

MEMORANDUM

FROM: Jennifer Sukow, IDWR Hydrology Section *JS*
TO: Monica Van Bussum, IDWR Water Supply Bank Coordinator
CC: Sean Vincent, IDWR Hydrology Section Manager
DATE: February 22, 2012
RE: Review of Lee Sutton Application to Rent Water from the Water Supply Bank

Introduction

The Hydrology Section was requested to provide an initial assessment of potential impacts of a proposed water supply bank rental. Lee Sutton has applied to rent groundwater to irrigate 87 acres from 2012 through 2015 in Township 4 North, Range 40 East, Section 2 NWSESW. Portions of two water rights are being considered for rental to Mr. Sutton, including 243.2 AF/yr of water right 22-7336 and 61.3 AF/yr of water right 22-13994.

The proposed point of diversion and water right points of diversion are located within the Eastern Snake Plain Aquifer (ESPA) and tributary aquifer basins. Guidance for approving transfers which propose a change to points of diversion in the ESPA is contained in Administrative Transfer Processing Memorandum No. 24, dated January 21, 2009. Because the proposed Water Supply Bank rental would in effect be a temporary change to the points of diversion, potential impacts to the Snake River can be evaluated using this guidance. The transfer guidance indicates that a change which increases depletions to a modeled reach of the Snake River by greater than 10 percent must be fully mitigated, unless the increased depletion is less than two acre-feet per trimester or the total steady-state depletion to the reach is less than 10 percent of the total depletion.

Figure 1 shows the locations of the proposed point of diversion and the points of diversion for the available water rights. The proposed point of diversion is located within the ESPAM1.1 model in cell 1068181. The point of diversion for water right 22-7336 is located in model cell 1061184.

The point of diversion for water right 22-13994 is located outside of the ESPAM1.1 model boundary in the upper Teton River basin. Tributary underflow from the upper Teton River basin into the Eastern Snake Plain Aquifer is included in the model as a specified flux boundary (Figure 1). Benefits from ceasing diversion of groundwater at the point of diversion for water right 22-13994 may be expected to accrue to the modeled tributary underflow and/or streamflow in the Teton River. Based on the well driller's log and water right examination documents (Attachment A), water right 22-13994 is diverted from a 170-foot deep well constructed with

16-inch diameter casing perforated from 20 to 170 feet. The driller's log identifies water producing sand and gravel units at 38 to 65 feet and 150 to 170 feet below ground surface. The driller's log reported a static water level of 26 feet below ground surface in 1977. The water right licensing examiner reported a pumping water level of 90 feet. Based on the pumping water level, it appears that the primary production zone for water right 22-13994 is the sand and gravel unit at a depth of 150 to 170 feet. However, it is possible that some water may also be produced from the gravel unit above 65 feet. For this initial assessment, the benefits from ceasing diversion are assumed to accrue entirely to the modeled tributary underflow during the same four-month period. In reality, the point of diversion is approximately 18 miles upgradient from the modeled tributary underflow boundary. Transient effects between these points are neglected in this initial assessment. This assumption also neglects the transient effects of benefits that may accrue to surface flow in the Teton River rather than to tributary underflow.

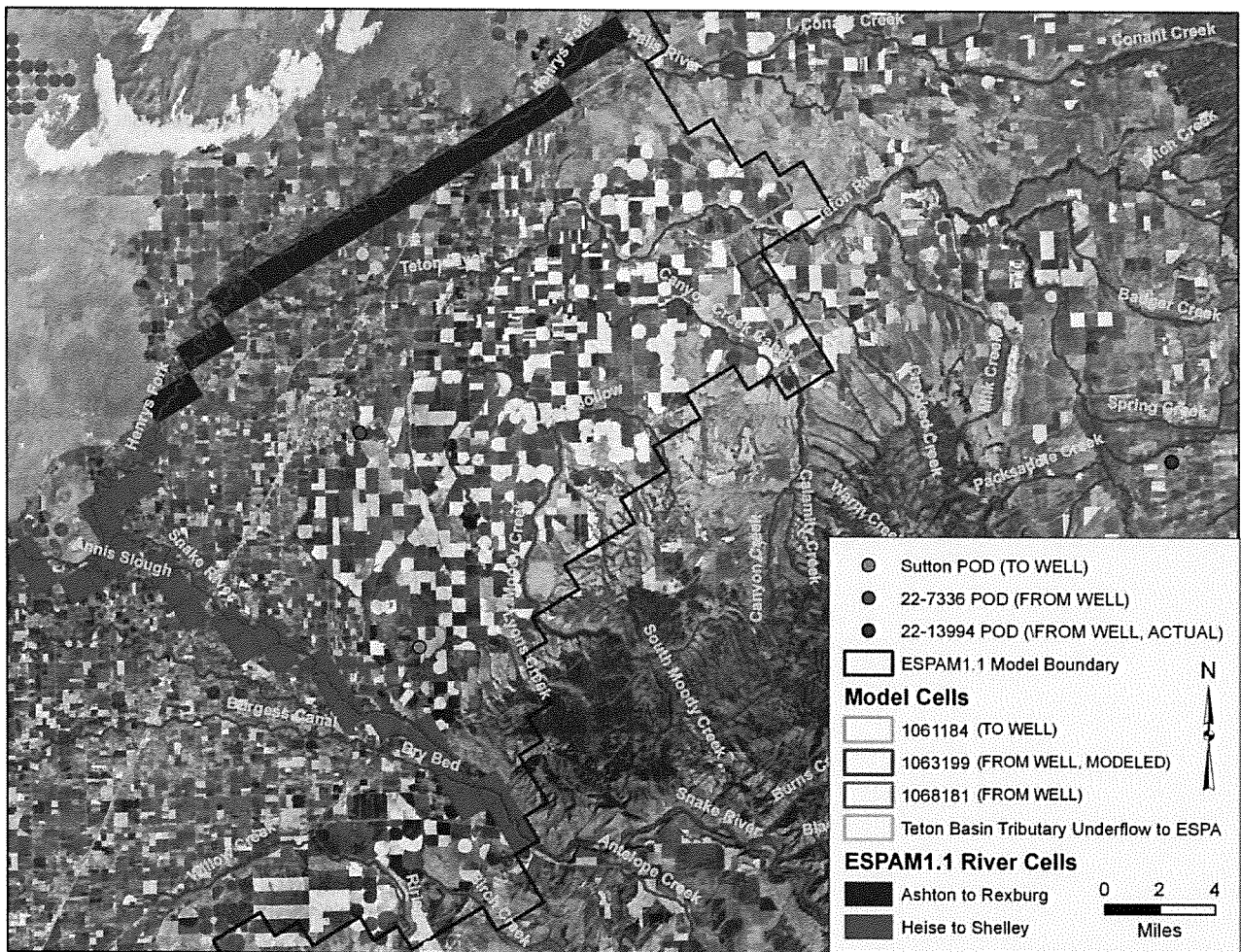


Figure 1. Location map.

