000 minutes.

3 Temperature measurements and spring flow measurements at the existing monitoring locations should be taken on minimum two-hour intervals during the first day of the test, and at the same intervals as pressure or well flow measurements after the first day of the test.

MITIGATION AND BONDING

Bond. A bond of $20,000 will be posted prior to drilling in order to provide funding for well abandonment. The $20,000 amount is based on IDAPA 37.03.09.030.02, and assumes that a bottom hole temperature in excess of 150 degree F is possible.

Mitigation. Mitigation for impacts to existing water rights will depend on the type of impact. For instance, a temporary impact during test pumping can potentially be mitigated (if necessary) by pumping hot water from the test well to the water users.

If exploration or water development activities by MacGregor reduce geothermal water supply below the amount that historically has been both legally and physically available to the Pancheris, then MacGregor would mitigate impacts for material injury to the Pancheri water rights pursuant to Idaho law. Potential mitigation methods to address material injury to the beneficial use of the Pancheri water rights could include:

1. Provide well water of a temperature and rate (within water right volume limitations) to address material injury to the Pancheri water rights. The water would be delivered to the Pancheris at the MacGregor/Pancheri property line or other mutually acceptable location.

2. Supply an alternate heat source to Pancheris (electric, natural gas, etc.) to the extent necessary to address material injury to the beneficial use of the Pancheri water rights.

3. Increase the efficiency of the Pancheri delivery or heating system in order to address material injury to the beneficial use of the Pancheri water rights.

Please contact me with any questions or comments. We look forward to your response.

Sincerely,

Terry M. Scanlan, P.E., P.G.

Cc: Carol MacGregor
Jo Beeman
Sherl Chapman
Scott Campbell

Attachments

A Monitoring Data

B Excerpts From "Geothermal Investigation Of The Cascade Area", July 1976, Boise State University

C Excerpts From USGS Water Resources Investigations Open File Report 80-1020

D Geologic Map From USGS Bulletin 1311-A

E Correspondence From Unpublished Investigation And Well Siting Study For Eastern Western Corporation

F Well Drillers Reports

ATTACHMENT A
MONITORING DATA

Proposed Geothermal Monitoring Plan - Belvidere Hot Spring Area
March 12, 2001

A geothermal monitoring program is proposed to provide data related to pending Applications for Permit 65-13912, 65-13913, 65-13986. The applications have been submitted by Carol Lynn MacGregor and have been protested by Duane and Laura Pancheri and Darwin and Joan Pancheri. The Pancheris divert water from the hot spring under water rights 65-13332 and 65-12981.

The purpose of the monitoring program is to document (1) existing discharge rates and temperatures at the springs and (2) existing diversion rates and source temperatures under water rights 65-13332 and 65-12981. The proposed monitoring program will supplement initial monitoring conducted on January 27, 2001. Monitoring should take place for a one-year period beginning in the spring of 2001.

This plan has been jointly prepared by Terry Scanlan (consultant to MacGregor) and Sheri Chapman (consultant to the Pancheris). Data shall be collected jointly by Scanlan and Chapman (unless otherwise agreed to by the parties). As part of this plan, Chapman shall be allowed to enter the MacGregor property for scheduled monitoring events or with pre-notification to (and approval by) MacGregor or MacGregor's representatives. Similarly, Scanlan shall be allowed to enter the Pancheri property for scheduled monitoring events or with pre-notification to (and approval by) the Pancheris or their representatives.

Monitoring Locations and Methods

Darwin Pancheri System (Water Right Permit No. 65-13332). Darwin Pancheri's system is very simple and additional flow measurements might not be necessary. However, monthly spot checks of source temperatures are recommended as part of the monitoring discussed below. Since pumping rate is easily monitored (with bucket and stopwatch) at the point where the water discharges back to the creek, the pumping rate should be measured occasionally for additional verification. Temperatures shall be measured at the pump intake.

Duane Pancheri System (Water Right License No. 65-12891). Flow measurements and temperature measurements at Duane Pancheri's system are recommended. Measurements should be collected quarterly, beginning in the spring of 2001. Measurements, using a bucket and stopwatch, should be as follows.

1. The pool should be partially drained to allow access to the 4-inch pipe.

2. With the tomato can in place, flow rate should be measured at (1) the 4-inch pipe that discharges to the pool (2) the pipe that discharges to the pool from the two homes and (3) the pipe that discharges into Brush Creek from the home and shop.

3. The can should then be removed from the 4-inch pipe, flows should be allowed to reach equilibrium, and flow rates should be re-measured at all three locations.

Note that in the non-heating season, steps 2 and 3 would probably be reversed (i.e., measure initially with tomato can out, and then with tomato can in).

In addition to the flow monitoring, source temperature should be measured on a monthly basis for a one-year period. Measurements should be made through the pipeline vent using a thermometer with a probe that can be lowered through the vent into the pipe. Water level in the vent pipe should also be measured to determine if pipe pressure (and therefore, flow rate) varies. If significant variations in flow rate are detected, then installation of a totalizing flow meter in the 4-inch pipeline should be considered.

Spring Discharge Monitoring (Pancheri Stockwater Source). The discharge from the MacGregor spring area and the overflow from the Pancheri spring source (if any) are combined approximately 50 feet southwest of Darwin Pancheri's pump. Since the Pancheri's utilize this surface water for irrigation and stockwater purposes, monitoring is recommended to document existing conditions. Monitoring can best be conducted using a v-notch weir and staff gage. Recommended weir location is a few feet north of the MacGregor-Pancheri fence. This weir area should be fenced from livestock. Measurements of flow and temperature should be collected on a monthly basis for a period of one year.

In addition to the main weir on the Pancheri side of the fence, an additional weir that measures the flow from the MacGregor springs only is proposed. The MacGregor weir measurement could be subtracted from the Pancheri weir measurement to estimate the surface discharge from the springs on the Pancheri property. The MacGregor weir and spring area shall be fenced from livestock.

Temperatures should be monitored at the two MacGregor bathhouse sites on a monthly basis.

Baseline Monitoring Report

Following the completion of one-year of baseline monitoring, a summary report of the monitoring results shall be prepared. The report will provide a summary of monitoring methodology and results. The report shall be prepared jointly by Chapman and Scanlan, and shall be submitted to the parties.

Monitoring Costs. The parties agree to pay costs for their respective consultants. MacGregor shall pay costs for installation of weirs. Scanlan and Chapman shall participate in weir installation. If data are collected by one consultant or an outside third party for the benefit of both parties, the cost of that acquisition shall be shared equally by both parties.

By signing below, Scanlan and Chapman agree that the above-described methodology will provide accurate data for the purposes described.

Sheri L. Chapman

Terry M. Scanlan

SCANLAN ENGINEERING
Groundwater and Environmental Engineering

November 28, 2002

Mr Gary Spackman
Idaho Department of Water Resources
2735 Airport Way
Boise, ID 83705

Subject: Applications for Permit 65-13992 and 65-13993

Dear Gary:

Carol MacGregor and I have reviewed Sherl Chapman's letter of November 5, 2002, requesting termination of baseline monitoring associated with Applications 65-13992 and 65-13993. As described in Sherl's letter, significant and valuable data have been collected in an attempt to characterize (1) the discharge from the geothermal resource in this area and (2) the diversion of geothermal water under the Pancheri water rights (65-12891 and 65-13332). A copy of the data summary is attached for your information.

Although the discovery period has ended, we believe that continued monitoring of diversion under the Pancheri water rights is warranted. The Pancheri's have indicated that they will oppose any depletion to the discharge from the springs that might impact their water rights. In such a situation, accurate flow monitoring is necessary to protect both parties from allegations of hydraulic impacts or over diversion. We feel that accurate diversion data can only be obtained through flow metering. Therefore, please consider this letter as a request for the Department to order the immediate installation of totalizing flow meters on the pipelines that supply these water rights. Furthermore, we request that totalized flows be reported to the Department on a monthly basis until further notice. It is important for data collection to begin prior to the end of December so that totalized flows can be collected for calendar year 2003.

The totalizing flow meters are needed to document spring diversions both before and after test well drilling. Carol would like to conduct test drilling in the summer of 2003. Will the Department issue drilling permits for one or more test wells at that time?

We look forward to your response regarding our request for installation of flow meters, monthly flow metering, and issuance of test well permits. We are available to meet with you and the protestants for further discussions if necessary.

Sincerely,

Terry M. Scanlan, P.E., P.G.

Cc: Carol MacGregor
Sherl Chapman
Duane Pancheri
Darwin Pancheri

600 East River Park Lane, Suite 105
Boise, Idaho 83706

Telephone (208) 383-4140
Facsimile (208) 383-4156

	MacGregor						Darwin Pancheri							
	Upper Pool	Seep S. of Upper Pool	Lower Pool		MacGregor Weir		pipe vent		Pancheri Weir		Sump	Pump Sump Overflow	pump return	
Date	temp	temp	temp	flow	temp	flow	temp	DTW (ft)	temp	flow	temp	temp	temp	flow
06/07/1999	104		121											
08/03/2000	102.4		119.5	10										
09/01/2000	92.0		116.0	10										
10/18/2000				15										
01/27/2001											104		88	16.6
05/05/2001	102.7		116.6		100.2		111.9	2.96			103.3	106.5		0
07/07/2001	100.8		118.0				112.6	3.19				108.1		0
07/21/2001	104.5		118.9		106.2	54	112.6	3.18	99.7	7		104.4		0
08/08/2001	100.0		119.1		104.2	45	113.5	2.56	91.4+/-	8	106.3	107.1		0
09/26/2001	101.5	111.8	118.4		106.3	45	112.8	3.30	93.8	13	107.4	108.1		
11/02/2001	98.8	112.1	117.1		flooded		111.9	3.05	86+/-	13	104.7	106.9		0
02/16/2002	95.9	112.6	117.5		96.6	54	111.0	2.72	88+/-	13	105.3		86.2	7.3
03/09/2002	93.2	112.6	117.3		88	54	110.8	2.75	80+/-	15	104.5		85.6	7.2
06/01/2002	101.8	112.3	118.8		flooded		108.7	2.01	flooded		59.7	flooded		0
07/18/2002	102.4	111.7	120.6		103.8	45	113.2	3.22	97.2	8	106.2	108		0
10/09/2002	100.8	110.8	117.0		101.5		112.6	3.18	85.8	11	104.7			0

Flow is gallons per minute
Temperature is degrees F

	Duane Pancheri									
				Tomato Can In			Tomato Can Out			
Date	Shop temp	House temp	Pool temp	Shop flow	House flow	Pool flow	Shop flow	House flow	Pool flow	Total
06/07/1999										
08/03/2000										
09/01/2000										
10/18/2000										
01/27/2001	88		95	7.6				1	89	97
05/05/2001	87.3	87.4	97.9	6.2	4.1	62.5	5.2	1	73.1	79.3
07/07/2001										
07/21/2001										
08/08/2001	92.5		101.8				5.4	0.5	54	59.9
09/26/2001										
11/02/2001	88.0	88.7	98.6	6.0	3.7	58.9		<1	70.2	76+/-
02/16/2002										
03/09/2002	80.8			6.2						
06/01/2002	88.9	89.2	95.9	6.3	4.6	63.5	5.0	<1	74	80+/-
07/18/2002										
10/09/2002	90.3	86	101.5	5.2	2.1	60.6		1	62.3	68

Flow is gallons per minute
Temperature is degrees F

ATTACHMENT B
EXCERPTS FROM "GEOTHERMAL INVESTIGATION OF THE CASCADE AREA", JULY 1976, BOISE STATE UNIVERSITY

Boise, Idaho July, 1976

GEOTHERMAL INVESTIGATION OF THE CASCADE, IDAHO AREA

by

Monte D. Wilson
James K. Applegate
Sherl L. Chapman
Paul R. Donaldson

DEPARTMENT OF GEOLOGY AND GEOPHYSICS

BOISE STATE UNIVERSITY

GEOTHERMAL INVESTIGATION OF THE CASCADE, IDAHO AREA.

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GEOTHERMAL INVESTIGATION OF THE CASCADE, IDAHO AREA.

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GEOTHERMAL INVESTIGATION OF THE CASCADE, IDAHO AREA

Monte D. Wilson
James K. Applegate
Sherl L. Chapman
Paul R. Donaldson

ABSTRACT

Field and laboratory investigations show the existence of a geothermal resource in the Cascade area of west-central Idaho which may have development potential for non-electrical uses. Numerous high angle faults cut the Idaho batholith in this area; displacements on some of these faults are as great as 10,000 feet and many of them have associated alteration zones. X-ray analyses of samples collected from these zones indicate substantial hydrothermal alteration. Fault controlled hot springs have temperatures at the surface of up to 71° C and temperatures at depth, based on the silica geothermometer, of up to 179° C.

Microseisimic monitoring in the area suggests that east-west trending faults are active, supporting the plausibility of an accessible geothermal resource.

The domestic ground water supply for most of the area is from very shallow wells, most of which are developed in the upper 200 feet of the valley floor derive their water from joints rather than from fault systems. Preliminary data indicate no connection between the thermal systems and the water supply for the area.

GEOLOGY

Regional Geology

The study area is located along the western margin of the Idaho batholith. It is in the Northern Rocky Mountain geomorphic province with the Seven Devils section of the Columbia Intermontane geomorphic province bordering it on the west (Thornbury 1965, p.445).

An extensive system of faults in this region was described by Anderson (1934, p.25) and by Capps (1941, p.7), with the Long Valley fault being the largest fault in this system. Many of the other faults mapped during field work on this project are parts of this regional branching system.

Lithologic Units

Idaho Batholith Granitic Rocks

For the purposes of this study rocks of the Idaho batholith were mapped as a single lithologic unit rather than being subdivided into various compositional types. Reasons for using this approach to mapping are primarily that the geothermal potential is apparently not controlled by details of lithology and also that zones of lithologic variation are both large and gradational, so that they are best mapped on a regional scale rather than on a restricted scale such as the map for this report.

Because of its location on the margin of the Cretaceous Idaho batholith, the Cascade area is in a belt with gradation of rocks from directionless granite of the central batholith to gneiss and schist of

the batholith border. There is a systematic increase in metamorphic intensity going eastward across the area. Schmidt (1964, p.8) has recognized and mapped six major rock zones trending north and south to northeast-southwest through this region. Three of these rock zones make up most of the bedrock in the Cascade area, they are: 1) the quartz diorite gneiss of Donnelly which is present in the western and northwestern part of the map area, 2) the quartz diorite of Little Valley which underlies the central portion of the map area and, 3) the granodiorite of Gold Fork which underlies the eastern and southeastern portions of the map area.

Columbia River Basalts

Along the western boundary of the study area, rocks of the Idaho batholith border zone have been eroded and are overlain by flows of the Columbia River Basalts of Miocene age. These flows are dipping westerly at moderate angles. They were not mapped in detail during field work on this project, so their contacts on the geologic map (Plate 1) must be considered approximate. Isolated remnants of basalt are located along the eastern margin of Long Valley and in the southern part of Little Valley, near the northeastern corner of the map. These basalts have been downfaulted into the granitic rocks of the Idaho batholith, and each of these isolated basalt outcrops is proximal to a conspicuous fault or faults. These basalt outcrops are remnants of flows which were formerly much more extensive in this region (Capps, 1941, p.5, Bond, 1963). Several quarries are located in these basalt remnants, with much of the basalt being crushed and used in road building.

Latah (?) Formation

Associated with the Columbia River Basalts is a sequence of poorly consolidated silt and clay layers which is interpreted to be primarily of lacustrine origin. Most of this sequence is stratigraphically lower than the basalts, but there is some interbedding of the upper lacustrine strata with the lower basalt flows. Schmidt and Mackin (1970, p.4), on the bases of stratigraphic position and pollen studies, tentatively correlated this unit with the Latah Formation of Tertiary age. Because of its poorly resistant nature, this unit is not well exposed on the surface. However, it can be seen in excavations, and is particularly well exposed in the basalt quarry about one mile northwest of the Cascade Dam. A few specimens of *Equisetum sp.* were found at this locality, but no other plant megafossils are known to have been collected from this formation in the Cascade area.

Surficial Deposits

A detailed study and map of surficial deposits in this area was published in 1970 by Schmidt and Mackin. Most surficial deposits in the Cascade area are either alluvium or glacial drift, primarily moraines and outwash. Colluvium and lacustrine strata are also present but these materials comprise smaller portions of the surficial deposits. Most of these surficial materials were deposited during the Quaternary Epoch, but Schmidt and Mackin (1970, p.11) suggest that some of them, mostly sediments on the floors of the fault block valleys, are of Pliocene age.

Faults

Earlier workers such as Anderson (1934) and Capps (1941) who described block faulting in west-central Idaho considered it to be a northward continuation of Basin-and-Range structures. This conclusion was apparently based on the following similarities between structures in the two areas: types of movement are similar; strikes of major faults are similar; and age span of movement is similar, although age is better documented in the Basin-and-Range Province.

The largest faults in the Cascade area trend north-south and north-northeast, however, as can be seen by the map (Plate I), other faults trend northeast, east-northeast, northwest and west-northwest while still others are curved in plan. Most faults in the area appear to be high angle with dip-slip movement as best as can be interpreted from field evidence, which is admittedly scanty. Considerable fault movement occurred after the Columbia River Basalt was emplaced in Miocene time and before the intensive glaciation of the early Pleistocene. Two early workers (Anderson, 1934, p.26 and Capps, 1941, p.6) have assigned a late Pliocene age to the major faulting. While this age determination may be accurate for the major faulting, the differences in geomorphic expression as well the offsetting relationships show that faulting has occurred at different times in various parts of the area and probably occurred at many different times along each of the large faults. Recent seismic and microseismic observations show continued activity. Long Valley, Cascade Valley and Round Valley are all basically fault-bounded structures which

can properly be called grabens.

The Long Valley fault trends approximately north-south through the map area. This fault is reported (Capps, 1941, p.7) to extend as a single fault from Boise to Grangeville, a distance of 160 miles. Field observations made during this study show that although the system of faults may indeed extend for 160 miles, the Long Valley fault as a continuous fracture is not nearly so long. The Long Valley fault separates West Mountain, with its cap of westerly dipping basalts, from Long Valley, 3,000 feet below. A total throw on this fault of at least 10,000 feet is determined by combining the 3,000 foot West Mountain escarpment with the 7,000 feet of sedimentary fill indicated by a gravity survey (Kinoshita, 1962) to exist in Long Valley near the northern margin of the study area for this project. Glacial sediments obscure the fault trace and prove that it has not experienced significant movement since these materials were deposited starting in early Pleistocene time. Despite its large displacement and relative recency, (10,000 feet of displacement, and offsetting of Miocene strata) there are no known hot springs or other geothermal indications along the Long Valley fault. Two faults in the map area (Plate I) appear to have lateral components. One of these is herein termed the Scott Valley fault, and it strikes north-south through the eastern part of the map where it makes the western margins of Scott Valley and Horsethief Basin. This is an oblique fault with the east block having moved down and north relative to the west block which moved up and south. The other location where lateral movement is indicated involves the north 60° west fault going through the south edge of the town of Cascade and/or the north 75° west fault going

through the Cascade damsite. Geomorphic evidence suggests left lateral movement along one or both of these faults. Microseismic monitoring indicates continued activity along faults in this immediate area.

Fault Controlled Hot Springs

Eleven hot springs are located within, or immediately adjacent to, the area mapped in this project (Plate I); all of them are within twelve miles of Cascade and all are fault controlled. In addition, one former hot spring on Little Pearsol Creek, about four miles east of Cascade, has dried up in the last 20 years and several former hot springs on the fault trace about one mile northwest of Cascade are now flooded by the reservoir. Silica analysis and projected temperatures at depth were done on seven of these springs. The four hot springs near the Boiling Springs Guard Station, just off the south-western portion of the map, were not included in these analyses.

Silica analyses were done by the standard molybdosilicate method (Taras and other, 1971, p.303) using a Bausch and Lomb Spectronic 20 spectrophotometer. The mixing model used to project temperatures at depth is the one established by Fournier and Truesdell (1974). For the purposes of establishing a mixing model, a temperature of 10°C and a silica content of 25 ppm was used for all cold water mixes based on analyses of representative samples collected near hot springs.

From Table 1 it can be seen that surface temperatures of hot springs range from 36°C to 71°C, while silica contents range from 42.9 ppm to 68 ppm. A mixing model using these hot spring temperatures and silica contents along with a cold water temperature of 10°C and silica content

Hot Springs	Location	Silica ppm	Temperature °C Surface	Mixing Model
Cabarton	SW¼, Sec. 31, T13N, R4E	68.0	71.0°	147°
Arling	NW¼, Sec. 13, T15N, R3E	56.6	40.0	179
Gold Fork	SW¼. Sec. 35, T16N, R4E	62.3	50.5	165
Flat Creek	SW¼. Sec. 21, T15N, R4E	47.5	38.0	158
Cascade	NE¼, Sec. 36, T14N, R3E	42.9	38.5	140
Little Creek	NE¼, Sec. 5, T14N, R5E	48.6	36.0	168
Belvidere	NE¼, Sec. 13, T13N, R3E	60.0	49.5	163

TABLE 1: Silica analyses and mixing model temperatures of hot springs near Cascade

of 25 ppm predicts temperatures at depth ranging from 140°C to 179°C (Figures 2-8).

It should be noted that five of these hot springs are located on or near the Cascade Valley fault which marks the western edge of Cascade Valley and extends northward through Little Valley. These hot springs, from south to north are Cabarton, Belvidere (also called Sky Ranch), Cascade, Flat Creek and Gold Fork.

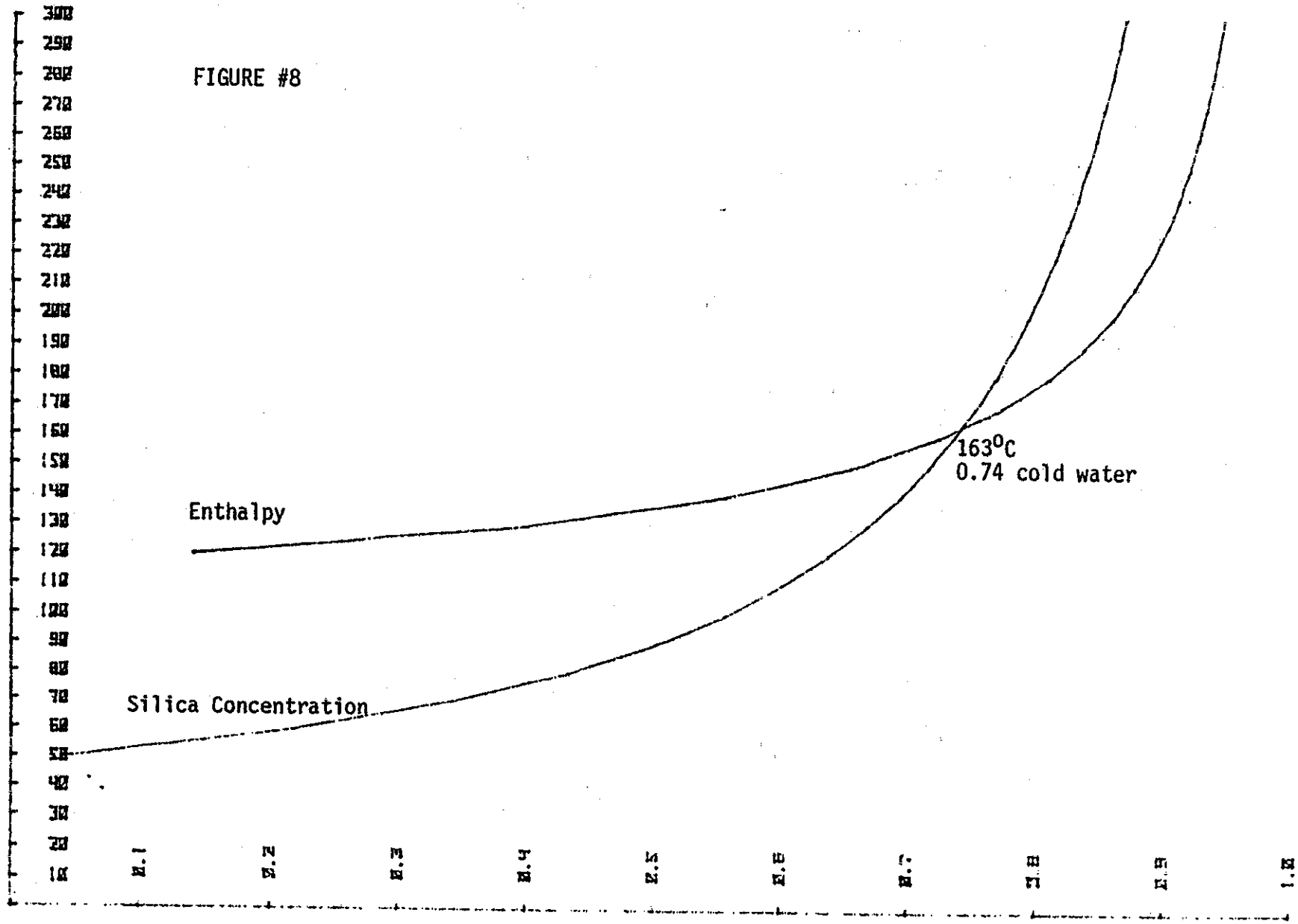
Hydrothermal Alteration Zones

Zones of rock alteration exist along several faults in the Cascade area. In an attempt to determine the extent to which hydrothermal solutions were responsible for this rock alteration, eleven samples were collected for powder analysis by x-ray diffraction techniques.

