**Well ID:** UGS-PW06ABC

**Well Location:** ~7 miles NNE of Eskdale, UT, Snake Valley; 27' S of PW06D [MONITOR WELL #0718002M00 (1)]

**UTM:** x 249111.84 m, y 4342856.62 m NAD 83 (zone 12N) N 39.19877 W 113.90528

**Start Date:** 09/05/07  **Completion Date:** 9/12/07  **Driller:** USGS-Western Research drilling

**Drilling Method:** Conventional Mud Rotary - Drag Bit

**Total Depth:** 390 ft

**Static Water Level:**
- A: 107.9 ft
- B: 107.7 ft
- C: 107.5 ft

**Ground Elevation:** 5000.88 ft

**Logging:**
- Charles Bishop, Hugh Hurlow,
- Matt Affolter, UGS

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**Geophysical Log:**
- [ ] Yes  [ ] No

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**Lithology Log**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Lithology</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5'</td>
<td>Silt to fine sand, yellowish brown, about 7% pebbles, 1 mm to 10 mm.</td>
<td></td>
</tr>
<tr>
<td>5-15'</td>
<td>Pebbles in a sand matrix, 2-4 mm (decreasing), light brown to orange quartz pebbles, but mostly limestone, some shale</td>
<td></td>
</tr>
<tr>
<td>15-25'</td>
<td>Like above, but coarser, 2-10 mm</td>
<td></td>
</tr>
<tr>
<td>25-30'</td>
<td>Like above, finer</td>
<td></td>
</tr>
<tr>
<td>30-45'</td>
<td>Like above, coarser</td>
<td></td>
</tr>
<tr>
<td>45-50'</td>
<td>Gravel like above, 20% of sample sand to silt</td>
<td></td>
</tr>
</tbody>
</table>

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**Logging Details:**

- **Screen Type & Diameter**
  - "A" 2" dia 0.020" slot Sch 80 PVC
  - "B" 2" dia 0.020" slot Sch 80 PVC
  - "C" 2.5" dia 0.020" slot Sch 80 PVC

- **Casing Type & Diameter**
  - 8" steel completion casing
  - "A" 2" diameter Sch 80 PVC
  - "B" 2" diameter Sch 80 PVC
  - "C" 2.5" diameter Sch 80 PVC

- **Borehole Diameter**
  - 11" (Ream) from 0" to 196.5 ft
  - 8.75" from 0" to 390'

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**Diagram:**

- 10" steel casing
- Cement
- Time-release Bentonite Pellets
- 8" steel casing
- 30% Bentonite grout

**Other Logs:**

**Top of PVC riser**

**Measured From:**

- **Screen**
  - "A" 2" dia 0.020" slot Sch 80
  - "B" 2" dia 0.020" slot Sch 80
  - "C" 2.5" dia 0.020" slot Sch 80

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**Notes:**

- * = depths referenced to natural ground level
- ** = For well "A", 20' sump added, 170-190'
Well ID: UGS-PW06ABC

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>LITHOLOGY</th>
<th>WELL DIAGRAM</th>
<th>DRILLING INFO</th>
<th>LITHOLOGY DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-65</td>
<td></td>
<td>A</td>
<td></td>
<td>50-65 -- Finer grained, only 3% gravel</td>
</tr>
<tr>
<td>65-75</td>
<td></td>
<td>B</td>
<td></td>
<td>65-75 -- Like above, fraction of fine sand and silt increasing</td>
</tr>
<tr>
<td>75-95</td>
<td></td>
<td>C</td>
<td></td>
<td>75-95 -- Like above, volcanics present for first time</td>
</tr>
<tr>
<td>95-100</td>
<td></td>
<td></td>
<td></td>
<td>95-100 -- Like above, increase in gravel</td>
</tr>
<tr>
<td>100-105</td>
<td></td>
<td></td>
<td></td>
<td>100-105 -- Like above, possibly some volcanics (3%), mostly limestone, angular to subrounded, sands are well rounded</td>
</tr>
<tr>
<td>105-135</td>
<td></td>
<td></td>
<td></td>
<td>105-135 -- Gravel at least 15%, angular, fine sand (40%); gravels are limestone, shale, quartzite</td>
</tr>
<tr>
<td>135-150</td>
<td></td>
<td></td>
<td></td>
<td>135-150 -- Coarse sand to coarse gravel (90-95%) with tan sticky clay (5-10%); sand=tan, fine-grained, calcareous; gravel=medium grey limestone, chert, pink-buff quartzite, minor welded tuff</td>
</tr>
</tbody>
</table>

Faster drilling 90'
30% Bentonite grout
Time-release Bentonite Pellets
#3 Monterrey Sand
Choppy 140-150'
30% Bentonite grout
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Groute...
**Lithology Description**

150-175 -- Large cobbles started coming up at ~150', clasts are coarse sand to cobble sized: tan, pale pink tan, grey fine calcareous sandstone; medium-grey micrite to fine calcarenite, visually veined; pale to dark grey, buff chert; tan-grey medium to coarse calcarenite; cemented breccia of limestone

175-185 -- Like above, with clay (5-10%), cemented red and tan breccia; rare tan non-calcareous fine sandstone, clearly rounded sedimentary clasts, subangular to subrounded

180-190 -- Like above, fewer cobbles, increase in clay (10-15%)

