APPENDIX C

OTTER CREEK MINE BASELINE REPORT 304E

AQUIFER TEST DATA
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\A4 Pump Test (59.7 GPM)_final.aqt
Date: 07/17/12

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: A4
Test Date: 08/10/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>A4</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[ T = 2130. \text{ ft}^2/\text{day} \]
\[ Kz/Kr = 1 \]
\[ b = 50. \text{ ft} \]
\[ S = 0.1151 \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\A6 Pump Test (50 GPM).aqt
Date: 07/17/12  Time: 11:57:59

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: A6
Test Date: 07/06/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>A6</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined

\[ T = \frac{7750. \text{ ft}^2/\text{day}}{} \]

\[ Kz/Kr = 1 \]

Solution Method: Theis

\[ S = 3.843E-9 \]

\[ b = 14 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\..\A8 Pump Test (55 GPM).aqt
Date: 10/15/14  Time: 10:00:47

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: A8
Test Date: 6/18/2014

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>X (ft)</th>
<th>Y (ft)</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td></td>
<td></td>
<td>Well Name</td>
</tr>
<tr>
<td>A8</td>
<td>0</td>
<td>0</td>
<td>d A8</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined  Solution Method: Theis
T = 2400. ft²/day
Kz/Kr = 0.1
S = 3.087E-5
b = 30. ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Preliminary\A9\A9 Pump Test.aqt
Date: 10/15/14
Time: 10:04:01

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: A9
Test Date: 07/08/2014

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>A9</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

\[ T = 850. \text{ ft}^2/\text{day} \]
\[ S = 0.02259 \]
\[ \frac{K_z}{K_r} = 1 \]
\[ b = 70. \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\AVF1-2 Pump Test (60 gpm).aqt
Date: 07/17/12
Time: 11:58:48

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: AVF1-2
Test Date: 11/17/11

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>AVF1-2</td>
<td>2809578.219</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Leaky

\[
T = 1363. \text{ ft}^2/\text{day}
\]

\[
\frac{1}{B} = 0.01228 \text{ ft}^{-1}
\]

\[
b = 17. \text{ ft}
\]

Solution Method: Hantush-Jacob

\[
S = 0.004358
\]

\[
\frac{Kz}{Kr} = 1
\]
WELL TEST ANALYSIS

Data Set: H:\...\AVF1-2 Pump Test (60 gpm)_OBS AVF1-1.aqt
Date: 07/17/12      Time: 11:59:43

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: AVF1-2
Test Date: 11/17/11

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Well Name</strong></td>
<td><strong>X (ft)</strong></td>
</tr>
<tr>
<td>AVF1-2</td>
<td>2809578.219</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Leaky

\[
T = 1480.8 \text{ ft}^2/\text{day} \\
1/B = 0.01228 \text{ ft}^{-1} \\
b = 17. \text{ ft}
\]

Solution Method: Hantush-Jacob

\[
S = 0.002671 \\
Kz/Kr = 1
\]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\AVF3-1 Pump Test (10.6 gpm).aqt
Date: 07/17/12

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: AVF3-1
Test Date: 05/08/12

WELL DATA
Pumping Wells | Observation Wells
---|---
Well Name | X (ft) | Y (ft) | Well Name | X (ft) | Y (ft)
AVF3-1 | 2823451.75 | 470051.63 | AVF3-1 | 2823451.75 | 470051.63
AVF3-2 | 2823459.65 | 470043.96 | AVF3-2 | 2823459.65 | 470043.96

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[ T = 234.7 \text{ ft}^2/\text{day} \]
\[ K_z/K_r = 1 \]
\[ S = 0.01558 \]
\[ b = 69.5 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\AVF3-1 Pump Test (10.6 gpm)_OBS AVF3-2.aqt
Date: 07/17/12  Time: 12:01:03

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: AVF3-1
Test Date: 05/08/12

AQUIFER DATA

Saturated Thickness: 69.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVF3-1</td>
<td>2823451.75</td>
<td>470051.63</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVF3-1</td>
<td>2823451.75</td>
<td>470051.63</td>
</tr>
<tr>
<td>AVF3-2</td>
<td>2823459.65</td>
<td>470043.96</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = \frac{2958.2 \text{ ft}^2/\text{day}}{S} = 0.0008519 \]
AVF4-4 PUMPING TEST DATA

Data Set: H:\PROJECTS\OTRC\Hydrology\Aquifer Testing\Final\AVF4-4 Pump Test (110 GPM).aqt
Date: 07/17/12  Time: 12:01:32

