

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
IN-OFFICE REVIEW/BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 95-16651

Exam Date: 8/1/2016

1. Does this qualify for an in-office field exam (IDAPA 035.02.r)? ☒ Yes ☐ No
- a. Irrigation of 5 acres or less
- b. Storage of up to 14.6 AF for stockwater purposes only
- c. Any use other than irrigation or storage, if the combined diversion rate is 0.24 cfs or less
- d. Other < >

2. Current Owner: Name: Raymond R Bradley
- Owner-of-Record Correct? ☒ Yes ☐ No
- Address-of-Record Correct? ☒ Yes ☐ No
- If No: <Address>

The available Kootenai County taxlot information shows that the property is owned by Raymond R Bradley

3. Beneficial Use Fees have been paid: ☐ Yes ☐ No Receipt No: N/A – permit is less than 0.04 cfs from ground water. The fee was paid and then refunded.

4. SOURCE TRIBUTARY
- Ground water N/A
- Method of Determination: UIC file confirmation
- Change in Source: ☐ Yes ☒ No

B. OVERLAP REVIEW

1. Other water rights with the same place of use: Overlap? ☐ Yes ☒ No

Water Right No.	Source	Purpose of Use	Basis

Comments: Riverview Island Estates Homeowners Assn holds water right WR 95-12025. The well for the HOA's system is also located within the Bradley property and the Bradley's in-house domestic use is supplied by that system.

The Bradley property also has licensed right 95-16958 for domestic use in the form of 0.04 cfs:0.6 af irrigation use from the Spokane River.

2. Other water rights with the same point of diversion: Overlap? ☐ Yes ☒ No

Water Right No.	Source	Purpose of Use	Basis

Comments: This well is both the production and the injection well; the point of diversion and the point of discharge.

C. DIVERSION AND DELIVERY SYSTEM

1. LOCATION OF POINT(S) OF DIVERSION:

Source	Govt. Lot	¼	¼	¼	Sec.	TWP	RGE		County
Ground water	05		SE	NE	8	50N	04W	B.M.	KOOTENAI

Method of Determination: The legal description in the permit is validated by PLS data and aerial photography.

Change in POD? ☐ Yes ☒ No Amendment Required? ☐ Yes ☒ No

2. **LOCATION OF PLACE(S) OF USE:** Use: Heating and Cooling

TWP	RGE	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
50N	04W	08				H,C													
						L5													

Method of Determination: The legal description in the permit is validated by PLS data and aerial photography.

Change in POU? ☐ Yes ☒ No Amendment Required? ☐ Yes ☒ No

3.

☐ Delivery System Diagram Attached (required). Indicate all major components and distances between components.
Indicate weir size/pipe as applicable. The pipe size is unknown.

☒ Aerial Photo Attached (required for irrigation of 10+ acres).

☒ Photo of Diversion and System Attached

4. Well or Diversion Identification No.	Heat Pump Make	Hp	Heat Pump Model No.	Well Pump Make	Well Pump Model No. Discharge Size
	Carrier		50YCV036LLC301**	Grundfos	10 SQE05-110 8-10 gpm+

+From the UIC Application For Permit 95-W-012-001*

**Heat Pump make, model and serial numbers were provided by the installer, Ron Nelson of Advanced Heating & Air Conditioning. For Carrier, the unit size (36 BTU) is imbedded in the middle of the model number.

D. **FLOW MEASUREMENTS**

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

2. Measurements: In-office field exam. No measurements taken

E. **FLOW CALCULATIONS**

☒ Additional Computation Sheets Attached

Industry standard = 2 - 3 gpm per ton. This heat-pump is a 36 BTU (or 3 ton) unit. 3 gpm/ton x 3 ton = 9 gpm or 0.02 cfs

Permit allowed = 0.03 cfs

License recommended for 0.02 cfs.

F. **VOLUME CALCULATIONS**

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = \underline{\text{N/A}}$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = \underline{\text{N/A}}$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} = \underline{\text{N/A}}$$

Volume Calculations for Other Uses: see attached spreadsheet

License recommended for 7.6 af

G. **PURPOSE OF USE**

Irrigation ☐ Yes ☒ No # Stock _____

Domestic # of Homes _____

Other: Heating and Cooling

Change in Purpose of Use? ☐ Yes ☒ No

Method of Determination: Information from the field inspection is consistent with the permit.

If Yes: From Use _____ To Use _____ Amount _____ CFS _____ AFA

H. NARRATIVE/REMARKS/COMMENTS

Permit 95-16651 authorizes 0.03 cfs diversion from ground water for heating and cooling purposes. Based on the small permitted diversion rates, this permit qualifies for an in-office field exam.

Legal description of the POU was used to locate the property. Available Kootenai County taxlot information indicates that Raymond R Bradley owns the property.

The place of use is the geothermal heat pump itself and it is located inside the garage. In a phone conversation on July 25, 2016, the permit holder stated that only 3000 sq ft of the residence was climate controlled by the heat pump system. This footage excludes an addition to the home. The POU shape is roughly the entire home and is based on taxlot information and aerial photography.

Point of diversion: I selected SpatialData point 488058 as the best representation of the location provided by the well driller.

Point of discharge: The well is a standing column well. See the attached schematic. It serves as both the production and injection well for the geothermal heat pump system.

WR permit 95-16651 authorizes the heat pump system to provide heating and cooling uses only, so the use was expected to be non-consumptive. Spent heating/cooling water is not discharged to the land surface.

This well is drilled into the southern bank of the Spokane River and is likely hydraulically connected to the river. However, it is outside of the current boundary for Rathdrum Prairie Ground Water Management Area.