Methodology

Potential impacts to the Snake River were evaluated using the ESPA Transfer Spreadsheet Version 3.1.

The effects without transfer were modeled assuming that water rights 22-7336 and 22-13994 had not been leased to the Water Supply Bank and were diverted each spring and summer. Winter trimester diversions were modeled as zero for all wells. For water right 22-7336, diversion of 121.6 AF in each spring and summer trimester was modeled, beginning in the spring of 1981, based on the water right priority date of 10/22/1980. For water right 22-13994, diversion of 30.65 AF in each spring and summer trimester was modeled beginning in the spring of 1978, based on completion of well construction in June of 1977. IDWR records document that water use at this site began prior to the 1991 application for permit.

The effects with transfer were modeled assuming that water rights 22-7336 and 22-13994 were diverted each spring and summer trimester beginning in 1981 and 1978, respectively, and ending when leased to the water supply bank. During 2012 through 2015, diversion of 152.25 acre-feet was modeled at the Sutton point of diversion in each spring and summer trimester. Diversion of water rights 22-7336 and 22-13994 was assumed to resume at their original locations beginning in the spring of 2016.

Water right 22-13994 was modeled at the center of the Teton basin tributary underflow flux boundary in model cell 1063199 (Figure 1). As discussed in the introduction, this method neglects transient effects on the timing of impacts, resulting from the distance between the actual point of diversion in the tributary basin and the modeled tributary underflow boundary. Water right 22-7336 and the proposed Sutton point of diversion were modeled in cells 1061184 and 1068181, respectively.

The effects without and with transfer were also modeled assuming that the water right volume was diverted year-round at rates of 81.07 AF/trimester for 22-7336, 20.43 AF/trimester for 22-13994, and 101.5 AF/trimester at the Sutton point of diversion. This was requested to provide smoothed output that is easier to view graphically. However, this method results in slightly lower peak trimester impacts.

Results

Because of the locations of the points of diversion between the Henry's Fork and South Fork of the Snake River, significant effects on modeled Snake River gains are limited to the Ashton to Rexburg and Heise to Shelley reaches. Net changes to depletions and accruals in other modeled reaches are less than 2.0 acre feet per trimester. Net transfer effects on reaches above Milner are shown in Figure 2. The transient increase in depletions to the Heise to Shelley reach peaks in the summer trimester of 2015 at 34.1 acre-feet. Modeling the net transfer effects assuming year-round use results in a lower peak depletion of 26.5 acre-feet to the Heise to Shelley reach (Figure 3).

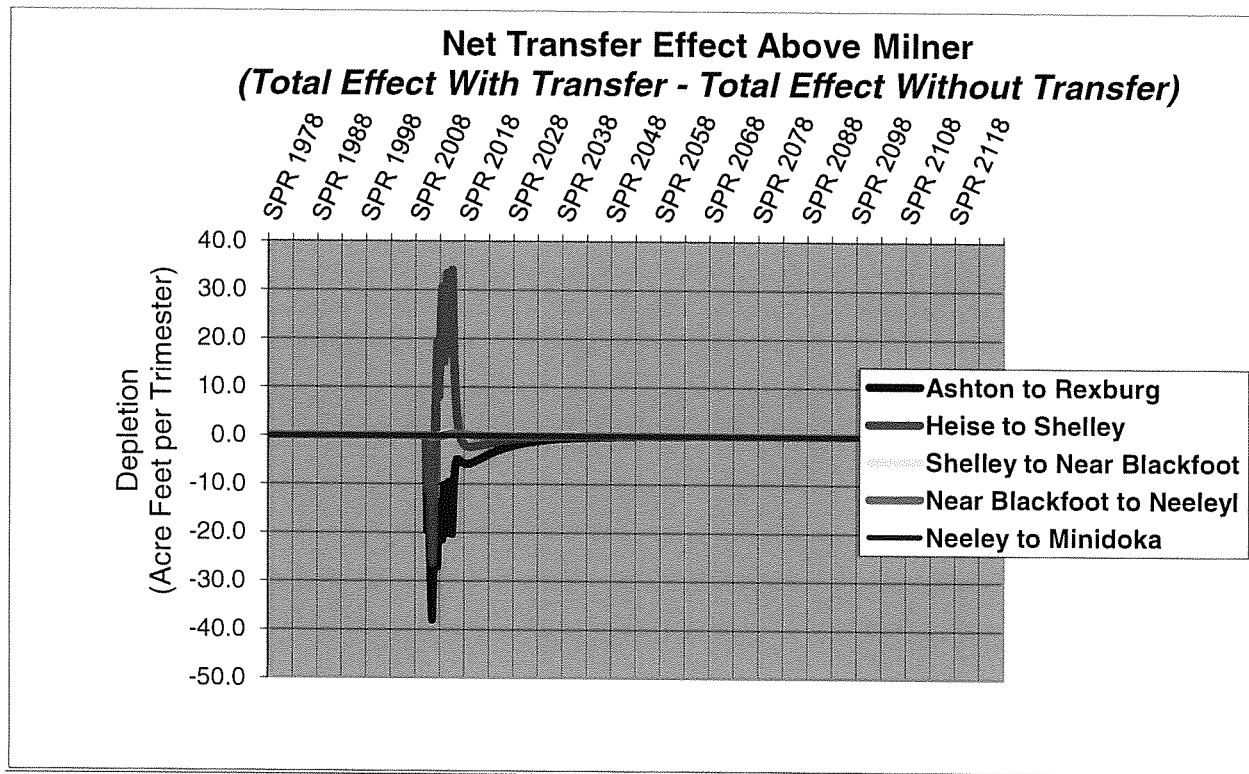


Figure 2. Net effect on modeled river reaches above Milner.

