Response to SPF’s Memorandum Entitled “Response to IDWR Staff Memo Regarding the Sufficiency of Water Supply For Water Right Applications and Transfers Along the I-84 Corridor,” November 15, 2012

Prepared for—

Idaho Power Company

Prepared by—

David B. Shaw and Norman C. Young

ERO Resources Corporation
3314 Grace Street
Boise, Idaho 83713
(208) 373-7983

January 31, 2013
This report is submitted on behalf of Idaho Power Company (IPCo) to further assist the Idaho Department of Water Resources (IDWR) and its hearing officer in reviewing the six applications for permit to appropriate ground water and two applications for transfer under consideration in the consolidated hearing (IDWR, January 24, 2012). SPF Water Engineering, LLC (SPF) submitted a memorandum (SPF, November 15, 2012) responding to the Idaho Department of Water Resources staff Memorandum (IDWR, May 31, 2012) on behalf of Mayfield Townsite LLC (Application for Permit No. 63-32499), Nevid LLC (Applications for Permit Nos. 61-12095 and 61-12096) and Mayfield Townsite/ARK Properties (Application for Permit No. 63-33344). The opinions and conclusions in SPF’s memorandum relate to the three general questions used as the outline in this report.

The size, nature and arid location of the proposed projects provide added incentive to seek sound technical data and exercise appropriate technical methodology to insure that the estimate used to determine the adequacy of the water supply for the proposed projects is within the amount actually available and sustainable from the source of supply. Investors in the projects, purchasers of lots and homes, families that move into the new communities and those that presently rely upon the limited water resources in the area will be at risk if the estimate overstates the actual water supply. After the lots are sold, the houses, shops and other facilities are built and families have moved into the new community is not an acceptable time for determining that the estimate of water availability was too optimistic.

**QUESTION NO. 1. Should IDWR’s estimate of the volume of ground water available for appropriation in the consolidated hearing study area be increased?**

SPF suggests a number of reasons for either increasing IDWR’s estimate of the volume of ground water available for appropriation or for at least considering IDWR’s estimate as conservatively low. ERO responds to SPF’s suggested reasons as follows:

a. Does upwelling geothermal water add to the supply?

SPF requests that IDWR’s estimate of the average rate of annual recharge to the consolidated hearing study area be increased by 550 afa to include upwelling geothermal water (Page 2, Item No. 1 and Pages 7 and 8, Items No. 16 and 17).

Response: The basis for this request is a suggestion in a recent report (Welhan, February 2012, Page 2) that elevated temperatures in some wells may be caused by mixing of geothermal water originating outside of the consolidated hearing study area. An earlier study (IDWR, September 1976) found that elevated ground-water temperatures in southern Idaho, including wells in the study and comparison areas, are attributable to the upward movement of heat without always having an associated upwelling of heated ground water from sources of deep circulation.
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Welhan references the IDWR report, but concludes that water temperatures observed in shallow wells in the consolidated hearing study area are too high to exist without circulating water (Welhan, February 2012, Page 19). However, the 21-25°F range in temperature increase observed in shallow wells in the area is equal to 12-14°C rather than 38-45°C (final paragraph, Page 19, Welhan, February 2012). A 14°C temperature increase in a 600 feet deep well requires a temperature gradient of 76°C/km. This revised temperature gradient, though high, is consistent with that listed for some wells in and near the consolidated hearing study area in IDWR’s earlier report (IDWR, 1976, for example see Pages 90 to 94).

If some or all of the elevated temperature is attributable to regional heat flow through conductivity and not entirely from mixing of upwelling geothermal water, the estimate of the percentage of geothermal water will be lower than Welhan suggested. Given the uncertainty regarding the volume, if any, of upwelling geothermal water, IDWR’s recharge estimate is appropriately conservative in not including this factor.

b. Should the estimate of ground water supply be increased if DCMI uses are not fully consumptive?

SPF requests that IDWR’s estimate of the average rate of annual recharge to the consolidated hearing study area be increased by 180 af/a because not all water diverted for “DCMI” purposes is consumptively used and some of the irrigation assumed by IDWR is on land without water rights (Page 2, Item No. 2 and Page 8, Item No. 18).

Response: IDWR’s estimate of water availability should not be increased in reliance upon unconsumed water returning to the aquifer. The timely return to the regional aquifer in the consolidated hearing study area of water diverted but not consumed is not assured because of layers of fine sediment and other low permeability materials overlaying the regional aquifer. Such layers impede the downward movement of water and can encourage lateral movement potentially making the water unavailable for rediversion by wells in the consolidated hearing study area.

The documents posted by IDWR for this matter include drillers’ reports for some wells constructed in and near the area proposed for development (Item 9, Other EAC Logs). Attached are additional drillers’ reports downloaded from IDWR’s electronic record of drillers’ reports for other wells in this area that IDWR did not included in the posted information for this matter. Most of these reports show that wells in the area penetrate a significant thickness of clay and other fine-grained materials above the water-producing zone developed by the well. Typically, the post-construction static water level is reported to be significantly above the level water was first encountered in the well. This confirms that the low permeability materials above the producing zone cover a significant area. Water percolating downward from the surface would have to overcome the hydraulic pressure of the producing zone to re-enter the regional aquifer, but the drillers’ reports do not identify the extensive depth of saturated materials needed. Such conditions, described in some but not all drillers’ reports in the consolidated hearing study area,
indicate that hydrogeology of the consolidated hearing study area is complex and water once diverted may not have a direct path back to the aquifer. For this reason, water diverted from the regional aquifer should not be considered to be available for further diversion and use without information to accurately estimate the amount, timing and location of unconsumed water reaching the regional aquifer.

Further, IDWR’s estimate should not be adjusted because some of the estimated water use occurred on land without valid water rights. Conversely, IDWR’s estimate does not include water use on acres authorized to use water under valid existing rights that were not irrigated in 2011. IDWR assumed that long-term annual withdrawals of ground water can be accurately estimated from the use of water observed in the consolidated hearing study area in a single year instead of conservatively recognizing that diversion and use of ground water can occur under all valid water rights. This concept is particularly applicable to the consolidated hearing study area because rights found to be valid in the SRBA are unlikely to have been lost by abandonment or forfeiture in the relatively short time since the partial decrees were issued. In addition, holders of existing rights are motivated to use water to protect their water rights, at least in part, because of the demand created by the projects under consideration in the consolidated hearing. Accordingly, the full volume authorized by existing rights should be recognized when determining whether un-appropriated water is available for new uses.

Assuming all valid rights are fully used and that unconsumed water is not available for re-diversion from the aquifer, the volume of water available for appropriation for new uses is only 3,000 afa if the consolidated hearing study area is indeed a water source separated from the Cinder Cone Butte Critical Ground Water Area (CGWA) comparison area as implied by the separate estimates of water supplies for the two areas in IDWR’s staff report (May 31, 2012). However, because information is not available to confirm that the areas are separate, the water supply is over-appropriated by 23,000 afa by existing and permitted uses (ERO, November 14, 2012, Table D).

c. Is the volume of evapotranspiration accurately estimated?

SPF expresses concern that, because the rate of evapotranspiration is the most uncertain parameter in the water budget, an overestimate of this parameter could result in a substantial underestimate of aquifer recharge (Page 2, Item No. 3). SPF does not suggest a more credible estimate for this parameter.

Response: IDWR used the best available data for estimating evapotranspiration in preparing its estimate. It is just as likely that the volume of evapotranspiration is too small, and hence the volume of aquifer recharge is too large in IDWR’s estimate.

In the event that there is precipitation that exceeds evapotranspiration at times, reliable information is not available to estimate how much actually reaches the regional aquifer for use within the consolidated hearing study area. Precipitation in excess of evapotranspiration is retained in the soil profile to support vegetative growth during the
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growing season when precipitation is limited. This is particularly true for the generally southwest facing slopes of the recharge area that are likely to warm earlier than either Arrowrock or Anderson Ranch weather stations and are thus better able to use the early season moisture to exhibit higher evapotranspiration than at either weather station. All precipitation in excess of that needed for on-going evapotranspiration and to fill the root zone may not accrue as recharge to the regional aquifer because significant layers of sediment, previously discussed in this report, can prevent water from reaching the regional aquifer at a location to allow diversion and use within the consolidated hearing study area.

d. Will failure to develop existing permits free up water for the pending applications?

