ANALYSIS OF SEPTIC TANK DENSITY
Part of Upper Kolob Plateau and Oak Valley
Washington County, Utah

Prepared For:

Ash Creek Special Service District
11 South Main
La Verkin, Utah 84745

Prepared By:

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June 27, 2007

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Mr. Darwin Hall, Superintendent
Ash Creek Special Service District
11 South Main
La Verkin, UT 84475

RE: Analysis of Septic Tank Density
Part of Upper Kolob Plateau and Oak Valley
Ash Creek Special Service District
Washington County, Utah

Dear Mr. Hall,

Submitted herewith is the report for an analysis of septic tank density for part of the Upper Kolob Plateau and Oak Valley in Washington County, Utah. This study was initiated by the Whispering Pines development, which is located within the study area.

This study was conducted based on limited available data. The services provided on this project, as described in this report, include professional opinions and judgments based on the data collected and analyzed. We performed these services according to currently accepted water resources engineering principles and practices conducted in this area. No other warranty, expressed or implied, is made.

If you have any questions regarding this report, please contact us at (801) 523-0100.

Sincerely,
Sunrise Engineering, Inc.

Prepared by:

Dao Yang, P.E.
Project Hydrogeologist

Derek S. Anderson
Engineer in Training

Reviewed by:

Charlie Rehn, P.E.
Environmental Manager

EXECUTIVE SUMMARY

Sunrise Engineering, Inc. has completed an analysis of septic tank density at the northern part of the Upper Kolob Plateau and Oak Valley. This study indicates that the average septic tank density on buildable area within any subdivision is 1.24 acres/lot. In reviewing subdivision plans within the study area, it is recommended that the site slope be reviewed carefully. The actual average septic tank density is different for each slope zone. In the 0-19% slope zone, the average septic tank density is 1.24 acres/lot; in the 20-29% slope zone where 70% of the slope shall remain undisturbed, the actual average septic tank density is 4.14 acres/lot; and in the 30% or greater slope zone where 90% of the slope shall remain undisturbed, the actual average septic tank density is 12.4 acres/lot.

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ANALYSIS OF SEPTIC TANK DENSITY
PART OF UPPER KOLOB PLATEAU
ASH CREEK SPECIAL SERVICE DISTRICT
WASHINGTON COUNTY, UTAH

November 18, 2010

1.0 INTRODUCTION

1.1 Background

Residential development in rural areas has become a significant land use issue in many parts of the United States. Rural developments often rely on single family domestic water wells for culinary water supply and on-site wastewater treatment systems for wastewater disposal. Local county officials are in charge of regulating unsewered residential development, and regulations in some areas are driven by concerns about the impact of development on groundwater quality. On-site treatment of wastewater can release contaminants such as nitrate, bacteria, viruses and household hazardous chemicals to the subsurface, posing potential threats to groundwater and nearby wells.

The project study area is located in southwestern Utah in a rural area in the northern part of the Upper Kolob Plateau and Oak Valley. The proposed Whispering Pines Subdivision is located within the study area and lies within the Ash Creek Special Service District (ACSSD) service area. Summer homes will be constructed in the proposed subdivision if approved by the ACSSD.

County officials have used septic tank suitability studies, such as percolation tests, to determine where these systems will likely percolate within an acceptable range as set forth by the Utah Division of Water Quality (2000). However, percolation alone does not remove many constituents in wastewater, including nitrate. Ammonia from septic tank effluent under aerobic conditions can convert to nitrate, contaminating groundwater and posing potential health risks to humans. If the nitrate level in drinking water is too high, infants up to the age of six months can develop a fatal disease called blue baby syndrome (methemoglobinemia). The U.S. Environmental Protection Agency (EPA) has established the maximum contaminant level for nitrate (as nitrogen) in drinking water at 10 milligrams per liter (mg/L). To avoid potential groundwater contamination resulting from septic tanks, the ACSSD has authorized Sunrise Engineering, Inc. (Sunrise) to determine the average lot

size without violation of groundwater quality standards under the build-out condition within the study area.

1.2 Previous Studies

Pro Valley Engineering conducted 87 percolation tests in the proposed Whisper Pines Subdivision between May 28 and June 7, 2007. The test results indicate that the percolation rate is between 3 and 60 minutes/inch with an average rate of 21 minutes/inch and a standard deviation of 18 minutes/inch. These results are within the acceptable range as set forth by the Utah Division of Water Quality (2000).

1.3 Purpose and Scope

The purpose of this study is to estimate the septic tank density within the study area using the mass balance approach as was used by Hansen, Allen and Luce, Inc. (1997) for Washington County, Utah. To estimate the septic tank density, the following tasks were performed:

1. Collection of weather and drainage information for the study area
2. Delineation of the surface drainage boundaries of the study area
3. Analysis of the precipitation data from surrounding weather stations and interpolation of precipitation and recharge rate in the study area
4. Estimation of buildable area within the study area in accordance with Washington County's current Disturbance Standards (10-24-3)
5. Evaluation of groundwater conditions in the area
6. Review of available study reports
7. Estimation of aquifer parameter values
8. Evaluation of ambient background nitrate concentration
9. Estimation of septic tank density in the study area

2.0 SITE DESCRIPTION

2.1 Location and Hydrogeography

The project study area is located in northeastern Washington County of southwestern Utah (**Figure 1**) and is situated in Township 38 and 39 South, Range 10 and 11 West, Salt Lake Base and Meridian (**Figure 2**). The area can be accessed through the Kolob Reservoir Road.

As shown in **Figure 2**, the Kolob Reservoir is located in the upper part of the Kolob Creek drainage. Numerous springs are also present in the area north and east of the reservoir.

Kolob Creek originates approximately 2.5 miles north of the reservoir and continues southward downstream of the reservoir for approximately 2 miles before it turns eastward. The creek runs generally eastward for approximately 2.5 miles and then turns southward after Oak Creek joins Kolob Creek.

The study area covers the whole drainage area above the convergence of Kolob Creek with Oak Creek. The total surface drainage area is approximately 15,466 acres. The altitude of the study area ranges from approximately 6,400 to 9,400 feet with an estimated average of roughly 8,000 feet. Most of the land in the study area can be characterized as steeply sloping.

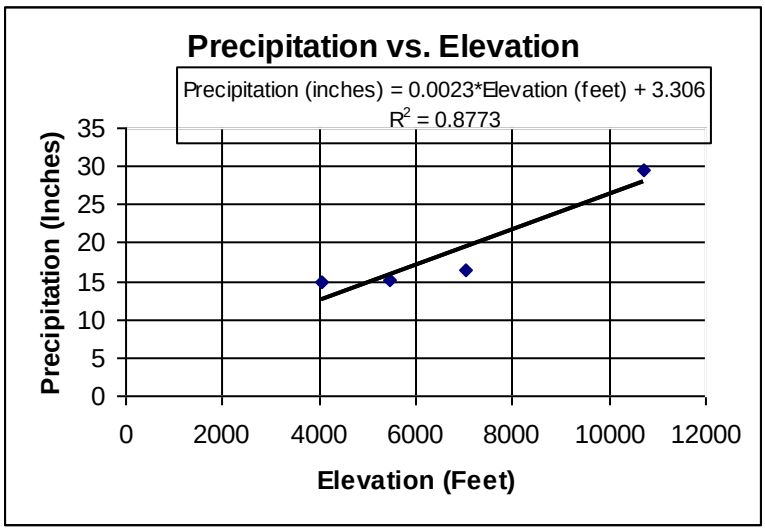
2.2 Precipitation

There is no weather station with long-term monitoring precipitation data in the study area. Annual average total precipitation data were collected from four surrounding weather stations in Utah. These stations are Zion National Park, Alton, Orderville and Blowhard Mountain Radar. Elevation data of the weather stations were also collected. These data are summarized in **Table 1**.

A regression analysis of the data indicates that precipitation correlated well with station elevations. Using the regression equation and the average elevation (8,000 feet) within the study area, the annual average total precipitation was estimated to be 21.71 inches within the study area.

Table 1. Summary of Precipitation Data

Station Name	Station Elevation (Feet)	Annual Average Total Precipitation (Inches)	Record Period
Zion National Park	4,050	14.97	1/2/1928~12/31/2005
Alton	7,040	16.40	1/1/1928~12/31/2005
Orderville	5,460	15.11	1/1/1928~12/31/2005
Blowhard Mountain Radar	10,700	29.53	8/1/1964~12/31/2005



Source: Western Regional Climate Center, wrcc@dri.edu.

2.3 Geologic Setting

As shown in **Figures 3 and 4**, the Quaternary deposits (Qaco, Qbkp, Qbkpc, Qblp, Qc, Qac, Qmt, Qmsh and Qmsy) are present throughout the majority of the study area. These deposits are relatively thin, ranging from less than 100 feet to a few hundred feet. These deposits consist primarily of basalt lava flows and cinders, and landslide deposits, capping the terraces. The Dakota Formation (Kd) of the Cretaceous age, and the Carmel Formation (Jcw, Jcp, Jcx, Jccu and Jccl), Temple Cap Formation (Jtw and Jts) and the Navajo Sandstone (Jn) of the Jurassic age are exposed and underlie the Quaternary deposits.

The Cretaceous Dakota Formation consists of inter-bedded, slope- and ledge-forming sandstone, siltstone, mudstone, claystone, carbonaceous shale, coal and marl. This formation is up to 850 feet in thickness.

The Jurassic Carmel Formation consists of the following four members:

1. Winsor Member (Jcw). This member consists of light-reddish-brown, very fine to medium-grained sandstone and siltstone and is 240 to 320 feet thick.
2. Paria River Member (Jcp). This member consists of laminated to very thin bedded, light-gray argillaceous limestone and micritic limestone and is 50 to 160 feet thick.
3. Cristal Creek Member (Jcx). This member consists of thin- to medium-bedded, reddish-brown gypsiferous siltstone, mudstone and very fine to medium-grained sandstone and is 150 to 250 feet thick.
4. Co-op Creek Limestone Member. This member consists of two units: Upper Unit (Jccu) and Lower Unit (Jccl). This member is composed of thin- to medium-bedded, light-gray micritic limestone and calcareous shale. The total thickness of this member ranges from 340 to 520 feet.

The Jurassic Temple Cap Formation consists of the following two members:

1. White Throne Member (Jtw). This member consists of thick-bedded, yellowish-gray to pale-orange, well-sorted, fine-grained quartz sandstone with large high-angle cross-beds similar to the Navajo Sandstone, and is 0 to 130 feet thick.
2. Sinawava Member (Jts). This member consists of inter-bedded, slope-forming, moderate-reddish-brown mudstone, siltstone and very fine grained siltstone, and is 10 to 40 feet thick.

The Jurassic Navajo Sandstone (Jn) consists of moderate-reddish-orange to moderate-orange-pink, massively cross-bedded, poorly to moderately well cemented sandstone that is composed of well-rounded, fine- to medium-grained, frosted quartz, and is about 2,100 to 2,200 feet thick.

A detailed description of the geologic formations can be found on the Geologic Map of the Kolob Reservoir Quadrangle, Washington and Iron Counties, Utah by Biek (2007) and in **Appendix A**.

The geologic map does not indicate the presence of any fault or fault zone in the study area.

Figure 4 is a generalized geologic cross-section and the location of the cross-section is shown in **Figure 3**. **Figure 4** was generated based on **Figure 3**, Cross-section A-A' of the Geologic Map of the Kolob Reservoir Quadrangle, Washington and Iron Counties, Utah by Biek (2007) and driller's logs of existing wells as plotted on **Figures 2 and 3**. The well logs are attached in **Appendix B**. **Figure 4** indicates that geologic formations generally dip to the east at an angle of approximately 3 degrees.

2.4 Groundwater Conditions

Presently, there is no hydrogeologic report that provides a full characterization of the groundwater conditions in the study area. To better describe the groundwater conditions in the study area, well logs were collected from the Utah Division of Water Rights database. Thirty-three well logs (Wells #1 through #33) were obtained and plotted in **Figures 2 and 3**. The wells are primarily located in the southwestern corner of the study area and range in depth from 60 to 705 feet below ground surface. The deepest well (Well #10) was dry and is located in the northeast portion of Section 18, Township 39 South, Range 10 West in the Oak Creek sub-drainage. The second deepest well is Well #27 with a total depth of 450 feet below ground surface. Except for the dry well, the well logs indicate that depth to the groundwater surface ranges from 13 to 180 feet below ground surface.

Characterizing the groundwater conditions in the study area is a challenge due to the fact that all wells, excluding the dry well, are located in the southwestern portion of the study area. Based on the well logs, the groundwater conditions in the southwestern portion of the study area can be characterized below:

> Groundwater occurs in both the Quaternary deposits and the Cretaceous and Jurassic bedrocks. Pumping test information recorded in the well logs indicates that the Quaternary deposits, which are composed primarily of volcanic lava flow rich of clay, are not very conductive of groundwater. It appears that perched groundwater is present in located zones due to the presence of clay layers within the volcanic lava flow. The perched groundwater is not the interest of this study because it is believed to be too shallow and too little in volume for drinking water exploration. It appears that the primary aquifer in the area consists of both the Quaternary deposits and the bedrock, and primarily the sandstone in the Cretaceous Dakota Formation and the Jurassic Carmel Formation. Based on the water level data recorded in the driller's well logs and the elevation data from the topographic maps, a potentiometric surface of the primary aquifer was created in **Figure 5**. **Figure 5** indicates that groundwater generally moves from the west and north to the east. The lowest hydraulic gradient is estimated to be 4%.

Figure 2 indicates that a local surface drainage divide (topographic ridge) is present between the Upper Kolob Plateau and Oak Valley. An evaluation of the study area reveals that this ridge does not coincide with a groundwater divide in the study area. It is believed that groundwater flows from the Upper Kolob Plateau across the local ridge and into Oak Valley.

Figures 3 and 4 indicate that the Quaternary deposits are not present in the northernmost part and the southeastern portion of the project area. The primary aquifer in these areas is believed to consist of bedrock. As described above, Well #10, located in the northeastern

portion of Section 18, Township 39 South, Range 10 West, is dry. Based on this information, it is assumed that the area with high elevations and steep slopes in the northern part of Oak Valley and the northern part of the Upper Kolob Plateau are the primary recharge zone and the primary aquifer exists in the southern part primarily along Kolob Creek. Thus, groundwater moves from the Upper Kolob Plateau eastward towards Oak Valley and continues in the bedrock aquifer. It is possible that the hydraulic gradient is greater in Oak Valley because of steeper surface slopes. It is difficult to decide the width of the aquifer. The potentiometric surface in **Figure 5** indicates that the width of the aquifer is at least 4,000 feet. The bedrock aquifer may have a larger width along Kolob Creek.

The thickness of the aquifer can be determined through many wells that fully penetrate the aquifer. However, there is not any well that fully penetrates the aquifer in the study area. Well #14 is a drinking water well owned by Whispering Pines Water Company. This well is 410 feet in depth and 6 inches in diameter. A pumping test was conducted in the well where the drawdown vs. time data and the subsequent recovery vs. time data were collected. These data were analyzed and the results are attached in **Appendix C**. An analysis of the drawdown and recovery vs. time data yields transmissivity values of 44 and 48 feet^2/day, respectively. It is generally believed that the results from the recovery data are more reliable. Therefore, the transmissivity value of the producing aquifer is assumed to be 48 feet^2/day. The well was perforated between 330 and 410 feet where sandstone was encountered. If drilling had been continued, more sandstone may have been encountered from below the 410 foot depth. The sandstone aquifer is at least 80 feet thick at this well location. With an assumed 80 foot aquifer thickness, the hydraulic conductivity of the producing aquifer is 0.6 foot/day.

2.5 Recharge

Recharge to the aquifer is from precipitation and surface water bodies. Precipitation is believed to provide the most recharge to the groundwater system in the study area. Kolob Reservoir, Kolob Creek and Oak Creek are also believed to provide recharge to the groundwater system. To maintain a conservative nature to this study, the recharge from surface water bodies was omitted.

In the septic tank density study for Washington County, Utah by Hansen, Allen & Luce (1997), the recharge to the aquifer was assumed to be 10% of the annual precipitation. Because the study area is also located in Washington County, the same percentage was used in this study. Thus, the estimated recharge to the aquifer is 2.171 inches/year.

2.6 Land Development Constraints and Buildable Area

The land in the study area includes part of Zion National Park, land administered by the U.S. Bureau of Land Management (BLM) and private holdings. It is assumed that no development is to be allowed in Zion National Park. It is possible that land development will be allowed on BLM-administered land, as it is happening in the Santa Clara area where BLM is selling land for residential development.

Future land development in the study area will need to comply with relevant Washington County Regulations. The following is Washington County Rule 10-24-3 Disturbance Standards:

In furtherance of the purposes set forth above, site disturbance related to hillside development shall comply with the following schedule:

A. Zero to nineteen percent (0-19%) slope: See existing ordinances and standards unless otherwise required by the county.

B. Twenty to twenty nine percent (20-29%) slope: Seventy percent (70%) of the slope shall remain undisturbed. The seventy percent (70%) area is based upon the overall area/development rather than per lot.

C. Thirty percent (30%) and greater slope: Ninety percent (90%) of this slope category shall remain undisturbed. The ninety percent (90%) area is based upon the overall area/development rather than per lot.

D. The county commission shall have the authority to adjust the above percentages, for cause, after receiving a recommendation from the county staff and the land use authority. (Ord. 2006-910-O, 5-2-2006)

The study area is sub-divided based on the three slope categories into three different zones as shown in **Figure 6**. With these three zones, the buildable area can be estimated using the following assumptions:

1. Land within Zion National Park is not buildable.
2. Land administered by the BLM may still be buildable because the BLM may sell the public land to private entities, as such is occurring in the Santa Clara area.
3. Land with a slope of 0- 19% is 100% buildable.
4. Land with a slope of 20-29% is 30% buildable.
5. Land with a slope of 30% and greater is 10% buildable.

6. The Washington County Water Conservancy (WCWCD) owns Kolob Reservoir and the land associated with the reservoir is not buildable. The WCWCD owns an additional 80 acres of land in the study area, of which 40 acres is buildable.

The estimated buildable area is summarized in **Table 2**.

Table 2. Buildable Area Calculation Summary

Land Slope/Ownership	Area (Acres)	Buildable Percentage (%)	Buildable Area (Acres)
30% and Greater	8,351		778
Zion National Park	572	0	
BLM	504	10	50
Private	7,275	10	728
20-29%	3,642		1,091
WCWCD	6	0	
Private	3,636	30	1,091
0-19%	2,888		2,685
Zion National Park	9	0	
WCWCD	194	0	
WCWCD	40	100	40
Private	2,645	100	2,645
Total	**15,466**		**4,554**

3.0 SEPTIC TANK DENSITY EVALUATION

Ammonia and organic nitrogen are commonly present in effluent from septic tank systems, mostly from the human urinary system. Typically, almost all ammonia is converted into nitrate before leaving the septic tank soil-absorption system. Once nitrate passes below the zone of aerobic bacteria and the roots of plants, there is negligible attenuation as it migrates farther through the soil (Franks, 1972). Once in groundwater, nitrate becomes mobile with little or no retardation and can persist in the environment for long periods of time (Freeze and Cheery, 1979). Areas with high densities of septic tank systems risk elevated nitrate concentrations reaching unacceptable levels. In the early phases of groundwater contamination associated with septic tank systems, nitrate is likely to be the only pollutant detected (Deese, 1986).

Nitrate is considered the key contaminant for use in determining the density of septic tank systems that should be allowed in the study area. Nitrate concentrations in all or part of aquifers can be estimated for increasing septic tank system densities using a mass-balance approach. In estimating nitrate concentrations using the mass-balance approach, the nitrogen mass from septic systems, irrigation water and the recharge water is assumed to accumulate to the existing ambient mass of nitrogen in groundwater and then diluted with the groundwater flow available for mixing, plus water that is migrating into the groundwater system from septic tank systems, irrigation water and recharge water.

