

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

RECEIVED

OCT 06 2010

DEPARTMENT OF
WATER RESOURCES

A. GENERAL INFORMATION

Permit No. 63-33077

1. Owner Knife River Phone No. 208-362-6152

Current address 5450 W. Gowen Rd., Boise, ID 83709

2. Examiner's name Scott N. King, P.E. (Examiner No. 11-133) EXAM DATE August 23, 2010

3. Accompanied by Dave Turner Email

Address same

Relationship to permit holder President, Idaho Division / Project Manager Phone No. 208-941-9737

4. Source Ground Water tributary to

B. OVERLAP REVIEW

1. Other water rights with the same place of use United Water of Idaho Municipal Rights

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
D0052917			NW	NW	22	2N	2E	Ada	Exam, 2009 Photo, GPS
									N 43° 30.085' / W 116° 12.654' (WGS 84)

2. Place(s) of Use: Method of determination Field Exam

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
2N	2W	22					C	C	C	C									

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe diameter (inside), as applicable. Use the space provided or ☒ see attached.

Scale: 1" = _____

- ☒ Copy of USGS Quadrangle 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
D0052917	Franklin	40	06819-21-6051	FPS Sub Turbine	Model 150ST30 D681464

*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:

E. NARRATIVE/REMARKS/COMMENTS

Ground water is diverted from an 8-inch diameter, 725-foot deep well equipped with a submersible pump controlled by a variable frequency drive. The pump is an FPS Submersible Turbine Pump model 150ST30D6B1464, which is rated for a 30-hp motor. However, a 40-hp motor is installed on the pump and controlled by a variable speed drive. The pump can be operated "over-speed" to deliver more water than indicated on the standard pump performance curve (which is derived for the nominal speed of 3450 rpm). The submersible pump's standard curve at 3450 rpm is designed to deliver 150 gpm at 590 feet of head. At a speed of 3797 rpm, which is 10% over the rated speed of 3450 rpm and within allowable over-speed operating limits, the 40-hp motor would be fully loaded and the pump would deliver 150 gpm at 660 feet of head, and 155 gpm at 646 feet of head. Total dynamic head at 150 gpm is calculated at 646 feet. I conclude that the well and pumping system have the capacity to divert the permitted 0.33 cfs. See attached sheet for detailed calculations.

Flow rates can be controlled with the variable frequency drive and the butterfly valve.

Diverted water is open-discharged to a nearby pit where it is subsequently pumped out to re-circulating gravel washing equipment. The system was not operating during the exam as much of the washing equipment had been temporarily moved to another project site.

The permitted annual volume limit of 92.0 acre-feet is voluntary and based on the maximum annual volume supplied to the site for the same uses by Suez Environment-United Water during years prior to the application for permit (see Roxanne Brown's June 17, 2009 letter to Kay Walker).

During peak operation, the well pump operates nearly continuously, 24-hours per day. Continuous operation at 0.33 cfs yields the 92 acre-feet annual limit in 141 days. The United Water connection remains available as a backup to supply the facility in case the 92 acre-feet limit is reached.

Has the permit holder met all conditions of permit approval, including any mitigation requirements and/or measuring device installation requirements? ☒ Yes ☐ No If no, what must be done to meet the permit requirements?

F. FLOW CALCULATIONS

✓ Additional computation sheets attached

Measured Method:

Theoretical calculations demonstrate capacity to divert 0.33 cfs at 660 feet of head (TDH)

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$ _____

$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 =$ _____

$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$ _____

2. Volume Calculations for Other Uses:

Commercial use: 92 afa (see Narrative, above)

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use		Rate of Diversion Q (cfs)	Annual Volume V (afa)
	From	To		
Commercial	1/1	12/31	0.33 cfs	92.0 afa
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Totals:			0.33 cfs	92.0 afa

2. Recommended Amendments

- ☐ Change P.D. as reflected on page 1 ☐ Add P.D. as reflected on page 1 ☒ None
☐ Change P.U. as reflected on page 1 ☐ Add P.U. as reflected on page 1 ☐ Other

I. AUTHENTICATION

Field Examiner's Signature Scott N. King

Date 10-1-2010

Reviewer _____

Date _____



ATTACHMENT A

PERMIT RECORD AND PROOF OF BENEFICIAL USE

State of Idaho
Department of Water Resources
Permit to Appropriate Water

NO. 63-33077

Priority: July 29, 2008

Maximum Diversion Rate: 0.33 CFS
Maximum Diversion Volume: 92.0 AF

This is to certify, that KNIFE RIVER
5450 W GOWEN RD
BOISE ID 83709

has applied for a permit to appropriate water from:

Source: GROUND WATER

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

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>RATE OF DIVERSION</u>	<u>ANNUAL VOLUME</u>
COMMERCIAL	01/01 to 12/31	0.33 CFS	92.0 AF

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER NW1/4NW1/4 Sec. 22, Twp 02N, Rge 02E, B.M., ADA County

PLACE OF USE: COMMERCIAL

Twp Rge Sec	NE				NW				SW				SE				Totals
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
02N 02E 22					X	X	X	X									

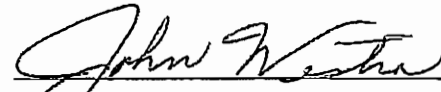
CONDITIONS OF APPROVAL

1. Proof of application of water to beneficial use shall be submitted on or before **August 01, 2010**.
2. Subject to all prior water rights.
3. After specific notification by the Department, the right holder shall install a suitable measuring device or shall enter into an agreement with the Department to use power records to determine the amount of water diverted and shall annually report the information to the Department.
4. This right does not grant any right-of-way or easement across the land of another.
5. Commercial use is for washing gravel.

State of Idaho
Department of Water Resources
Permit to Appropriate Water
NO. 63-33077

6. The Director retains jurisdiction to require the right holder to provide purchased or leased natural flow or stored water to offset depletion of Lower Snake River flows if needed for salmon migration purposes. The amount of water required to be released into the Snake River or a tributary, if needed for this purpose, will be determined by the Director based upon the reduction in flow caused by the use of water pursuant to this permit.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Boise, this 4th day of August, 20 09.


JOHN WESTRA, Western Regional Manager

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
STATEMENT OF COMPLETION
FOR SUBMITTING PROOF OF BENEFICIAL USE

FOR OFFICE USE ONLY

Amt. of Fee \$: _____
Receipt No.: _____
Receipt By: _____
Date Received: _____

The Idaho Department of Water Resources considers this form a statement by the permit holder(s) that development of a water right has been completed and that water has been applied to beneficial use to the extent described below. This form must be accompanied by an examination fee, when necessary, or by a completed Beneficial Use Field Report prepared by a certified water right examiner. Please refer to the instructions and fee schedule for this form. If ownership of the permit has changed, please contact any Department office or visit the Department's website at: www.idwr.idaho.gov for an Assignment of Permit form. If you wish to relinquish your permit because you have not established the authorized use of the water and are not applying for an extension, please notify the Department in writing.

1. Permit No.: 63-33077 Telephone No.: 208-362-6152
2. Name of Permit Holder(s): Knife River
3. Mailing Address: 5450 West Gowen Road City: Boise
State: ID Zip: 83709 Email: Dave.Turner@Kniferiver
4. Source of Water: Ground Water If GROUND WATER (well), Date Drilled: mo. 7 / yr. 2008
Well Driller: Coonce Well Drilling Drilling Permit Number: 0-0-5-2917
5. Extent of use(s) completed (as authorized by the water right permit):
Domestic (No. of households): 0 Stockwater (No. and type of stock): 0
Irrigation (No. of acres): 0 Other: Commerical use for washing gravel
6. Total rate of diversion or storage volume for which proof is submitted: 0.33 cfs OR _____ acre-feet.
7. Compliance with a measuring device requirement, lockable controlling device requirement, and/or other conditions of permit: Refer to the approval conditions on your permit and respond accordingly. The Department will not issue a license if permit conditions are not met.
- Measuring Device: Is a measuring device required? Yes ☐ No ☒
If yes, has the measuring device been installed? Yes ☐ No ☐
- Lockable Controlling Device: Is a lockable device required to control the diversion? Yes ☐ No ☒
If yes, has the lockable device been installed? Yes ☐ No ☐
- Other Conditions of Permit: Do the approval conditions on your permit require you to submit additional information in connection with your proof of beneficial use? If yes, list the conditions below and attach documents with the required information.
No _____ Completed? Yes ☐ No ☐
8. Fee Enclosed: \$ 100.00 See fee schedule on back of the Instructions for filing proof of beneficial use.
Proofs filed without an appropriate fee, will be considered incomplete.