SPF asserts that the net annual recharge is larger than IDWR’s estimate if existing permits are not developed, but does not provide an estimate of the additional volume that will become available if the permits are not fully developed (Page 2, Item No. 5 and Page 9, Item No. 20).

Response: ERO identified only four active permits in the consolidated hearing study area (Table E, Page 37 and 38, ERO November 14, 2012). IDWR has now issued licenses confirming development of essentially the permitted amount for two of the permits (63-12447 Ark Properties/Mayfield Townsite and 63-12494 Danskin Properties). The remaining two permits (61-12090 Nevid and 63-32225 Intermountain Sewer) are associated with developments under consideration in the consolidated hearing. These permits, having priorities earlier in time than the pending applications for the same projects, can be expected to be fully developed before or in conjunction with developing the applications (if the applications are approved). There is no basis for concluding that the existing permits will not be fully developed to justify an increase in IDWR’s estimate of net annual recharge.

e. Is recharge greater than estimated in certain parts of the non-recharge area?

SPF suggests that portions of the “non-recharge area” may have greater infiltration rates than recognized in IDWR’s recharge estimate (Page 7, Item 15). SPF does not provide an estimate of the land area involved or the increase in volume of recharge water that should be considered.

Response: IDWR describes the separation between the recharge and non-recharge areas as the 3,600-foot land surface contour representing the transition between the foothills and the plateau (IDWR, May 31, 2012, Page 5) and uses this as a boundary between areas of significant recharge potential and areas of limited recharge potential. This arbitrary separation of the recharge area from the non-recharge area makes it as likely that infiltration rates are over estimated as under estimated.
SPF observes that the beds of streams entering the non-recharge area can have high seepage rates. However, an increase in the estimate of recharge from precipitation falling directly on the non-recharge area is not justified because the portion of the area occupied by stream channels is insignificant compared to the entire non-recharge area. Percolation in stream channels in the non-recharge area of flow originating upstream in the area delineated as the recharge area is already included in the estimate of recharge for that area.

ERO reiterates its contention that the total volume of recharge in the non-recharge area should not be considered as water available for the developments under consideration in the consolidated hearing because most of the area is down gradient from the proposed development. All of the recharge is available only if the draw down resulting from ground water withdrawal for the developments is so severe as to reverse the gradient of the aquifer.

QUESTION NO. 2. Do ground water levels in the consolidated hearing study area behave differently than in the CGWA comparison area?

SPF points to ground water levels in the consolidated hearing study area that are more stable than those in the CGWA as a basis for asserting that ground water is available for the proposed projects and suggests the following as reasons why IDWR should give weight to this phenomenon to justify approval of the pending applications:

a. Are results from recent, more extensive data collection efforts adequate to show that water levels are stable?

SPF notes that the more extensive collection of hydrologic data in the area for recent years indicates “relatively stable groundwater levels” (Page 6, Items 9 and 10).

Response: An abundance of data related to recent conditions during a period of above average precipitation does not substitute for a long-term record.

b. Are ground water level decline problems only associated with a limited area, remote from the proposed development area?

SPF noted that the area of greatest ground water level declines is limited to the southern portion of the CGWA and that the affects of “approximately four decades” of pumping in the CGWA have not propagated into the portion of the consolidated hearing study area in which appropriations are sought (Pages 5 and 6, Item No. 8 and Page 11, Item No. 26).

Response: Existing ground water withdrawals in the CGWA are concentrated in the area noted by SPF, and as would be expected, ground water declines are also greater in this area. However, information and studies are available showing the spread of declines beyond the immediate area of pumping into the consolidated hearing study area. This information suggests that the rate of decline resulting from existing uses in the CGWA is
increasing and that if ground water withdrawals are increased as proposed in the applications under consideration in the consolidated hearing, the rate of decline of ground water levels and the consequent impacts to the flow of Snake River will continue to increase.

IDWR’s ground water change maps (IDWR, May 31, 2012 Page 7) show that ground water declines have migrated out of the CGWA into the consolidated hearing study area. These maps show that the area exhibiting the largest decline experienced more than 90 feet of decline in the latest decade compared to about 30 feet in the previous decade. This is because, at least in part, annual ground water pump withdrawals have not been at the maximum authorized rate every year during the four decades since development began (ERO, November 14, 2012 Pages 8 and 16). Figure 9 on Page 19 of IDWR’s staff memorandum (IDWR, May 31, 2012) shows that the downward trend in ground water levels in the CGWA continues unabated decades after further development was halted.

The aquifer analysis done by ERO (ERO, November 14, 2012 Pages 18 and 19) shows ground water declines of more than 20 feet in a hypothetical observation well located north of I-84 on the boundary between IDWR’s consolidated hearing study area and CGWA comparison area resulting from 20 years of withdrawals under existing rights. Adding the affects of using ground water during the same 20-year period as proposed in the applications under consideration in the consolidated hearing more than doubles the ground water level decline at this location.

The boundaries of the CGWA and the Mountain Home Ground Water Management area were drawn based upon information available to IDWR in the early 1980s. The continuing ground water declines and the spread of the declines beyond the boundaries justify a review to expand the boundaries.

c. Can ground water declines to the extent now occurring in the CGWA be expected to occur in the area proposed for development?

SPF takes exception to IDWR’s conclusion that ground water declines similar to those observed in the CGWA will occur in the consolidated hearing study area if the applications are approved. SPF notes that estimated withdrawals in the CGWA are about triple IDWR’s estimate of recharge in the CGWA comparison area while the present withdrawals of ground water in the consolidated hearing study area are only a fraction of the estimated recharge to the consolidated hearing study area (Page 3, Item No. 8 and Page 12, Item No. 29). SPF calculated that the annual volume that will be depleted from the aquifer if the proposed projects are all fully developed is an additional 14,200 afa. This amount is double the average recharge estimate for the consolidated hearing study area aquifers (Pages 2 and 3, Item No. 6 and Pages 10 and 11, Item Nos. 23, 24 and 25).

Response: SPF’s estimate of water required for the proposed uses is lower than the volumes authorized under the vested rights being transferred and its own volume estimates in reports filed on behalf of the applicants concerning the adequacy of the water
supply for the requested projects. Table A, Page 31, of ERO's first report submitted in this matter indicates that a total of about 19,000 afa is sought by the applications pending in the consolidated hearing (ERO, November 14, 2012). In any case, IDWR is not authorized to issue permits for a quantity of water exceeding the average rate of future natural recharge whether exceeded by “only” twice the amount as asserted by SPF or the 10-fold amount found by IDWR (§42-237ag, Idaho Code).

d. Do IDWR’s water level decline maps accurately define the extent of ground water declines in the consolidated hearing study area from pumping in the CGWA?

SPF suggested that the ground water declines “extending west and southwest (i.e., outside) of the CGWA in the consolidated cases study area” are “software interpolations unsupported by actual ground water-level data” (Page 5, Item No. 4). SPF also questioned whether the observed ground water level declines in the southwestern portion of the CGWA are associated with all of the aquifer zones encountered within the open interval of the wells or with only individual aquifer zones (Page 5, Item No. 5).

Response: Relative to IDWR’s estimate of ground water declines in the area west and southwest of the CGWA, ground water level data are not available from this area to support or refute the results of IDWR’s water level analysis. The program used by IDWR to estimate the location of the contour lines is supportable unless ground water level decline data or technical information is available to show that faults or changes in aquifer properties skew the results.

SPF does not elaborate on how the open aquifer interval issue has significance relative to ground water levels and the ground water supply available in the area. The well SPF references as having an open interval of over 1000 feet is apparently misidentified. Without information to document that some of the aquifer zones encountered have separate water sources, this matter will not alter IDWR’s finding that water supplies in the CGWA comparison area are over appropriated by existing water rights.

e. Are ground water level changes in the consolidated hearing study area caused by regional or local conditions?

SPF notes that water levels have risen about 10 feet since 1993 in well 02S4E-09DDD2 (Page 5, Item No. 7). SPF further notes “It is unclear whether this rise reflects regional or local conditions.”

Response: IDWR’s hydrographs for other wells in the CGWA nearest to well 02S4E-09DDD2 exhibit declines in water level throughout the period of record indicating that the anomalous increase noted for well 02S4E-09DDD2 is related to “local” conditions such as pumping of a nearby well (note the greater yearly fluctuation in water level observed in IDWR’s hydrograph for this well since the early 1980s).
QUESTION NO. 3. How will development and use of ground water as proposed in the applications affect flows in Snake River?