3.1 Wastewater Characteristics and Background Nitrate Concentration

A typical single-family septic tank system discharges approximately 400 gallons per day (gpd) of effluent containing nitrate at a concentration of approximately 40 mg/l as nitrogen. However, because the homes in the study area are all summer and second homes, or other recreational dwellings, average daily flows discharging from septic tanks are less than 400 gpd. Based on the maximum availability of culinary and household water from recent water system studies and designs for a similar area (Duck Creek Village where the average total water use per household was 167 gpd) in Utah, 200 gpd would be the maximum wastewater effluent possible from each connection at build-out. The drinking water standard for nitrate as nitrogen is 10 mg/l as recommended by the EPA and the State of Utah has adopted the EPA recommended standard.

Presently, the study area is barely developed. Therefore, there is not much groundwater quality information. Ms. Kate Johnson of the Utah Division of Drinking Water conducted a water quality search in the Utah Division of Drinking Water database and identified two water quality records. One record indicates that nitrate in the water sample from one well was non-detected and the other was 0.25 milligram per liter (mg/l) as nitrogen. In this study, the background level of nitrate in groundwater was assumed to be 1 mg/l as nitrogen.

3.2 Assumptions and Limitations

The following assumptions were used in this septic tank density evaluation:

1. Nitrate loading from recharge associated with precipitation is 1 mg/l as it was used by Hansen, Allen & Luce, Inc. (1997).
2. The irrigated area was assumed to be 10% of the buildable area. Nitrate loading associated with irrigation was assumed to be 1 mg/l. The total irrigation water was assumed to be 2 acre-feet/year per acre of irrigated land. In Hansen, Allen & Luce, Inc.'s 1997 study, 6 acre-feet/year per acre of irrigated land was used. A lower amount was used in this study as only summer and second home developments exist.
3. Calculations are based on limited groundwater information.
4. Complete nitrification occurs before the septic effluent reaches groundwater.
5. Uniform and instantaneous groundwater mixing occurs in the entire aquifer or entire mixing zone below the study area.
6. Calculations do not account for changes in groundwater conditions due to groundwater withdrawal from wells.
7. Calculations are based on aquifer parameters that must be extrapolated to larger areas where they may not be entirely representative.
8. Calculations are based on existing data that may not represent the entire study area.

3.3 Mass Balance Equation

The mass balance approach was used in this study because it has previously been used in Washington County, Utah (Hansen, Allen & Luce, Inc., 1997). In the mass-balance approach, in order to estimate projected nitrate concentrations, the nitrate mass from projected septic tanks, irrigation water and recharge water associated with precipitation is added to the existing ambient mass of nitrate in groundwater and then diluted with the groundwater flow available for mixing, plus water that is added to the system from septic tanks, irrigation and recharge associated with precipitation (Hansen, Allen & Luce, Inc., 1997). The mass balance equation was expressed by Hansen, Allen & Luce, Inc. (1997) as:

$$QsNs + QpNp + QiNi + QbNb = QtNt$$

Or

$$NLal = [Qp(Nt-Np)+Qi(Nt-Ni)+Qb(Nt-Nb)]/[Qs1(Ns-Nt)]$$

Where:

NLal	=	Total Allowable Septic System
Qs	=	Discharge from septic tanks (l/day);
Qs1	=	Discharge from one septic system (l/day);
Ns	=	Nitrate concentration in septic effluent (mg/l);
Qp	=	Recharge associated with precipitation (l/day);
Np	=	Nitrate concentration in the recharge water from precipitation (mg/l);
Qi	=	Irrigation water flow (l/day);
Ni	=	Nitrate concentration in irrigation water (mg/l);
Qb	=	Groundwater flow (l/day);
Nb	=	Background nitrate concentration in groundwater (mg/l);
Qt	=	Total flow (l/day); and
Nt	=	Total nitrate concentration, or allowed concentration in groundwater (mg/l).

3.4 Density Evaluation

To evaluate the density of septic tank systems using the mass balance approach, information contained in Sections 2.4 through 2.6 were used. The only missing aquifer parameter is the mixing zone thickness. The mixing zone thickness is generally less than the total thickness of the aquifer. The actual mixing zone thickness should be determined through groundwater flow and contaminant transport modeling. Depending on which transport mechanism dominates, the mixing zone thickness can be different. As a non-adsorbed solute, nitrate moves with groundwater with no transformation and little or no retardation (Freeze and Cherry, 1979). Therefore, convection can be generally considered the dominant transport mechanism for nitrate. Nonetheless, as a general rule, the higher the groundwater flow velocity, the smaller the mixing zone thickness; the slower the groundwater travels, the larger the mixing zone thickness. Some states have rules regulating the selection of mixing zone thickness for septic tank studies. The Montana Department of Environmental Quality (1996) set the mixing zone thickness to 15 feet. However, in the State of Utah, no regulation in this regard is available at this time. Hansen, Allen & Luce, Inc. (1997) used a mixing zone depth of 100 feet, or the extent of the saturated thickness, whichever is less. In this study, the assumed specific groundwater flow velocity is only 0.024 [0.6 (hydraulic conductivity) * 0.04 (hydraulic gradient) = 0.024] foot/day in the study area. If an effective porosity of 0.2 is assumed, the groundwater flow velocity is only 0.12 foot/day. This groundwater velocity is very low. It is believed that it is acceptable to use the mixing zone thickness of 100 feet, or the extent of the saturated thickness, whichever is less, in the study area. In this study, the mixing zone thickness was assumed to be 80 feet, the known saturated thickness from the well data.

Based on the assumed data and the described method, **Table 3** summarizes the estimated septic tank densities at build-out in the study area. **Table 4** summarizes the final parameter values for determining the septic tank density.

Table 3. Summary of Septic Tank Density Calculation

Total Allowable Septic Systems	Total Buildable Area at Build-out (Acres)	Septic Density (Acre/System)
3,684	4,554	1.24
Note: * In estimating the total allowable septic tank systems, the criterion used was that the estimated concentration of nitrate as nitrogen in groundwater does not exceed 8 mg/l, which is 2 mg/l lower than the EPA standard.		

Table 4. Final Parameter Values Used to Calculate Septic Tank Density

Parameter	Quantity	Unit
Groundwater		
Hydraulic Conductivity, K	1.25	feet/day
Mixing Zone Thickness, D	80	feet
Aquifer Width, B	4,000	feet
Hydraulic Gradient, i	0.04	dimensionless
Groundwater Flow, Qb	7,680	$feet^3$/day
Qb	217,473	l/day
Background Nitrate Concentration, Nb	1	mg/l
Recharge Associated with Precipitation		
Precipitation	21.71	inches/year
Recharge (10% Precipitation)	2.171	inches/year
Drainage Area	15,466	Acres
Total Recharge, Qp	2,798	acre-feet/year
Qp	9,454,019	l/day
Nitrate Loading, Np	1	mg/l
Recharge Associated with Irrigation		
Total Buildable Area	4,554	acres
Irrigated Area (10% Buildable Area)	455.4	acres
Irrigation Water Rate	2	acre-feet/year/acre
Total Irrigation Water, Qi	910.8	acre-feet/year
Qi	3,077,797	l/day
Nitrate Loading, Ni	1	mg/l
Wastewater from Septic Tanks		
Effluent from One Septic Tank, Qs1	200	gallons/day

Parameter	Quantity	Unit
Qs1	757	l/day
Nitrate Concentration, Ns	40	mg/l
Calculations		
Allowed Groundwater Nitrate Concentration, Nt	8	mg/l
Qb(Nt-Nb)	1,522,311	mg/day
Qp(Nt-Np)	66,178,133	mg/day
Qi(Nt-Ni)	21,544,579	mg/day
Qs1(Ns-Nt)	24,224	mg/day
Qb(Nt-Nb)+ Qp(Nt-Np)+ Qi(Nt-Ni)	89,245,023	mg/day
NLal	3,684	units

When the county's current disturbance standards are incorporated into the septic density map, as shown in **Figure 7**, the actual septic density in each slope category is summarized in **Table 5**.

Table 5. Summary of Septic Tank Density with County's Disturbance Standards Incorporated

Land Slope/Ownership	Area (Acres)	Total Allowable Septic Systems	Septic Density (Acre/System)
30% and Greater	8,351		
Zion National Park	572	0	
BLM	504	40	12.4
Private	7,275	587	12.4
20-29%	3,642		
WCWCD	6	0	
Private	3,636	879	4.14
0-19%	2,888		
Zion National Park	9	0	
WCWCD	194	0	
WCWCD	40	32	1.24
Private	2,645	2,133	1.24

The proposed Whispering Pine Subdivision is 117 acres in total area and is located in the southwestern corner of the study area as shown in **Figure 7**. All the land within this subdivision is in the 0-19% slope category. The total number of lots can be developed in this subdivision is 94. As long as the average lot size is equal to or greater than 1.24 acres in this subdivision, the impact of the development of this subdivision will not result in a violation of groundwater quality protection with respect to nitrate concentration.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Sunrise has completed an analysis of septic tank density at the northern part of the Upper Kolob Plateau and Oak Valley. This study indicates that the average septic tank density on buildable area within any subdivision is 1.24 acres/lot. In reviewing subdivision plans within the study area, it is recommended that the site slope be reviewed carefully. The actual average septic tank density is different for each slope zone. In the 0-19% slope zone, the average septic tank density is 1.24 acres/lot; in the 20-29% slope zone where 70% of the slope shall remain undisturbed, the actual average septic tank density is 4.14 acres/lot; and in the 30% or greater slope zone where 90% of the slope shall remain undisturbed, the actual average septic tank density is 12.4 acres/lot.

5.0 LIMITATIONS

The services provided on this project, as described in this report, include professional opinions and judgments based on the data collected and analyzed. Sunrise performed these services according to currently accepted water resources engineering principles and practices conducted in this area.

This report does not provide a warranty as to variable subsurface conditions that may actually exist. This report does not apply to other areas outside the study domain. In addition, evaluation of geologic and hydrogeologic conditions is a difficult task. Engineers and hydrogeologists must occasionally make general judgments leading to conclusions with incomplete knowledge of the geologic history, subsurface conditions and hydraulic characteristics present.

6.0 REFERENCES

Biek, R.F., 2007, Geologic Map of the Kolob Reservoir Quadrangle, Washington and Iron Counties, Utah. Map 220.

Deese, P.L., 1986, an Evaluation of Septic Leachate Detection: U.S. Environmental Protection Agency Project Summary EPA/600/52-86/052, 2 p.

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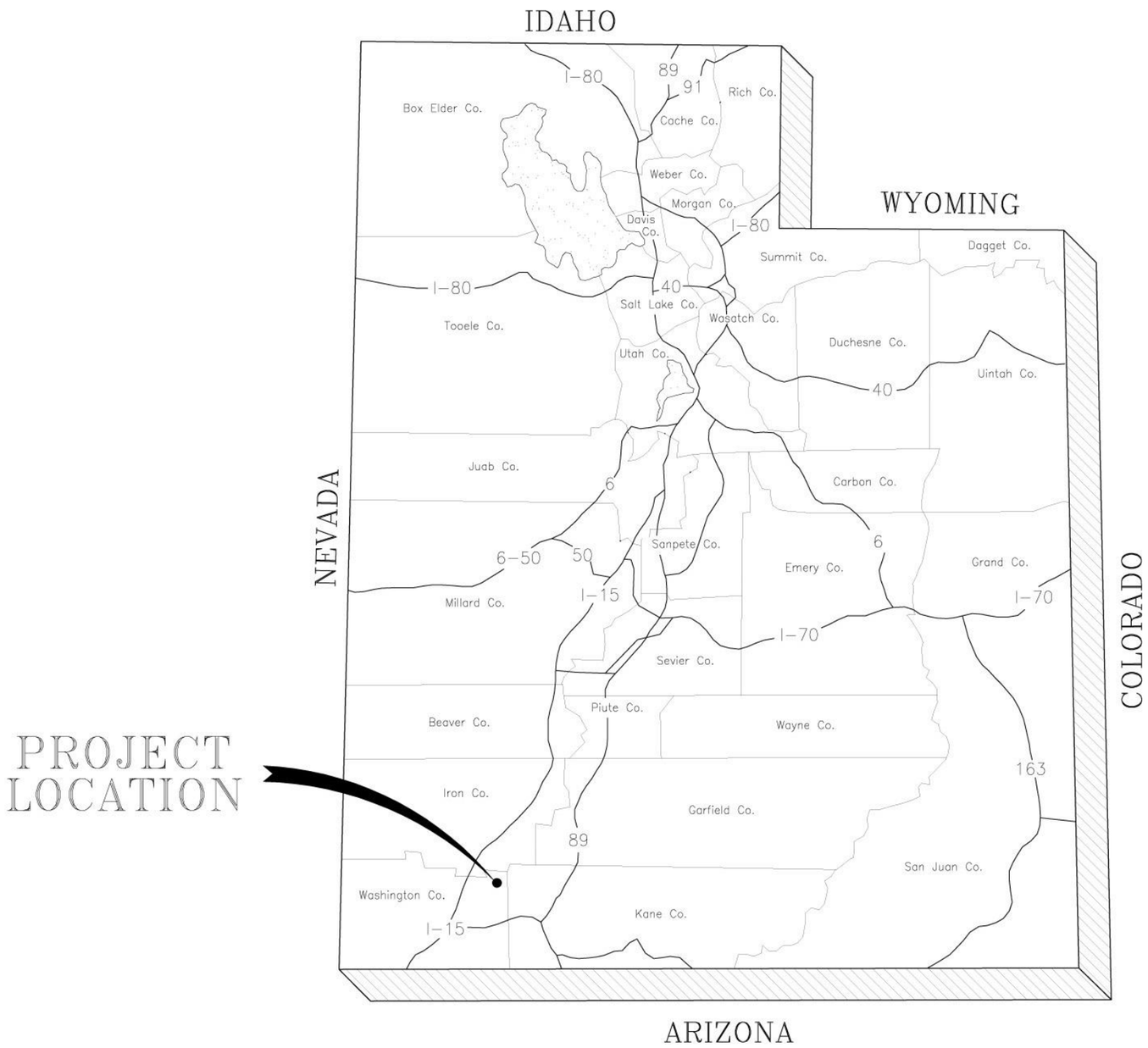
Figure

SITE LOCATION MAP



REV NO.	COMMENT	DATE

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TEL 801.523.0100 · FAX 801.523.0990
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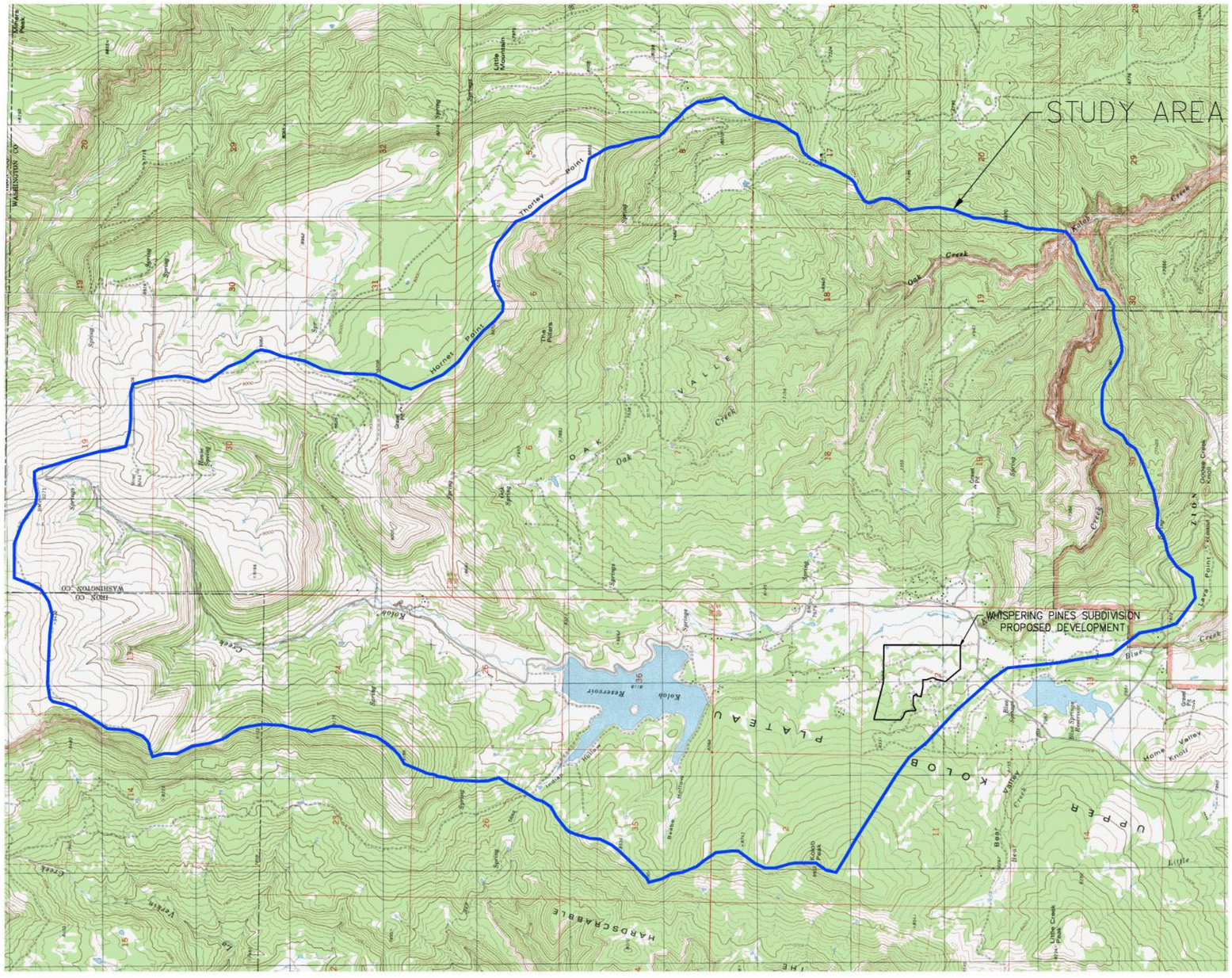
ASH CREEK SPECIAL SERVICE DISTRICT

UPPER KOLOB PLATEAU AND OAK VALLEY
WASHINGTON COUNTY, UTAH
SITE LOCATION MAP

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DY	DSA	DY	01 of 08	FIGURE 1

P:\Kolob Valley\Area Map.dwg Jun 26, 2007 12:00pm dunderson



NORTH

SCALE
2000' 0 1000' 2000'