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

Name: Dave Turner Telephone Number: 208-362-6152
Mailing Address: 5450 West Gowen Road City: Boise
State: ID Zip: 83709 Email: Dave.Turner@Kniferiver.com

The information given on this form is my true statement of the extent to which the above numbered permit has been developed and water has been diverted and applied to a beneficial use. I understand that any undeveloped portion of the permit is relinquished to the State of Idaho.

Signature of permit holder: Dave Turner Date: 4/28/2010
(Include your title, if on behalf of company or organization)

Mail to: Idaho Department of Water Resources, PO Box 83720, Boise, ID 83720-0098

ATTACHMENT B

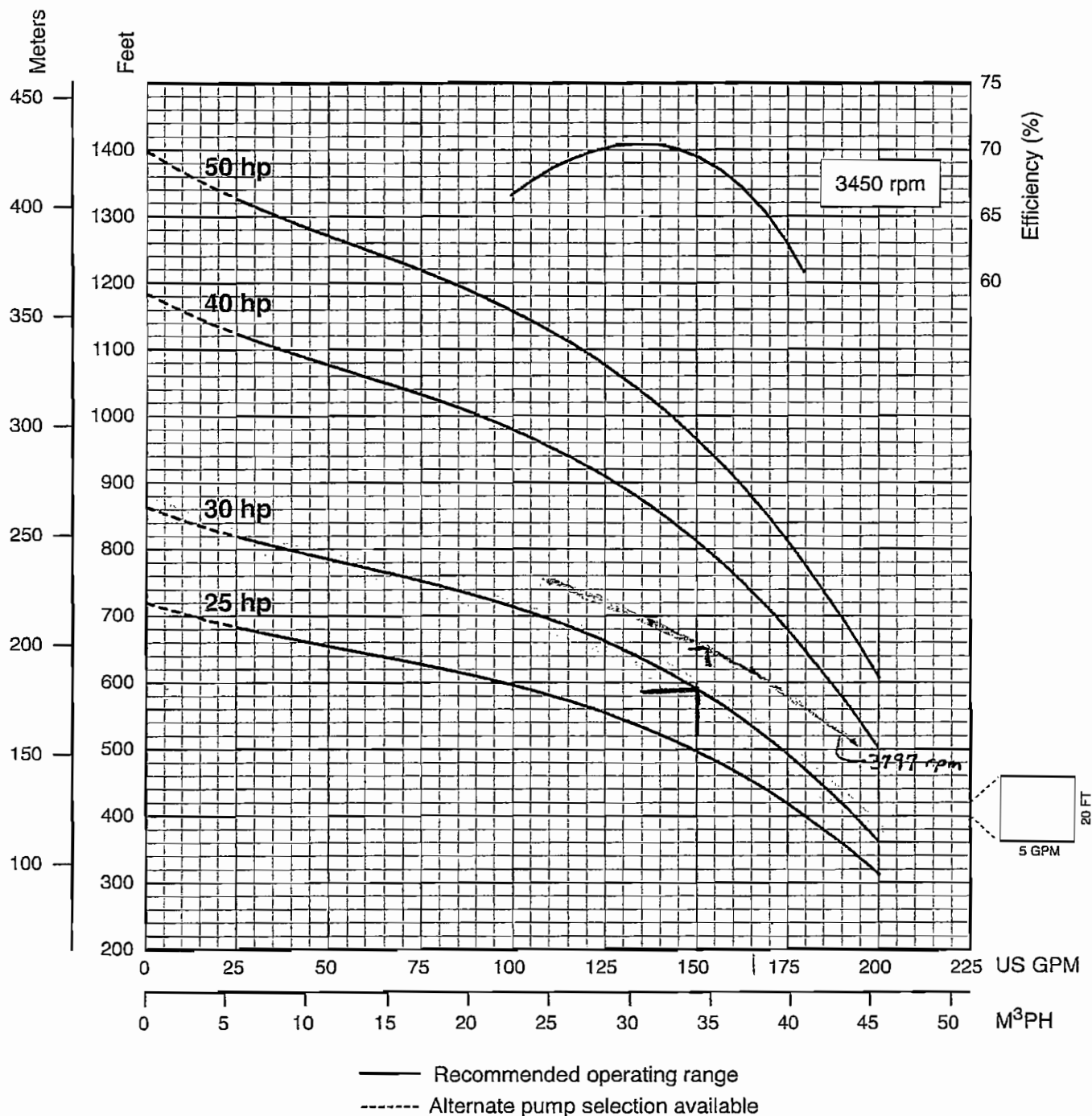
**WELL DRILLERS' REPORT, PUMP CURVE
AND ADDITIONAL COMPUTATIONS**

Submersible Turbine Pumps

Model 150ST6 Performance

PAGE: SP-211

DATE: Mar 1, 2009



Note: Performance based on:

-Fresh water, 68 °F

-6" motor / 3450 rpm

FPS
 ST series

Submersible Turbine Pumps

Model 150ST6 Performance

Dimension Information

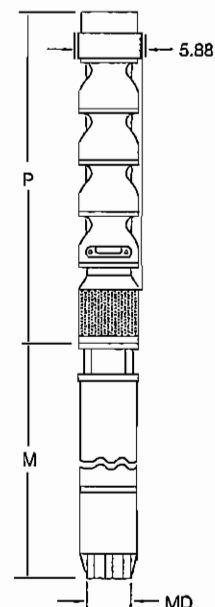
HP	Stages	Trim	Motor Size	P [*] Inches	M [*] Inches	MD [*] Inches	Motor Wt Lbs.	Pump Wt Lbs.
25	9	A	6"	59.57	33.10	5.38	148	143
30	11	10A, 1B	6"	69.57	35.70	5.38	162	167
40	15	14A, 1B	6"	88.02	40.80	5.38	195	215
50	18	A	6"	102.32	57.80	5.38	310	250

Note: *MD diameter = Franklin Electric Motor, M = Maximum Length of Franklin Electric Motor

Specifications

Minimum Well I.D.	6"
Minimum Submergence Above Inlet	10 Feet
Discharge	4" NPT
Maximum Working Pressure	Standard: 350 psi Double Bolted: 675 psi

Note: Refer to Franklin Electric AIM data for motor cooling requirements.



Materials of Construction

Part Name	Common Material Name	Material Spec Number
Discharge Bracket	Ductile Iron	A536 65-45-12
Top Bowl	Ductile Iron	A536 65-45-12
Intermediate Bowl	Ductile Iron	A536 65-45-12
Bearings, Disch. & Suction	Bronze	B505 C932
Impeller	Stainless Steel	A743 CF-8
Pump Shaft	Stainless Steel	A582 416
Suction Bracket	Ductile Iron	A536 65-45-12
Bowl Bearing	Rubber	Nitrile
Sand Collar	Stainless Steel	A276
Suction Screen	Stainless Steel	A666
Cable Guard	Stainless Steel	A666
Shaft Coupling	Stainless Steel	A276
Upthrust Bolt	Stainless Steel	A320 304
Taper Lock	Stainless Steel	A276
Bolting	Stainless Steel	A320 304



Franklin Electric

400 East Spring Street, Bluffton, IN 46714
Tel: 260.824.2900 Fax: 260.824.2909
www.franklin-electric.com

Knife River
Permit 63-33077

Beneficial Use Field Exam
Supporting Calculations for Pumping Capacity

Conditions:

FPS ST series submersible pump model 150ST30D6
Rated for a 30-hp motor. Equipped with a 40-hp Franklin Electric motor and variable speed drive.
Capable of over-speed operation to full 40-hp load (plus service factor)

Calculations:

Step 1: Use Affinity Laws to determine pump speed at 40-hp load. Impeller diameter is unchanged.

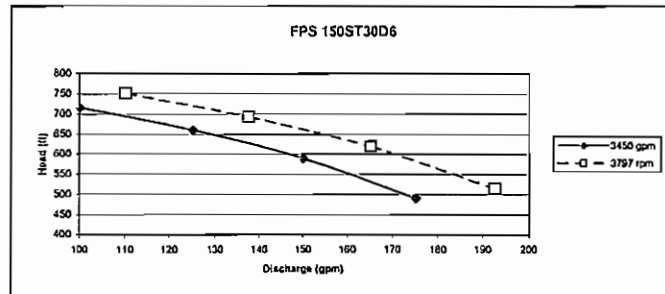
Power $P_1/P_2 = (n_1/n_2)^3$ (power is a function of speed)
 $P_1 =$ 40 hp
 $P_2 =$ 30 hp
 $n_2 =$ 3450 rpm, from curve
 $n_1 =$ 3797 determined
10% percent speed increase (within allowable operating limits)

Step 2: Use Affinity Laws to determine operating conditions at 40-hp load speed.