Table II shows the locations of samples collected and results of the x-ray analyses. In fault zones where hydrothermal alteration has occurred kaolinite is usually found. Such fault zone kaolinite, however, may have been formed at depth because hot waters flowing out at the surface tend to deposit silica rather than alter rock (Clayton R. Nichols, personal communication, 1975). Kaolinite was found in significant amounts in two of the alteration zones and it was found in minor amounts in three others. Zeolite minerals are often found where there has been extensive fracturing and mylonitization of rock and they are usually associated with illite and montmorillonite (Clayton R. Nichols, personal communication, 1975).

X-AXIS=FRACTION COLD WATER
#7 SKY RANCH (BELVIDERE)

FIGURE #8



factor of water quality or quantity.

Thermal Water

Introduction

The thermal water occurrences found in the study area are directly related to geologic structure as previously outlined in previous sections of this report. Hot springs and wells are located at several locations as shown in Plate II, and all of these locations lie upon or adjacent to fault zones as shown in Plate I. It is primarily due to this structural affinity that a reasonably accurate assessment of the potential for development of the resource can be made.

Possible Thermal Reservoir Units

Generally, water temperatures from many of the springs and wells issuing from or penetrating the valley fill materials are higher than temperatures that are considered normal in springs and wells close to fault zones in granite. For this reason, these two units may be considered as possible reservoir units or sources of thermal water.

Granitic Rocks - The granitic rocks exposed on the boundaries of the Cascade-Long Valley study area contain a high number of hot springs (Plate I). These rocks from the basement complex in the area; and because granitic rocks are generally dense and impermeable, they may not contain significant volumes of hot water. However, because the hot water in the area appears to be concentrated near large fracture zones and drillers' logs often indicate a significant thickness of decomposed granite near the upper surface of the unit, it may be that those portions of the unit constitute a significant aquifer. Unfortunately, sufficient data do not yet exist to make that specific an assessment.

Valley Fill - A few wells drilled into the valley fill near fault zones yield water of moderate temperature (42.5°C). It is believed that water leaking from fault zones in the granitic rocks enters the valley fill and move laterally out into the valley. Because of the layered structure of the valley fill and the large number of relatively impermeable lenses, there may be a significant amount of hot water leaking from the granitic rocks into the valley fill that is yet undiscovered. The shallow wells do not provide sufficient data because they have penetrated only a very minor section of the valley fill. As in the granitic rocks, however, the lack of deep well data precludes any true assessment of the unit's potential as a thermal aquifer.

Thermal Water Quality

Analyses of four thermal wells or springs are shown on Table III. Interpretation of these samples analyzed by the U.S. Geological Survey (Young and Mitchell, 1973) demonstrates the separation between the thermal and non-thermal systems in the valley as we know them. While mixing between the two systems does occur upon ascension of the hot water, the difference in ionic constituents and the lack of correlation between ratios of several of the ions indicates a very different circulation pattern between the hot water and the cold water present in the valley.

As shown in Table III, the thermal water in the valley is alkaline, has a high sodium and chloride content and a relatively high total dissolved solids content. The cold water is acid and has low sodium and chloride content and very low total dissolved solids content. The primary reason for the wide variability in chemical constituents is believed to be the result of circulation pattern, temperature of the water and time of travel within the aquifer system.

It should be noted that the quality of the thermal waters analyzed is excellent in comparison to hot springs and wells in other areas of the nation and world, and in fact could be utilized for irrigation of all crops now growing in the valley. The sodium absorption ratio (SAR) for Cabarton Hot Springs, the highest in total dissolved solids, is 4.6. Generally, water having an SAR value less than 10 is considered to be suitable for irrigation of the crops grown in this area.

Recharge Characteristics

Any discussion of recharge to the geothermal system must necessarily be limited because of the lack of data available. However, some conslusions can be drawn, based on the results of this study.

The chemistry of the thermal water in the study area is notably low in dissolved solids and conductivity. This, coupled with the knowledge of the geology of the area, indicates the water is: (1) of meteoric origin, (2) has not traveled great distances in the reservoir rock, and (3) has a relatively direct connection with the recharge area. Additionally, the thermal system probably acts as a minor source of recharge for the cold water system beneath the valley floor. Because of the lack of definite hydrologic parameters, no assessment of the quantity of recharge to the thermal system can be made.

Conclusions and Recommendations

Based upon the investigation conducted in the Cascade-Long Valley area, several conclusions regarding both the thermal and non-thermal ground water systems can be drawn. These are as follows:

1 Water supplies in the valley are sufficient for all uses now being made. The river and stream system provides adequate water for irrigation of all agricultural land.

2 The major non-thermal aquifer is the valley fill and alluvium, and it is adequate to supply water for nearly all wells on the valley floor and future ground water development.

3 The valley fill aquifer contains a large number of artesian zones, most of which are untapped and are capable of supplying fair yields to wells.

4 The hydrologic parameters, such as the storage coefficent and transmissivity, have not been calculated because of a lack of adequate pumping well data.

5 Water quality in the cold water system is considered to be poor for domestic purposes because of the high iron and manganese content. Other constituents, however, are within acceptable limits.

6 Known thermal water occurrences in the valley are related to the geologic structure. Locations of existing hot springs are directly controlled by the presence of fault and fracture patterns.

7 Both the granitic rocks and valley fill offer potential as reservoirs for thermal water. A significant untapped thermal aquifer may exist at depth in the valley fill.

8 Quality of the present geothermal resource is good. Samples analyzed show that hot water issuing from springs and wells in the area can be utilized for nearly all uses, including irrigation of crops.

9 Recharge to both the non-thermal and thermal systems is probably

meteoric in origin. Chemical differences in the water are the result of the longer time of travel and heat in the thermal reservoir.

Several recommendations can be made for further study in the Cascade-Long Valley area. These include:

1 Resistivity techniques should be utilized to determine the possibility of a large thermal aquifer present in the valley fill..

2 Based upon the results of the resistivity, study participants should confer and agree upon the location and depth of at least two drill sites on the valley floor for test holes. These holes should be constructed in such a manner as to permit packer testing. Parameters of transmissivity and storage should be determined, as well as geological analysis of penetrated formations and water quality changes with depth.

3 One additional drill site should be located in such a manner as to assess the capability of the granitic rocks to function as a thermal aquifer. Location of the well site should take into account geologic structure with emphasis on fault patterns and the proximity to the ultimate place of use, should development occur.


CASCADE RESERVOIR
SPILLWAY ELEV 4815 OCT 1954
CASCADE PARK
N FK PAYETTE
PAYETTE
Belvidere
Caberton
Kib
Qs
Du
Dl
Creek
RIVER
VALLEY

ATTACHMENT C
EXCERPTS FROM USGS WATER RESOURCES INVESTIGATIONS OPEN FILE REPORT 80-1020

THERMAL SPRINGS IN THE PAYETTE RIVER BASIN, WEST-CENTRAL IDAHO

By R. E. Lewis and H. W. Young

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations

Open-File Report 80-1020



October 1980

common ions, silica, and the minor elements arsenic, boron, lithium, and mercury, are given in table 1. In addition, chemical analyses of water from three thermal springs sampled by Young and Mitchell (1973) and five thermal springs for which only partial analyses are available are included. Spring locations are shown on plate 1.

Chemical Character

All the thermal springs discharge fresh water (less than 600 mg/L dissolved solids) of a sodium bicarbonate type, at temperatures between 34° and 86°C. These waters are slightly alkaline--pH ranges from 8.0 to 9.6. Generally, the higher pH values are associated with waters having lower concentrations of dissolved solids. Concentrations of chloride and fluoride are variable and show no definite correlation with temperature. Concentration of boron is low compared with other thermal waters in Idaho, and is, to a degree, correlative with water temperature.

Nonthermal spring waters are either a calcium or sodium bicarbonate type. Water temperature measured in these springs is 7.0°C or less and, generally, is representative of local, ambient conditions. Concentrations of dissolved solids in these near-neutral waters (pH ranges from 6.2 to 7.3) are 90 mg/L or less.

Chemical Geothermometers

Aquifer temperatures in the Payette River basin were estimated using the silica geothermometer (Fournier and Rowe, 1966) and the Na-K-Ca geothermometer (Fournier and Truesdell, 1973). Temperatures estimated by these chemical geothermometers are valid only for hot-water systems and only if the following basic assumptions are met (Fournier, White, and Truesdell, 1974): (1) The chemical reactions at depth are temperature dependent; (2) an adequate supply of chemical constituents used for the thermometry is present in the aquifer; (3) chemical equilibrium is established at depth between the hot water and the specific aquifer minerals; (4) there is negligible reequilibration of the chemical composition of the hot water as it rises to the surface; and (5) hot water rises rapidly to the surface with no dilution or mixing of hot and cold waters.

Dissolved silica (SiO_2) reported in chemical analyses is actually present as silicic acid (H_4SiO_4) and various dissociated species, particularly $H_3SiO_4^-$. In neutral to slightly acid waters, dissolved silica ($H_4SiO_4 + H_3SiO_4^-$) consists mostly of H_4SiO_4, and, under these conditions,

Table 1. Chemical analyses of water from thermal and selected nonthermal springs

[Chemical constituents in milligrams per liter, except where noted]

-- = Constituents not analyzed for,
< = Less than.

Spring no.	Date of collection	Flow rate[1] (gal/min)	Specific conductance (µmhos)	pH	Water temperature[2] (°C)	Hardness as $CaCO_3$	Noncarbonate hardness	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Percent sodium	Sodium-adsorption ratio (SAR)	Potassium (K)	Bicarbonate[3] (HCO_3)	Carbonate[3] (CO_3)	Alkalinity as $CaCO_3$	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Silica (SiO_2)	Dissolved solids (calculated)	Nitrite plus nitrate as N (NO_2+NO_3)	Phosphorus, total as P	Arsenic (As) (µg/l)	Boron (B) (µg/l)	Lithium (Li) (µg/l)	Mercury (Hg) (µg/l)
Nonthermal																											
17N- 2E-15BAB1S	6-28-79	2	85	7.3	7.0	31	0	7.8	2.9	3.9	20	0.3	1.8	51	0	42	2.6	0.4	<.1	45	90	0.11	0.02	0	2	<4	<0.01
15N- 5E-23DAC1S	6-27-79	2	20	6.2	4.0	5	1	1.7	.2	2.4	53	.5	.3	12	0	10	.7	.3	.2	17	29	<.01	.02	1	0	<4	<.01
13N- 5E-21CAA1S	6-26-79	4	21	6.2	6.5	3	0	1.1	.1	1.9	58	.5	.2	7	0	6	1.4	.4	<.1	13	22	<.01	.02	0	0	<4	<.01
9N- 9E-32BAD1S	8-31-79	2	52	6.6	4.5	17	0	3.8	1.9	3.1	27	.3	.6	29	0	24	1.9	.4	.1	14	42	.13	.02	0	10	10	<.01
Thermal																											
16N- 4E-35CCB1S	6-27-79	94	304	9.5	50.0	3	0	1.1	<.1	70	98	18	.7	49	36	100	12	11	9.0	63	215	<.01	.01	11	50	30	<.01
15N- 3E-13BBC1S	8- 2-72	798	279	--	34.0	4	0	1.3	.1	60	97	14	.6	17	45	89	43	16	2.6	60	210	--	--	--	--	--	--
15N- 4E-21DCC1S	6-27-79	31	206	9.6	36.0	4	0	1.3	.1	43	96	9.8	.5	32	34	84	7.8	2.5	2.1	48	146	<.01	.01	3	10	8	<.01
13N- 3E-13ADA1S	6-26-79	20	433	9.3	49.0	3	0	1.2	<.1	85	98	21	1.0	56	34	102	24	28	5.3	61	256	<.01	.01	21	310	40	<.01
13N- 4E-31CAB1S	6-26-79	70	514	9.0	71.0	4	0	1.5	<.1	110	97	25	2.1	68	25	97	43	40	11	72	329	<.01	.01	39	400	60	.1
13N- 6E-29DAB1S	7- 7-79	50	334	9.5	53.0	4	0	1.6	.1	64	96	13	1.3	32	36	86	31	7.8	15	80	240	<.01	.01	6	50	30	<.01
12N- 5E- 2CCC1S	7- 8-79	12	--	--	46.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2DAC1S	7- 8-79	10	337	9.3	50.0	3	0	1.3	<.1	65	97	16	1.1	34	34	84	16	6.5	16	73	219	<.01	<.01	6	60	60	<.01
10DDD1S	7- 8-79	22	--	--	66.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22BBC1S	6- 5-79	134	331	8.9	86.0	4	0	1.4	.1	74	96	16	1.9	95	18	108	12	11	12	86	259	<.01	.01	10	90	80	.2
36DBA1S	8- 8-79	334	266	8.9	38.0	7	0	2.8	<.1	54	94	8.9	.9	77	5	71	26	5.8	12	54	196	.03	.02	5	50	50	<.01
11N- 5E-29CDB1S	8- 8-79	50	293	8.8	49.0	8	0	3.1	<.1	97	96	4.8	.9	99	4	88	24	9.6	13	74	277	<.01	.01	6	70	90	<.01
11N- 7E-16AAB1S	7-24-79	90	315	9.3	65.0	5	0	1.8	.1	65	95	13	1.8	13	35	69	36	3.9	15	82	236	.02	.03	14	50	80	<.01
10N- 4E-33CBD1S	11-27-78	500	402	8.4	75.0	5	0	1.9	.1	90	96	17	3.2	130	2	110	27	19	13	110	331	.01	<.01	9	120	100	<.01
10N-10E-31BCC1S	3-13-79	360	378	9.3	84.0	4	0	1.5	<.1	77	96	17	3.2	18	38	78	50	8.0	17	91	282	<.01	<.01	1	70	110	.2
10N-11E-31ADD1S	5- 7-79	75	381	9.6	67.0	5	0	1.9	.1	77	95	15	2.6	1	45	76	46	9.5	15	82	267	.02	<.01	2	90	110	.1
9N- 3E-25BAC1S	11-22-78	32	622	8.0	79.5	16	0	6.1	.1	120	92	13	5.3	160	0	131	88	39	12	120	470	.01	<.01	5	240	150	<.01
9N- 7E-35AAA1S	5- 7-79	3	287	9.3	37.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9N- 8E-31ACA1S	3-13-79	20	369	9.2	63.5	4	0	1.4	<.1	79	97	18	1.8	40	31	84	39	5.7	20	83	270	<.01	<.01	2	20	120	<.01
32CBA1S	2-27-79	350	321	9.1	64.0	5	0	1.9	<.1	70	96	14	1.3	29	29	72	39	3.9	16	67	232	.02	<.01	2	50	110	<.01
9N- 9E-22DCA1S	7-29-79	13	--	--	54.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8N- 5E- 1BCC1S	6- 8-72	1.5	317	--	40.0	6	0	2.4	.1	66	95	11	.9	85	1	71	42	5.1	3.1	48	216	--	--	--	--	--	--
6DCB1S	11-23-78	14	359	9.0	42.0	8	0	2.9	.1	77	95	12	1.2	67	20	88	37	7.3	15	75	262	.01	<.01	6	110	120	<.01
6DCC1S	2-26-79	75	343	9.1	51.0	12	0	5.0	<.1	72	92	8.9	1.3	61	22	87	36	7.8	15	63	245	.01	<.01	6	110	130	<.01
10ADD1S	11-22-78	10	344	9.0	54.0	5	0	2.0	<.1	76	96	15	1.2	59	19	80	40	5.7	14	78	259	.01	<.01	4	90	80	<.01
10BDD1S	11-27-78	90	345	9.2	54.5	5	0	2.0	.1	75	96	14	1.0	40	23	78	38	5.7	14	74	249	.01	<.01	4	70	70	<.01
11BAA1S	2-26-79	35	352	9.1	60.0	5	0	1.8	<.1	78	96	16	1.4	49	28	87	41	5.4	17	66	254	.01	<.01	5	90	160	<.01
11BAC1S	7-25-79	5	346	9.2	56.5	--	--	--	--	--	--	--	--	43	26	79	--	--	--	--	--	--	--	--	--	--	--
8N- 6E- 1ADB1S	2-27-79	175	343	9.2	59.5	5	0	2.0	<.1	75	96	15	1.1	39	29	80	38	6.7	17	63	242	.01	<.01	6	80	100	<.01
7N- 1E- 8DDA1S	9- 5-79	50	780	8.0	64.0	22	0	8.4	.2	160	92	15	8.0	180	0	148	120	61	16	110	573	<.01	<.01	10	710	220	<.01
9CDC1S	8- 4-72	20	529	--	45.0	47	0	15	2.4	99	80	6.3	5.3	169	0	139	57	30	8	94	397	--	--	--	--	--	--

[1]Flow rate is for entire spring complex.
[2]Water temperature is highest temperature at spring vents or temperature of sampled vent.
[3]Total alkalinity distributed as carbonate and bicarbonate at the spring temperature and pH.
[4]Analyses taken from Young and Mitchell (1973).
[5]Temperature may be higher because vents were underwater.
[6]Shown in Young and Mitchell (1973) as BCB1S.

silica geothermometers give good estimates of reservoir temperatures. In alkaline waters, hydroxide (OH^-) reacts with silicic acid to reduce the proportion of silicic acid to total dissolved silica. The total concentration of dissolved silica measured in the laboratory (H_4SiO_4 + $H_3SiO_4^-$) must therefore be reduced by the concentration of $H_3SiO_4^-$ occurring at the pH level of the spring water, to obtain an accurate estimate of the reservoir temperature.

For thermal waters having pH greater than 8.2, reported values for dissolved silica were corrected for dissociation of silicic acid at the spring temperature, and reservoir temperatures were estimated assuming equilibrium with both quartz and chalcedony (table 2). The pH of water in the thermal aquifer would be slightly lower than the pH measured at the spring, and calculation of aquifer pH might increase the $H_3SiO_4^-$-corrected quartz temperature by 5° or 10°C (R. H. Mariner, written commun., 1980). Calculation of aquifer pH requires consideration of acid-base equilibria, distribution of acidic gases between steam and water, and the effect of temperature on the equilibria (Ellis and Mahon, 1977). Most of the calculations are time consuming and require computer methods, such as those presented by Truesdell and Singers (1973).

Concentration of magnesium in thermal waters sampled generally was 0.1 mg/L or less, so corrections for magnesium in the Na-K-Ca geothermometer suggested by Fournier and Potter (1979) were not applied. Applying the magnesium correction to the Na-K-Ca geothermometer for one thermal spring having a magnesium concentration of 2.4 mg/L increased the estimated reservoir temperature by 6° to 90°C.

Reservoir temperatures calculated from water analyses for 26 thermal springs in the Payette River basin are given in table 2, along with selected chemical reaction coefficients. In applying the $H_3SiO_4^-$-corrected silica geothermometer for thermal springs having water temperature at the land surface generally greater than 65°C, best estimates were obtained by assuming that quartz was controlling the SiO_2 concentration. For springs having temperatures at the surface generally less than 65°C, better estimates of reservoir temperature were obtained by assuming that chalcedony was controlling the SiO_2 concentration. If, however, the calculated free energy of formation showed the waters were unsaturated with chalcedony; or, if the estimated temperature was less than the temperature of the spring, then quartz was assumed to be controlling the SiO_2 concentration.

Using a plot of reservoir temperatures estimated by the silica and the Na-K-Ca geothermometers, Fournier, Sorey, Mariner, and Truesdell (1979) showed waters that plot on or

Table 2. Estimated aquifer temperatures and free energy of formation for selected thermal springs

Spring No.	Water temperature at the surface (°C)	Estimated aquifer temperatures based on geothermometers: Silica quartz-conductive (°C)	Silica quartz-conductive $H_3SiO_4^-$ corrected (°C)	Sodium-potassium-calcium (°C)	Silica-chalcedony (°C)	Silica-chalcedony $H_3SiO_4^-$ corrected (°C)	Free energy of formation[1]: Aragonite	Calcite	Chalcedony	Quartz	Reference No. (fig.2)
16N- 4E-35CCB1S	50.0	113	69	71	84	37	0.1	0.2	-0.2	0.3	1
15N- 3E-13BBC1S	34.0	110	61	61	81	28	-.1	0	-.1	.5	2
15N- 4E-21DCC1S	36.0	100	62	53	70	30	0	.1	-.1	.5	3
13N- 3E-13ADA1S	49.0	111	79	83	82	47	0	.1	0	.5	4
13N- 4E-31CAB1S	71.0	120	91	117	91	61	.1	.2	-.1	.3	5
13N- 6E-29DAB1S	53.0	125	76	82	97	45	.2	.3	-.1	.4	6
12N- 5E- 2DAC1S	50.0	120	86	81	92	55	0	0	.1	.6	7
22BBC1S	86.0	129	101	100	101	71	.3	.4	-.2	.2	8
36DBA1S	38.0	105	93	57	76	62	-.3	-.2	.3	.9	9
11N- 5E-29CDB1S	49.0	121	107	61	93	77	-.1	0	.4	.9	10
11N- 7E-16AAB1S	65.0	126	84	91	99	52	-.3	.4	-.2	.3	11
0N- 4E-33CBD1S	75.0	143	132	138	116	105	-.3	-.2	.4	.8	12
0N-10E-31BCC1S	84.0	132	81	145	105	50	.5	.6	-.5	-.1	13
10N-11E-31ADD1S	67.0	126	63	134	99	31	.6	.7	-.5	-.1	14
9N- 3E-25BAC1S	79.5	148	143	144	122	116	.1	.2	.5	.9	15
9N- 8E-31ACA1S	63.5	127	90	99	99	60	.1	.2	0	.4	16
32CBA1S	64.0	116	86	79	87	55	.2	.3	-.1	.4	17
8N- 5E- 1BCC1S	40.0	100	89	62	70	59	-.5	-.4	.3	.8	18
6DCB1S	42.0	122	104	69	94	74	.1	.1	.4	1.0	19
6DCC1S	51.0	113	88	60	84	58	.6	.7	.1	.6	20
10ADD1S	54.0	124	101	76	96	71	-.1	0	.2	.8	21
10BDD1S	54.5	121	89	70	93	58	.1	.2	.1	.6	22
11BAA1S	60.0	115	87	84	86	56	.2	.2	0	.4	23
8N- 6E- 1ADB1S	59.5	113	80	74	84	49	.3	.3	-.1	.3	24
7N- 1E- 8DDA1S	64.0	143	138	152	116	112	0	.1	.6	1.1	25
9CDC1S	45.0	134	133	[2]90	107	106	-.5	-.4	.8	1.3	26

[1]Values are departure from theoretical equilibrium in kilocalories; (+) values indicate supersaturation, (-) values indicate unsaturated. Calculations from computer program SOLMNEQ (Kharaka and Barnes, 1973).
[2]Magnesium corrected (Fournier and Potter, 1979).

near the equal-temperature line ($T°_{SiO_2} = T°_{Na-K-Ca}$; slope = 1) are likely to be unmixed waters or waters that have reequilibrated with the aquifer minerals after mixing. Waters that plot significantly above the equal-temperature line probably contain anomalous concentrations of silica, owing to evaporation or to dissolving amorphous silica from the aquifer material. The Na-K-Ca geothermometer uses ratios of constituents and is less sensitive to concentration changes that occur during evaporation than is the silica geothermometer.

Waters that plot significantly below the equal-temperature line may be due to: (1) Mixing with another type water without sufficient time to equilibrate with the surrounding rock (in mixed waters, silica-estimated temperatures are generally decreased more than Na-K-Ca estimated temperatures); (2) precipitation of silica during cooling, whereas Na-K-Ca proportions remain unchanged; or (3) precipitation of calcite or aragonite due to loss of carbon dioxide without adjustment of sodium and potassium through reaction with clays, zeolites, or other minerals (Fournier and others, 1979).

Figure 2 is a plot of reservoir temperatures estimated using silica and Na-K-Ca geothermometers for thermal springs in the Payette River basin. Most thermal springs plot on or near the equal-temperature line. As suggested by Fournier and others (1979), these waters are probably unmixed waters that have lost some heat through conduction or are mixed waters that have had time to reequilibrate. Several springs (samples 5, 7, 13, and 14) plot significantly below the equal-temperature line and may indicate a mixed water or water from which calcite and aragonite have precipitated. Table 2 shows that, with the exception of sample 7, waters from these springs are supersaturated with calcite or aragonite, which may indicate a possible loss of calcium without an adjustment of the sodium and potassium concentrations. For these samples, the silica geothermometer probably gives the better estimate of reservoir temperature.