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: AVF4-4
Test Date: 10/20/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>AVF4-4</td>
<td>2825342.295</td>
</tr>
<tr>
<td></td>
<td>2825333.128</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined  Solution Method: Theis
T = 2749.2 ft²/day  S = 0.1608
Kz/Kr = 1.  b = 17. ft
AVF4-4 PUMPING TEST DATA
Data Set:  H:\...\AVF4-4 Pump Test (110 GPM)_OBSAVF4-1.aqt
Date: 07/17/12  Time: 12:02:17

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: AVF4-4
Test Date: 10/20/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>AVF4-4</td>
<td>2825342.295</td>
</tr>
<tr>
<td></td>
<td>AVF4-1</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[
T = 3271.4 \text{ ft}^2/\text{day}
\]

\[
Kz/Kr = 1.
\]

\[
S = 0.0001266
\]

\[
b = 17. \text{ ft}
\]
**WELL TEST ANALYSIS**

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\AVF5-2 Pump Test (99 gpm).aqt
Date: 07/17/12  Time: 12:02:46

**PROJECT INFORMATION**

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: AVF5-2
Test Date: 11/02/11

**AQUIFER DATA**

Saturated Thickness: 50. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b') : 1. ft
Aquitard Thickness (b''): 1. ft

**WELL DATA**

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>X</th>
<th>Y</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X</td>
<td>Y</td>
<td>Well Name</td>
</tr>
<tr>
<td>AVF5-2</td>
<td>2819885.35</td>
<td>489701.138</td>
<td>AVF5-2</td>
</tr>
<tr>
<td></td>
<td>2819885.116</td>
<td>489716.273</td>
<td>AVF5-3</td>
</tr>
<tr>
<td></td>
<td>2819988.685</td>
<td>489376.302</td>
<td>AVF5-4</td>
</tr>
</tbody>
</table>

**SOLUTION**

Aquifer Model: Leaky
Solution Method: Cooley-Case

\[
T = 3842.2 \text{ ft}^2/\text{day} \\
1/B = 0.01881 \text{ ft}^{-1} \\
S'/Sy = 0. \\
S = 0.00878 \\
\beta/r = 3.0E-5 \text{ ft}^{-1} \\
L/b' = 0.
\]
WELL TEST ANALYSIS

Data Set: H:\...\AVF5-2 Pump Test (99 gpm)_obsAVF5-3.aqt
Date: 07/17/12  Time: 12:05:52

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: AVF5-2
Test Date: 11/02/11

AQUIFER DATA

Saturated Thickness: 50. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b'): 1. ft
Aquitard Thickness (b''): 1. ft

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>AVF5-2</td>
<td>2819885.35</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Leaky
\[ T = 3795.7 \text{ ft}^2/\text{day} \]
\[ 1/B = 0.01884 \text{ ft}^{-1} \]
\[ S'/Sy = 0. \]

Solution Method: Cooley-Case
\[ S = 0.00673 \]
\[ \beta/r = 3.0E-5 \text{ ft}^{-1} \]
\[ L/b' = 0. \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\AVF6-3 Pump Test (102 gpm).aqt
Date: 07/17/12
Time: 12:07:08

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: AVF6-3
Test Date: 11/16/11

WELL DATA

<table>
<thead>
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<th>Pumping Wells</th>
<th>Observation Wells</th>
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</thead>
<tbody>
<tr>
<td><strong>Well Name</strong></td>
<td><strong>X (ft)</strong></td>
</tr>
<tr>
<td>AVF6-3</td>
<td>2822620.037</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Leaky

\[
T = 3059.8 \text{ ft}^2/\text{day} \\
1/B = 0.06126 \text{ ft}^{-1} \\
b = 34. \text{ ft}
\]

Solution Method: Hantush-Jacob

\[
S = 0.02668 \\
\frac{K_z}{K_r} = 1
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B10-KL PUMP TEST (1.3 GPM).aqt
Date: 07/17/12  Time: 12:07:52

PROJECT INFORMATION

Company: Hydrometrics  
Client: Otter Creek  
Project: 10068  
Location: Ashland, MT  
Test Well: B10-KL  
Test Date: 07/07/2011

AQUIFER DATA

Saturated Thickness: 10.5 ft  
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B10-KL</td>
<td>0</td>
<td>0</td>
<td>B10-KL</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined  
Solution Method: Cooper-Jacob  
\[ T = 2.858 \text{ ft}^2/\text{day} \]  
\[ S = 0.07519 \]
WELL TEST ANALYSIS

Data Set: \PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B10-KU Pump Test (2.7 GPM).aqt
Date: 07/17/12
Time: 12:08:19