SPF found that the depletion of flows to the Snake River will not exceed 9.8 cfs (i.e. IDWR’s estimate of average annual natural recharge to the consolidated hearing study area although SPF argues for a higher estimate), that this depletion is insignificant in comparison to flows in this reach of Snake River and will not be realized for decades in the future (Page 3, Item No. 7 and Page 12, Item No. 28).

Response: SPF’s estimate understates the likely amount of the depletion of Snake River flows. More importantly, comparing the amount of this depletion in flow to the normal flow in the reach or even to the established minimum flows has little if any relevance to IDWR’s responsibility to prevent injury to senior priority water rights, including minimum stream flows, and to reallocate trust water. Said another way, an actual depletion of any amount, even if not measurable, reduces water availability to senior priority water rights whenever flows are not adequate to satisfy all rights calling for water. The following factors should be considered when evaluating whether and under what conditions further depletions to Snake River flows can be allowed:

a. A year-round reduction in flow of 9.8 cfs (the reduction will likely be higher as discussed below) resulting from development of the projects as proposed in the pending applications is a significant share of the 600 cfs of trust water and of the 150 cfs increment of trust water reserved for DCMI purposes. When the Swan Falls Agreement was signed in 1984, these flow rates were expected to be available year-round to support future development in southern Idaho. Decisions on the pending applications must incorporate the criteria set out in Idaho law for appropriating water and for reallocating trust water.

b. The affects of pumping will reach outside of the consolidated hearing study area to tap ground water supplies not included in the estimate (ERO November 14, 2012, Page 19) thereby ultimately further reducing inflow to Snake River. If the projects as applied for are approved and developed from ground water, SPF’s estimated depletion of 14,200 afa will ultimately reduce the average rate of flow in Snake River by 19.6 cfs (SPF, November 15, 2012, Page 11, Item No. 25).

c. Flow in the Snake River could be drawn into the aquifer if pumping levels fall below the level of the river. A substantial lowering of ground water levels will be required to induce flow from Snake River into the regional aquifer, but a municipality pressed for adequate water supplies may find that chasing ground water even to these levels is the most feasible way of obtaining water to sustain the community.

d. Larger diversion rates could be sought from Snake River as an alternate source to save the communities created as a result of approval of all or some of the pending applications if ground water supplies are not adequate to complete or sustain the projects. The diversion rate sought from Snake River would likely approximate the
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diversion rates applied for in the applications (including those for irrigation) totaling nearly 85 cfs (ERO November 14, 2012, Table A). Other projects (such as those evidenced by withdrawn, rejected and voided applications and lapsed permits, most of which are associated with the individuals and entities that are applicants for the pending applications in the consolidated hearing) can be expected to join in a project to bring water into the area using a Snake River diversion. Potential projects already identified by inactive filings total another 57 cfs (ERO November 14, 2012 Table B) and additional projects could be identified if a pipeline from Snake River is seriously pursued.

Applications filed subsequent to those included in the consolidated hearing are another indication of continuing interest in diverting water for use in the consolidated study area. IDWR’s electronic record lists two such applications: Application for Permit No. 61-12271 seeking 1.25 cfs for domestic and fire protection (voided October 1, 2012) and Application for Permit No. 61-12275 seeking 6 cfs to irrigate 320 acres.

e. IDWR is obligated to fully protect the portion of IPCo’s water rights not subordinated in the Swan Falls Agreement and the matching minimum stream flow rights held by the IWRB. At this time, nearly three decades after the Agreement, it is beginning to be realized that the minimum stream flow at Murphy Gage may constrain water diversions even for presently existing uses. Thus, the postulated increment of 600 cfs of “firm” trust water estimated at the time of the Agreement may never have been available, may have been reduced by changed conditions, such as droughts and conservation practices, in the Snake River watershed that have reduced base flows in the reach, and/or has been substantially depleted by the additional diversion and use of water developed since the Agreement (in part through permits issued for use of trust water).

ERO’s analysis of Snake River flow (ERO November 14, 2012, Pages 22 to 26) shows that the average daily winter flow of 5600 cfs at Murphy Gage required by the agreement will not be met by 2025 if the rate of decline noted since 1981 continues. Similarly, if the rate of decline continues, the 3900 cfs summertime flow at Murphy Gage required by the agreement will not be met by average daily flow during low flow periods of the year by 2025 or sooner. The affect on water availability represented by the continuing decline in base flows must be considered as IDWR evaluates applications for new consumptive uses that will have the effect of further reducing these flows during the upcoming decades.

f. While routine violations of the minimum stream flows at Murphy Gaging Station are in the near future, short-term violations during critical flow periods are already a concern. The preliminary order issued creating Water District No. 2 in the Milner to Murphy reach of Snake River found that “Snake River flows measured at Murphy Gaging Station have diminished over time and, in recent years, have approached the minimums established as part of the Swan Falls Agreement” (IDWR, May 1, 2012,
Page 1, Finding 2). Responding to exceptions to the preliminary order, IDWR determined that although a water distribution crisis has not yet occurred in the Milner to Murphy reach of Snake River, the “potential for significant water administration is real” (IDWR, July 10, 2012). New consumptive uses depleting flows in this reach, including the projects under consideration in the consolidated hearing, will hasten administration by priority in Water District No. 2 causing curtailment of diversions under existing senior priority water rights that otherwise would have had water available.

g. Permits and licenses issued by IDWR to use trust water are subject to a term condition such as: “This right is for the use of trust water and is subject to review 20 years after issuance of the permit to determine availability of water and to re-evaluate the public interest.” Some permits and the license subsequently issued have reached or are approaching the time for such review. IDWR has notified holders of such rights that reviews will be initiated.

A list prepared by IDWR dated March 28, 2011 identifies 680 permits and licenses that have been issued with a term condition (IDWR Staff Memorandum, March 28, 2011 accessed in IDWR’s electronic file for Permit No. 35-8359). The total diversion rate authorized under these permit and licenses is more than 1100 cfs. Of these, 486 have an irrigation component, totaling more than 800 cfs. About 90 percent of these filings have priority dates earlier than July 28, 2006, the earliest date of filing for the applications in the consolidated hearing. The continued availability of water will be a vital consideration as IDWR conducts the term review of these rights. Under the appropriation doctrine during times of scarcity, trust water flows are available for use by senior priority rights, including those subject to term review, in preference to junior priority rights.

In addition to the permits and licenses already issued for trust water, IDWR’s water right records list over 850 pending applications seeking, in total, nearly 2500 cfs of trust water (IDWR electronic data base query). About 90 percent of these filings were made prior to July 28, 2006, the earliest date of filing for the applications in the consolidated hearing. To the extent that these filings and the pending applications in the consolidated hearing seek trust water and/or water sources interconnected with trust water, the additional water depletion if any or all of these earlier applications are ultimately approved must be considered in determining water availability for the applications pending in the consolidated hearing.
LIST OF REFERENCES

ERO, November 14, 2012. Water Supply Evaluation for Proposed Projects Along the I-84 Corridor. David B. Shaw and Norman C. Young, ERO Resources Corp.


IDWR, May 1, 2012. Preliminary Order in the Matter of the Creation of Water District No. 2, Snake River from Milner Dam to the Murphy Gage Below Swan Falls Dam. Jeff Peppersack, Hearing Officer, Idaho Department of Water Resources.


IDWR, July 10, 2012. Final Order in the Matter of the Creation of Water District No. 2, Snake River from Milner Dam to the Murphy Gage Below Swan Falls Dam. Gary Spackman, Interim Director, Idaho Department of Water Resources.

SPF, November 15, 2012. Response to IDWR Staff Memo regarding the sufficiency of water supply for water right applications and transfers along the I-84 corridor. Christian R. Petrich, Ph.D., P.E., P.G., SPF Water Engineering LLC.