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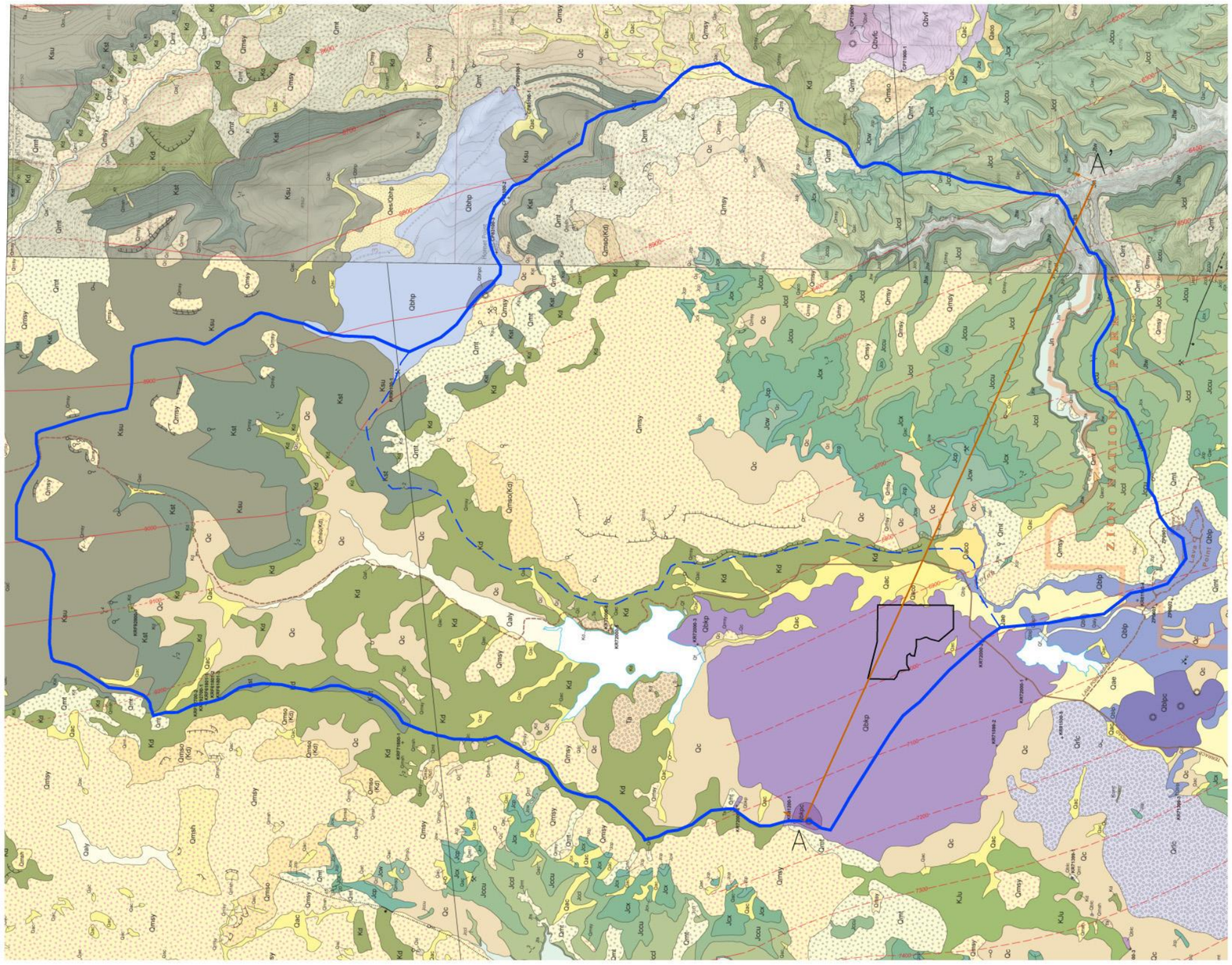
SITE VICINITY MAP

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DY	DSA	DY	02 of 08	FIGURE 2

P:\Kolob Valley Area Map.dwg Jun 27, 2007 9:50am danderson



LEGEND

- WATERSHED BOUNDARY
- LOCAL RIDGE
- WHISPERING PINES SUBDIVISION BOUNDARY
- GEOLOGIC CROSS-SECTION

North

SCALE
2000' 0 1000' 2000'

REV NO.	COMMENT	DATE

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WASHINGTON COUNTY, UTAH
GEOLOGIC MAP

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DY	DSA	DY	03 of 08	FIGURE 3

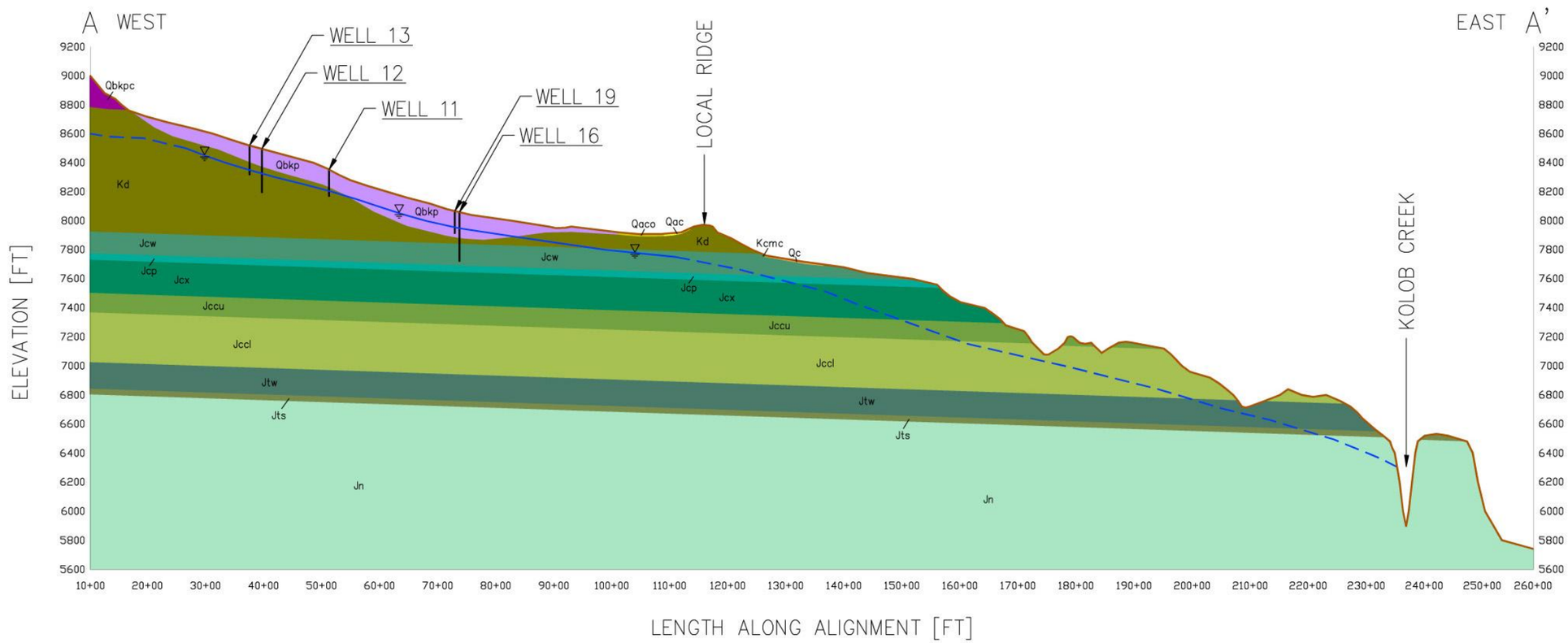
P:\Kolob\dwg\Area Map.dwg Jun 27, 2007 9:59am danderson

LEGEND

GROUND SURFACE

GROUND WATER SURFACE

APPROXIMATE GROUND WATER SURFACE



Qbkpc	Kd	Jccu
Qbkp	Kcmc	Jccl
Qac	Jcw	Jtw
Qaco	Jcp	Jts
Qc	Jcx	Jn

REV. NO.	COMMENT	DATE

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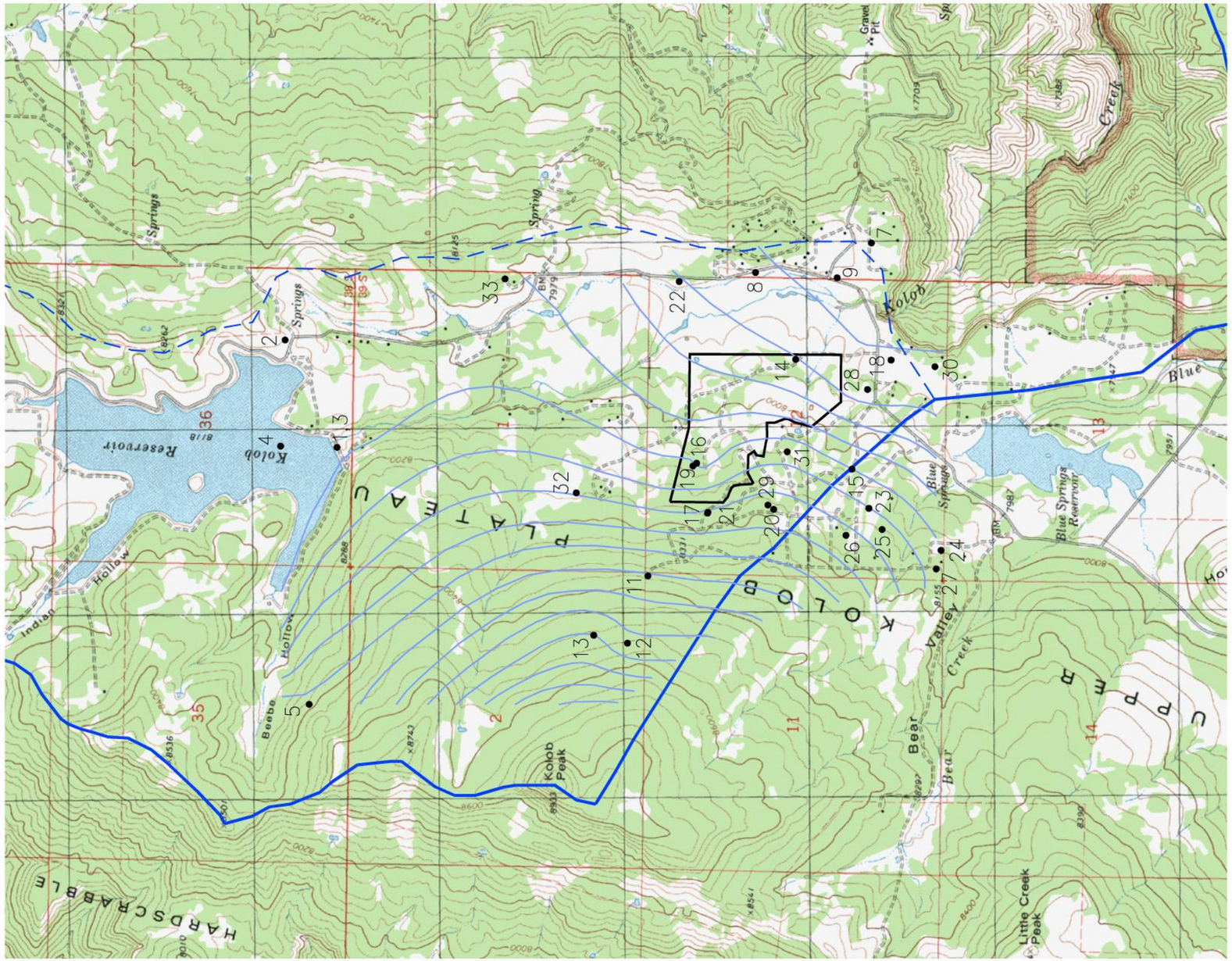
UPPER KOLOB PLATEAU AND OAK VALLEY
WASHINGTON COUNTY, UTAH
GEOLOGIC CROSS-SECTION

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DSA	DSA	DY	04 of 08	FIGURE 4

P:\Kolob\dwg\Misc Map.dwg Jun 26, 2007 12:07pm dunderson



LEGEND

- WATERSHED BOUNDARY
- LOCAL RIDGE
- • 15 WELL LOCATION AND NUMBER
- GROUND WATER CONTOUR
- WHISPERING PINES SUBDIVISION BOUNDARY

NORTH

SCALE
1000' 0 500' 1000'

REV NO.	COMMENT	DATE

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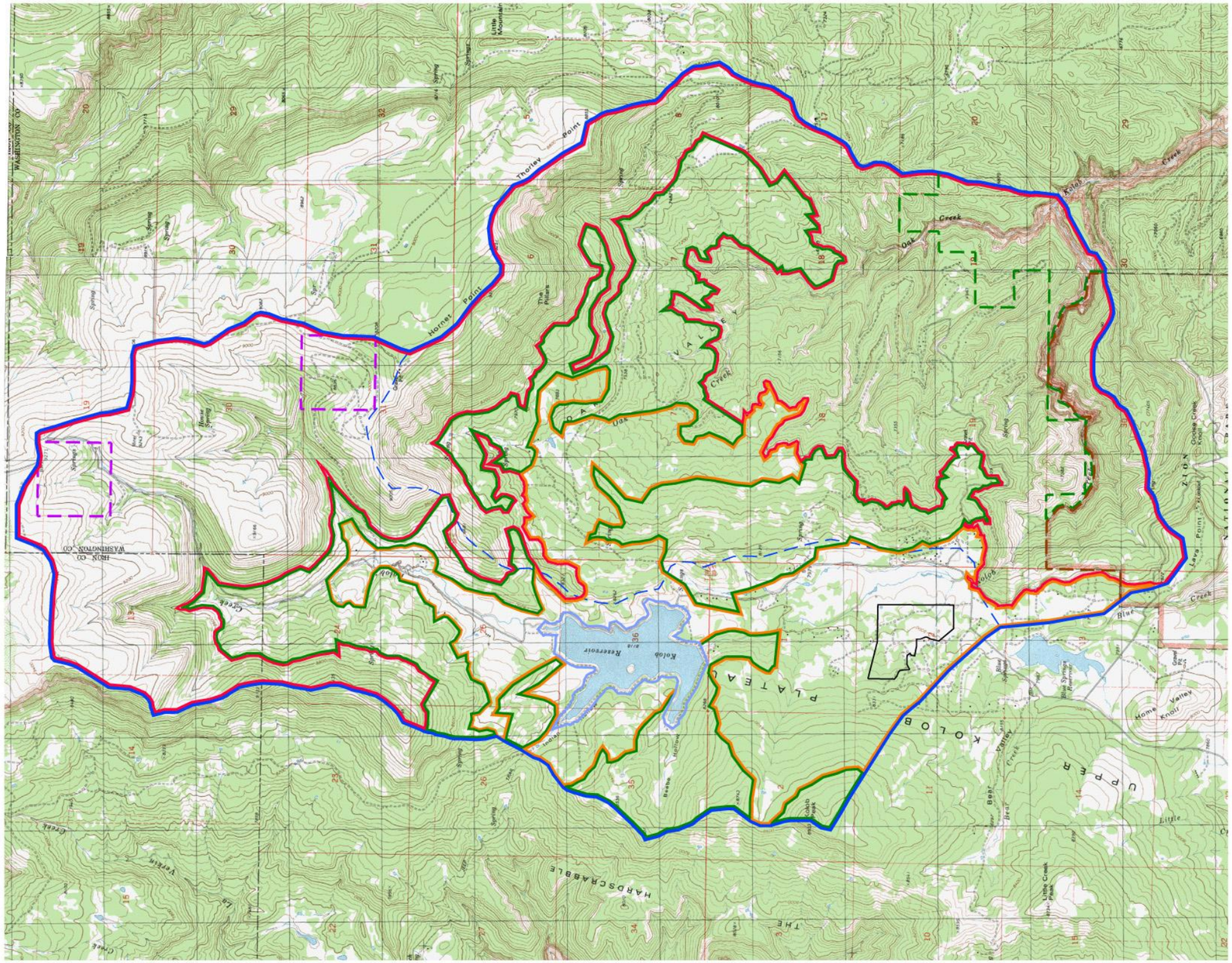
ASH CREEK SPECIAL SERVICE DISTRICT

UPPER KOLOB PLATEAU AND OAK VALLEY
WASHINGTON COUNTY, UTAH
POTENTIOMETRIC SURFACE

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DY	DSA	DY	05 of 08	FIGURE 5

P:\Kolob\dwg\Acad Map\dwg Jun 27, 2007 10:05am danielsen



LEGEND

- WATERSHED BOUNDARY
- LOCAL RIDGE
- WHISPERING PINES SUBDIVISION BOUNDARY
- BLM LAND
- STATE LAND
- ZION NATIONAL PARK
- WASHINGTON COUNTY WATER CONSERVANCY DISTRICT
- 30% < SLOPE
- 20% < SLOPE < 29%
- 0% < SLOPE < 19%

North

SCALE

2000' 0 1000' 2000'

REV NO.	COMMENT	DATE

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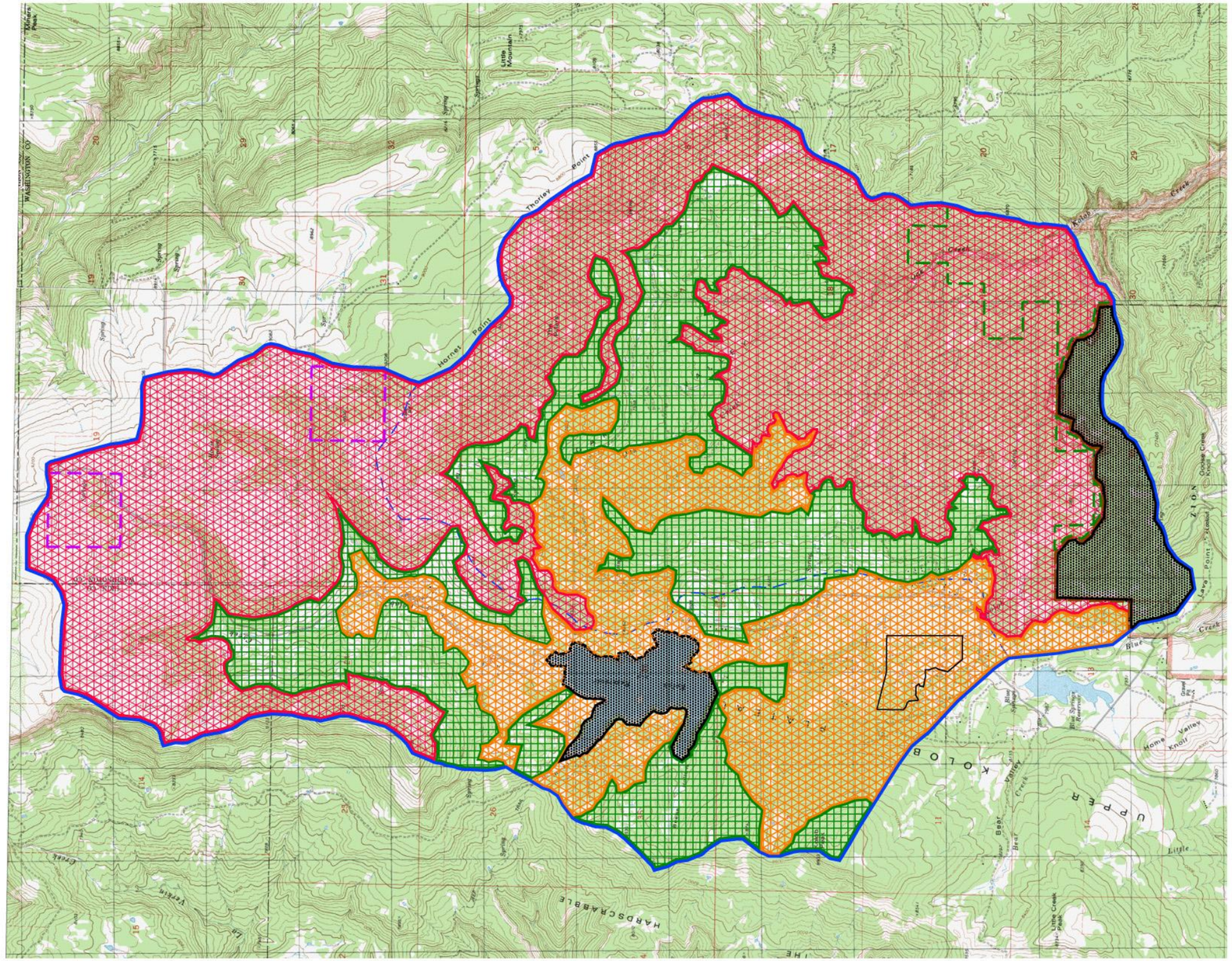
ASH CREEK SPECIAL SERVICE DISTRICT

UPPER KOLOB PLATEAU AND OAK VALLEY
WASHINGTON COUNTY, UTAH
SLOPE AND OWNERSHIP MAP

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DSA	DSA	DY	06 of 08	FIGURE 6

P:\Kolob\dwg\Area Map.dwg Jun 27, 2007 10:06am dandersen



LEGEND

- WATERSHED BOUNDARY
- LOCAL RIDGE
- WHISPERING PINES SUBDIVISION BOUNDARY
- BLM LAND
- STATE LAND
- ZION NATIONAL PARK
- WASHINGTON COUNTY WATER CONSERVANCY DISTRICT
- 12.4 AC/LOT 90% UNDISTURBED
- 4.14 AC/LOT 70% UNDISTURBED
- 1.24 AC/LOT 0% UNDISTURBED
- UNDEVELOPABLE

NORTH

SCALE
2000' 0 1000' 2000'

REV NO.	COMMENT	DATE

PRELIMINARY NOT FOR CONSTRUCTION DATE

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UPPER KOLOB PLATEAU AND OAK VALLEY
WASHINGTON COUNTY, UTAH
SEPTIC DENSITY MAP

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
02737	DSA	DSA	DY	07 of 08	FIGURE 7

P:\kolob\dwg\Area Map.dwg Jun 27, 2007 10:18am dsanderson

Appendix A Geologic Description

QUATERNARY

Alluvial deposits

Qaly

Younger stream deposits (Holocene) – Stratified, moderately to well-sorted sand, silt, clay, and pebble to boulder gravel in river channels and flood plains; locally includes small alluvial-fan and colluvial deposits, and minor terraces as much as 20 feet (6 m) above current stream level; equivalent to stream deposits (Qal_1) and stream-terrace deposits (Qat_2) in the adjacent Kolob Arch quadrangle, but undivided here due to uncertain correlation between upper and lower reaches of drainages; generally 0 to 30 feet (0-9 m) thick.

