

MEMO

State of Idaho

Department of Water Resources

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Date: February 2, 2010
To: Aaron Marshall
From: Mike McVay 
cc: Sean Vincent and Rick Raymondi
Subject: Evaluation of Southeast Idaho Energy water right transfer

Introduction

Per your request, the Hydrology Section in the State Office has reviewed the water right transfer application # 75147 submitted by Brockway Engineering for Southeast Idaho Energy (SEI) to assess potential impacts to the Eastern Snake Plain Aquifer (ESPA). This review has been conducted to answer the following questions:

- 1) Will this transfer impact flow in the Snake River?
- 2) Will this transfer impact other wells?
- 3) Will this transfer impact nearby springs?

Proposal Summary

SEI has purchased two industrial ground water rights from the FMC Corporation near Pocatello at T06N R33E SECTIONS 12 and 13. The rights have priority dates of 3/2/1949 and 4/24/1951 and were decreed in the SRBA on 3/22/2004 for a combined diversion rate of 8.5 cubic feet per second (cfs), and a combined maximum volume of 6153.8 acre-feet (AF) annually (Table 1).

Table 1. FMC Water Rights Purchased by SEI

Right	Use	Priority	Discharge (cfs)	Annual Volume (AF)
29-2284	Industrial	3/2/1949	4.5	3257.9
29-2301	Industrial	4/24/1951	4.0	2895.9

The transfer involves moving the purchased rights to a proposed (POU) that is located approximately 1.5 miles southwest of American Falls, Idaho in Power County at T07S R30E Section 35 (Figure 1).

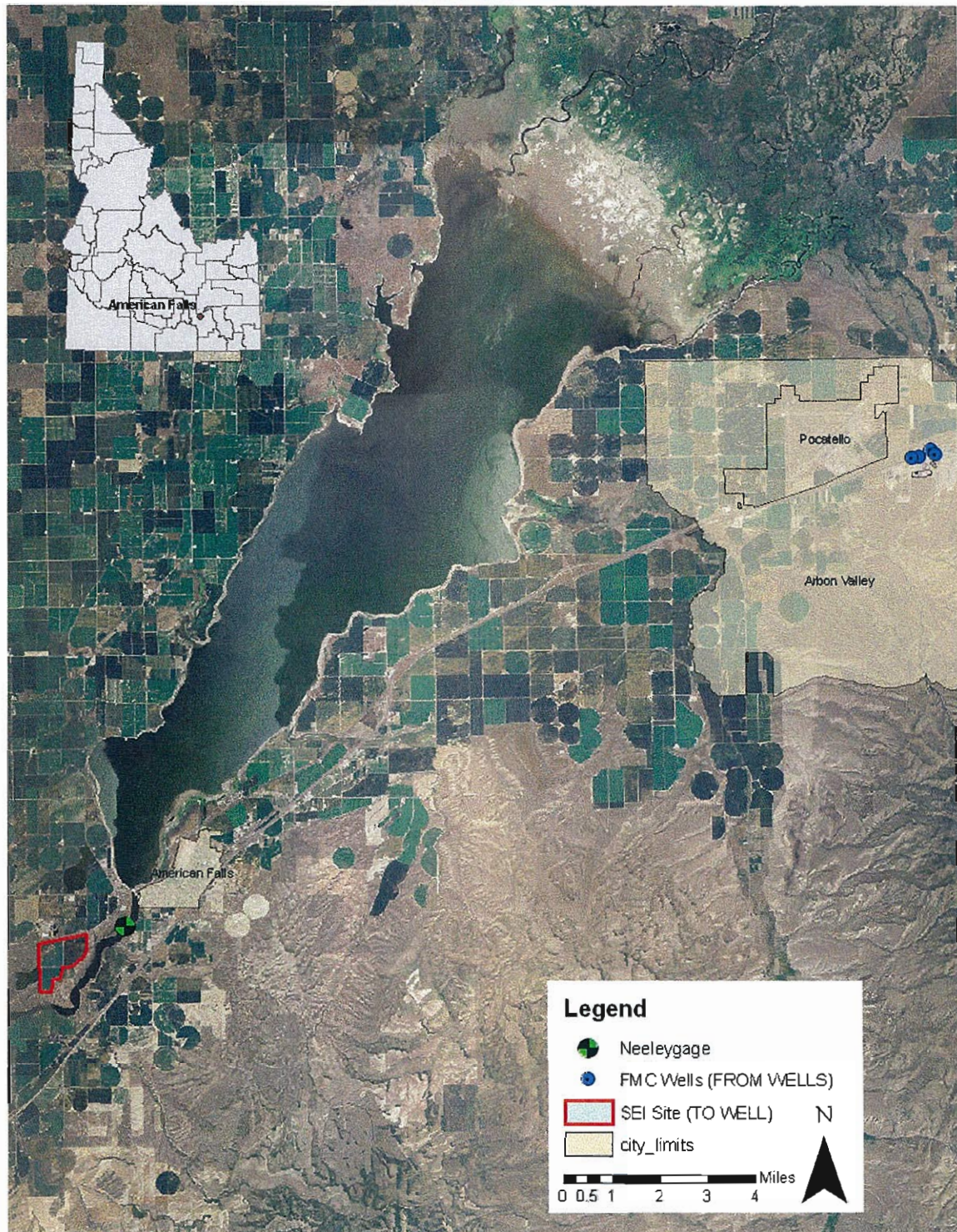


Figure 1. Map showing the showing study area and the locations of the SEI site and FMC wells.

The former FMC wells (From Wells) are located on the south side of the Near-Blackfoot-to-Neeley reach of the Snake River, upstream of American Falls Reservoir. The SEI site (To Well) is located on the north side of the Neeley-to-Minidoka reach of the Snake River, southwest of American Falls Reservoir (Figure 2.).

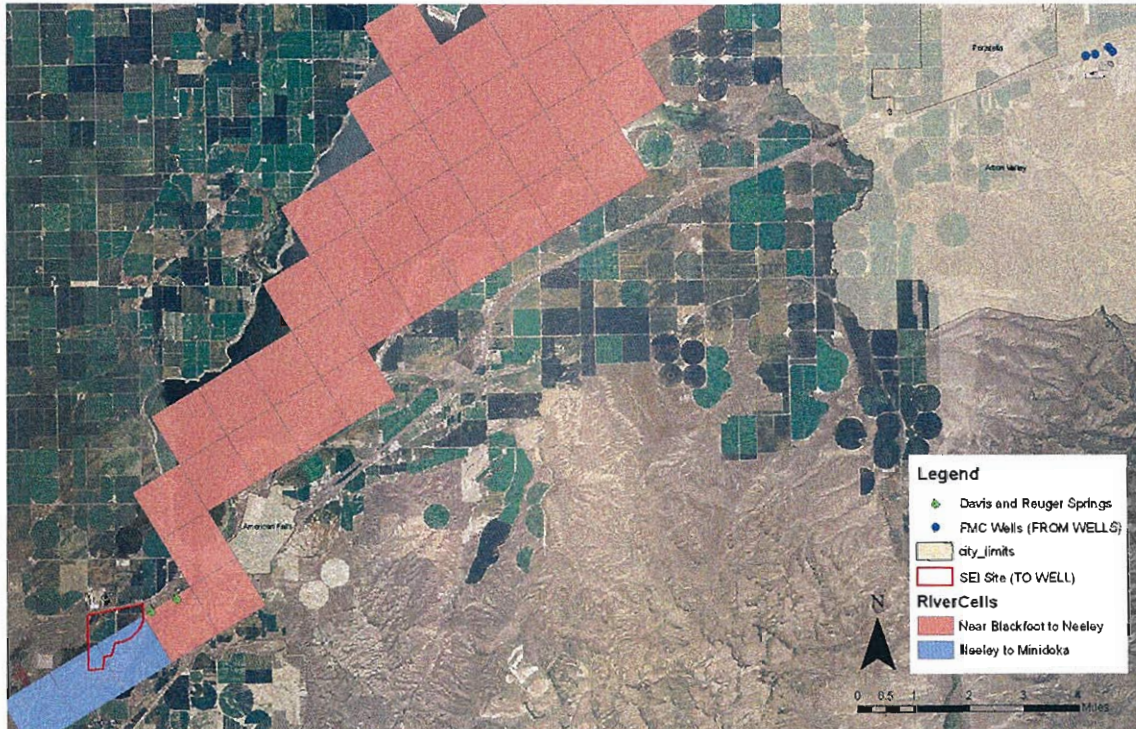


Figure 2. Location of the SEI site and FMC wells in proximity to ESPAM river reach cells, as well as Davis and Reuger Springs.

Because the SEI site is at a location very near the junction of the Near-Blackfoot-to-Neeley and Neeley-to-Minidoka reaches, SEI has requested that these reaches be combined for evaluation with the Transfer Tool. Brockway Engineering's reasoning behind this request is that the reach-by-reach analysis required by ESPA Transfer Guidelines overstates depletions to the Neeley-to-Minidoka reach because the site is located very near to a model river reach boundary. The appropriateness of this combined-reach method is addressed below in the American Falls Reservoir subsection.

Local Hydrogeology

The ESPA is composed of a series of relatively thin basalt flows and interbedded sediments. Sedimentary interbeds are thin or absent near the center of the ESPA, and the subsurface hosts a single, unconfined, basalt aquifer (Mundorff, 1967). In contrast, sedimentary interbeds are thick and extensive adjacent to the Snake River, where the inter-fingering of basalt flows with fine-grained sediments creates individual aquifers and confining units (Ralston, 2008). The SEI site is located on the margin of the plain where

the subsurface is dominated by fine-grained sediments layered with basalt (Figures 3 through 6).