Only two springs (samples 10 and 26) plot significantly above the equal-temperature line in figure 2. These waters are thought to have dissolved amorphous silica from the aquifer materials (calculated free energy of formation of amorphous silica is 0, which indicates equilibrium with this phase). For these springs, the Na-K-Ca geothermometer probably gives the better estimate of reservoir temperature.

Estimated reservoir temperatures determined from the silica and Na-K-Ca geothermometers are highly variable and range from 53° to 143°C. Along the North Fork of the

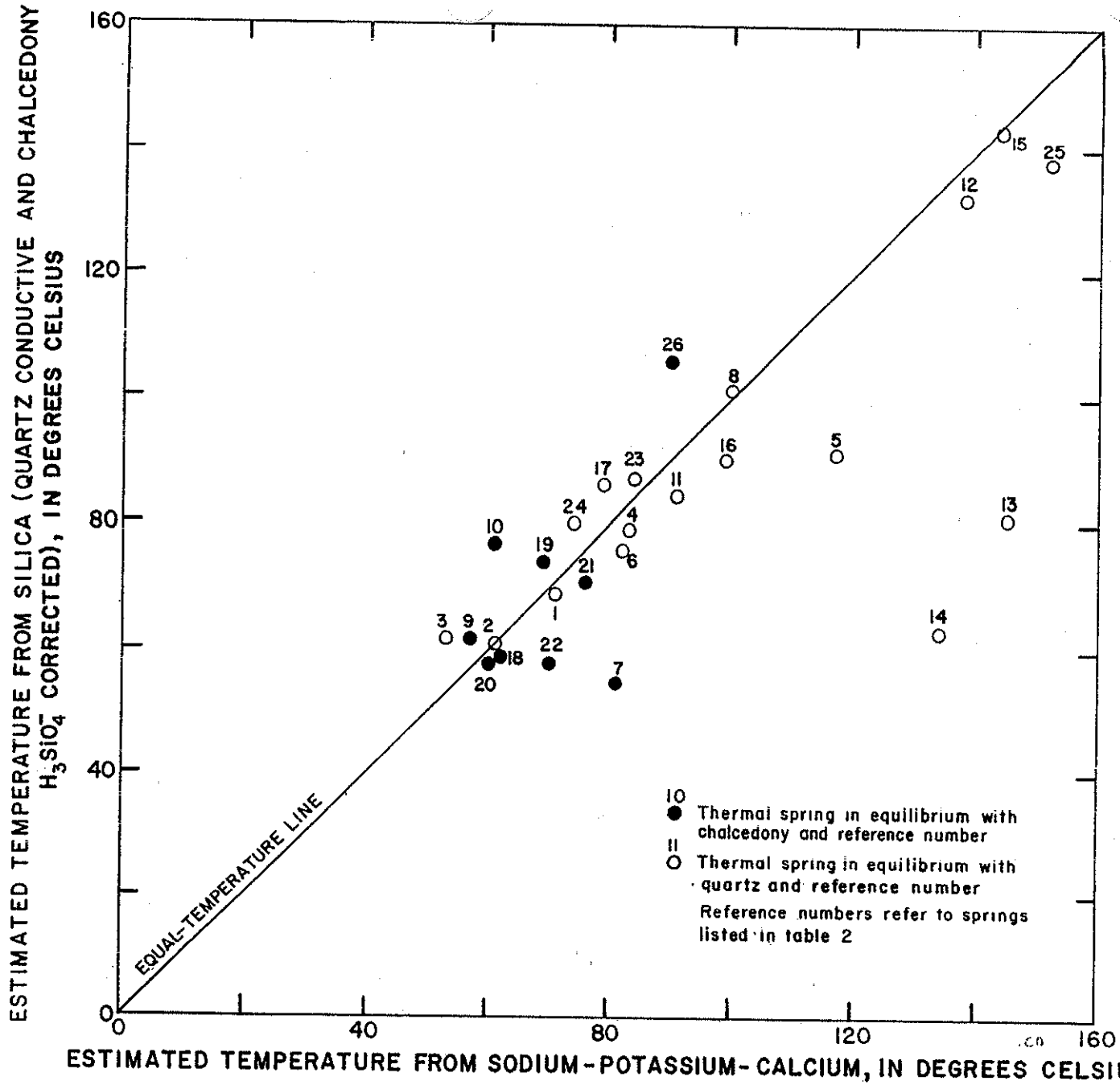


Figure 2.-- Comparsion of reservoir temperatures estimated by the silica and sodium-potassium-calcium geothermometers

53° to 91°C. Along the Middle and South Forks of the Payette River, estimated reservoir temperatures range from 57° to 138°C and 58° to 99°C, respectively. Estimated reservoir temperatures along the Payette River from Banks, Idaho, range from 90° to 143°C.

Assuming conductive heat loss, reservoir temperatures for six thermal springs were estimated using the sulfate-water isotope geothermometer described by McKenzie and Truesdell (1977): 16N-4E-35CCB1S, 71°C; 13N-4E-31CAB1S, 75°C; 13N-6E-29DAB1S, 71°C; 9N-3E-25BAC1S, 139°C; 9N-8E-32CBA1S, 88°C; and 8N-5E-10BDD1S, 76°C. Additional temperatures of 89° and 94°C were estimated for thermal springs 12N-5E-22BBC1S and 10N-10E-31BCC1S, respectively, by Nehring and others (1979).

Isotopes

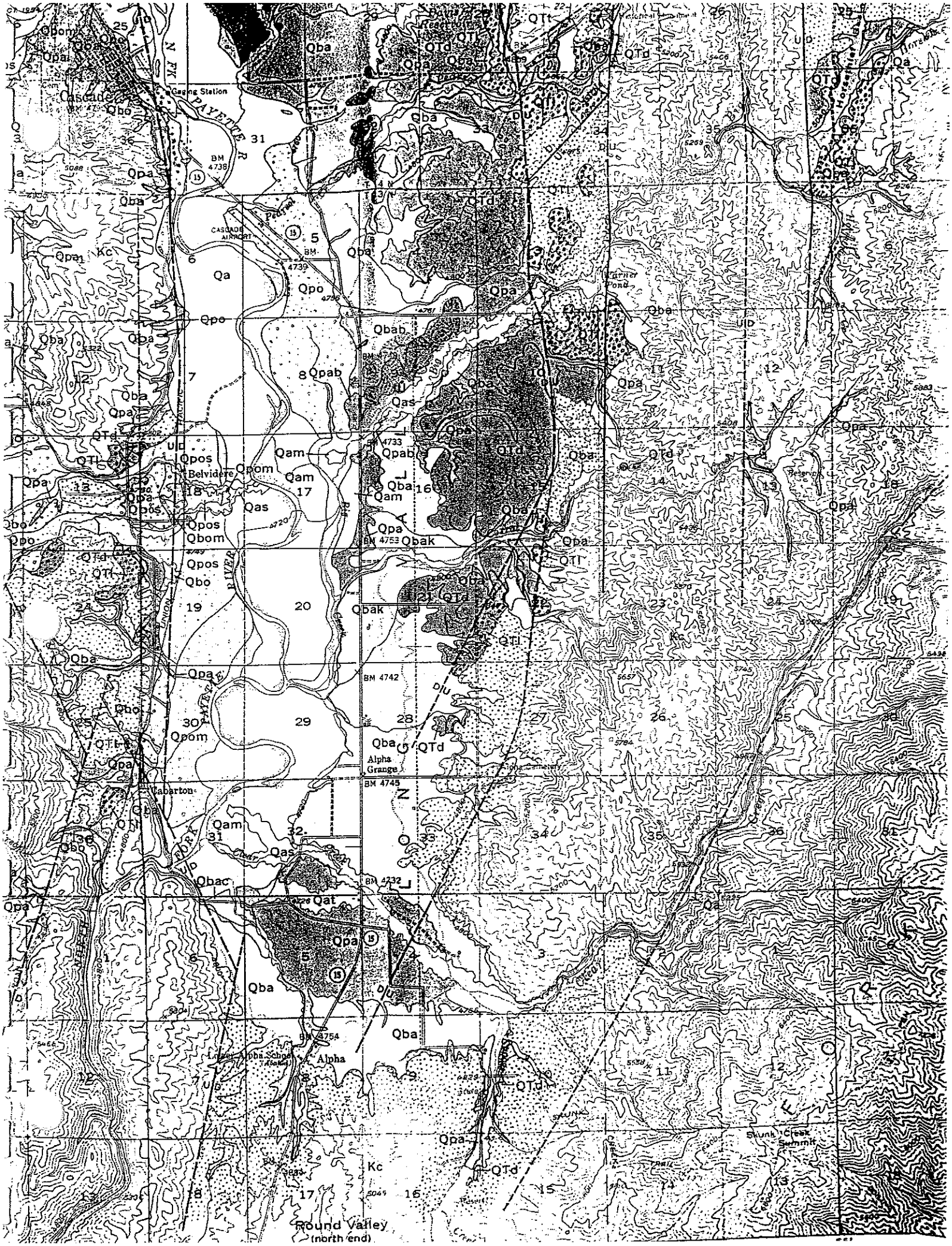
Samples of thermal and nonthermal water from selected springs in the Payette River basin were collected for analyses of oxygen-18, deuterium, and tritium. In this report, isotope data are presented in tabular and graphical format (tables 3 and 4 and fig. 3); interpretations concerning age or relation of the various waters are offered only insofar as they apply to the Payette River basin and are considered preliminary. A discussion of the isotopic composition and possible relations of thermal waters in the Payette, Salmon, and Boise River basins will be presented in a final report.

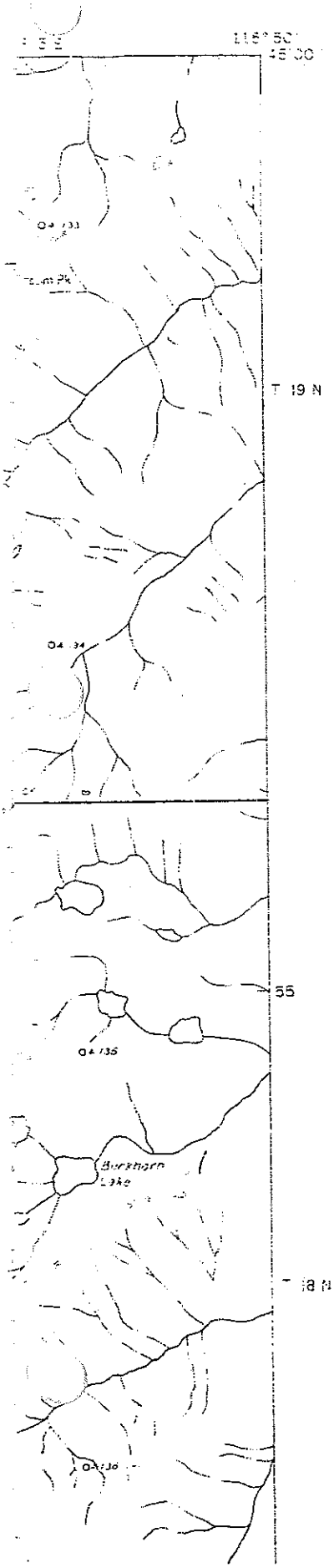
Tritium

Tritium (H^3) is produced naturally in small quantities in the upper atmosphere during bombardment by subatomic particles. The tritium, incorporated in water molecules, enters the water cycle in rain and snow. Having a half life of about 12.3 years, tritium can be used to determine how long a particular water may have been stored out of contact with the atmosphere. The transit or residence time can be determined from the concentration of tritium in the discharge water, if the amount of tritium in the recharge water and the nature of the subsurface flow regime are known.

Before extensive thermonuclear testing began in 1954, tritium in the atmosphere ranged from 10 to 20 TU (tritium unit). One TU equals a $^3H/H$ ratio of about 10, or about 3.2 picocuries per liter. By 1963, worldwide tritium levels had

ATTACHMENT D
GEOLOGIC MAP FROM USGS BULLETIN 1311-A


Cascade
Gaging Station
N FK PAYETTE R
CASCADE AIRPORT
BM 4738
BM 4739
BM 4733
BM 4742
BM 4745
BM 4732
BM 4754
Belvidere
Tabarton
Alpha
Alpha Grange
Lower Alpha School
Round Valley
(north end)
Skunk Creek Summit
Qba
Qpa
Qpo
Qpom
Qpos
Qbom
Qbo
Qbac
Qbab
Qbak
Qam
Qas
Qat
Qa
QTd
QTl
QTt
Kc
Dlu
UID



EXPLANATION

SURFICIAL DEPOSITS

Holocene

Qa | Qam | Qas

Alluvium on flood plains

Includes some colluvium in small stream valleys

Qa, *alluvium undivided*
Qam, *main-stream deposit; designated only where necessary*
Qas, *side-stream deposit; designated only where necessary*

Qat

Terrace alluvium

Noncyclic terraces of larger streams

Qt

Morainal deposit

Cirque moraines and rock glaciers of the Neoglaciation

Ql

Landslide deposits

Pinedale Glaciation

Qpa | Qpab

Alluvium and colluvium

Mostly cyclic periglacial deposits of small streams. South of Cascade, source stream is partly designated.

Qpab, *Big Creek*

Qpo | Qpom | Qpos | Qpto

Outwash

Qpo, *outwash undivided*
Qpom, *main-stream deposit; designated only where necessary*
Qpos, *side-stream deposit; designated only where necessary*
Qpto, *moraine and outwash in ice-scoured cirque and valley floors; mostly stagnation moraine reworked by melt water*

Qpt

Morainal deposit

Qpt, *morainal deposit*
Circular overprint on bedrock color where drift is thin and patchy on abundantly exposed glaciated bedrock

Pleistocene

Bull Lake Glaciation

Qba | Qbab | Qbac | Qbak

Alluvium and colluvium

Mostly cyclic periglacial deposits of small streams. South of Cascade, source streams are partly designated.

Qbab, *Big Creek*
Qbac, *Clear Creek*
Qbak, *Corral Creek*

Qbo | Qbom | Qbos

Outwash

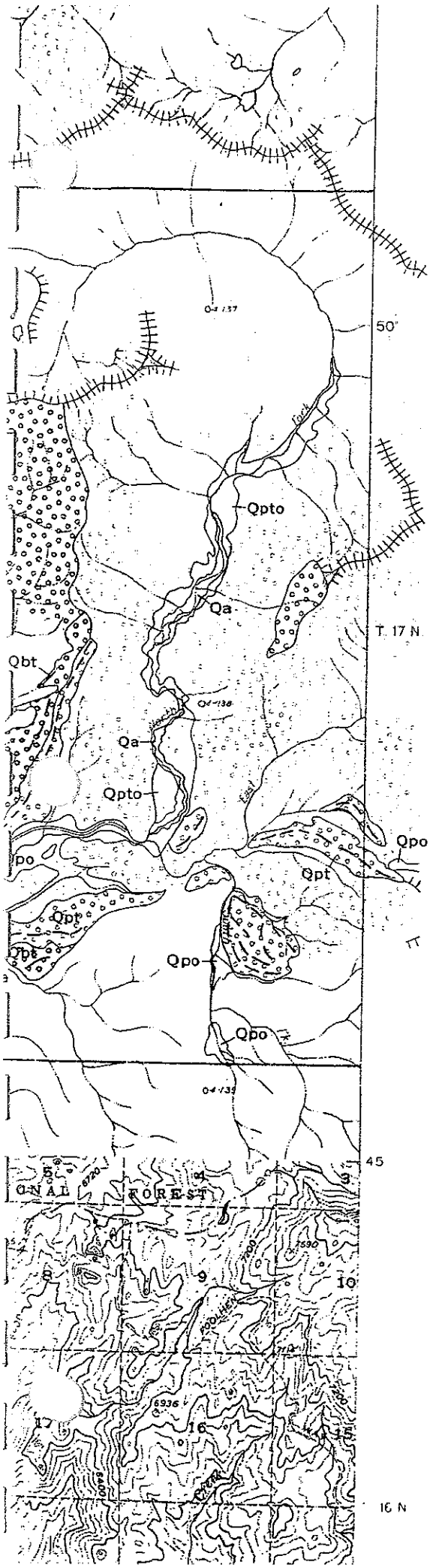
Qbo, *outwash undivided*
Qbom, *main-stream deposit; designated only where necessary*
Qbos, *side-stream deposit; designated only where necessary*

Qbt | Qbtb

Morainal deposit

Qbt, *morainal deposit*

QUATERNARY



Qbtb, *boulder line partly buried by younger outwash* (Qbo)

Circular overprint on bedrock color where drift is thin and patchy on abundantly exposed glaciated bedrock; less accurately mapped than comparable Pinedale areas

Qlg

Lag gravel

Resistant cobbles and pebbles residual from eroded pre-Bull Lake surficial deposits (QTt *and* QTd). *Mostly associated with remnant erosion surfaces*

QTt

Till

Deposits deeply weathered and truncated by erosion; probably of different ages. Source of deposit east of Cascade is not apparent, whereas the source of the deposit southeast of Little Payette Lake probably was Lake Fork drainage

QTd QTd$_1$ QTd$_2$

Fluvial and lacustrine deposits

Deposits of various origins probably including fault-trough fills, aggradational deposits, and glacial deposits. Many are faulted and moderately tilted. All are truncated by erosion and deeply weathered where relief is low; most contain small amounts of detrital gold. Large valley floor deposit east of Lakefork townsite may be proglacial outwash related to oldest morainal deposits on Lake Fork (QTt)

QTd$_1$ *and* QTd$_2$ *subscripts distinguish adjoining deposits of distinctly different ages and origins; unit 1 is younger than unit 2, but correlation outside local area is not implied*

BEDROCK

Tb

Columbia River Basalt

Contacts on West Mountain not accurately located

Tl

Latah(?) Formation

Unconsolidated sediments interbedded with Columbia River Basalt flows but chiefly underlying lowest basalt flows

Kc

Cretaceous and older crystalline rocks

Schist, gneiss, and granitic rock; associated with the Idaho batholith

ATTACHMENT E
CORRESPONDENCE FROM UNPUBLISHED INVESTIGATION AND WELL SITING STUDY FOR EASTERN WESTERN CORPORATION

ASSOCIATED EARTH SCIENCES INC.
• BIOLOGY • GEOLOGY • ENGINEERING • SOIL SURVEYS • SOIL AND WATER QUALITY
• RESOURCE PLANNING AND SITE INVESTIGATIONS

7025 Emerald St., Suite 200A Boise, Idaho 83704 (208) 377-2248

Scanlan Eng.
600 E Riverpark Lane
83706

October 19, 1995

Mr. Michael McGinley
Eastern Western Corporation
P.O.Box 3228
Portland, OR 97208-3228

Subject: Hydrothermal Well
Location: SE of NE of NE 1/4 Sec.13 T.12N. R.3E.

This report summarizes results of studies made by Boise State University (BSU) Geology Department regarding hot water potentials at SE NE NE Sec 13 T12N R3E in Valley County, Idaho.

Field work disclosed a fault scarp believed to be associated with the bath house hot spring. It can be seen about 150 yards west of the hot spring and was projected to pass close to the spring area. The broken rocks dip 55-65 degrees to the south and have a strike of N.70 degrees E.. No other springs were seen associated with this fault at other locations, but if they occur, it may be in or beneath the valley fill. Other faults in the area were not visibly traced to the vicinity of the hot spring.

After some difficulty with equipment,the BSU Geology Department completed their field surveys and a report of their results. It has taken a longer time than I expected for me to obtain that report and arrange a meeting with Dr. Paul Donaldson. During the interview he gave me his interpretation of the test results included in that report, most of which were in the report.

The results of BSU,s field testing produced less guidance than I had hoped. As you have seen in the BSU report, the zone of low resistivity passes through the central portion of the four transects. The low resistivity is believed to indicate the area most favorable for intercepting hydrothermal solutions with a well. Dr. Donaldson discussed the areas of highest probability in the central portion of the zone near transect three. A location selected for drilling in the southern portion of the zone near line three may produce the hottest water, but it would take a greater drilling depth to reach and test the fault zone where the maximum opportunity is believed to occur.

His recommendation was to first try a small diameter test well. It would be located a distance of about 400-450 feet southwesterly from the bath house at an intersect with transect

line three. Here the conditions of temperature, rock fractures, preasures, volume of water, location of the fault etc. could be checked on the way down to the fault zone which lies at an estimated depth of about 800 feet at this point. If conditons appear favorable in the test well, drilling a production well slightly to the south, about 500-600 feet from the bath house, to a depth of 1000-1200 or so, should be considered. The deeper well theoretically would produce hotter water, but not necessarily more water. This would depend upon the rock fracturing present. The exact position and dip of the fault is unknown but these figures are estimates based on an average of 60 degrees dip as seen in the outcrop to the west.

Part of the lack of clarity in the test results, according to Dr. Donaldson, may be due to a thick section of valley fill in the central portion of the valley. The main Payette River valley fault, trending nearly north-south about 2000 feet to the east, has a large displacement that resulted in a drop of the valley on the east side in respect to the west side of the fault. The age and relationship of the hot spring fault to the large fault is unknown and the thickness of Moores, Brush and Olson Creeks' valley alluvium is also unknown until a well is drilled.

Dr. Donaldson stated further testing in the "best area" discussed could be conducted using Resistivity Depth Soundings. This system tests one local area at a time using electronic/magnetic currents. He agreed, however, because of testing delays and additional cost it would probably be better to use the present information and proceed with a test well.

If you have further questions or need further clarification regarding these recommendations, please let me know.

Howard R. Smith, PG
4925 Allamar Dr.
Boise, ID 83704
(208)375-7891

Howard R. Smith



RESISTIVITY INVESTIGATIONS

CABARTON HOT SPRINGS AREA

NEAR CASCADE, IDAHO

REPORT PREPARED FOR

EASTERN-WESTERN CORPORATION

PORTLAND, OREGON

PAUL R DONALDSON, PhD

CENTER FOR GEOPHYSICAL INVESTIGATION
OF THE SHALLOW SUBSURFACE

BOISE STATE UNIVERSITY

AUGUST 30, 1995

1.0 Summary

An electrical resistivity investigation was commissioned by the Eastern-Western Corporation at a site near Cascade, Idaho which includes the Cabarton Hot Springs. The Field data were acquired during June and August, 1995. The split data acquisition periods resulted due to equipment problems encountered during the initial acquisition period. All data are summarized and discussed in this report.

2.0 Objectives

The analysis is focused primarily on indications of controls, stratigraphic or structural, that might influence the migration and surface leakage of geothermal fluids in the area. Such a diagnosis may provide insight about locating a drill-hole that might intersect the source or a subsurface conduit controlling the movement of the fluids. It is reasonable to hope that, at depth, a drill-hole intersecting such a controlling feature might produce higher temperature and/or greater volumes of geothermal fluids than are naturally leaking at the surface nearby.

3.0 Resistivity Profiles

Four resistivity profiles were acquired utilizing a standard dipole-dipole array. This approach simultaneously measures variations laterally and vertically along a line, allowing analysis of data roughly approximating a cross-sectional view. The profiles follow a N25W heading with a 60 m (about 200 ft) separation. The profiles are 420-450 m in length and each extends 60-90 m beyond the fence bounding the northern extent of land controlled by Eastern-Western. This results in data coverage at least to the fence line and extending about 300 m (1000 ft) to the SE for each of the profiles. Electrode geometry precludes data acquisition along the entire length of the lines.

3.1 Data Acquisition

All data were acquired with a Zonge Engineering GDP 16 digital recording system. The signal source was generated with a Geotronics FT 4 transmitter which was synchronized to the receiver by a Zonge XMT 16 transmitter controller. A standard 8-sec period time-domain signal was utilized. Several cycles (minimum 4) of the signal were stacked for each data point to enhance the signal-to-noise ratio. A real-time statistical analysis of data was monitored to ensure high data quality. Any questionable data were discarded and repeated to satisfaction before being stored to memory. All data are judged to be very good quality.

3.2 Data Analysis and Interpretation

The dipole-dipole resistivity data is summarized in four plots appended to this report. Each plot represents an individual profile labeled 1R, 2, 3, or 4 and summarizes the data from South to North. The first profile is labeled 1R because the data were acquired from N to S but reversed before plotting to correspond to the S to N data acquisition utilized for the other three profiles and to follow the convention of N generally being at the top of a page or plot. The left edge of each plot nominally represents the ground surface with (to repeat) S at the bottom and N at the top of each plot. The location map following the data plots summarizes the position of each profile relative to the fences bounding the property to the N and W.

Electrical resistivity in the shallow part of the earth's crust is controlled primarily by porosity and the temperature and salinity of the fluids filling those pore spaces. Addressing the purposes of this investigation, those areas exhibiting lower resistivity would provide guidelines for recommending exploratory drilling.