Qas

Alluvial sand deposits (upper Holocene) – Well-sorted, fine- to medium-grained sand on the floor of Hop Valley, in the southwest corner of the quadrangle, where the Hop Valley stream has reworked the upper few feet of sandy basin-fill deposits.

Qaf_1

Alluvial-fan deposits (Holocene) – Poorly to moderately sorted, non-stratified, boulder- to clay-size sediment deposited as small alluvial fans along major drainages; form active depositional surfaces, although locally the master stream is deeply entrenched; typically overlies alluvial channel deposits at the toe of the fans, and locally includes minor slope wash and talus along the upslope margins of the fans; many small fans, because they are too small to depict at this scale and because they are typically poorly developed, are lumped with mixed alluvial and colluvial deposits; generally 0 to 30 feet (0-9 m) thick.

Artificial-fill deposits

Qf

Artificial-fill deposits (historical) – Engineered fill used to create the Kolob Reservoir and Blue Springs Reservoir dams; unmapped fill is locally present in developed areas; as much as 60 feet (18 m) thick.

Colluvial deposits

Qc

Colluvial deposits (Holocene to upper Pleistocene) – Poorly sorted, angular, clay- to boulder-size, locally derived sediment deposited principally by slope wash and soil creep; gradational with talus deposits and mixed alluvial and colluvial deposits; locally includes large areas of talus where slope angles increase such that colluvium and talus form a thin mantle that grades from one deposit to another; may include undifferentiated landslide deposits; generally less than 20 feet (6 m) thick.

Lacustrine and basin-fill deposits

Qla

Lacustrine and basin-fill deposits (Holocene) – Well-stratified sand, silt, and minor peat deposited in the Hop Valley basin in the southwest corner of the quadrangle; grades into colluvial, alluvial, and alluvial-fan deposits at basin margins and in upper part of deposits; forms planar surfaces that slope downstream, which are incised about 40 feet (12 m) at the south end of Hop Valley; a radiocarbon age of 2640 ± 60 ^{14}C yr B.P. establishes a minimum age for the formation of Hop Valley Lake (Biek and others, 2003; Biek, 2007), and Eardley (1966) obtained a radiocarbon age of 670 ± 200 ^{14}C yr B.P. from the upper part of the deposits; deposits in Hop Valley are probably about 250 feet (75 m) thick (Biek, 2007), but are probably less than 60 feet (18 m) thick in this quadrangle; also mapped at Potamogeton (Chasm) Lake, a permanent pond about 2 miles (3 km) west of Kolob Reservoir that formed behind a rockfall of Navajo Sandstone; "Potamogeton" is Latin for pondweed, which sometimes covers the pond's surface. ^{14}C analytical data is available on the Utah Geological Survey Web site (http://geology.utah.gov/online/analytical_data.htm).

Mass-movement deposits

Qmsh
Qmsy
Qmso
Qmso (Kd)

Landslide deposits (historical to middle[?] Pleistocene) – Very poorly sorted, clay- to boulder-size, locally derived material deposited by rotational and translational movement; characterized by hummocky topography, numerous internal scarps, and chaotic bedding attitudes; basal slip surfaces most commonly form in the lower unit of the Co-op Creek Limestone Member of the Carmel Formation, the Dakota Formation, and the upper unit of the Straight Cliffs Formation, and the slides themselves incorporate these and overlying map units; the Dakota Formation especially forms very large, complex mass movements; Qmsh denotes slides with historical movement; younger landslides (Qmsy) may have historical movement, but typically are characterized by slightly more subdued landslide features indicative of early Holocene to late Pleistocene age; older landslides (Qmso) are deeply incised and their main scarps and hummocky topography have been extensively modified by erosion, suggestive of late to possibly middle(?) Pleistocene age, but they too may be locally active; Qmso(Kd) denotes large, relatively coherent bedrock blocks of the Dakota Formation as much as about 150 feet (45 m) thick that slumped downslope under the influence of gravity and which are late to possibly middle(?) Pleistocene in age.

Qmt

Talus deposits (Holocene to upper Pleistocene) – Very poorly sorted, angular boulders and finer-grained interstitial sediment deposited principally by rock fall on and at the base of steep slopes; typically grades downslope into colluvial deposits, and may include colluvial deposits where impractical to differentiate the two; generally less than 30 feet (9 m) thick.

Mixed-environment deposits

Qac
Qaco

Alluvial and colluvial deposits (Holocene to upper Pleistocene) – Poorly to moderately sorted, generally poorly stratified, clay- to boulder-size, locally derived sediments deposited principally in swales, small drainages, and along the upper reaches of larger streams by fluvial, slope-wash, and creep processes; gradational with both alluvial and colluvial deposits; Qac deposits form active depositional surfaces and are generally less than 20 feet (6 m) thick; Qaco deposits are deeply incised and of similar thickness.

Qae

Alluvial and eolian deposits (Holocene to upper Pleistocene) – Locally derived, fine- to coarse-grained sand and silt with subangular to angular gravel; deposited in topographic depressions by small streams, slope wash, and wind; includes small alluvial fans and colluvium along margins of deposits; 0 to 20 feet (0-6 m) thick.

Qer

Eolian and residual deposits (Holocene to upper Pleistocene) – Reddish-orange, fine- to medium-grained sand with residual Navajo Sandstone pebbles, cobbles, and boulders; forms irregular sheets on top of the Navajo Sandstone, from which it is derived, in the southwest corner of the quadrangle; generally less than 3 feet (1 m) thick.

Residual deposits

Qrlc

Residual deposits (Holocene to lower[?] Pleistocene) – Residual lag of angular to subangular basalt blocks derived from the Little Creek Peak lava flow, which is preserved in place on the ridge to the west; includes very rare blocks of Dakota Formation sandstone; although Little Creek Peak basalt is virtually the only rock type seen in this unit, nowhere is it clearly in place; probably represents a lag of basalt let down by erosion of underlying beds, but may represent a flow that cascaded southeastward from the adjacent ridge; thickness uncertain, but probably as much as several tens of feet thick.

Spring deposits

Qst

Spring tufa (Holocene) – Light-gray to light-brownish-gray, porous, calcareous tufa characterized by a sponge-like network of cavities; mapped at Birch Spring, about 2 miles (3 km) northwest of Kolob Reservoir; 0 to about 20 feet (0-6 m) thick.

Volcanic rocks

Major- and trace-element geochemistry and $^{40}Ar/^{39}Ar$ raw data is available on the Utah Geological Survey Web site (http://geology.utah.gov/online/analytical_data.htm); rock names are after LeBas and others (1986).

Qbg

Grapevine Wash lava flows (middle Pleistocene) – Medium-gray, weathering to dark-brownish-gray to dark-brownish-black, fine-grained olivine basaltic trachyandesite lava flows; erupted from a number of vents on the Lower Kolob Plateau, including the Firepit Knoll and Spendlove Knoll cinder cones; five $^{40}Ar/^{39}Ar$ plateau ages on these flows range from 0.22 ± 0.03 Ma to 0.31 ± 0.02 Ma (Willis and Hylland, 2002); only distal end of one flow is preserved at the south end of Hop Valley, in the southwest corner of the quadrangle, where it is about 20 feet (6 m) thick.

Qbhpc
Qbhp

Hornet Point lava flow and cinder cone (middle Pleistocene) – Medium- to dark-gray, medium- to coarse-grained olivine basalt to trachybasalt lava flow containing abundant pyroxene phenocrysts; locally deeply weathered to gruss-like soils; boulders typically have concentric weathering rinds; erupted from vent at deeply eroded cinder cone (Qbhpc) at Hornet Point; yielded $^{40}Ar/^{39}Ar$ isochron age of 0.74 ± 0.05 Ma from sample CP83100-3 in the Cogswell Point quadrangle (Biek and Hylland, 2007); lava flow is as much as 240 feet (73 m) thick in this quadrangle.

Qbkpc
Qbkp

Kolob Peak lava flow and cinder cone (lower Pleistocene) – Medium- to light-gray, fine-grained olivine basaltic trachyandesite lava flow; forms densely vegetated dip slope on the east side of Kolob Peak; erupted from vent at Kolob Peak, a cinder cone (Qbkpc) now eroded nearly in half; sample KR81200-1 yielded $^{40}Ar/^{39}Ar$ plateau age of 1.05 ± 0.05 Ma; thickness uncertain, but likely in excess of 100 feet (30 m) thick where it fills paleodrainages.

Qblpc
Qblp

Lava Point lava flow and cinder cones (lower Pleistocene) – Light- to medium-gray, fine- to medium-grained olivine basaltic trachyandesite to borderline basaltic andesite and trachybasalt lava flow; query indicates uncertain correlation near Blue Springs Reservoir; erupted from vents at Home Valley Knoll, a group of three overlapping cinder cones (Qblpc); yielded $^{40}Ar/^{39}Ar$ plateau ages of 1.02 ± 0.03 Ma (sample ZP-0601) and 1.08 ± 0.02 Ma (sample ZP-0602) for this flow at Lava Point, consistent with several published K-Ar and $^{40}Ar/^{39}Ar$ ages (Best and others, 1980; Hamblin and others, 1981; Willis and Hylland, 2002); as much as 120 feet (37 m) thick where it fills paleodrainages.

Qblc

Little Creek Peak lava flow (lower Pleistocene) – Medium-gray, fine- to medium-grained olivine basalt; locally caps ridge south of Little Creek Peak, and a basalt lag (Qrlc) derived from this flow covers the slope to the southeast of Little Creek Peak; yielded $^{40}Ar/^{39}Ar$ plateau age of 1.44 ± 0.04 Ma from sample VR43-01 in The Guardian Angels quadrangle (Willis and Hylland, 2002); source unknown; 0 to 30 feet (0-9 m) thick.

unconformity

TERTIARY

Old boulder gravel deposits (Miocene?) – Poorly sorted, clay- to very large boulder-size sediment characterized by very large quartz monzonite boulders; clasts also include large boulders of Cretaceous fossiliferous sandstone, cobbles and small boulders derived from the Carmel Formation, recycled, rounded pebbles and small cobbles of Precambrian and Cambrian quartzite, and uncommon cobbles and boulders of Claron limestone; most clasts are subangular to subrounded, but the quartzite clasts are well rounded; quartz monzonite boulders as much as 24 feet (7.3 m) long, 22 feet (6.7 m) wide, and at least 8 feet (2.4 m) high are present in the vicinity of Kolob Reservoir, and subspherical quartz monzonite boulders 10 to 15 feet (3-5 m) long are common; most quartz monzonite clasts, however, are 1.5 to 3 feet (0.5-1 m) in diameter; forms a deeply eroded surface that drapes over pre-existing topography; probably deposited by debris flows or possibly a gravity slide originating in the ancestral Pine Valley Mountains; this hypothesis, however, requires a complete eastward-to-westward reversal of drainage across the Hurricane fault; Averitt (1962, 1964) first described similar deposits farther north, east and southeast of Cedar City, and Anderson and Mehnert (1979) interpreted those exposures as debris-flow deposits shed off the ancestral Pine Valley Mountains; Hacker (1998) and Hacker and others (2002) provided evidence that the Pine Valley Mountains stood very high and shed gravity slides, volcanic rocks, and debris flows about 20.5 million years ago, long before initiation of the Hurricane fault; blocks of the Pine Valley laccolith caught in the Hurricane fault zone (Biek, 2007) show that the laccolith once likely reached east of the Hurricane fault, thus providing a somewhat closer source for the large Pine Valley boulders; thickness uncertain, but probably less than 30 feet (9 m) thick in this quadrangle; some deposits may contain just a lag of widely scattered larger clasts over poorly exposed bedrock, the matrix having been eroded away.

Two basalt boulders clearly incorporated into the deposits at Kolob Reservoir (samples KR72000-5 and KR72000-6) have a chemical signature similar to the Horse Ranch Mountain lava flow, and one boulder (KR72000-6) yielded a maximum $^{40}Ar/^{39}Ar$ age of 0.97 ± 0.18 Ma, analytically indistinguishable from the 1.03 ± 0.06 Ma Horse Ranch Mountain lava flow (Biek, 2007); how the basalt boulders came to be incorporated into these assumed Miocene-age deposits is not known.

unconformity

CRETACEOUS

Straight Cliffs Formation

Ksu

Upper unit (Upper Cretaceous, Santonian[?] to Turonian) – Slope-forming, grayish-orange to yellowish-brown, thin- to thick-bedded, fine-grained subarkosic sandstone and gray mudstone and shale; contains a few thin coal beds, common carbonaceous shale, and several thin coquina beds; forms broad, rounded hills typically mantled with unmapped colluvium; believed to be equivalent to the Smoky Hollow Member and possibly John Henry Member of the Straight Cliffs Formation of the Kaiparowits Plateau (see, for example, Eaton and others, 2001); deposited in fluvial, flood-plain, and lagoonal environments of a coastal plain (Eaton and others, 2001); incomplete thickness as much as 320 feet (100 m) in the quadrangle, but upper part not preserved.

Kst

Tibbet Canyon Member (Upper Cretaceous, Turonian) – Grayish-orange to yellowish-brown, generally medium- to thick-bedded, planar-bedded, fine- to medium-grained quartzose sandstone and lesser interbedded, grayish-orange to gray mudstone and siltstone; locally contains pelecypods, gastropods, and thin to thick beds of oyster coquina; typically forms cliffs, but in this quadrangle more commonly weathers to steep, vegetated slopes; upper contact corresponds to a break in slope and is placed at the top of a coquinoid oyster bed that caps the member; deposited in shoreface, lagoonal, estuarine, and flood-plain environments of a coastal plain (Laurin and Sageman, 2001; Tibert and others, 2003); thickens eastward across quadrangle from about 240 to 450 feet (75-135 m) thick.

KJu

Dakota Formation, Cedar Mountain Formation, and Winsor Member of the Carmel Formation, undivided (Upper Cretaceous to Middle Jurassic) – Mapped in the vicinity of Little Creek Peak, where access to private land was denied; the Dakota Formation is present over most of this area, Cedar Mountain strata may be present, and Winsor strata are likely present at the lowest elevations.

Kd

Dakota Formation (Upper Cretaceous, Cenomanian) – Interbedded, slope- and ledge-forming sandstone, siltstone, mudstone, claystone, carbonaceous shale, coal, and marl; sandstone is yellowish brown or locally white, thin to very thick bedded, fine to medium grained; includes two prominent cliff-forming sandstone beds, each several tens of feet thick, in the upper part of the formation; mudstone and claystone are gray to yellowish brown and commonly smectitic; oyster coquina beds, clams, and gastropods, including large *Craginia* sp., are common, especially in the upper part of the section; uppermost marl beds above the uppermost sandstone cliff contain distinctive gastropods with beaded edge *Admetopsis* n. sp. indicative of a latest Cenomanian brackish environment (Eaton and others, 2001) (samples KRF in sections 14 and 23, T. 38 S., R. 11 W.); Dakota strata are typically poorly exposed and involved in large landslides; includes the overlying Tropic Shale, which is restricted to the east part of the quadrangle where it is silty and sandy and no more than a few feet thick (see, for example, Eaton and others, 2001); upper contact placed at the top of a slope-forming, coaly and marly mudstone sequence and at the base of the typically cliff-forming sandstone of the Tibbet Canyon Member of the Straight Cliffs Formation; deposited in a variety of flood-plain, estuarine, lagoonal, and swamp environments (Gustason, 1989; Laurin and Sageman, 2001; Tibert and others, 2003); invertebrate and palynomorph fossil assemblages indicate shallow-marine, brackish, and freshwater deposits of Cenomanian age (Nichols, 1995); probably about 850 feet (260 m) thick.

unconformity

Cedar Mountain Formation

Kcmc

Conglomerate member (Cretaceous, Cenomanian to Albian) – Thick- to very thick bedded, yellowish-brown, channel-form conglomerate, pebbly sandstone, and pebbly gritstone; clasts are subrounded to rounded, pebble- to small-cobble-size quartzite, chert, limestone, and rare, reworked petrified wood; locally stained reddish brown to dark yellowish brown; forms two small exposures southwest of Birch Spring and southeast of Little Creek Peak; deposited in river-channel environment on broad, coastal plain (Tschudy and others, 1984; Kirkland and others, 1997); Biek and Hylland (2007) reported a single-crystal $^{40}Ar/^{39}Ar$ age of 97.9 ± 0.5 Ma on sanidine from a volcanic ash in Cedar Mountain mudstone immediately above this conglomerate bed in the Straight Canyon quadrangle to the east; pollen analyses indicate an Albian or older age for these beds (Doelling and Davis, 1989; Hylland, 2000); upper contact not exposed, but regionally, east of the Hurricane fault, is unconformably overlain by the Dakota Formation (see, for example, Kirkland and others, 1997); previously mapped as the lower part of the Dakota Formation, but the lithology, age, and stratigraphic position of these beds suggest correlation to the Cedar Mountain Formation; 0 to 35 feet (0-11 m) thick.

unconformity (K)

JURASSIC

Carmel Formation

Jcw

Winsor Member (Middle Jurassic) – Light-reddish-brown, very fine to medium-grained sandstone and siltstone; poorly cemented and weathers to densely vegetated slopes; upper contact is the basal Cretaceous unconformity; near Birch Spring, Winsor strata are overlain by Cedar Mountain conglomerate, but in the northwest corner of the quadrangle, the conglomerate is missing and the Winsor Member is overlain by Dakota strata; deposited on a broad, sandy mudflat (Imlay, 1980; Blakey and others, 1983); thickens westward from about 240 to 320 feet (73-98 m) thick.

Jcp

Paria River Member (Middle Jurassic) – Laminated to very thin bedded, light-gray argillaceous limestone and micritic limestone that locally overlies a thick, white, alabaster gypsum bed common in the basal part of the Paria River Member; limestone weathers to small chips and plates and locally contains small pelecypod fossils; forms steep, ledgy slopes; upper contact is sharp and planar; deposited in shallow-marine and coastal-sabkha environments (Imlay, 1980; Blakey and others, 1983); about 50 to 160 feet (15-48 m) thick.

Jcx

Crystal Creek Member (Middle Jurassic) – Thin- to medium-bedded, reddish-brown gypsiferous siltstone, mudstone, and very fine to medium-grained sandstone; typically friable and weakly cemented with gypsum; forms vegetated, poorly exposed slopes; upper contact is sharp and broadly wavy and corresponds to the base of a thick Paria River gypsum bed or argillaceous limestone interval; deposited in coastal-sabkha and tidal-flat environments (Imlay, 1980; Blakey and others, 1983); about 150 to 250 feet (45-75 m) thick.

Co-op Creek Limestone Member (Middle Jurassic) – Thin- to medium-bedded, light-gray micritic limestone and calcareous shale; locally contains *Isocrinus* sp. columnals, pelecypods, and gastropods; deposited in a shallow-marine environment (Imlay, 1980; Blakey and others, 1983).

Jccu

Upper unit – Thin- to medium-bedded, light-gray micritic limestone; locally oolitic and sandy; forms sparsely vegetated, ledgy slopes and cliffs; upper contact is sharp and planar; about 100 to 140 feet (30-43 m) thick.