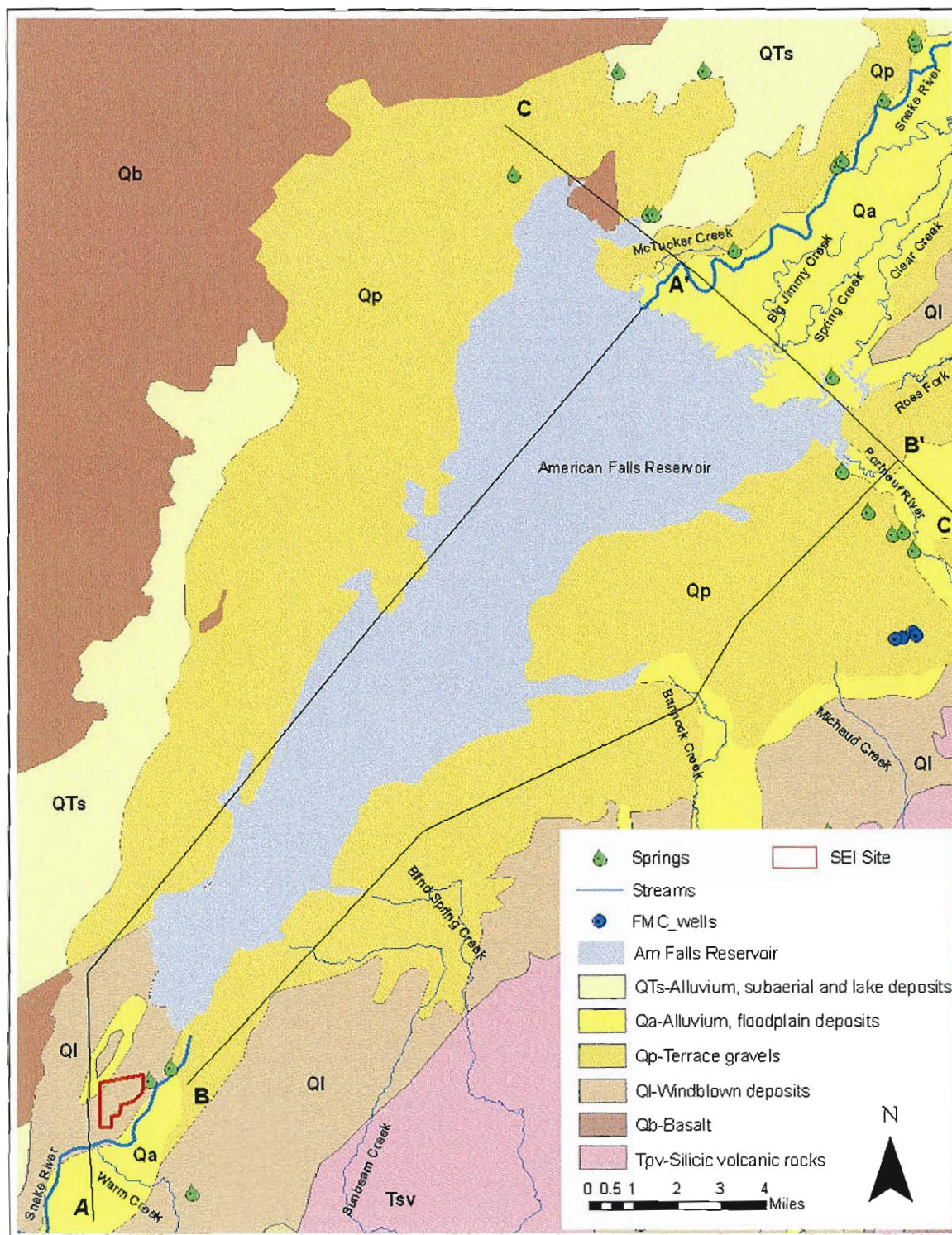


Figure 3. Surface geology map of the study area illustrating approximate cross-section locations (adapted from Warner 2005).

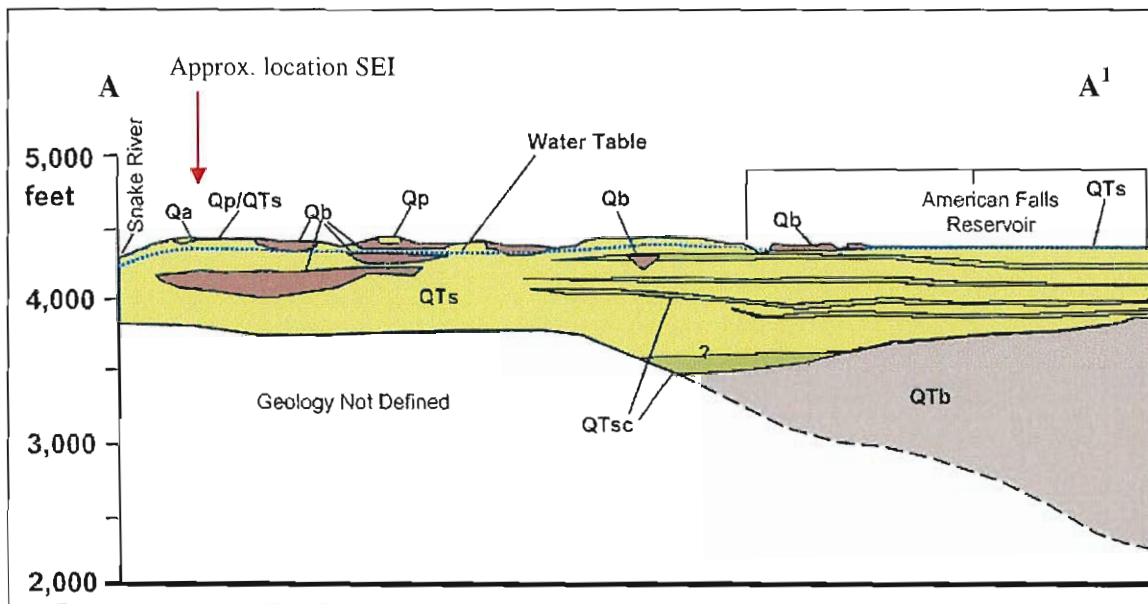


Figure 4. Geological cross-section A – A' along the northwest side of American Falls Reservoir (adapted from Warner, 2005). Qa = floodplain deposits; Qp = terrace gravels; QTs = subareal and lake deposits; QTsc = lake beds; Qb = basalt; QTb = basalt.

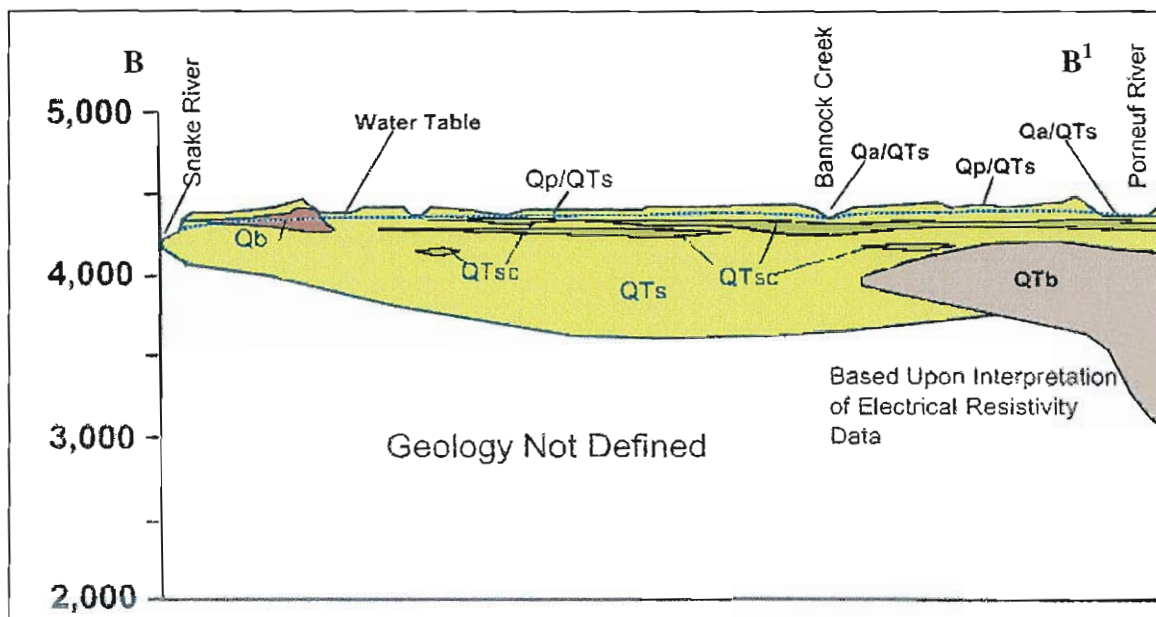


Figure 5. Geological cross-section B – B' along the southeast side of American Falls Reservoir (adapted from Warner, 2005). Qa = floodplain deposits; Qp = terrace gravels; QTs = subareal and lake deposits; QTsc = lake beds; Qb = basalt; QTb = basalt.

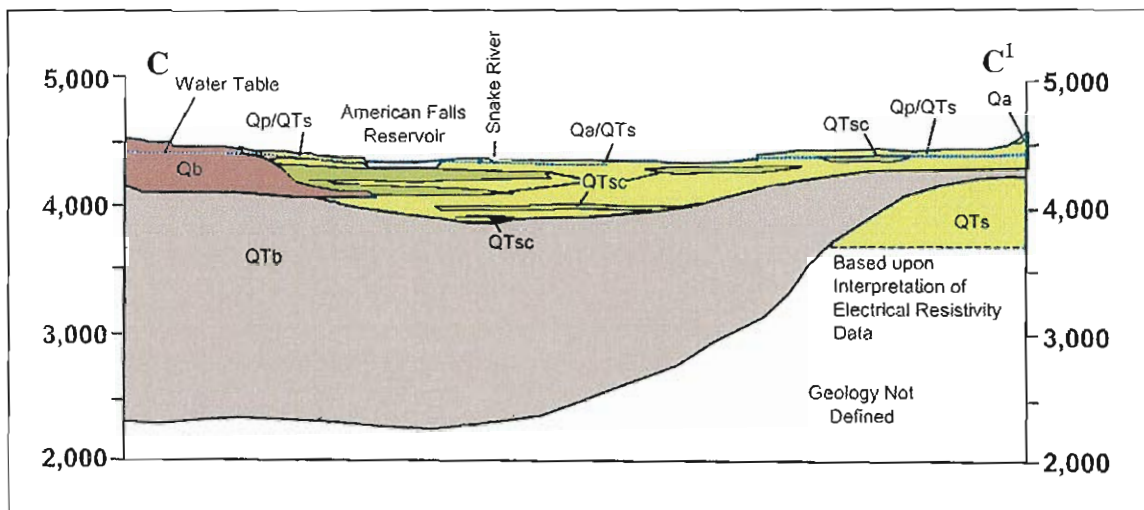


Figure 6. Geological cross-section C – C' along the northeast end of American Falls Reservoir (adapted from Warner, 2005). Qa = floodplain deposits; Qp = terrace gravels; QTs = subareal and lake deposits; QTsc = lake beds; Qb = basalt; QTb = basalt.

The local geologic setting is generally comprised of Tertiary and Quaternary basalt, gravel deposits associated with the Snake and Portneuf Rivers, and fine-grained lacustrine sediments (Ralston, 2008). More detailed descriptions of the area geology are provided in Carr and Trimble (1961), Mundorff (1967), Pierce and Scott (1982), Houser (1992), and Ralston (2008).