A commonly accepted model for hot-spring activity, such as that observed on the property, consists of a fault or faults intersecting a geothermal aquifer. The aquifer may be at great depth but the fault provides a conduit to transport the fluids upward, in some cases leaking to the surface due to a pressure differential. In such a case, even though the aquifer may be too deep to reasonably access, the fault zone may provide a reasonable drilling target from which the fluids may be recovered. A NE trending fault has been interpreted to cross this area with a surface trace somewhere in the vicinity of the hot springs (Howard Smith, personnel communication).

3.2.1 Profile 1R

This first (most westerly) profile exhibits only one coherent zone of anomalously low resistivities, found near the southern extent of the profile. The trend extends weakly toward the surface nearer the midpoint, suggesting a SE dip. The contrast in resistivity is not very dramatic but the zone is reasonably well defined.

3.2.2 Profile 2

Profile 2 exhibits a comparable zone, shifted a bit further to the N. The resistivity contrast, while still not large in magnitude, appears of define a zone of uniformly lower resistivity. The inferred dip is again to the SE.

3.2.3 Profile 3

In profile 3 we find a well defined zone of reduced resistivity

positioned near the middle of the profile. The suggested dip is again to the SE and if we make the reasonable assumption that the zones are correlative from profile to profile, they seem to be defining a roughly SW-NE trend.

3.2.4 Profile 4

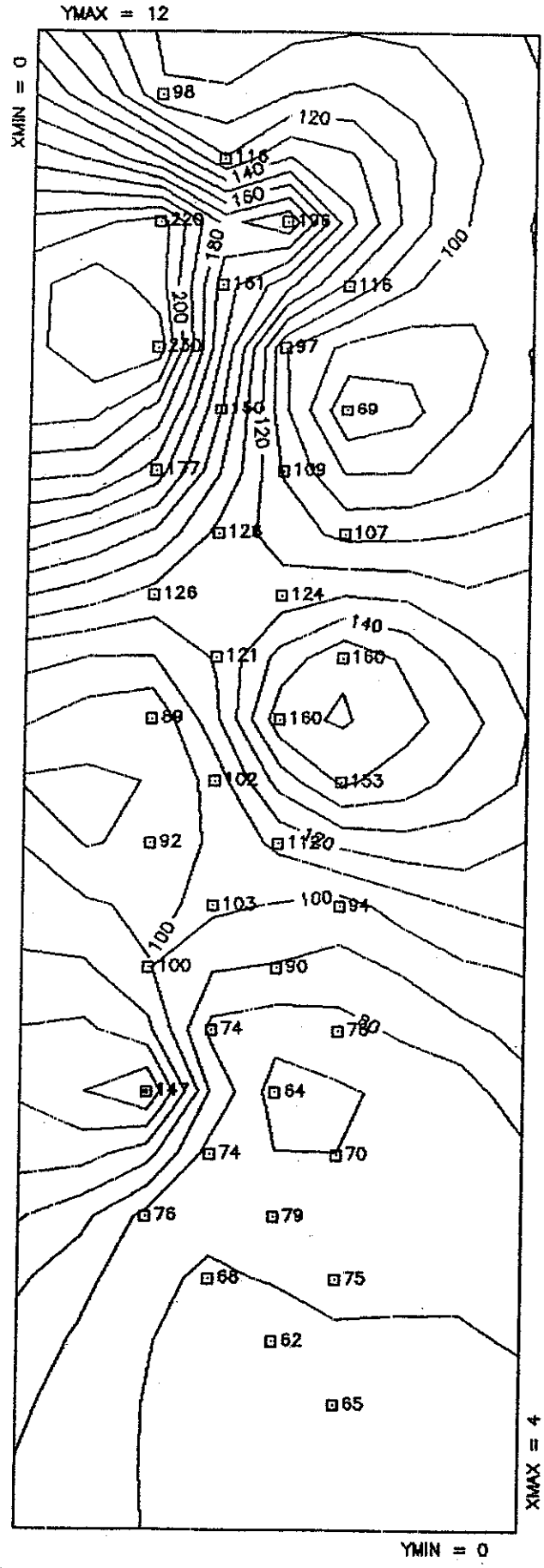
This final (most easterly) profile continues the pattern of a low resistivity zone indicating SE dip and shifted to the N relative to the previous profiles. This supports the conclusion of a SW-NE trending zone of reduced resistivity which may be indicative of geothermal fluid conduits.

4.0 Conclusions and Recommendations

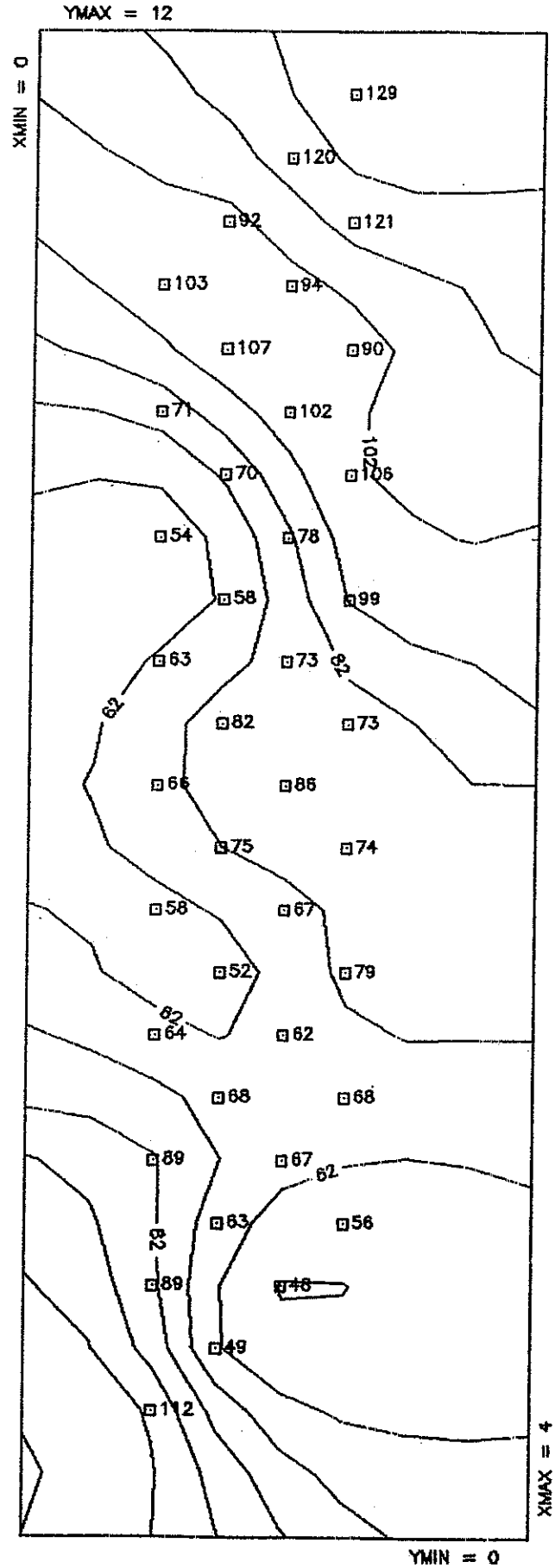
The location map following the profiles summarizes the data analysis discussed above. The low resistivity trend shown is best defined in profiles 2-4 which have therefore been given greater weight than profile 1 in defining the apparent trend. The entire zone is rather broad (about 300 ft) and includes, in general, the full anomaly width along each profile. The nature of the data is to smear the anomaly relative to the dimensions of the source or cause of the anomaly. In general, then, the middle of the trend represents the heart of the source.

It should be reiterated that the anomalies are quite subtle and do not suggest a strong contrast in resistivity with the surrounding material.

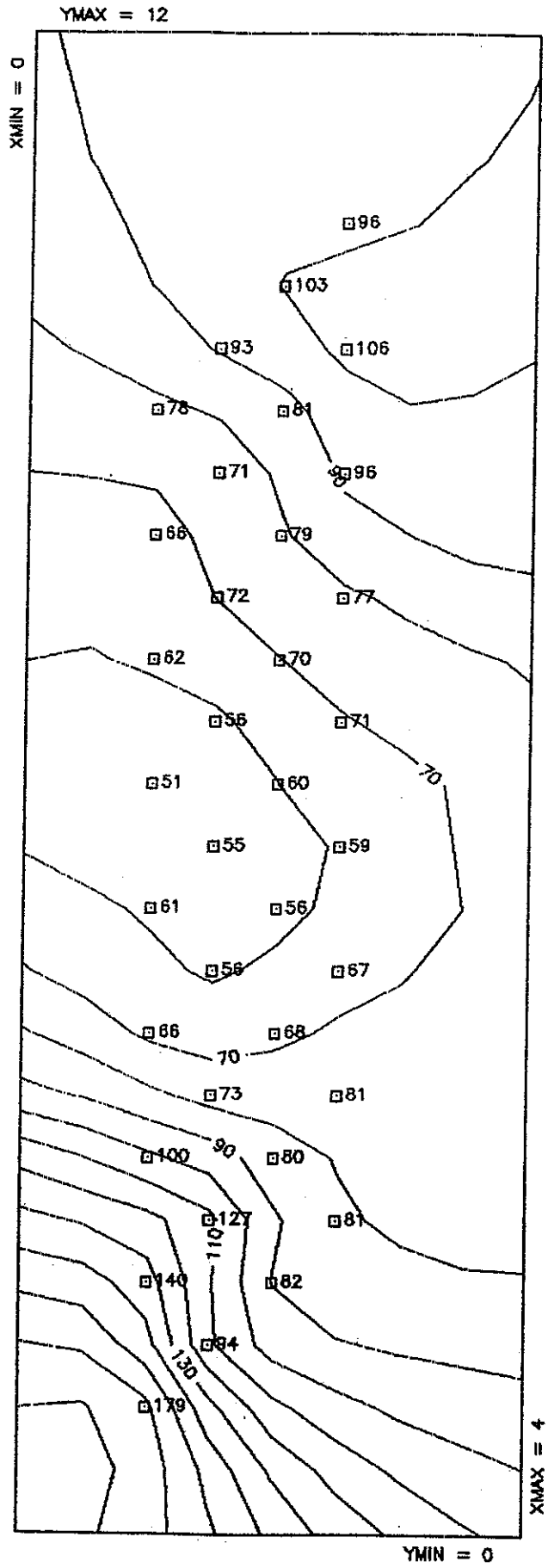
Best judgement, based on these results, would be to recommend exploratory drilling within this trend, if such is planned. The indications of dip to the SE suggest that anomaly intersection will occur at increasing depth to the SE within the trend. Also, since the anomalies are better defined to the NE, a reasonable suggestion might be to choose a site near profile 3, and near the central part of the indicated trend.



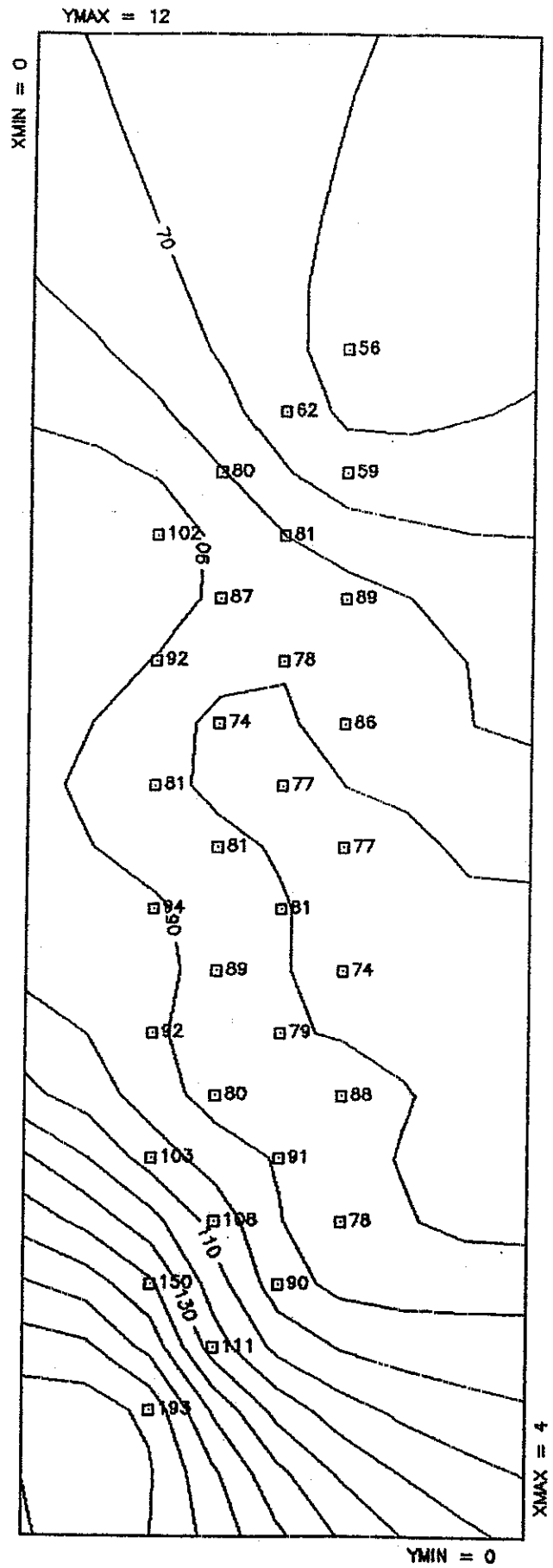
RESISTIVITY PROFILE 1R: S–N



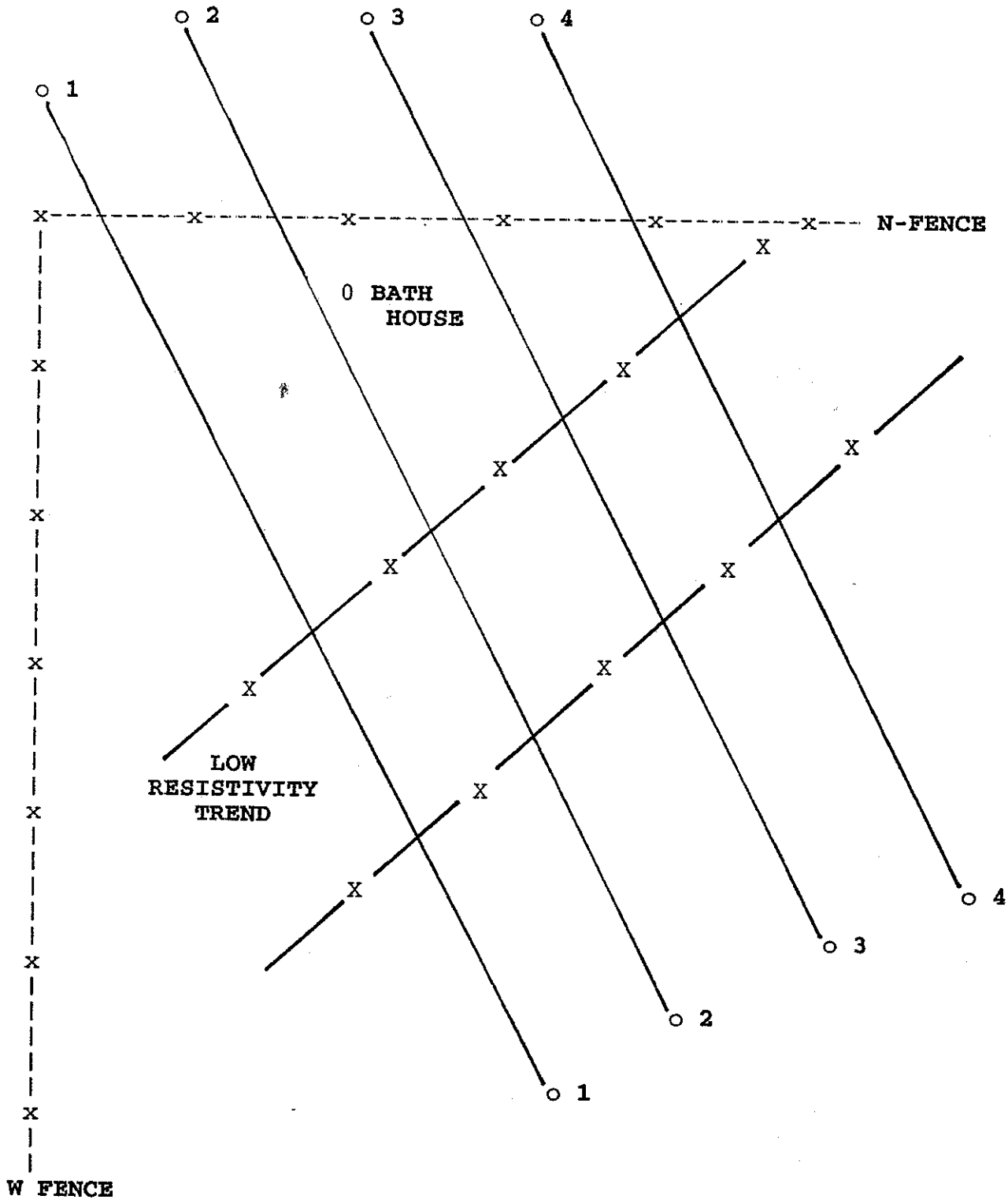
RESISTIVITY PROFILE 2:S–N



RESISTIVITY PROFILE 3: S–N



RESISTIVITY PROFILE 4: S--N-



Profile Locations
MAP SCALE: 1 in = 200 ft

June 30, 1994

Copy

Mr. Michael McGinley
Eastern Western Corp.
P.O. Box 3228
Portland, OR 97208-3228

Subject: Hydrothermal Well
Location: SE of NE of NE 1/4 Sec.13 T.13N. R.3E.

The following information outlines work I have done at this point on the hot water development on Eastern Western land near Cascade, Idaho:

Consultation has been made with other geologists, geologic literature and water well logs have been checked. I met with the Idaho Department of Water Resources regarding hot water development. There I obtained the necessary forms for establishing water rights and at their suggestion, contacted the Boise State University Geology Department to obtain their recommendations on hot water development near Cascade, Idaho. I believe a drilled well is necessary to maximize hot water production. A surface excavation would yield only a small volume because of the low flow rate of the springs.

I met with a group from the Geology Department on June 7 to discuss geologic conditions at the site and possible procedures for hot water development. The group consisted of Dr.Paul Donaldson, Dr.Jack Pelton and five graduate students, a team attached to the Geology Department. They perform subsurface investigative work for the public and apparently charge close to their cost of operation. In return, they gain experience and make a little money for the school. They appear conscientious, talented and should do a good job at minimum cost. They recommended a subsurface investigation using the electric resistivity method. There has been some delay getting the paper work started because they have been busy with other work, but they should be able to proceed on the field work soon after the papers are signed, if this arrangement is satisfactory with you. Enclosed is a blank sample of the contract. I hoped they would fill in some of the blanks but as soon as there is mutual agreement, activities should proceed smoothly.

The geologic picture in the vicinity of the hot springs is complicated because of the apparent number of faults present and the lack of knowledge of subsurface conditions. The actual number of faults present is unknown, but surface conditions indicate at least two are present, both more or less parallel to a larger fault near the county road intersection, located a short distance to the northwest. Also, the angles of dip on the fault planes are unknown, but this will be important to know in planning the location of the well.

It is general belief that hot water occurs here in deep granitic rocks zones due to compression from overlying rocks, radioactive decay and residual heat from the Idaho Batholith. Escaping hot water tends to follow faults and fractured rocks toward the surface. Migrating water usually does not follow a simple vertical path but more of a zig-zag

pattern following broken rocks. Upon initial investigation, it seemed drilling near the springs would be satifactory, but when considering the interest in obtaining maximum hot water, I believe it would be better to use technical facilities available and employ subsurface investigations prior to drilling. The electric resistivity method records zones of electrolytes, lower density and saturation at depth.

Although there are no guarantees, the presence of hot water discharge at the springs demonstrates the possibility of a moderate volume of hot water available from deeper rocks. Hot water may be leaking to other points in the valley and going undetected because of the thick section of valley fill to the south and east, and the moderate volume of cold water flowing through the alluvium. Since the BSU survey should locate the most advantageous location to drill and the necessary depth, it is possible the location may fall on Joan and Darwin Pancheri's land a short distance to the north and would require an easement.

During the initial discussioin with the BSU group they said they might obtain sufficient data from two transects, for a cost of about $2500. Now they are thinking more in terms of four transects. I can understand their desire to obtain the best information before making a decision. But we might request an evaluation after two or three transects instead of automatically going to four. There is also the possibility, with the complicated geologic structure present, they may request more than four before they are satisfied. The cost apparently is $1250 per transect.

If you have any questions, please let me know.

Yours truly,

Howard R. Smith, PG

Howard Smith

4925 Allamar Dr.
Boise, ID 83704
(208) 375-7891
377-5569

Enclosed: Documents from BSU

Copy to R.W. Fodrea

BOISE STATE UNIVERSITY • 1910 UNIVERSITY DRIVE • BOISE, IDAHO 83725

CENTER FOR GEOPHYSICAL INVESTIGATION OF THE SHALLOW SUBSURFACE TELEPHONE. (208) 385-1419
FAX. (208) 385-4061

July 25, 1994

TO: Michael E. McGinley
Eastern-Western Corp.
P O Box 3228
Portland, OR 97208-3228

FROM: Paul R Donaldson, PhD
CGISS
Boise State University
Boise, Idaho 83725

RE: Geophysics project near Cascade Idaho

The work we propose for the project near Cascade Idaho, outlined at our recent meeting with Howard Smith consists of four dipole-dipole resistivity profiles. The profiles would be parallel to each other and perpendicular to the suspected fault trace. They would be arranged to include the surface projection of the fault near one end with the majority of the coverage including the expected down dip zone. The location of the profiles will rely primarily on discussion with Howard Smith concerning his understanding of the structural geometry. He will stake and flag the profile locations at points where each intersect his best estimation of the fault surface-projection. The profiles will be located on approximately 200 foot spacing with a station spacing of approximately 100 ft along each profile. Each profile will be about 1000-1200 feet in total length and will yield an electrical "pseudosection". Utilized together they will yield contour maps at a variety of depths of investigation. Dr. Jack Pelton has provided Howard Smith with a few literature references that review these tools applied to problems similar to yours.

The technique we propose is sensitive to conditions that vary the electrical properties of the area being investigated. At depths of interest to you the earth's electrical properties are controlled primarily by porosity, fluid saturation and fluid conductivity which in turn is controlled by fluid temperature and salinity. At your site the bulk porosity is probably dominated by fracture porosity. It can be anticipated that the fault zone should produce anomalous electrical conditions and will be the exploration target. Our goal will be to verify the position and geometry of the fault. We will also be looking for clues that indicate if porosity and/or

temperature variations are suggested in the data that might further constrain a drilling target. Ultimately, we will provide our recommendations for a geothermal test well based on the data gathered or possibly what additional work we might recommend before a final drilling decision is made. The total cost for the work we propose is $5,000. The work could be scaled upward to include a larger area of investigation or add more detail if warranted and agreed to after the initial investigation.

In addition to locating the profile positions, we will rely on you or your representatives to secure all access permission necessary for us to complete this project.

Our deliverables will include a written report with appropriate figures and diagrams which will summarize the data we acquire and include our interpretations and recommendations.

Before we can proceed, a signed contract must be in place. The contract may be initiated by either your company or by Boise State University. If you have a contract you prefer to use, please submit a signed copy to Carol Joyce, CGISS Department, Boise State University, Boise, Idaho 83725. If you want BSU to prepare the contract please let Carol know as soon as possible to allow the paper work to be initiated. Also, questions regarding the contract agreement should be directed to Carol. Her telephone number is (208) 385-3920.

ATTACHMENT F
WELL DRILLERS REPORTS

Form 238-7
73

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Dewey Dexter

Address Box 705 Cascade, Idaho

Owner's Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☒ Other PVC

Thickness	Diameter	From	To
.250 inches	6 inches	+ 1 feet	139 feet
160 inches	4 inches	4 feet	139 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

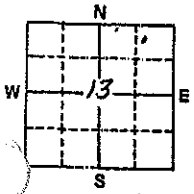
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☐ Torch Saw
Size of perforation 1/8 inches by 2 inches

Number		From	To
100	perforations	79 feet	139 feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20 Material used in seal: ☒ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port Sanitary well seal

6. LOCATION OF WELL 65

Sketch map location must agree with written location.



Subdivision Name _____
Carbarton West Sub
Lot No. 16 Block No. _____
County Valley
NE ¼ NE ¼ Sec. 13, T. 13N N/S, R. 3E E/W.

