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## APPENDICES

APPENDIX A: March 2018 & March 2020 Water Level Data

APPENDIX B: Renegade Ranch Well Drillers Log
1.0 INTRODUCTION

As part of a Memorandum Decision for the San Juan Spanish Valley Special Service District (SJSVSSD) water right a37400, monitoring and reporting of water elevation data in the Spanish Valley/Moab City area is a requirement. In an April 2018 report submitted to the Utah Division of Water Rights (DWRi), a framework for the monitoring and reporting was set forth and agreed on by the DWRi and stakeholders. Data will be collected from March to March each year and then reported to the DWRi by end of July. Figure 1 shows the location of the Monitoring plan and the wells involved.

2.0 EXISTING WELLS & DRILLING ACTIVITY ON SJSVSSD WATER RIGHT

Figure 2 shows the location of all of the well points of diversion on change application a37400. As of the end of March, 2020, is only one active and one inactive well on the change application. The SJSVSSD Well 1 is an active source and the Behind the Rocks Well is inactive with no plans to put into production. Refer to Figures 1 and 2 for the location of these wells.

There has been no drilling activity on this change application from March, 2019 to March, 2020.

3.0 EXTRACTIONS ON SJSVSSD WATER RIGHT

San Juan Spanish Valley Special Service District put the SJSVSSD Well 1 into production into the SJSVSSD Public Water System in July of 2019. The total extraction from SJSVSSD into the Public Water System from March, 2019 to March, 2020 is 20.14 acre feet. When this is combined with previous year’s extractions, the total extraction form the well is, 28.37 acre-ft. The extractions from the previous years were from the pump and aquifer testing DWRi required for the well.
SJSVSSD 2020 Monitoring Report

Figure 1.
Location of Monitoring Wells

Drawn By: G3 Mapping
Rich Emerson
rich@g3mapping.com

Date: April 2020

Project Manager: John Files

SITE KEY | SITE NAME | SITE KEY | SITE NAME |
---|---|---|---|
1 | (D-25-21)26dcc-1 | 19 | (D-26-22)18dca-1 |
2 | (D-25-21)35ddc-1 | 20 | (D-26-22)15dca-1 |
3 | (D-25-21)35cdc-1 | 21 | (D-26-22)15ddc-1 |
4 | (D-26-21)2acc-1 | 22 | (D-26-22)15bdb-1 |
5 | (D-26-21)2bdd-1 | 23 | (D-26-22)22daa-1 |
6 | (D-26-21)1caa-1 | 24 | (D-26-22)22aab-2 |
7 | (D-26-21)1dbb-3 | 25 | (D-26-22)22aab-1 |
8 | (D-26-21)1ddb-1 | 26 | (D-26-22)22abc-1 |
9 | (D-26-22)7aca-1 | 27 | (D-26-22)22abc-1 |
10 | (D-26-22)17aaa-2 | 28 | (D-26-22)22aad-1 |
11 | (D-26-22)17aba-3 | 29 | (D-26-22)22dad-1 |
12 | (D-26-22)15bbb-1 | 30 | (D-26-22)20dL86-1 |
13 | (D-26-22)17aad-3 | 31 | (D-26-22)22cab-1 |
14 | (D-26-22)15acb-1 | 32 | (D-26-22)23cdd-1 |
15 | (D-26-22)15acc-1 | 33 | (D-26-22)23cc-1 |
16 | (D-26-22)15bcc-2 | 34 | (D-26-22)21cad-1 |
17 | (D-26-22)17cab-1 | 35 | (D-26-22)21dab-1 |
18 | (D-26-22)15daa-2 | 36 | (D-26-22)26dbd-1 |
19 | (D-26-22)16ddd-3 | 37 | (D-26-22)26dba-1 |
20 | (D-26-22)15edc-1 | 38 | (D-26-22)26ddc-2 |
21 | (D-26-22)17aaa-2 | 39 | (D-26-22)26aca-

Formerly SITLA Behind the Rocks Well [(D-26-22)26dda-1]
Kens Lake
SITLA Behind the Rocks Well [(D-27-22)26dda-1]
SJSVSSD Well 1

Figure 2.
SJSVSSD Existing Wells and Points of Diversion

Project Manager: John Files
Date: April 2020

Drawn By: G3 Mapping
Rich Emerson
rich@g3mapping.com

SJSVSSD Existing Well
SJSVSSD POD
The graph below depicts the extractions from SJSVSSD Well 1, DWRi has approved up to 500 acre-ft a year of extractions from SJSVSSD Well 1.