MAP SYMBOLS

Contact, dashed where approximately located

Normal fault, dashed where approximately located, dotted where concealed; bar and ball on downthrown side

Structure contour on top of Navajo Sandstone (south and west part of map) and on top of Tibbet Canyon Member (northeast part of map); contour interval 100 feet; short dash where projected, long dash where control is poor

Major joint

Landslide or slump scarp, hachures on down-dropped side

2 Approximate strike and dip of inclined bedding determined photogrammetrically

Joint, near vertical

Pit - sand and gravel (no letter), cinders (c)

Quarry

Spring

Volcanic vent

Collapse feature (sinkhole)

KR81100-1 Sample location and number

Appendix B Well Logs

orm 113—5M—12-60

Examined _____
Recorded: B. C. _____ T. B. _____
Inspection Sheet _____
Copied _____

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 81-3472
Claim No. 215741
Coordinate No. _____

(1)

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Richard Lee 84737
Address 243 W. 100 N. Hurricane Ut.

(2) LOCATION OF WELL:
County Washington Ground Water Basin _____ (leave blank)
North 270 feet, East 2127 feet from SW Corner
South _____ feet, West _____
of Section 36, T. 38 S., R. 11 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: _____

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☒ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
12" Diam. from 18" feet to 270 feet Gage _____
_____" Diam. from _____ feet to _____ feet Gage _____
_____" Diam. from _____ feet to _____ feet Gage _____
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☒ No ☐
Type of perforator used mill
Size of perforations 1/8 inches by 2 1/2 inches
_____ perforations from 210 feet to 230 feet
_____ perforations from 250 feet to 270 feet
_____ perforations from _____ feet to _____ feet
_____ perforations from _____ feet to _____ feet
_____ perforations from _____ feet to _____ feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____
Diam. _____ Slot size _____ Set from _____ ft. to _____

(9) CONSTRUCTION:
Was well gravel packed? Yes ☒ No ☐ Size of gravel: 3/4
Gravel placed from 100 feet to 270 feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 100 feet
Material used in seal: Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: _____ Depth of strata _____
Method of sealing strata off: _____

Was surface casing used? Yes ☐ No ☒
Was it cemented in place? Yes ☐ No ☒

(10) WATER LEVELS:
Static level 180 feet below land surface Date 7/6/91
Artesian pressure _____ feet above land surface Date _____

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Flow ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom? _____
Yield: _____ gal./min. with _____ feet drawdown after _____ hours
" _____ " _____ " _____ "
" _____ " _____ " _____ "
Bailer test _____ gal./min. with _____ feet drawdown after _____ hours
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 10 1/2 inches
Depth drilled 270 feet. Depth of completed well 270 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	3	X										
3	170										X	Volcanic Basalt
170	270										X	Red cinders

Work started July 1, 1991 Completed July 10, 1991

(14) PUMP:
Manufacturer's Name _____
Type: _____ H. P. _____
Depth to pump or bowls _____ feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Gardner Drilling (Person, firm, or corporation) (Type or print)
Address Box 18 New Castle, Ut. 84756
(Signed) J. L. Gardner (Well Driller)
License No. 492 Date July 22, 1991

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined
Recorded: B. C. ..... T. B. .....
Inspection Sheet
Copied

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. A2994 (81-2378)
Claim No.
Coordinate No.

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Bill Douglas
Address Box 920, Price 84770

(2) LOCATION OF WELL:
County Carbon Ground Water Basin (leave blank)
North 1230 feet, East 1260 feet from SE Corner
South West
of Section 36, T. 38 N. S, R. 11 E. W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
6" Diam. from 0 feet to 147 feet Gage
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☑ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☑ No ☐
Type of perforator used Torch
Size of perforations 1/8 inches by 6 inches
60 perforations from 60 feet to 147 feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? feet
Material used in seal:
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☐ No ☑
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 67 feet below land surface Date Aug 14 84
Artesian pressure feet above land surface Date

LOG RECEIVED: OCT 15 1984 WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☑ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " " "
Bailer test 70 gal./min. with 70 feet drawdown after 12 hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 inches
Depth drilled 147 feet. Depth of completed well 147 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	10											Sand Stone
10	30											" "
30	40											" "
40	50											" "
50	60											" "
60	70											" "
70	80											" "
80	90											Shale Yellow
90	120											Shale Yellow
120	147											Shale Blue

Work started Aug 9, 19 84 Completed Aug 14, 19 84

(14) PUMP:
Manufacturer's Name
Type: H. P.
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Price Drilling Co. (Person, firm, or corporation) (Type or print)
Address
(Signed) (Well Driller)
License No. 112 Date Sept 17, 19 84

SEE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined .....
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

(3)

Application No. A-12333 (81-2232)
Claim No. .....
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Jim Ballard
Address .....

(2) LOCATION OF WELL:
County Wash. Ground Water Basin ..... (leave blank)
North 970 feet, East 2127 feet from S.W. Corner of Section 36, T. 35 S, R. 11 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
8" Diam. from 0 feet to 145 feet Gage .188
" Diam. from ..... feet to ..... feet Gage .....
" Diam. from ..... feet to ..... feet Gage .....
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☑ No ☐
Type of perforator used mills
Size of perforations 4 inches by 3 inches
perforations from 90 feet to 95 feet
perforations from 130 feet to 143 feet
perforations from ..... feet to ..... feet
perforations from ..... feet to ..... feet
perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☑
Was it cemented in place? Yes ☐ No ☑

(10) WATER LEVELS:
Static level 20 feet below land surface Date July 15
Artesian pressure ..... feet above land surface Date .....

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

LOG RECEIVED
FEB 9 1984
WATER RIGHTS

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☑ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test 10 gal./min. with 135 feet drawdown after 1 hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☑ Yes ☐

(13) WELL LOG: Diameter of well 8 inches
Depth drilled 145 feet. Depth of completed well July 15 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	10						X					
10	20						X					
20	30	X										
30	40	X										
40	45	X										
45	55	X										
55	65	X										
65	75	X										
75	85	X										
85	95	X		X	X							
95	105	X										
105	116	X										
116	126	X		X	X							
126	135	X										
135	145	X		X	X							

Work started June 30, 19[illegible] Completed July 15, 19[illegible]

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Ballard Drilling Co. (Person, firm, or corporation) (Type or print)
Address Hurricane Utah
(Signed) Jim Ballard (Well Driller)
License No. 912 Date Dec 23, 1984

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—534—12-60

Examined
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

(4)

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 61-3678
Claim No. A.5.365
Coordinate No.

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Floyd Thayne
Address Logan, Utah

(2) LOCATION OF WELL:
County Kane Ground Water Basin (leave blank)
North/~~South~~ 1276 feet, East/~~West~~ 2127 feet from SW Corner of Section 36 T. 38 ~~N~~ S R 11 ~~E~~ W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☑
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
8 " Diam. from 0 feet to 25 feet Gage .250
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☑
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? feet
Material used in seal:
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☐ No ☐
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 115 feet below land surface Date 9/16/91
Artesian Pressure lbs. above land surface Date

LOG RECEIVED
SEP 26 1991
WATER RIGHTS
SALT LAKE

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☑ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " "
" " " "
Bailer test 1 gal./min. with 7.5 feet drawdown after 1½ hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 8 inches
Depth drilled 200 feet. Depth of completed well 200 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	15											Soil
15	25											Sand stone
25	50											" "
50	75											" "
75	100											" "
100	105											" "
105	117											Clay
117	125											Sandstone
125	150											Red Shale
150	175											Red Shale
175	200											Red Shale

Work started Sept 4, 1991 Completed Sept. 16, 1991

(14) PUMP:
Manufacturer's Name
Type: H. P.
Depth to pump or bowls feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Bullard Drilling Co. (Person, firm, or corporation) (Type or print)
Address Parowan, Utah
(Signed) Dan Bullard (Well Driller)
License No. 212 Date Sept 22, 1991

USE OTHER SIDE FOR ADDITIONAL REMARKS

(5) 65

Form 113—5M—12-60

Examined .....
Recorded: B. C. ..... T. D. .....
Inspection Sheet .....
Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 81-3605 (A15504)
Claim No. .....
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Robert Richard Heller
Address 6562 Cayuga Drive W. Lancaster Calif. 93563

(2) LOCATION OF WELL:
County Washington Ground Water Basin ..... (leave blank)
North 700 feet, East 2100 feet from N.W. Corner
~~South~~ West
of Section 35, T. 38 S, R. 11 W SLBM (strike out words not needed) W USM

(3) NATURE OF WORK (check):
New Well ☑ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE:
Threaded ☐ Welded ☑
6" Diam. from ..... feet to ..... feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS:
Perforated? Yes ☑ No ☐
Type of perforator used Torch
Size of perforations 1/4 inches by ..... inches
4 holes per ft. perforations from 360 feet to 400 feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS:
Well screen installed? Yes ☐ No ☐
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☑ No ☐ Size of gravel pea
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☐
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 207 feet below land surface Date 8-13-90
Artesian pressure ..... feet above land surface Date .....

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS:
Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test 3 gal./min. with 20 feet drawdown after 1 hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG:
Diameter of well 6" inches
Depth drilled 360 feet. Depth of completed well 360 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5											Soil
5	95											Tuff
95	210											red & brown Stone
210	500											light red sandstone
500	400											Red & brown Stone

Work started June 25, 1990 Completed Aug 13, 1990

(14) PUMP:
Manufacturer's Name Jacuzzi
Type: Jet H. P. 1½
Depth to pump or bowles 300 feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Sullivan Drilling Inc. (Type or print)
(Person, firm, or corporation)
Address Cedar City, Utah
(Signed) Robert Sullivan (Well Driller)
License No. 212 Date Aug 13, 1990

RECEIVED
AUG 24 1990
WATER RIGHTS
SALT LAKE

USE OTHER SIDE FOR ADDITIONAL REMARKS

AUG 18 1980
AUG 1 1 1980

(6)

(81-1567)

Form 115-Sbd—12-40

Examined 4/22/80 KET

Recorded: B. C. ..... T. B. .....

Inspection Sheet .....

Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

ch Application No. a-11180

Claim No. .....

Coordinate No. (A39S-10W) 2a d b

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Z.B.T., INC.
Address ST. GEORGE, UTAH

(2) LOCATION OF WELL:
County WASH. Ground Water Basin (leave blank) .....
North/South 1920 feet, East/West 1010 feet from NE Corner of Section 20, T 39 S, R 10 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
6 5/8" Diam. from 0 feet to 180 feet Gage .275
..." Diam. from ..... feet to ..... feet Gage .....
..." Diam. from ..... feet to ..... feet Gage .....
New ☑ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☑
Type of perforator used .....
Size of perforations ..... inches by ..... inches
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☐ No ☑
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☑
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☑
Was it cemented in place? Yes ☐ No ☑

(10) WATER LEVELS:
Static level 190 feet below land surface Date Aug 4, 80
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED:
RECEIVED
AUG 18 1980
WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☑ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test 15 gal./min. with 20 feet drawdown after 1 hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☑ Yes ☐

(13) WELL LOG: Diameter of well 6 5/8 inches
Depth drilled 285 feet. Depth of completed well 285 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	12	X			X							
12	50										X	TAN SHALE
50	90										X	GREY Shale - hard
90	105										X	GREY Shale - fractured
105	120										X	" " - hard
120	135										X	" "
135	143										X	TAN Shale - hard
143	155	X										Yellow
155	165	X										RED
165	170										X	RED sandy shale
170	185										X	Brown Sand Stone - water
185	270										X	GREY shale
270	285										X	" " - fractured & more water

Work started July 22, 1980 Completed Aug 4, 1980

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name BALLARD DRILLING CO. (Person, firm, or corporation) (Type or print)
Address HURRICANE UTAH
(Signed) [signature] (Well Driller)
License No. 212 Date Aug 9, 1980

USE OTHER SIDE FOR ADDITIONAL REMARKS

RECEIVED
OCT 11 1978

no location
81-1587

Form 113—5M—12-60

Examined .....
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

REPORT OF WATER WELL DRILLER
STATE OF UTAH

Application No. A-8740
Claim No. .....
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Zion Building Industries - Dave ~~Limbacher~~
Address Kolob Mountain

(2) LOCATION OF WELL:
County Washington Ground Water Basin ..... (leave blank)
North ..... feet, East ..... feet from ..... Corner
South ..... West .....
of Section 20, T. 39 ~~N~~ S, R. 10 ~~E SLBM~~ W USM (strike not words not needed)

(3) NATURE OF WORK (check):
New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE:
Threaded ☐ Welded ☒
6 " Diam. from 0 feet to 40 feet Gage .....
" Diam. from ..... feet to ..... feet Gage .....
" Diam. from ..... feet to ..... feet Gage .....
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS:
Perforated? Yes ☐ No ☒
Type of perforator used .....
Size of perforations ..... inches by ..... inches
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS:
Well screen installed? Yes ☐ No ☒
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 20 feet
Material used in seal: Grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level 250 feet below land surface Date 9-11-78
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS:
Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" " " " "
" " " " "
Bailer test ..... gal./min. with ..... feet drawdown after ..... hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☒ Yes ☐

(13) WELL LOG:
Diameter of well 8 inches
Depth drilled 300 feet. Depth of completed well 300 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5	X										Dark Brown
5	6			X								Sandstone
6	15	X										Dark Brown
15	17			X								Sandstone - White
18	25	X										Red Clay
25	50	X										Red Clay, Some White
50	206										X	Hard gray shale
206	210	X										Brown Clay
210	218	X										Red Clay
218	221										X	Gray Shale
221	230										X	Red & Brown Shale
230	300										X	Gray Shale

Work started Sept. 7, 1978. Completed Sept. 8, 1978

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Terrence Frandsen (Type or print)
(Person, firm, or corporation)
Address PO Box 235 WASHINGTON UTAH 84780
(Signed) Terrence Frandsen (Well Driller)
License No. 476 Date ..... 19....

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined ..... Recorded: B. C. ..... T. B. ..... Inspection Sheet ..... Copied .....

(7)

KT. 11-13-92

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 81-1191
Claim No. 214423
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Jackson Construction Co.
Address 3033 Sugar Loa Rd. St. Geo. 84770

(2) LOCATION OF WELL:
County Wash. Ground Water Basin (leave blank) .....
North 700 feet, East 2102 feet from N100 E660 NW Corner
South ..... feet, West .....
of Section 19 T. 39 S, R. 10 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
10" Diam. from 12" T feet to 300 feet Gage .250
..... " Diam. from ..... feet to ..... feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☒ No ☐
Type of perforator used Mill
Size of perforations 1/8 inches by 3 1/2 inches
..... perforations from 200 feet to 300 feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☒ No ☐ Size of gravel: pea
Gravel placed from 100 feet to 300 feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 100 feet
Material used in seal: cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☒
Was it cemented in place? Yes ☐ No ☒

(10) WATER LEVELS:
Static level 200 feet below land surface Date .....
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED

(11) FLOWING WELL:
Controlled by (check) Valve ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

RECEIVED NOV 2 1992 WATER RIGHTS SALT LAKE

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test ..... gal./min. with ..... feet drawdown after ..... hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 10 inches
Depth drilled 300 feet. Depth of completed well 300 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheets if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
1	30	X	X			X						
30	130										X	Black Basalt
130	215	X									X	Red clay Soft Shale layers
215	250										X	Sand Shale
250	300										X	Sandstone

Work started 9-26, 19 92 Completed 10-15, 19 92

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Gardner Drilling (Person, firm, or corporation) (Type or print)
Address Box 8 New Castle Ut.
(Signed) Dale Gardner (Well Driller)
License No. 492 Date 10-26, 19 92

USE OTHER SIDE FOR ADDITIONAL REMARKS

(81-583)
(81-795)

Form 115—5M—12-60

Examined 8-7-62 R.C.T.
Recorded: B. C. ..... T. B. .....
Inspection Sheet 8-10-62
Copied .....

8

RECEIVED JUL 2 1962 STATE ENGINEER

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. ..... Test hole
Coordinate No. 39-10 19 DDD

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Otual Wright
Address Hurricane, Utah

(2) LOCATION OF WELL:
County Washington Ground Water Basin ..... (leave blank)
~~North~~ South 500 feet, ~~East~~ West 100 feet from NW Corner of Section 19, T. 39 S, R 16 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☑

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
6" Diam. from 0 feet to 36 feet Gage 3/16
..." Diam. from ..... feet to ..... feet Gage .....
..." Diam. from ..... feet to ..... feet Gage .....
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☑
Type of perforator used Torch
Size of perforations ¼ inches by ..... inches
..... perforations from 16 feet to 54 feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☐
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☑ No ☐
Was it cemented in place? Yes ☐ No ☑

(10) WATER LEVELS:
Static level 13 feet below land surface Date July 13, 62
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test 3 gal./min. with ..... feet drawdown after ..... hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6" inches
Depth drilled 165 feet. Depth of completed well 165 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	25	X		X	X							
25	35	X										Blue
35	50	X										Blue
50	55	X										Blue
55	110	X										Red Sticky
110	115											Shaly Shale
115	125											Red Sandstone
125	165											Red Sandstone

Work started July 11, 1962 Completed July 13, 1962

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowls ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Lita Ella Ward (Person, firm, or corporation) (Type or print)
Address Hurricane, Utah
(Signed) Lita Ella Ward (Well Driller)
License No. 742 Date July 24, 1962

USE OTHER SIDE FOR ADDITIONAL REMARKS

WL1

W LL DRILLER'S REPO T

State of Utah
Division of Water Rights

9

For additional space, use "Additional Well Data Form" and attach

Well Identification

CHANGE APPLICATION: a21236(81-4158)

RECEIVED
AUG 27 1999
WATER RIGHTS
SALT LAKE

Owner *Note any changes*

Durham, John R.
1239 West 4200 North
St. George, UT 84770

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
NORTH 700 feet EAST 30 feet from the W4 Corner of
SECTION 19, TOWNSHIP 39S, RANGE 10W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) ~~Woodland Retreat~~

Drillers Activity Start Date: 6/23/99 Completion Date: 7/23/99

Check all that apply:
☒ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0'	140'	11"	Cable tool	NONE

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	7		/								/		BLACK	Topsoil
7	31			/								SANDSTONE	TAN	MEDIUM HARD
31	37	X	X		X			X					GRAY	WATER QUALITY UNKNOWN - SEEPAGE
37	50			X								SANDSTONE	TAN	MEDIUM HARD
50	75			X	X								TAN	
75	81	X		X								SANDSTONE	TAN	HARD - BROKEN (WATER BEARING)
81	87		X			X	X						BROWN	MUD
87	105			X								SANDSTONE	TAN	HARD
105	116			X								SANDSTONE	RED	MEDIUM
116	140			X								SANDSTONE	RED	HARD

Static Water Level

Date 8-11-99 Water Level 60 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement PIEZOMETER If Flowing, Capped Pressure PSI

Point to Which Water Level Measurement was Referenced Top of casing

Height of Water Level reference point above ground surface 2 feet Temperature ☐ °C ☐ °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0'	70'	6.58" O.D. .250 WALL STEEL A53B-84	.250	6"	70'	110'	1/8"	2.5"	12
110'	140'	STEEL A53B-84	.250	6"					

Well Head Configuration: Pitless Adapter Access Port Provided? ☐ Yes ☒ No

Casing Joint Type: WELDED Perforator Used: No

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0'	50'	CEMENT GROUT	2 yds.	6gal to 1sack to Equal sand
50'	140'	3/8 PEA GRAVEL	3 yds.	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
7/23/99	Pumping	2	✓		40	6

Pump (Permanent)

Pump Description: [redacted] JACUZZI Horsepower: 1/2 Pump Intake Depth: 135' feet

Approximate maximum pumping rate: 16gpm Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name TRI-STATE Drilling (Person, Firm, or Corporation – Print or Type) License No. 710

Signature Robert C. Roehm (Licensed Well Driller) Date 8/23/99

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights
For additional space, use "Additional Well Data Form" and attach

RECEIVED
MAY 23 2001
WATER RIGHTS
SALT LAKE

Well Identification

CHANGE APPLICATION: a24035(81-4335)

Owner *Note any changes*

McCombs, Douglas T.
3045 Sunrise Heights Drive
Henderson, NV 89052

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
SOUTH 660 feet WEST 1980 feet from the NE Corner of
SECTION 18, TOWNSHIP 39S, RANGE 10W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Kolob Area

Start Date: 5-2-01 Completion Date: 5-17-01

Check all that apply: ☑ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use:

If a replacement well, provide the location of the new well. ____ feet north/south and ____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	30	12 5/8	Rotary	Air
30	705	7 7/8	Rotary	Air Foam

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	10			X	X	X							Brown	clay & silt some fine gravel
10	20			X								siltstone	Tan	silt stone
20	35			X								sandstone	Grey	silt sandstone
35	45			X								claystone	Tan	clay stone
45	50			X								claystone	Grey	claystone
50	70			X								siltstone	Red	siltstone Red some blue chips
70	80			X								sandstone	Tan	Fine sandstone
80	110			X								siltstone	Red	siltstone Red some Blue chips
110	145			X								Silty sands	Red	silty sandstone Red
145	195			X								Siltstone	Red	Silt Stone

Static Water Level

Date 110 water Water Level – feet Flowing? ☐ Yes ☐ No

Method of Water Level Measurement Air If Flowing, Capped Pressure ____ PSI

Point to Which Water Level Measurement was Referenced ____ Ground Elevation (If known) ____

Height of Water Level reference point above ground surface ____ feet Temperature ____ ☐ °C ☐ °F

SCANNED

Well Log

A DITIONAL WELL DATA FO M

Water Right #_____

OWNER NAME

Well Log DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g. relative %, grain size, sorting, angularity, bedding, grain composistion, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
195	360			x								Siltstone	Grey	Shale
360	385			x								Siltstone	Red & White	Shale some gypsum
385	445			x								Siltstone	Grey	Shale
445	490			x								Limestone	Grey	
490	585			x								Siltstone	Grey	
585	595			x								Siltstone	Red	"
595	605			x								Sandstone	Red & White	Sandstone Fine grained Red & White
605	705			x								Sandstone	Pink	Sandstone Pink & White Fine grained

RECEIVED
MAY 23 2001
WATER RIGHTS
SALT LAKE

SCANNED

[redacted] Well Log [redacted]

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	☐ SCREEN ☐ PERFORATIONS ☐ OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	30	Steel	.250	8					

Well Head Configuration: weld on cap Access Port Provided? ☐ Yes ☒ No

Casing Joint Type: weld Perforator Used: _____

Was a Surface Seal installed? ☑ Yes ☐ No Depth of Surface Seal: 30 feet Drive Shoe? ☐ Yes ☐ No

Surface Seal Material Placement Method: _____

Provide Seal Material description below:

DEPTH (feet) FROM	TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	30	Bentonite chips	20 50# bags	5 gal per bag

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Layers of very unstable shale 195 - 360, lost 30 ft of hole after one day, Drilled 360 to 605 lost 40 feet after one day, Drilled sandstone 605 to 705 returns were mostly shale from up hole. Needs to be cased if deepend.