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B10-KU
Test Date: 03/10/11

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B10-KU</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>△ B10-KU</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

\[ T = 16.78 \text{ ft}^2/\text{day} \]
\[ K_z/K_r = 1 \]
\[ S = 0.06871 \]
\[ b = 31.5 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B10-O Slug In.aqt
Date: 07/17/12
Time: 12:10:44

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B10-O
Test Date: 07/06/2011

AQUIFER DATA

Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B10-O)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 3.5 ft
Screen Length: 3.5 ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 41.36 ft/day
y0 = 0.6518 ft
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B10-O Slug Out.aqt
Date: 07/17/12  Time: 12:12:11

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B10-O
Test Date: 07/06/2011

AQUIFER DATA
Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B10-O)
Initial Displacement: 1.6 ft
Total Well Penetration Depth: 3.5 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 3.5 ft
Screen Length: 3.5 ft
Well Radius: 0.333 ft

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 29.88 ft/day
y0 = 0.4492 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B10-U Pump Test (8.1 GPM).aqt
Date: 07/17/12
Time: 12:12:59

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B10-U
Test Date: 03/10/11

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B10-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[
T = 56.21 \text{ ft}^2/\text{day}
\]

\[
\frac{K_z}{K_r} = 1.
\]

\[
S = 0.009803
\]

\[
b = 90. \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B11-K Pump Test (9.9 GPM).aqt
Date: 07/17/12, Time: 12:13:19

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B11-K
Test Date: 07/21/2011

WELL DATA

Pumping Wells | X (ft) | Y (ft) | Observation Wells
---|---|---|---
B11-K | 0 | 0 | B11-K

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 85.29 ft^2/day
Kz/Kr = 1
S = 0.04104
b = 75 ft
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B11-O Slug In.aqt
Date: 07/17/12 Time: 12:13:47

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B11-O
Test Date: 08/10/2011

AQUIFER DATA
Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B11-O)
Initial Displacement: 1.2 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.1875 ft
Static Water Column Height: 38. ft
Screen Length: 5. ft
Well Radius: 0.3333 ft

SOLUTION
Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.001247 ft/day
y0 = 1.635 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B11-O Slug Out.aqt
Date: 07/17/12 Time: 12:14:16

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B11-O
Test Date: 08/10/2011

AQUIFER DATA

Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B11-O)

Initial Displacement: 1.2 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.1875 ft
Screen Water Column Height: 38. ft
Screen Length: 5. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.03931 ft/day
y0 = 0.1732 ft
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B11-U Pump Test (1.6 GPM).aqt
Date: 07/17/12  Time: 12:14:43

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B11-U
Test Date: 07/20/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B11-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[
T = 1.146 \text{ ft}^2/\text{day} \\
Kz/Kr = 1 \\
S = 0.04651 \\
b = 23 \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Preliminary\B12-CO\B12-CO Slug In.aqt
Date: 10/15/14  Time: 10:04:40

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B12-CO
Test Date: 6/16/2014

AQUIFER DATA

Saturated Thickness: 11.5 ft
Anisotropy Ratio (Kz/Kr): 

WELL DATA (B12-CO)

Initial Displacement: 1.3 ft
Total Well Penetration Depth: 10.23 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 11.5 ft
Screen Length: 10.23 ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3. ft/day
y0 = 0.2658 ft
### WELL TEST ANALYSIS

Data Set: \H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Preliminary\B12-CO\B12-CO Slug Out.aqt  
Date: 10/15/14  
Time: 10:04:55

### PROJECT INFORMATION

Company: Hydrometrics  
Client: Otter Creek  
Project: 10068.303  
Location: Ashland, MT  
Test Well: B12-CO  
Test Date: 6/16/2014

### AQUIFER DATA

<table>
<thead>
<tr>
<th>Saturated Thickness:</th>
<th>11.5 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anisotropy Ratio (Kz/Kr):</td>
<td>1.</td>
</tr>
</tbody>
</table>

### WELL DATA (B12-CO)

<table>
<thead>
<tr>
<th>Initial Displacement:</th>
<th>1.8 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Well Penetration Depth:</td>
<td>10.23 ft</td>
</tr>
<tr>
<td>Casing Radius:</td>
<td>0.1875 ft</td>
</tr>
<tr>
<td>Static Water Column Height:</td>
<td>11.5 ft</td>
</tr>
<tr>
<td>Screen Length:</td>
<td>10.23 ft</td>
</tr>
<tr>
<td>Well Radius:</td>
<td>0.3333 ft</td>
</tr>
</tbody>
</table>

