

SUBMISSION OF WATER DEVELOPMENT PROJECTS

FOR AGENCY USE ONLY

Through the development of scientific studies defining the aquifer within the Cedar Basin it has been documented that additional water resources will be necessary to sustain the growth and further development of the area. Without water the future economic development will be impacted by the availability and cost of existing water supplies to accommodate only the growth capable within our current water budget. This form is being circulated to document additional water supply sources that could be utilized to further alleviate the water deficit in the aquifer, as well as provide water for the future residents of the valley. This form will be evaluated for completeness of content. Please ensure that the proposed project is fully defined and information to substantiate the claim is submitted for a complete evaluation.

Application Number

Date Filed

Name and address of applicant (include zip code)
 Gary F. Player
 1671 W 546 S
 Cedar City, Utah 84720
 gfplayer@kennylakeventures.us

Name, title, and address of authorized agent if different from item 1 (include zip code)
 H. Roice Nelson, Jr.
 2155 W 700 S #31
 Cedar City, Utah 84720
 rnelson@walden3d.com

Telephone (area code)

Applicant

Authorized Agent

A. Provide names, addresses, phone numbers and email addresses of those who filled out this form.

Gary F. Player
 1671 W 546 S
 Cedar City, Utah 84720
 gfplayer@kennylakeventures.us

H. Roice Nelson, Jr.
 2155 W 700 S, No. 31
 Cedar City, Utah 84720
 rnelson@walden3d.com

B. Project Description (Details are Vital)

1. Scope of Work and Project Description
2. Type of System or Facility
3. Quantity of Water Anticipated
4. Scientific Analysis of Water Resource
5. Uses (irrigation, culinary, industrial etc.)
6. Years Resource is Available
7. Constructability
8. Additional information to describe resource and availability (utilize additional sheets as necessary)

Cretaceous Well #1 at Shepherders Cabin Road

B.1. This project is an opportunity to develop ground water from porous bedrock aquifers within the eastern portion of the Cedar Valley basin as defined by the Utah Division of Water Rights (UDWR). The availability of water would be proven initially with the completion of one well south of Utah Highway 14. The first well would be drilled along Shepherders Cabin Road on lands owned by Southern Utah University. The well would be drilled to a depth of 500 to 1,000 feet, with projected sustainable productivity of 1,000 to 1,500 gallons per minute. Produced water would be pumped into a tributary of Crow Creek, and allowed to flow down Crow Creek to its intersection with Ashdown Creek (where it becomes Coal Creek). Water could then be directed to a proposed off stream storage facility along Rock Creek, or be allowed to flow into Cedar Valley via existing stream channels and newly constructed canals.

B.2. This well would be one of an eventual larger set of wells utilized to stabilize flow in the Coal Creek drainage system throughout the spring and summer months. Water could be utilized for both agricultural and culinary purposes. The well location is near to existing power lines and Crow Creek so that only minimal new development would be necessary to test the concept.

B.3. Each well capable of 1,000 gallons per minute would produce 2.228 cubic feet per second, or 4.418 acre-feet per day. Therefore, one well pumped for 182 days each year would provide slightly more than 800 acre-feet. Eventual development of only five wells could provide about 4,000 acre-feet over 182 days. A development of 15 wells, each producing 1,000 gallons per minute, would provide approximately 12,000 acre-feet in six months, allowing wells in the valley floor to be shut-in, so that all over-drafting of the valley aquifers could be eliminated. Recharge estimates for the bedrock aquifers prepared by Player in 2010 range from 10,000 to 15,000 acre-feet per year, showing that continuous production of 12,000 acre-feet per year would not draw down the bedrock aquifer.