Well Driller Statement This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Cluff Drilling & Pump (Person, Firm, or Corporation - Print or Type) License No. 441

Signature Walter Cluff (Licensed Well Driller) Date 5-18-01

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

(11)

RECEIVED

WATER RIGHTS
SALT LAKE

Well Identification CHANGE APPLICATION: a18809(81-3968)

Owner *Note any changes*
Spruce Culinary Water Company
P.O. Box 177
Logandale, NV 89021

Contact Person/Engineer: Curtis Waite

Well Location *Note any changes*
COUNTY: Washington
SOUTH 50 feet WEST 50 feet from the NE Corner of
SECTION 11, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) Near Kolob Reservoir 1.5 miles up road to Kolob Mountain Ranch

Drillers Activity Start Date: July 26, 1995 Completion Date: Sept 13 1995

Check all that apply:
[x] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [x] Public Nature of Use: water system

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	80	10"+	rotary air	water
80	120	8"+	cable tool	water
120	217	6"	rotary air and cable tool	water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	26													boulders, clay lava rocks
26	34												blk	lava
34	48												red	lava
48	64												blk	lava
64	89												blk-gray	lava cinders soft, lost air returns
89	96												blk	hard lava
96	114												blk	med hard lava with soft spots
114	129												blk	hard lava
129	135													med to soft lava with clay,cinders
135	147												red	" " " " " "

Static Water Level

Date sept 13 1995 Water Level 142 feet Flowing? ☐ Yes ☐ No

Method of Water Level Measurement drill tool If Flowing, Capped Pressure _____ PSI

Point to Which Water Level Measurement was Referenced ground

Height of Water Level reference point above ground surface _____ feet Temperature _____ ☐ °C ☐ °F

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	SCREEN [ ] PERFORATIONS [ ]: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
+2	120	steel	1/4"	6"ID					
+2	205	F 480 pvc 17		4.5"	185	205	.030		

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ No

Casing Joint Type: steel-welded PVC-certa lock Perforator Used: _____

DEPTH (feet) FROM	DEPTH (feet) TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	100+	grout	5 yards	12 sack mix

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	Units Check One: CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	air	30	x			2 hrs
sept 13	bailer					2 hrs

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Clay layers at 160- 170 continued to slip and cave blocking water, took 2 days with cable tool to redrill and bail, redrill and bail in order to set 4.5" liner, each attempt to bail the well clean would collasp well at 160' to 170' so had to set the 4.5" liner without bailing the well clean. The clays have chunks of sandstone in them and should

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Thayer Well Drilling (Person, Firm, or Corporation—Print or Type) License No. 661

Signature [signature] (Licensed Well Driller) Date Sept. 25, 1995

ADDITIONAL WELL DATA FORM

Water Right # a18809(81-3968)

OWNER NAME Spruce culinary

Page ____ of ____

Well Log DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
147	172													silty yellowish brn, black, gray clays
														some softish siltstone, hunks of sand
														stone in parts of the clay
172	175												brn	tanish sandstone some water, but dries up
175	190												brn	silty clay with rock ledges
190	193												tan	sandstone with water
193	203													broken rock with some clays more water
203	217													clays, gray, blue, white, with the
														gray clay slick jointed and heaving
														into the well

Construction Information (con't)

DEPTH (feet)		CASING			DEPTH (feet)		SCREEN ☐ PERFORATIONS ☐		
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)

DEPTH (feet)		FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL		
FROM	TO	ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)

Comments (con't)

when clay collaspes at the 160 to 170 ft area a seal should form around the liner at that point leaving the screen open at the water bearing areas 193' to 203' areas

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Thayer Well Drilling (Person, Firm, or Corporation – Print or Type)

License No. 661

Signature [signature] (Licensed Well Driller)

Date Sept 25 1995

WL1

(72)

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

CHANGE APPLICATION: a21452(81-4166)

RECEIVED
AUG 28 1998
WATER RIGHTS
SALT LAKE

Owner *Note any changes*

KC Unlimited
5520 Stephanie St.
Las Vegas, NV 89122

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
NORTH 300 feet WEST 1250 feet from the SE Corner of
SECTION 2, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)
~~Near Kolob Reservoir~~

Drillers Activity Start Date: July 22 Completion Date: Aug 9

Check all that apply:
☒ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	300	10	Air R.	water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABILITY high	PERMEABILITY low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	8				X	X			X	X				
8	165										X	Lava	Black	
165	300										X	Shale		

Static Water Level

Date Aug 9 Water Level 210 feet Flowing? ☐ Yes ☐ No
Method of Water Level Measurement probe If Flowing, Capped Pressure — PSI
Point to Which Water Level Measurement was Referenced ground
Height of Water Level reference point above ground surface — feet Temperature ☒ °C ☐ °F

[redacted] *Well Log* [redacted]

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
18"	200	Steel	.250	6	260	200	5/32 x 2½		

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☒ No

Casing Joint Type: Welded Perforator Used: mill

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	20	Bentonite hole plug		
20	200	pea gravel		

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	N/A					

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Dale Gardner (Person, Firm, or Corporation – Print or Type) License No. 492

Signature Gardner Drilling (Licensed Well Driller) Date Aug 19 1998

13

WL1

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification CHANGE APPLICATION: a21477(81-4172)

Owner *Note any changes*
Bleak, Duane
1545 East 1850 South
St. George, UT 84790

RECEIVED
AUG 28 1998
WATER RIGHTS
SALT LAKE

Contact Person/Engineer:

Well Location *Note any changes*
COUNTY: Washington
NORTH 900 feet WEST 1120 feet from the SE Corner of
SECTION 2, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) Near Kolob Reservoir

Drillers Activity Start Date: Aug 10 1998 Completion Date: Aug 15 1998

Check all that apply:
☒ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	200	10"	Air R.	Water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABILITY high	PERMEABILITY low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	12				X	X			X	X				
12	125										X	Lava	Black	
125	200										X	Shale		

Static Water Level
Date Aug 14 Water Level 130 feet Flowing? ☐ Yes ☒ No
Method of Water Level Measurement probe If Flowing, Capped Pressure — PSI
Point to Which Water Level Measurement was Referenced ground
Height of Water Level reference point above ground surface — feet Temperature ☒ °C ☐ °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
2'	300	Steel	.250	6"	260	300	5/32 x 2½		

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☒ No

Casing Joint Type: Welded Perforator Used: mill

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	20	Bentonite hole plug		
20	300	pea gravel		

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	N/A					

Pump (Permanent)

Pump Description: N/A Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Drilling Gardner (Person, Firm, or Corporation – Print or Type) License No. 492

Signature Dale Gardner (Licensed Well Driller) Date Aug 17 1998

WELL DRILLER'S REPORT 14

State of Utah
Division of Water Rights
For additional space, use "Additional Well Data Form" and attach

RECEIVED
OCT 17 2002
WATER RIGHTS
SALT LAKE

Well Identification CHANGE APPLICATION: a24842(81-990)

Owner *Note any changes*

Sorenson, Karl
3575 Santa Anita Drive
St. George, UT 84790

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
SOUTH 2615 feet EAST 1212 feet from the N4 Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Near Kolob Reservoir

Start Date: Aug-20-02 Completion Date: Oct-15-02

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use:

If a replacement well, provide the location of the new well. ____ feet north/south and ____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	60	11"	Rotary	Air
60	410	10"	"	"

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	27			X	X					X	X	Basalt	Black	very hard
27	150			X							X	"	"	" "
150	165		X								X	Basalt + sandstone	Black brown	" "
165	180										X	mudstone	brown	
180	240										X	limestone	gray	hard
240	280										X	mudstone	brown	
280	410										X	sandstone	"	

Static Water Level

Date Oct-15-02 Water Level 40 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement Probe If Flowing, Capped Pressure ____ PSI

Point to Which Water Level Measurement was Referenced ground Ground Elevation (If known) ____

Height of Water Level reference point above ground surface — feet Temperature ____ ☐ °C ☐ °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	☐ SCREEN ☒ PERFORATIONS ☒ OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
2+	410	Steel	.250	6	330	410	5/32	2 1/2	6 rows

Well Head Configuration: Capped Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: Welded Perforator Used: mill

Was a Surface Seal installed? ☒ Yes ☐ No Depth of Surface Seal: 50 feet Drive Shoe? ☐ Yes ☒ No

Surface Seal Material Placement Method: pumped in from bottom up

Provide Seal Material description below:

DEPTH (feet) FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	50	Cement grout	44 bags = 440 lbs	12 bag mix 18
50	100	3/4 gravel	1 yard	
100	410	Pea gravel	7 yards	

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
Oct-15-02	Submersible pump	100	X		150'	24 hrs

Pump (Permanent)

Pump Description: N/A Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Gardner Brother Drilling License No. 492
(Person, Firm, or Corporation - Print or Type)

Signature Dale Gardner Date Oct-15-02
(Licensed Well Driller)

Form 113—5M—12-60

Examined 12/3/75 WO.
Recorded: B. C. 12/8/75 T. B. WO.
Inspection Sheet
Copied

15

A-1399

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 9-76985
Claim No.
Coordinate No. (C-39-4) 12 cad

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Owen Watkins
Address Hurricane Utah

(2) LOCATION OF WELL:
County Washington Ground Water Basin (leave blank)
North ~~South~~ 1630 feet, ~~East~~ West 650 feet from SW Corner of Section 12, T. 39 S N, R. 11 W E SLBM ~~W USM~~ (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☐ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☐
6" Diam. from 0 feet to 145 feet Gage
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☒
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☐
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☐ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 140 feet
Material used in seal: Clay & Cement.
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level feet below land surface Date
Artesian pressure feet above land surface Date

LOG RECEIVED: NOV 28 1975 WATER RIGHTS C E E U

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☒ No ☐ If so, by whom? Owner
Yield: 5 gal./min. with 6 feet drawdown after 8 hours
" " " " "
" " " " "
Bailer test gal./min. with feet drawdown after hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6" PVC inches
Depth drilled 145 feet. Depth of completed well 145 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	75										X	Lava (Some water)
75	140										X	Lava - Cavities
140	145											Water
145	155				X						X	Lava ground

Work started NOV. 3 19 Completed NOV 5 1975

(14) PUMP:
Manufacturer's Name Berkley
Type: Sub H. P. 1 HP
Depth to pump or bowles 140 feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Ricky Johnson Driller Cont. (Person, firm, or corporation) (Type or print)
Address Box 494 St. Geo Utah
(Signed) (Well Driller)
License No. Date NOV 5 1975

USE OTHER SIDE FOR ADDITIONAL REMARKS

(16)

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights
For additional space, use "Additional Well Data Form" and attach

Well Identification CHANGE APPLICATION: a24843(81-3879)

Owner *Note any changes*

Sorenson, Karl
3575 Santa Anita Drive
St. George, UT 84770

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
SOUTH 886 feet WEST 670 feet from the N4 Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Near Kolob Reservoir

Start Date: 11-12-01 Completion Date:

Check all that apply: [x] New [ ] Repair [ ] Deepen [ ] Clean [ ] Replace [ ] Public Nature of Use:

If a replacement well, provide the location of the new well. ____ feet north/south and ____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	336	7 7/8	Rotary	water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	20					x				x		volcanic	redish	black
20	40				x	x				x		"	"	
40	60				x	x				x		"	"	Hard drilling
60	65				x	x				x		"	"	
65	78			x	x	x				x		"	"	Easier drilling fractured area
78	80			x	x					x		"	"	
80	100			x						X		X	black	Verd hard rock
100	115		x			x	x			x		"	"	
115	136					x	x	x				"	"	Drilling alittle easier
136	140					x	x	x				"	redish	brown

Static Water Level

Date July 24, 2002 Water Level 119 feet Flowing? [ ] Yes [x] No

Method of Water Level Measurement electronic tape If Flowing, Capped Pressure ____ PSI

Point to Which Water Level Measurement was Referenced top of casing Ground Elevation (If known) ____

Height of Water Level reference point above ground surface 2' feet Temperature N/A [ ] °C [ ] °F

Well Log

ADDITIONAL WELL DATA FORM

Water Right #_____

OWNER NAME KARL SORENSON

Well Log DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g. relative %, grain size, sorting, angularity, bedding, grain composistion, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
140	160				x		x	x				volcanic	redish	brown Very hard drilling
160	180									x		"	"	"
180	200									x		"	"	"
200	296									x		"	"	"
296	330									x		"	"	"
330	336									x		"	"	"

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	☐ SCREEN ☒ PERFORATIONS ☐ OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
+2	336	PVC SDR 17		5	230	336	¼	6	4 per round

Well Head Configuration: PVC slip cap Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: bell glue Perforator Used: saw

Was a Surface Seal installed? ☐ Yes ☐ No Depth of Surface Seal: _____ feet Drive Shoe? ☐ Yes ☐ No

Surface Seal Material Placement Method: _____

Provide Seal Material description below:

DEPTH (feet) FROM	TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
6-24-02	Air surge	10	X			6 hr.

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Received permission from State Engineers Office, Jim Goddard to remove rig for another job.

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Gary's Drilling License No. 689
(Person, Firm, or Corporation - Print or Type)

Signature _____ Date _____

WL1

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

17

For additional space, use "Additional Well Data Form" and attach

Well Identification WATER RIGHT APPLICATION: 81-1441(D2217)

RECEIVED DEC 30 1994

RECEIVED DEC 27 1994 WATER RIGHTS CEDAR CITY

Owner *Note any changes*
Anderson, Richard E. & Donna M.
4044 S. 13th East
Salt Lake City, UT 84117

Contact Person/Engineer: WATER RIGHTS

Well Location *Note any changes*
COUNTY: Washington
SOUTH 1093 feet EAST 1094 feet from the NW Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, nearest city, buildings, landmarks, ground elevation, local well #) Rolob Terrace

Drillers Activity Start Date:_____ Completion Date:_____

Check all that apply: [X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use: DOM

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0'	178'	6"	Air Rotary	Mist

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	10'													Top Soil
10'	20'											Lava		
20'	50'											Lava	Red	
50'	60'											Lava	Gray Red	Hard
60'	90'											Cinder Ash	Red	Soft
90'	100'											Lava		Hard
100'	140'											Lava		Soft
140'	150'													Hole - Lost Circulation
150'	160'	✓										Lava-Hard		Case to 150 Ft.
160'	178'	Bottom												Water G.P.M. Open Hole

Static Water Level

Date_____ Water Level_____ feet Flowing? [ ] Yes [ ] No

Method of Water Level Measurement_____ If Flowing, Capped Pressure_____ PSI

Point to Which Water Level Measurement was Referenced_____

Height of Water Level reference point above ground surface_____ feet Temperature_____ [ ] °C [ ] °F

[redacted] *Well Log* [redacted]

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0'	150'	Steel	#188	6 5/8 O.D.	0'	178'	None	None	—

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ No

Casing Joint Type: _____ Perforator Used: _____

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0'	150'	—	Approx 2½ yds	9 Bag mix - Neat Cement

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	Submersible Pump		40		10'-15'	36 Hrs

Pump (Permanent)

Pump Description: Berkeley - Horsepower: 1-220 Volts Pump Intake Depth: 165 feet

Approximate maximum pumping rate: 22-28 GPM Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name: Rudy Johnson (Person, Firm, or Corporation - Print or Type) License No. 330

Signature: Rudy Johnson (Licensed Well Driller) Date 7/20/79

Construction Information (con't)

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN [ ]: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	PERFORATIONS [ ]: SCREEN TYPE OR NUMBER PERF (per round/interval)

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)

Comments (con't) to the bottom of well. I then bailed well to bottom two different days. the well percored slow and I couldn't determine what the flow was. it was told the well had a good yield in the Spring and early summer, but topped off on the late fall.

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Thayer Well Drilling (Person, Firm, or Corporation – Print or Type) License No. 661

Signature Steve A. Thayer (Licensed Well Driller) Date ~~Oct~~ Nov 20, 1996

WL1

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WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification
CHANGE APPLICATION: a17498(81-3459)

Owner *Note any changes*
Michaels, John and Dianna
6358 LaPalma Parkway
Las Vegas, NV 89118

RECEIVED
JUN 18 1998
WATER RIGHTS
SALT LAKE

Contact Person/Engineer:

Well Location *Note any changes*
COUNTY: Washington
NORTH 990 feet EAST 1232 feet from the S¼ Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)
~~2 mi. south of Kolob Reservoir~~

Drillers Activity Start Date: 9/1/95 Completion Date: 9/29/95

Check all that apply:
☒ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	147	10"	Air Drilling	Foam

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	35										X	Lava Rock		
35	55										X	Cinders		
55	110										X	Lava Rock		
110	147							X						

Static Water Level
Date 9/28/95 Water Level 65 feet Flowing? ☐ Yes ☒ No
Method of Water Level Measurement Mark on drill pipe Flowing, Capped Pressure PSI
Point to Which Water Level Measurement was Referenced top of casing
Height of Water Level reference point above ground surface 2 feet Temperature ☐ °C ☐ °F

[redacted] *Well Log* [redacted]

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	SCREEN ☐ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	127	A 252 B Steel	.250	6 5/8	127	147	3/8 - 3"		

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ No

Casing Joint Type: _____ Perforator Used: _____

DEPTH (feet) FROM	DEPTH (feet) TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./suck etc.)
0	60	Cement Seal		
60	147	Gravel pack		

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name A+A Pump + Drilling (Person, Firm, or Corporation -- Print or Type) License No. 27

Signature Steven R. Engelking (Licensed Well Driller) Date 5/10/98

19

State of Utah
Division of Water Rights

RECEIVED
APR 26 1995
WATER RIGHTS
SALT LAKE

For additional space, use "Additional Well Data Form" and attach

Well Identification CHANGE APPLICATION: a16110(81-976)

Owner *Note any changes*
Wright, Orval
P.O. Box 641
Hurricane, UT 84737

Contact Person/Engineer:

Well Location *Note any changes*
COUNTY: Washington
SOUTH 821 feet EAST 1920 feet from the NW Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) Kolob Terrace

Drillers Activity Start Date: August 94 Completion Date: August 94

Check all that apply:
[X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	20	10"	Rotary	air
20	82	9"	Rotary	air
82	152	8"	Cable tool	water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	8		X		X	X			X			volcanic	Blk/red	soil and volcanic boulders minimal sand
8	20			X								Volcanic	Red	medium Hard
20	30			X								Volcanic	Blk	Hard
30	50		X	X								Volcanic	Red	Soft. 30-40 then Hard 40-50'
50	70			X								Volcanic	Red	Hard Red Volcanic Rock
70	94			X								Volcanic	Black	Very Hard Rock tough
94	100			X								Volcanic	Red	lava was softer
100	115			X								Volcanic	Black	Med. Lava Some softer
115	132	X	X		X	X	X				X	"	Blk/red	Blk-Red Vol. Rocks / Cinders / clay lenses sand
132	152			X								"	Blk	med lava transition 132-135'

Static Water Level

Date August 94 Water Level 105 feet Flowing? [ ] Yes [X] No
Method of Water Level Measurement Drill tool If Flowing, Capped Pressure PSI
Point to Which Water Level Measurement was Referenced Ground
Height of Water Level reference point above ground surface feet Temperature [ ] °C [ ] °F

Well Log

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
+2½	152	F480 PVC	SDR 17	5" ID	112	152	7/64"	5" ID.	15 per ft.