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT
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1. WELL TAG NO. D 0019724
DRILLING PERMIT NO. ____________
Other IDWR No. ____________

2. OWNER:
Name: Kenneth W. Lange
Address: 15888 E. Monroe Ave. - HC 34
City: Boise, State ID Zip 83716

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

4. USE:
\( \square \) Domestic
\( \square \) Municipal
\( \square \) Irrigation
\( \square \) Thermal
\( \square \) Injection

5. TYPE OF WORK check all that apply
(Replacement etc.)
\( \square \) New Well
\( \square \) Modify
\( \square \) Abandonment
\( \square \) Other

6. DRILL METHOD
\( \square \) Air Rotary
\( \square \) X Cable
\( \square \) Mud Rotary
\( \square \) Other.

7. SEALING PROCEDURES

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<th>SEALER/PACK</th>
<th>FROM</th>
<th>TO</th>
<th>AMOUNT</th>
<th>METHOD</th>
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<td>168.6</td>
<td>550 lb</td>
<td>Open hole maintained with slurry - over bore with slip / pack</td>
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Was drive shoe used? \( \square \)
Was drive shoe seal tested? \( \square \)
Was drive shoe depth (\( \square \)) 168.6

8. CASING/LINER:

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<tr>
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<td>203.0</td>
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Length of Headpipe 71.18 ft
Length of Tailpipe 0.97 ft

9. PERFORATIONS/SCREENS

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10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
\( \_ _ _ _ \) ft below ground
Artesian pressure __ lb.
Depth flow encountered __ ft. Describe access port or control devices. __

11. WELL TESTS:

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Water Temp: Excellent
Water Quality test or comments: __

12. LITHOLOGIC LOG:
(Describe repairs or abandonment)

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<th>From</th>
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<td>386</td>
<td>386</td>
<td>Basalt, Medium Hard, Grey</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>401</td>
<td>424</td>
<td>Granitic Sand and Clay, Red Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>424</td>
<td>523</td>
<td>Sandy Silts &amp; Silty Sands, Brown-Tan</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>523</td>
<td>526</td>
<td>Clay, Gravelly &amp; Sandy, Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>526</td>
<td>532</td>
<td>Sand, Clayey, Brown</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>532</td>
<td>534</td>
<td>Clay, Gravelly, Grey</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>534</td>
<td>537</td>
<td>Clay, Gravelly, Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>537</td>
<td>547</td>
<td>Sand, Clayey, Brown</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>547</td>
<td>562.5</td>
<td>Sandy Silts &amp; Silty Sands, Brown</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>562.5</td>
<td>588</td>
<td>Basalt, Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>588</td>
<td>597</td>
<td>Cinders, Sand, then Clay, Brown</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>597</td>
<td>609</td>
<td>Clay, Gravelly, Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>609</td>
<td>619</td>
<td>Sand, Coarse, Poorly Sorted</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>619</td>
<td>619.5</td>
<td>Clay, Brown</td>
<td>N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RECEIVED
OCT 1, 2002
WATER RESOURCES
WESTERN REGION

RECEIVED
OCT 1, 2002
Department of Water Resources

Completed Depth: 619.5 ft (Measureable)
Date: Started March 11, 2002 Completed Sept. 3, 2002

13. DRILLER'S CERTIFICATION:
We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name: Artesian Co.
Artesian Co. 318

Driller's Certification
Hugh Harden Date 10/8/02
Department of Water Resources

Office Use Only
Inspected by
Twp Rge. Sec.
1/4 1/4 1/4
Lat Long

Hugh Harden Date October 8, 2002
1. DRILLING PERMIT NO. 61 - 94 - W - 0027 - 000
Other IDWR No.

2. OWNER:
Name LEONARD BISEMAN
Address 802 East Pennsylvania Ave.
City Boise State ID Zip 83706

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

4. PROPOSED USE:
□ Domestic □ Municipal □ Monitor □ Irrigation
□ Thermal □ Injection □ Other

5. TYPE OF WORK:
□ New Well □ Modify or Repair □ Replacement □ Abandonment

6. DRILL METHOD
□ Mud Rotary □ Air Rotary □ Cable □ Other

7. SEALING PROCEDURES
SEAL/FILTER PACK AMOUNT METHOD
Felt 7/8 20 0.250 0 200ft overbore

8. CASING/LINER:
<table>
<thead>
<tr>
<th>Diameter</th>
<th>From</th>
<th>To</th>
<th>Gauge</th>
<th>Material</th>
<th>Casing</th>
<th>Liner</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.625</td>
<td>0</td>
<td>250</td>
<td>1.250</td>
<td>steel</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>6.625</td>
<td>2</td>
<td>250</td>
<td>1.250</td>
<td>steel</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5.57</td>
<td>4361</td>
<td>4362</td>
<td>1.88</td>
<td>steel</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

9. PERFORATIONS/SCREENS
□ Perforations Method
□ Screens Screen Type V-wire
From | To | Skt Size | Number | Diameter | Material |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>453</td>
<td>468</td>
<td>0.040</td>
<td>5.57</td>
<td>S.S.</td>
<td>□</td>
</tr>
<tr>
<td>436</td>
<td>431</td>
<td>0.030</td>
<td>5.57</td>
<td>S.S.</td>
<td>□</td>
</tr>
</tbody>
</table>

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
335 ft. below ground Artesian pressure lb.
Depth flow encountered ft. Describe access port or control devices:

11. WELL TESTS:
□ Pump □ Bailer □ Air □ Flowing Artesian

12. LITHOLOGIC LOG: (Describe repairs or abandonment)
Water
<table>
<thead>
<tr>
<th>Depth Diag</th>
<th>From</th>
<th>To</th>
<th>Remarks: Lithology, Water Quality &amp; Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>0</td>
<td>2</td>
<td>Topsoil</td>
</tr>
<tr>
<td>2'</td>
<td>11</td>
<td>11</td>
<td>Brown Clay</td>
</tr>
<tr>
<td>11'</td>
<td>18</td>
<td>11</td>
<td>Sand &amp; Gravel</td>
</tr>
<tr>
<td>18'</td>
<td>21</td>
<td>11</td>
<td>Brown Clay</td>
</tr>
<tr>
<td>21'</td>
<td>43</td>
<td>11</td>
<td>Sand &amp; Gravel</td>
</tr>
<tr>
<td>43'</td>
<td>65</td>
<td>11</td>
<td>Clay w/Sand</td>
</tr>
<tr>
<td>65'</td>
<td>80</td>
<td>11</td>
<td>Coarse Sand</td>
</tr>
<tr>
<td>80'</td>
<td>84</td>
<td>11</td>
<td>Sandy clay</td>
</tr>
<tr>
<td>84'</td>
<td>108</td>
<td>11</td>
<td>Sand w/gravel</td>
</tr>
<tr>
<td>108'</td>
<td>140</td>
<td>11</td>
<td>Sandy clay</td>
</tr>
<tr>
<td>140'</td>
<td>150</td>
<td>11</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>150'</td>
<td>155</td>
<td>11</td>
<td>Sandy clay</td>
</tr>
<tr>
<td>155'</td>
<td>161</td>
<td>11</td>
<td>Coarse sand w/clay</td>
</tr>
<tr>
<td>161'</td>
<td>190</td>
<td>11</td>
<td>Cemented sand &amp; gravel</td>
</tr>
<tr>
<td>190'</td>
<td>203</td>
<td>11</td>
<td>Clay w/sand &amp; gravel</td>
</tr>
<tr>
<td>203'</td>
<td>228</td>
<td>11</td>
<td>Coarse Sand</td>
</tr>
<tr>
<td>228'</td>
<td>240</td>
<td>11</td>
<td>Coarse Sand</td>
</tr>
<tr>
<td>240'</td>
<td>330</td>
<td>11</td>
<td>Sandstone</td>
</tr>
<tr>
<td>330'</td>
<td>340</td>
<td>11</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>340'</td>
<td>356</td>
<td>11</td>
<td>Brown clay</td>
</tr>
<tr>
<td>356'</td>
<td>365</td>
<td>11</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>365'</td>
<td>375</td>
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<td>386</td>
<td>11</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>386'</td>
<td>409</td>
<td>11</td>
<td>Clay w/sand &amp; seams</td>
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<tr>
<td>409'</td>
<td>415</td>
<td>11</td>
<td>Brown clay</td>
</tr>
<tr>
<td>415'</td>
<td>428</td>
<td>11</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>428'</td>
<td>430</td>
<td>11</td>
<td>Brown clay</td>
</tr>
<tr>
<td>430'</td>
<td>439</td>
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<tr>
<td>439'</td>
<td>441</td>
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<td>Brown clay</td>
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<td>441'</td>
<td>458</td>
<td>11</td>
<td>Sand &amp; Gravel</td>
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<tr>
<td>458'</td>
<td>467</td>
<td>11</td>
<td>Brown clay</td>
</tr>
</tbody>
</table>