### SOLUTION

<table>
<thead>
<tr>
<th>Aquifer Model:</th>
<th>Unconfined</th>
</tr>
</thead>
<tbody>
<tr>
<td>K =</td>
<td>3. ft/day</td>
</tr>
<tr>
<td>y0 =</td>
<td>0.2504 ft</td>
</tr>
<tr>
<td>Solution Method:</td>
<td>Bouwer-Rice</td>
</tr>
</tbody>
</table>
WELL TEST ANALYSIS

Data Set: H:\...\B12-KL Pump Test Weighted.aqt
Date: 10/15/14
Time: 10:09:55

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B12-KL
Test Date: 6/16/2014

AQUIFER DATA

Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B12-KL</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
K = 0.25 ft/day
n = 2.
Sw = 0.
r(c) = 0.1875 ft

Solution Method: Barker
Ss = 1.339E-7
b = 16. ft
r(w) = 0.333 ft
r(c) = 0.1875 ft
WELL TEST ANALYSIS
Data Set: H:\...\B12-KL Pump Test (2.4 GPM).aqt
Date: 10/15/14  Time: 16:53:10

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B12-KL
Test Date: 6/16/2014

AQUIFER DATA
Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b'): 1. ft
Aquitard Thickness (b''): 1. ft

WELL DATA
Pumping Wells
<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B12-KL</td>
<td>2842007</td>
<td>454392</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ B12-KL</td>
<td>2842007</td>
<td>454392</td>
</tr>
<tr>
<td>□ B12-UK1</td>
<td>2842005</td>
<td>454404.3</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

\[ T = 4. \text{ ft}^2/\text{day} \]
\[ 1/B = 0.0185 \text{ ft}^{-1} \]
\[ T2 = 0.22 \text{ ft}^2/\text{day} \]
\[ S = 1.0E-5 \]
\[ \beta/r = 0.02276 \text{ ft}^{-1} \]
\[ S2 = 0.01 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Preliminary\B12-U\B12-U Pump Step.aqt
Date: 10/15/14
Time: 10:12:02

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B12-U
Test Date: 6/17/2014

AQUIFER DATA
Saturated Thickness: 25. ft
Anisotropy Ratio (Kz/Kr): 0.1
Aquitard Thickness (b'): 1. ft
Aquitard Thickness (b''): 1. ft

WELL DATA
Pumping Wells
<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B12-U</td>
<td>2842009</td>
<td>454380.8</td>
</tr>
</tbody>
</table>

Observation Wells
<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B12-U</strong></td>
<td>2842009</td>
<td>454380.8</td>
</tr>
<tr>
<td><strong>B12-LK</strong></td>
<td>2842007</td>
<td>454392</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

\[ T = 4. \text{ ft}^2/\text{day} \]
\[ 1/B = 0.9061 \text{ ft}^{-1} \]
\[ T_2 = 4. \text{ ft}^2/\text{day} \]

\[ S = 0.01888 \]
\[ \beta/r = 0.001808 \text{ ft}^{-1} \]
\[ S_2 = 0.0001 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B12-UK1 Pump.aqt
Date: 10/15/14  Time: 16:58:21

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B12-UK1
Test Date: 6/18/2014

AQUIFER DATA
Saturated Thickness: 11.5 ft  Anisotropy Ratio (Kz/Kr): 0.09333

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B12-KU1</td>
<td>2842005</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined  Solution Method: Papadopulos-Cooper

\[ T = 0.22 \text{ ft}^2/\text{day} \]
\[ r(w) = 0.3333 \text{ ft} \]
\[ S = 0.04973 \]
\[ r(c) = 0.1875 \text{ ft} \]
### WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B12-UK2 Slug In.aqt  
Date: 10/15/14  
Time: 16:59:15

### PROJECT INFORMATION

Company: Hydrometrics  
Client: Otter Creek  
Project: 10068.303  
Location: Ashland, MT  
Test Well: B12-UK2  
Test Date: 6/16/2014

### AQUIFER DATA

Saturated Thickness: 21 ft  
Anisotropy Ratio (Kz/Kr): 1.

### WELL DATA (B12-KU2)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Displacement</td>
<td>3.76 ft</td>
</tr>
<tr>
<td>Total Well Penetration Depth</td>
<td>10.23 ft</td>
</tr>
<tr>
<td>Casing Radius</td>
<td>0.1875 ft</td>
</tr>
<tr>
<td>Static Water Column Height</td>
<td>21 ft</td>
</tr>
<tr>
<td>Screen Length</td>
<td>10.23 ft</td>
</tr>
<tr>
<td>Well Radius</td>
<td>0.3333 ft</td>
</tr>
</tbody>
</table>

