Denver Water ASR as a Potential Complement to Existing Surface Water Infrastructure

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Agenda

- Why ASR?
- What is ASR for Denver Water?
- What have we done?
- What’s next?
Why ASR?
Water Planning Challenges

- Drought
- Climate Change
- Beetle Kill
- Flood
- Fire
- Dust on Snow
- Growth Challenges
- CO River Basin

Abbreviations:
- CO: Colorado
Cone of Uncertainty
Why ASR?

Advantages:
- Supply diversity
- Phase-able/scalable
- Fewer environmental impacts
- Cost competitive
- No evaporation

Challenges:
- Well siting in an urban area
- Water quality?
- Recoverability risks
- New operations
- Uncertainty regarding aquifer productivity
What is ASR for DW?
Denver Basin ASR

~1,000-2,000'

Water Level

Denver Basin Aquifer
Injection / Storage Mode (Surplus Years)

Inject potable water

Injected water
Recovery Mode (Drought Years)
Denver Basin Aquifers

- 6,700 square miles
- ~200 million acre-feet stored
Denver Basin Aquifers
What Has DW Done?
Pilot Project Scope & Schedule

Will ASR work for Denver Water?

Phase I
- Siting, Water Quality, Operations, Cost

Phase I - A&B
- Borehole Drilling & Data Analysis

Phase II
- Pilot Siting, Monitoring Well, Permitting

Phase III
- Pilot Facility Design & Construction

Phase IV
- Pilot Site Operations

2014
2015 - 2017
2019 - 2024
2032?
2033...
Borehole Drilling to Reduce Uncertainty

Siting challenges

- Negotiating access
- Neighborhood concerns
- Rapid development
Capitol Hill Pilot Project Overview

Strategic objective

• Develop DW’s first operational ASR facility to verify economic and technical feasibility, as well as support investment in future ASR sites

Monitoring well completion

• Verified hydrogeologic conditions at the site through drilling & logging
• Gathered samples for testing to ensure compatibility of surface and groundwater
  • Groundwater
  • Aquifer material
  • Potable water
• Installed a Westbay System for ongoing monitoring & sampling

Draft EPA area permit
Capitol Hill Project Lessons Learned

- Upper Arapahoe and Laramie-Fox Hills should support operational wells
- Neighborhood outreach was important
- Balancing long-term & short-term capital investment is complex
What’s Next?
Capitol Hill Next Steps

• Continued operations of the Westbay System
• Apply for an EPA for injection permit
• Based on EPA feedback and analysis, plan for operational ASR site development
Questions?