13. DRILLER'S CERTIFICATION
We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Riddleston & Son, Inc. Firm No. 35
Firm Official (Sign once if Firm Official & Operator)
Date 7/19/94
Supervisor or Operator (Sign once if Firm Official & Operator)
Date

FORWARD WHITE COPY TO WATER RESOURCES
1. WELL TAG NO. D 0052631
   Drilling Permit No. 903350-650338
   Water right or injection well # 63-33036

2. OWNER
   Name: Pacific West Land, LLC
   Test Well #1
   Address: Bainbridge Island
   WA 98110

3. WELL LOCATION:
   Twp. 8
   Sec. 8
   NW 1/4 SW 1/4 NE 1/4
   10 acres 40 acres 160 acres
   City: Bainbridge Island
   State: WA
   Zip: 98110
   Gov't Lot: North or South
   Rge. 4 East or West
   Lot: N/A
   Block: Ada
   Lat.: N43° 21.23' (Deg. and Decimal minutes)
   Long.: W116° 0.243' (Deg. and Decimal minutes)
   Address of Well Site: 2.3 mi. S of 184 on S Orchard Access Rd. &
   200 ft. E. of Orchard
   Water right: State water right
   Water right owner: State
   Water right issue date: 3/21/2008
   Water right issue number: 0052631
   4. USE:
      Domestic
      Municipal
      Irrigation
      Other
      Piezometer Nest
      Other
      Well Design by Hydro Logic, Inc.

5. TYPE OF WORK:
   New Well
   Replacement Well
   Modify existing well
   Abandonment
   Other
   Permit:

6. DRILL METHOD:
   Air Rotary
   Mud Rotary
   Cable
   Other
   AR 110' to 310'

7. SEALING PROCEDURES:
   Seal material: 3/4' Baroid
   Pins: 0' 19' 11.9 ft.
   Quantity (lbs or ft): Poured
   Placement method: Poured

8. CASING/LINER:
   Diameter (nominal):
   16' 0' 19' 0.250 Steel
   12' 0' 110' 0.375 Steel
   10' 0' 295' 0.250 Steel
   Was drive shoe used? Yes
   Shoe Depth(s):

9. PERFORATIONS/SCREENS:
   Perforations:
   Y
   N Method
   Manufactured screen:
   Y
   N Type 2' PVC Sch80 Slotted
   Diameter (nominal):
   From (ft) To (ft)
   Slot size
   Number of
   Diameter (nominal):
   From (ft) To (ft)
   Slot size
   Number of

10. FILTER PACK:
    Filter Material:
    From (ft) To (ft)
    Quantity (lbs or ft)
    Placement method
    See Table Pg. 2

11. FLOWING ARTESIAN:
    Flowing Artesian? Yes
    Description of device:
    Linked Steel Enclosure

12. STATIC WATER LEVEL and WELL TESTS:
    Depth first water encountered (ft): 516
    Static water level (ft): See Pg. 2
    Water temp. (°F): See Pg. 2
    Bottom hole temp. (°F): 78.59
    Describe access point:
    3 - 2' Tube Wells inside Locked Well Head
    Well test method:

13. LITHOLOGIC LOG and/or replacement or abandonment:
    Water Quality test or comments:
    See Table Pg. 2

14. DRILLER'S CERTIFICATION
    Date: Started 3/21/2008
    Completed 3/21/2008
    *Principal Driller
    *Operator I
    *Operator II

*Signature of Principal Driller and rig operator are required.
## WELL TAG NO. D 0052631

Drilling Permit No. 905350-850338
Water right or injection well # 63-33036

## 2. OWNER

Name: Pacific West Land, LLC
Test Well #1

Address: 911 Hildebrand Lane NE #203
City: Bainbridge Island
State: WA
Zip: 98110

## 3. WELL LOCATION:

<table>
<thead>
<tr>
<th>Twp.</th>
<th>North or South</th>
<th>Sec.</th>
<th>Lat.</th>
<th>Long.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>North</td>
<td>8</td>
<td>N 43°21.27&quot;</td>
<td>W 116°0.24&quot;</td>
</tr>
</tbody>
</table>

Gov't Lot

Lat. ___________ Sec. ___________ Lot ___________

| Adjacent To ___________ County ___________ |

Alt. ___________

Method of Installation

- Lowered & Tagged into Place

## 4. USE:

- Domestic
- Municipal
- Monitor
- Irrigation
- Thermal
- Injection
- Other: Piezometer Nest

## 5. TYPE OF WORK:

- New Well
- Replacement well
- Modify existing well
- Abandonment
- Other: Well Design by Hydro Logic, Inc.

## 6. DRILL METHOD:

- Air Rotary
- Mud Rotary
- Cable
- Other: AR 110' to 310'

## 7. SEALING PROCEDURES:

- Seal material
  - 3/4" Baroid Chips
    - 0' 19' 11.9 ft. Poured

## 8. CASING/LINER:

- Diameter (nominal)
  - 2" +2" 632
  - 2" +2" 732
  - 2" +2" 575

- Slotted
  - Schedule/Threaded/Welded
  - PVC

- Was driven shoe used?
  - Y

- Shoe Depth(s)
  - 2.3 mi. S of 184 on S Orchard Access Rd. & 200 ft. E. of Orchard

## 9. PERFORATIONS/Screens:

- Perforations
  - Y

- Manufactured screen
  - Y

- Type PVC Sch80 Slotted

- Method of Installation
  - Lowered & Tagged into Place

## 10. FILTER PACK:

- Filter Material
  - "Birdseed" #8-#16

- From (ft) To (ft) Slotted
  - 632 1052
  - 732 822
  - 575 645

- Length of Tailpipe
  - None

## 11. FLOWING ARTESIAN:

- Flowing Artesian?
  - Y

- Artesian Pressure (PSIG)
  - See Table

- Describe control device
  - Locked Steel Enclosure

## 12. STATIC WATER LEVEL and WELL TESTS:

- Depth first water encountered (ft): 516
- Static water level (ft): See Below

- Water temp. (°F): See Below
- Bottom hole temp. (°F): 78.59°F

- Describe access port
  - 3 - 2" Tube Wells inside Locked Well Head

### WELL TEST:

<table>
<thead>
<tr>
<th>Drawdown (days)</th>
<th>Discharge or yield (gpm)</th>
<th>Test duration (minutes)</th>
<th>Pump</th>
<th>Bailer</th>
<th>Air Flowing provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Pump</td>
<td>Testing</td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Than</td>
<td>Air-Lifting</td>
<td>and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump</td>
<td>Samples</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Water Quality test or comments:** See Table Below

## 13. LITHOLOGIC LOG and/or repairs or abandonment:

<table>
<thead>
<tr>
<th>Bed</th>
<th>Dia. From</th>
<th>To</th>
<th>Remarks, lithology or description of repairs or abandonment</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>992</td>
<td>1027</td>
<td>Medium Sand with Some Blue Clay</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>1027</td>
<td>1063</td>
<td>Medium Gray Sand</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>1063</td>
<td>1087</td>
<td>Sticky Blue Clay</td>
<td>X</td>
</tr>
</tbody>
</table>

### SEALING PROCEDURES:

- 0 19 11.9 ft. 3/4" Bentonite Chips Poured
- 0 105 1.9 ft. 3/4" Bentonite Chips Poured
- 0 300 3.2 CY Cement Grout Pumped
- 3 877 8.3 ft. 30% Bentonite Grout Pumped
- 877 862 6.7 ft. Cement Grout Pumped
- 862 828 9.9 ft. 30% Bentonite Grout Pumped
- 709 689 8.2 ft. 30% Bentonite Grout Pumped
- 669 672 6.7 ft. Cement Grout Pumped
- 672 645 9.5 ft. 30% Bentonite Grout Pumped
- 532 493 9.9 ft. 30% Bentonite Grout Pumped
- 0 493 7.2 CY Cement Grout Pumped

### FILTER PACK:

- 1082 895 30% Bentonite Grout Pumped
- 828 729 30% Bentonite Grout Pumped
- 645 532 30% Bentonite Grout Pumped

### WATER LEVEL, TEMPERATURE, CHEMISTRY:

| Z-1 | 1052 | 932 | SWL=523.8; 70.0°F; pH=5.53; 275 pS |
| Z-2 | 822 | 732 | SWL=522.6; 63.0°F; pH=5.50; 259 pS |
| Z-3 | 645 | 575 | SWL=516.2; not meas.; not meas. |

### ARTESIAN PRESSURES:

| Z-1 | 371 FL or 161 psig |
| Z-2 | 156 FL or 81 psig |
| Z-3 | 16 FL or 7 psig |

Completed Depth (Measureable): 1082

Date: Started 1/7/2008
Completed 3/21/2008

## 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: Treasure Valley Drilling
Co. No.: 550

*Principal Driller* 
Date: 4/2/2008

*Driller* 
Date: 4/2/2008

*Operator II* 
Date: 

Operator I 
Date: *Signature of Principal Driller and rig operator are required.