### SOLUTION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer Model</td>
<td>Unconfined</td>
</tr>
<tr>
<td>Solution Method</td>
<td>Bouwer-Rice</td>
</tr>
<tr>
<td>K</td>
<td>0.7 ft/day</td>
</tr>
<tr>
<td>y0</td>
<td>1.415 ft</td>
</tr>
</tbody>
</table>
### WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B12-UK2 Slug Out.aqt  
Date: 10/15/14  Time: 17:00:32

### PROJECT INFORMATION

- Company: Hydrometrics  
- Client: Otter Creek  
- Project: 10068.303  
- Location: Ashland, MT  
- Test Well: B12-UK2  
- Test Date: 6/16/2014

### AQUIFER DATA

- Saturated Thickness: 11.8 ft  
- Anisotropy Ratio (Kz/Kr): 1

### WELL DATA (B12-KU2)

- Initial Displacement: 2.2 ft  
- Total Well Penetration Depth: 10.23 ft  
- Casing Radius: 0.1875 ft  
- Static Water Column Height: 21 ft  
- Screen Length: 10.23 ft  
- Well Radius: 0.3333 ft

### SOLUTION

- Aquifer Model: Unconfined  
- Solution Method: Bouwer-Rice  
- \( K = 0.57 \text{ ft/day} \)  
- \( y_0 = 1.392 \text{ ft} \)
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B1-U Pump Test (31.8 gpm).aqt
Date: 07/17/12
Time: 12:15:07

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B1-U
Test Date: 11/17/11

AQUIFER DATA

Saturated Thickness: 43 ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Papadopulos-Cooper

\[ T = 799.7 \text{ ft}^2/\text{day} \]
\[ r(w) = 0.3333 \text{ ft} \]
\[ r(c) = 0.1875 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B2-K Pump Test (5.6 gpm).aqt
Date: 07/17/12  Time: 12:15:33

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek Coal, LLC
Project: 10068.303
Location: Ashland, MT
Test Well: B2-K
Test Date: 09/14/11

AQUIFER DATA

Saturated Thickness: 61.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-K</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Observation Wells</td>
<td>X (ft)</td>
<td>Y (ft)</td>
</tr>
<tr>
<td>B2-K</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 42.39 ft²/day
S = 0.08217
PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B2-U
Test Date: 9/14/11

AQUIFER DATA

Saturated Thickness: 53. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B2-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = 4.823 \text{ ft}^2/\text{day} \]
\[ S = 0.03357 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B3-K Slug Out.aqt
Date: 07/17/12

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B3-K
Test Date: 6/6/12

AQUIFER DATA
Saturated Thickness: 15.36 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B3-K)
Initial Displacement: 1.2 ft
Total Well Penetration Depth: 44. ft
Casing Radius: 0.1875 ft
Static Water Column Height: 15.36 ft
Screen Length: 44. ft
Well Radius: 0.3333 ft

SOLUTION
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\[ K = \boxed{0.4068 \text{ ft/day}} \]
\[ y_0 = \boxed{0.5164 \text{ ft}} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B3-U Pump Test (1.5 GPM).aqt

Date: 07/17/12  Time: 12:17:16

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B3-U
Test Date: 07/22/2011

AQUIFER DATA

Saturated Thickness: 9 ft
Anisotropy Ratio (Kz/Kr): 1

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B3-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = 2.102 \text{ ft}^2/\text{day} \]

\[ S = 0.02802 \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRC\Hydrology\Aquifer Testing\Final\B4-K Pump Test (4.0 GPM).aqt
Date: 07/17/12
Time: 12:17:35

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B4-K
Test Date: 09/06/2011

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4-K</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ B4-K</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[
T = 56.73 \text{ ft}^2/\text{day} \\
Kz/Kr = 1. \\
S = 2.158\times10^{-9} \\
b = 66. \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B4-O Slug In.aqt
Date: 07/17/12  Time: 14:06:03

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B4-O
Test Date: 09/07/2011

AQUIFER DATA

Saturated Thickness: 12.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B4-O)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 12.95 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 11.49 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

$K = 0.2509 \text{ ft/day}$
$y_0 = 1.355 \text{ ft}$
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B4-O Slug Out.aqt
Date: 07/17/12 Time: 12:19:20

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B4-O
Test Date: 09/07/2011

AQUIFER DATA

Saturated Thickness: 12.2 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B4-O)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 12.95 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 11.49 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

\( K = 0.2722 \) ft/day
\( y_0 = 1.456 \) ft
**WELL TEST ANALYSIS**

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B4-U Pump Test (1.0 GPM).aqt

Date: 07/17/12  Time: 12:29:48

**PROJECT INFORMATION**

Company: Hydrometrics  
Client: Otter Creek  
Project: 10068.303  
Location: Ashland, MT  
Test Well: B4-U  
Test Date: 09/01/2011

**AQUIFER DATA**

Saturated Thickness: 41. ft  
Anisotropy Ratio (Kz/Kr): 1.