7. WATER LEVEL

Static water level 26 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature ____ °F. Quality good

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
2	139	1

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8	0	3	Top Soil		X
8	3	20	Brown sandy clay		X
6	20	25	cemented gravel		X
6	25	55	Brown sandy clay		X
6	55	140	Cemented sand + gravel		X
6	140	150	Brown sand	X	

Date received [illegible]
Water Resources Office

10. Work started 6-19-78 finished 6-22-78

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Jones' Drilling Co. Firm No. 355
Address Rt. 1 Donnelly, Ida. Date 6-22-78
Signed by (Firm Official) Robert W. Jones
and
(Operator) Robert W. Jones

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

RECEIVED
JUL 7 19[illegible]
Department of Water Administration

State law requires that this report be filed with the Director, Department of Water Administration within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Frank Bilbao

Address South Cascade Idaho

Owner's Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

_____

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)

☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☒ Cable ☐ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6 inches Total depth 74 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.025 inches	6 inches	+ 4 feet	24 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was a packer or seal used? ☐ Yes ☐ No

Perforated? ☒ Yes ☐ No

How perforated? ☐ Factory ☒ Knife ☐ Torch

Size of perforation _____ inches by _____ inches

Number		From	To
24	perforations	62 feet	68 feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name _____

Type _____ Model No. _____

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Diameter ___ Slot size ___ Set from _____ feet to _____ feet

Gravel packed? ☐ Yes ☒ No Size of gravel _____

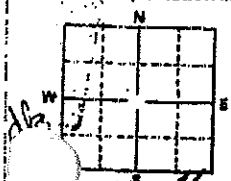
Placed from _____ feet to _____ feet

Surface seal depth 20 Material used in seal ☐ Cement grout ☒ Puddling clay ☐ Well cuttings

Sealing procedure used ☐ Slurry pit ☐ Temporary surface casing ☒ Overbore to seal depth

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____

Lot No. _____ Block No. _____

County Valley

NW ¼ SE ¼ Sec. 13 T. 17 N/S, R. 3 E/W

7. WATER LEVEL

Static water level 23 feet below land surface

Flowing? ☐ Yes ☐ No G.P.M. flow _____

Temperature _____ ° F. Quality _____

Artesian closed-in pressure _____ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
12 gal	23-48	2

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
6	0	10	Topsoil		X
	10	32	clay		X
	32	42	sand		X
	42	60	clay		X
	60	69	sandy gravel	X	
	69	74	gabbo		X

10. Work started 7-19-74 finished 7-26-74

11. DRILLERS CERTIFICATION

Firm Name H&H drilling Firm No. 281

Address 327 S. 7th Rupert Date _____

Signed by (Firm Official) Vernon Holloway

and

(Operator) Vern Holloway

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1 WELL OWNER

Name Gary Peterson

Address HC 71 Box 4660
CASCADE ID 83611

Owner's Permit No

2 NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3 PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

4 METHOD DRILLED

☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other

5 WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	6 inches	0 feet	114 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

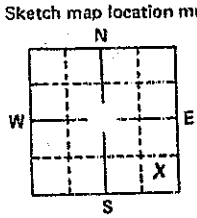
Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☒ Factory ☐ Knife ☐ Torch
Size of perforation 1/4 inches by 4 inches

Number		From	To
1/4 x 4	perforations	45 feet	55 feet
1/4 x 4	perforations	65 feet	75 feet
1/4 x 4	perforations	90 feet	100 feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 1/2 -
Placed from 35 feet to 114 feet
Surface seal depth 25FT Material used in seal: ☐ Cement grout ☐ Puddling clay ☒ Well cuttings
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port

6 LOCATION OF WELL

Sketch map location must agree with location.



Subdivision Name
Lot No Block No
County Valley
SE ¼ SE ¼ Sec. 12, T. 13 N/S, R. 3 E/W.

7 WATER LEVEL

Static water level 30 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature °F. Quality

8 WELL TEST DATA

☒ Pump ☐ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
5gal	90 FT	2 Hr

9 LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	30	Top Soil		X
	30	55	Gravel	X	
	55	85	Course Sand	X	
	85	114	Brown Sand with Some Gravel	X	

RECEIVED
MAY 14 1985
Department of Water Resources

RECEIVED
MAY 13 1985
Department of Water Resources
Western Regional Office

10. Work started 9-14-84 finished 9-23-84

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boise Valley Pump and Drilling Firm No. 207
Address 2950 S Garden Date 9-24-84
Signed by (Firm Official)
and
(Operator)

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3/95

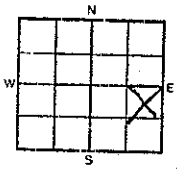
IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
Use Typewriter or Ballpoint Pen

Office Use Only
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO 65-96-W-0325-000
Other IDWR No _____

2. OWNER:
Name Dean Bentley
Address 7080 W. McMillan Rd.
City Meridian State ID Zip 83642

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.



Twp. 13 North X or South ☐
Rge. 3 East X or West ☐
Sec. 12 , ____ 1/4 NE 1/4 SE 1/4
(10 acres) (40 acres) (160 acres)
Gov't Lot ____ County Valley
Lat: : : Long: : :
Address of Well Site 200 Ponderosa Lane
(Give at least name of road + Distance to Road or Landmark) City Cascade
Lt 7 Blk _____ Sub. Name Cabarton Ranchettes Subd.

4. USE:
X Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
X New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
X Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Chip Bentonite	0	19	2 sacks	Over bore to Seal Depth.
Cement	"	"	2 sacks	filled from top.
1/4 Pea Gravel	34'	210'	4 yards	Drawn.

Was drive shoe used? ☐ Y X N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y X N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
8"	+1	19½"	.250	Steel	X	☐	X	☐
5"	+1	214	.188	Steel	☐	X	X	☐
5"	"	"	.258	Steel	☐	X	X	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
X Perforations Method Star Wheel Ale Perforator
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
75'	80'	⅛"x1"	25	5"	Steel	☐	X
110'	140'	⅛"x1"	250	5"	Steel	☐	X
150'	160'	⅛"x1"	100	5"	Steel	☐	X
170'	180'	⅛"x1"	50	5"	Steel		X

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
49 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: 8" Sanitary Well Seal

11. WELL TESTS:
☐ Pump ☐ Bailer X Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time
5		190	4 hrs

Water Temp 47° Bottom hole temp. 47°
Water Quality test or comments: Good
Depth first Water Encountered 160'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	2	Top Soil		X
10	2	4	Brown Clay		X
10	4	18	Brown Clay Decom Brown Granite		X
8	18	27	Brown Clay Decom Brown Granite		X
8	27	35	Med Hard Brown Granite		X
8	35	37	Fractured		X
8	37	47	Med Hard Gray, Brown Granite		X
8	47	51	Fractured Softer Granite		X
8	51	60	Med Hard Gray Granite		X
8	60	61	Fracture ¼ GPM	X	
8	61	74	Med Hard Gray Granite		X
8	74	75	Fracture ¼ GPM	X	
8	75	83	Med Hard Gray Granite		X
8	83	84	Fracture		X
8	84	105	Lt Brown Hard Granite		X
8	105	110	Fractured Dk Brown Granite		X
8	110	115	Hard Lt Brown Granite		X
8	115	130	Med Hard to Soft Fractured	X	
8	"	"	Brown Granite	X	
8	130	150	Med Hard Brown Granite		X
8	150	156	Gray Caliche		X
8	156	160	Softer Brown Granite w/Fine		X
8	160	180	Soft to Med Hard Granite		X
8	180	208	Soft to Med Hard Granite w/Fine	X	
8	208	211	Soft Brown Granite		X
8	211	280	Fracture		X
			Soft Brown Granite w/Med Hard Spots		X

RECEIVED
DEC 09 1996
NOV 29 1996
WATER RESOURCES WESTERN REGION
Department of Water Resources

Completed Depth 201 (Measurable)
Date: Started 10-11-96 Completed 10-25-96

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Gestrin Well Drilling Firm No. 408
Firm Official and Supervisor or Operator _____ Date 10-31-96
Supervisor or Operator _____ Date 10-31-96
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name George Mendenhall
Address 884 Trout Run Loop Boise, Id 83712

Drilling Permit No. 93-W-0257

Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☐ Reverse rotary
☐ Cable ☐ Mud ☐ Other _____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter		From	To
.250 inches	6 inches	+	1 feet	163 feet
____ inches	____ inches		____ feet	____ feet
____ inches	____ inches		____ feet	____ feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ____ inches by ____ inches

Number		From	To
____	perforations	____ feet	____ feet
____	perforations	____ feet	____ feet
____	perforations	____ feet	____ feet

Well screen installed? ☐ Yes ☐ No
Manufacturer _____ Type _____
Top Packer or Headpipe _____
Bottom of Tailpipe _____

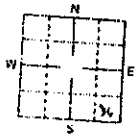
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet

Surface seal depth 20 Material used in seal: ☒ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit
☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Sanitary Well Seal

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County Valley
Address of Well Site Roadroom St. Cascade, Id.
(give at least name of road)

SE ¼ SE ¼ Sec 12, T 13 N ☒ or S ☐, R 3 E ☒ or W ☐

7. WATER LEVEL

Static water level 6' feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 47 °F. Quality Clear
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
10	140	2

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0	2	Top Fill		X
8"	2	20	Decomp. granite		X
6"	20	40	Decomp granite		X
	40	60	Hard grey granite		X
	60	80	" "		X
	80	100	Softer granite		X
	100	110	Hard grey granite	X	
	110	130	Soft granite		X
	130	149	Hard granite		X
	149	155	Soft Brown granite		X
	155	163	Hard granite		X
6"	163	190	Hard granite	X	

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AUG 29 1993
Department of Water Resources

AUG 31 1993
Department of Water Resources
Western Regional Office

10.

Work started 8.12.93 finished 8.14.93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Mengsco Drilling Firm No. 391
Address McCall, Id. Date 8.16.93
Signed by Drilling Supervisor _____
and
(Operator) _____
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
5/95

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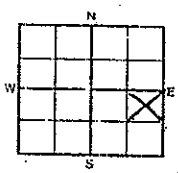
IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
Use Typewriter or Ballpoint Pen

Office Use Only
Inspected by _____
Twp __ Rge ___ Sec ___
___1/4 ___1/4 ___1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. D0001032
Other IDWR No. 165-97-W-0213-000

2. OWNER:
Name MIKE FACKRELL
Address Box 353
City CASCADE State ID Zip 83611

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.



Twp. 13 North X or South ☐
Rge 3 East X or West ☐
Sec. 12 ____ 1/4 NE 1/4 SE 1/4
Gov't Lot ____ County VALLEY
Lat: : : Long: : :
Address of Well Site 219 PONDEROSA LN.
(Give at least name of road + Distance to Road or Landmark)
City CASCADE
Lt 11 Blk ____ Sub. Name CABARTON RANCHETTS

4. USE:
X Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
X New Well ☐ Modify ☐ Abandonment ☐ Other ____

6. DRILL METHOD
X Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
BENT CHIPS	19	0	5 BAGS	OVER BORE TO SEAL DEPTH, FILL
CEMENT	19	0	1 BAG	FROM TOP DOWN
8-12 COLORADO SAND	181	50	2000 LBS	

Was drive shoe used? ☐ Y X N Shoe Depth(s) ____
Was drive shoe seal tested? ☐ Y X N How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+1	-20'	250	STEEL	X	☐	X	☐
4"	-7	81	160PSI	PVC	☐	X	X	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☐ Perforations Method ____
X Screens Screen Type SAWED

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
81	181	.020	100'	4"	PVC		X
							☐
							☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
17 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft Describe access port or control devices: SANITARY WELL SEAL

11. WELL TESTS:
☐ Pump ☐ Bailer X Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time
2		125	1 Hr

Water Temp. 54° Bottom hole temp. 54°
Water Quality test or comments: GOOD, LITTLE SULFER SMELL
Depth first Water Encountered 94

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
9	0	3	TOP SOIL		X
9	3	17	BROWN SANDY CLAY		X
9	17	19	GRAY BROWN DECOMPOSED GRAN.		X
6	19	20	GRAY BROWN DECOMPOSED GRANITE		X
6	20	48	SOFT GRAY GRANITE		X
6	48	50	FRAC. BROWN GRANITE		X
6	50	65	SOFT GREY GRANITE W/MED HRD SPOTS		X
6	65	75	SOFT GREY GRANITE		X
6	75	94	BLUE GREY GRANITE W/COLICHE	X	1/8
6	94	110	SOFT GREY GRANITE W/FRAC.	X	1/4
6	110	125	SOFT BLUE GREEN GRANITE W/ BROWN COLICHE & FRAC	X	1 1/2
6	125	140	SOFT GREY GREEN GRANITE		X
6	140	181	SOFT GREY GREEN GRANITE W/FRAC	X	2 GPM

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WATER RESOURCES WESTERN REGION
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AUG 14 1997
Department of Water Resources

Completed Depth 181 (Measurable)
Date: Started 7-15-97 Completed 7-16-97

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name GESTRIN WELL DRILLING Firm No. 408
Firm Official Robert W. Gestrin Date 7-16-97
and
Supervisor or Operator Jim Bo Date 7-16-97
(Sign once if Firm Official & Operator)

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Form 238-7
11/97

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

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OCT 16 2001
Department of Water Resources

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Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0018957
DRILLING PERMIT NO. _____
Other IDWR No. _____

2. OWNER:
Name Jackie Lee
Address 59 Badger Hollow Rd
City Cascade State ID Zip 83611

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S — X

Twp 13 North ☒ or South ☐
Rge 3 East ☒ or West ☐
Sec 13 ____ 1/4 NE 1/4 NW 1/4 (10 acres / 40 acres / 160 acres)
Gov't Lot ____ County Valley
Lat: : : Long: : :
Address of Well Site 54 Badger Hollow Rd
City Cascade
(Give at least name of road + Distance to Road or Landmark)

Lt. 37 Blk ____ Sub. Name Cabartan West Subd. #2

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	0	18	10 bag	poured From Top down

Was drive shoe used? ☐Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+1	19	.250	Steel	☒	☐	☐	☐
4	-6	140	160	PVC	☐	☒	☐	☐
4	160	180	160	PVC	☐	☒	☐	☐
4	280	280	160	PVC	☐	☒	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
(Perforations) Screens
Method Sawed
Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
140	160	40	40	4	PVC	☐	☒
180	240	120	120	4	PVC	☐	☒
280	331	120	120	4	PVC	☐	☒

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
68 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: Santex Well Seal

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
7½		330	2hr

Water Temp. 50 Bottom hole temp. _____
Water Quality test or comments: good
Depth first Water Encounter 150

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	3	Top Soil		X
10	3	18	Brown decon granite		X
6	18	20	Brown decon granite		X
6	20	30	Med hard Brown granite		X
6	30	35	Soft Brown Granite		X
6	35	77	Med hard Brown granite w/Softs		X
6	77	78	Rose quartzs		X
6	78	95	Med hard brown granite		X
6	95	105	Med hard Brown granite w/Softs		X
6	105	120	Med hard Brown granite w/Frac		X
6	120	140	Med hard Brown granite		X
6	140	170	Med hard Brown granite w/Frac	X	
6	170	172	Rose quartzs		X
6	172	190	hard Brown granite w/Frac		X
6	190	192	Frac. Brown granite	X	
6	192	201	hard gray granite		X
6	201	232	hard gray granite w/Frac	X	
6	232	235	hard Brown granite w/Frac		X
6	235	248	hard gray w/Frac		X
6	248	256	hard Brown granite w/Rust Brown		X
6	256	264	hard gray brown granite		X
6	264	272	hard brown granite w/Frac		X
6	272	283	hard gray granite w/Frac	X	
6	283	294	Broken Ton granite	X	
6	294	300	hard gray granite		X
6	300	320	hard gray granite w/Frac	X	
6	320	331	hard gray granite		X

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OCT 16 2001
WATER RESOURCES
WESTERN REGION

Completed Depth 331 (Measurable)
Date: Started 9-10-00 Completed 9-14-00

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Gestrin well drilling Firm No. 408
Firm Official Robert Gestrin Date 9-25-01
and
Driller or (Operator) Larry Gestrin Date 9-23-01
(Sign once if Firm Official's & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

SEP 16 1988

WELL DRILLER'S REPORT

NOV 29 1988

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

Department of Water Resources

Department of Water Resources

WELL OWNER

Name Scott Wurthen
10701 Reutzel Dr.
Address Boise, Id. 83709

Owner's Permit No. 65-88-2-141

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6" inches	+ 1 feet	40 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

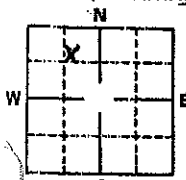
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☒ Torch
Size of perforation 6 inches by 1/8 inches

Number		From	To
100	perforations	20 feet	39 feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel _____
Placed from 20 feet to 40 feet
Surface seal depth 20 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port Sanitary Well Seal

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County Valley
NE ¼ NW ¼ Sec. 13, T. 13 N/S, R. 3 E/W.

7. WATER LEVEL

Static water level 140 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 35 °F. Quality Clear
Describe artesian or temperature zones below.

8. WELL TEST DATA

☒ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
1/2	240	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10"	0	40	Decomp. granite		X
6"	40	100	Blue granite		X
6"	100	160	" "		X
6"	160	200	crystal + granite	X	
6"	200	250			X

10.

Work started 8-26-88 finished 8-27-88

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Menasco Drilling Firm No. 391
Address McCall, Id. Date _____
Signed by (Firm Official) _____
and
(Operator) _____

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

W

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

93

1. WELL OWNER Rayne Clark

Name John Boehm, Ernie Dunlap

Address Boise Idaho

Owner's Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	279 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

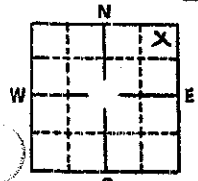
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number		From	To
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 30 Material used in seal: ☐ Cement grout
☒ Bentonite ☒ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port sanitary seal

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____
Lot No. _____ Block No. _____
County Valley
NE ¼ NE ¼ Sec. 13, T. 13 N, R. 3 E.W.

7. WATER LEVEL

Static water level 16 feet below land surface
Flowing? ☐ Yes ☐ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 80 °F. Quality hard
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
20	280	2
10	280	1

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
6"	0	4	sandy soil		X
	4	12	brown clay		X
	12	30	brown sandy clay		X
	30	35	decomposed granite		X
	35	85	soft stone		X
	85	104	brown sandy clay		X
	104	107	sand with silt	X	
	107	135	decomposed granite		X
	135	230	sand & silt	X	
	230	237	decomposed granite		X
	237	245	sandy clay		X
	245	270	silt & sand		X
	270	360	decomposed granite	X	

RECEIVED
MAR 21 1985
Department of Water Resources
Western Regional Office

CC2431
MICROFILMED

10. Work started 9-26-83 finished 10-18-83

11. DRILLERS CERTIFICATION 89

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

W. W. Garringer - Well Drilling Firm No. 373
Firm Name
William W. Garringer
1480 W. Black Canyon Hwy. Date 6-20-84
Address
Emmett Idaho 83617
Signed by (Firm Official) William W. Garringer
and
(Operator) W. Garringer

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
1/78

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Robert & Janet Shellworth

Address P.O. Box 753 Cascade, Id. 83611

Owner's Permit No. _____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☒ Other P.V.C.

Thickness	Diameter	From	To
.250 inches	6" inches	+ 2' feet	30' feet
P.V.C. .125 inches	5" inches	- 10' feet	80' feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

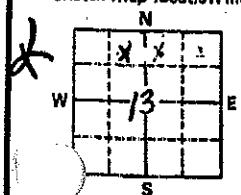
Is casing drive shoe used? ☐ Yes ☒ No
Is a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☐ Torch Saw
Size of perforation 1/8 inches by 4 inches

Number	From	To
60 perforations	50 feet	65 feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 25' Material used in seal: ☒ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☒ Solvent Weld PVC ☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name Carbarton West Sub.
Lot No. _____ Block No. _____
County Valley B.M.
N.E. ¼ N.W. ¼ Sec. 13, T. 13 N/S, R. 3 E/W.

7. WATER LEVEL

Static water level 25' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 46 °F. Quality Good

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
8 to 10	80'	4 hrs.

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0'	2'	overburden		x
8"	2'	15'	decomposed granite		x
8"	15'	60'	granite gray		x
6"	60'	62'	decomposed granite	x	
6"	62'	90'	granite dark gray		x

RECEIVED
JUL 27 1979
Department of Water Resources
Western Regional Office

10.

Work started 6/19/79 finished 7/4/79

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Garys Well Drilling Firm No. 317
Address Star Route Cascade, Id. Date July 24, 1979
Signed by (Firm Official) Gary W. Wilson
and
(Operator) _____

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/89

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well

1. WELL OWNER

Name Irle W. Bocham

Address 28 Polecat Ridge Rd. Box 778
Cascade, Idaho 83611

Owner's Permit No. 65-90-W-076-000

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☒ Other PVC

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	22 feet
160 inches	4½ inches –	8 feet	265 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

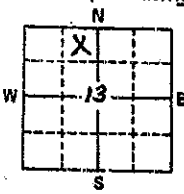
Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No SAW
How perforated? ☐ Factory ☐ Knife ☐ ~~Torch~~ ☐ Gun
Size of perforation 1/8 inches by 4 inches

Number		From	To
100	perforations	85 feet	125 feet
200	perforations	205 feet	265 feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 19 Material used in seal: ☒ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☒ Solvent Weld
☐ Cemented between strata
Describe access port SANITARY well Seal

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name: _____

Lot No. _____ Block No. _____

County Valley

NE ¼ NW ¼ Sec. 13, T. 13 N ☒ S ☐ R. 3 E ☐ W ☐

7. WATER LEVEL

Static water level 41 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 50 °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
1½	265	1

9. LITHOLOGIC LOG

022357

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
9	0	3	TOP Soil		X
9	3	19	BROWN DECOMPOSED GRANITE		X
6	19	21	BROWN DECOMPOSED GRANITE		X
6	21	60	MED/HARD BROWN GRANITE		X
6	60	92	BROWN DECOMPOSED GRANITE		X
6	92	95	BROKEN GRANITE	X	
6	95	115	HARD BLUE GRANITE		X
6	115	124	BROKEN GRANITE	X	
6	124	265	MED/HARD GRAY GRANITE		X

RECEIVED
OCT 3 1990
Department of Water Resources

OCT 09 1990
Department of Water Resources
Western Regional Office

10.

Work started 9-25-90 finished 9-29-90

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Gostrin well drilling Firm No. 408

Address He 38 Box 8 Donnelly, Id. Date 9-29-90

Signed by (Firm Official) Robert Gostrin

and

(Operator) Robert Gostrin

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name W. (Bill) Jones

Address 10408 Ustick Blvd. Boise Ida.

Owner's Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)

☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 6" inches Total depth 81' feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.250 inches	6" inches	+ 2 feet	81 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☒ Yes ☐ No

How perforated? ☐ Factory ☐ Knife ☒ Torch

Size of perforation 1/8 inches by 6 inches

Number		From	To
100	perforations	60' feet	80' feet
	perforations	feet	feet
	perforations	feet	feet

Well screen installed? ☐ Yes ☒ No

Manufacturer's name

Type Model No.

Diameter Slot size Set from feet to feet

Diameter Slot size Set from feet to feet

Gravel packed? ☐ Yes ☒ No Size of gravel

Placed from feet to feet

Surface seal depth 20' Material used in seal ☒ Cement grout ☐ Puddling clay ☐ Well cuttings

Sealing procedure used ☐ Slurry pit ☒ Temporary surface casing ☒ Overbore to seal depth

6. LOCATION OF WELL

Sketch map location must agree with written location. 65

N / W / E / S

Subdivision Name Carbarton West

Lot No. 15 Block No.

County Valley B.M.

¼ ¼ Sec. 13 T. 13 N/S, R. 3 E/W

7. WATER LEVEL

Static water level 32' feet below land surface

Flowing? ☐ Yes ☒ No G.P.M. flow

Temperature 46 ° F. Quality good

Artesian closed-in pressure p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
10 to 12	20	4 hrs.

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0'	4'	overburden		x
8"	4'	25'	conglomerate clay- brown		x
6"	25'	60'	mild granite		x
6"	60'	81'	decomposed granite - gravely white	x	

SEP 20 1977

Department of Water Resources
Western Regional Office

10. Work started May 17,1977 finished June 15,1977

11. DRILLERS CERTIFICATION

Firm Name ~~Carys Well Drilling~~ Firm No. ~~317~~

Address P.O.Box 571 Cascade Ida. Date Sept.9,1977

Signed by (Firm Official) Harry W. Wilson

and

(Operator)

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

788284

Form 238-7
3/95-C96

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Office Use Only
Inspected by _____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. __ - __ D -0025 -754
Other IDWR No. _____

2. OWNER:
Name Darwin Pancheri
Address 9325 Missouri Ave.
City Nampa State ID Zip 83686

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location

N
W E
S

Twp. 13 North ☒ or South ☐
Rge. 4 East ☒ or West ☐
Sec. 13 1/4 (10 acres) SW 1/4 (40 acres) NE SW 1/4 (160 acres) NE
Gov't lot _____ County Valley
Lat: : : Long: : :
Address of Well Site 2nd Ranch on left - Cabarton Rd
City Cascade
(Give at least name of road + Distance to Road or Landmark)
Lt. _____ Blk _____ Sub Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Cuttings	0	4'		Overbore
Bentonite	4'	25'	11S	Overbore

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) 78'
Was drive shoe seal tested? ☐ Y ☒ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2'	78'	.250	Steel	☒	☐	☒	☐
4 1/2"	72'	152'	Sc40	PVC	☐	☒	☐	☒
					☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☒ Perforations Method saw
☐ Screens Screen Type _____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
92'	152'	1/4"	160	4.5"	PVC	☐	☒
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
39ft. below ground Artesian Pressure ____ lb
Depth flow encountered ____ ft. Describe access port or control devices: _____

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Pumping Level	Time
10		120'	30 Min.
8		67'	2 Hrs.