Have conditions of permit approval been met? ☒ Yes ☐ No

I. RECOMMENDATIONS**1. Recommended Amounts**

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
Heating and Cooling	01/01-12/31	0.02 cfs	7.6 AF
	<u>Totals</u>	0.02 cfs	7.6 AF

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

Other: < >

I. AUTHENTICATION

Field Examiner's Name Adam Fredericks and Michele Edl Date June 21, and August 1, 2016 respectively

Reviewer _____ Date _____

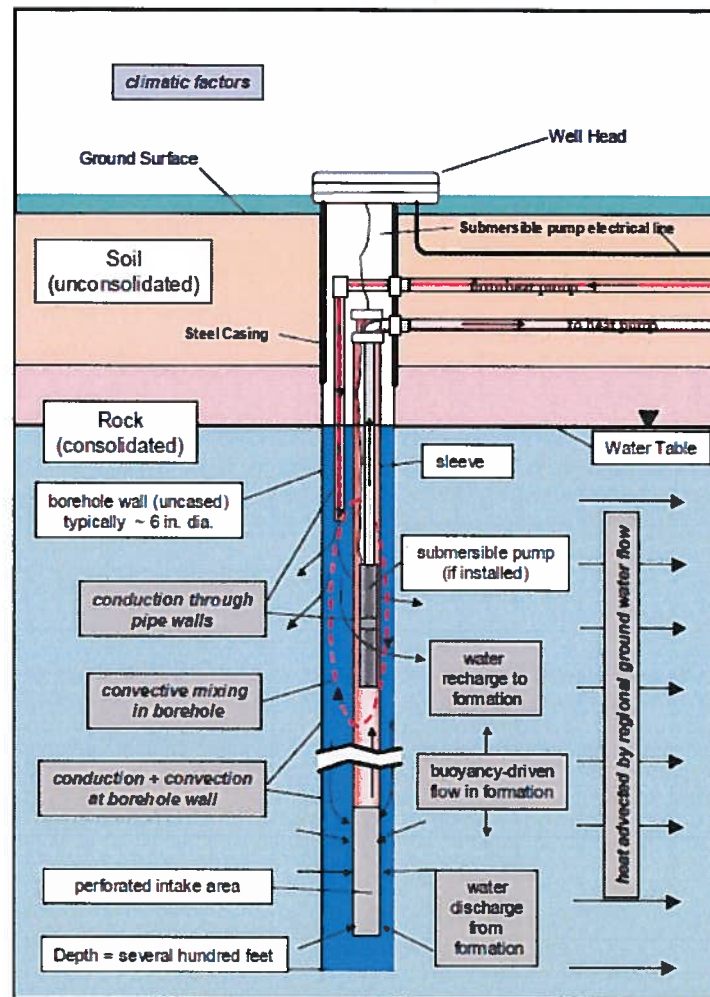


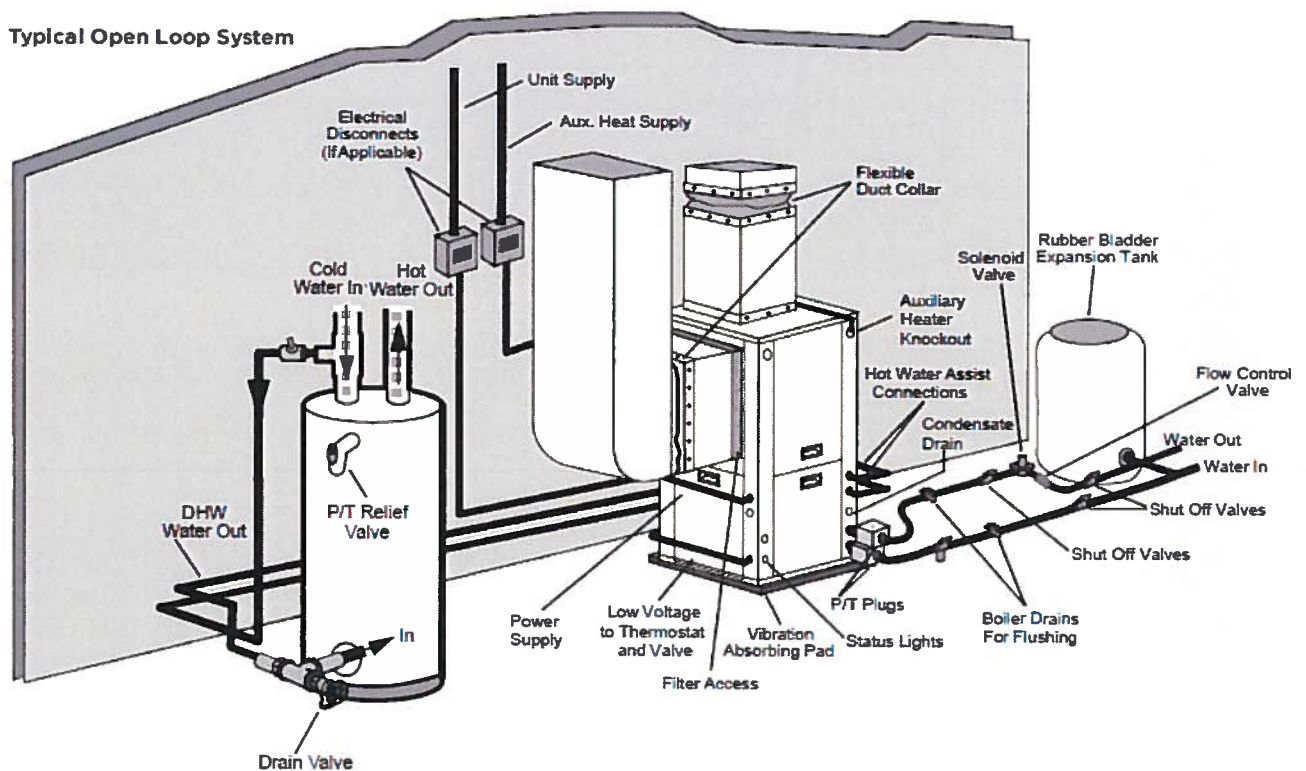
Figure 1 A schematic of a typical standing column well (<http://www.hvac.okstate.edu/>)

Open Loop Components

Major components in an open loop/well system include:

- Geothermal unit placed on mounting pad
- Thermostat
- Well & pump
- Pressure tank
- Supply water piping
- Discharge water piping with solenoid valves and flow regulators
- Shut-off/isolation valves and drain valves
- Electrical supply
- Duct system (except for radiant floor heating systems)
- Hot water piping (if hot water generator used)
- Auxiliary heater (if used)