B.4. The likelihood of a sustainable bedrock aquifer resource in the western portion of the Markagunt Plateau was shown by Player in geohydrologic reports prepared for the Cedar City Water Utility. Scientific studies included estimation of bedrock thickness, laboratory measurements of aquifer porosity, and review of published and unpublished chemical analyses of spring waters issuing from the bedrock aquifers. Summaries of those studies are attached to a cover letter delivered with this Submission. Water samples from Cedar City springs developed in Right Hand Canyon, south of Coal Creek, averaged 230 -250 mg/L of Total Dissolved Solids (TDS), comparable to water developed in Cedar Valley. One sample collected by Player from the "piped spring" exiting Cretaceous Straight Cliffs Sandstones due east of the major landslide along Highway 14 was analyzed at the SUU water laboratory in December of 2014. That sample had at a TDS of 230 mg/L, the same as the waters issuing from springs in Cretaceous bedrock at Right Hand Canyon.

B.5. Water pumped into Coal Creek would be usable by for irrigation in Cedar Valley, allowing farmers and ranchers to switch from expensive pumped wells to virtually free canal water. Water stored at Rock Creek (to be described in a future Submission) or other CICWCD facilities along Coal Creek would be suitable for domestic and industrial use after suspended solids settled out during residency in reservoirs.

B.6. The bedrock aquifer resource is sustainable due to annual infiltration from precipitation. In the unlikely event of long term drought, the production of 4,000 acre-feet per year could be sustained for more than 6,900 years without recharge to that portion of the bedrock aquifer system within the Cedar Valley Basin estimated to contain more than 27,648,000 acre-feet of water in place.

This with reso The from conn woul The is no Brian below cann woul water The be ch of div most dry u up to After the v conv use Utiliz woul be ar In th runo by an aquif The pump free

B.7. This well could be drilled by local drilling contractors. Power lines are in place near the Shepherders Cabin Road for easy access to the drill site. Produced water could be piped to a Crow Creek tributary within an economical and short (less than 500 feet) PVC pipeline.

B.8. Summaries of bedrock aquifer studies completed in 2010 are attached to the cover letter referenced above. More detailed reports can be provided when requested.

C. Attach a map covering the area of development and location of proposed project.

1. Identify Property Ownership
2. Identify Potential Conflicts
3. Provide Details of the Area and Necessary Changes to the Area
A map showing the proposed location for the first well at Shepherders Cabin road is attached. Also attached is a well log from a well drilled by Brian Head City into rocks overlying the Cretaceous Rocks.

C.1. The first test well would be drilled on lands owned by Southern Utah University.

C.2. Rapid agreement with surface owners at SUU is likely. Power lines and water lines will cross an SUU right of way, requiring negotiated access.

C.3. The proposed test well location is on private, developed lands. A well at Shepherders Cabin Road would require a power line to be constructed across an SUU road. Produced water could be directed to Crow Creek through a tributary channel, less than 500 feet away from the proposed drill site.

D. Identify any Federal, State or Local Government Issues

1. Federal
 - a. Army Corp of Engineers
 - b. Bureau of Land Management
 - c. Fish and Wildlife
 - d. Forest Service
 - e. Other

Federal issues, such as wetlands, are minimal on private property. Crow Creek and Coal Creek are both certified as having no fishery. The entire proposed area is outside of designated Sage Grouse Habitat.

2. State
 - a. Department of Environmental Quality
 - b. Division of Water Rights
 - c. Other

There are no known State issues. Proposed stream flow maintenance could be done at rates that do not exceed 35 cubic feet per second, rates routinely exceeded naturally during spring run off. Cedar Basin water rights will be transferred by the Utah Division of Water Rights into each well prior to beginning full scale production. The sources of those water rights would be farmers, ranchers, Cedar City Municipal Water Utility, and Southern Utah University. It is at least possible that the wells would discover "new water" that could be appropriated to the District.

3. Local
 - a. County
 - b. Municipal
 - c. Other

Approvals were already obtained 1 mile away at Woods Ranch, and so no local issues are anticipated.

E. Provide cost estimates of project

An exploratory well will cost on the order of \$200,000 to complete and equip with pumps and short pipelines to streams. A full scale development of 15 wells would cost approximately \$3,000,000 to produce 12,000 acre-feet per year. The CAPEX for full development of the aquifer would be on the order of \$250 per acre-foot.