**Extractions From SJSVSSD Well 1 (acre-ft)**

![Extractions Graph]

**4.0 WATER ELEVATION**

SJSVSSD monitors Well 1 and three nearby private wells with transducers that are logging at a minimum a reading every 6 hours. These wells are the Spielman, Shumway, and BLM wells. The USGS checks the water level in wells in its monitoring plan once a year in March. As the transducer data can give an insight into the local trends near Well 1, recharge periods, recharge influences, and pumping influences it can be valuable data and will be presented within this document.

Below is a table of the change in water elevation of the wells monitored with transducers;

<table>
<thead>
<tr>
<th>Well ID</th>
<th>Change in Elevation March 2018 to March 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJSVSSD Well 1</td>
<td>+0.86</td>
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<tr>
<td>Spielman Well</td>
<td>-1.92</td>
</tr>
<tr>
<td>Shumway Well</td>
<td>-1.47*</td>
</tr>
<tr>
<td>BLM Well</td>
<td>+2.32</td>
</tr>
</tbody>
</table>

*Shumway transducer installed in early April of 2018*

Below are the time series of the water elevation in each well. The Kens Lake storage in acre feet has been added to the plots.
Groundwater Elevation in SJSVSSD Well 1 & Kens Lake Storage

Date
9/22/17 12/31/17 4/10/18 7/19/18 10/27/18 2/4/19 5/15/19 8/23/19 12/1/19 3/10/20 6/18/20

Groundwater Elevation (ft)
0 500 1000 1500 2000 2500 3000

Kanes Lake Storage (acre-ft)

Groundwater Elevation in Spielman Well & Storage in Kens Lake

Date
9/22/17 12/31/17 4/10/18 7/19/18 10/27/18 2/4/19 5/15/19 8/23/19 12/1/19 3/10/20 6/18/20

Groundwater Elevation
0 500 1000 1500 2000 2500 3000

Storage in Kens Lake (acre-ft)
To graphically show the change in water level from the time of the start of the monitoring plan in 2018, a change in potentiometric surface elevation map has been created showing the change in water level from March 2018 to March 2020. The USGS water levels are only taken once a year in March, where as the transducer data is reading a minimum of every 6 hours, levels were used from March 31st, 2020. Figure 3 presents this data. The values used to create this map are included in Appendix A. This data is presented in Figure 3. Figure 4 depicts the change in ground water elevation from 1986 to 2020.

The contour intervals given on the map are:

-10’ to -15’ (red shaded)
-5 to -14.99 (orange shaded)
-1 to -4.99 (yellow shaded)
0 to -.99 (green numbers)
.01 to 1.0 (blue numbers)

The values from negative 1 foot to positive 1 foot were not contoured as they are likely more representative of regional changes and not local influence and it was not feasible to draw these changes with a closed contour.

As the 2018 and 2020 data is just a snapshot of the long term trends of the Valley, a long-term USGS time series has been added to the plot to give an idea of the long-term, pre-SJSVSSD Well 1 trends.

5.0 DISCUSSION OF WATER ELEVATION MONITORING

As was hypothesized in the 2019 Monitoring Report; for the March 2018 to March 2019 time frame, the declines for the previous year ending in 2019 attributed to a sharp decline in recharge for the 2017-2018 water year (Oct-Apr) appear to hold true.

The May 1st, 2018 NRCS Utah Water Supply Outlook Report for Southeastern Utah which includes Spanish Valley had the following data for the 2017-2018 water year (Oct-Apr):

“Snowpack in the Southeastern Utah is much below normal at 0% of normal, compared to 0% last year. Precipitation in April was much below average at 31%, which brings the seasonal accumulation (Oct-Apr) to 46% of average. Soil moisture is at 64% compared to 74% last year. Reservoir storage is at 49% of capacity, compared to 92% last year. Forecast streamflow volumes range from 4% to 42% of average. The surface water supply index is 9% for Moab.”