**WELL DATA**

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B4-U</td>
<td>0</td>
</tr>
</tbody>
</table>

**SOLUTION**

Aquifer Model: Confined  
Solution Method: Cooper-Jacob  
\[ T = 0.5798 \text{ ft}^2/\text{day} \]  
\[ S = 0.07829 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B5-K Pump Test (12.2 GPM).aqt
Date: 07/17/12 Time: 12:56:45

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B5-K
Test Date: 07/14/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B5-K</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[
T = 691.1 \text{ ft}^2/\text{day} \\
Kz/Kr = 1 \\
S = 0.04702 \\
b = 70. \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: \H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B5-O Slug In.aqt
Date: 07/17/12
Time: 12:57:08

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B5-O
Test Date: 08/31/2011

AQUIFER DATA

Saturated Thickness: 11.8 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (B5-O)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 10.23 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 10.23 ft
Screen Length: 10.23 ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 31.95 ft/day
y0 = 0.8603 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B5-U Pump Test (11.8 GPM).aqt
Date: 07/17/12
Time: 12:58:48

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B5-U
Test Date: 07/14/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B5-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = 31.91 \text{ ft}^2/\text{day} \]
\[ Kz/Kr = 1 \]
\[ S = 0.0004761 \]
\[ b = 60 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B6-K Pump Test (8.6 GPM).aqt
Date: 07/17/12
Time: 12:59:16

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B6-K
Test Date: 9/8/11

WELL DATA

Pumping Wells

Well Name | X (ft) | Y (ft)
---|---|---
B6-K | 0 | 0

Observation Wells

Well Name | X (ft) | Y (ft)
B6-K | 0 | 0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[
T = 64.63 \text{ ft}^2/\text{day}
\]
\[
Kz/Kr = 1
\]
\[
S = 1.309
\]
\[
b = 66. \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B6-O Pump Test (1.0 GPM).aqt
Date: 07/17/12 Time: 12:59:43

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B6-O
Test Date: 09/07/2011

AQUIFER DATA

Saturated Thickness: 18 ft
Anisotropy Ratio (Kz/Kr): 1

WELL DATA

Pumping Wells | Observation Wells
---|---
Well Name | X (ft) | Y (ft) | Well Name | X (ft) | Y (ft)
B6-O | 0 | 0 | B6-O | 0 | 0

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

T = 0.7606 ft²/day
S = 0.07685
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B6-U Pump Test (1.8 GPM).aqt
Date: 07/17/12  Time: 13:00:10

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B6-U
Test Date: 09/7/11

AQUIFER DATA
Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA
Pumping Wells
Well Name  X (ft)  Y (ft)
B6-U        0       0

Observation Wells
Well Name  X (ft)  Y (ft)
B6-U        0       0

SOLUTION
Aquifer Model: Confined
Solution Method: Papadopulos-Cooper
T = 39.84 ft²/day
S = 9.903E-17
r(w) = 0.3333 ft
r(c) = 0.1875 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B7-KL Pump Test (3.6 GPM).aqt
Date: 07/17/12  Time: 13:00:33

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B7-KL
Test Date: 07/19/2011

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-KL</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-KL</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = 4.47 \text{ ft}^2/\text{day} \]
\[ \frac{K_z}{K_r} = 1 \]
\[ S = 0.05688 \]
\[ b = 19 \text{ ft} \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B7-KU Pump Test (1.2 GPM).aqt
Date: 07/17/12
Time: 13:01:03

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B7-KU
Test Date: 07/15/2011

WELL DATA
Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-KU</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis

\[
T = 24.3 \text{ ft}^2/\text{day}
\]

\[
K_z/K_r = 1.
\]

\[
S = 1.768E-11
\]

\[
b = 10. \text{ ft}
\]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B7-O Pump Test (1.3 GPM).aqt
Date: 07/17/12
Time: 13:02:05

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B7-O
Test Date: 07/19/2011

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-O</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-O</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Theis
T = 6.314 ft²/day
Kz/Kr = 1
b = 5 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B7-U Pump Test (0.8 GPM).aqt
Date: 07/17/12  Time: 13:02:27

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B7-U
Test Date: 07/20/2011

WELL DATA

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = 1.517 \, \text{ft}^2/\text{day} \]
\[ K_z/K_r = 1 \]
\[ S = 0.0524 \]
\[ b = 35. \, \text{ft} \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B8-KL Pump Test (3.5 GPM).aqt
Date: 07/17/12 Time: 13:03:41