Quaternary-Tertiary basalt (QTb) is not present at the surface in the study area; however, it is present in the subsurface southeast of the Snake River. Knowledge of the hydraulic properties of this unit is limited, and the effect the Quaternary-Tertiary basalt has on ground water flow is unknown (Ralston, 2005)

Quaternary-age basalt of the Snake River Group (Qb) is found locally at or near the surface in the northwestern portion of the study area. The basalt typically yields large quantities of water and hosts the target aquifer (ESPA) underneath the SEI site (Warner, 2005).

Terrace gravels are found along a corridor on both sides of the Snake River starting above Idaho Falls and continuing down-river to thin and terminate against fine-grained sediments near the upper end of American Falls Reservoir (Ralston, 2008).

Fine-grained sediments, designated as the Raft River Formation (QTs) and the American Falls Lake Beds (QTsc), were deposited as the result of repeated damming of the Snake River by basalt in Quaternary time (Ralston, 2008). The Raft River Formation is found in the subsurface below American Falls Reservoir, and extends northeast approximately four miles beyond the upper end of reservoir (Houser, 1992). The American Falls Lake Beds overlie the Raft River Formation and basalt (where present), and extend to the northeast at least as far as Ferry Butte (Houser, 1992). These sediments do not transmit large quantities of water, and act as flow barriers and confining layers (Warner, 2005).

The existence of fine-grained sediments in this area provides important control on ground water flow by restricting the movement of ground water. The distribution of fine-grained sediments effectively blocks the southwestward movement of ground water in both the Terrace Gravels and deeper basalt units. This restriction forces ground water to flow upward northeast of the reservoir, resulting in ground-water discharge in the form of springs and river gains that flow into the American Falls Reservoir (Figure 7).

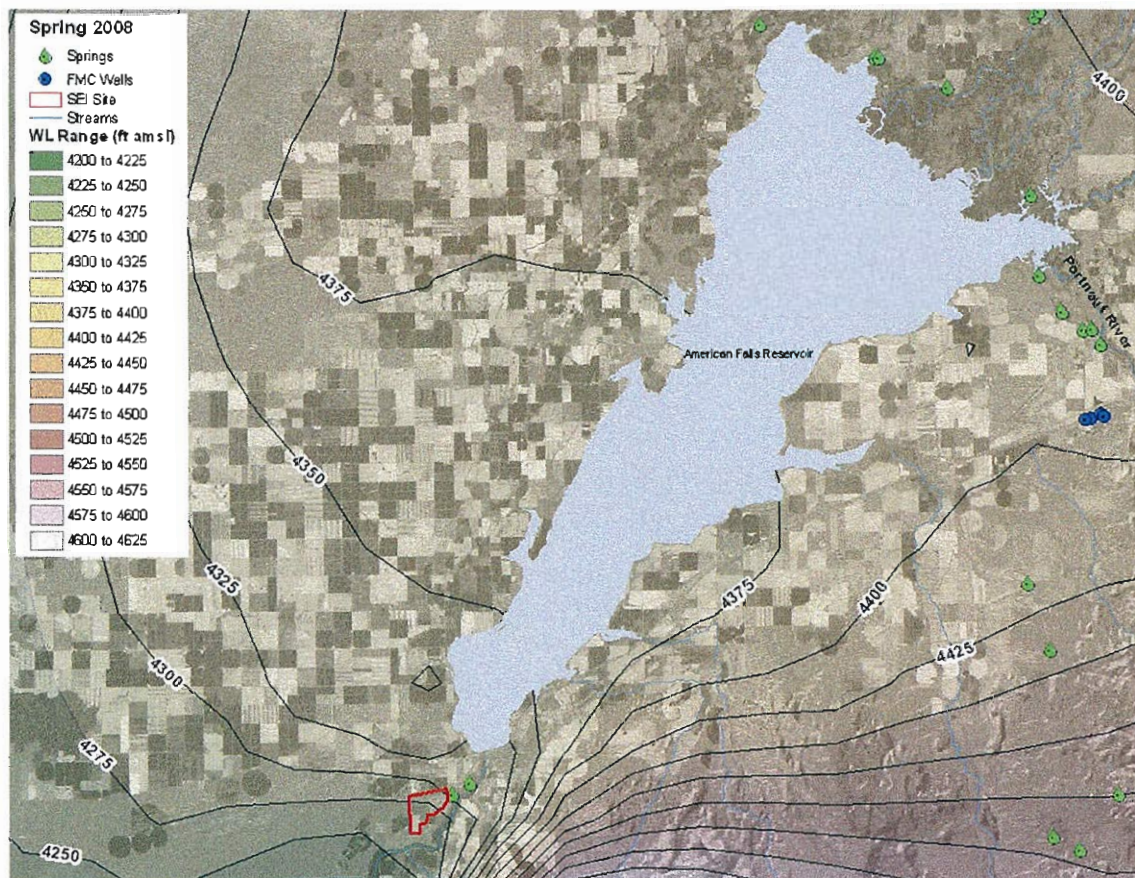


Figure 7. Potentiometric map illustrating the general direction of ground water movement. Note the springs located northeast of the reservoir. The maximum stage of American Falls Reservoir is approximately 4,354 feet above mean seal level (ftamsl).

The presence of fine-grained sediments plays a similar role in controlling ground water discharging from the Portneuf River Valley. Deep ground water flowing to the northwest out of the valley toward the ESPA is blocked by the fine-grained sediments and forced upward to discharge as springs and Portneuf River gains.

The fine-grained sediments also hinder ground water flow to the west from beneath the FMC site; resulting in flow to east-northeast and discharge in the form of springs and Portneuf River gains (Figure 8). According to Baldwin, et al. (2004), both shallow and deep ground water flow from the FMC facility toward the Portneuf River. Therefore, the Portneuf River serves as the discharge area for the shallow and deep aquifers that underlie the FMC facility and Portneuf valley. Water samples from springs near the

FMC site indicate that discharge is a mixture of both shallow and deep ground water (Baldwin, et. al, 2004).

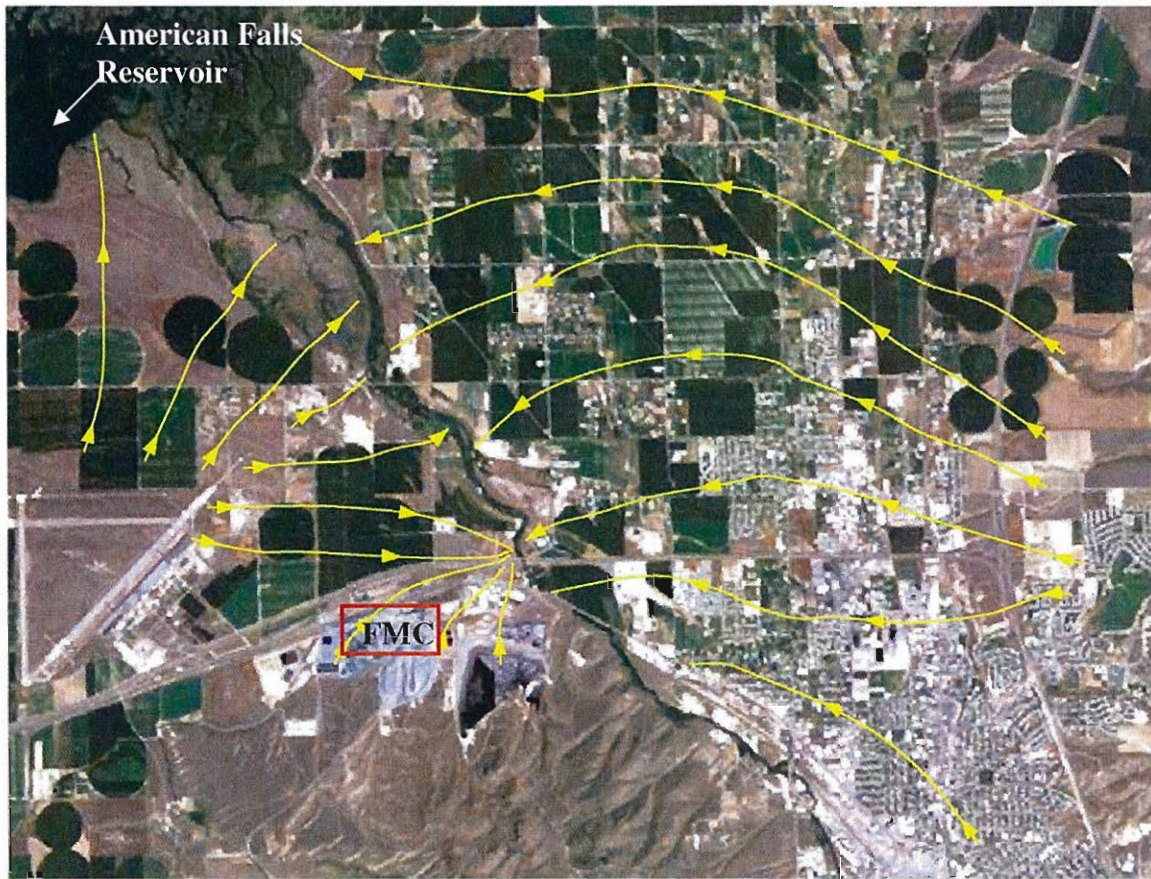


Figure 8. Ground water flow directions for aquifers east and west of the Portneuf River. Flow directions based on potentiometric maps (adapted from Baldwin, et. al, 2004)

American Falls Reservoir

Due to the proximity of the proposed transfer to the American Falls Reservoir, it is imperative to understand the relationship between the reservoir and the aquifer. The fine-grained sediments described in the previous section are present under all but the southwestern end of the American Falls Reservoir, and the upward vertical movement of water through these sediments is believed to be small (Ralston, 2008).

As described previously, the fine-grained sediments restrict both the regional southwest flow of ESPA ground water, and the northwest flow of ground water from the Portneuf River Valley. This causes ground water to discharge in the form of springs and surface water gains east of the reservoir. These springs and river gains flow into American Falls Reservoir.

The fine-grained sediments also block upward vertical ground water flow directly into the reservoir. Water table elevations are higher than the maximum reservoir stage (4,354 ft amsl) under most of the reservoir, except the far southwestern end (Figure 7). Therefore,

it appears that the sediments effectively restrict vertical leakage where present, and the reservoir does not gain significant amounts of ground water from the aquifer directly below.

Previous researchers have concluded that the reservoir may lose water to the aquifer at the far southwestern end, where fine sediments are absent and the water table is below lake level (Mundorff, 1967; Ralston, 2008; Warner 2005). Utilizing a water balance for the Neeley-to-Minidoka reach in combination with spring discharge analyses, Mundorff (1967) estimated that the reservoir loses an estimated average of 60 cfs due to seepage from the southwestern portion of the lake. This amount of seepage appears to be insignificant given the annual average flow of 7,200 cfs flowing past the Neeley gage on the Snake River (USGS, 2009).