Form provided by Forms On-A-Disk - (214) 346-9425 - www.FormsOnADisk.com
IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. DRILLING PERMIT NO. ____________
Other IDWR No. D0019379

2. OWNER:
Name JIM PHAGAN
Address 4200 PASADENA DR. #30
City BOISE State IDAHO Zip 83705

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK check all that apply (Replacement etc.)
☐ New Well ☐ Modify ☐ Abandonment ☐ Other

6. DRILL METHOD
☐ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES
☐ Seal Filter Pack ☐ Amount ☐ Method

8. Casing/Liner:
Length of Headpipe 10'8" Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type telescoping

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
481 ft. below ground Artesian Pressure ____________ lb
Depth flow encountered ______ ft. Describe access port or control devices:

11. WELL TESTS:

<table>
<thead>
<tr>
<th>Bore Dia</th>
<th>From</th>
<th>To</th>
<th>Remarks: Lithology, Water Quality &amp; Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0</td>
<td>3</td>
<td>BROWN TOPSOIL</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>14</td>
<td>BROWN SANDY CLAY</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
<td>18</td>
<td>TAN SANDY CLAY</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
<td>29</td>
<td>TAN SANDY CLAY</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
<td>57</td>
<td>BROWN CLAY, SAND &amp; SMALL GRAVEL</td>
</tr>
<tr>
<td>8</td>
<td>57</td>
<td>81</td>
<td>BLACK LAVA</td>
</tr>
<tr>
<td>8</td>
<td>81</td>
<td>212</td>
<td>TAN CLAY W/SAND</td>
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<tr>
<td>8</td>
<td>212</td>
<td>244</td>
<td>STICKY TAN CLAY</td>
</tr>
<tr>
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<td>244</td>
<td>309</td>
<td>STICKY TAN CLAY W/TRIPS BROWN SAND</td>
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<td>8</td>
<td>309</td>
<td>376</td>
<td>BROWN SAND W/SMALL TRIPS</td>
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<td>376</td>
<td>421</td>
<td>CEMENTED BROWN SAND</td>
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<tr>
<td>8</td>
<td>421</td>
<td>480</td>
<td>STRIPS BROWN SAND &amp; TAN CLAY</td>
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<tr>
<td>8</td>
<td>480</td>
<td>487</td>
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</tr>
<tr>
<td>8</td>
<td>487</td>
<td>511</td>
<td>FINE BROWN &amp; CLEAR QUARTZ SAND</td>
</tr>
<tr>
<td>6</td>
<td>511</td>
<td>539</td>
<td>STICKY TAN CLAY</td>
</tr>
<tr>
<td>6</td>
<td>539</td>
<td>541</td>
<td>VERY FINE BROWN &amp; MICA SAND</td>
</tr>
<tr>
<td>6</td>
<td>541</td>
<td>545</td>
<td>DIRTY BROWN SAND &amp; SOFT TAN CLAY</td>
</tr>
<tr>
<td>6</td>
<td>545</td>
<td>562</td>
<td>MEDIUM STICKY TAN CLAY</td>
</tr>
<tr>
<td>6</td>
<td>562</td>
<td>572</td>
<td>COARSE CLEAR QUARTZ SAND &amp; PEA GRAVEL</td>
</tr>
</tbody>
</table>

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

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

Firm Name SOS Well Drilling & Pump Co
Firm No. 212

Date: Started 11/12/01 Completed 11/17/01

Supervisor or Operator

Date: 12/5/01 Time: 12:12 PM
1. WELL OWNER
Name: Neil Helnick
Address: HC 34 Mayfield, Boise, ID 83706
Drilling Permit No.: 61-92-W-044
Water Right Permit No.: 3

2. NATURE OF WORK
- ☐ New well  ☐ Deepened  ☐ Replacement  ☐ Modification
- ☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9)

3. PROPOSED USE
- ☐ Domestic  ☐ Irrigation  ☐ Monitor
- ☐ Industrial  ☐ Stock  ☐ Waste Disposal or Injection  ☐ Other (specify type)

4. METHOD DRILLED
- ☐ Rotary  ☐ Air  ☐ Auger  ☐ Reverse rotary  ☐ Cable  ☐ Mud  ☐ Other (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION
- Casing schedule: ☐ Steel  ☐ Concrete  ☐ Other PVC
  Thickness: 2 5/8 inches   5 5/8 inches
  Diameter: 4 0 inches   4  inches
  From: 240 feet   420 feet
  To: 604 feet   604 feet

- Was casing drive shoe used? ☐ Yes  ☐ No
- Was a packer or seal used? ☐ Yes  ☐ No
- Perforated? ☐ Yes  ☐ No
- How perforated? ☐ Factory  ☐ Knife  ☐ Torch  ☐ Gun
- Size of perforation? inches by inches

- Well screen installed? ☐ Yes  ☐ No
- Manufacturer: Johnson  Type: PVC
- Top Packer or Headpipe: 240
- Bottom of Tailpipe: 510

- Diameter 4". Slot size .010" set from 410 feet to 440 feet
- Diameter 4". Slot size .020" set from 440 feet to 510 feet
- Gravel packed? ☐ Yes  ☐ No  ☐ Size of gravel placed from feet to feet
- Surface seal depth: Material used in seal: ☐ Bentonite  ☐ Puddling clay
- Sealing procedure used: ☐ Slurry pit  ☐ Overbore to seal depth
- Method of joining casing: PVC ☐ Threaded ☐ Welded
- ☐ Solvent Weld  ☐ Cemented between strata
- Describe access port: Top of 6"

6. LOCATION OF WELL
Sketch map location must agree with water location!
Subdivision Name:  DEC 03 1992
Lot No.:  Block No.:  County:  Bannock

7. WATER LEVEL
Static water level: 340 feet below land surface.
Flowing: ☐ Yes  ☐ No  ☐ G.P.M. flow
Artesian closed-in pressure: p.s.i.
Controlled by: ☐ Valve  ☐ Cap  ☐ Plug
Temperature: °F. Quality: 
Describe artesian or temperature zones below.

8. WELL TEST DATA
- Discharge G.P.M.
- Pumping Level
- Hours Pumped
- 20
- 5HR

9. LITHOLOGIC LOG
<table>
<thead>
<tr>
<th>Depth</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>8-6</td>
<td>11</td>
</tr>
<tr>
<td>40</td>
<td>105</td>
</tr>
<tr>
<td>105</td>
<td>120</td>
</tr>
<tr>
<td>120</td>
<td>143</td>
</tr>
<tr>
<td>143</td>
<td>162</td>
</tr>
<tr>
<td>162</td>
<td>190</td>
</tr>
<tr>
<td>190</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>260</td>
</tr>
<tr>
<td>260</td>
<td>268</td>
</tr>
<tr>
<td>266</td>
<td>296</td>
</tr>
<tr>
<td>296</td>
<td>305</td>
</tr>
<tr>
<td>305</td>
<td>336</td>
</tr>
<tr>
<td>336</td>
<td>375</td>
</tr>
<tr>
<td>375</td>
<td>420</td>
</tr>
<tr>
<td>420</td>
<td>510</td>
</tr>
</tbody>
</table>

10. Driller's Certification
We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name: Higleston & Son, INC
Address: Rt 3, Box 610-D
Phone: 359-2401
Date: 8-10-92

11. RECORDED
- Received: AUG 17 1992
- Department of Water Resources
- Western Region 12-28-92
1. DRILLING PERMIT NO.: 6198-00075-000

2. OWNER:
   Name: Frank Bonessa
   Address: 1979 Boscher's Drive
   City: San Jose
   State: CA Zip: 95124

3. LOCATION OF WELL by legal description:
   Sketch map location must agree with written location.

   T. 1S
   R. 3E
   Sec. 13
   NE 1/4 NE 1/4 NE 1/4

   Govt Lot 
   County

Address of Well Site: 1 MILE WEST OF ORCHARD
Access Rd: on Orchard Ranch Lane, then 1 MILE NORTH

4. PROPOSED USE:
   Domestic:  
   Municipal:  
   Monitor:  
   Irrigation:  
   Thermal:  
   Injection:  
   Other:  

5. TYPE OF WORK
   New Well:  
   Modify:  
   Replacement:  
   Abandonment:  

6. DRILL METHOD
   Mud Rotary:  
   Air Rotary:  
   Cable:  
   Other:  

7. SEALING PROCEDURES
   Seal/Filter Pack
   Amount
   Method
   Displaced
   NEAT CEMENT
   LIFT THROUGH 8" GROUT
   BENTONITE
   HAMMAGE CASING
   NEAT CEMENT GROUT 1/8" LIFT Poured

   Was drive shoe seal tested? Yes
   How? 