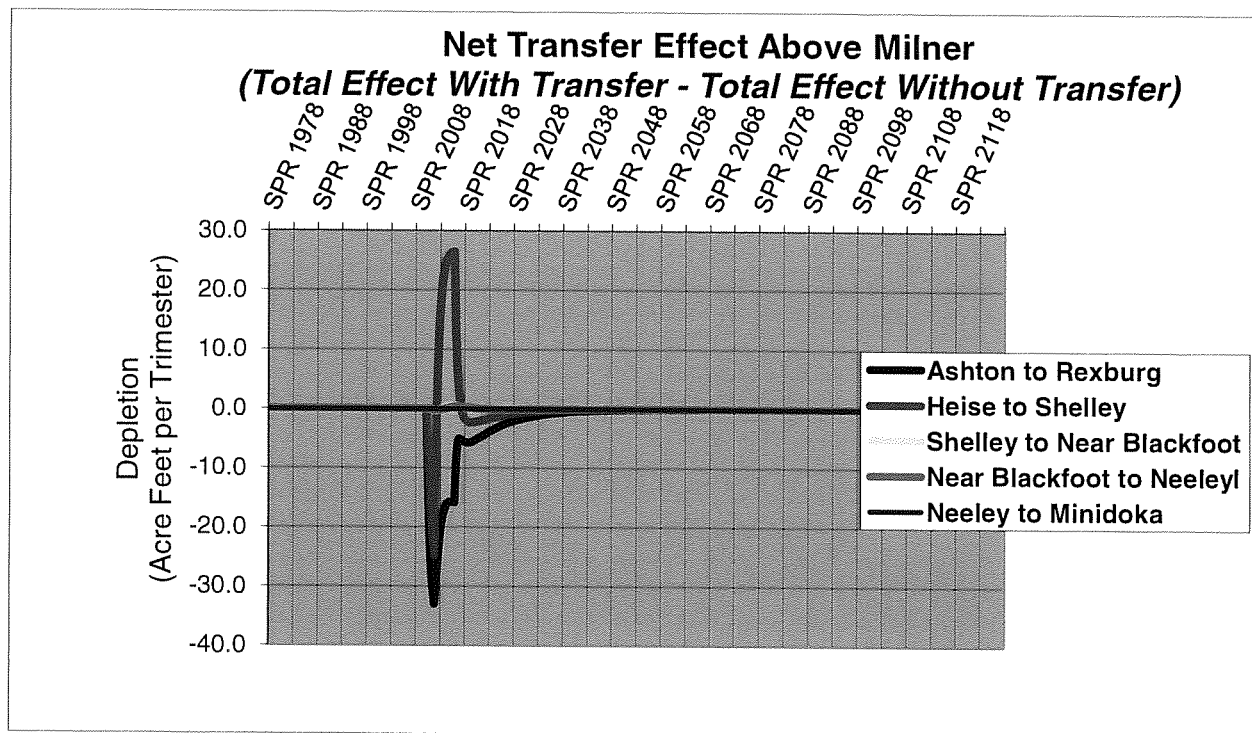


Figure 3. Net effect on modeled river reaches above Milner, assuming year-round water use.

The percentage increase in transient depletions to the Heise to Shelley reach peaks at 79% in the summer trimester of 2015 (Figure 4). Modeling the net transfer effects assuming year-round use results in a lower peak increase in depletions of 68% to the Heise to Shelley reach (Figure 5). Percentage increases in depletions to other reaches are not relevant, because the net increase in depletions is less than 2.0 acre-feet per trimester.

Hydrologic responses in the Ashton to Rexburg and Heise to Shelley reaches are shown in Figures 6 through 9. Because of the relative size and locations of the water rights, it appears that the effect of neglecting transient effects between the tributary basin location of water right 22-13994 and the modeled tributary underflow boundary does not significantly affect the outcome of this analysis with respect to depletions in the Heise to Shelley reach.