Any gains to the Near-Blackfoot-to-Neeley reach would be realized as increased flow into the American Falls Reservoir; where fine-grained sediments effectively isolate the reservoir from the underlying aquifer. Depending on operation of American Falls dam, these gains would not readily translate to increased Snake River flow below the Near-Blackfoot-to-Neeley reach boundary. The gains to the Near-Blackfoot-to-Neeley reach would not be available to mitigate depletions in the Neeley-to-Minidoka reach unless operations at the American Falls dam were adjusted to pass the gains beyond the impoundment. It is important to note that, although the combined-reach method may help to balance gains and losses on the Snake River, it will not mitigate potential negative impacts to nearby springs located on the Neeley-to-Minidoka reach (Figure 2).

Transfer Tool Analysis

As stated above, the geology of the area and the operation of American Falls Reservoir imply that gains to the reservoir will not readily translate to river gains below the dam, and combining the reaches will likely underestimate impacts to the Neeley-to-Minidoka reach - unless dam operations are adjusted to administer this water right.

The transfer application does not use any stated transfer volume in the Transfer Tool. Instead, a combined-reach approach (Near-Blackfoot-to-Neeley plus Neeley to Minidoka) is assumed, and a volume of water is estimated based on impacts to the combined reach. Because combining these reaches depends on dam operation, the transfer has been analyzed using the requested transfer volume of 6,153.8 AF/yr. The Brockway Engineering method will be addressed as a mitigation option.

Full Transfer Volume Analysis (Reaches Not Combined)

Using the requested transfer volume of 6,153.8 AF/yr, negative effects calculated by the transfer tool are greatest in the Neely-to-Minidoka reach of the Snake River with depletions of 372.8 AF/trimester. This analysis also predicts significant gains for the Shelley-to-Near Blackfoot (264.0 AF/trimester), Near Blackfoot-to-Neeley (53.3

AF/trimester), Heise-to-Shelley (29.13 AF/trimester), and Ashton-to-Rexburg (24.22 AF/trimester) reaches (Figure 9, Table 2).

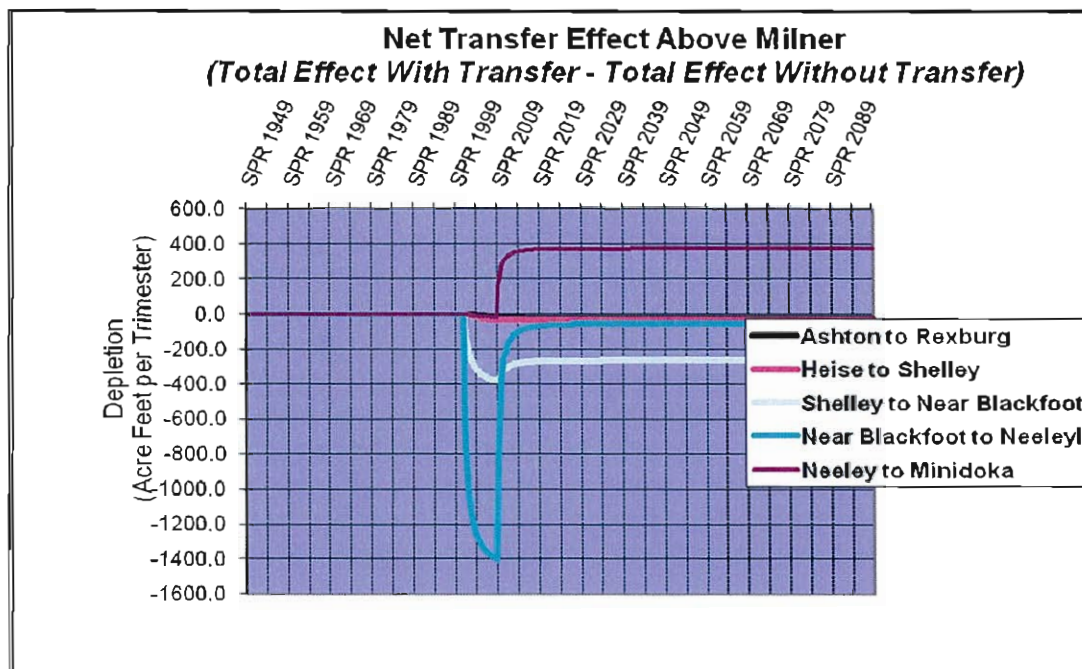


Figure 9. Graph of the net effects of the proposed well on the Snake River reaches above Milner assuming full transfer volume.

Table 2.

Full Transfer Volume - Net Transfer Effect (AF/four months) after 90 years										
Ashton to Rexburg	Heise to Shelley	Shelley to Nr Blackft	Nr Blackft To Neely	Neeley to Minidoka	Dev. Wbl. to Buhl	Buhl to Kspr	Kspr	Kspr to Malad	Malad	Malad to Bancroft
-24.22	-29.13	-263.97	-53.29	372.84	-1.09	-0.43	-0.27	-0.03	-0.26	-0.01
Negative indicates gains to Snake River										

Combined-Reach Mitigation Analysis

Because the SEI site is located very near the reach boundary between the Near-Blackfoot-to-Neeley and the Neeley-to-Minidoka reaches, Brockway Engineering has proposed combining the reaches to assess impacts due to the transfer. The Brockway Engineering analysis indicates that, based on the combined-reach evaluation, the requested transfer volume of 6,153.8 AF/yr could be reduced by 17.6% to 5,070 AF/yr in an effort to provide mitigation to the Neeley-to-Minidoka reach of the Snake River.

Using the reduced pumping volume of 5,070 AF/yr, the Transfer Tool calculates a *gain* of 302.9 AF/trimester along the Near-Blackfoot-to-Neeley reach, and a *depletion* of 302.2 AF/trimester along the Neely-to-Minidoka reach of the Snake River. This analysis also predicts significant gains for the Shelley-to-Near Blackfoot (290.3 AF/trimester), Heise-

to-Shelley (32.2 AF/trimester), and Ashton-to-Rexburg (26.9 AF/trimester) reaches (Figure 10, Table 3).

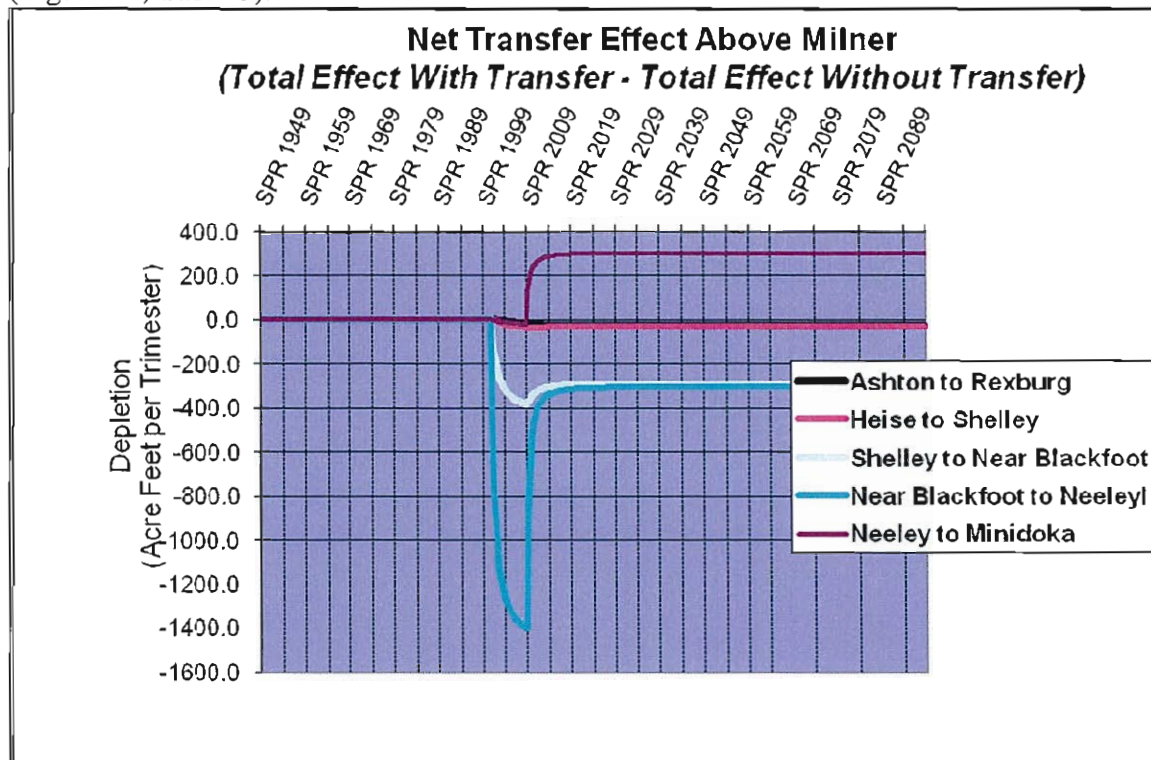


Figure 10. Graph of the net effects of the proposed well on the Snake River reaches above Milner assuming 17.6% reduction in transfer volume.

Table 3.

Reduced Transfer Volume - Net Transfer Effect (AF/four months) after 90 years										
Ashton to Rexburg	Heise to Shelley	Shelley to Nr Bickft	Nr Bickft To Neely	Neeley to Minidoka	Dev. Wbl. to Buhl	Buhl to Kspr	Kspr	Kspr to Malad	Malad	Malad to Bancroft
-26.9	-32.3	-290.3	-302.9	302.2	-5.4	-2.1	-1.3	-0.1	-1.3	0.0
Negative indicates gains to Snake River										

The calculated effect due to the transfer on the combined Near-Blackfoot-to-Minidoka reach is a *gain* of 0.7 AF/trimester. Assuming that dam operations can be altered to administer this transfer, this approach appears to mitigate flow in the combined Neeley-to-Minidoka reach.

It is important to note that, although the combined-reach method may help to balance gains and losses on the Snake River, it will not mitigate potential negative impacts to nearby springs located on the Neeley-to-Minidoka reach. The proposed well locations for the SEI site are 0.75 miles from Davis Springs and 1.25 miles from Reuger Springs at the American Falls State Fish Hatchery (Figure 2). Ground water pumping at the SEI location will result in reduced spring flows; however, a lack of data precludes a quantitative evaluation of impacts to these springs.

Well Impact Analysis

Brockway Engineering used the Theis (1935) equation to estimate drawdown in nearby wells due to pumping the SEI wells at 2,000 gpm. Results from this analysis indicate that pumping the SEI wells at 2,000 gpm for 60 days will result in 0.41 ft of drawdown at a radial distance of one mile (Appendix C).