8. CASING/LINER:
   Diameter From To Gauge Casing Liner Shell Plastic Welded Threaded
   8.5" 6.58 139.6A L80  
   6.58 5.51 0.28  
   5.51 5.04 639.7 0.18  
   4.19 5.04 591.0 0.23  

   Final location of shoe: B'NE 52' 124.61'
   Top Packer or Headpipe: 5.64
   Bottom Tailpipe: 6.25 7.6

9. PERFORATIONS/SCREENS
   Perforations
   Method: SAWED IN PVC TAPED
   Screens
   Type: JONAS MATERIAL CONTINUOUS SLOT WIRE WOON D

   From To Slot Size Number Diameter Thickness Casting Liner
   40 500 3/32 169.6 65/8 PIPE
   500 570 45.0 0.30 3/4" 3/4" L80 (Oilfield) 
   5.04 51.0 1.78 4.5 L80 (Oilfield)

   MICROFILMED

10. WELL TESTS:

   Yield gal/min
   Drawdown
   Pumping Depth
   Time
   9.7 < 1 FT 500.8 12 HRS

   Temperature of water: 66°F
   Was a water analysis done? Yes
   No
   By whom? 
   Water Quality (odor, etc.): EXCELLENT
   Bottom Hole Temperature: 66°F

11. STATIC WATER LEVEL:
   500 ft. below surface
   Depth artesian flow found
   Artesian pressure: 10 lb. Describe access port
   BY REMOVING WELL CAP

12. LITHOLOGIC LOG:

   Remarks: Lithology, Water Quality & Temperature

   Date: Started Nov 30, 1993
   Completed Sep 3

13. DRILLER'S CERTIFICATION
   We certify that all minimum well construction standards were complied with at the time the rig was removed.
   Firm Name: ARTESIAN CO
   Firm No: 318
   Firm Official: HUGH HARDEN
   Date: Dec 1993
   Supervisor or Operator: HUGH HARDEN
   Date: Dec 1993
**RECEIVED**
IDAHO DEPARTMENT OF WATER RESOURCES
JUN 14 1999

**WELL DRILLER’S REPORT**

1. **DRILLING PERMIT NUMBER:**
   Other IDWR No.: 0 000 7483

2. **OWNER:**
   Name: **FRANK BONESSA**
   Address: ____________
   City: ____________ State: ____________ Zip: ____________

3. **LOCATION OF WELL** by legal description:
   Sketch map location must agree with written location.
   Address of Well Site: ____________________________________________
   (Give at least direction + distance to Road or Landmark)
   Lot No. ______ Block No. ______ Subd. Name: ____________________

4. **PROPOSED USE:**
   ☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
   ☐ Thermal ☐ Injection ☐ Other ______

5. **TYPE OF WORK:**
   ☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment ______

6. **DRILL METHOD:**
   ☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other ______

7. **SEALING PROCEDURES**
   Material | Seal/Filter Pack | Amount
   __________________ | __________________ | ____________
   Steel | Plastic | Welded | Threaded
   □ | □ | □ | □
   Was drive shoe seal tested? ☐ Yes ☐ No How? ____________________________

8. **CASING/LINER:**
   Diameter | From | To | Gauge | Casting | Liner | Steel | Plastic | Welded | Threaded |
   ____________________________________________ | __________________ | __________________ | __________________ | __________________ | __________________ | __________________ | __________________ | __________________ | __________________ |
   Final location of shoes: ____________
   Top Packer or Headpipe: ____________
   Bottom Tailpipe: ____________

9. **PERFORATIONS/SCREENS**
   ☐ Perforations ☐ Screens
   Method | Type | Material | Date: Started | Completed
   __________________ | __________________ | __________________ | ____________ | ____________
   From | To | Slot Size | Number | Diameter | Top/Bottom | Liner | Steel | Plastic | Welded | Threaded |
   □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □

10. **WELL TESTS:**
   ☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian
   | Yield gal/min | Drawdown | Pumping Depth | Time |
   ____________________________________________ | __________________ | __________________ | __________________ |
   Temperature of water: ____________
   Was a water analysis done? ☐ Yes ☐ No How? ____________________________
   Water Quality (odor, etc.): ____________________________
   Artesian pressure: ________ lb. Describe access port: ____________________________
   Describe Controlling Devices: ____________________________

11. **STATIC WATER LEVEL:**
   ____________ ft. below surface
   Depth artesian flow found: ____________________________
   Artesian pressure: ________ lb. Describe access port: ____________________________
   Describe Controlling Devices: ____________________________

12. **LITHOLOGIC LOG:** (Describe repairs or abandonment)
   ____________
   Date: Started | Completed
   ____________ | ____________

13. **DRILLER’S CERTIFICATION:**
   We certify that all minimum well construction standards were complied with at the time the rig was removed.
   Firm Name: **ARTESIAN CO**
   Firm No.: 318
   Firm Officer: __________________
   Supervisor or Operator: __________________
   Date: ____________
   (Sign once if Firm Officer & Operator)
**WELL DRILLER'S REPORT**

**WATER RESOURCES WESTERN REGION**

1. **DRILLING PERMIT NO.**
   - Form 238-7 µ.193 •
   - Water Resources No. D 0000-7483

2. **OWNER:**
   - Name: FRANK BONESSA
   - Address: 979 Borchers Drive
   - City: SAN JOSE
   - State: CA
   - Zip: 95124

3. **LOCATION OF WELL by legal description:**
   - Office Use Only
   - North or South
   - East or West
   - Section (40 acres)
   - Township
   - Range
   - County

   Address of Well Site:
   - (Give at least Direction + Distance to Road or Landmark)
   - Lot No. _______ Block No. _______ Subd. Name _______

4. **PROPOSED USE:**
   - Domestic
   - Thermal
   - Injection
   - Other

5. **TYPE OF WORK:**
   - New Well
   - Modify or Repair
   - Replacement
   - Abandonment

6. **DRILL METHOD:**
   - Mud Rotary
   - Air Rotary
   - Cable
   - Other

7. **SEALING PROCEDURES:**
   - SEAL/PACK
   - From To
   - Seals or Pounds
   - METHOD

   Was drive shoe seal tested? Y N How?

8. **LINER: HANGER:**
   - From To
   - Remarks: Lithology, Water Quality & Temperature

9. **PERFORATIONS/Screens:**
   - Perforations
   - Type
   - Material

10. **WELL TESTS:**
    - Yield gal./min.
    - Drawdown
    - Pumping Depth
    - Time

    Temperature of water
    - Was a water analysis done? Yes □ No □
    - Water Quality (odor, etc.)
    - Bottom Hole Temperature

11. **STATIC WATER LEVEL:**
    - ft. below surface
    - Depth artesian flow found
    - Artesian pressure
    - Describe access port
    - Describe Controlling Devices

12. **LITHOLOGIC LOG:**
    - (Describe repairs or abandonment)

13. **DRILLER'S CERTIFICATION**
    - We certify that all minimum well construction standards were complied with at the time the rig was removed.