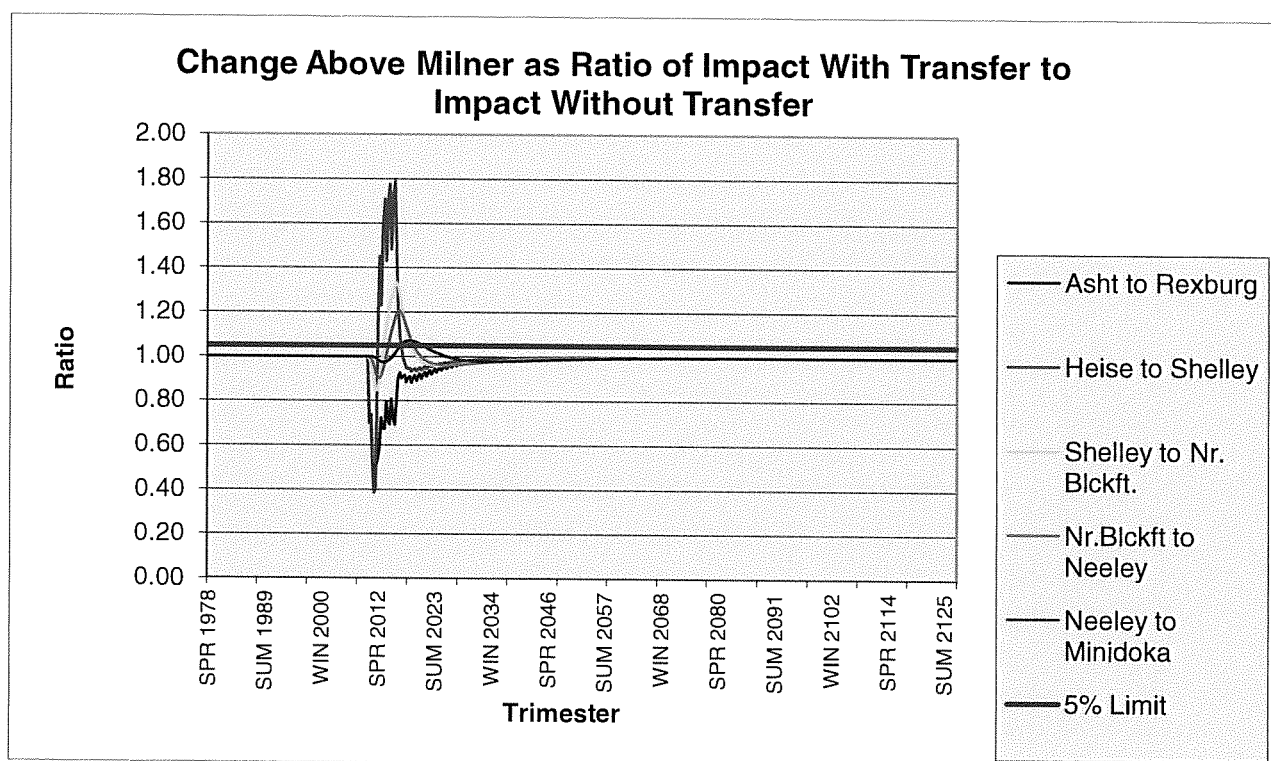


Figure 4. Change in depletions to reaches above Milner.

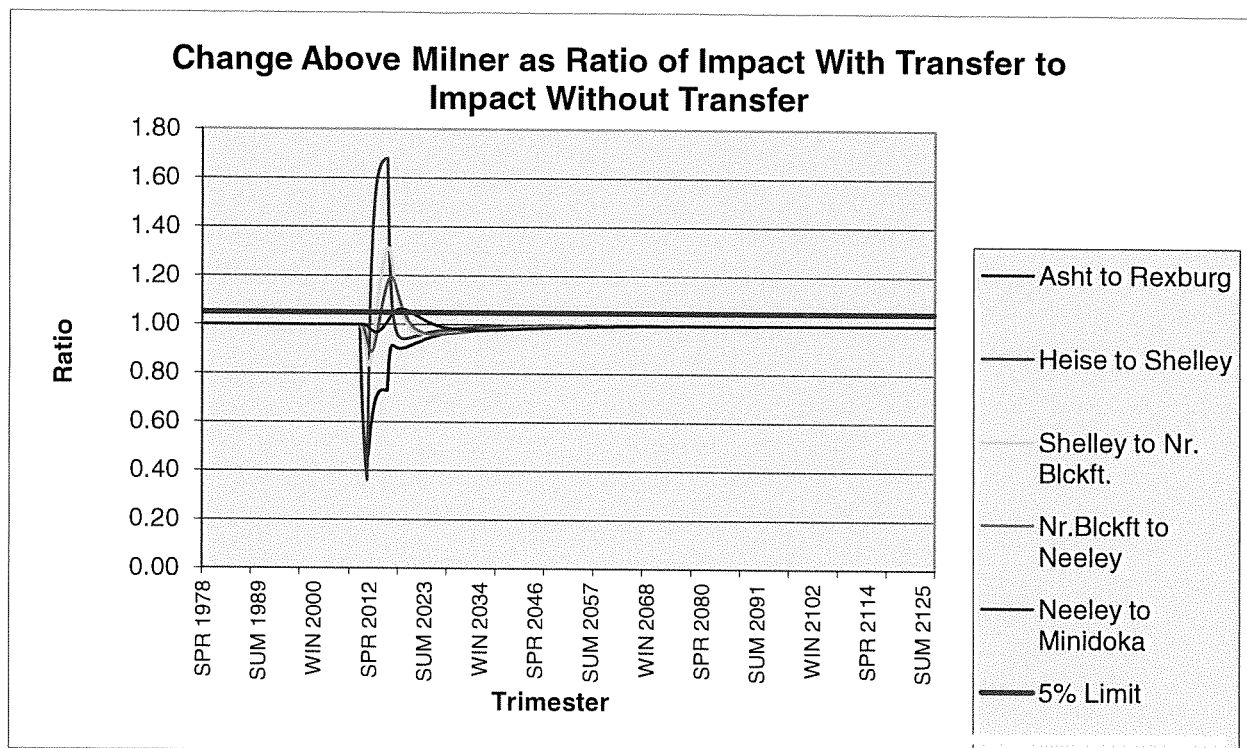


Figure 5. Change in depletions to reaches above Milner, assuming year-round use.