F. Describe additional evaluated alternatives, if any

Separate Submissions of Water Development Projects from Player and Nelson include the following: (1) Deepening of the Cedar City Quichapa Creek Number 1 well into the fractured quartz monzonite aquifer; and (3) A re-entry of the ARCo Three Peaks well to test the fractured quartz monzonite aquifer at Iron Springs.

G. Describe any environmental effects the proposed project would have on wildlife and/or plant species

Continuous summertime flow of Coal Creek could possibly allow the establishment of a trout fishery. Eventual construction of off-stream storage at Rock Creek would allow development of both trout and bass fisheries.

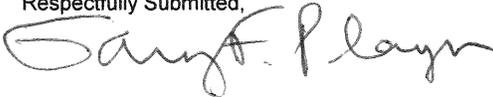
H. Provide cultural resource evaluations of proposed area

No cultural or archeological resources are present at the site. For your information, Player served as an environmental inspector during construction of the Kern River Pipeline, and supervised SUU archeologist Barbara Frank as she prepared clearances across a 100-mile segment of the line from Milford to eastern Nevada.

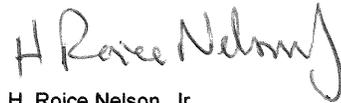
I. Provide any additional information deemed necessary in the evaluation of this project to provide future sustainable water resources to the Cedar Basin

Player reviewed the Markagunt Plateau bedrock aquifer system for Cedar City in 2010. All of his work will be available for review with the permission of the City Engineer's office. For example, additional data includes meteorological studies, summaries of geology, water analyses, aquifer rock properties (matrix porosity and fracture systems), old well records, etc. Summaries of the aquifer study are attached to the cover letter accompanying this Submission.