Brockway Engineering's choice of a 60-day pumping duration may not be of adequate duration to characterize pumping-induced water level declines. IDWR convention is to estimate long-term pumping impacts by employing a 365-day continuous pumping duration, which is in accordance with Idaho Department of Environmental Quality guidance for Public Water Systems, (IDEQ, 2007). Utilizing the Phase 1 peak flow of 2,000 gpm for one year is equivalent to 3,226 AF/year, or approximately 48% of the requested 6,153.8 AF/yr.

IDWR utilized the Theis equation to estimate drawdown in nearby wells due to pumping the SEI wells at 2,000 gpm. Results from this analysis indicate that pumping the SEI wells at 2,000 gpm for 60 days and 365 days will result in 0.43 ft and 0.86 ft of drawdown, respectively, at a radial distance of one mile (Appendix A). The estimated aquifer properties and resulting drawdown estimates for both the Brockway and IDWR analyses are presented in Table 3 below.

Table 3. Summary of well impact analyses.

	Withdrawal	Estimated Aquifer Properties		Impact
Analysis	Pumping Rate (gpm)	Storativity	Transmissivity (ft ² /day)	Drawdown at 1 mile distance (ft)
Brockway 60 days	2,000	0.12	130,331	0.41
IDWR 60 days	2,000	0.12	121,876	0.43
IDWR 365 days	2,000	0.12	121,876	0.86

Conclusions

To summarize the conclusions of this review, the responses to the introductory questions are presented below.

Question 1

Will this transfer impact flow in the Snake River?

The Transfer Tool analysis predicts depletions of 372.8 AF/trimester for the Neely-to-Minidoka reach of the Snake River. However, due to the proximity of the site to the river reach boundary between the Near-Blackfoot-to-Neeley and the Neely-to-Minidoka

reaches, it may be appropriate to combine these reaches. If the combined-reach method is deemed acceptable, and if the transfer volume is reduced to 5,070 AF/trimester, the effects to the combined Near-Blackfoot-to-Minidoka reach is a gain of 0.7 AF/trimester. It is important to note that the combined-reach method depends on altering American Falls dam operation to administer this transfer.

Question 2

Will this transfer impact other wells?

Results from a Theis (1935) analysis indicate that pumping the SEI wells at 2,000 gpm for 60 days and 365 days will result in approximately 0.4 ft and 0.9 ft of drawdown, respectively, in a well one mile away from the site.

Question 3

Will this transfer impact nearby springs?

All of the Snake River depletions predicted by the Transfer Tool (327.8 AF/trimester) are to the Neely-to-Minidoka reach. Because the springs along this reach (Davis Springs and the American Falls State Fish Hatchery at Reuger Springs) are within close proximity to the SEI site, it is expected that ground water pumping at this location will result in reduced spring flows. However, a lack of data prevents a quantitative evaluation of impacts to these springs.

References

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Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground water storage. Trans American Geophysical Union Part 2, 16:519–524.

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APPENDIX A
IDWR THEIS ANALYSIS

In an effort to assess impacts to nearby wells, Brockway Engineering utilized the Theis (1935) equation to estimate drawdown due to pumping at the SEI site. In order to use the Theis equation, the aquifer parameters transmissivity and storativity must be estimated (transmissivity is hydraulic conductivity multiplied by the aquifer thickness). It appears that a specific capacity estimation of hydraulic conductivity was employed; however, it is unclear exactly how the value was derived, as there appear to be several errors in the submitted material.

Table D1. IDWR estimate of hydraulic conductivity based on specific capacity in nearby wells.

Wada			
Input Cells			
Calculated Cells			
Parameter	Notation	Units	Value
Well Discharge	Q	gal/min	2000
Total Drawdown	st	feet	32
Time Since Pumping Began	t	minutes	120
Well Screen Length	L	feet	20
Effective Wellbore Radius	rw	inches	8
Aquifer Storage Coefficient	S	dimensionless	0.12
Aquifer Thickness	D	feet	159
Well Loss Coefficient	C	seconds ² /feet ⁵	0.24
Well Efficiency	E	percent	85
Drawdown Due to Well Loss	sw	feet	4.80
Partial Penetration Effect	sp	dimensionless	22.80
L/D ratio function of Bradbury and Rothschild	G	dimensionless	2.19
fitting coefficient	a		2.95
fitting coefficient	b		7.36
fitting coefficient	c		11.45
fitting coefficient	d		4.68
Transmissivityguess	Tguess	ft ² /day	65272.8
Transmissivitycalculated	Tcalc	ft ² /day	65272.8
Hydraulic Conductivity	K	ft/day	410.5
Error	ERR	dimensionless	0.0

Kent			
Input Cells			
Calculated Cells			
Parameter	Notation	Units	Value
Well Discharge	Q	gal/min	1600
Total Drawdown	st	feet	17
Time Since Pumping Began	t	minutes	120
Well Screen Length	L	feet	12

Effective Wellbore Radius	rw	inches	8
Aquifer Storage Coefficient	S	dimensionless	0.12
Aquifer Thickness	D	feet	55
Well Loss Coefficient	C	seconds ² /feet ⁵	0.20
Well Efficiency	E	percent	85
Drawdown Due to Well Loss	sw	feet	2.55
Partial Penetration Effect	sp	dimensionless	9.23
L/D ratio function of Bradbury and Rothschild	G	dimensionless	1.84
fitting coefficient	a		2.95
fitting coefficient	b		7.36
fitting coefficient	c		11.45
fitting coefficient	d		4.68
Transmissivityguess	Tguess	ft ² /day	51850.6
Transmissivitycalculated	Tcalc	ft ² /day	51850.6
Hydraulic Conductivity	K	ft/day	942.7
Error	ERR	dimensionless	0.0

Kent 585			
Input Cells			
Calculated Cells			
Parameter	Notation	Units	Value
Well Discharge	Q	gal/min	1500
Total Drawdown	st	feet	10
Time Since Pumping Began	t	minutes	180
Well Screen Length	L	feet	30
Effective Wellbore Radius	rw	inches	8
Aquifer Storage Coefficient	S	dimensionless	0.12
Aquifer Thickness	D	feet	89
Well Loss Coefficient	C	seconds ² /feet ⁵	0.13
Well Efficiency	E	percent	85
Drawdown Due to Well Loss	sw	feet	1.50
Partial Penetration Effect	sp	dimensionless	6.50
L/D ratio function of Bradbury and Rothschild	G	dimensionless	1.59
fitting coefficient	a		2.95
fitting coefficient	b		7.36
fitting coefficient	c		11.45
fitting coefficient	d		4.68
Transmissivityguess	Tguess	ft ² /day	69807.9
Transmissivitycalculated	Tcalc	ft ² /day	69807.9
Hydraulic Conductivity	K	ft/day	784.4
Error	ERR	dimensionless	0.0

Lamb Weston #24			
Input Cells			
Calculated Cells			
Parameter	Notation	Units	Value
Well Discharge	Q	gal/min	3000
Total Drawdown	st	feet	10
Time Since Pumping Began	t	minutes	480
Well Screen Length	L	feet	20
Effective Wellbore Radius	rw	inches	8
Aquifer Storage Coefficient	S	dimensionless	0.12
Aquifer Thickness	D	feet	20
Well Loss Coefficient	C	seconds ² /feet ⁵	0.03
Well Efficiency	E	percent	85
Drawdown Due to Well Loss	sw	feet	1.50
Partial Penetration Effect	sp	dimensionless	0.00
L/D ratio function of Bradbury and Rothschild	G	dimensionless	2.36
fitting coefficient	a		2.95
fitting coefficient	b		7.36
fitting coefficient	c		11.45
fitting coefficient	d		4.68
Transmissivityguess	Tguess	ft ² /day	74986.9
Transmissivitycalculated	Tcalc	ft ² /day	74986.9
Hydraulic Conductivity	K	ft/day	3749.3
Error	ERR	dimensionless	0.0

Lamb Weston #25			
Input Cells			
Calculated Cells			
Parameter	Notation	Units	Value
Well Discharge	Q	gal/min	2736
Total Drawdown	st	feet	2
Time Since Pumping Began	t	minutes	240
Well Screen Length	L	feet	97
Effective Wellbore Radius	rw	inches	9
Aquifer Storage Coefficient	S	dimensionless	0.12
Aquifer Thickness	D	feet	89
Well Loss Coefficient	C	seconds ² /feet ⁵	0.01
Well Efficiency	E	percent	85
Drawdown Due to Well Loss	sw	feet	0.30
Partial Penetration Effect	sp	dimensionless	-0.19
L/D ratio function of Bradbury and Rothschild	G	dimensionless	2.47
fitting coefficient	a		2.95
fitting coefficient	b		7.36
fitting coefficient	c		11.45

fitting coefficient	d		4.68
Transmissivityguess	Tguess	ft ² /day	347460.5
Transmissivitycalculated	Tcalc	ft ² /day	347460.5
Hydraulic Conductivity	K	ft/day	3904.1
Error	ERR	dimensionless	0.0

Average estimated Transmissivity 121,875.8 ft²/day

Taking the average of the specific capacity-transmissivity estimates, IDWR employed a transmissivity value of 121,876 ft²/day for transmissivity in the Theis analysis.

The Brockway estimate of storativity appears to be based on reference values for ESPA basalt, and IDWR has no reason to disagree with the presented estimate of 0.12.

Below is presented the IDWR Theis analysis of impacts due to pumping the SEI wells. The projected drawdown at a point one mile away from SEI, due to pumping 2000 gpm continuously for 60 days and 365 days, are 0.5 ft and 1.01 ft, respectively (Table D2, Figure D1).

Table D2. Estimated drawdown vs. time for wells located 0.5 ft, 5,280 ft, and 26,400 ft from the SEI site.