Typical Open Loop System

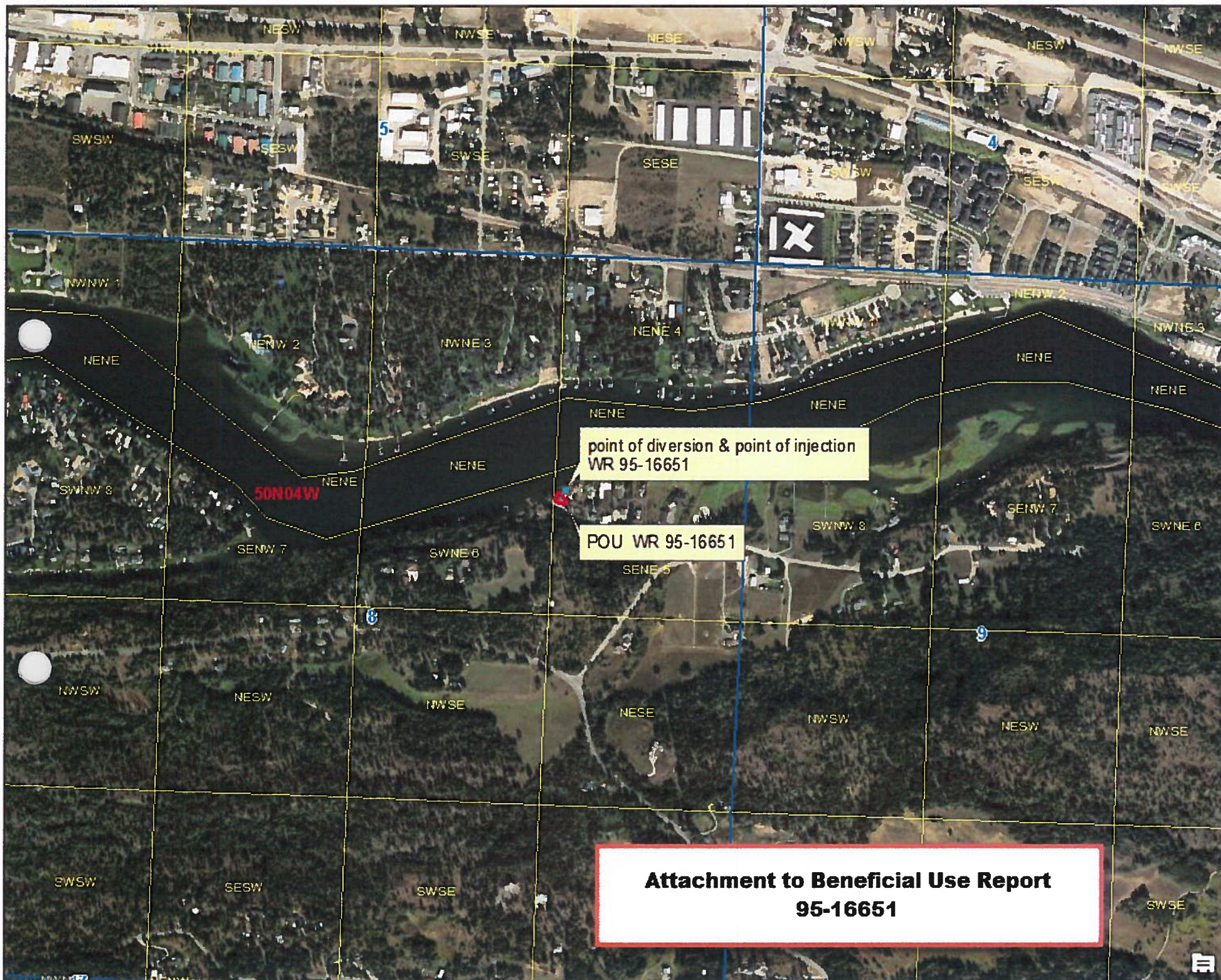




HEAT PUMP

06/21/2016





Edl, Michele

**ATTACHMENT TO BU REPORT 95-16651
POD LOCATION**

From: Steve Burchett [sburchett@budingerinc.com]
Sent: Monday, July 25, 2016 5:10 PM
To: Edl, Michele
Subject: Well Location
Attachments: Bradley Well.pdf

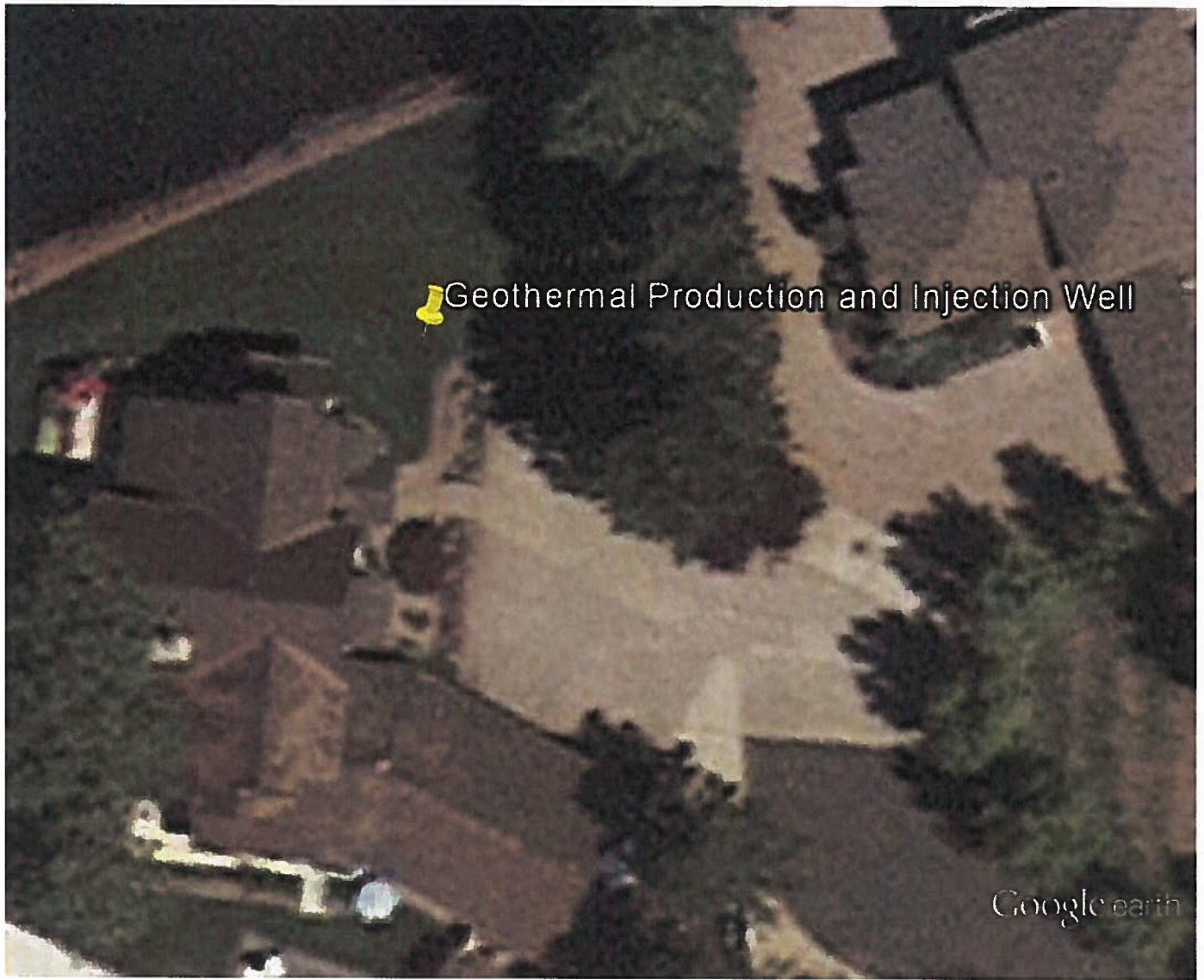
Hi Michele, it was nice speaking with you today. The pushpin on the google map should be within a couple of feet of the location. I had to use an older map to find one that the location was not in the shade. I'll send you some more information hopefully tomorrow.