During March, 2019 to March, 2020 the precipitation has been above normal leading to an increase in water elevations in the area.
Figure 3.
Water Level Change 2018 - 2019

Kens Lake-SJSVSSD Well 1 Area

SJSVSSD 2020 Monitoring Report

Water Level Change 2018 - 2019

Water level change 2018 - 2020

Drawn By:
G3 Mapping
Rich Emerson
rich@g3mapping.com

Project Manager:
John Files

Date: April 2020
Figure 4.
Water Level Change 1986 - 2020

Water Level Change 1986 - 2020

SJSVSSD Well 1

Drawn By: G3 Mapping
Rich Emerson
rich@g3mapping.com

Project Manager: John Files

Date: April 2020

0 2 Mils

1:100,000
When the distribution of change in elevation is studied, it appears the Kens Lake storage is directly and indirectly tied to the groundwater recharge in the area. The SJSVSSD Well 1 and BLM Well appear to mimic the storage in the reservoir. The Spielman and Shumway Wells appear to just have a slow recharge and do not vary as much. Below is a combined plot with all groundwater elevations for comparison.

This plot demonstrates the different rates of recharge for the area wells. The reason for the different recharge curves could be due to structural geology. Both the BLM and SJSVSSD Well 1 could be located in highly fractured fault zones that Kens Lake Storage leaks into, this would lead to an almost direct recharge to these wells added to the more steady base regional recharge. The Spielman and Shumway wells may not be in this same fracture zone, but may be slowly recharged from the fracture zone and other base regional recharge.
6.0 PLANNED ACTIVITY FOR 2020-21 MONITORING YEAR

SJSVSSD Started production out of the SJSVSSD Well 1 in July of 2019. The current number of culinary hook ups is 79, by the end of March, 2021 the expected number of culinary hook ups is estimated to be 210.

Currently there are no additional planned wells or testing for other POD’s for 2020-21 Monitoring Year.

7.0 RECOMMENDED CHANGES TO MONITORING PLAN

There are no formal changes to the monitoring plan recommended at this time. An informal monitoring site was added to the Monitoring Plan known as the Renegade Ranch Well. This well is located south of the Behind the Rocks area just south of the highway. Refer to Figure 1 for the location of this well. The owners of the well have opted to install a transducer into the well and have allowed us to access the data. This well will provide a much needed up gradient site monitoring location in the Navajo Sandstone. The well drillers log and well diagram for the well are included in Appendix B. Below is the time series of the level in the well as of the end of March, 2020.

![Groundwater Elevation in Renagade Ranch Well](image)
APPENDIX A:

March 2018 & March 2019 Water Elevation Data
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<tr>
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</table>
APPENDIX B:

Renegade Ranch Well Drillers Log
# WELL DRILLER'S REPORT

**State of Utah**  
**Division of Water Rights**

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

## Well Identification

- **Water Right:** 05-3880  
- **WIN:** 443519

## Owner

- **Note any changes:**  
- **Renegade Ranch**  
- **4001 Kirby Lane**  
- **Moab UT 84532**

## Contact Person/Engineer:

- 

## Well Location

- **Note any changes:**  
- **New wellsite:** Northing 4252421  
- **Easting:** 636026  
- **NAD 83 Zone 12N**

### Location Description:

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

## Drillers Activity

- **Start Date:** 11/19/19  
- **Completion Date:** 12/20/19

Check all that apply:  
- [X] 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.