190-215 -- Medium sand to coarse gravel (80-85%), no cobbles, increased clay (15-20%)

215-225 -- Gravel: mostly medium-tan fine calcareous sandstone with minor medium-grey calcarenite limestone, no clay

225-230 -- Gravel: mostly medium-tan fine calcareous sandstone with minor medium-grey calcarenite limestone, no clay

230-235 -- Medium sand to fine gravel (90%); mostly tan calcareous fine sandstone and tan to grey chert; 10% clay

235-250 -- Medium sand to gravel (70-80%) and clay (20-30%) gravel=grey to tan fine calcareous sandstone clasts
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>255-255</td>
<td>B C</td>
<td>250-255 -- Gravelly/sandy (85%) clay (15%); clasts are tan fine sandstone (75%), medium brown to tan chert (20%), fine calcarenite (5%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>255-260 -- Like above, but lack of limestone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>260-260</td>
<td></td>
<td>260-280 -- Like above, return of 5% limestone in clasts, tan sticky clay ranges from 5% to 15%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>260-280</td>
<td></td>
<td>260-335 -- Tan sandstone chips (50-90%), medium sand- to medium gravel-sized with very sticky grey clay, increasing and decreasing (10%-50%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>270-270</td>
<td></td>
<td>grout/sand 295’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>270-275</td>
<td></td>
<td>“B” Screen = 300-320’ Water gushed out of B well while drilling D well</td>
<td></td>
</tr>
<tr>
<td></td>
<td>280-280</td>
<td></td>
<td>grout/sand 295’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>280-335</td>
<td></td>
<td>300-320’ = 11 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>290-295</td>
<td></td>
<td>Lost circulation @ 320’ sand/bentonite pellets 321.5’ Very choppy 327’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>295-300</td>
<td></td>
<td>320-320’ = 2 hr 10 min Somewhat choppy 330-334’ Very choppy 335’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300-305</td>
<td></td>
<td>335-342 -- Coarser, cobbles to medium sand, limestone to sandstone clasts, no clay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>310-315</td>
<td></td>
<td>Moderately slow, choppy 340-345’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>315-320</td>
<td></td>
<td>Slow, choppy 345-350’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>320-325</td>
<td></td>
<td>342-343 -- Even coarser, collected a bag of cobbles; cobbles are yellow to red brown calcareous sandstone, grey to pale buff, fine- to medium-grained bioclastic limestone, and dark grey chert</td>
<td></td>
</tr>
<tr>
<td></td>
<td>325-330</td>
<td></td>
<td>343-390 (Total Depth) -- Arcturus Formation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>330-335</td>
<td></td>
<td>343-350 -- Chips of brownish grey, very fine, hard limestone/sandy limestone with yellowish-brown, fine-grained, calcareous sandstone</td>
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<tr>
<td></td>
<td>335-340</td>
<td></td>
<td>343-350 -- Chips of brownish grey, very fine, hard limestone/sandy limestone with yellowish-brown, fine-grained, calcareous sandstone</td>
<td></td>
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<tr>
<td></td>
<td>340-345</td>
<td></td>
<td>343-350 -- Chips of brownish grey, very fine, hard limestone/sandy limestone with yellowish-brown, fine-grained, calcareous sandstone</td>
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<tr>
<td></td>
<td>345-350</td>
<td></td>
<td>343-350 -- Chips of brownish grey, very fine, hard limestone/sandy limestone with yellowish-brown, fine-grained, calcareous sandstone</td>
<td></td>
</tr>
<tr>
<td>DEPTH</td>
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<tr>
<td>355</td>
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<td>Slow, moderately choppy 350-355'</td>
</tr>
<tr>
<td>360</td>
<td></td>
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<td></td>
<td>hole plug/time-release pellet contact @356'</td>
</tr>
<tr>
<td>365</td>
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<td></td>
<td>bentonite/sand 360'</td>
</tr>
<tr>
<td>370</td>
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<td></td>
<td>360-380'= 2 hr 25 min</td>
</tr>
<tr>
<td>375</td>
<td></td>
<td></td>
<td></td>
<td>2.5” to 2” reducer 370'</td>
</tr>
<tr>
<td>380</td>
<td></td>
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<td></td>
<td>Moderately choppy, very slow 370-375</td>
</tr>
<tr>
<td>385</td>
<td></td>
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<td></td>
<td>Lost circulation 377'</td>
</tr>
<tr>
<td>390</td>
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<td></td>
<td>'C' screen 370-390'</td>
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<td></td>
<td>Massive lost circulation 390'</td>
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<tr>
<td>395</td>
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<td>350-360 -- Medium to coarse sand-sized chips of yellow-tan, fine calcareous sandstone and medium-to pale-grey to tan-grey, very fine-grained calcareous sandstone or sandy limestone</td>
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<tr>
<td>400</td>
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<td>360-380 -- Like above, but minor clay, up to 5%</td>
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<td>405</td>
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<td>380-390 -- Medium-grey, fine-grained limestone (30%) and light tan to medium brown calcareous fine- to medium-grained sandstone (70%)</td>
</tr>
</tbody>
</table>

**Lithology**

- silt
- sand
- gravel
- siltstone
- sandstone
- conglomerate
- shale
- clay
- tuff
- limestone
- limestone-bedded
- limestone-shaley
- cherty limestone