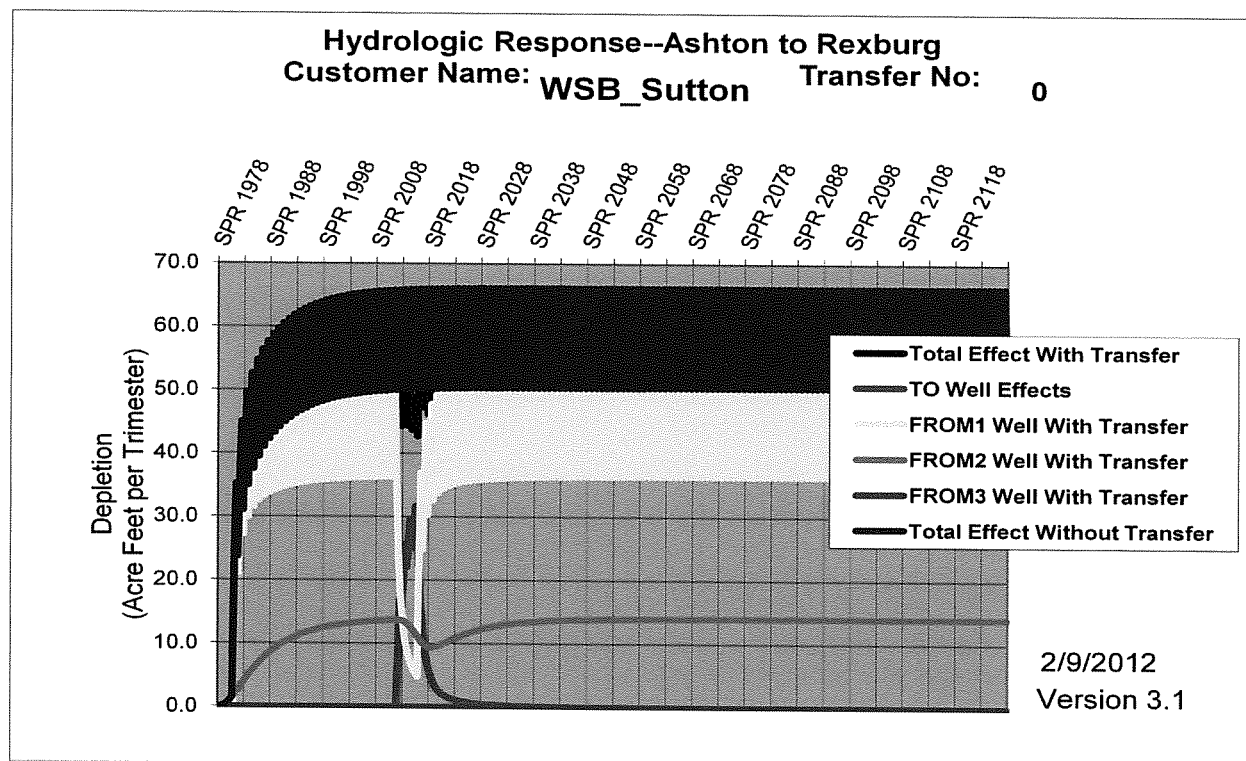


Figure 6. Hydrologic response in Ashton to Rexburg reach.

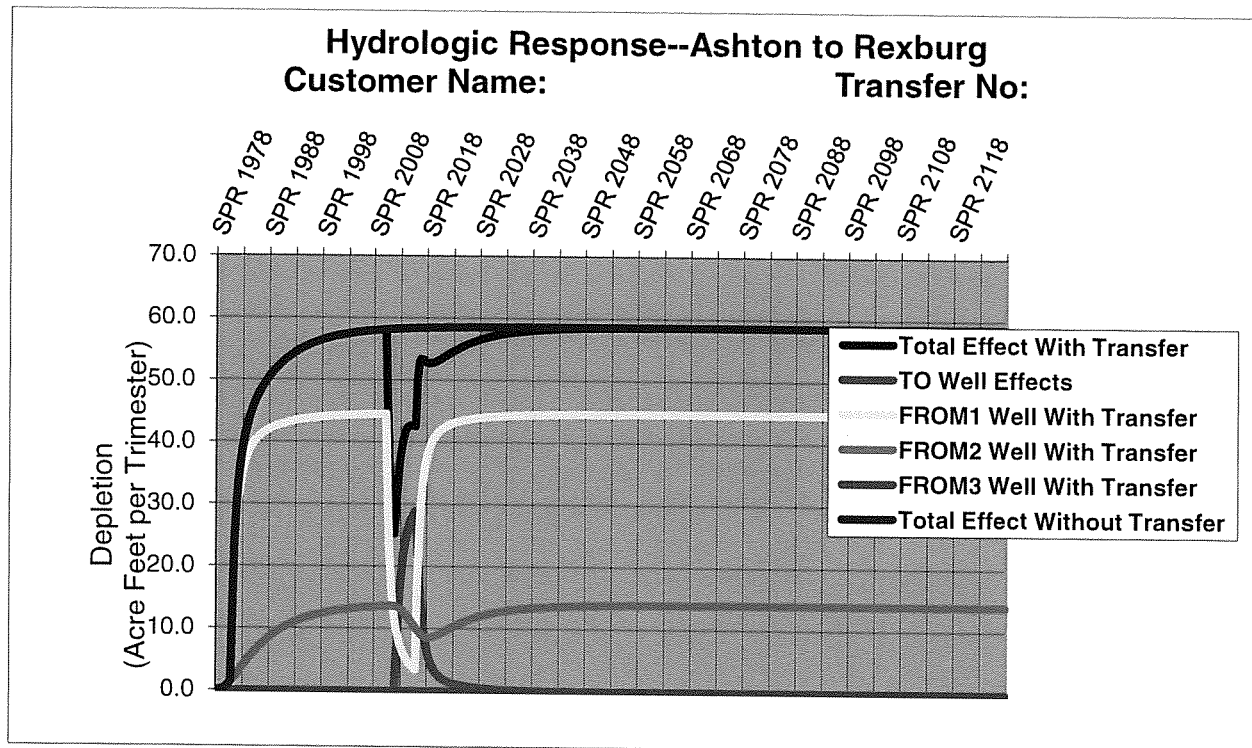


Figure 7. Hydrologic response in Ashton to Rexburg reach, assuming year-round use.