Water Temp. _____ Bottom hole temp. _____
Water Quality test or comments: _____
Depth first Water Encountered 30'

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia	From	To	Remarks: Lithology, Water Quality & Temp.	Water Y	Water N
10"	0	2'	Top Soil		☒
10"	2'	12'	Brown Clay		☒
10"	12'	15'	Brown Sand		☒
10"	15'	25'	Brown Sand & Gravel		☒
6"	25'	30'	Brown Sand & Gravel		☒
6"	30'	70'	Brown Decomposed Granite	☒	
6"	70'	78'	Brown Clay		☒
6"	78'	125'	Brown Decomposed Granite	☒	
6"	125'	145'	Coarse Brown/White Decom. Granite	☒	
6"	145'	160'	Brown Decomposed Granite		☒

RECEIVED
OCT 24 2002
WATER RESOURCES
WESTERN REGION

Completed Depth: 142' (Measurable)
Date: Started 10/07/02 Completed 10/08/02

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Down Right Drilling & Pump Firm No. 637
Firm Official _____ Date 10-23-02
Supervisor or Operator _____ Date 10-23-02
(Sign once if Firm Official & Operator)

Date: 10/18/2002 Time: 10:27 AM

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name DARWIN OR JOHN PANCHERI

Address 15501 STAGECOACH Rd. NAMPA, Id.

Drilling Permit No 65-91-2-018

Water Right Permit No

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	6 inches	1 feet	99 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

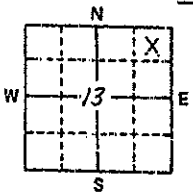
Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☒ Knife ☐ Torch ☐ Gun
Size of perforation 1/8 inches by 1 inches

Number	From	To
570 perforations	46 feet	84 feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☒ Yes ☐ No ☒ Size of gravel 1/4 TO 1/2
Placed from 25 feet to 92 feet
Surface seal depth 25 Material used in seal: ☒ Cement grout ☒ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port SANITARY WELL SEAL

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name
Lot No. Block No.
County VALLEY
NE ¼ NE ¼ Sec. 13, T. 13 N ☒ S ☐ R. 3 E ☒ W ☐

7. WATER LEVEL

Static water level 28 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 52 °F. Quality good
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☒ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
10	98	2

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	2	TOP SOIL		X
10	2	7	BROWN CLAY		X
10	7	15	BROWN SANDY CLAY		X
10	15	17	CEMENTED SAND + GRAVEL		X
10	17	19	BROWN CLAY		X
10	19	45	BROWN + GRAY SAND W/CLAY STREAKS		X
10	45	47	BROWN CLAY		X
10	47	92	BROWN DECOMPOSED GRANITE W/FRACTURES	X	
6	92	99	BROWN DECOMPOSED GRANITE		X

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JUL 05 1991
Department of Water Resources

10.

Work started 6-3-91 finished 6-7-91

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name GOSTRIN WELL DRILLING Firm No. 408

Address Hc 38 Box 10 DIETRICH, Id. Date 6-7-91

Signed by (Firm Official)

and

(Operator)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
9/82

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

RECEIVED JUN 14 1989 Department of Water Resources

1. WELL OWNER

Name Gulf Pacific Cattle Co.
Address RT1 Box 35 Melba, Id. 83641
Owner's Permit No. 65-89-X-049-000

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	19 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number		From	To
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20' Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port. Sanitary well seal

6. LOCATION OF WELL

Sketch map location must agree with written location.

N / W / E / S

Subdivision Name _____
Lot No. _____ Block No. _____
County Valley
SW ¼ NE ¼ Sec. 18, T. 13 ☒N ☐S, R. 3 ☒W. ☐W.

7. WATER LEVEL

Static water level 35' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 52 °F. Quality clear
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
4.7	140	1

9. LITHOLOGIC LOG

022356

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0	3	Top Soil		X
6"	3	18	Decomp granite		X
6"	18	20	Baked Granite		X
6"	20	60	" "		X
6"	60	140	" "	X	

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RECEIVED SEP 15 1989 Department of Water Resources

RECEIVED SEP 13 1989 Department of Water Resources Western Regional Office

10.

Work started 6-9-89 finished 6-12-89

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Menasco Drilling Firm No. 391
Address McCall, Id. Date 6-12-89
Signed by (Firm Official) _____
and
(Operator) _____

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

42

Please See Hearing Exhibit No. 42

(Large Map)

In Docs Under Document # 347147.

43

Examination and Evaluation of Geothermal Sites in the State of Idaho with Emphasis Given to Potential for Electrical Generation or Direct Use

By

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Idaho Department of Water Resources
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September, 2002

Funding provided in part by a grant from the U S. Department of Energy

EXHIBIT 43

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Abstract

Several geothermal occurrences in the state of Idaho were examined for their potential for electrical generation and direct use. Five sites were studied in detail with respect to their current conditions and developments, and the potential for future power generation projects: Crane Creek Hot Springs, Raft River, Big Creek Hot Springs, Vulcan Hot Springs KGRA, and the Magic Reservoir Hot Spring area. From this evaluation, Crane Creek Hot Springs was determined to be the best prospect for future development, in light of the current state of private-sector development at the Raft River site. The Vulcan KGRA and Big Creek Hot Springs are considered to be low priority candidates for electrical generation because of their remote locations and other conditions. Additional hydrogeologic information is needed for the Magic Reservoir area to determine the feasibility of a project in this area.

In terms of direct use of geothermal fluids, the cities of Cascade and Lava Hot Springs, and the Bruneau Dunes State Park were all determined to be suitable for new developments or expansions to existing developments Cascade and Lava Hot Springs are prime candidates for district heating programs using geothermal resources. Bruneau Sand Dunes State Park is a prime candidate for the space heating of a proposed interpretive center using an existing geothermal well.

Idaho possesses a great number of geothermal occurrences, and future developments are not limited to the sites examined in this report. Additional potential, especially with respect to the wide range of direct-use applications, may be feasible in other geothermal resource areas throughout the state.

Section 1. Overview-Geothermal Power and Direct Use

Idaho has been gifted with a large geothermal resource, which is evidenced by the occurrence of 308 hot springs and 745 geothermal wells (IDWR, 2002). These resources were used for centuries by native Americans, and have been developed over the past 100+ years for recreation, district heating, domestic heating, aquaculture, and greenhouse operations. A geothermal power plant at Raft River in south-central Idaho generated electricity for a short time in the early 1980's as part of a United States Department of Energy test. This report describes some of the potential development projects, both power generation and direct use, that may be possible with the use of geothermal energy.

A number of sites in Idaho with geothermal power-generation potential have been examined in the past by governmental and private organizations. A literature search was conducted in the beginning phase of this study to develop initial rankings for the potential geothermal sites in Idaho.

Sites examined included areas where there are hot springs, but no geothermal wells (such as the Big Creek Hot Springs area in Lemhi County) and areas with surface occurrences and very hot wells (such as the Crane Creek area in Washington County, and the Raft River area in Cassia County). The data examined for this report included water temperature at surface and in wells, as well as geochemical data, most notably the thermometric calculations based upon the water chemistry.

The sites examined for their electricity-generation potential in the first phase of this study are (Figure 1):

- Crane Creek Hot Springs area in Washington County
  ~176° Celsius (°C) reservoir estimate, power estimates to 179 megawatts (MW).
- Raft River Known Geothermal Resource Area (KGRA) in Cassia County
  ~140°C reservoir, proven 5 MW producer.
- Big Creek Hot Springs area in Lemhi County
  ~160°C reservoir estimate, power estimates 20-50 MW
- Vulcan KGRA in Valley County
  ~150°C reservoir estimate, power estimates to 50 MW
- Magic Reservoir area in Blaine and Camas Counties
  ~149°C reservoir estimate

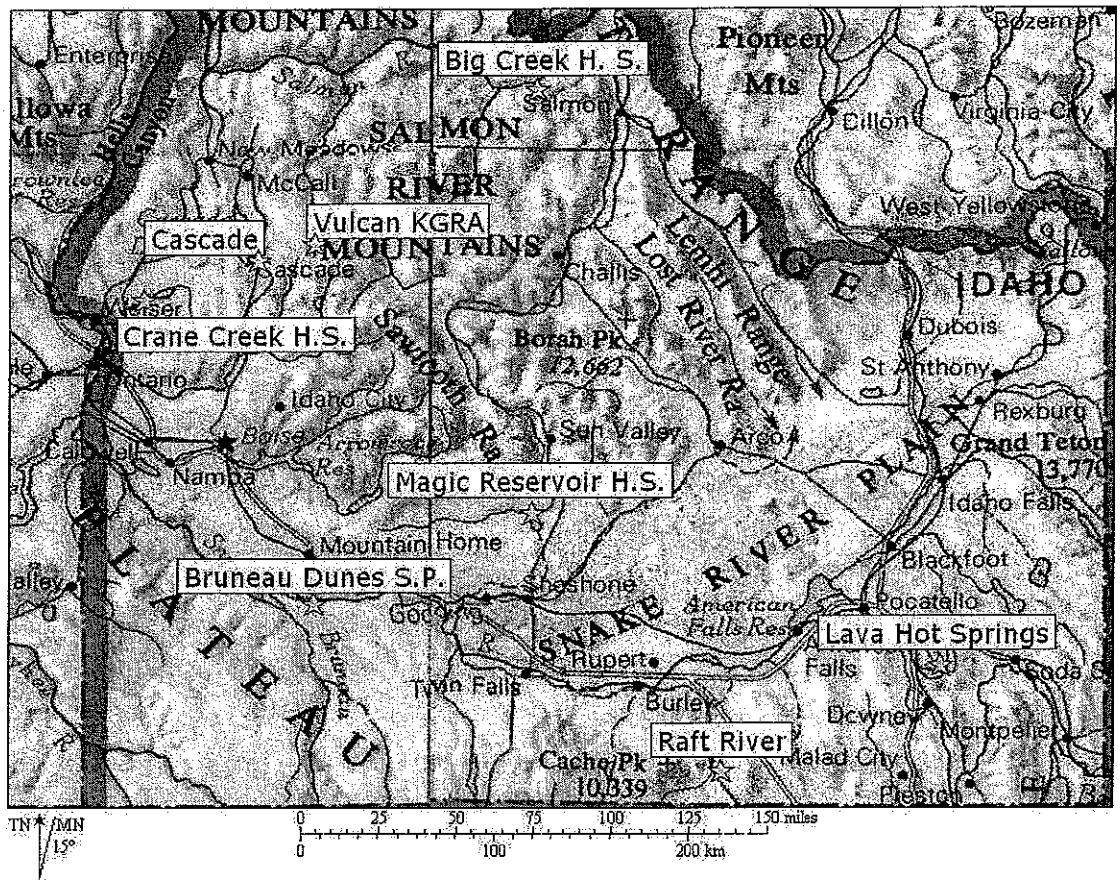


Figure 1. Location of sites examined in this study for electrical generation and direct use.

There are many sites in Idaho that have the potential for direct-use facilities. In this study, three potential sites were selected on the basis of a combination of current use, local interest, or both. The locations that were examined include (Figure 1):

- Cascade in Valley County.
- Lava Hot Springs in Bannock County.
- Bruneau Dunes State Park in Owyhee County

The sites were examined for their respective resources, and the accessibility of those resources.

Section 2. Regulatory Environment

As with any large development project, ownership of the property in question, or the permission to use the property in question, is necessary. In the case of privately-owned property, this requirement may be easily fulfilled. However, in the case of publicly-owned lands, permission must be obtained in the form of permits and leases issued by the federal agency responsible for the lands being developed. In addition to leasing issues, water rights to divert the resource must be acquired through the Idaho Department of Water Resources (IDWR).

Federal Leases

The Geothermal Steam Act of 1970 (United States Code, Title 30 Chapter 25, Sections 1001-1025) requires that geothermal leasing on National Forest System lands be subject to the consent of the United States Department of Agriculture (USDA), Forest Service, rather than the Department of Interior (Bureau of Land Management). The leases are subject to conditions prescribed by the USDA to protect the lands for the purpose for which they were withdrawn or acquired. The Department of the Interior is not authorized to issue prospecting permits for geothermal resources that might occur in National Forest System lands, but the Forest Service may issue a prospecting permit. According to the Boise office of the Bureau of Land Management, as of February 2002, there are currently no geothermal leases or claims on federal lands filed in Idaho. A check with the U.S. Forest Service in Idaho confirms that there are no geothermal leases on Forest Service land in the state.

Geothermal Rights

The Geothermal Resources Act (Idaho Code Title 42, Chapter 40) defines any ground water having a bottom-hole temperature of greater than 100°C as a "geothermal resource." Geothermal resources are put into a classification separate from water resources or mineral resources, and permits separate from those resources must be obtained for their extraction and use.

Water Rights

Article 15 of the Idaho Constitution declares that all waters within the State, both surface and ground, are "subject to the regulations and control of the state in the manner prescribed by law". In addition to leases for any development on federal land, any proposed power-generation facility would also require that water rights be conveyed by the State of Idaho. These rights would have to include any non-

thermal ground water and/or surface water used for cooling or other applications in addition to the geothermal rights.

If the surface water rights to a potential development have not been established prior to 1971 or not adjudicated in the Snake River Basin Adjudication (SRBA), the owner or developer must apply for a water right with the Idaho Department of Water Resources. If a ground water right has not been established prior to 1963 or not adjudicated in the SRBA, the owner or developer must apply with IDWR for the ground water rights. It is unlikely that any potential development would have the water rights in place considering the length of these "grandfather" periods, so the necessary water rights (surface and ground water) for potential developments must be obtained from the IDWR through an application and permitting process.

Energy Regulation

The Public Utility Regulatory Policies Act of 1978 (PURPA), Sections 201 and 210 (since amended), encourages the generation of electricity by small producers (those with a capacity of less than 80 MW), including those utilizing geothermal energy to generate electricity. Under the regulations set forth by PURPA, electric utilities are required to sell electric energy to qualifying cogeneration and small power production facilities and to purchase electrical energy from such facilities.

This 80 MW threshold should not be a problem with any of the sites examined in this study Indeed, most estimates for electrical generation at potential Idaho sites are lower than this, although the Crane Creek area does have one estimate that is nearly two times the threshold (Bloomquist et al., 1985). Any estimates higher than the PURPA limit of 80 MW are likely to be optimistic, perhaps unreasonably so, and the actual, sustainable level of power generation will probably be much lower than estimated.

A small number of companies manufacture modular geothermal (both flash and binary-cycle) generators that can be installed quickly. Several such geothermal power plants in California and Nevada were constructed in under a year. Some companies, such as Ormat, will build and operate an electrical plant and sell the electricity to the local utility company as provided under PURPA. Other companies, such as Barber-Nichols, will provide design, manufacturing, installation, and testing services, but do not operate the finished plant. Either of these options could be attractive for a development company or a small, rural power cooperative that may or may not want to operate its own generating facility.

Section 3. Electrical Generation

There are three general methods for the geothermal generation of electricity: dry steam, flashed steam, and binary.

1. Dry Steam

The dry steam method taps an underground reservoir of high-temperature steam. The steam expands under the reduced pressure and drives a steam-turbine generator like conventional thermal power-generation plants (Figure 2). The steam is then vented or cooled, condensed, and returned to the underground reservoir via injection wells. Such a power-generation scheme requires large underground steam-filled aquifers or very hot (>260°C) water. The only dry-steam power-generation facility currently operating in the United States is The Geysers complex in California.

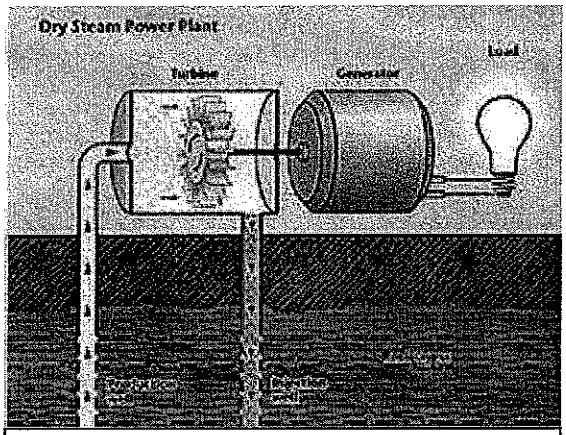


Figure 2. Dry steam electrical generation (From DOE Geothermal Energy Program web site).

Yellowstone National Park contains dry steam reservoirs, but its status as a national park guarantees that those reservoirs will not be exploited. No such aquifers have been identified in Idaho, although the region near Yellowstone National Park, including the Island Park Caldera region in Fremont County, might contain such a resource. However, this region is sparsely populated, and few thermal wells have been drilled. Even if such a steam aquifer were discovered in the region, the proximity to Yellowstone National Park would probably preclude any development. As a result, the likelihood of developing resources using the dry steam method in Idaho is currently very low. The cost of electricity produced in this manner is approximately 4¢ and 6¢ per kilowatt-hour (kWh) (U.S. Dept. of Energy, 2001), or $40 to $60 per MW.

2. Flashed Steam

Flashed-steam power generation taps a reservoir of high-temperature (>182°C) water (U.S. Dept. of Energy, *Geothermal Today*, 1999). The decreased pressure at the surface allows some of the water to spontaneously convert (i.e., "flash"), into steam. The steam expands, is separated from the water, and is used to drive a steam-turbine generator. The steam may then be vented, or it may be cooled,

condensed and returned to the aquifer with the remaining water via injection wells (Figure 3). It is possible that a geothermal reservoir suitable for flashed steam generation could be identified and developed in Idaho. Hotter systems in Idaho, such as the Vulcan KGRA and the Big Creek Hot Springs areas may have this potential. The cost of electricity produced in this manner is approximately 4¢ to 6¢ per kWh (Dept. of Energy, 2001), or $40 to $60 per MW.

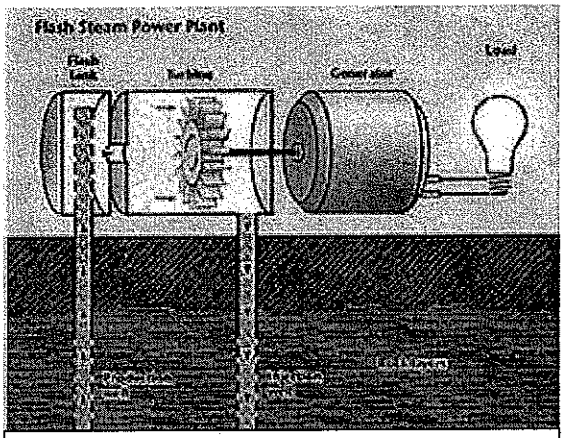


Figure 3. Flashed Steam method of generation. (From DOE Geothermal Energy Program Web Site).

3. Binary

Binary-cycle power plants are designed to use water with temperatures between 107° and 182° C (U.S. Dept. of Energy, *Geothermal Today*, 1999). The heat from the geothermal water is used to boil a second fluid, which is usually an organic compound or a mixture of compounds with a low boiling point. This "working fluid" vaporizes, expands, and drives a turbine generator. The geothermal water is injected back into the aquifer, and the working fluid is cooled, condensed, and recycled (Figure 4). Another method of binary production is to use two working fluids, one of which is pumped down a well to extract the heat from the reservoir through a down-hole heat exchanger, which is then brought back to the surface to boil the second working fluid.

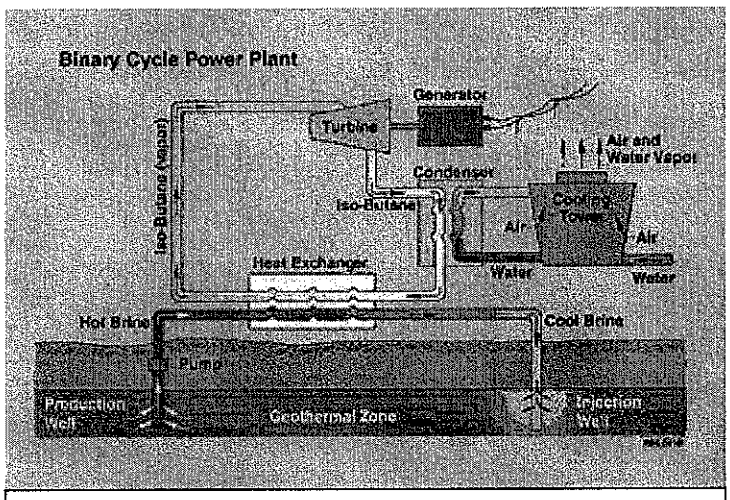


Figure 4. Binary electrical generation method (From DOE Geothermal Energy Program Web site).

Binary generation does not require fluids as hot as the steam methods, so this method will probably be the one most widely used in the future. Binary generation is not as efficient as the steam methods, but this can be partially countered in that the geothermal fluids can be reduced to a lower working temperature, getting as much energy possible per unit volume (Armstead and Christopher, 1976). Moreover, the potentially corrosive geothermal fluid does not come into contact with the power-generating system and there is no risk of damage to the turbines. One potential problem associated with using hydrocarbon working fluids is that plants may be classified as hazardous-chemical facilities, raising insurance costs. The cost of the generated electricity runs between 5¢ and 8¢ per kW (U.S. Dept. of Energy, 2001), or $50 to $80 per MW.

Even though current Idaho residential electrical rates are lower than this rate (Idaho Power Web Site – www.idahopower.com), there would be a market for geothermally-generated electricity, because it qualifies as "green energy" (i.e., electricity generated by renewable methods with a minimum of environmental damage, which includes geothermal, as well as solar and wind power).

Size and space requirements for binary plants vary, but recently constructed plants (in Bloomquist et al., 1989, Appendices) indicate that one acre per megawatt is a good general estimate. This area includes the plant, well field, and support facilities. If cooling ponds are used instead of cooling towers for condensing the working fluid, space requirements may increase by a factor of two or more. Roughly one production well is required to provide two to three MW of electricity. Approximately one re-injection well is required for every two production wells. Actual numbers will vary depending on reservoir temperature, flow rate, etc.

Section 4. Potential for Power Generation

Several potential power-generation sites were examined in this study. The sites listed in this section were examined on the basis of the following factors:

- Location
  - Proximity to markets and/or power grids
  - Approximate population served
- Potential for electrical generation
  - Water temperature
  - Water flow rates
  - Aquifer geology
  - Sustainability of geothermal flows

These sites are presented in their ranked order with the highest potential candidate listed first. It should be noted that various estimates for total power potential have been put forth for a number of these sites in previous reports and publications, and some estimates are quite high (the highest being 179 MW for Crane Creek). However, the criteria for these estimates are rarely documented. Therefore, it is assumed that the authors of these previous reports have given their most optimistic estimates, or estimates of the potential if the entire field were to be developed. It may also be assumed that the likely sustainable power-generating capacity of these sites is some fraction of the previously estimated capacity. Significant fieldwork (geophysics, geochemical, and drilling) would be required in the pre-development and development stages to determine the true sustainable capacity of the field in question.

Five Potential Sites for Power Generation

Previous studies have centered around a small number of sites in the state which have the potential for electrical generation. These sites are considered to have potential based on their surface temperature, as well as estimates of the temperature of the reservoir using geochemical analyses. The sites examined for this study included the following:

- The Crane Creek Hot Springs area east of Weiser in Washington County
- The Raft River area southeast of Burley in Cassia County
- The Big Creek Hot Springs area west of Salmon in Lemhi County
- The Vulcan Hot Springs KGRA east of Cascade in Valley County
- The Magic Reservoir area in Camas and Blaine Counties

1. Crane Creek Hot Springs area (Washington County)

Overview

The Crane Creek Hot Springs area of Washington County is located 12 miles east of the city of Weiser in a predominantly agricultural area (Figure 1). The area was formerly designated as a KGRA with an approximate size of seven square miles (mi^2). The springs' surface temperature has been reported at various times ranging from 74° to 77° C. Measurements at the Crane Creek Hot Springs in 2002 yielded a surface temperature of 81° C and an approximate discharge of 30 gallons per minute (gpm). McClain (1979) reported the discharge to be approximately 50 gpm, and that both the silica and Na-K-Ca geochemical thermometers suggest the reservoir temperature is 166° to 176° C. There are at least two other lower temperature hot springs in the immediate vicinity. A watering hole for cattle has been excavated over at least one spring to the west of Crane Creek Hot Springs, and another spring is being used on an adjacent property to the southwest of Crane Creek Hot Springs.