Volume Capacity (gpm) $q_1/q_2 = (n_1/n_2)$
Head (ft) $h_1/h_2 = (n_1/n_2)^2$

Rated Speed (n_2)		New Speed (n_1)	
3450 rpm		3797 rpm	
Q (gpm)	h (ft)	Q (gpm)	h (ft)
100	717	110	752
125	661	138	693
150	590	165	619
175	491	193	515

Rated values are based on the manufacturer-supplied pump curve
Projected values are plotted on the curve based on Affinity Laws



Step 3: Total Dynamic Head at 150 gpm rated condition

Lift 535 ft, static water level (per Well Driller's Report)
30 ft, drawdown at 150 gpm (per Well Driller's Report)

Friction Losses 630 ft of 3-inch column pipe
3.3 psi loss per 100 ft of 3-inch column pipe at 150 gpm
7.6 ft loss per 100 ft of 3-inch column pipe at 150 gpm
48 ft friction loss in column pipe, total (630 ft x 7.6 ft/100 ft)
2 number of 3-inch check valves
100 assumed equivalent length of pipe per check valve
15 ft loss in 3-inch check valves (2 valves x 7.6 ft per valve)
15 ft loss assumed 3" discharge head, butterfly valve, and 3" to 4" enlarger
100 ft of 4-inch flexible irrigation discharge hose
3 ft loss per 100 ft of 4-inch discharge hose at 150 gpm
3 ft loss in the flexible discharge hose (100 ft x 3 ft/100 ft)
+ 0 ft discharge pressure (open-discharge)