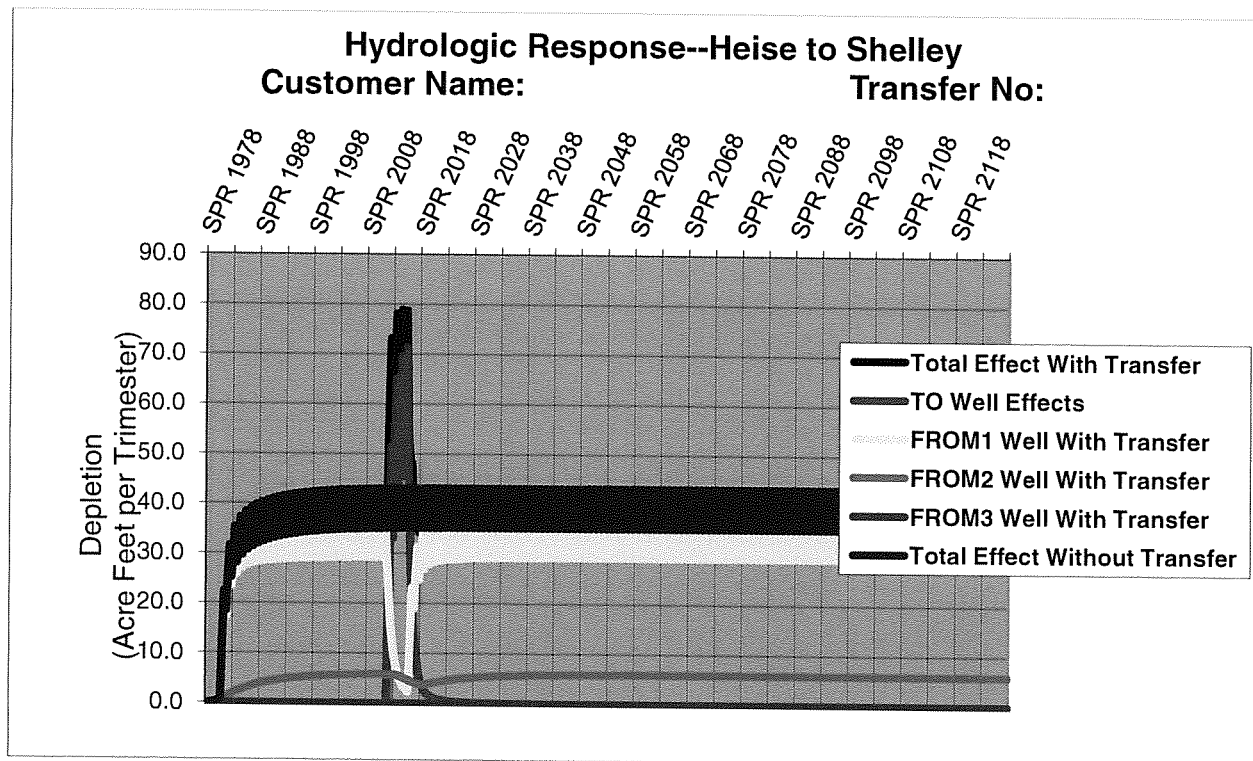


Figure 8. Hydrologic response in Heise to Shelley reach.

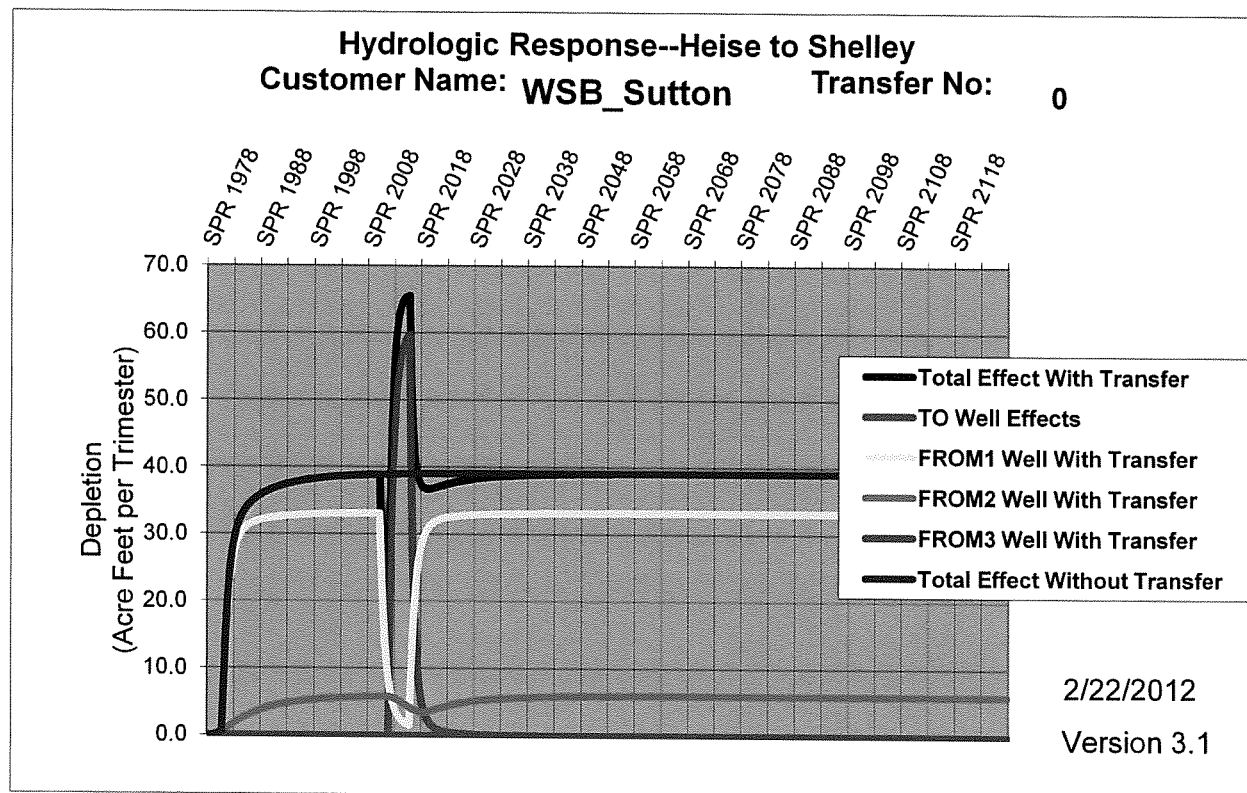


Figure 9. Hydrologic response in Heise to Shelley reach.

Conclusions

The following conclusions are based on analysis of the proposed water bank rental using the ESPA Transfer Spreadsheet Version 3.1.

1. Significant effects (exceeding 2.0 acre-feet per trimester) on Snake River gains are expected to be limited to the Ashton to Rexburg and Heise to Shelley model reaches.
2. Model results indicate that reach gains in the Ashton to Rexburg reach will increase during the rental period, with a peak transient benefit of 20.3 acre-feet in the summer trimester of 2015.
3. Model results indicate that reach gains in the Heise to Shelley reach will be depleted during the rental period, with a peak transient depletion of 34.1 acre-feet in the summer trimester of 2014.
4. The net benefits of ceasing diversion at the original water right points of diversion during the rental period accrue to the Ashton to Rexburg reach through 2057, exceeding 2.0 acre-feet through spring 2028.