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ No

Casing Joint Type: Lenta lock Perforator Used: Pre perforated

FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL

DEPTH (feet) FROM	DEPTH (feet) TO	ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
94	152	1/4" pea gravel	2-pickup loads	
0	94	Sand grout	2 pickup loads sand 24 sacks cement	Appx. 9 sack mix

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	Units Check One CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
aug	Bailer	5	✓		to bottom	3 hrs
Oct.	Pump (owner pump additional)	10+	✓			8+ hours

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

This was quite difficult - there were some loose rock cinders at water entry points 115-130' - stuck tools numerous times - customer requested a 100 ft. Grout - and we had about 94-96' - but from 40' to 115 ft had hard solid low permeability volcanic rocks // a fair amount of fine sand during development

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name: Thayer Well Drilling (Person, Firm, or Corporation – Print or Type) License No. 661

Signature: Steve D. Thay (Licensed Well Driller) Date: April 20, 1995

WL1

WELL DRILLER'S REPORT

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State of Utah
Division of Water Rights

RECEIVED
SEP 15 1994
WATER RIGHTS
SALT LAKE

For additional space, use "Additional Well Data Form" and attach

Well Identification

WATER RIGHT APPLICATION: 81-1400(D2217)

Owner *Note any changes*

Wright, Orval
P.O. Box 641
Hurricane, UT 84737

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
NORTH 376 feet EAST 1189 feet from the W¼ Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity

Start Date: Completion Date: July 16, 1994

Check all that apply:
☒ New ☒ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use: DOM

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	30	13"	Cable tool & Rotary	air-rotary water-cable tool
30	110	10"	Cable tool pilot / Rotary ream	air-rotary " "
110	140	9"+	" "	" "

Well Log

140-160+ cable tool - 6" bore hole

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	3		✓							✓	✓	Lava top soil		top soil with lava rocks / boulders
3	13			✓	✓								Brn	
13	16			✓								Lava	Red	
16	31			✓								Lava	Black	Very hard
31	43		✓									Lava	Red	Honeycomb, some mud
43	48			✓								Lava	Blk/Brn	Med hard
48	72			✓								Lava	Blk	Some brn lapilli - hard
72	83			✓								Lava	Red	med. hard
83	95		✓									Lava	Red	soft lava some cinders / parts are permeable
95	113	✓										Lava	Red	medium hard

Static Water Level

Date Water Level 102 feet Flowing? ☐ Yes ☒ No
Method of Water Level Measurement Cable tool If Flowing, Capped Pressure PSI
Point to Which Water Level Measurement was Referenced ground level
Height of Water Level reference point above ground surface feet Temperature ☐ °C ☐ °F

Well Log

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	140	Steel-mild	.188	6"	120	140	1/8"	2"	5 rows

Well Head Configuration: _____ Access Port Provided? ☐ Yes ☐ No

Casing Joint Type: Butt joint weld Perforator Used: pre cut

DEPTH (feet) FROM	DEPTH (feet) TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0'	95'	Grout	Apx 3yds	95# mix 1gal

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	air develop		10			4hrs

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well yielded about 4gpm before developing — increased as mud cleared from crevices. In Cable tool drilling rock fell on bit getting stuck in hole numerous times. Water level did not vary from winter to late spring summer.

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name: Thayer Well Drilling (Person, Firm, or Corporation - Print or Type) License No. 661

Signature: _____ (Licensed Well Driller) Date: Sept 8 1996

RECEIVED

Water Right # 81-1400

ADDITIONAL WELL DATA FORM

OWNER NAME

Page ___ of ___

Well Log DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
113	130			✓								Cova		medium hard
130	136	✓	X									Cova	Blk/Brn	Broken Cova Some mud and cinders
136	160											Cova	Black	a grainy lava crushes to a black sand - med hard solid formation

WI-1

WELL DRILLER'S REPORT

21

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification: WATER RIGHT APPLICATION: 81-992(D2018)

RECEIVED DEC 30 1994 WATER RIGHTS

RECEIVED DEC 27 1994 WATER RIGHTS CEDAR CITY

Owner (Note any changes): Mathews, Tony
P. O. Box 116
Virgin, UT 84779

Contact Person/Engineer:

Well Location (Note any changes): COUNTY: Washington
NORTH 1541 feet EAST 1107 feet from the W¼ Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity — Start Date: _____ Completion Date: _____

Check all that apply: X New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use: DOM

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0'	140'	6"	Air Rotary	Mist

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
-0-	10'													Top Soil
10'	20'											LAVA		
20'	30'													
30'	35'											Cinders		
35	40'													
40'	42'													
42	50'											LAVA		
50'	60'													
60'	70'											Cinders		
70	75'													

Static Water Level

Date _____ Water Level 40' feet Flowing? [ ] Yes [ ] No

Method of Water Level Measurement Electric Probe If Flowing, Capped Pressure No PSI

Point to Which Water Level Measurement was Referenced From Surface to Water Level

Height of Water Level reference point above ground surface 40 feet Temperature 42° [ ] °C [X] °F

[redacted] Well Log [redacted]

RECEIVED
DEC 27 1994
WATER RIGHTS
Place of Use
CEDAR CITY

ADDITIONAL WELL DATA FORM

Water Right # 81-992(D2013)

OWNER NAME Mathews, Tony

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
75'	80'	1st												
80'	90'													
90'	100'											Lava + Cinders		
100'	110'						X						Black	4'-5'
110'	125'	✓					X	X				Small + Sand		Water 8'-10'
125'	130'							X				Larger		
130'	140'											Shale	white	
140'	155											"		Stopped

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☒: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
	1'		.188	6 5/8 O.D	0'	155'	1/8x3"	No Screen From 116' Perf.	

Well Head Configuration: Sanitary Seal Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: Butt Weld Perforator Used: Clean Slot

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL, and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0'	110'		Approx. 2 yds	9 Bag - Neat Cement

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	Submerable Pump		40		10'-15'	5 DAYS (24 hrs DAILY)

Pump (Permanent)

Pump Description: Berkeley Horsepower: 1 1/2 Pump Intake Depth: 145' feet

Approximate maximum pumping rate: 35-45 GPM Well disinfected upon completion? ☒ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name: Rudy Johnson (Person, Firm, or Corporation - Print or Type) License No. 330

Signature: Rudy Johnson (Licensed Well Driller) Date 6/22/77

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Form 113—5M—12-60

Examined .....
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 36260 (81-631)
Claim No. .....
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Leon Glazier
Address Hurricane, Utah

(2) LOCATION OF WELL:
County Wash Ground Water Basin (leave blank)
~~North~~ 531 feet, ~~East~~ 85.22 feet from NE Corner
South West
of Section SE4 SE4, T. 39 S, R. 11 SLBM W'~~SLBM~~ (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☑ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
6" Diam. from 0 feet to 100 feet Gage 14
..." Diam. from ..... feet to ..... feet Gage .....
..." Diam. from ..... feet to ..... feet Gage .....
New ☑ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☑
Type of perforator used .....
Size of perforations ..... inches by ..... inches
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☐ No ☐
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☐
Was it cemented in place? Yes ☑ No ☐

(10) WATER LEVELS:
Static level 120 feet below land surface Date June 3
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED:
RECEIVED
SEP 18 1976
WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☑ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test ..... gal./min. with ..... feet drawdown after ..... hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 inches
Depth drilled 168 feet. Depth of completed well 168 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5											Soil
5	20											lava
20	40											lava
40	60											lava
60	80											lava
80	100											lava
100	120											lava
120	140											Red porus lava
140	168											Red porus lava

Work started May 25, 19 76 Completed June 3, 19 76

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Self (Person, firm, or corporation) (Type or print)
Address Hurricane Ut
(Signed) Leon Glazier (Well Driller)
License No. ..... Date June 3, 19 76

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined 12/3/75 WO
Recorded: B. C. 12/3/75 T. B. WO.
Inspection Sheet
Copied

23

(C-39-11)12 cbd.

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. a-6622
Claim No.
Coordinate No. 81-1060

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Orvan Wright
Address Hurricane Utah

(2) LOCATION OF WELL:
County ..... Ground Water Basin ..... (leave blank)
North 1345 feet, ~~East~~ West 1335 feet from SW Corner ~~South~~
of Section 12 T. 39 S. R. 11 W. SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
6 5/8" Diam. from 0 feet to 110 feet Gage 18
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☒
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☐
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☐ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 110 ft feet
Material used in seal: Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level 60 feet below land surface Date Oct 30, 1975
Artesian pressure feet above land surface Date

LOG RECEIVED: RECEIVED NOV 28 1975 WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom? Driller
Yield: gal./min. with feet drawdown after hours
" " " " " "
Bailer test 5.45 gal./min. with 8 feet drawdown after 8 hrs hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 11 inches
Depth drilled 140 ft feet. Depth of completed well 140 ft feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	20										X	Sand
20	40										X	Red Sandrock
40	60										X	Red Rock (gravel type)
60	80										X	Sandy (red rock)
80	110										X	Sandy gravel (red rock)
110	140										X	Sandy River gravel

Work started NOV 1, 1975 Completed NOV 2, 1975

(14) PUMP:
Manufacturer's Name
Type: H. P.
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Kleon Norman (Person, firm, or corporation) (Type or print)
Address Box 442 St George Utah
(Signed) (Well Driller)
License No. 330 Date NOV 1, 1975

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined V.F.O. 10-27-65
Recorded: B. C. N.E. Cor. 14 S.E. B. V.F.O.
Inspection Sheet 10-29-65 B.M.
Copied 11-6-65 - D.A.

24

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 37223
Claim No.
Coordinate No. (C-38-11) 12 ccc

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name: Orval Wright
Address: Washington, Utah

(2) LOCATION OF WELL:
County: Wash Ground Water Basin: (leave blank)
North 50 feet, ~~South~~ East 550 feet from SW Corner ~~West~~
of Section 12, T. 39 ~~N~~ S, R. 11 ~~E~~ W ~~SLM~~ SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
6" Diam. from 0 feet to 47 feet Gage 5/16
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☑ No ☐
Type of perforator used: Torch
Size of perforations: 1/4 x 2 inches by inches
perforations from 13 feet to 47 feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name
Type: Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☑ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☐ No ☑
To what depth? feet
Material used in seal:
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☐ No ☑
Was it cemented in place? Yes ☐ No ☑

(10) WATER LEVELS:
Static level 16 feet below land surface Date Sept. 16, 65
Artesian pressure feet above land surface Date

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " " "
" " " " "
Bailer test 1 gal./min. with 14 feet drawdown after 1 hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 inches
Depth drilled 60 feet. Depth of completed well 60 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	2		X									
2	20											Lava
20	30											Lava
30	40											Lava
40	47											Cinders
47	60											Lava

Work started Sept 16, 1965 Completed Sept 16, 1965

(14) PUMP:
Manufacturer's Name
Type: H. P.
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name: Thos. Ballard (Person, firm, or corporation) (Type or print)
Address: Washington, Utah
(Signed): Thos. Ballard (Well Driller)
License No. 212 Date Oct. 10, 1965

USE OTHER SIDE FOR ADDITIONAL REMARKS

25

RECEIVED

OCT 30 1987

WATER RIGHTS
SALT LAKE

Form 113—5M—12-60

Examined .....
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. a 8089 (81-1401)
Claim No. 80863
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Rex Jackson
Address St. George Utah

(2) LOCATION OF WELL:
County Washington Ground Water Basin ..... (leave blank)
North 1100 feet, East 900 feet from SW Corner
of Section 12, T. 39 S, R. 11 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☑
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☑ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☑
5" Diam. from +2 feet to 130 feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
New ☑ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☑ No ☐
Type of perforator used Torch
Size of perforations 1/8 inches by 8 inches
..... perforations from 90 feet to 130 feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☑
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☑ No ☐ Size of gravel: .....
Gravel placed from 0 feet to 130 feet
Was a surface seal provided? Yes ☐ No ☑
To what depth? ..... feet
Material used in seal: .....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☑
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 100 feet below land surface Date 10-3-87
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED:

RECEIVED
OCT 2 1987
WATER RIGHTS
CEDAR CITY

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Is there a leak around casing? Yes ☐
No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☐ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test approx. 5 gal./min. with Total feet drawdown after 30 ~~hours~~ min
Arterian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 8 inches
Depth drilled 140 feet. Depth of completed well 130 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5											Soil
5	75											Broken lava cinders & clay
75	85											lava
85	95											lava
95	105											lava
105	115											lava
115	120											lava
120	130											Cinders
130	140											Cinders

Work started Sep 24, 19 87 Completed Oct 2, 19 87

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Ballard Drilling Co. (Person, firm, or corporation) (Type or print)
Address Hurricane Utah
(Signed) [signature] (Well Driller)
License No. 212 Date Oct 26, 19 87

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined NOV 17 1978

Recorded: B. C. ..... T. B. ..

Inspection Sheet

Copied

LAPSED

26

REPORT OF WELL DRILLER

STATE OF UTAH 96-2.

Application No. A-7989 (81-144)

Claim No.

Coordinate No. (C-39-11) 12 bbc

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:

Name Rex Jackson

Address Sugar Leo, Road, Bloomington, Utah

(2) LOCATION OF WELL:

County Washington Ground Water Basin (leave blank)

North 1740 feet, West 780 feet from 5½ Corner of Section 12, T. 39 S, R. 11 W SLBM (strike out words not needed)

(3) NATURE OF WORK (check):

New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐

If abandonment, describe material and procedure:

(4) NATURE OF USE (check):

Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐ Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):

Rotary ☒ Dug ☐ Jetted ☐ Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE:

Threaded ☐ Welded ☐

6" Diam. from 0 feet to 156 feet Gage #250

" Diam. from feet to feet Gage

" Diam. from feet to feet Gage

New ☒ Reject ☐ Used ☐

(7) PERFORATIONS:

Perforated? Yes ☒ No ☐

Type of perforator used Torch Slots

Size of perforations ¼ inches by 12 inches

66 perforations from 110 feet to 154 feet

perforations from feet to feet

perforations from feet to feet

perforations from feet to feet

perforations from feet to feet

(8) SCREENS:

Well screen installed? Yes ☐ No ☒

Manufacturer's Name

Type Model No.

Diam. Slot size Set from ft. to

Diam. Slot size Set from ft. to

(9) CONSTRUCTION:

Was well gravel packed? Yes ☐ No ☒ Size of gravel:

Gravel placed from feet to feet

Was a surface seal provided? Yes ☒ No ☐

To what depth? 20 feet

Material used in seal: Grout

Did any strata contain unusable water? Yes ☐ No ☒

Type of water: Depth of strata

Method of sealing strata off:

Was surface casing used? Yes ☐ No ☒

Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:

Static level 65 feet below land surface Date 10-17-78

Artesian pressure feet above land surface Date

LOG RECEIVED: RECEIVED NOV 15 1978 WATER RIGHTS

(11) FLOWING WELL:

Controlled by (check) Valve ☐ Cap ☐ Plug ☐ No Control ☐

Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☒ If so, by whom?

Yield: gal./min. with feet drawdown after hours

" " " " "

" " " " "

Bailer test gal./min. with feet drawdown after hours

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG:

Diameter of well 6 inches

Depth drilled 156 feet. Depth of completed well 156 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	3										X	Top Soil
3	69										X	Lava
69	84										X	Cinders
84	94										X	Lava
94	156										X	Drilling Blind-Some return indicates some red clay, cinders, black top soil. Cinders seem to be water bearing.

Work started 10-5, 1978 Completed 10-17, 1978

(14) PUMP:

Manufacturer's Name

Type: H. P.

Depth to pump or bowls feet

Well Driller's Statement:

This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Terrence Frandsen (Person, firm, or corporation) (Type or print)

Address P O Box 235 Washington Utah 84780

(Signed) Terrence Frandsen (Well Driller)

License No. 436 Date Nov 9, 1978

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

27

Examined .....
Recorded: B. C. ..... T. B. .....
Inspection Sheet .....
Copied .....

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. A-8690(81-1560)
Claim No. .....
Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Blaine Wood
Address St. George, Utah 84770

(2) LOCATION OF WELL:
County Washington Ground Water Basin ..... (leave blank)
North 130 feet, ~~West~~ 220 feet from SW Corner ~~SE SW~~ of Section 12, T. 39 N/S, R. 11 W ~~SLBM~~ (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
6 " Diam. from 0 feet to 430 feet Gage .250
..... " Diam. from ..... feet to ..... feet Gage .....
..... " Diam. from ..... feet to ..... feet Gage .....
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☒ No ☐
Type of perforator used Slof Torch
Size of perforations ¼ inches by 12 inches
90 perforations from 160 feet to 220 feet
90 perforations from 370 feet to 430 feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet
..... perforations from ..... feet to ..... feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to .....
Diam. ..... Slot size ..... Set from ..... ft. to .....

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... feet to ..... feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 20 feet
Material used in seal: Grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: ..... Depth of strata .....
Method of sealing strata off: .....

Was surface casing used? Yes ☐ No ☒
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 180 feet below land surface Date 10-20-78
Artesian pressure ..... feet above land surface Date .....

LOG RECEIVED
NOV 15 1978
WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom? .....
Yield: ..... gal./min. with ..... feet drawdown after ..... hours
" ..... " ..... " ..... "
" ..... " ..... " ..... "
Bailer test ..... gal./min. with ..... feet drawdown after ..... hours
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? No ☒ Yes ☐

(13) WELL LOG: Diameter of well 6" inches
Depth drilled 450 feet. Depth of completed well 430 feet

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	80										X	Lava
80	250	X										Soft Clay
250	252				X							Some gravel/little wat
252	450	X										Soft Clay

COPY

Work started Oct. 18, 1978 Completed Oct. 20, 1978

(14) PUMP:
Manufacturer's Name .....
Type: ..... H. P. .....
Depth to pump or bowles ..... feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Terrence Frandsen (Person, firm, or corporation) (Type or print)
Address PO Box 235 Washington, Utah 84
(Signed) Terrence Frandsen (Well Driller)
License No. 436 Date Nov 9, 1978

USE OTHER SIDE FOR ADDITIONAL REMARKS

81-1402

Form 113—5M—12-60

Examined 12/3/75 WO
Recorded: B. C. 12/3/75 T. D. WO
Inspection Sheet
Copied

28

REPORT OF WELL DRILLER
STATE OF UTAH

RECEIVED

Application No. a 57710
Claim No.
Coordinate No. ~~(C-37-10)1bbb~~ (C-37-11)12dba

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Sun Land Block & Cadillac Co.
Address [illegible]

(2) LOCATION OF WELL:
County [illegible] Ground Water Basin (leave blank)
North 1496 feet, East 702 feet from 8¼ Corner
South West
of Section 12, T. 39 N. S., R. 11 W. SLBM (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
[illegible]" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☐ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☒
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☐ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? [illegible] feet
Material used in seal: Bentonite & Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level [illegible] feet below land surface Date [illegible]
Artesian pressure feet above land surface Date

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐
No ☐

RECEIVED NOV 28 1975 WATER RIGHTS

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " " "
" " " " "
Bailer test 16 gal./min. with 0 feet drawdown after 1 hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well [illegible] inches
Depth drilled [illegible] feet. Depth of completed well [illegible] feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
[illegible]	75										X	[illegible]
75	145										X	[illegible]
145	155										X	[illegible]

Work started [illegible], 19[illegible] Completed [illegible], 19[illegible]

(14) PUMP:
Manufacturer's Name [illegible]
Type: H. P.
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name [illegible] (Person, firm, or corporation) (Type or print)
Address [illegible]
(Signed) [illegible] (Well Driller)
License No. Date [illegible], 19[illegible]

USE OTHER SIDE FOR ADDITIONAL REMARKS

Form 113—5M—12-60

Examined 12/3/75 WO
Recorded: B. C. 12/3/75 T. B. WO
Inspection Sheet
Copied

29

(C-39-11)12bd.