TDH 646 ft, Total Dynamic Head

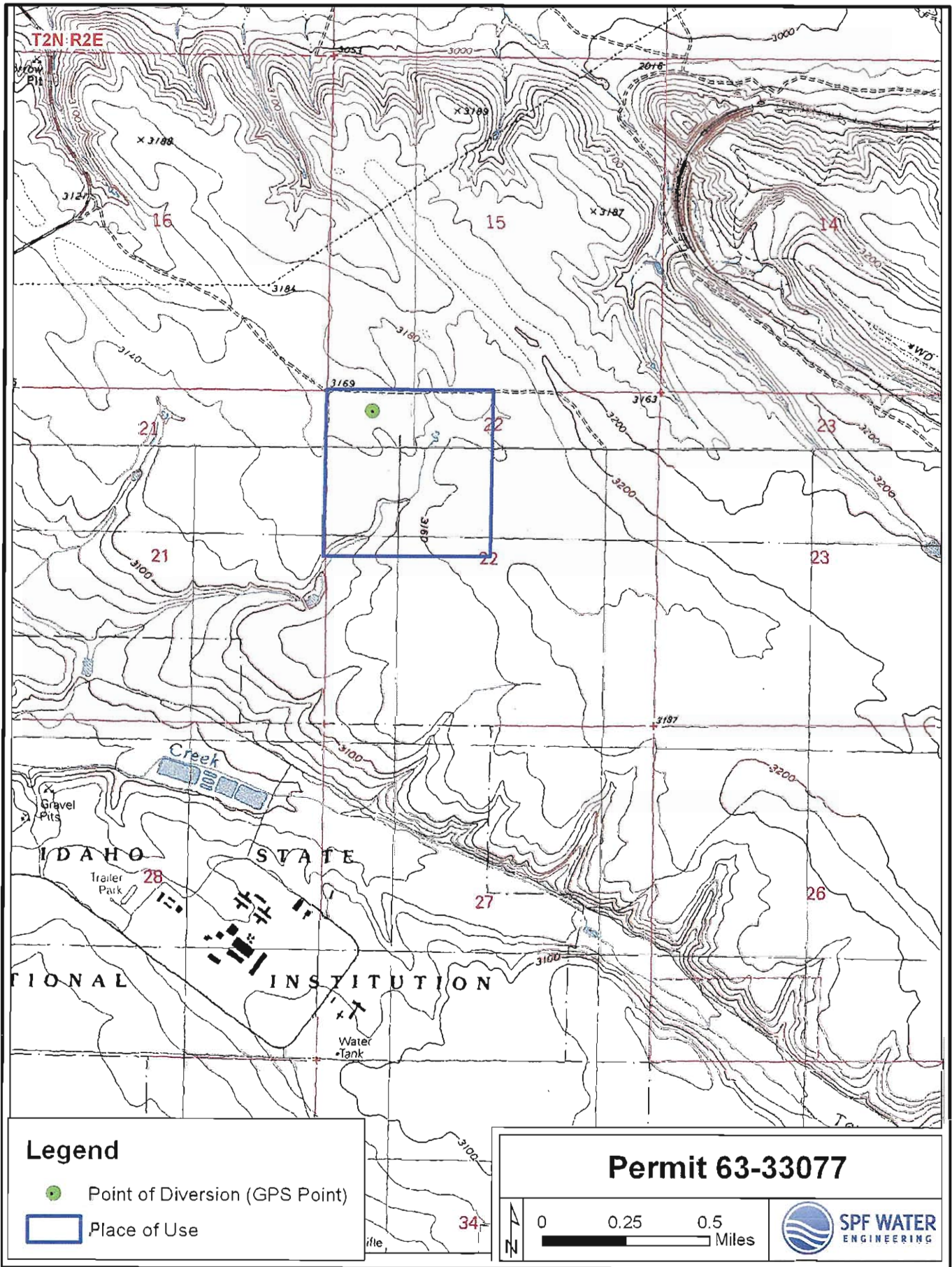
Step 4: Confirm Operating Conditions

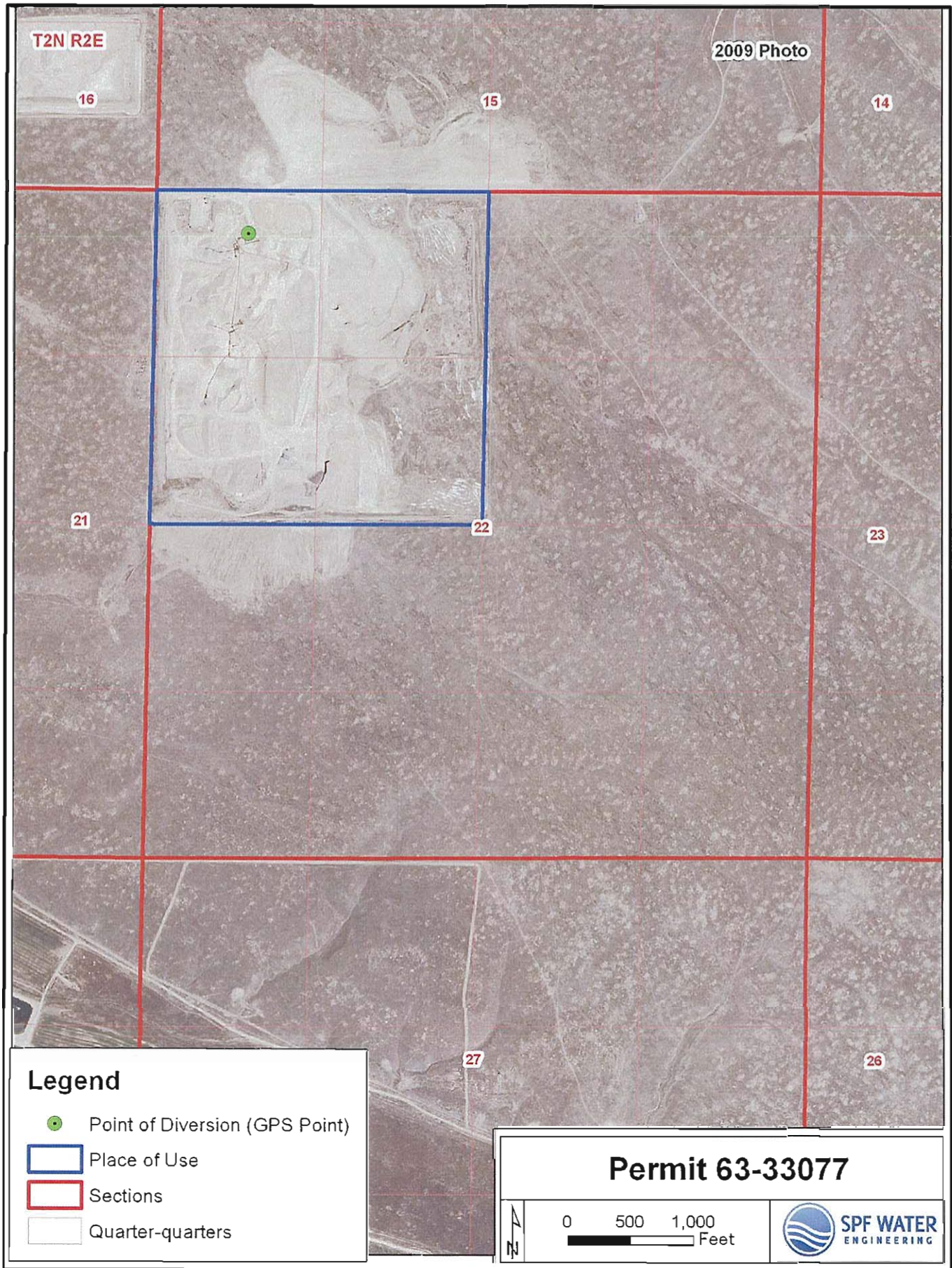
Using operating curve at 3797 rpm, the following conditions are confirmed:

Discharge: 155 gpm, at 646 ft of head
Discharge: 150 gpm, at 660 ft of head

Conclusion: Installed system can divert 150 gpm with pump operating at an over-speed condition within its design output of 40-hp without utilizing any of the motor's allowable 15% service factor.

ATTACHMENT C
TOPO MAP AND 2009 AERIAL PHOTO





ATTACHMENT D
PHOTOS

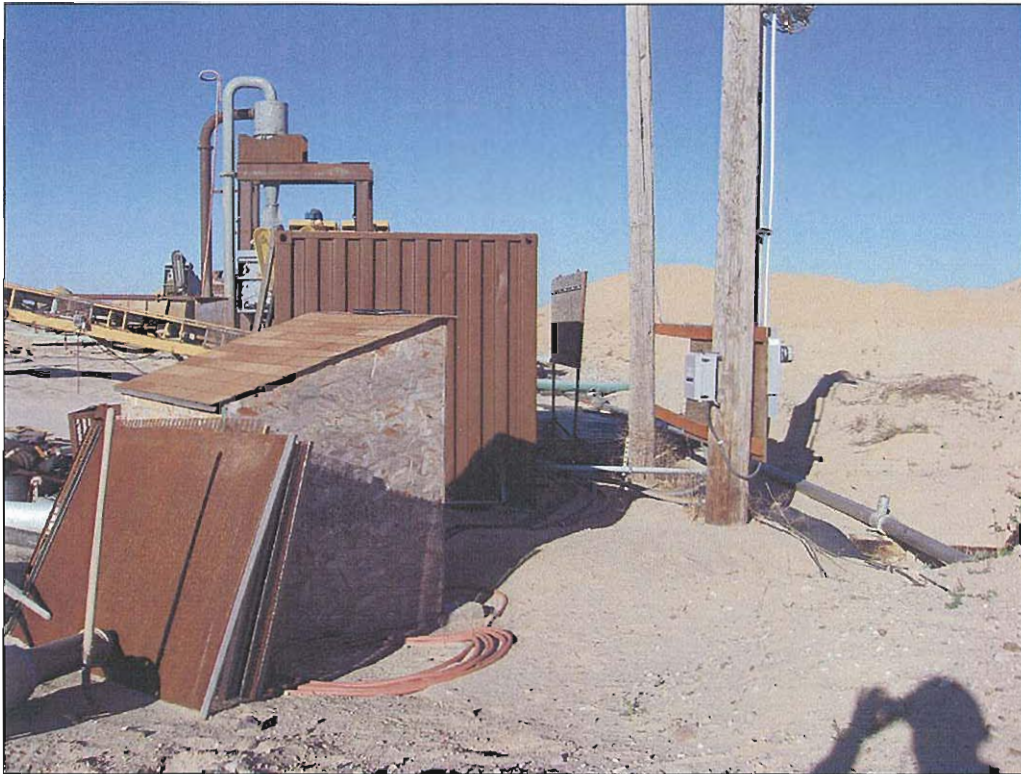


Photo 1: Point of Diversion. Well is located in the small well house in left foreground.



Photo 2: Eight-inch well, pressure transducer for variable speed drive control, four-inch discharge piping, 4-inch butterfly valve, and connection to flexible delivery hose.



Photo 3: Well, pump house, and discharge piping.



Photo 4: Well water is delivered to this pit where it is subsequently rediverted for gravel washing.



Photo 5: Place of use is at gravel pit.



Photo 6: Gravel washing equipment.



Photo 7: Gravel washing equipment.