5. The net increase in depletions to the Heise to Shelley reach occurs over a shorter period, and is less than 2.0 acre-feet by winter 2016. The modeled increase in depletions exceeds 10% from spring 2012 through spring 2016.
6. The benefits from ceasing diversion of water right 22-13994 were assumed to accrue entirely to the modeled tributary underflow boundary during the same four-month period. Because of the relative size and locations of the water rights, it appears that the effect of neglecting transient effects between the tributary basin location of water right 22-13994 and the modeled tributary underflow boundary does not significantly affect the outcome of this analysis with respect to depletions in the Heise to Shelley reach. This appears to be an acceptable method for modeling this scenario, but may or may not be appropriate for other scenarios involving the transfer of water rights from a non-modeled tributary basin.
7. If the Ashton to Rexburg and Heise to Shelley reaches were combined into a single reach for consideration of impacts to the Snake River, the transient impacts would peak in the summer 2015 trimester with a 13% increase in depletion (an increased depletion of 13.8 acre-feet). The increase in total transient depletions to the combined reach would exceed 10% (and exceed 10 acre-feet) during the spring and summer of 2014 and 2015. This is the result of some of the transient-state benefits accruing to aquifer storage during the rental period, which occurs because the Sutton point of diversion is closer to the modeled river reach than the point of diversion for water right 22-7336.
8. Administrative Transfer Processing Memorandum No. 24 states, "*Increased depletions greater than 10 percent for any reach are presumed to cause injury...*" Per this guidance, injury to water rights in the Heise to Shelley reach, or a combined Ashton/Heise to Shelley reach would be presumed. The likelihood of actual injury occurring during the proposed 4-year rental term has not been evaluated.

ATTACHMENT A. WELL LOG, WATER RIGHT 22-13994

RECEIVED

WELL DRILLER'S REPORT

NOV 14 1977

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 _____

1. WELL OWNER
Name Jim Hatch
Address Driggs Idaho
Owner's Permit No. _____

7. WATER LEVEL
Static water level 26 feet below land surface
Flowing? ☐ Yes ☐ No G.P.M. flow _____
Temperature Cold ° F. Quality _____
Artesian closed-in pressure _____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

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 16 inches Total depth 170 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
<u>250</u> inches	<u>16</u> inches	<u>1</u> feet	<u>170</u> 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 4 inches by 12 inches

Number	From	To
<u>312</u> perforations	<u>20</u> feet	<u>170</u> 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 18 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 Teton
SW 5 NE 5 Sec. 5 T. 5 N. 45 E. 84

8. WELL TEST DATA
☐ Pump ☐ Bailer ☐ Other _____

Discharge G.P.M.	Draw Down	Hours Pumped

9. LITHOLOGIC LOG

Hole Diam.	Depth		Material	Water	
	From	To		Yes	No
<u>16</u>	<u>0</u>	<u>4</u>	<u>Brown clay</u>		
	<u>4</u>	<u>65</u>	<u>Muddy gravel</u>	<u>38</u>	<u>X</u>
	<u>65</u>	<u>75</u>	<u>Brown clay</u>		
	<u>75</u>	<u>150</u>	<u>Muddy gravel & sand</u>		
	<u>150</u>	<u>170</u>	<u>Red gravel & sand</u>	<u>X</u>	

10. Work started 6-22-77 finished 6-29-77

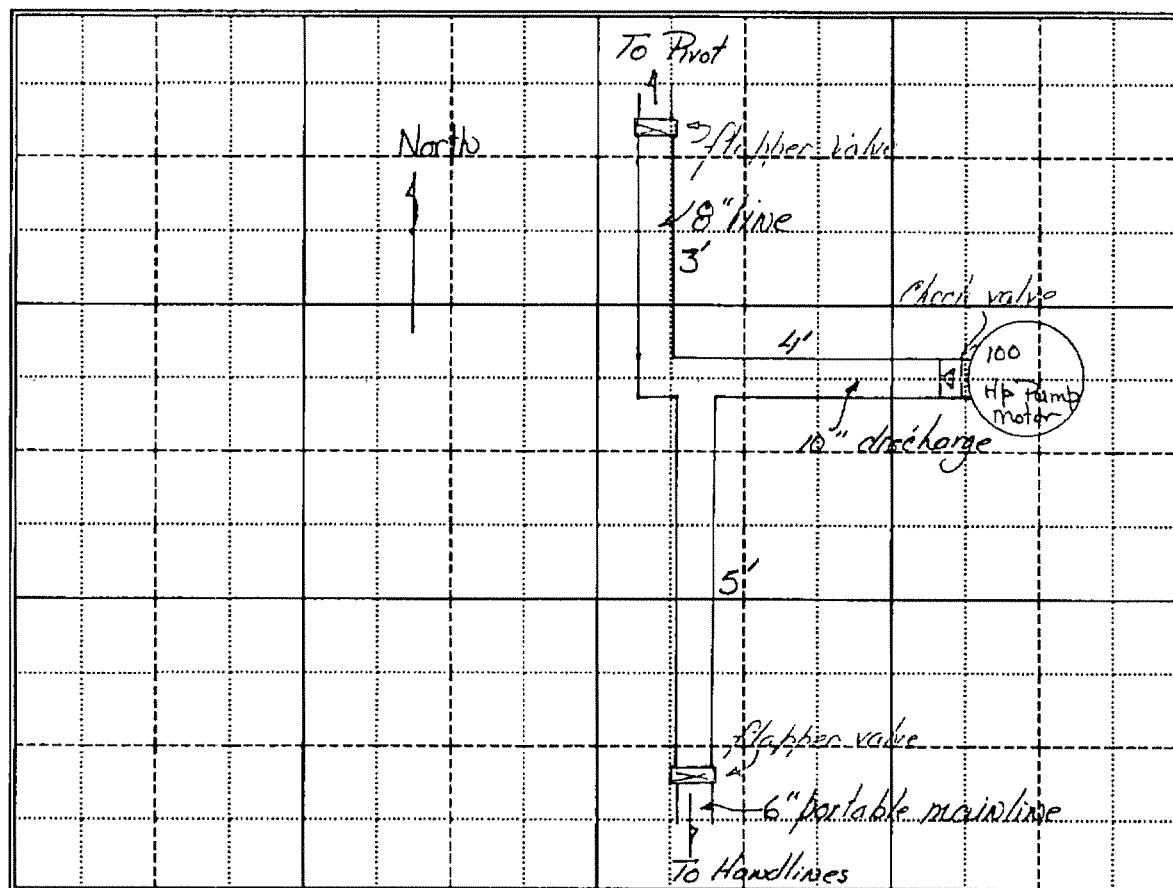
11. DRILLERS CERTIFICATION
Firm Name Center Mt Drilling Firm No. 106
Address Box 747 Lark Id Date 7-24-77
Signed by (Firm Official) Charles Franchon
and (Operator) Charles Franchon

pumping level
of 90 Feet
measured
during
licensing
exam

→ also possible
some production

most likely
→ production
zone

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe i.d. as applicable.



