Overview of ABCWUA
Recharge Projects

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Why is ABCWUA interested in Aquifer Storage and Recovery?

- Maximize storage capacity
- Improve management of seasonal water supply
- Reduce evaporative losses
- Reduce drawdown in the largest cones of depression in Middle Rio Grande Basin
Policy C: Establish and maintain a groundwater drought reserve (Policy C)

Recommendation: The City/Authority should proceed to implement an aquifer storage and recovery (ASR) program beginning with the necessary pilot studies and permitting phase such that the program can be implemented...
ABCWUA Recharge Projects

Bear Canyon ★

Large Scale ★

Source: USGS
### ABCWUA Recharge Projects

<table>
<thead>
<tr>
<th>Basic Info</th>
<th>Type of Recharge</th>
<th>Bear Canyon</th>
<th>Large Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Infiltration</td>
<td>Injection</td>
</tr>
<tr>
<td>Volume (ac-ft/yr)</td>
<td></td>
<td>3,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Recharge Activities</td>
<td></td>
<td>Winter 2007-08</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Winter 2008-09</td>
<td></td>
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</tbody>
</table>

#### OSE

<table>
<thead>
<tr>
<th>Project Proposal</th>
<th>Jan 2007</th>
<th>July 2010</th>
</tr>
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<tbody>
<tr>
<td>Permit Application</td>
<td>Sep 2007</td>
<td>NA</td>
</tr>
<tr>
<td>USR Permit to Recharge</td>
<td>Jan 2008</td>
<td>NA</td>
</tr>
<tr>
<td>USR Permit to Recover</td>
<td>Feb 2011</td>
<td>NA</td>
</tr>
</tbody>
</table>

#### NMED

| Discharge Permit Application | Oct 2007 | NA     |
| DP Issued                     | Nov 2008 | NA     |
Large Scale Recharge Project

Injection Well Design

- Estimated depth to water = 200 ft bgs
- Borehole: 40"
- Cement
- Bentonite seal
- Silica sand filter pack
- Stainless steel screen, 0.080" louvers (ASTM A-409 Type 304)
- Stainless steel sump, (ASTM A-409 Type 304)

Notes:
1. bgs = below ground surface
2. Drawing is not to scale
3. Dimensions are for inside diameter

Approximate location of injection well
Monitoring well
Bear Canyon Project

Bear Canyon Recharge Demonstration
Bear Canyon Recharge Demonstration Project
Why Bear Canyon Arroyo?

- Favorable hydrogeologic conditions
- Nearby & available source water
- Existing infrastructure
- Source water is compatible with groundwater
- Ability to capture, store, and recover recharged water
Why Infiltration Systems?

- Suitable hydrogeology
- Improved water quality through SAT (soil aquifer treatment)
- Low tech >> low maintenance >> low cost
Favorable Hydrogeology

From Connell, 1997
Ability to Capture, Store & Recover

From Bexfield, Danskin & McAda, 2004
Discharge to Arroyo

- Max volume = 3,000 ac-ft
- Max recharge period = Oct through Mar
- Discharge rate: 2.8 to 5.6 mgd

<table>
<thead>
<tr>
<th>Applied Water</th>
<th>Recharge Period</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Begin Date</td>
<td>02/06/08</td>
</tr>
<tr>
<td>End Date</td>
<td>04/02/08</td>
</tr>
<tr>
<td>Duration (days)</td>
<td>57</td>
</tr>
<tr>
<td>Total volume discharged (gal)</td>
<td>137,913,535</td>
</tr>
<tr>
<td>Total volume discharged (acre-feet)</td>
<td>423</td>
</tr>
<tr>
<td>Wetted area (acres)</td>
<td>3.86</td>
</tr>
<tr>
<td>Total water applied (feet)</td>
<td>110</td>
</tr>
<tr>
<td>Average application rate (gpm)</td>
<td>2,400</td>
</tr>
</tbody>
</table>
Monitoring Points

- Monitoring wells (550 ft blw LS)
- Water quality lysimeter nest (50, 100, 150 ft blw LS)
- Vadose zone transect (3 completions 50 ft blw LS)
- SW monitoring
So, how much was recharged?

\[
\text{Recharge} = \text{Volume released} - \text{Evap} - \text{VZ storage}
\]
Evaporation

Volume released

Volume evaporated
How much was recharged?

<table>
<thead>
<tr>
<th></th>
<th>First Recharge Period</th>
<th></th>
<th>Second Recharge Period</th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Total Volume (ac-ft)</td>
<td>As Percentage of Volume Released</td>
<td>Total Volume (ac-ft)</td>
<td>As Percentage of Volume Released</td>
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<tr>
<td>Volume released</td>
<td>423</td>
<td>—</td>
<td>737</td>
<td>—</td>
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<tr>
<td>Evaporative loss</td>
<td>6.15</td>
<td>1.45</td>
<td>10.32</td>
<td>1.40</td>
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<tr>
<td>Vadose zone storage</td>
<td>4.23</td>
<td>1.00</td>
<td>7.37</td>
<td>1.00</td>
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<tr>
<td>Recoverable</td>
<td>412.62</td>
<td>97.55</td>
<td>719.31</td>
<td>97.60</td>
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</tbody>
</table>

Total recoverable = 1,132 ac-ft
Permitted by OSE = 1,073 ac-ft
Aquifer vs. Surface Storage

Aquifer Storage

- 10% lost to evaporation
- 15% lost to evaporation

2008: 1,073 AF
2015: 382 AF

1,073 AF
549 AF
382 AF
ABCWUA Recharge Projects

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