## Well Log

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<thead>
<tr>
<th>DEPTH (feet) FROM TO</th>
<th>BOREHOLE DIAMETER (in)</th>
<th>DRILLING METHOD</th>
<th>DRILLING FLUID</th>
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</thead>
<tbody>
<tr>
<td>0 - 110'</td>
<td>13&quot;</td>
<td>Air Mist Rotary</td>
<td>Foamy Soap + Water</td>
</tr>
<tr>
<td>110' - 730'</td>
<td>9&quot;</td>
<td>Air Mist Rotary + Hammer</td>
<td>Foamy Soap + Water</td>
</tr>
<tr>
<td>730' - 940'</td>
<td>6'1/4&quot;</td>
<td>Air Mist Rotary</td>
<td>Foamy Soap + Water</td>
</tr>
</tbody>
</table>

### Well Log

<table>
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<tr>
<th>DEPTH (feet) FROM TO</th>
<th>WATER PERMEABLE</th>
<th>UNCONSOLIDATED CONSOLIDATED</th>
<th>ROCK TYPE</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 210</td>
<td>V High</td>
<td></td>
<td>Sandstone/Shale Pink/Buff, Morrison Formation</td>
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<tr>
<td>210' - 645'</td>
<td>V High</td>
<td></td>
<td>Sandstone Redish Grey, Enderle Formation</td>
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<tr>
<td>645' - 705'</td>
<td>V High</td>
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<td>Sandstone Purple/Blue, Carmel Formation</td>
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<tr>
<td>705' - 940'</td>
<td>V High</td>
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<td>Sandstone Whitish/Grey, Navajo Formation</td>
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### Static Water Level

- **Date:** 12/12/19  
- **Water Level:** 344' feet  
- **Flowing?** Yes  
- **Method of Water Level Measurement:** Transducer  
- **If Flowing, Capped Pressure:** 546 PSI  
- **Point to Which Water Level Measurement was Referenced:**  
- **Height of Water Level reference point above ground surface:**  
- **Temperature:** 63.5 degrees  
- **Water Rights TL**  
- **RECEIVED JAN 10 2020**
### Construction Information

<table>
<thead>
<tr>
<th>DEPTH (feet)</th>
<th>CASING TYPE AND MATERIAL/GRADE</th>
<th>WALL THICK (in)</th>
<th>NOMINAL DIAM. (in)</th>
<th>DEPTH (feet)</th>
<th>SCREEN</th>
<th>PERFORATIONS</th>
<th>OPEN BOTTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM TO</td>
<td>CASING DEPTH (feet)</td>
<td>SCREEN</td>
<td>PERFORATIONS</td>
<td>OPEN BOTTOM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 730</td>
<td>&quot;Low Carbon Steel&quot;</td>
<td>Grade J55</td>
<td>$7^2$0</td>
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<td></td>
<td></td>
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<tr>
<td>730 940</td>
<td>&quot;No Casing&quot; OpenHole Completed</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Well Head Configuration:**
- **Access Port Provided?** Yes [ ] No [ ]
- **Casing Joint Type:** Threaded & Coupled [ ]
- **Perforator Used:** Perforator [ ]
- **Was a Surface Seal Installed?** Yes [ ] No [ ]
- **Depth of Surface Seal:** 110' [ ] feet
- **Drive Shoe?** Yes [ ] No [ ]
- **Surface Seal Material Placement Method:** Next Cement Grout Pressure Pumped [ ]
- **Was a temporary surface casing used?** Yes [ ] No [ ]

**Well Development and Well Yield Test Information**

<table>
<thead>
<tr>
<th>DATE</th>
<th>METHOD</th>
<th>YIELD</th>
<th>UNITS</th>
<th>DRAWDOWN</th>
<th>TIME PUMPED</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/10/19</td>
<td>Test Pumped w/ 25 HP Submersible 125 gpm Pump</td>
<td>77</td>
<td>GPM</td>
<td>85</td>
<td>24</td>
</tr>
</tbody>
</table>

**Pump (Permanent):**
- **Submersible:** Franklin Electric 4" 45 gpm [ ]
- **Horsepower:** 7.5 [ ]
- **Pump Intake Depth:** 515 feet [ ]
- **Well Disinfected upon Completion?** Yes [ ] No [ ]

**Comments:**
- Good Drilling w/No Big Problems, We Closed Off Pressure Camed Upper Entrada Water to 730 & Drilled into Lower Navajo Water Formation & Left Lower 210' of Navajo Formation & Open Hole Completed.

**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.

**License No.:** 824

**Date:** 12/20/2019