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
	C-E	100	FNJ613424	Johnston	10" discharge

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

D. FLOW MEASUREMENTS

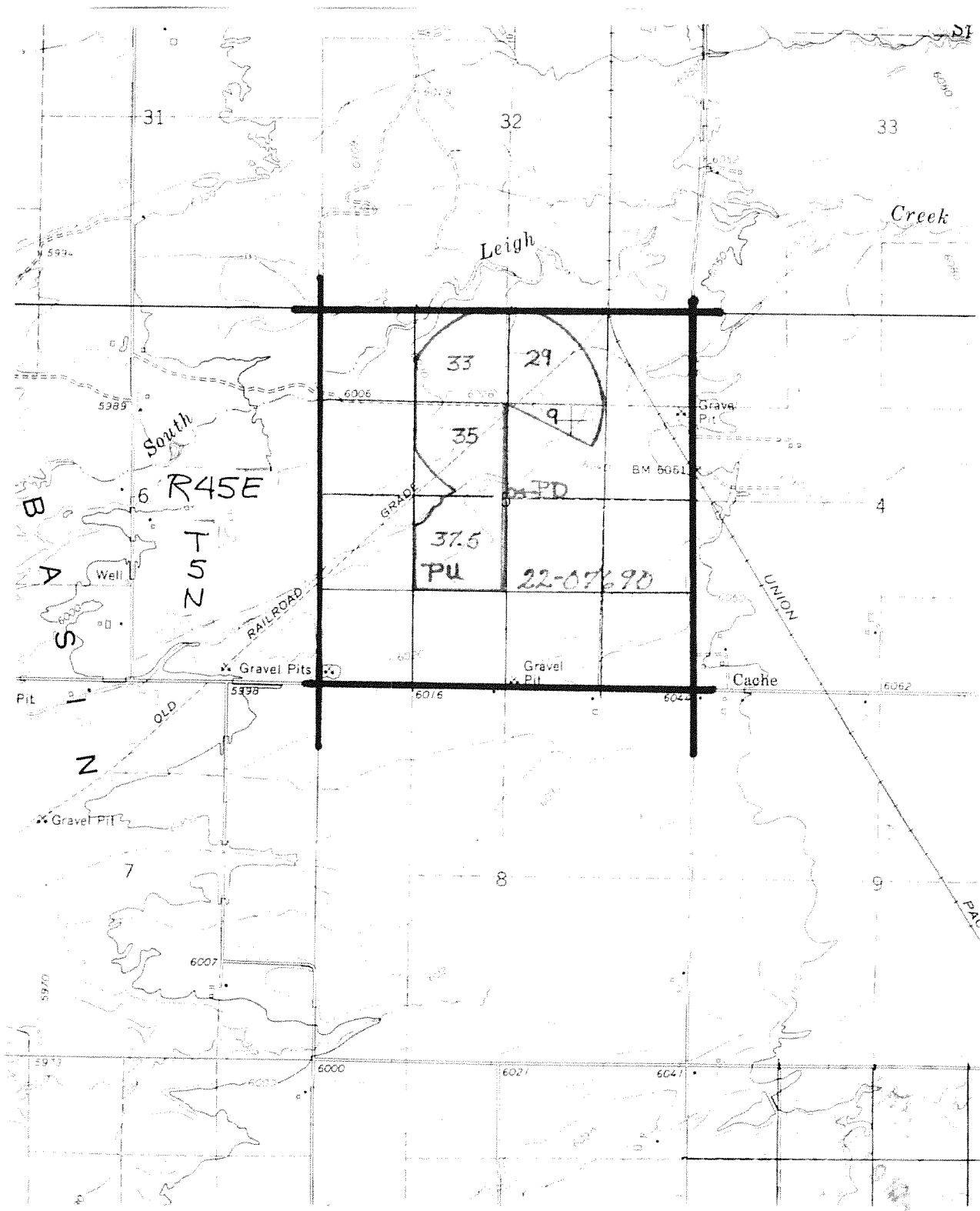
1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
Hand tube	double wire	Flow				

2. Measurements: type is low wire down 90 feet → dynamic pumping depth 90 feet
 static pressure is 60 psi (according to permit owner) → operating pressure 15.60 psi according to permit owner

RECEIVED

JUL 19 1983



22-7690



May 2, 1991

RECEIVED
MAY 8 1991

Department of Water Resources
1301 North Orchard Street
Statehouse Mail
Boise, Idaho 83720-9000

Department of Water Resources

RE: Permit Approval Notice - Hatch/Huff
Permit No. 22-07690
Your letter 4/17/91

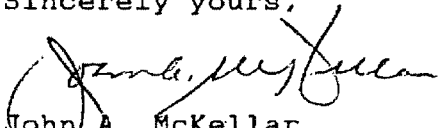
Subsequent to your issuing the Permit Approval Mr. Huff and Mr. Hatch sold their farm to Katherine Strode, 126 Mill Street "C", Healdsburg, California, 95548. The sale included all surface, subsurface and water rights owned by the Seller.

Mr. Huff has delivered your April 17, 1991 letter to our office and I have forwarded it on to Ms. Strode.

Would you please correct your records to show the new owner and address.

Thank you for your consideration.

Sincerely yours,


John A. McKellar

cc: Katherine Strode

JUN 28 1991