Regards,
Steve

Stephen D. Burchett, PE



*1101 North Fancher Road
Spokane Valley, WA 99212
Phone: 509-535-8841
Fax: 509-535-9589
www.budingerinc.com*



Google earth

feet
meters



Heating, and Cooling Energy Estimator*

Heating Estimator

FloorArea 3000 ft²
 HeatLoss kBtu/h
 HeatSqFt 40 kBtu/h-ft²→
 HeatReqd 120.0 kBtu/h
 HeatHours 1500 Hours/year

Read Me

GPMpTonH
 GPMpTonC

Heating
 Cooling
 Total

Read Me

2.5	Gal/min
2.5	Gal/min
2250000	Gal/year
225000	Gal/year
2475000	Gal/year
330882	Cu.Ft./year
7.596	AcreFt/year

2.5 gpm/ton is optimal for open loops

HeatHours Estimates			
Region		Low	High
South	House	600	800
	School	200	400
	Office	200	700
Mid-USA	House	800	1000
	School	300	500
	Office	700	900
North	House	1000	1500
	School	500	600
	Office	900	1100

HeatSqFt Estimates (kBtu/h per 1000 ft ² of Floor Area)					
Region		Poor Quality	Std. Quality	Hi. Quality	Super Eff.
South	House	30	20	15	10
	School	30	22	15	10
	Office	22	18	14	11
Mid-USA	House	40	32	25	16
	School	35	27	20	13
	Office	25	22	15	12
North	House	50	40	30	20
	School	40	30	25	15
	Office	30	24	18	13

Cooling Estimator

HeatGain kBtu/h
 CoolSqFt 20 kBtu/h-ft²→
 CoolReqd 60.0 kBtu/h
 CoolHours 300 Hours/year

CoolHours Estimates			
Region		Low	High
South	House	1100	1600
	School	600	1000
	Office	1200	1800
Mid-USA	House	800	1000
	School	400	550
	Office	700	1100
North	House	200	300
	School	200	300
	Office	300	600

CoolSqFt Estimates (kBtu/h per 1000 ft ² of Floor Area)					
Region		Poor Quality	Std. Quality	Hi. Quality	Super Eff.
South	House	32	25	17	10
	School	65	53	36	31
	Office	35	28	20	15
Mid-USA	House	30	22	15	9
	School	60	48	38	28
	Office	30	25	17	14
North	House	28	20	14	8
	School	50	42	30	26
	Office	28	22	16	12

* adapted from HeatCoolWater.xlsx with permission from the spreadsheet author, Dr. Steve Kavanaugh

ATTACHMENT TO BU REPORT 95-16651

The following documents were copied from UIC records. In addition to providing information about the well, well construction and pump, the documents confirm compliance with permit conditions.

Attachment to Beneficial Use Field Report for 95-16651

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Lat: 47° 41.7996
Long: 116° 51.3780

1. WELL TAG NO. D0061834

Drilling Permit No. 870621

Water right or injection well # _____

2. OWNER:

Name Ray Bradley

Address 351 South Hidden Island Lane

City Coeur d'Alene State ID Zip 83814

3. WELL LOCATION:

Twp. 50N North ☒ or South ☐ Rge. 4 East ☐ or West ☒

Sec. 8 NW 1/4 SE 1/4 NE 1/4

Gov't Lot _____ County Kootenai

Lat. 47 degrees 41'47.96 (Deg. and Decimal minutes)

Long. 116 degree 51'22.52 (Deg. and Decimal minutes)

Address of Well Site 351 South Hidden Island Lane

City Coeur d'Alene

(Give at least name of road - Distance to Road or Landmark)

Lot. _____ Blk. _____ Sub. Name _____

4. USE:

☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection

☒ Other geothermal

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well

☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method/procedure
Bentonite	15	3'	200 lb	tremmie

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
3"	18'	3'	Sch 4	PVC	☐	☐	☒	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☐ N Method _____

Manufactured screen ☐ Y ☐ N Type Western well screen

Method of installation lowered into casing

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
56	38	.010		3"	PVC	Sch 40
28	18	.010		3"	PVC	Sch 40

Length of Headpipe N/A Length of Tailpipe N/A

Packer ☒ Y ☐ N Type 3" Rubber

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method
#6-9 sand	56	35	300	tremmie
#6-9 sand	30	15	200	tremmie

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) _____

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 7' Static water level (ft) 7'

Water temp. (°F) 55 degrees Bottom hole temp. (°F) 55 degrees

Describe access port threaded plug

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
1.5	28	75

Test method:

Pump	Ballor	Air	Flowing artesian
☒	☐	☐	☐

Water quality test or comments: _____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water	
				Y	N
7	0	9	Silty sand with clay occ gravel water at 7	x	
7	9	17	Sand and gravel with cobbles and boulders	x	
7	17	54	Medium to coarse sand with gravel	x	
7	54	56	Crystalline metamorphic bedrock	x	

Completed Depth (Measurable): <u>56'</u>
Date Started: <u>11-25-2013</u> Date Completed: <u>11-27-2013</u>

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Budinger & Associates, Inc. Co. No. 569

*Principal Driller St. Bruchett Date 2/21/14

*Driller _____ Date _____

*Operator II _____ Date _____

Operator I _____ Date _____

* Signature of Principal Driller and rig operator are required

Permit No. 95-W-012-001



**APPLICATION FOR PERMIT TO CONSTRUCT OR MODIFY A
LOW-FLOW (<50 GPM) HEAT PUMP INJECTION WELL (5A7 ONLY)**

IDAHO DEPARTMENT OF WATER RESOURCES
322 East Front St., PO Box 83720, Boise, ID 83720-0098
Under the Provisions of Title 42, Chapter 39 of the Idaho Code