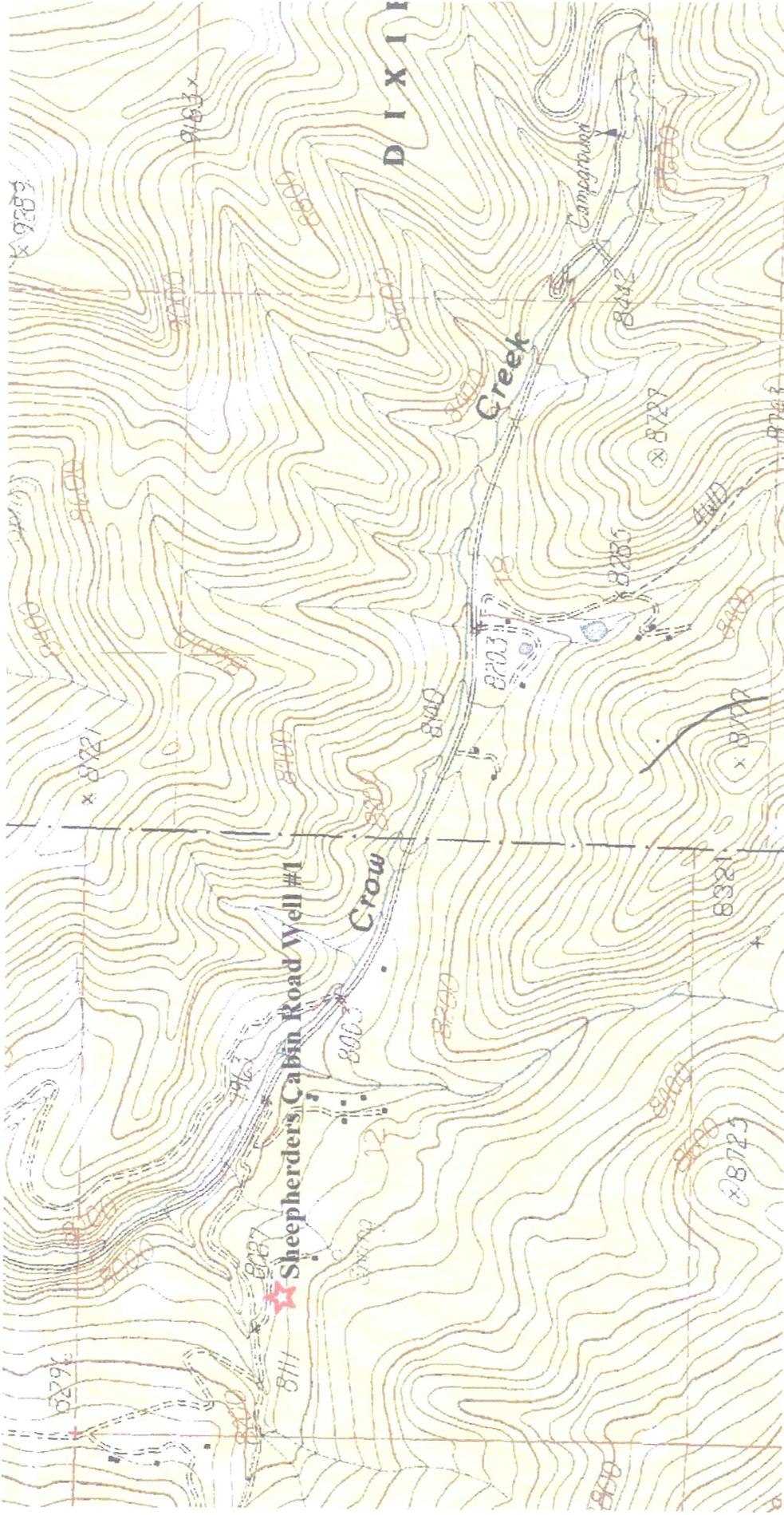
Respectfully Submitted,



Gary Farnsworth Player
Utah Professional Geologist No. 5280804-2250
Idaho Professional Geologist No. 1050
Certified Petroleum Geologist No. 3097



H. Roice Nelson, Jr.
Texas Professional Geoscientist No. 5120
Louisiana Professional Geoscientist No. 879



**LOCATION MAP:
PROPOSED SHEPHERDERS CABIN ROAD EXPLORATORY WELL #1**

Basemap is Webster's Flat Topographic Map

Submitted by G.F. Player and H. Roice Nelson, Jr.

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: a37313 (75-661)

WIN: 434816

Owner

Note any changes

Town of Brian Head
P.O. Box 65
Brian Head UT 84719

Contact Person/Engineer:

ADVANCED ENVIRONMENTAL ENGINEERING

Well Location

Note any changes

DAVE LORE 801-200-2528
801-773-3155

S 568 E 2182 from the W4 corner of section 02, Township 36S, Range 9W, SL B&M

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

Drillers Activity

Start Date: MAY 12 - 2011 Completion Date: NOV. 01 - 12

Check all that apply: New Repair Deepen Clean Replace Public Nature of Use: _____
If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM	DEPTH (feet) TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	6'	34"	ROTARY	
0	115	28"	MUD ROTARY	BENTONITE / POLYMER
115	750	23"	MUD ROTARY	BENTONITE / POLYMER
750	1502	14 3/4"	MUD ROTARY	BENTONITE / POLYMER

Well Log

DEPTH (feet) FROM	DEPTH (feet) TO	WATER	PERMEABILITY		UNCONSOLIDATED					CONSOLIDATED		ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
			High	Low	CLAY	SAND	GRAVEL	COBBLES	BOULDER					
0	5												BLACK	
5	15	x	x		x	x						LAUD ROCK	BLACK	YELLOW SAND
15	30	x	x					yx						
30	65	x	x					yx	x			LAVA		VARY HARD FRACTURED
65	93	x	x							x			BLACK & WHITE	
93	112	x	x							x		LAUD	BLACK	HARD
112	129	x	x							x		LAUD	RED BROWN	VARY HARD
129	135					x				x			"	CLAY IS TAN ORANGE
135	146					x				x			"	" ORANGE

Static Water Level

Date 11-28-11 Water Level 137 feet Flowing? Yes No
 Method of Water Level Measurement CHAPER If Flowing, Capped Pressure _____ PSI
 Point to Which Water Level Measurement was Referenced TOP OF CASING Elevation _____
 Height of Water Level reference point above ground surface 2' feet Temperature 41 degrees C F