The rocks underlying the Crane Creek area are faulted and gently folded by a north-south trending fault zone (Dansart et al., 1994). In general, the geology consists of tilted blocks of older metavolcanic and metasedimentary rocks with infillings of Miocene basalt and interbedded arkosic sandstone. The aquifer supplying Crane Creek Hot Springs is likely fracture-dominated, and a combination of these different rock formations. Bloomquist et al. (1985 vol.2) calculated the aquifer volume to be 9.3 cubic miles (mi^3). A previous geophysical (audio-magnetotelluric) study by the USGS (Hoover et al., 1976) indicated the presence of a shallow conductive zone under Crane Creek Hot Springs (Young and Whitehead, 1975). This may indicate that there is either a substantial reservoir of geothermal water containing significant dissolved ions underlying the area, or that there is a large deposit of conductive minerals, probably deposited by the geothermal system. Either of these scenarios is possible, but Young and Whitehead (1975) describe the geochemistry of the thermal spring waters at Crane Creek as being Na-Cl-SO_4^{2-} with pH values of 7.1 to 8.0. It is unlikely that these waters would be responsible for large-scale metallic deposits, and so it is more likely that the conductivity anomaly below Crane Creek is due to the ionic nature of the reservoir. This study also indicated the presence of a structural "break" that trends roughly north-south, which is interpreted as a fault and is likely the conduit for the geothermal fluids.

McClain (1979) estimated the power potential to be 100 MW and Bloomquist et al. (1985, vol. 2) suggested 179 MW as the field's potential. If these estimates are accurate, the development could require between 100 and 200 acres for the

plant site; it is unknown if this much land is available for development. Additional geologic work will be required to determine the actual field potential.

Mitchell et al. (1984) performed a $\delta D/\delta^{18}O$ isotopic study that indicated the water in the springs may be of Pleistocene age. This could indicate a regional or intermediate groundwater recharge system and possibly slow recharge compared to the area's non-thermal springs. If this is the case, the suitability of the reservoir may be brought into question. However, development using a heat-exchange system as opposed to a fluid-extraction system may still be a very attractive possibility.

Site development:

The Crane Creek area is one of the best choices for a new geothermal power development project in Idaho. The location is convenient to major highways (I-84 and US-95) and to a well-developed power transmission system because of the proximity to the Idaho Power hydroelectric dams on the Snake River. The area is close to the Idaho Power electrical transmission lines coming out of the Hells Canyon dam complex. This is a series of 500kV lines emanating from the dam sites in Hells Canyon. These lines cross the region approximately 7 miles to the west-northwest while running southeast from Brownlee Dam to the Boise metropolitan area. The closest transmission substation on this series of lines is at Midvale, 11 linear miles to the north-northwest of the Crane Creek Hot Springs. The closest transmission substation to the area is in Weiser, approximately 10 linear miles to the west-southwest. However, the capacity of the power lines at the Weiser substation is only 69kV and may not be sufficient for the electric power generated at Crane Creek.

Interwest Development owns 226 acres around Crane Creek Hot Springs, including water rights on Crane Creek. This area abuts BLM land which has no current geothermal leases or claims. Interwest is currently allowing the land to be used for grazing and hopes to use the land as a game bird hunting reserve. Interwest apparently has all of the access required for development, as well as the ability to purchase the adjoining private land. Interwest is strongly favorable to development of this site for electrical generation as well as some kind of cogeneration facility (e.g., ethanol production or food processing) (Leon Blaser, personal communication).

Recommendations

1. Updated geochemistry: The temperature of the reservoir underlying Crane Creek Hot Springs has been estimated to be 160° to 170° C, depending upon the study and the geochemical thermometer used (Young and Mitchell, 1973; Young and

Whitehead, 1975). It would be advisable to conduct new chemical measurements on the water from Crane Creek Hot Springs and to re-calculate the reservoir estimate using the most recently published geothermometer formula. Even though the silica and the Na-Ca-K methods produced similar estimates for the Crane Creek Hot Springs, both methods should be used in the new study for verification purposes.

2. Geologic mapping: The area surrounding Crane Creek Hot Springs has never been geologically mapped in detail. A potential fault zone is visible in the hillside to the southwest of the hot springs in the adjoining property, and may be the fault responsible for Crane Creek Hot Springs. The area should be mapped at a scale of 1:24,000 or smaller in an attempt to reveal any structures that may be allowing geothermal fluids to flow to, or near to, the land surface. This project may be an attractive subject for a graduate-student thesis, and the possibility of graduate research support at the master's degree level should be examined.

3. Geophysical study: The previous audio- magnetotelluric study (Hoover et al., 1976) indicated a shallow conductive zone and a probable fault underlying Crane Creek Hot Springs. This study was rather rudimentary, and further geophysical studies should be undertaken to more accurately determine the subsurface structure in this area. According to Spencer and Russell (1979), the hot springs in the Crane Creek area occur on the east side of the fault zone. Geophysical study could be a very cost-effective method for locating potential drill sites.

4. If the exploratory geophysical and field mapping indicate attractive sites for detailed exploration, one or more exploration wells should be drilled to determine lithologic, structural, geochemical, and temperature information. Interwest Development is concerned with only heat extraction from the reservoir via heat exchanger rather than geothermal fluids via pumping, and the most suitable sites may be at a distance from the springs. By the same token, the areas with the highest heat flow are likely to be those with the highest fluid flow. It is likely that several wells may have to be drilled to determine the site's suitability. The depth of the exploration wells is unknown, but may be predicted using an estimated geothermal gradient. An average gradient, as measured in boreholes or in underground mines, is 2 to 3° C per 100 meters (°C/100m) (Press and Siever, 1974). A lower gradient (e.g., 1.5° C/100m) would result in a lower temperature for a given depth, and a higher gradient (e.g., 5°C/100m) would result in a higher temperature for a given depth. It can be assumed that in the immediate vicinity of the hot springs, the geothermal gradient is higher than normal, but the exact value

cannot be known for certain. Brott, 1976 indicates that the geothermal gradient for three wells in Washington County is 6° to 8° C/100m. If a similar geothermal gradient exists for the Crane Creek area, maximum reservoir temperature may be reached with a 1000 meter well (approximately 3000 feet). This estimate is entirely dependent upon the nature of the temperature gradient. It is likely that one of the reasons for the temperature drop between the reservoir and the spring output is mixing with cool near-surface groundwater. If this hypothesis is true, drilling through this mixing zone may result in a marked increase in water temperature, perhaps close to the estimated reservoir temperature.

Well-drilling can be the most expensive portion of an exploration program, with drilling costs of $20 to $25 per foot (for 6-inch wells). Therefore, drilling should commence after suitable targets have been identified.

2. Raft River KGRA (Cassia County)

Overview

The Raft River KGRA lies in Cassia County of south-central Idaho, about six miles north of the Utah border and 15 miles south of the town of Malta. It is one of the most studied geothermal systems in Idaho. The Department of Energy Idaho National Engineering and Environmental Laboratory (INEEL) operated a 5 MW test plant from the fall of 1981 to the spring of 1982. U.S. Geothermal, Inc., of Boise, is in the process of purchasing the Raft River complex from Vulcan Power of Bend, Oregon, and intends to develop the site into a commercial power plant. A few low temperature geothermal springs occur in the area, but the resource was discovered primarily by the drilling of irrigation wells, which was followed by geophysical exploration (Chappell et al., 1978). Allen, et al. (1979) gave a range of bottom-hole reservoir temperatures between 133°-150° C.

The aquifer for the Raft River KGRA is a complex mixture of Tertiary alluvial sediments, sedimentary and metasedimentary rocks, and crystalline rocks which often occur in Basin and Range terranes. Fracturing in the rock is the primary control on the flow of water. Bloomquist et al. (1985 vol. 2) estimate the volume of the aquifer underlying the Raft River KGRA to be approximately 5 mi^3. Flows from wells drilled into the aquifer vary greatly. Production ranged from about 15 gpm to 1,250 gpm (Applegate and Moens, 1980).

Site Development

Raft River is the only proven geothermal electricity producer in Idaho. McClain (1979) suggested a 100 MW potential, while Bloomquist et al. (1985)

suggested 12 MW as their best estimate for the area's potential. Based on the work done by the DOE (Bliem and Walrath, 1983), approximately 10 MW can probably be considered a very likely estimate of the field's potential, although greater output may be possible. Much of the work needed prior to full development would be those procedures necessary to pass environmental and regulatory hurdles (e.g., environmental impact statements, water and geothermal rights, etc).

Recommendations

From the standpoint of development, the Raft River area would likely be the most favorable site in Idaho for electrical production. Much of the necessary infrastructure, including the production and injection wells, is already in place. As stated above, U.S. Geothermal Inc., is planning to develop the Raft River site for electricity generation. As a result, very few (if any) state resources would need to be expended in the development of this resource.

3. Big Creek Hot Springs (Lemhi County)

Overview

Big Creek Hot Springs are located on United States Forest Service land in Lemhi County, approximately 24 miles west-northwest of Salmon, near the Frank Church River of No Return Wilderness. Access to the area is by unimproved and primitive roads.

Big Creek Hot Springs is one of the hottest geothermal systems in Idaho, with a surface temperature of approximately 93° C, (the boiling point of water at the springs' elevation) and a discharge from fifteen vents of approximately 75 gpm (McClain, 1979). Geochemical thermometers indicate that the underground reservoir temperatures are in the 137° to 179° C range (Dansart et al., 1994). Bloomquist et al. (1985 vol. 2) offered a reservoir temperature estimate of 159° C. As such, it is a prime candidate for electrical power development using binary-cycle generation, but the remote location, potential environmental implications, and the sparse population may not justify development.

The aquifer supplying geothermal water to Big Creek Hot Springs is altered granite of the Cretaceous Idaho Batholith, and water flow is controlled by fractures in the rock. Bloomquist et al. (1985 vol.2) gave an aquifer volume value of 0.8 mi^3, based on the estimated area and thickness values used in that study, and as such, cannot be relied upon as a meaningful value. Significant research into the thickness and areal extent of the Big Creek aquifer would be required to determine a more reliable volume.

Site Development

There have been numerous estimates of the electrical potential of the Big Creek Hot Springs area, such as 11 MW (for binary cycle generation) given by Struhsacker (1981), 23 MW from Bloomquist et al. (1985), and according to McClain (1979), the field has a 50 MW potential. All of these figures probably fall into the category of "best estimates," and as a result, the sustainable power that the field can be expected to produce is unknown. Again, significant geologic work would be required to determine the size of the geothermal resource.

Recommendations

The apparent geothermal potential of the Big Creek Hot Springs area alone would make it an attractive candidate for development. However, like Vulcan Hot Springs to the west, Big Creek Hot Springs lies in a scenic, remote, and publicly-owned area. Any power generation facility would be located approximately 10 miles from the closest transmission line to tie into the Idaho Power grid. This line runs from the city of Salmon to the Blackbird mine and is rated at 68 kV.

In order to more accurately delineate the geothermal aquifer, substantial exploration work is needed. Field mapping of the area is a prerequisite to subsurface exploration. However, the value of field mapping may be limited because the bedrock is all Idaho Batholith granite, and the fractures that serve as the fluid conduits may or may not have surface expressions. However, field studies could attempt to identify zones of geothermal alteration that may indicate points of future interest. Other work would most likely consist of geophysical work to determine the nature of the fractures that serve as the fluids' conduits, and hydrogeological studies including the drilling of a number of test wells to determine the production capacity of the aquifer.

The location of Big Creek Hot Springs is probably the main barrier that will be the most challenging to overcome for the development of a power plant. In addition to the construction of the generation facilities, transmission capacity would need to be established, as well as suitable access roads to the remote location. Extensive research is needed to determine the suitability of this site for development. This site would likely require a strongly favorable outlook in terms of the technical, political, and economic factors to drive development forward. The recommendation of this study is that Big Creek Hot Springs remain under consideration, but that other, more readily developable, sites should be considered with higher priority.

4. Vulcan KGRA (Valley County)

Overview

The Vulcan Hot Springs KGRA is located in a remote area of Valley County, over 20 miles east of Cascade. Access is by paved county highway, a Forest Service road, and a 0.75-mile hiking trail. The main vent at Vulcan Hot Springs discharges roughly 500 gpm at a surface temperature of 84° C, and 12 other nearby vents add 100 gpm (Dansart et al., 1994; McClain 1979). Geochemical analysis of the springs indicates a reservoir temperature of about 150° C (Mitchell and Young, 1973). The springs form a hot creek, which has been dammed with logs and tarpaulins at a number of points to create soaking pools.

The aquifer for Vulcan Hot Springs is Cretaceous granite of the Idaho Batholith, and flow is assumed to be fracture-controlled. Bloomquist et al. (1985 vol. 2) give an aquifer volume of 0.8 mi^3, which is based upon a "best estimate" of the area and thickness since there are few data for this area.

McClain (1979) estimated the area's electrical potential at approximately 50 MW, although space limitations imposed by the area's rugged topography may limit development potential. The general lack of research data also adds uncertainty to this estimate.

Site Development

Development of the Vulcan Hot Springs KGRA would require a great deal of research and effort. This effort would require geophysical study to determine the subsurface extent of the reservoir and the conduit structures which bring the geothermal water to the surface, geochemical study of the water to confirm reservoir temperature estimates, and well-drilling and reservoir testing to determine the suitability of the reservoir for electrical power generation. Some of this work, specifically the geophysics and drilling, would require the construction of an access road to the springs' discharge area, or would require that all necessary equipment be packed in or flown in by helicopter.

Recommendations

It is unlikely that the Vulcan KGRA will ever be developed due to a number of barriers. First, it is on Forest Service land in a remote and scenic area of a sparsely populated region. Second, the springs are popular as a recreational destination, and development of the springs would probably meet with resistance from hunters, hikers, and campers. Third, the area is a salmon spawning drainage, and development may cause conflict with the Endangered Species Act and raise

objections from environmentalists. In addition, the closest transmission line to the area is about 18 miles to the north and according to an Idaho Power grid map, has a capacity of 69 kV.

Development of the Vulcan Hot Springs KGRA would likely require substantial efforts in road-building and power-transmission capacity, in addition to the actual construction of the generation facility. Any of these required elements would most likely meet with resistance from a number of interested parties, and obtaining the necessary permits would probably be extremely difficult. The recommendation of this report is that development of the Vulcan Hot Springs KGRA not be pursued at this time.

5. Magic Hot Springs area (Blaine, Camas Counties)

Overview

According to Ross (1971), Magic Hot Springs previously discharged near the north edge of Magic Reservoir at 36° C with a discharge of 130 gpm. In 1965, a 259-foot well was drilled near the site of the springs, which discharged 74° C water at a rate of 15 gpm. The springs ceased flowing after the well was completed. Geochemical analysis of the water in this well indicated a reservoir temperature of approximately 149° C (Struhsacker et al., 1984).

Local rock types are basalt, rhyolite, and sediments. The flow of water appears to be controlled by normal faults (Struhsacker et al., 1984). In general, wells drilled near major faults have higher temperature gradients and higher water yields (Dansart et al., 1994). The existence of a number of large geologic structures in the area may indicate the potential for a significant geothermal resource.

No estimates have been made with respect to the electric power potential of the Magic Hot Springs area. Additional geologic data are needed to assess the resource. This would require geophysical studies and the drilling of at least one exploration well determine flow and geothermal gradient information.

The location of the former Magic Hot Springs is approximately two miles from the closest power-transmission line, rated at 138 kV and owned by Idaho Power. The closest substation is also approximately two miles from the Magic Hot Spring location. Other power plants in the area include the Magic Dam hydroelectric project, a new gas-fired power plant, and a planned gas-fired power plant in the area.

Site Development

The Magic Hot Springs area is close to power transmission lines, and with the fossil-fuel power plants in the area, the capacity for additional generation exists. In addition to the generation facilities, the transmission lines necessary to connect the facility to the power grid would have to be erected.

Recommendations

1. Hydrologic study: The primary resource consists of a single well which dried up a single hot spring. Temperature estimates have been made for the reservoir, but there do not seem to be any data on the hydrologic qualities of the reservoir. Testing on the one thermal well should be performed to determine current flow and temperature.

2. Geophysical study: A shallow geophysical study should be performed to determine the subsurface structure, which may point the way to likely sites for exploration and/or production wells.

Section 5. Potential for Direct-Use Projects

In general, the direct use of geothermal fluids for heating, recreation, and aquaculture applications is appropriate when water temperatures are lower than those required for electrical power generation. This encompasses the entire range of low temperature geothermal resources (30 to 100° C), although heat can be extracted from fluids much cooler than that (Forcella, 1984). Of course, geothermal fluids can be extracted without utilizing the thermal energy in any way, such as irrigating crops or watering livestock. Even then, the water's heat can be an asset in the colder months. However, it can also be a detriment during the hot months.

Direct-use involves the removal of either the geothermal fluid (water + heat) from the aquifer, or just the geothermal energy (heat) itself. More complex uses, such as surface and down-hole heat exchangers and even refrigeration units also fall under this category. Some of the specific methods employed are as follows (Forcella, 1984):

1. Hydronic Heating Systems: Best when the geothermal fluid can be directly used, these heat-emitting systems (e.g., radiant panels, finned-tube baseboard convector units and forced-air systems) are commonly used for space heating. The primary drawback to these systems is that the geothermal fluid is pumped directly through the heating unit, and these fluids often contain dissolved minerals that can cause corrosion or scale deposition within the units.
2. Heat Exchangers: Heat exchangers work by extracting the heat from the geothermal fluid to warm a second fluid. The advantage to this method is that the potentially corrosive or scaling effects of the geothermal fluid are limited to one side of a system, while the radiant heating units on the other side are not affected. Heat exchangers can be operated by pumping water out of a well and into the exchanger, or down-hole exchangers can be used to remove only the heat from the water inside the well without extracting the water.

Three potential sites for direct-use applications.

It is impractical to list all of the sites in Idaho where direct-use applications could be feasible, or even attractive. There are literally hundreds of places where wells have encountered water ranging from a few degrees above mean annual surface temperature to near boiling. Many geothermal direct-use applications are already operating in the state, such as the geothermal heating of the Idaho Capitol Mall Complex, City of Boise buildings, the College of Southern Idaho in Twin Falls, Boise's Warm Springs Water District residential area, numerous greenhouses, resorts, and aquaculture facilities.

As a result, only three potential direct-use sites will be discussed in this report. The interested reader can refer to the Idaho State Geothermal maps (1978, 1994, 2002) or to the Idaho Department of Water Resources web page for information

about the resources throughout Idaho and the various uses of geothermal water in the state (www.idahogeothermal.org).

1. Cascade (Valley County)

Overview

The Cascade, Idaho area overlies a low temperature geothermal resource of unknown size. A number of wells in the vicinity have intersected geothermal fluids in the 29°-37° C range, and a number of other wells have produced water in the 20°-29° C range (Figure 5). All of the thermal wells occur in granite, west of a northeast-trending fault near the site of the now-closed Boise Cascade Corporation sawmill. A portion of the surface trace of a fault can be seen in the Payette River from the mill site. However, heavy glacial cover obscures the remainder of the trace and the orientation of the fault as it moves away from the river. It appears that the fault dips to the east-southeast, and that at least two of the hot wells occur in fractured, decomposed granite on the northwest side of the fault zone.

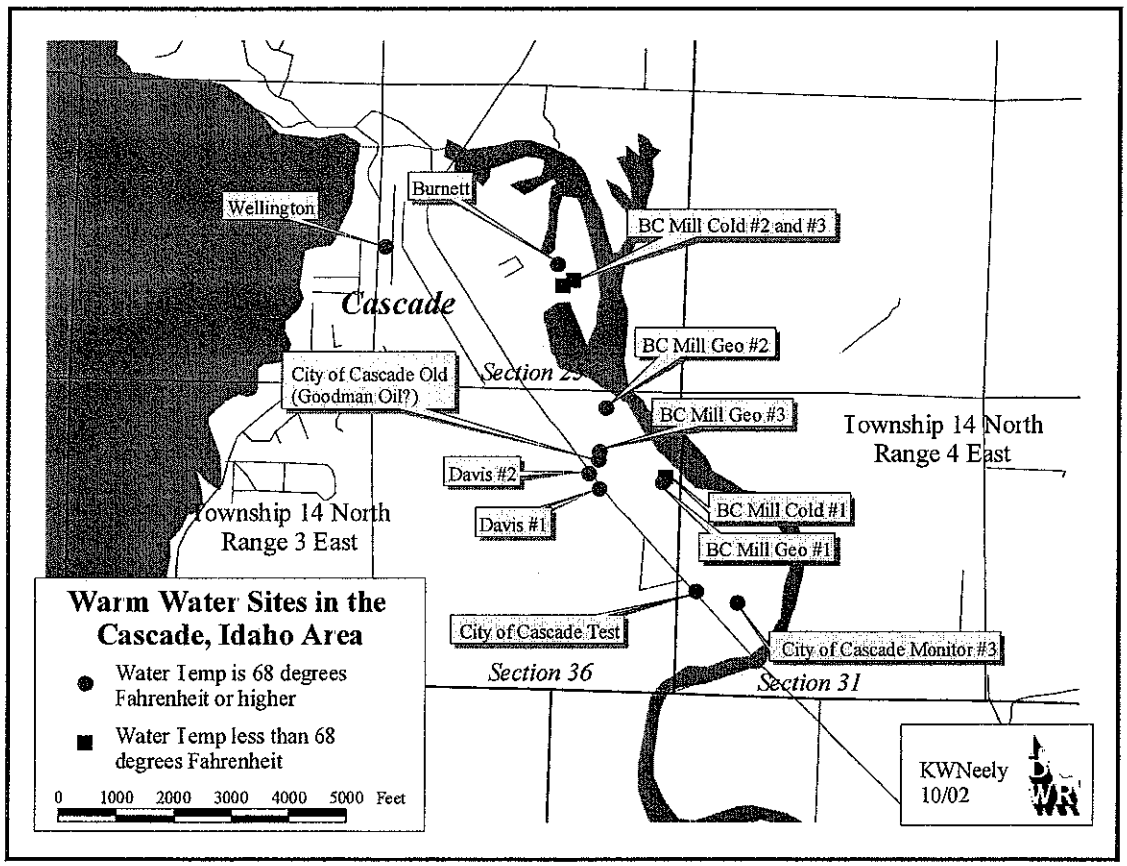


Figure 5. Warm water wells in the Cascade, Idaho Area.

While there are few surface hot springs in the immediate vicinity of Cascade (apart from one submerged in Cascade Reservoir), the region is home to eleven thermal springs within twelve miles of the city that are fault controlled according to Wilson et al. (1976).

Site Development

The city of Cascade has two potential sources of low temperature geothermal water for direct use applications. The first is a well drilled in the 1980's for municipal drinking water in the southern half of the city. According to Mayor Larry Walters of Cascade, this well encountered thermal water of approximately 38° C, was subsequently capped and has not been used since. This well would need to be tested for hydrologic and temperature parameters to determine if it is capable of provide heating water to the city.

The second potential resource is the thermal well on the site of the now-closed Boise Cascade corporation mill. The mill site is being decommissioned, and the future status of the mill site and its property is currently unknown. Negotiations would have to be undertaken to secure the well and its water rights for a city and/or county project.

The Valley County Recreation District is in the early stages of developing a recreation center in Cascade, including a swimming pool complex. At present, the center's projected location is at the north end of the city, near the Payette River's outflow from Cascade Reservoir. This site is approximately 1.5 miles north of the City of Cascade's hot well and 0.8 miles north of the Boise Cascade mill low temperature geothermal well. The original proposed location for the recreation center was in the city park just west of the Boise Cascade mill. This location is within 2,000 feet of the city's low temperature geothermal well and only a few hundred feet from the Boise Cascade well. The temperatures recorded in these wells would be sufficient to heat a swimming pool and associated recreational buildings if the flow is adequate and sustainable.

Another possible use for the geothermal fluids is a district heating program in the city of Cascade. The wells could serve as the head of a trunk line of geothermal fluid that would run down the central business district of Cascade where State Highway 55 passes through the city. Businesses could tap into the geothermal trunk line for heating. If there is sustainable discharge at an adequate temperature, this line could even be continued to the site of the proposed recreation center, where it could be used for space heating, and/or for use in heating the swimming pool, most

likely through a heat exchanger. At this point, the water could be discharged into the Payette River or re-injected into the aquifer system.

In addition to recreation and district heating, the potential for other applications in the Cascade area also exist. These may include greenhouse operations, aquaculture operations (e.g., tropical fish), or food dehydration.

Recommendations

The City of Cascade is a prime candidate for a district-heating program utilizing the low temperature geothermal wells in the area. This could include a business district heating program, the space heating of a proposed recreation center, or both. However, the geothermal system underlying the city seems to be rather "hit or miss," in that one well may tap a geothermal reservoir while a nearby (and deeper) well will produce cool water. Also, while most of the hot wells are close to the river, at least one well has intersected geothermal fluids at about 800 feet depth distant from the river (Ben Wellington, pers. comm., 2002). This disparity would make the development of a system of geothermal wells challenging. Also, it is unknown whether an injection well would be effective in recharging the low temperature aquifer. A study would need to be completed to determine if re-injection would benefit aquifer pressures and the possibility for thermal breakthrough at the production wells.