I. GENERAL INFORMATION

A. Application Type:

- ☒ New Injection Well Operating Permit (A Drilling Permit is also required prior to construction)
☐ Permit to Modify an Existing Injection Well

B. Legal Owner:

Name Ray Bradley
Organization Name Homeowner
Mailing Address 351 South Hidden Island Lane
City Coeur d'Alene State ID Zip Code 83814
Phone No. 1 208-667-0644 Phone No. 2 _____

**If the property will change ownership soon, provide contact information for future owner:

C. Well Location:

Facility Name Ray Bradley
Address 351 South Hidden Island Lane
City Coeur d'Alene State ID Zip Code 83814
County _____ Facility Phone No. 208-667-0644

Provide one of the following two options:

- 1) GPS Location (Datum = WGS84):
Latitude 47 Degrees 41' 47.96" Longitude 116 Degrees 51' 22.52"

(You can check the accuracy of your GPS data with the "Well Diller's Locator Tool" here:
<http://maps.idwr.idaho.gov/locator/default.aspx>)

- 2) A USGS Topographic Map or aerial photo with the well location marked and Township, Range, Section information.

Township	Range	Section	¼, ¼, ¼ Section	¼, ¼ Section	¼ Section
50 N	4 W	8	NW	SE	NE

(Get free maps using this tool: <http://maps.idwr.idaho.gov/IrrigationRightsFinder>)

D. Well Operation:

Frequency of Injection: ☐ Continuous (24 hr/day, 7 day/wk) ☒ Intermittent

Maximum Average Weekly Rate 8 ☐ cfs ☒ gpm

E. Well Construction Information: (Attach well log, if available)

☐ As Built ☒ Expected Construction ☐ Well Modification

Total Well Depth: 80 (ft)

Well Casing: Diameter 6 (in) Depth _____ (ft)

Ht. above Ground Surface 2½ (ft) Casing Type Steel

Perforation: From 18 (ft) To 80 (ft)

Surface Seal: Depth 18 (ft) Seal Type Bentonite

Construction Date (Indicate Actual, Approximate or Anticipated): 11/22/13

Driller's Name: Budinger + Assoc. #569

For well modifications describe purpose and intended changes:

F. Adjacent Features:

Depth to Groundwater 7 (ft) ☐ Estimate ☒ Measured Date Measured 11/7/13

Distance to Nearest Domestic Well 75 (ft) Direction Southwest

II. WATER USAGE INFORMATION

A. Attach documentation from your heat pump contractor that indicates how many gallons per day your heat pump will use during peak heating and cooling days.

B. What is the approximate square footage of the structure served by the heat pump? 2,000SF

C. Please check all of your domestic uses served by your groundwater well:

☐ Household ☐ Irrigation ($\leq \frac{1}{2}$ acre) ☐ Livestock
☒ Heat Pump ☐ Other _____

What is your total domestic groundwater usage? 12,000 Gallons Per Day
(Guidance on page 5)

Are you connected to a city or community drinking water system? ☒ Yes ☐ No

Do you have a water right for the heat pump? ☐ Yes ☒ No Water Right # _____

Have you applied for a water right for the heat pump? ☒ Yes ☐ No Water Right Application # _____

III. CONDITIONS OF APPROVAL

1. This injection well is administered under IDAPA 37.03.03, Rules and Regulations for the Construction and Use of Injection Wells, and IDAPA 37.03.09, Well Construction Standards & Rules.
2. The facility owner and operator bear sole responsibility to mitigate for harm or degradation resulting from the injection activities authorized in this permit.
3. Violating the water quality standards stated in IDAPA 37.03.03.050, degrading the quality of the groundwater, or impacting a beneficial use of groundwater resources through the use of this injection well is prohibited and is cause for cancellation of this permit.
4. In the event that existing or future points of diversion for beneficial use are suspected by IDWR of being contaminated by injection activities at this well, IDWR will require that injection activities at this well cease immediately. Burden of proof that injection activities at this well are not contaminating existing or future points of diversion is the responsibility of the injection well owner.
5. Approval of this permit does not authorize diversion or beneficial use of water. This permit is not a Water Right nor does approval of this permit guarantee the approval of any Water Right being sought for this well.
6. The system must be closed to the surface to prevent contamination of the injectate. A protected air vent may be installed if needed, and a sampling port is required.
7. The injectate entering this well must be restricted to heat exchange unit return water. Prior approval from the IDWR UIC Program is required for the use of additives.
8. Discharge water from the heat exchange unit into the well is recommended to be delivered via a drop pipe that terminates below the static water level in the well. Seasonal fluctuations in groundwater levels should be considered when determining the depth of the drop pipe to insure that the outflow end is submerged at all times. A pitless adaptor should be used to create a watertight seal between the drop pipe and conductance pipe delivering water to the well to prevent contamination of the discharge water.
9. The temperature of injected water must be maintained below 85° F. If the injectate temperature exceeds 85° F, the Department of Water Resources must be notified within 48 hours of the increased injectate temperature.
10. If at any time use of this injection well is not desired, the owner/operator must contact the IDWR UIC Program to obtain approval prior to decommissioning activities commence.
11. A well log must be submitted to IDWR within thirty (30) days of the construction of new injection wells.

IV. SIGNATURE OF LEGAL OWNER

I certify under penalty of law that there are no discharges of hazardous substances or other fluids in amounts that may endanger an underground source of drinking water from the injection well(s) identified on this application form.

I have read and understand the Conditions of Approval for the operation of this injection well. Additionally, I certify under penalty of law that this document and all attachments were prepared under my direction or

supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

All sections of this form must be complete and accurate. Incomplete forms will be returned to applicant. The information submitted is subject to verification by IDWR or its agents.

11-14-13
Date

Raymond R. Bradley
Signature

Owner
Title

Ray Bradley
Print Name

V. PROCESSING FEE

A \$100.00 processing fee must be submitted for each permit application. A separate permit application and processing fee must be submitted for each injection well. Make checks payable to: Idaho Department of Water Resources.

All sections of this form must be complete and accurate. Incomplete forms will be returned to applicant. The information submitted is subject to verification by IDWR or its agents. Applications and fees can be submitted your nearest IDWR office:

IDWR Northern Region
7600 N Mineral Dr., Suite 100
Coeur d'Alene, ID 83815
Ph: (208) 762-2800

IDWR Southern Region
1341 Fillmore St., Suite 200
Twin Falls, ID 83301
Ph: (208) 736-3033

IDWR Eastern Region
900 North Skyline
Idaho Falls, ID 83402
Ph: (208) 525-7161

IDWR Western Region
2735 Airport Way
Boise, ID 83705
Ph: (208) 334-2190

IDWR State Office
322 East Front St., PO Box 83720
Boise, ID 83720-0098
Ph: (208) 287-4800.