NOV 21 2012
DAVE LORE

Construction Information

DEPTH (feet)		CASING			DEPTH (feet)		<input checked="" type="checkbox"/> SCREEN	<input type="checkbox"/> PERFORATIONS	<input type="checkbox"/> OPEN BOTTOM
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	6	A53 GRADE B	.375	30	520	600	.050	16"	304 STAINLESS STEEL
0	115	A53 GRADE B	.312	24"	705	745	.050	16"	304 STAINLESS STEEL
+2	520	A53 GRADE B	.312	16"	735	745	BLANK	8 5/8"	304 STAINLESS STEEL SCREEN
600	705	A53 GRADE B	.312	16"	745	805	.030	8 5/8"	304 STAINLESS STEEL
0	175	A53 GRADE B	.250	4 1/2"	805	1200	BLANK	8 5/8"	304 STAINLESS STEEL
0	518	A53 GRADE B	.250	5 1/2"	1200	1470	.050	8 5/8"	304 STAINLESS STEEL
					1470	1480	BLANK	8 5/8"	ACCESS TUBES

Well Head Configuration: STEEL PLATE Access Port Provided? Yes No
 Casing Joint Type: BUTT WELD Perforator Used: STAINLESS STEEL 304
 Was a Surface Seal Installed? Yes No Depth of Surface Seal: 115 feet Drive Shoe? Yes No
 Surface Seal Material Placement Method: PUMPED 50/50 TO BOTTOM BACK TO SURFACE
 Was a temporary surface casing used? Yes No If yes, depth of casing: 6" feet diameter: 30 inches THIS CASING WAS REMOVED 2012

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION		
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicab)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	6	CEMENT & BENTONITE HOLE PLUG	36 CUBIC FEET	
0	115	50/50 SAND CEMENT	11 CUBIC YARDS	18.40 lbs
560	750	3/8 ROUND PEA GRAVEL	45 CUBIC YARDS	
740	1476	12-20 SILICA SAND	16 CUBIC YARDS	
95	113	3/8 BENTONITE HOLE PLUG	13 CUBIC FEET	
PLACED 10 BAG HEAVY BENTONITE DRILLING FLUID - OUTSIDE UP INTO 24" CASING				

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One		DRAWDOWN (ft)	TIME PUMPED (hrs & min)
			GPM	CFS		
Sept. Oct. 11	AIR DEVELOPMENT	600	x		380	46 Ws
10-14 = 10-22-11	TEST PUMP	1163	x		326	184 Ws
10-18 = 20-12	WELL DEVELOPMENT	825	x		304.40	45.25

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.
PEA GRAVEL WAS EXTRACTED FROM SURFACE TO 560 FEET. THE SCREEN WAS COLLAPSED FROM 524' TO 540' SCREEN SIZE DISTORTED OR UNDERSIZED FROM 540' TO 560' SCREEN WAS SWAGED FROM 522' TO 542' AND 304 STAINLESS STEEL PATENTS WERE PLACED FROM 518.7' TO 527.5' THE SWAGING TOOL WAS UNABLE TO GO BELOW 541' 6 1/4". INSTALLED TEST PUMP TO 495' TEST RESULTS WERE SAME AS TEST PUMP 2011

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 GRIMSHAW DRILLING License No. 240
 Signature  Date Nov. 14 - 2012
Person, Firm, or Corporation (Print or Type) Licensed Well Driller

Construction Information

DEPTH (feet)		CASING			DEPTH (feet)		<input checked="" type="checkbox"/> SCREEN	<input type="checkbox"/> PERFORATIONS	<input type="checkbox"/> OPEN BOTTOM
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
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PLACED 10 BARRELS HEAVY BENTONITE DRILLING FLUID - OUTSIDE UP INTO 24" CASING

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Pump (Permanent)

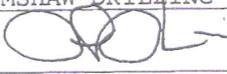
Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet
 Approximate Maximum Pumping Rate: _____ Well Disinfected upon Completion? Yes No

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

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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 GRIMSHAW DRILLING
 Signature 