Exploratory geophysical work should be performed near the existing low temperature geothermal wells in order to determine if there are any structural similarities that may be used to locate and drill other geothermal wells. Each of the low temperature geothermal wells appears to be associated with a fault, but geophysical study may indicate what relationship they have to the faults, and whether they are related to the same fault or separate ones. This geophysical work would likely only need to examine the shallow subsurface (500-1000 feet), as the geothermal wells drilled so far are generally less than 350 feet deep. A widespread geophysical survey may indicate sites attractive for potential production or injection wells.

In addition to geophysical work, reservoir testing needs to be performed on the low temperature geothermal wells belonging to the City of Cascade and the Boise Corporation. This is necessary to determine if the reservoirs intersected by the wells are connected hydrologically. Seeing as how some wells in Cascade have elevated temperatures and others do not, it may be that there are a number of disconnected sources of geothermal fluids underlying Cascade. In addition, injection tests may be

performed to determine if injection of spent fluids after use would positively affect head levels in the geothermal reservoir, and if they would affect water temperatures in the production wells.

Temperature profiles are needed on the existing low temperature geothermal wells in Cascade to determine if there is a specific horizon producing the geothermal waters (although this is probably an unlikely scenario) or to determine if the temperature seen at the wellhead is a result of mixing with colder water from a different level in the well. Temperature profiles could be useful for predicting if the temperature of water from a well might be increased through the judicious use of well casing.

2. Lava Hot Springs (Bannock County)

Overview

The City of Lava Hot Springs (population ~500) is located in Bannock County approximately 30 miles southeast of Pocatello. One of Idaho's truly historic resort areas, Lava Hot Springs centers around the renowned geothermal soaking pools that were used for centuries by Native Americans and which were deeded to the state in 1902 as a health and recreation facility. The State of Idaho, through the Lava Hot Springs Foundation, currently owns and operates the springs (Figure 6). These soaking pools, along with the geothermally-heated Olympic swimming pool complex (also operated by the Lava Hot Springs Foundation), are the basis for the town's resort status. According to the IDWR water rights, the soaking pools utilize 3 cubic feet per second (cfs), which is equivalent to 1346 gpm. The water in the pools is approximately 41° C. Because the sand bottom of the soaking pools covers the spring vents, a direct temperature measurement is not practical. The well that feeds the heat exchanger for the Olympic-size swimming pool has a water right for 0.5 cfs (224 gpm). According to Mark Lowe, director of the Lava Hot Springs Foundation, this water is used only for heating the water in the swimming pool, and discharges into the Portneuf River after it is used.

A number of local businesses, primarily hotels and motels, divert geothermal water from local hot springs and from shallow (less than 100') wells for space heating and for soaking tubs and pools for their guests. In addition, many private residences have soaking tubs built over geothermal springs and wells. The majority of these sites seem to be within a couple hundred feet of the Portneuf River (Figure 6).

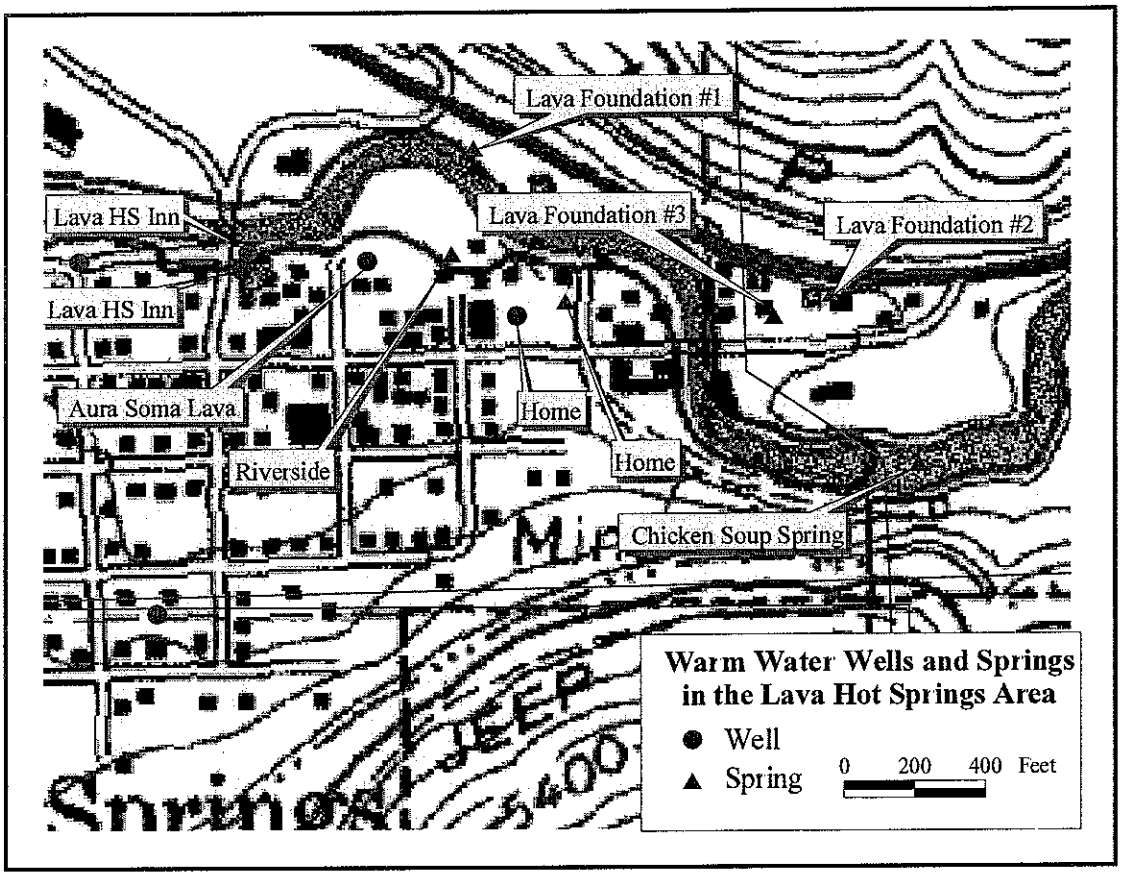


Figure 6. Warm water wells and springs in the Lava Hot Springs Area, Idaho.

At one time, the City of Lava Hot Springs piped geothermal water from the Chicken Soup Spring (the name used by local residents) just east of town. A well was drilled at the Chicken Soup spring to provide water for the city. This well was washed out when the Portneuf River flooded some years ago (none of the local residents spoken to during the reconnaissance trip were able to remember the exact year). The spring discharges from the riverbank with an estimated flow of 1.5 cfs (673 gpm). The temperature of the water was 47° C in August, 2002. The spring is at the end of a dirt road and a dilapidated chain-link fence partially surrounds the site. Schwarze (1960) describes a series of north-south trending normal faults in the area. These faults are likely candidates for the geothermal fluid conduits. However, the hydrogeology of the geothermal system in the Lava Hot Springs area has not been studied in detail and, therefore, is poorly understood.

Site Development

The city of Lava Hot Springs has potential for a space heating project and a district heating program. Mark Lowe indicated that the Community Center, located

on the north side of the river, might be re-fitted for geothermal heat. The line from State Pump House #1 runs north of the Community Center and into the Olympic swimming pool. It may be possible to tap into this line and deliver geothermal water to heat the Community Center.

The Chicken Soup spring, which was previously used for recreation and snow melt, could again be used as a source of geothermal fluids for the town for heating a small number of buildings in the city's downtown area, depending upon the water rights that could be obtained for the spring. The City of Lava Hot Springs has constructed a pipeline from the Chicken Soup Springs to the Lava Spa Motel, and has a lease with this facility to deliver 40 gpm to be used in hot tubs. However, the Lava Spa Motel has not purchased hot tubs so the water is currently returned to the river from the pipeline.

It is strongly recommended that any new development does not divert more water than is currently being discharged by the spring. Any additional development of the geothermal resource underlying the city must be prefaced with a thorough hydrogeological study of the resource. The reason for this is plain: The economic survival of the city is intimately tied to the geothermal resource. Any alteration, however minor, to the geothermal resource could result in an economic damage to the city and its residents, especially if the flow to the soaking pools of the Lava Hot Springs Foundation were reduced. A technical study would require the drilling of a number of test and monitoring wells and the performance of well-interference tests. If such a study shows that additional water can be withdrawn without damaging the flow to the resort, hotels, and local residents, then further exploitation of the resource may be feasible.

Recommendations

The city of Lava Hot Springs sits on a highly attractive geothermal resource. However, the intimate economic ties that the city has to that resource make it difficult to recommend further development because of the potential effects on the existing uses. This is not a simple case of conflicting water rights, but a potential irreversible damage to the city's livelihood. However, the water discharging into the Portneuf River from Chicken Soup Spring is presently unused, and utilization at its current discharge rate would not adversely affect the city's geothermal resource. The discharge should be enough to heat at least one building, if not several buildings, in the downtown area. Candidates for heating may include City buildings, the Lava Hot Springs Museum, or other public buildings. A hydrogeologic study of

the geothermal resource in this area must be conducted as an initial phase of a district-heating project.

A study of the resource was performed by G. Bloomquist of Washington State University, but the results of that study have not yet been received by the IWRRI or the IDWR.

3. Bruneau Dunes State Park (Owyhee County)

Overview

The Idaho Department of Parks and Recreation (IDP&R) operates the Bruneau Dunes State Park in Owyhee County. A low temperature geothermal well in the park is currently being used for irrigation. The IDP&R would like to develop this resource for heating a new interpretive center. The well is 990 feet deep, and has a temperature of approximately 37° C. The discharge listed on the IDWR Well Driller's Report is 132 gpm.

Aaron Boston, IDP&R Engineer, indicated that this well is prone to severe drawdown during the summer months, with subsequent recharge to "normal" levels during the winter and spring; this seasonal fluctuation may affect the discharge rate. According to Mr. Boston, the temperature of the well does not seem to vary greatly through this cycle. There may be reasons for this pattern. First, the IDP&R may be pumping too much water from the well. Therefore, use of the water from this well for heating may require the drilling of another well for irrigation. Second, the aquifer may be unconfined, with significant surface recharge due to infiltration of rainwater and snowmelt in the wet months. This may indicate a source of geothermal heat that is independent of the source of the water. If so, a system of down-hole heat exchangers might be used to heat the park buildings.

Recommendations

According to IDP&R Engineer Aaron Boston, the Department of Parks and Recreation is not currently ready for this type of development. However, some preliminary work could be accomplished now in preparation for future development. The use of geothermal by a state agency in a scientific interpretive center would project a favorable image of geothermal heat in Idaho.

Summary for Direct Use

The Cascade, Lava Hot Springs, and Bruneau Sand Dunes sites are the leading candidates for direct-use development projects in Idaho. The potential for development at these sites is fair to excellent. However, each site has barriers to development that will have to be overcome before district heating or other direct use

applications become a reality. In addition to these three sites, a number of other places in Idaho have been studied for district heating projects. Contact the Idaho Department of Water Resources (208-327-7900 or geothermalinfo@idwr.state.id.us) for a listing of these sites, or for additional information about the potential for geothermal direct use in your area of interest.

Section 6. Summary and Recommendations

Power Generation

Idaho has one site, Raft River, where power generation was successful for a short time in the 1980's. Raft River and four other sites were studied for their current power generation potential.

1. Crane Creek

The Crane Creek site in Washington County has high potential for a future power generation facility, but much technical work is needed to prove the resource.

Recommendations for Technical Work:

a. Cost benefits analysis for determining the feasibility of a power plant, and secondary (direct) use of the geothermal resources.

b. Updated geochemical study of the waters of Crane Creek Hot Springs.

c. Geophysical studies of the Crane Creek Hot Springs area.

d. Detail geologic mapping of the Crane Creek Hot Springs area.

e. Exploratory drilling in the Crane Creek Hot Springs area **if** prior geophysical work and mapping indicate a favorable situation.

2. Raft River

The Raft River site in Cassia County is being developed by U.S Geothermal, Inc. No technical work needs to be done by the State of Idaho at this time at the Raft River site.

3. Big Creek Hot Springs

The Big Creek site should remain under consideration for electrical development, but no technical work should be directed toward this site until the higher-priority Crane Creek site has been investigated.

4. Vulcan Hot Springs KGRA

No technical work should be pursued at the Vulcan KGRA at this time by IDWR.

5. Magic Reservoir Area

The Magic Reservoir site in Blaine and Camas Counties has very limited hydrogeologic information available at this time. Additional studies to determine the potential of this area can commence after the higher-priority Crane Creek area has been investigated.

Recommendations for Technical Work:

a. Hydrologic study of the Magic Reservoir Hot Springs area.

b. Geophysical study of the Magic Reservoir Hot Springs area.

Direct Use

Direct use projects are common throughout southern Idaho. District heating, domestic heating, heating of commercial businesses, recreation, and aquaculture are all current uses of low temperature geothermal resources. Three sites were examined in detail for potential new or expanded developments.

1. Cascade

The Cascade area has proven geothermal resources as evident by the existence of several wells with water temperatures in the 29°-37° C range. However, the capacity of the reservoir system is unknown at this time. The Cascade area has the highest development potential for direct use at this time, and investigations should begin as soon as possible due to a possible window of opportunity with the decommissioning of the Boise Cascade site.

Recommendations for Technical Work:

a. Cost Benefits analysis to assist the City with planning for new development.

b. Geophysical study of the Cascade area.

c. Determination of the availability of resources by thorough reservoir testing (pump tests, temperature profiles, re-injection potential, thermal breakthrough investigations).

2. Lava Hot Springs

The Lava Hot Springs area has proven geothermal resources that are currently being used for heating and recreation. Additional development of the resources could be accomplished by using both the existing Lava Hot Springs Foundation pipeline, and the unused Chicken Soup Spring. This development will not require any new withdrawals from the aquifer system, but would use existing water rights. Technical work with respect to the reservoir is not needed unless additional withdrawals are proposed. However, technical work is needed to determine how to use the water from the Lava Hot Springs Foundation and the Chicken Soup Spring to heat local buildings

Recommendations for Technical Work:

a. Determine the infrastructure changes needed to provide geothermal heat to the Community Center.

b. Determine the infrastructure changes needed to supply geothermal water from the Chicken Soup Springs to downtown buildings on the south side of the river.

3. Bruneau Dunes State Park

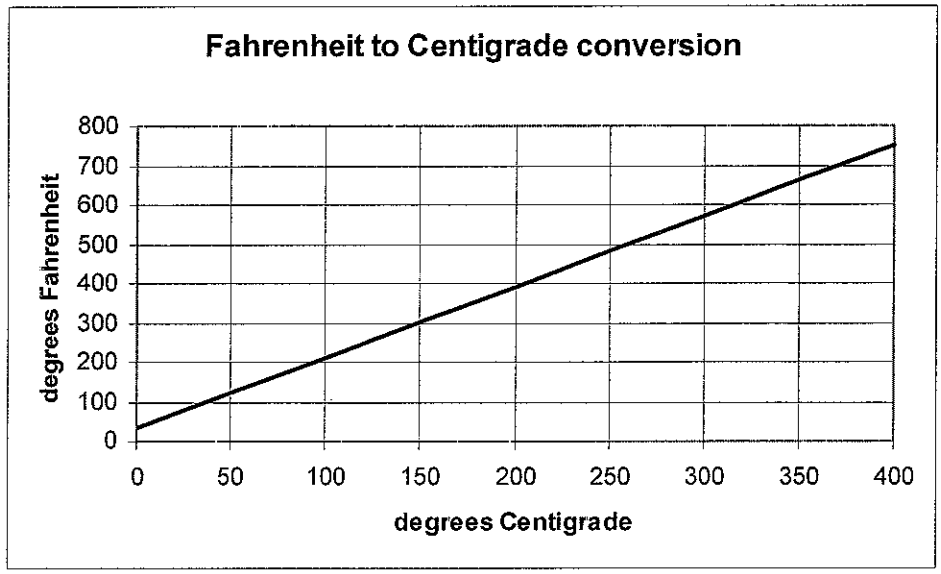
The Bruneau Dunes State Park has a proven low temperature geothermal resource and a desire to use that resource for heating a proposed new interpretive center.

Recommendations for Technical Work:

Investigate heating methods which would be best used in conjunction with the existing low-temperature thermal well in the park and with the new interpretive center

Appendix 1. Temperature Conversion

Temperatures are given in various reports and publications in either Centigrade or Celsius (metric) scale or in Fahrenheit (imperial) scale. In this report, temperatures are reported in Centigrade. Conversions are based upon the relation **°F = 1.8°C + 32**. The chart below depicts the temperature relations. The boiling point of water is 100°C, or 212°F. The elevated pressure below the surface of the earth inhibits boiling, and the temperatures of subsurface geothermal fluids can be far in excess of the boiling point of water.



References

Allen, C.A., Chaney, R.E., and McAtee, R.E., 1979, Geochemical Modeling at Raft River, *in* Transactions of the Geothermal Resources Council (Volume Three) Annual Meeting, pp. 1-4.

Applegate, J.K. and Moens, T.A., 1980, *Geophysical Logging Case History of the Raft River Geothermal System, Idaho*, Los Alamos Scientific Laboratory Informal Report, 30 pp.

Armstead, H. and Christopher, H., 1976, Summary of Section VII Electricity Production, *Proceedings of the Second United Nations Symposium on the Development and Use of Geothermal Resources* (San Francisco), pp. ciii-cx.

Bloomquist, R.G., Black, G.L., Parker, D.S., Sifford, A., Simpson, S.J., and Street, L.V., 1985, *Evaluation and Ranking of Geothermal Resources for Electrical Generation or Electrical Offset in Idaho, Montana, Oregon and Washington*, Bonneville Power Administration Resource Assessment, 2 volumes.

Bloomquist, R.G., Geyer, J.D. and Sifford B.A., 1989, Innovative Design of New Geothermal Generating Plants, Bonneville Power Administration.

Bliem, C.J. and Walrath, L.F., 1983, Raft River binary-cycle geothermal pilot plant final report: EG&G Idaho, Inc. Report EGG-2208.

Boston, Aaron, 2002 personal communication.

Brott, C.A., Heat Flow and Tectonics of the Snake River Plain, Idaho, Geothermal Investigations in Idaho, Part 8, Idaho Department of Water Resources Water Information Bulletin No. 30, 195 pp.

Chappell, R.N., Griffith, J.L., Knowles, W.R., and Schultz, R.J., 1978, The Multi-Purpose Geothermal Test and Experimental Activities at Raft River, Idaho, *in* Geothermal Resources Council, TRANSACTIONS, Vol. 2, pp. 83-85.

Dansart,, W.J., Kauffman, J.D., and Mink, L.L., 1994, Overview of Geothermal Investigations in Idaho, 1980 to 1993, Idaho Water Resources Research Institute research technical completion report, 79 pp.

Forcella, L.S., 1984, *Low Temperature Geothermal Resource Management*, Oregon Department of Energy Report, 28 pp.

Gawlik, K. and Kutscher, C., 2000, Investigation of the Opportunity for Small-Scale Geothermal Power Plants in the Western United States (Draft), National Renewable Energy Laboratory, 49p.

Hoover, D.B., Brougham, G.W., and Clark, J.C., 1976, Station and traverse location map, audio-magnetotelluric data log, and telluric profiles for Crane Creek Known Geothermal Resource Area, Idaho, United States Geological Survey Open-File Report #76-409.

Idaho Code, Article 42, Chapter 40.

Idaho Department of Water Resources, 2002, Geothermal Resources: Idaho Department of Water Resources website, (http://www.idwr.state.id.us/planpol/techserv/gwmon/geotherm.htm)

Idaho State Constitution, Article 15.

Idaho State Geothermal Map, 1978, 1994, 2002

Lowe, M., 2002, personal communication.

Mabey, D.R., 1983, Geothermal resources of southern Idaho: U.S. Geological Survey Circular 866, 24 p.

McClain, D.V., 1979, Geothermal Energy in Idaho: Site Data Base and Development Status, OIT Geo-Heat Utilization Center & Idaho Energy Office.

Mitchell, J.C., Johnson, L.L., and Anderson, J.E., 1980, *Geothermal Investigations in Idaho Part 9:* Potential for Direct Heat Application of Geothermal Resources, Idaho Department of Water Resources Water Information Bulletin No. 30.

Mitchell, J.C., Bideganeta, K., and Palmer, M.A., 1984, Stable Isotopic Evaluation of Thermal Water Occurrences in the Weiser and Little Salmon River Drainage Basins and Adjacent Areas, West-Central Idaho with Attendant Gravity and Magnetic Data on the Weiser Area, Idaho Department of Water Resources Water Information Bulletin No. 30.

Muffler, L.J.P. (editor), 1979, Assessment of geothermal resources of the United States – 1978: United States Geologic Survey Circular 790, 163 pp.

Press, F., and Siever, R.R., 1974 *Earth*, W.H. Freeman, 649 pp.

Ross, S.H., 1971, Geothermal potential of Idaho, Idaho Bureau of Mines and Geology Pamphlet No. 150, 72 pp.

Schwarze, D.M., 1960, *The Geology of the Lava Hot Springs Area, Idaho,* Occasional Papers of the Museum of Idaho State College, No. 4, 51pp.

Spencer, S.G. and Russell, B.F. (eds.), 1979, *Crane Creek KGRA: An Environmental Analysis*, EG&G Idaho, 117 pp.

Spencer, S.G. and Russell, B.F., 1979, *Vulcan Hot Springs KGRA: An Environmental Analysis*, EG&G Idaho, Inc., 125pp.

Struhsacker, D.W., Jewell, P.W., Zeisloft, J., and Evans, S.H., Jr., 1984, The Geology and Geothermal Setting of the Magic Reservoir Area, Blaine and Camas Counties, Idaho.

United States Code, Title 30 Chapter 25, Sections 1001-1025 (Geothermal Steam Act of 1970)

United States Department of Energy, 1999, *Geothermal Today* (1999 Geothermal Energy Program Highlights), 36 pp.

United States Department of Energy, Geothermal Energy Program World Wide Web Site, 2001. (www.eren.doe.gov/geothermal/)

Walters, Larry, 2002, personal communication.

Wellington, Ben, 2002, personal communication.

Wilson, M.D., Applegate, J.K., Chapman, S.L., and Donaldson, P.R., 1976, *Geothermal Investigation of the Cascade, Idaho area*, Department of Geology and Geophysics, Boise State University, 44 pp.

Young, H.W., 1985, Geochemistry and Hydrology of Thermal Springs in the Idaho Batholith and Adjacent Areas, Central Idaho, USGS Water-Resources Investigations Report 85-4172.

Young, H.W., and Mitchell, J.C., 1973, *Geothermal Investigations in Idaho Part 1, Geology and Geochemistry*, Idaho Department of Water Resources Bulletin No. 30.

Young, H.W., and Whitehead, R.L., 1975, Geothermal Investigations in Idaho, Part 3, An evaluation of thermal water in the Weiser area, Idaho, Idaho Department of Water Resources Water Information Bulletin No 30.

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RE: McGregor Application #65-13913 (Protested); Test Well Proposal

Dear Ms. Beeman and Mr. Campbell:

On 1/30/2003 the Idaho Department of Water Resources (Department) received a proposal for construction of a geothermal test well at Belvidere Springs relating to the McGregor Application for Permit #65-13913. Additional information was received from Scanlan Engineering addressing specific questions on 9/4/2003. The Department also received correspondence from Sherl Chapman of ERO Resources presenting analysis and concerns from the protestant's position on 10/07/03.

Pursuant to Idaho Code Sections 42-235 & 42-237a, the Director is charged with protecting the environment, preventing the mixture of water from different aquifers, and protecting the resource from damage and depletion. In addition, IDAPA 37, Chapter 9, Rule 45.01.d states that "[d]rilling permits will not be issued for construction of a well which requires another separate approval from the department, such as a water right permit . . . until the other separate approval has been given by the department." The Director may grant a waiver "if the public interest will be served by the expedited approval." Finally, Idaho Code § 42-1805 grants the Director the authority to "conduct surveys, tests, investigations, research, examinations, studies . . . relating to availability of unappropriated water . . . ." The need for additional information, the public interest in gathering the information, and the risk of injury to other water users should be considered in determining whether to approve a drilling permit.

The Department has reviewed the proposal submitted by Scanlan Engineering and analysis from Sherl Chapman of ERO Resources. In consideration of State Law, Administrative Rules, and information presented by the parties, the Department concludes the following:

Drilling into the low temperature geothermal system at Belvidere presents a substantial risk for permanent damage to the resource, and additionally subjects the Pancheri water right to possible injury. MacGregor can attempt to establish proof of water sufficiency at the location by other means. The Department will not consider approval of a drilling permit at the proposed location until the following has occurred:

Application for permit #65-13913 is approved, and a drilling permit can be considered.

OR

An agreement to compensate for possible damages is executed by the applicant and protestant.

Should you have any questions, please feel free to contact me or Rob Whitney at the Western Regional Office, phone 334-2190.

Sincerely,

John Westra

John Westra, Manager
Western Region

cc: Sherl Chapman, ERO
Terry Scanlan, Scanlan Engineering