VI. IDWR APPROVAL (to be completed by IDWR personnel)

This permit will be administered in accordance with Idaho law and applicable rules of the Idaho Department of Water Resources.

Date this 18th day of November, 20 13

Matt Rula - Hydrogeologist
Title

UIC Program Guidance For Calculating Total Domestic Water Use For Permitting a Ground-Source Heat Pump



Idaho Code (42-111 & 42-227) defines domestic water use and states that a water right is not required for domestic use, provided that the volume of water does not exceed 13,000 gallons per day. When permitting an injection well for a ground-source heat pump, the UIC Program must determine if the use of a heat pump will cause a homeowner to exceed the 13,000 gallon per day limit for a domestic water right exemption. If domestic water use is anticipated to exceed 13,000 gallons per day, the applicant must obtain a water right before the injection well permit can be issued by IDWR.

The following table should be completed to document your calculation of total domestic water use for Section II of your injection well application.

Use	Gallons Per Day Per Person		Number of People		Total Gallons Used Per Day
Single Family Residence	75	x		=	NA- Water System
Luxury Residence	150	x		=	
Use	Gallons Per Day Per Animal		Number of Animals		
Cattle	12	x		=	
Dairy Cattle	35	x		=	
Horses	12	x		=	
Mules	12	x		=	
Hogs	4	x		=	
Goats	2	x		=	
Sheep	2	x		=	
Other Livestock		x		=	
Use	Gallons Per Day Per 100 Animals		Number of Animals		
Chickens	10	x		=	
Turkeys	18	x		=	
Other Poultry		x		=	
Use	Gallons Per Day Per 1 Acre at 9 gpm		Number of Acres		
Irrigation	12,960	x		=	
Use	Average Weekly Injection Rate (gpm)		Minutes Per Day		
Heat Pump	8	x	1440	=	11,520
Other Uses	Gallons Per Day				
Total Gallons Per Day Used					

M. Anders
11/18/13

Steve Burdett @ Budinger & Assoc.

509-535-8841

cell 509-954-4355

- Heat pump is ~5 yrs old so they don't have
manufacturers specifications.

- Steve made 2 calculations:

1) Production pump is rated at 10 gpm,
assuming the system runs 80% of the time,
that is 8 gpm

2) Exchanger is 2.5 - 30 tons, the industry
rule of thumb is 1-3 gpm per ton.
At maximum the unit will use 9 gpm, which
is less than calculation #1 above.

Anders, Matthew

From: Steve Burchett [sburchett@budingerinc.com]
Sent: Monday, November 18, 2013 6:19 PM
To: Anders, Matthew
Subject: Ray Bradley Geothermal System
Attachments: Grundfos SQ SQE SP submersible Pump Product Guide se (1).pdf

Hi Matthew, thanks for the call back. Pump curves for the pump are on page 7 of the pdf. it is model 10 SQE05-110. 8-10 gpm falls right in the middle of the curve. We have applied for a water right, but I don't have the application number back yet.

The existing unit is 2 1/2 or 3 ton-I don't know the make or model number yet, but can get it from the HVAC contractor. A good rule of thumb is that a geothermal pump needs 1-3 gpm per ton and raises/lowers the water temperature 5-10 degrees depending on flow rate and equipment specifics. 9 gallons per minute is just under the 13,000 gpd exemption limit, and the water will go back to the same aquifer. Mr. Bradley has domestic water from a community water system and won't be using the geothermal water supply.

The flow is regulated by an automatic regulator valve that maintains the preset flow rate to accommodate fluctuations in system pressure.

Thanks for your help,

Regards,

Steve

Stephen D. Burchett, PE

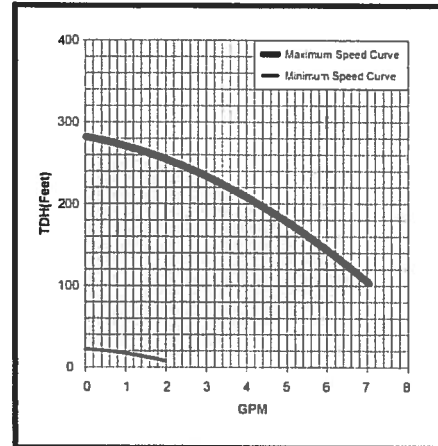
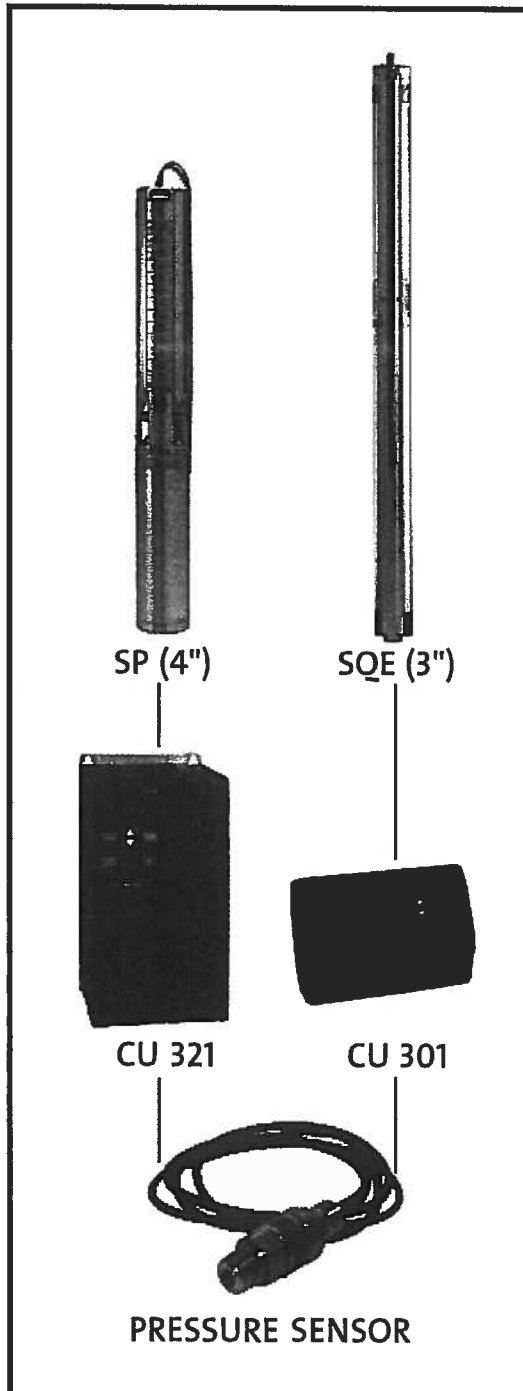