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B8-KL
Test Date: 08/20/2011

AQUIFER DATA
Saturated Thickness: 16. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B8-KL</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = 9.955 \text{ ft}^2/\text{day} \]
\[ S = 0.04826 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B8-KU Pump Test (5.8 GPM).aqt
Date: 07/17/12  Time: 13:04:25

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B8-KU
Test Date: 08/11/2011

AQUIFER DATA
Saturated Thickness: 48 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA
<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B8-KU</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 16.77 ft²/day
S = 0.003428
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B8-O Pump Test (4.3 GPM).aqt
Date: 07/17/12

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: B8-O
Test Date: 08/10/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B8-O</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = \frac{90.44 \text{ ft}^2/\text{day}}{Kz/Kr = \frac{1}{b}} = \frac{8.235E-7}{53. \text{ ft}} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B8-U Pump Test (1.6 GPM).aqt
Date: 07/17/12
Time: 13:05:17

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B8-U
Test Date: 08/30/2011

AQUIFER DATA

Saturated Thickness: 38 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>B8-U</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = 2.771 \text{ ft}^2/\text{day} \]
\[ S = 0.04489 \]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B9-K Pump Test (7.5 GPM).aqt
Date: 07/17/12 Time: 13:05:40

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B9-K
Test Date: 08/31/2011

WELL DATA
Pumping Wells
Well Name  X (ft)  Y (ft)
B9-K        0        0

Observation Wells
Well Name  X (ft)  Y (ft)
  B9-K      0        0

SOLUTION
Aquifer Model: Confined
T = 481.1 ft²/day
Kz/Kr = 1

Solution Method: Theis
S = 4.64E-13
b = 67.5 ft
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\B9-U Pump Test (1.0 GPM).aqt
Date: 07/17/12 Time: 13:06:04

PROJECT INFORMATION
Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: B9-U
Test Date: 08/31/2011

AQUIFER DATA
Saturated Thickness: 11 ft
Anisotropy Ratio (Kz/Kr): 1

WELL DATA
Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-U</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Cooper-Jacob

\[ T = 0.6004 \text{ ft}^2/\text{day} \]
\[ S = 0.08298 \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\C-1 Slug Out.aqt
Date: 07/17/12
Time: 13:06:30

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: C-1
Test Date: 09/06/2011

AQUIFER DATA

Saturated Thickness: 1.22 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (C-1)

Initial Displacement: 1.6 ft
Total Well Penetration Depth: 1.22 ft
Casing Radius: 0.1875 ft
Static Water Column Height: 1.22 ft
Screen Length: 1.22 ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.07537 ft/day
y0 = 0.2394 ft
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\C2 Pump Test (90gpm).aqt
Date: 07/17/12  Time: 13:07:26

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Date: 2/8/2011

AQUIFER DATA

Saturated Thickness: 18.5 ft  Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>C2</td>
<td>476059.44</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined  Solution Method: Cooper-Jacob

T = 1.3E+6 ft²/day  S = 0.2847
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\C4 Pump Test (365 gpm).aqt
Date: 07/17/12
Time: 13:07:56

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068.303
Location: Ashland, MT
Test Well: C-4
Test Date: 11/02/11

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>C4</td>
<td>2824994.612</td>
</tr>
<tr>
<td>C4</td>
<td>2824994.612</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

\[ T = 7.622E+5 \text{ ft}^2/\text{day} \]
\[ \frac{K_z}{K_r} = 1 \]
\[ S = 4.145E-6 \]
\[ b = 50. \text{ ft} \]
**WELL TEST ANALYSIS**

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-1 PUMP TEST (13 GPM).aqt

Date: 07/17/12  
Time: 13:08:24

**PROJECT INFORMATION**

Company: Hydrometrics, Inc.  
Client: Otter Creek Coal, LLC  
Project: 10068.300  
Location: Ashland, MT  
Test Well: K-1  
Test Date: 1/25/2011

**WELL DATA**

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>K-1</td>
<td>0</td>
</tr>
</tbody>
</table>

**SOLUTION**

Aquifer Model: Confined  
Solution Method: Theis  

\[
T = \frac{232. \text{ ft}^2/\text{day}}{Kz/Kr} = 1.
\]

\[
S = 2.054 \times 10^{-8}
\]

\[
b = 72. \text{ ft}
\]
WELL TEST ANALYSIS
Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-1 PUMP TEST (17 GPM).aqt
Date: 07/17/12
Time: 13:08:52

PROJECT INFORMATION
Company: Hydrometrics, Inc.
Client: Otter Creek Coal, LLC
Project: 10068.300
Location: Ashland, MT
Test Well: K-1
Test Date: 1/25/2011