**FORWARD WHITE COPY TO WATER RESOURCES**
**1. DRILLING PERMIT NO.**

**Other IDWR No.:** D001859

**2. OWNER:**

**Name:** Linda McFain

**Address:** 250 S. Bobwhite Ct., Ste #350

**City:** Boise

**State ID:** Zip 83706

**3. LOCATION OF WELL by legal description:**

Sketch map location must agree with written location

- Twp. 1 North □ or South X
- Rge. 4 East □ or West □
- Sec. 20 □
- SW1/4 □ NW1/4 □
- Gov't Lot □
- County Ada

**4. USE:**

- X Domestic □ Municipal □ Monitor □ Irrigation □ Thermal □ Injection □ Other

**5. TYPE OF WORK:** check all that apply (Replacement etc.)

- X New Well □ Modify □ Abandonment □ Other

**6. DRILL METHOD:**

- X Air Rotary □ Cable □ Mud Rotary □ Other

**7. SEALING PROCEDURES:**

<table>
<thead>
<tr>
<th>Seal/Filter Pack</th>
<th>Material</th>
<th>From</th>
<th>To</th>
<th>Sacks or Pounds</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bentonite</td>
<td>0</td>
<td>120</td>
<td>40 sacks</td>
<td>overbore</td>
</tr>
</tbody>
</table>

- Was drive shoe used? X Y □ N Shoe Depth(s)
- Was drive shoe seal tested? X Y □ N How? Air

**8. CASING/LINER:**

<table>
<thead>
<tr>
<th>Diameter/From To</th>
<th>Gauge/120</th>
<th>Material</th>
<th>Casing</th>
<th>Liner</th>
<th>Welded Threaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.625 +1 120</td>
<td>322</td>
<td>Steel</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.625 +2 736</td>
<td>250</td>
<td>Steel</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Length of Headpipe
- Length of Tailpipe

**9. PERFORATIONS/SCREENS:**

- X Perforations □ Method
- X Screens □ Screen Type

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Slot Size</th>
<th>Number</th>
<th>Diameter</th>
<th>Material</th>
<th>Casing</th>
<th>Liner</th>
</tr>
</thead>
</table>

**10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:**

- 505 ft. below ground
- Artesian Pressure lb
- Depth flow encountered
- Describe access port or control devices

**11. WELL TESTS:**

- Pump □ Bailet X Air □ Flowing Artesian

<table>
<thead>
<tr>
<th>Yield g/min.</th>
<th>Drawdown</th>
<th>Pumping Level</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>50+</td>
<td></td>
<td></td>
<td>1 hr</td>
</tr>
</tbody>
</table>

- Water Temp.
- Bottom hole temp.
- Water Quality test or comments:
  - Depth first Water Encountered: 610'

**12. LITHOLOGIC LOG:** (Describe repairs or abandonment)

<table>
<thead>
<tr>
<th>Water Bore From To Remarks</th>
<th>Lithology, Water Quality &amp; Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 0 2</td>
<td>Topsoil</td>
</tr>
<tr>
<td>10 2 60</td>
<td>Sand &amp; gravel</td>
</tr>
<tr>
<td>10 60 65</td>
<td>Brown clay</td>
</tr>
<tr>
<td>10 65 89</td>
<td>Sand &amp; gravel</td>
</tr>
<tr>
<td>10 89 93</td>
<td>Brown clay</td>
</tr>
<tr>
<td>10 93 120</td>
<td>Sand &amp; gravel</td>
</tr>
<tr>
<td>10 120 300</td>
<td>Gray lava</td>
</tr>
<tr>
<td>8 300 320</td>
<td>Red sandstone</td>
</tr>
<tr>
<td>8 320 340</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>8 340 400</td>
<td>Fine sand</td>
</tr>
<tr>
<td>8 400 580</td>
<td>Gray lava</td>
</tr>
<tr>
<td>6 580 610</td>
<td>Brown clay</td>
</tr>
<tr>
<td>6 610 680</td>
<td>Fine sand</td>
</tr>
<tr>
<td>6 680 684</td>
<td>Brown clay</td>
</tr>
<tr>
<td>6 684 715</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>6 715 718</td>
<td>Brown clay</td>
</tr>
<tr>
<td>6 718 730</td>
<td>Coarse sand</td>
</tr>
<tr>
<td>6 730 736</td>
<td>Brown clay</td>
</tr>
<tr>
<td>6 736 745</td>
<td>Sand, coarse</td>
</tr>
</tbody>
</table>

**13. DRILLER'S CERTIFICATION:**

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

**Firm Name:** Hiddleston & Son, Inc.

**Firm Official:**

**Firm No.:** 35

**Date:** 09/20/01

**Completed Depth:** 736' (Measurable)

**RECEIVED**

**WATER RESOURCES WESTERN REGION**

**Date:** 11/21/01

**Sign once if Firm Official & Operator**
1. DRILLING PERMIT NO. — — —
Other IDWR No. D0019537

2. OWNER:
Name Bob Wickham
Address 730 S. Prairie Grass Dr.
City Boise State ID Zip 83716

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location

4. USE:
X Domestic □ Municipal □ Monitor □ Irrigation

5. TYPE OF WORK check all that apply (Replacement etc.)
X New Well □ Modify □ Abandonment □ Other

6. DRILL METHOD
X Air Rotary □ Cable □ Mud Rotary □ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK AMOUNT METHOD

Material From To Sacks or Pounds
Bentonite 0 20 700 lbs. Overbore

Was drive shoe used? □ Y □ N
Shoe Depth(s) _______
Was drive shoe seal tested? □ Y □ N
How? _______

8. CASING/LINER:

Diameter From To Gauge Material casing Liner Welded Threaded
6.625 +1 444 .250 Steel X X X

Length of Headpipe 6'
Length of Tailpipe 3'

9. PERFORATIONS/SCREENS
□ Perforations Method
X Screens Screen Type Johnson

From To Slot Size Number Diameter Material Casing Liner
445 450 .060 5" SS X X

10. STATIC WATER LEVEL OR ARTESIAN

PRESSURE:
337 ft. below ground Artesian Pressure ___ lb
Depth flow encountered ___ ft.
Describe access port or control devices: ______

11. WELL TESTS:
X Pump □ Boiler X Air □ Flowing Artesian

Yield gal/min. Drawdown Pumping Level Time
20

Water Temp. 68

Water Quality test or comments: Depth first Water Encountered 415'

12. LITHOLOGIC LOG: (Describe repair or abandonment)

Bore from To Remarks/Lithology, Water Quality & Temp. Y N
10' 0 2 Top Soil X
10' 2 7 Cleache X
10' 7 18 Sand & Gravel X
6' 18 30 Sand & Gravel X
6' 30 34 Brown Clay X
6' 34 225 Sand & Gravel w/ Clay Seams X
6' 225 236 Brown Clay X
6' 236 250 Tan Sand Stone X
6' 260 415 Sand & Gravel w/ Clay Seams X
6' 415 428 Coarse Sand X
6' 428 441 Brown Clay X
6' 441 455 Coarse Sand X
6' 455 460 Brown Clay X

Completed Depth: 455' (Measurable)
Date: Started 1-04-02 Completed 1-11-02

13. DRILLER'S CERTIFICATION
I/we certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Hiddleston & Son, Inc. Firm No. 35
Firm Official _____________ Date 04-22-02
Supervisor or Operator _____________ Date 04-17-02
(Sign once if Firm Official & Operator)
1. WELL TAG NO. D 0060330
Drilling Permit No. 913940-862568
Water right or Injection well #

2. OWNER: Lord Ranch LLP
Name Jeff Lord
Address 1171 Mayfield Road
City Boise State ID 83716

3. WELL LOCATION:
Twp. _1 __ North
Rge. _5 __ East
Sec. _5 _ SW
Gov’t Lot ____ County Elmore

4. USE:
[ ] Domestic [ ] Municipal [ ] Monitor [ ] Injection
[ ] Other

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

Bentonite #5 0 40’ 1350 lbs Overbore Pour

8. CASING/LINER:
Diameter (nominal) From (ft) To (ft) Gauge/ Schedule Material Casing Liner Threaded Welded
6 5/8” +2’ 298’ .250 Steel

Was drive shoe used? [ ] Y [ ] N Shoe Depth(s) 298 feet

9. PERFORATIONS/SCREENS:
Perforations [ ] Y [ ] N Method
Manufactured screen [ ] Y [ ] N Type
Method of Installation

10. FILTER PACK:
Filter Material From (ft) To (ft) Quantity (lbs or ft2) Placement method

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) 300 Static water level (ft) 243
Water temp. (°F) 58 Bottom hole temp. (°F)

13. LITHOLOGIC LOG and/or repairs or abandonment:

14. DRILLER’S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Completed Depth (Measureable): 303 Feet

Date Started: 11/17/2011 Date Completed: Dec 30, 2011

Company Name Hiddleston Drilling Co. No. 35
*Signature of Principal Driller and rig operator are required.