**Budinger
& Associates**

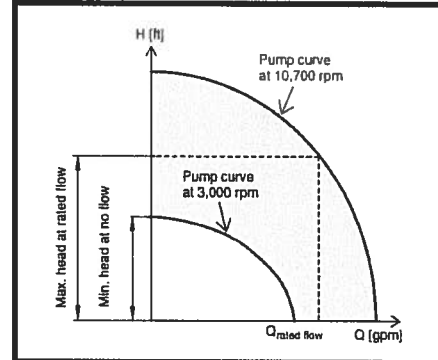
*1101 North Fancher Road
Spokane Valley, WA 99212
Phone: 509-535-8841
Fax: 509-535-9589
www.budingerinc.com*

Performance Curves and Technical Data

For 3-Inch & larger well applications



Performance Curves



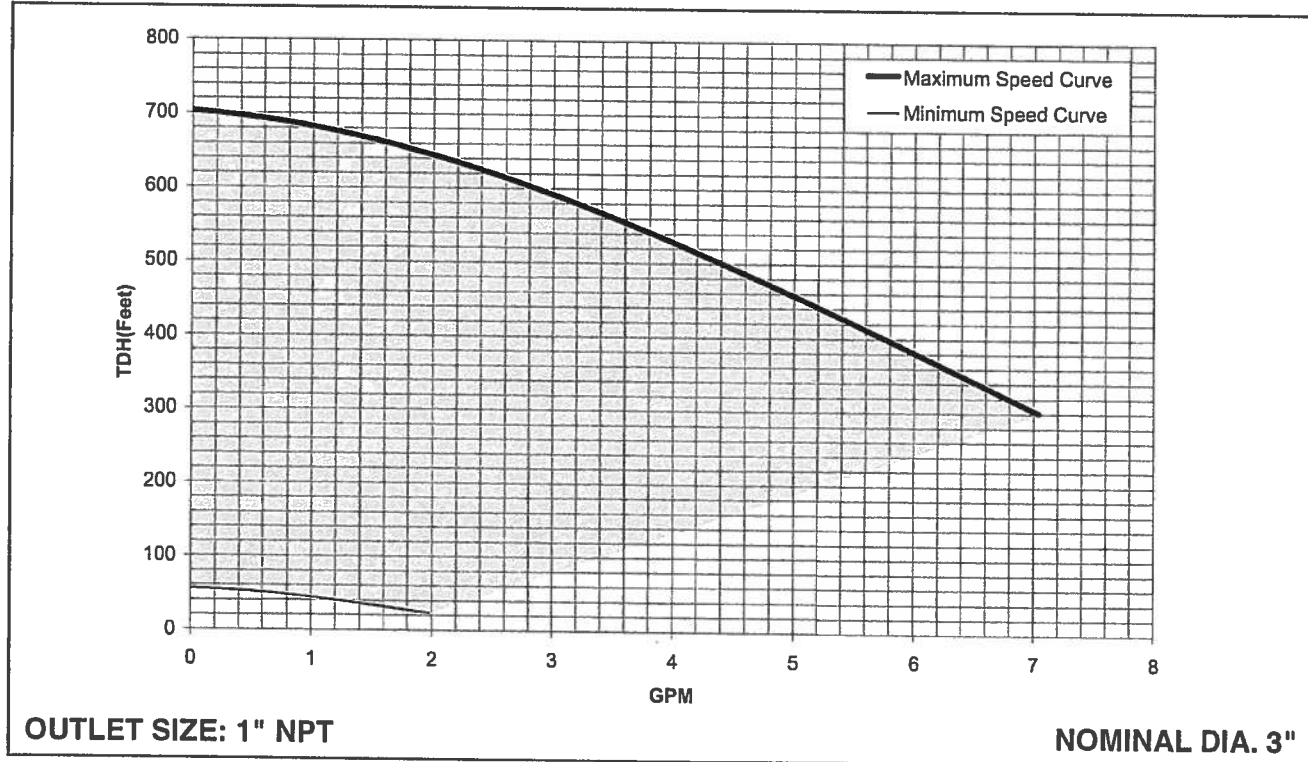
System Sizing Guide



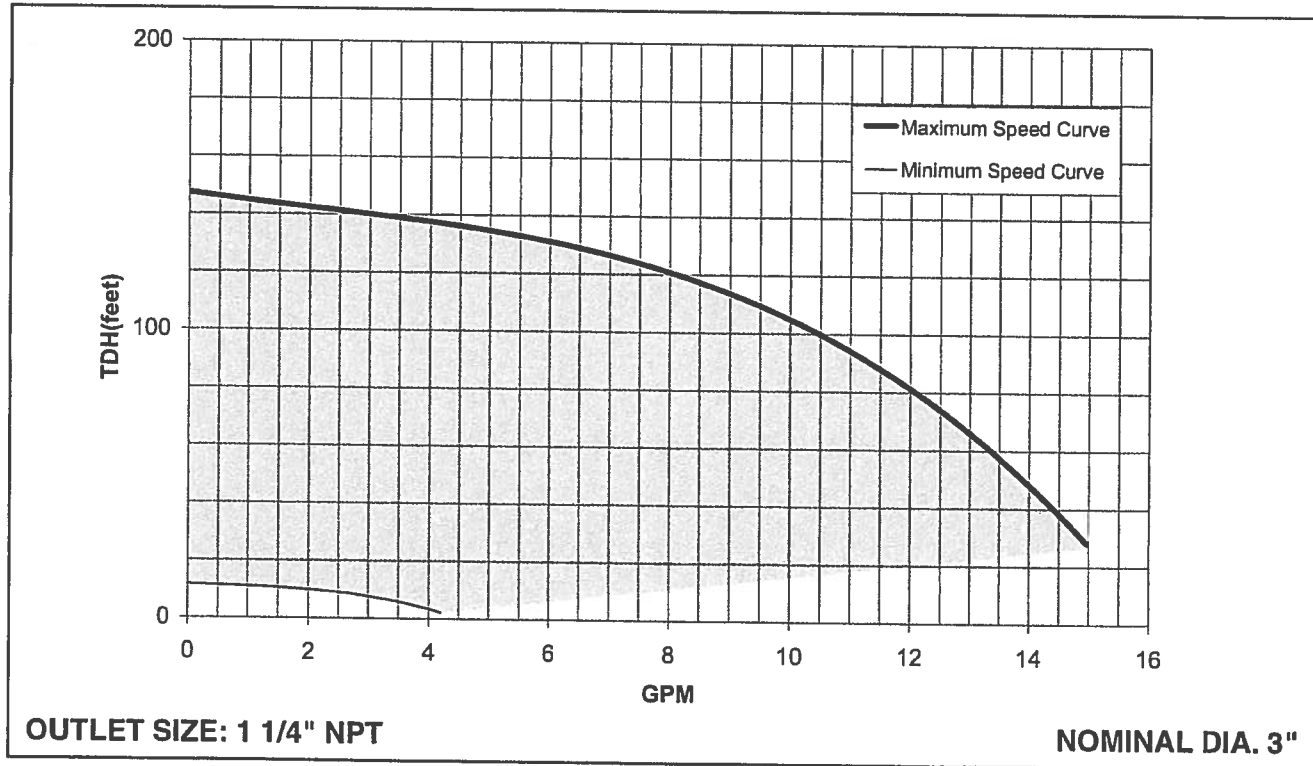
WATER TANK

2 gallon tank min. for SQE
4 gallon tank min. for CU 321

5 GPM • MODEL 5SQE15-450



10 GPM • MODEL 10SQE05-110



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Step 1

Calculate minimum head requirements at no flow conditions:

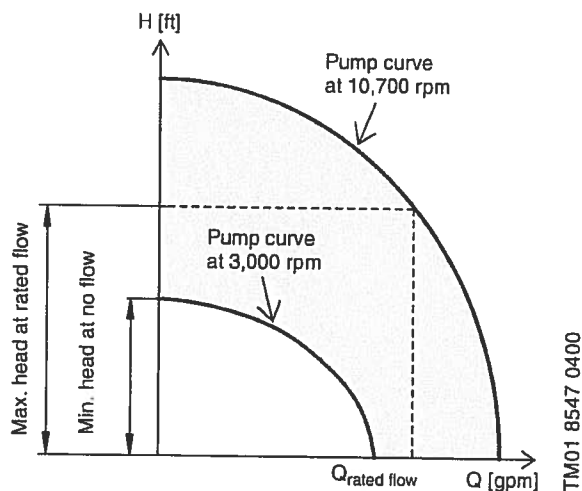
$H_{max} \text{ (required)} = \text{dynamic head} + \text{system pressure (in feet)} + \text{above grade elevation} + \text{friction loss.}$

Step 2

Select pump from chart as follows:

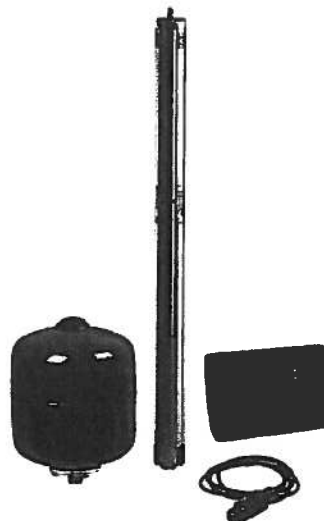
- Choose model family based on the desired flow rate. i.e. 15SQE for a flow rate of 15gpm
 - Select the first model with a value in Column 2 greater than the H_{max} calculated in Step 1
 - For example: the choice for a 22gpm model with an H_{max} of 140' would be the 22SQE-160.
- Double check your selection in the performance curves found in the previous pages of this book.

	Col. 1	Col. 2
System Sizing Matrix		
Pump Type Model B	Shutoff Head (0 GPM) @ 3000 RPM Min. Speed	Head @ Rated GPM @ 10700 RPM Max. Speed
	TDH(Feet)	TDH(Feet)
5SQE-90	11	86
5SQE-140	17	131
5SQE-180	22	177
5SQE-230	28	222
5SQE-270	34	270
5SQE-320	39	315
5SQE-360	45	360
5SQE-410	51	405
5SQE-450	56	450
10SQE-110	12	105
10SQE-160	17	164
10SQE-200	23	215
10SQE-240	29	267
10SQE-290	34	328
10SQE-330	40	390
15SQE-70	10	75
15SQE-110	14	123
15SQE-150	19	164
15SQE-180	24	205
15SQE-220	29	246
15SQE-250	33	287
15SQE-290	38	328