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. a 57699
Claim No.
Coordinate No. 91-140

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Orval Wright
Address Box 641 Hurricane Utah

(2) LOCATION OF WELL:
County Washington Ground Water Basin (leave blank)
North 480 feet, East 1360 feet from NW Corner of Section 12, T. 34 S, R. 11 E (SLBM) (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
6 5/8" Diam. from 0 feet to 158 feet Gage .156
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☒
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☐
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☒ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 100 ft feet
Material used in seal: Clay + Cement.
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level 5 feet below land surface Date 12/3/75
Artesian pressure feet above land surface Date

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☒

RECEIVED NOV 28 1975 WATER RIGHTS

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom?
Yield: 15 gal./min. with 1 feet drawdown after hours
" " " " " "
Bailer test 6 gal./min. with 6 feet drawdown after 6 hours
Artesian flow g.p.m. Date
Temperature of water 75 Was a chemical analysis made? No ☐ Yes ☐

(13) WELL LOG: Diameter of well 6 5/8 inches
Depth drilled 170 feet. Depth of completed well 170 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	10										X	Lava
10	42										X	Mixed Lavas
42	45										X	Lavas, Cavities
45	55										X	Mixed Lavas
55	80										X	Blue Lava
80	100											Cinders
100	120											Hard
120	130										X	Water Small gravel
130	158										X	Small Lava
158	160										X	Lava
160	170										X	gravel water bed

Work started 30 Oct, 1975 Completed 31 Oct, 1975

(14) PUMP:
Manufacturer's Name Burkley
Type: Jet H. P. 1 HP
Depth to pump or bowles 150 feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name [illegible] (Person, firm, or corporation) (Type or print)
Address [illegible]
(Signed) [illegible] (Well Driller)
License No. [illegible] Date [illegible], 1975

USE OTHER SIDE FOR ADDITIONAL REMARKS

WL1

W LL DRILLER'S REPO T

30

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

RECEIVED
DEC 08 1999
WATER RIGHTS
SALT LAKE

Well Identification

CHANGE APPLICATION: a21732(81-4188)

Owner *Note any changes*

Miller, Monte L. and Susan J.
176 Tierra Bonita Court
Henderson, NV 89014

RECEIVED
DEC 06 1999
WATER RIGHTS
SALT LAKE CITY

Contact Person/Engineer:

Well Location *Note any changes*

COUNTY: Washington
NORTH 210 feet EAST 1129 feet from the S4 Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

~~Kolob~~

Drillers Activity

Start Date: Apr. 15, 98 Completion Date: Aug. 20, 99

Check all that apply:
☑ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	20	12 1/4	Air Rotary	
20	150	8"	Air Rotary	
150	320	6"	Air Rotary	

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	280											Basalt	Black	with cinder pockets
280	320	X	X									Limestone	white grey	

Static Water Level

Date Aug. 20, 99 Water Level 110 feet Flowing? ☐ Yes ☑ No
Method of Water Level Measurement Sounder. If Flowing, Capped Pressure PSI
Point to Which Water Level Measurement was Referenced Ground
Height of Water Level reference point above ground surface 0 feet Temperature ☐ °C ☐ °F

[redacted] *Well Log* [redacted]

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☑ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	20	Steel A-53	.188	8 5/8	265	305	.050	4 1/2	
0	150	Steel A-53	.188	6 5/8					
0	305	PVC	SDR 17	4 1/2					

Well Head Configuration: Well Seal Access Port Provided? ☑ Yes ☐ No

Casing Joint Type: Welded - Certa lock Perforator Used: No

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	20	Bentonite chips	9 cu. ft.	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
Aug 21, 99	test pump	14	X		3 ft	2 hrs

Pump (Permanent)

Pump Description: Submersible Horsepower: 1 Pump Intake Depth: 260 feet

Approximate maximum pumping rate: 14 GPM Well disinfected upon completion? ☑ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name _____ License No. _____
(Person, Firm, or Corporation – Print or Type)

Signature _____ Date _____
(Licensed Well Driller)

Steve Anzalone

WL1

ELL DRILLER'S REPORT 31

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification WATER RIGHT APPLICATION: 81-588(A35595)

Owner *Note any changes* Wright, Orval
P.O. Box 641
Hurricane, UT 84737

Contact Person/Engineer:

Well Location *Note any changes* COUNTY: Washington
NORTH 151 feet EAST 2202 feet from the W¼ Corner of
SECTION 12, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Start Date: Completion Date: July 16, 1994 DOM

Check all that apply:
X New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	30	13"	Cable tool & Rotary	Rotary Air Water-cable tool
30	110	10"	" "	" " "
110	140	9"	" "	" " "

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	3		✓							✓	✓	Lava		top soil with Lava Rocks, boulders
3	13			✓	✓							"	Brn	
13	16			✓								Lava	Red	
16	31			✓								Lava	Black	very hard
31	43		✓	✓								Lava	Red	Honeycomb, some mud
43	48			✓								Lava	Blk/Brn	Med Hard
48	72			✓								Lava	Blk	some brn lava too - Hard
72	83			✓								Lava	Red	Med Hard
83	95		✓	✓								Lava	Red	areas of Lava/cinders/chunks
95	113	✓		✓								Lava		caving

Static Water Level

Date Water Level 102 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement Cable tool If Flowing, Capped Pressure PSI

Point to Which Water Level Measurement was Referenced ground level

Height of Water Level reference point above ground surface feet Temperature ☐ °C ☐ °F

[redacted] Well Log [redacted]

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN / PERFORATIONS: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	140	Steel - mild	.188	6"	120	140	18"	2"	5 rows

Well Head Configuration: _____ Access Port Provided? [ ] Yes [ ] No

Casing Joint Type: Butt joint weld Perforator Used: pre cut

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	95'	Grout	Appx 3+yds	9sk mix

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	Air develop		10			4hrs

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? [X] Yes [ ] No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well yield given 4 GPM before development, mixed as mud cleared from crevices. In cable tool drilling rocks fell on drill string getting it stuck numerous times. Water level stayed the same from winter to late spring

Well Driller Statement This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Thayer Well Drilling (Person, Firm, or Corporation – Print or Type) License No. 661

Signature Steve A. Thayer (Licensed Well Driller) Date Sept. 8, 1994

Water Right # 81-588

ADDITIONAL WELL DATA FORM

OWNER NAME ORVAL WRIGHT

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
113	130			✓								Lava		med Hard
130	136	✓	✓									Lava	Blk/Brn	Med Lava - some mud & cinders
136	160			✓								Lava	Black	grainy lava crushes to a black sand med Hard solid formation

Form 113—5M—12-60

Examined 12-1-70 V.E.O.
Recorded: B. C. 12-1-70 V.E.O. T. B. V.E.O.
Inspection Sheet 12-2-70 B.M.
Copied 12-2-70 B.M.

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REPORT OF WELL DRILLER
STATE OF UTAH

Application No. 2-6266 (81-42)
Claim No.
Coordinate No. (C-39-11) 1 cdb

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name: Board of Water Resources / To Farnsb[illegible]
Address: Salt Lake City, Utah / St. George, Utah

(2) LOCATION OF WELL:
County: Washington Ground Water Basin (leave blank)
North 1240 feet, ~~East~~ West 1240 feet from SW Corner South
of Section 1, T. 39 ~~N~~ S, R. 11 ~~E~~ W ~~SLBM~~ (strike out words not needed)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☐ Dug ☐ Jetted ☐
Cable ☒ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
43.00" Diam. from 0 feet to 126 feet Gage .188
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☒ No ☐
Type of perforator used Torch
Size of perforations 5/8 inches by 5 inches
55 perforations from 113 feet to 124 feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☒ No ☐ Size of gravel 3/8" minus
Gravel placed from 13 feet to 126 feet
Was a surface seal provided? Yes ☐ No ☒
To what depth? feet
Material used in seal:
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☐ No ☐
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 86 feet below land surface Date Nov 17, 1970
Artesian pressure feet above land surface Date

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " " " "
Bailer test gal./min. with feet drawdown after hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☒ Yes ☐

(13) WELL LOG: Diameter of well 43 inches
Depth drilled 126 feet. Depth of completed well 126 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	3			X	X							
3	12						X					Lava
12	40										X	Lava ledge
40	45				X		X					~~Clinker~~ Lava
45	73										X	Cinders
73	78						X					Lava
78	100						X				X	clinker with some small holes
100	125										X	Lava light clinker
125	126										X	Lava ledge

Work started Nov. 3, 19 70 Completed Nov. 17, 19 70

(14) PUMP:
Manufacturer's Name
Type: H. P.
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name Earl Frushower Well Drilling (Person, firm, or corporation) (Type or print)
Address 910 100 W. Hurricane, Utah 84737
(Signed) Earl E. Frushower (Well Driller)
License No. 114 Date Nov. 30, 19 70

WATER RIGHTS OFFICE DEC 1 1970

USE OTHER SIDE FOR ADDITIONAL REMARKS

33

RECEIVED
AUG 27 2001
WATER RIGHTS
SALT LAKE

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights
For additional space, use "Additional Well Data Form" and attach

D.R.

Well Identification CHANGE APPLICATION: a25314(81-4399)

Owner *Note any changes*
Bird, Steven E.
201 East Middleton Drive
Henderson, NV 89105
Contact Person/Engineer:

Well Location *Note any changes*
COUNTY: Washington
SOUTH 83 feet WEST 110 feet from the E4 Corner of
SECTION 1, TOWNSHIP 39S, RANGE 11W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) Near Kolob Reservoir

Drillers Activity Start Date: Aug 5 Completion Date: Aug 16 2001
Check all that apply: ☑ New ☐ Repair ☑ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use:
If a replacement well, provide the location of the new well. ____ feet north/south and ____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	155	8"	Rotary	Water

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition, density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	7												Black	soil
7	30												White	Clay
30	90												White	Clay
90	95												White	Shrady shale
95	122												Yellow	Sandstone (soft)
122	123												Clay	White
123	135												Yellow	sandstone
135	155												White	Clay

Static Water Level
Date Aug 16 2001 Water Level 117 feet Flowing? ☐ Yes ☐ No
Method of Water Level Measurement Bailer If Flowing, Capped Pressure ____ PSI
Point to Which Water Level Measurement was Referenced ground Ground Elevation (If known) ____
Height of Water Level reference point above ground surface ____ feet Temperature ____ ☐ °C ☐ °F

SCANNED

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	☐ SCREEN ☒ PERFORATIONS ☐ OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
42	147	steel	.250	8	137	147	1/8 x 4"		random

Well Head Configuration: sanitary well seal Access Port Provided? ☒ Yes ☐ No
Casing Joint Type: welded Perforator Used: torch
Was a Surface Seal installed? ☒ Yes ☐ No Depth of Surface Seal: 30 feet Drive Shoe? ☒ Yes ☐ No
Surface Seal Material Placement Method: poured

Provide Seal Material description below:

DEPTH (feet) FROM	TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	30	sand-cement type grout		
		12 → 8"		

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
August 01	Bailer	10	X		20 ft.	1 hr.

Pump (Permanent)

Pump Description: 1/2 Hp submersible Horsepower: _____ Pump Intake Depth: 141 feet
Approximate maximum pumping rate: 7 gpm Well disinfected upon completion? ☐ Yes ☒ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name Ballard Drilling Co. (Person, Firm, or Corporation - Print or Type) License No. 212

Signature [signature] (Licensed Driller) Date Aug 21 2001

Construction Information

☐ SCREEN ☐ PERFORATIONS ☐ OPEN BOTTOM

DEPTH (feet) FROM	TO	CASING TYPE	WALL (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN SLOT SIZE (in)	SCREEN DIAM. (in)	SCREEN TYPE (or NUMBER PER LENGTH)
2+	410	STEEL	.250	6	330	410	5/32	2 1/2	6 ROWS

Well Head Configuration: CAPPED Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: WELDED Perforator Used: NULL Drive Shoe: ☐ Yes ☒ No

Was a Surface Seal installed? ☒ Yes ☐ No Depth of Surface Seal: 70 feet

Surface Seal Material Placement Method: PUMPED FROM BOTTOM UP. Provide Seal Material description below:

SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION

DEPTH (feet) FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs/gal., # bag mix, gal./sack etc.)
0	50	CEMENT GROUT	44 BAGS @ 100 lbs.	18 lbs DENSITY = 4400 lbs.
50	100	3/4 GRAVEL	1 YARD	
100	410	PEA GRAVEL	7 YARDS	

Well Development and Well Yield Test Information

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
OCT 15 02	SUBMERSIBLE PUMP	100	X		150	24 HRS. = 1440 min.
	spec. cap: Q gpm / s ft =	100 / 150		= 0.67		

Pump (Permanent)

Pump Description: N/A Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☒ Yes ☐ No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name GARDNER BROTHERS DRILLING License No. 4773
(Person, Firm, or Corporation - Print or Type)

Signature Dale Gardner Date OCT 15 2002
(Licensed Well Driller)

NC

Form 113—314—12-60 N 2430' W 1065' SE

Examined

Recorded: B. C. T. B. Sec 20

Inspection Sheet

Copied

RECEIVED
OCT 11 1978
WATER RIGHTS

33

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. A-8740 (21-1567)

Claim No.

Coordinate No.

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Zion Building Industries - Dave ~~Limbacher~~
Address Kolob Mountain

(2) LOCATION OF WELL: units 1 & 2
County Washington Ground Water Basin (leave blank) Section 11, 19, 20
North ~~[illegible]~~ feet, East ~~[illegible]~~ feet Corner
South West
of Section ~~[illegible]~~ 1, T. 39 S., R. 11 E. SLBM (strike out words not needed)

T 39 S
R 11 W

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure:

(4) NATURE OF USE (check):
Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐
Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Dug ☐ Jetted ☐
Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE: Threaded ☐ Welded ☒
6" Diam. from 0 feet to 40 feet Gage
" Diam. from feet to feet Gage
" Diam. from feet to feet Gage
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☒
Type of perforator used
Size of perforations inches by inches
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet
perforations from feet to feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to
Diam. Slot size Set from ft. to

(9) CONSTRUCTION:
Was well gravel packed? Yes ☐ No ☒ Size of gravel:
Gravel placed from feet to feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 20 feet
Material used in seal: Grout
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: Depth of strata
Method of sealing strata off:

Was surface casing used? Yes ☒ No ☐
Was it cemented in place? Yes ☒ No ☐

(10) WATER LEVELS:
Static level 250 feet below land surface Date 9-11-78
Artesian pressure feet above land surface Date

LOG RECEIVED: RECEIVED NOV 06 1978 WATER RIGHTS

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☐ No ☒ If so, by whom?
Yield: gal./min. with feet drawdown after hours
" " " " "
Bailer test gal./min. with feet drawdown after hours
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? No ☒ Yes ☐

(13) WELL LOG: Diameter of well 8 inches
Depth drilled 300 feet. Depth of completed well 300 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5	X										Dark Brown
5	6			X								Sandstone
6	15	X										Dark Brown
15	17			X								Sandstone - White
18	25	X										Red Clay
25	50	X										Red Clay, Some White
50	206										X	Hard gray shale
206	210	X										Brown Clay
210	218	X										Red Clay
218	221										X	Gray Shale
221	230										X	Red & Brown Shale
230	300										X	Gray Shale

Work started Sept. 7, 1978. Completed Sept. 8, 1978.

(14) PUMP:
Manufacturer's Name H. P.
Type:
Depth to pump or bowles feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.

Name Terrence Frandsen (Type or print) (Person, firm, or corporation)
Address P.O. Box 235 Washington Utah 84780
(Signed) Terrence Frandsen (Well Driller)
License No. 436 Date, 19

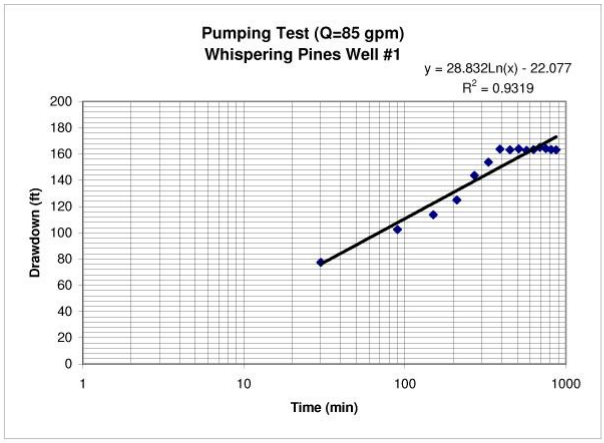
USE OTHER SIDE FOR ADDITIONAL REMARKS

Appendix C Pumping Test Data and Analysis

Well Description:	Whispering Pines Well #1
Test Date:	10/12/02
Static Water Depth:	35.2
Pump Setting Depth:	
Total Well Depth:	410
Well Diameter:	6
Pumping Rate:	85

DRAWDOWN TEST

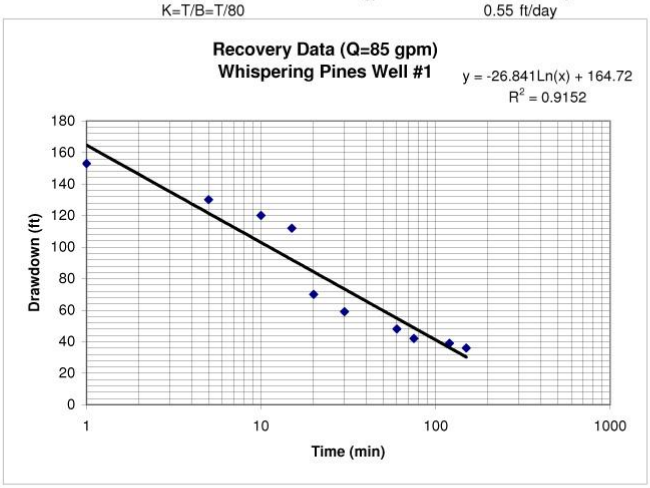
Pumping Rate		
30	113	77
90	138	102
150	149	114
210	160	125
270	179	144
330	189	154
390	199	164
450	198	163
510	199	164
570	198	163
630	199	163
690	200	165
750	199	164
810	199	163
870	198	163



Recovery Data

Time	Water Level
1	153
5	130
10	120
15	112
20	70
30	59
60	48
75	42
120	39
150	36

T = 264Q/ΔS
where
T = coefficient of transmissivitym in gpd/ft.
Q = Pumping Rate, in gpm.
ΔS = drawdown in one log cycle 66 feet
T = 264*85/66 = 328 gpd/ft 44 ft^2/day
K=T/B=T/80 0.55 ft/day



T = 264Q/ΔS
where
T = coefficient of transmissivitym in gpd/ft.
Q = Pumping Rate, in gpm.
ΔS = drawdown in one log cycle 62 feet
T = 264*85/62 = 362 gpd/ft 48 ft^2/day
K=T/B=T/80 0.60 ft/day