License No. 240
 Date NOV. 14 - 2012

WELL DRILLER'S REPORT ADDITIONAL DATA FORM

State of Utah
Division of Water Rights

Well Identification

Change Application: a37313 (75-661)

Owner

Note any changes

Town of Brian Head
P.O. Box 65
Brian Head UT 84719

Contact Person/Engineer: _____

Well Location

Note any changes

S 568 E 2182 from the W4 corner of section 02, Township 36S, Range 9W, SL B&M

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

Well Log		WATER	HYDRA- METER	UNCONSOLIDATED					CONSOLIDATED		ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
DEPTH (feet) FROM	TO			CLAY	SAND	GRAVEL	BOULDER	OTHER					
		High	Low										
146	148			X							ORANGE		
148	174			X				X	LOAM RED BROWN	CLAY ORANGE	ISOM FORMATION		
174	179	X	X					X	LOAM	RED BROWN & BLACK			
179	193	X	X					X	LOAM	BLACK RED BROWN	VERY HARD		
193	227	X	X					X	LOAM & QUARTZ	"	"	"	
227	393	X	X					X	LOAM	"	"	"	
393	489	X	X					X	LOAM	BLACK	MED HARD		
489	509	X	X					X	LOAM	RED BLACK	VERY HARD		
509	547	X	X					X	LOAM	BLACK	"	"	
547	551	X	X					X	LOAM	BLACK	HARD FRACTURED		
551	582	X	X					X	LOAM	BLACK	VERY HARD FRACTURED		
582	596	X	X					X	LOAM	RED BROWN	HARD		
596	609	X	X					X	LOAM	RED			
609	699	X	X					X	LOAM	RED, BROWN & BLACK	HARD		
699	788	X	X					X	LOAM	" " "	HARD BRITTLE		
788	790	X	X					X	LOAM	RED, BROWN & BLACK	SOME WHITE BIG FRACTURE		
790	857							X	MUDSTONE	WHITE, TAN	CLAYON FORMATION		
857	879							X	MUDSTONE	WHITE	HARDER		
879	886							X	MUDSTONE	RED			
886	927							X	MUDSTONE	WHITE			
927	931							X	MUDSTONE	WHITE	HARDER FRACTURED		

WELL DRILLER'S REPORT ADDITIONAL DATA FORM

State of Utah
Division of Water Rights

Well Identification

Change Application: a37313 (75-661)

Owner

Note any changes

Town of Brian Head
P.O. Box 65
Brian Head UT 84719

Contact Person/Engineer: _____

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

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			High	Low	CLAY	SAND	GRAVEL	COBBLES	BOLDER	OTHER	ROCK TYPE	COLOR		
DEPTH (feet)	FROM	TO												
931	1206									X	MUDSTONE	WHITE	CLARON FORMATION	
1206	1210	X	X							X	MUDSTONE	ORANGE	FRACTURED BROKEN HARD	
1210	1246	X	X							X	MUDSTONE	YELLOW, WHITE & GRAY	FRACTURED	
1246	1263	X	X							X	MUDSTONE	ORANGE	FRACTURED HARD	
1263	1294	X	X							X	MUDSTONE	ORANGE	VARY HARD FRACTURED	
1294	1362	X	X							X	MUDSTONE	ORANGE	HARD	
1302	1308	X	X							X	MUDSTONE	ORANGE	HARD FRACTURED BIG FLUID LOSE	
1308	1314	X	X							X	MUDSTONE	ORANGE		
1314	1322	X	X							X	MUDSTONE	ORANGE	FRACTURED BIG FLUID LOSE	
1322	1330	X	X							X	CONGLOMERATE	WHITE TAN	FRACTURED (GRAND CASTLE FORMATION)	
1330	1333									X	CONGLOMERATE	"	"	
1333	1338	X	X							X	CONGLOMERATE	"	" FRACTURED	
1338	1354									X	CONGLOMERATE	"	"	
1354	1440	X	X							X	CONGLOMERATE	"	" FRACTURED	
1440	1480									X	CONGLOMERATE	"	"	
1480	1502									X	MUDSTONE	ORANGE RED	CLARON FORMATION	