AQUIFER DATA
Saturated Thickness: 72. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA
Pumping Wells
<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-1</td>
<td>2825490.644</td>
<td>467480.099</td>
</tr>
</tbody>
</table>

Observation Wells
<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-1</td>
<td>2825490.644</td>
<td>467480.099</td>
</tr>
<tr>
<td>OC83-04</td>
<td>2827855.635</td>
<td>468541.1105</td>
</tr>
</tbody>
</table>

SOLUTION
Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 136.1 ft²/day
S = 0.0001297
WELL TEST ANALYSIS

Data Set: H:\...\K-1 PUMP TEST (17 GPM) obs oc83 04.aqt
Date: 07/17/12 Time: 13:09:34

PROJECT INFORMATION

Company: Hydrometrics, Inc.
Client: Otter Creek Coal, LLC
Project: 10068.300
Location: Ashland, MT
Test Well: K-1
Test Date: 1/25/2011

AQUIFER DATA


WELL DATA

Pumping Wells Observation Wells
Well Name X (ft) Y (ft) Well Name X (ft) Y (ft)
K-1 2825490.644 467480.099 K-1 2825490.644 467480.099
OC83-04 2827855.635 468541.110 OC83-04 2827855.635 468541.110

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob
T = 1624.9 ft²/day S = 0.0001644
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-2 PUMP TEST (8.4 GPM).aqt
Date: 07/17/12
Time: 13:10:07

PROJECT INFORMATION

Company: Hydrometrics, Inc.
Client: Otter Creek Coal, LLC
Project: 10068.300
Location: Ashland, MT
Test Well: K-2
Test Date: 1/26/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Well Name</strong></td>
<td><strong>X (ft)</strong></td>
</tr>
<tr>
<td>K-2</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = 104.6 \text{ ft}^2/\text{day} \]
\[ K_z/K_r = 1 \]
\[ S = 4.499 \times 10^{-5} \]
\[ b = 18 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-3 PUMP TEST (2 GPM).aqt
Date: 07/17/12 Time: 13:10:55

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: K-3
Test Date: 07/08/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>K-3</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Unconfined

Solution Method: Theis

\[ T = 34.31 \text{ ft}^2/\text{day} \]

\[ \frac{Kz}{Kr} = 1. \]

\[ S = 0.00444 \]

\[ b = 13.5 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-4 PUMP TEST (1.7 GPM).aqt
Date: 07/17/12  Time: 13:11:20

PROJECT INFORMATION

Company: Hydrometrics, Inc.
Client: Otter Creek Coal, LLC
Project: 10068.300
Location: Ashland, MT
Test Well: K-4
Test Date: 1/26/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>K-4</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

\[ T = 1.738 \text{ ft}^2/\text{day} \]
\[ Kz/Kr = 1 \]
\[ S = 0.0255 \]
\[ b = 17.5 \text{ ft} \]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-5 Pump Test (10.5 gpm).aqt
Date: 07/17/12  Time: 13:11:46

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek Coal, LLC
Project: 10068.303
Location: Ashland, MT
Test Well: K-5
Test Date: 09/13/11

AQUIFER DATA

Saturated Thickness: 71.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-5</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

Observation Wells

<table>
<thead>
<tr>
<th>Well Name</th>
<th>X (ft)</th>
<th>Y (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Confined
Solution Method: Papadopoulos-Cooper

\[
T = 320.6 \text{ ft}^2/\text{day}
\]
\[
r(w) = 0.1875 \text{ ft}
\]
\[
S = 5.9 \times 10^{-6}
\]
\[
r(c) = 0.1875 \text{ ft}
\]
WELL TEST ANALYSIS

Data Set: H:\PROJECTS\OTRCR\Hydrology\Aquifer Testing\Final\K-6 PUMP TES (5.5 GPM).aqt
Date: 07/17/12  Time: 13:12:11

PROJECT INFORMATION

Company: Hydrometrics
Client: Otter Creek
Project: 10068
Location: Ashland, MT
Test Well: K-6
Test Date: 07/08/2011

WELL DATA

<table>
<thead>
<tr>
<th>Pumping Wells</th>
<th>Observation Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Name</td>
<td>X (ft)</td>
</tr>
<tr>
<td>K-6</td>
<td>0</td>
</tr>
</tbody>
</table>

SOLUTION

Aquifer Model: Leaky

\[ T = 14.64 \text{ ft}^2/\text{day} \]
\[ r/B = 0.2767 \]
\[ b = 45. \text{ ft} \]

Solution Method: Hantush-Jacob

\[ S = 0.09521 \]
\[ Kz/Kr = 1 \]