Time-drawdown calculations using Theis equation						
Aquifer parameters			Radius (ft)	0.5	5280	10032
T S B	121,876 0.12	ft ² /da	Time	Drawdown (ft)	Drawdown (ft)	Drawdown (ft)
			(days)			
Pumping rate Q	385,000	ft ³ /da	1	4.03	0.00	-
			3	4.30	0.01	0.00
			5	4.43	0.03	0.00
			7	4.52	0.06	0.00
			10	4.61	0.10	0.01
			14	4.69	0.14	0.02
			18	4.76	0.18	0.03
			23	4.82	0.23	0.05
			27	4.86	0.26	0.06
			31	4.89	0.29	0.08
			60	5.06	0.43	0.17
			365	5.51	0.86	0.55

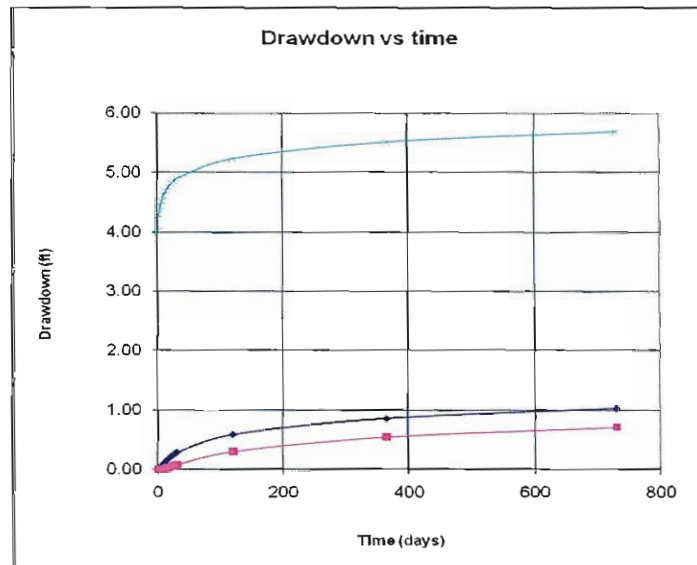


Figure D1. Estimated drawdown vs. time for wells located 0.5 ft, 5,280 ft, and 26,400 ft from the SEI site.

Table D3. Estimated drawdown vs. radial distance from SEI pumping wells for 30, 60, and 365 days of continuous pumping at 2,000 gpm.

Distance-drawdown calculations using Theis equation						
Aquifer parameters			Time (days)	30	60	365
T S B Pumping rate Q	121,876	ft ² /da	Radius	Drawdown	Drawdown	Drawdown
			(ft)	(ft)	(ft)	(ft)
			1	4.535	4.709	5.163
			2	4.187	4.361	4.815
	385,000	ft ³ /da	4	3.838	4.013	4.466
			8	3.490	3.664	4.118
			16	3.141	3.316	3.769
			32	2.793	2.967	3.421
			64	2.444	2.619	3.072
			128	2.096	2.270	2.724
			256	1.747	1.922	2.375
			512	1.399	1.573	2.027
			1024	1.053	1.226	1.679
			5280	0.280	0.428	0.859

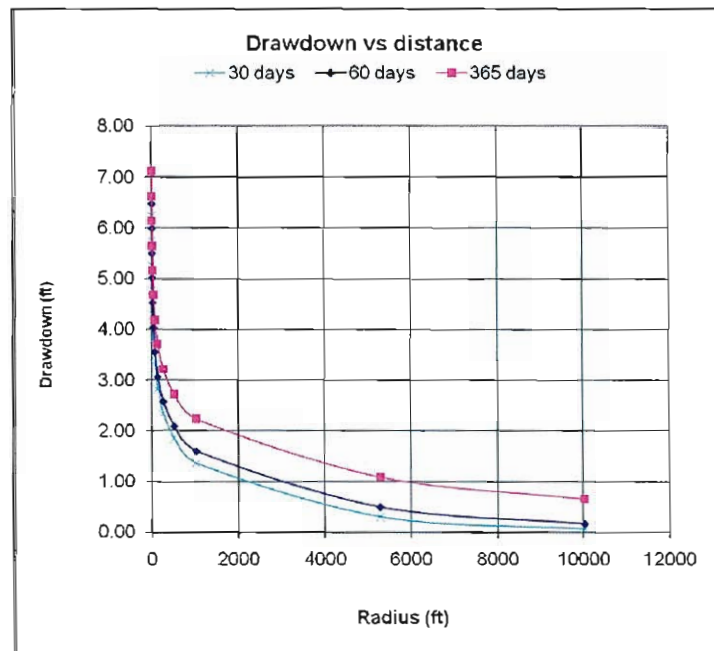


Figure D2. Estimated drawdown vs. radial distance from SEI pumping wells for 30, 60, and 365 days of continuous pumping at 2,000 gpm.

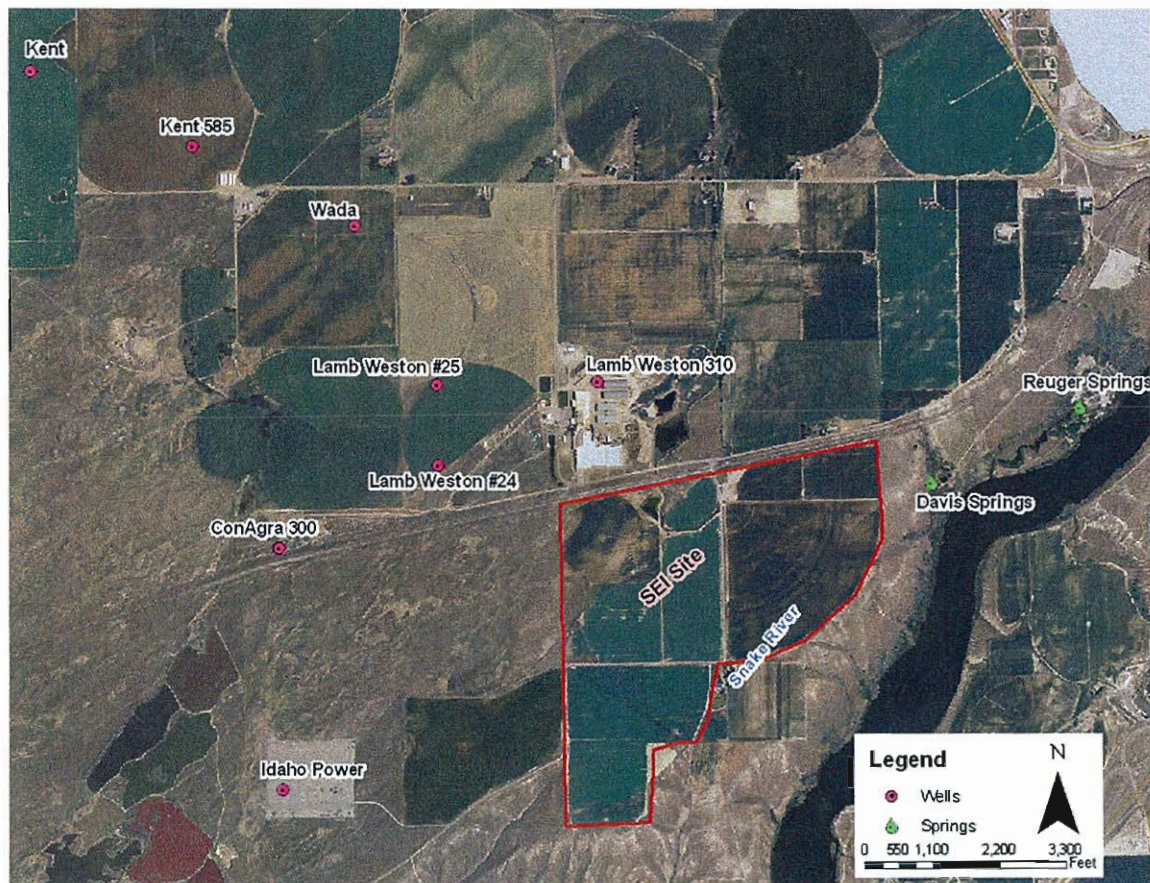


Figure D3. Location map for well driller's reports.

Form 1/78

RECEIVED

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

USE TYPEWRITER OR BALLPOINT PEN

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
Eastern District Office 785-6670

JUL 26 1991

1. WELL OWNER
Name ALBERT WADA
Address BLACK FOOT ID 83221
131 N OAK
Owner's Permit No. 35-91-E-023-000
35-8927

7. WATER LEVEL
Static water level 58' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 54° F. Quality Good

2. NATURE OF WORK
☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

8. WELL TEST DATA
☒ Pump ☐ Bailor ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
<u>2,000</u>	<u>90'</u>	<u>2</u>

3. PROPOSED USE
☐ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

9. LITHOLOGIC LOG 89044

Hole Diam.	Depth		Material	Water	
	From	To		Yes	No
20"	0	8'	SANDY SOIL		
20"	3'	18'	BROWN CLAY		
18"	18'	45'	CLAY & SAND		
18"	45'	55'	BLACK LAVA & CINDERS		
			BROWN		
18"	55'	76'	BROWN CLAY		
	76'	94'	BLUE SAND		
	94'	135'	BLUE CLAY		
	135'	146'	BROWN CLAY		
	146'	234'	BLUE CLAY		
	234'	258'	CLAY SAND		
	258'	263'	BLUE CLAY		
	263'	273'	CLAY & SAND		
	273'	348'	CLAY LAVA		
	348'	363'	RED CINDERS & GRAVEL		
	363'	400'	BLACK FRACTURED LAVA		
	400'	415'	GRAY SOLID LAVA		

4. METHOD DRILLED
☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION
Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____
Thickness 18" inches Diameter 1 inches From 263' feet To 263' feet
250 inches 16" inches 243' feet 343' feet
250 inches 14" inches 315' feet 363' 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 1/2 inches by 3 inches
Number 320 perforations From 343' feet To 363' feet
perforations _____ feet
perforations _____ feet
Well screen installed? ☐ Yes ☒ No
Manufacturer's name N/A
Type N/A Model No. _____
Diameter N/A Slot size N/A 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
☒ Fuddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth ☐ Welded ☐ Solvent
Method of joining casing: ☐ Threaded ☐ Weld
☐ Cemented by _____
Describe access port 2" PIPE

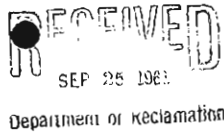
6. LOCATION OF WELL
Sketch map location must agree with written location.
Subdivision Name _____
Lot No. _____ Block No. _____
County POWER
N.E. 1/4 N.E. 1/4 Sec. 34 T. 7 S. N.E. 1/4 E. 1/4

10. DRILLERS CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name HOLLANDER WELL DRILLING Firm No. 383
ABERDEEN, IDAHO 83210
Address PO BOX 7 Date 06/05/91
407 E CUSTER
Signed by (Firm Official) Russell Hollander
and
(Operator) Russell Hollander

11. DRILLERS CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name HOLLANDER WELL DRILLING Firm No. 383
ABERDEEN, IDAHO 83210
Address PO BOX 7 Date 06/05/91
407 E CUSTER
Signed by (Firm Official) Russell Hollander
and
(Operator) Russell Hollander

USE ADDITIONAL SHEETS IF NECESSARY - FORWARD THE WHITE COPY TO THE DEPARTMENT

Wada #23 from the SEI submittal.