22SQE-40	5	36
22SQE-80	9	77
22SQE-120	14	117
22SQE-160	18	159
22SQE-190	23	200
22SQE-220	27	240
30SQE-40	5	33
30SQE-90	11	82
30SQE-130	16	126



TM01 8547 0400

Note: All calculated head requirements must lie between the selected pump models minimum and maximum speed curves.



SYSTEM SIZING GUIDE

SmartFlo™ - CU321

Step 1

Calculate maximum head requirements at rated flow conditions:

$H_{max} = \text{dynamic head} + \text{system psi (in feet)} + \text{friction loss} + \text{above grade elevation}$

Step 2

Select pump from chart as follows:

- Select a model in which the calculated value of H_{max} is below the value in columns 2
- For example: the choice for a 40gpm model with an H_{max} of 150 would be the 40S30-9

	Col. 1	Col. 2
System Sizing Matrix		
Pump Type	Shutoff Head (0 GPM) @ 1500 RPM Min. Speed	Head @ Rated GPM @ 3600 RPM Max. Speed
3HP	TDH(Feet)	TDH(Feet)
16S30-24	128	490
25S30-15	80	305
40S30-9	45	185
75S30-5	30	105
5HP		
16S50-38	200	825
25S50-26	105	530
40S50-15	75	310
75S50-8	45	175



Project BRADLEY G. THERMAL SYSTEM
Location 357 S HIDDEN ISLAND LANE
By SDT

Project No. 6C13494
Date 11/14/13
Sheet 1 of 1

AL BEARDSLEE - WATER USE

The existing system was installed with a ground loop that doesn't work (laid out in crawlspace). The unit is 2½-3 tons and needs 6-8 gpm when running, controlled by metering valve. Calculated injection rate is based on 10 gpm running 80% of the time, which is probably high. This falls under the 13,000 gpd limit.

Please let me know if we should cancel the water right application or go ahead with the process. The water right application is based on 10 gpm running ⅔ of the time for 10 ac.ft. Call with any questions,



(509) 535-8841

(509) 954-4355 cell



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