WELL LOG AND REPORT OF THE STATE RECLAMATION ENGINEER OF IDAHO

17040209

Permit No. 9-28851 Well No. _____ County Powder
 Owner Lamb, Weston Inc.
 Address American Falls, Idaho
 Driller George Vollmer
 Address American Falls, Ida
 Well location SW 1/4 SW 1/4 Sec 35, T. 7 N, R. 30 E
 Size of drilled hole 16"
 Total depth of well 220
 Give depth to standing water from the ground 74 Water temp. 54 °Fahr.
 On "Pumping Test" delivery was 3000 g.p.m. or _____ c.f.s. Drawdown was 10' feet.
 Size of pump and motor used to make test 14" 125 HP
 Length of time of test 8 hours _____ minutes.
 If flowing well, give flow _____ c.f.s. or _____ g.p.m. and of shut off pressure _____
 If flowing well, described control works _____ (TYPE AND SIZE OF VALVE, ETC.)
 Water will be used for Industry Weight of casing per lineal foot 42.05
 Thickness of casing 1/4" Casing material _____ (STEEL, CONCRETE, WOOD, ETC.)
 Diameter, length and location of casing _____ (CASING 12" IN DIAMETER OR LESS, GIVE INSIDE DIAMETER; CASING OVER 12" IN DIAMETER, GIVE OUTSIDE DIAMETER)

CASING RECORD

Diam. Casing	From Feet	To Feet	Length	Remarks—seals, grouting, etc.
16" OP	0	202		
14" OP	199	208		Cemented in rock & 16" pipe

Number and size of perforations _____ located _____ feet to _____ feet from ground
 Date of commencement of well 7-7-60 Date of completion of well 8-13-60

SWSE? S 35 75 30 E
(15a1) used

Lamb Weston #24 from the SEI submittal.

[illegible]

Lamb Weston #24 cont'd from the SEI submittal.

**WELL LOG AND REPORT OF THE
STATE RECLAMATION ENGINEER OF IDAHO**

17040209
32394?

Permit No. 28851 Well No. _____ County _____ Power _____

Owner Lamb, Weston, Inc.

Address American Falls, Idaho

Driller George Vollmer

Address Amy Falls, Idaho

Well location NW 1/4 Sec. 35, T. 7 N., R. 30 E.

Size of drilled hole 18" OD

001623

Locate well in section

NW 1/4	NE 1/4
SW 1/4	SE 1/4

Total depth of well 321

Give depth to standing water from the ground 74.5 Water temp. 54° Fahr.

On "Pumping Test" delivery was 2736 g.p.m. or _____ c.f.s. Drawdown was 2 feet.

Size of pump and motor used to make test 12" 225 H.P.

Length of time of test 4 hours _____ minutes.

If flowing well, give flow _____ c.f.s. or _____ g.p.m. and of shut off pressure _____

If flowing well, described control works _____ (TYPE AND SIZE OF VALVE, ETC.)

Water will be used for Industry Weight of casing per lineal foot 59.03

Thickness of casing 3.12 Casing material Steel (STEEL, CONCRETE, WOOD, ETC.)

Diameter, length and location of casing 18" (CASING 18" IN DIAMETER OR LESS, GIVE INSIDE DIAMETER; CASING OVER 18" IN DIAMETER, GIVE OUTSIDE DIAMETER)

CASING RECORD

Diam. Casing	From Feet	To Feet	Length	Remarks—seals, grouting, etc.
18"	0	220	220	
16"	209	224	15'	Cemented into rock & 18" pipe

Number and size of perforations _____ located _____ feet to _____ feet from ground

Date of commencement of well 6-22-61 Date of completion of well 8-14-61

SW SE? S. 35 T. 7 N. R. 30 E (1522) well

Lamb Weston #25 from the SEI submittal.

WELL LOG

From Foot	To Foot	Type of Material	Water Sampled Flowmeter Depth, Type and No.	Casing Description Depth, Type and No.
0	10	Sand		
10	40	Clay (Gray)		
40	50	Sandy Clay (Tan)		
50	56	Clay (Gray)		
56	65	Sand	Yes	
65	75	Clay (Gray)		
75	220	Sandy Clay (Gray)		
220	230	Gravel (Hard)		
230	236	Gravel (Cinders)	Yes	
236	282	Gravel (Hard)	Yes	
282	286	Gravel (Cinders)	Yes	
286	321	Gravel Cinders (Main Flow)	Yes	

If more space is required use Sheet No. 2

WELL DRILLER'S STATEMENT

This well was drilled under my supervision and the above information is true and correct to the best of my knowledge and belief.

Signed: Margaret Valenzuela

By: _____

Date: _____, 19____

License No. 97

Lamb Weston #25 cont'd from the SEI submittal.

Form 238-7
9/82
OCT 18 1988

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

USE TYPEWRITER OR
BALLPOINT PEN

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. IDENTIFY DRILLER Name <u>Lamb Weston</u> P.O. Box 489 Address <u>American Falls, ID 83211</u> Owner's Permit No. <u>35-8669</u> Drill permit # <u>35-88-E-031</u>		7. WATER LEVEL Static water level <u>76</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed-in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature <u>54</u> °F. Quality _____ Describe strata or temperature zones below.																																																																																									
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)		8. WELL TEST DATA ☐ Pump ☐ Bailor ☐ Air ☐ Other _____ <table border="1"><thead><tr><th>Discharge G.P.M.</th><th>Pumping Level</th><th>Hours Pumped</th></tr></thead><tbody><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td></tr></tbody></table>		Discharge G.P.M.	Pumping Level	Hours Pumped																																																																																					
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3. PROPOSED USE ☐ Domestic ☐ Irrigation ☐ Test ☐ Municipal ☒ Industrial ☐ Stock ☐ Waste Disposal or Injection ☐ Other _____ (specify type)		9. LITHOLOGIC LOG <table border="1"><thead><tr><th rowspan="2">Bore Diam.</th><th colspan="2">Depth</th><th rowspan="2">Material</th><th colspan="2">Water</th></tr><tr><th>From</th><th>To</th><th>Yes</th><th>No</th></tr></thead><tbody><tr><td>12"</td><td>0</td><td>18</td><td>sand</td><td></td><td>x</td></tr><tr><td>10"</td><td>18</td><td>58</td><td>yellow clay</td><td></td><td>x</td></tr><tr><td>10"</td><td>58</td><td>87</td><td>sand</td><td></td><td>x</td></tr><tr><td>10"</td><td>87</td><td>96</td><td>sand & a trace of gravel</td><td>x</td><td></td></tr><tr><td>10"</td><td>96</td><td>97</td><td>gray clay</td><td></td><td>x</td></tr><tr><td>10"</td><td>97</td><td>102</td><td>black sand</td><td></td><td>x</td></tr><tr><td>10"</td><td>102</td><td>216</td><td>black sandy clay</td><td></td><td>x</td></tr><tr><td>10"</td><td>216</td><td>222</td><td>black lava</td><td></td><td>x</td></tr><tr><td>10"</td><td>222</td><td>226</td><td>black cinders</td><td>x</td><td></td></tr><tr><td>10"</td><td>226</td><td>243</td><td>hard black lava</td><td></td><td>x</td></tr><tr><td>10"</td><td>243</td><td>258</td><td>red lava</td><td></td><td>x</td></tr><tr><td>10"</td><td>258</td><td>294</td><td>black lava</td><td></td><td>x</td></tr><tr><td>10"</td><td>294</td><td>310</td><td>red & black cinders</td><td>x</td><td></td></tr></tbody></table>		Bore Diam.	Depth		Material	Water		From	To	Yes	No	12"	0	18	sand		x	10"	18	58	yellow clay		x	10"	58	87	sand		x	10"	87	96	sand & a trace of gravel	x		10"	96	97	gray clay		x	10"	97	102	black sand		x	10"	102	216	black sandy clay		x	10"	216	222	black lava		x	10"	222	226	black cinders	x		10"	226	243	hard black lava		x	10"	243	258	red lava		x	10"	258	294	black lava		x	10"	294	310	red & black cinders	x	
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5. WELL CONSTRUCTION Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____ <table border="1"><thead><tr><th>Thickness</th><th>Diameter</th><th>From</th><th>To</th></tr></thead><tbody><tr><td><u>.250</u> inches</td><td><u>10</u> inches</td><td><u>1</u> feet</td><td><u>217</u> feet</td></tr><tr><td>_____ inches</td><td>_____ inches</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ inches</td><td>_____ inches</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ inches</td><td>_____ inches</td><td>_____ feet</td><td>_____ feet</td></tr></tbody></table> 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 <table border="1"><thead><tr><th>Number</th><th>From</th><th>To</th></tr></thead><tbody><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr><tr><td>_____ perforations</td><td>_____ feet</td><td>_____ feet</td></tr></tbody></table> 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 <u>25</u> 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 <u>well cap</u>				Thickness	Diameter	From	To	<u>.250</u> inches	<u>10</u> inches	<u>1</u> feet	<u>217</u> feet	_____ inches	_____ inches	_____ feet	_____ feet	_____ inches	_____ inches	_____ feet	_____ feet	_____ inches	_____ inches	_____ feet	_____ feet	Number	From	To	_____ perforations	_____ feet	_____ feet	_____ perforations	_____ feet	_____ feet	_____ perforations	_____ feet	_____ feet																																																								
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6. LOCATION OF WELL Sketch map location <u>must</u> agree with written location. <table border="1"><tr><td>N</td><td></td><td></td><td></td></tr><tr><td>W</td><td></td><td>X</td><td>E</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>S</td><td></td><td></td><td></td></tr></table> County <u>Power</u> Subdivision Name _____ Lot No. _____ Block No. _____ NW ¼ SE ¼ Sec. <u>35</u> , T. <u>7</u> NYS, R. <u>30</u> E/WX		N				W		X	E					S				10. Work started <u>6-27-88</u> finished <u>7-16-88</u>																																																																									
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11. DRILLERS CERTIFICATION I/We certify that all minimum well construction standards were complied with at the time the rig was removed. Firm Name <u>Dan's Pump & Service</u> Firm No. <u>339</u> P.O. Box 190 Address <u>American Falls, ID</u> Date <u>7-26-88</u> 83211 Signed by (Firm Official) <u>[Signature]</u> and (Operator) <u>[Signature]</u>																																																																																											

USE ADDITIONAL SHEETS IF NECESSARY – FORWARD THE WHITE COPY TO THE DEPARTMENT

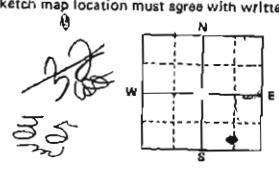
Lamb Weston 310

USE TYPEWRITER
BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

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 <u>Idaho Power Co. (Boise)</u> Address <u>Boise, Idaho</u> Owner's Permit No. <u>17040209</u>		7. WATER LEVEL Static water level <u>120</u> feet below land surface Flowing? ☐ Yes ☒ No G.P.M. flow _____ Temperature <u>54</u> ° F. Quality _____ Artesian closed-in pressure _____ p.s.i. Controlled by ☐ Valve ☐ Cap ☐ Plug																																																																																																											
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Idaho Power.

FORWARD WHITE COPY TO WATER RESOURCES

Form 228-7
11/07 JGE

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. WELL TAG NO. D 0043894

DRILLING PERMIT NO. D0043894

Other IDWR No. _____

2. OWNER:

Name: CONAGRA FOODS MW-17D

Address: P.O. BOX 489

City: AMERICAN FALLS

State: ID Zip: 83211

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

Map showing Township 8 North, Range 30 East, Section 3. The well location is marked in the NW 1/4 of the NE 1/4 of the section. The map is labeled with Township 8 North, Range 30 East, Section 3, and the well location is marked in the NW 1/4 of the NE 1/4 of the section.

Address of Well Site: N/A

City: AMERICAN FALLS

County: 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:

Material	From	To	Amount	Method
BENTONITE	268	272	50 LBS.	OVERBORE
CEMENT	68	268	70-SACKS	OVERBORE
BENTONITE	5	68	48-SACKS	OVERBORE

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

Was drive shoe seal tested? ☐ Y ☒ N How?

8. CASING/LINER:

Diameter	From	To	Group	Material	Casing	Liner	Welded	Threaded
2	+3	295	SCH 40	PVC	☒	☐	☐	☒

Length of Headpipe

Length of Tailpipe

9. PERFORATIONS/SCREENS:

☐ Perforations ☒ Screens

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
275	295	.010		2	PVC	☒	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

130 ft. below ground Artesian pressure _____ lb.
Depth flow encountered 150 ft. Describe access point or control device: LOCKING WELL CAP

11. WELL TESTS:

Yield gpm/min.	Drawdown	Pumping Level	Time
30		250	1-HOUR

Water Temp. 52

Bottom hole temp. 52

Water Quality test or comments: NOT TESTED

Depth first Water Encounter

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Depth	From	To	Remarks: Lithology, Water Quality & Temperature	Water
6	0	2	SAND	
2	2	9	DRY CLAY	
9	9	12	BROKEN BASALT	
12	12	22	FIRM BASALT	
22	22	40	BROKEN BASALT, CINDERS & SOME CLAY	
40	40	100	BASALT & SOME CINDERS	
100	100	110	BROWN CINDERS	
110	110	127	SAND	
127	127	135	BROWN CLAY	
135	135	140	CINDERS	
140	140	150	BROWN SANDY CLAY	
150	150	161	SAND & SOME GRAVEL	
161	161	231	BROWN CLAY	
231	231	265	SAND	
265	265	275	BROWN CLAY	
275	275	287	PEA GRAVEL	X
287	287	295	BROWN SANDSTONE	X
295	295	300	BROWN CLAY	

SEALING PROCEDURES

SAND 20/40 272-295 15-SACKS

RECEIVED

DEC 05 2006

Department of Water Resources

Boise, Idaho

Completed Depth 300 (Measurable)

Date Started 6/12/2006

Completed 6/16/2006

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: JACK CUSHMAN DRILLING, INC. Firm No. 94

Firm Official: Bob Cushman Date: 6/16/2006

and: Monte Staples Date: 6/16/2006

Driller or Operator: (Sign once if Firm Official & Operator)

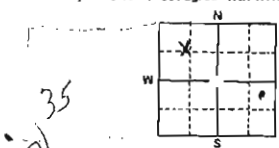
Con Agra.

USE TYPEWRITER OR
BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER 17040209 Name <u>Gilbert Kent</u> Address <u>645 Banock America Falls, Idaho</u> Owner's Permit No. <u>35-7162</u>	7. WATER LEVEL Static water level <u>172</u> 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																																																																																																																			
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe method of abandoning) _____	8. WELL TEST DATA ☒ Pump ☐ Bailer ☐ Other Discharge G.P.M. <u>1600</u> Draw Down <u>17'</u> Hours Pumped <u>2</u>																																																																																																																			
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USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

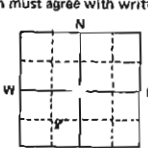
Kent Well.

USE TYPEWRITER OR
BALL POINT PEN

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer
within 30 days after completion or abandonment of the well.

1. WELL OWNER 17040209 Name <u>Gilbert Kent</u> 83211 Address <u>645 Bannock, American Falls</u> <u>Idaho</u> Owner's Permit No. _____	7. WATER LEVEL Static water level <u>158</u> 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																																																																																																																																																										
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe method of abandoning) _____	8. WELL TEST DATA ☒ Pump ☐ Bailer ☐ Other _____ Discharge G.P.M. _____ Draw Down _____ Hours Pumped _____ <u>Pump</u> <u>1500</u> <u>10'</u> <u>3 hrs</u>																																																																																																																																																										
3. PROPOSED USE ☐ Domestic ☒ Irrigation ☐ Test ☐ Municipal ☐ Industrial ☐ Stock	9. LITHOLOGIC LOG 32801 <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Hole Diam.</th> <th colspan="2">Depth</th> <th rowspan="2">Material</th> <th colspan="2">Water</th> </tr> <tr> <th>From</th> <th>To</th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr><td>80</td><td>0</td><td>4</td><td>Sand</td><td></td><td></td></tr> <tr><td>20</td><td>4</td><td>30</td><td>Sandy Clay</td><td></td><td></td></tr> <tr><td>20</td><td>30</td><td>105</td><td>Gray Lava Very Hard</td><td></td><td></td></tr> <tr><td>20</td><td>105</td><td>110</td><td>Broken Lava Hard</td><td></td><td></td></tr> <tr><td>20</td><td>110</td><td>130</td><td>Gray Lava Hard</td><td></td><td></td></tr> <tr><td>20</td><td>130</td><td>135</td><td>Broken Lava + Gravel</td><td></td><td></td></tr> <tr><td>20</td><td>135</td><td>142</td><td>" " " " Gravel</td><td></td><td></td></tr> <tr><td>20</td><td>142</td><td>155</td><td>Hard Gray Lava</td><td></td><td></td></tr> <tr><td>20</td><td>155</td><td>160</td><td>Broken Lava Gravel</td><td></td><td></td></tr> <tr><td>20</td><td>160</td><td>165</td><td>Gray Lava Hard Solid</td><td></td><td></td></tr> <tr><td>20</td><td>165</td><td>170</td><td>Broken Lava Gravel</td><td></td><td></td></tr> <tr><td>20</td><td>170</td><td>180</td><td>Sandy Clay + Gravel</td><td></td><td></td></tr> <tr><td>16</td><td>180</td><td>201</td><td>Sandy Clay Light yellow</td><td></td><td></td></tr> <tr><td>16</td><td>201</td><td>210</td><td>Blue Sandy Clay</td><td></td><td></td></tr> <tr><td>16</td><td>210</td><td>248</td><td>Gray Sand Heavy</td><td></td><td></td></tr> <tr><td>16</td><td>248</td><td>295</td><td>Blue Clay</td><td></td><td></td></tr> <tr><td>16</td><td>295</td><td>340</td><td>Yellow Sand Heavy</td><td></td><td></td></tr> <tr><td>16</td><td>340</td><td>360</td><td>Sand + Gravel Heavy</td><td></td><td></td></tr> <tr><td>16</td><td>360</td><td>374</td><td>Gravel + Sand</td><td></td><td></td></tr> <tr><td>14</td><td>374</td><td>470</td><td>Brown Heavy Sand</td><td></td><td></td></tr> <tr><td>14</td><td>470</td><td>495</td><td>Brown Clay Sandy</td><td></td><td></td></tr> <tr><td>14</td><td>495</td><td>565</td><td>Clay Brown Sticky</td><td></td><td></td></tr> <tr><td>14</td><td>565</td><td>573</td><td>Lava Rock Black</td><td></td><td></td></tr> <tr><td>14</td><td>573</td><td>585</td><td>Lava Cinders</td><td></td><td></td></tr> </tbody> </table>	Hole Diam.	Depth		Material	Water		From	To	Yes	No	80	0	4	Sand			20	4	30	Sandy Clay			20	30	105	Gray Lava Very Hard			20	105	110	Broken Lava Hard			20	110	130	Gray Lava Hard			20	130	135	Broken Lava + Gravel			20	135	142	" " " " Gravel			20	142	155	Hard Gray Lava			20	155	160	Broken Lava Gravel			20	160	165	Gray Lava Hard Solid			20	165	170	Broken Lava Gravel			20	170	180	Sandy Clay + Gravel			16	180	201	Sandy Clay Light yellow			16	201	210	Blue Sandy Clay			16	210	248	Gray Sand Heavy			16	248	295	Blue Clay			16	295	340	Yellow Sand Heavy			16	340	360	Sand + Gravel Heavy			16	360	374	Gravel + Sand			14	374	470	Brown Heavy Sand			14	470	495	Brown Clay Sandy			14	495	565	Clay Brown Sticky			14	565	573	Lava Rock Black			14	573	585	Lava Cinders		
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4. METHOD DRILLED ☒ Cable ☐ Rotary ☐ Dug ☐ Other _____	5. WELL CONSTRUCTION Diameter of hole <u>16</u> inches Total depth <u>585</u> feet Casing schedule: ☒ Steel ☐ Concrete Thickness Diameter From To <u>250</u> inches <u>20</u> inches <u>1</u> feet <u>30</u> feet <u>250</u> inches <u>16</u> inches <u>1</u> feet <u>374</u> feet <u>250</u> inches <u>14</u> inches <u>340</u> feet <u>570</u> 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 <u>1 1/2</u> inches by <u>1 1/2</u> inches Number From To <u>840</u> perforations <u>365</u> feet <u>375</u> feet <u>270</u> perforations <u>158</u> feet <u>167</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? ☒ Yes ☐ No To what depth <u>30</u> feet Material used in seal ☐ Cement grout ☒ Puddling clay																																																																																																																																																										
6. LOCATION OF WELL Sketch map location must agree with written location.  County <u>Power</u> <u>SE 1/4 Sec. 27</u> T. <u>7</u> S. R. <u>30</u> E. 20N	10. Work started <u>May 20 1971</u> finished <u>Jan 26 1972</u> 11. DRILLER'S CERTIFICATION (1517) This well was drilled under my supervision and this report is true to the best of my knowledge. <u>Paul Vollmer & Son</u> 67 Driller's or Firm's Name Number <u>American Falls Idaho Box 176</u> 83210 Address <u>Paul Vollmer & Son</u> Jan 28, 1972 Signed By Date																																																																																																																																																										

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Kent 585 Well.