Aquifer Storage and Recovery

Administrative Considerations

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December 3, 2019
Today’s Discussion

Aquifer Storage and Recovery discussion:

• Purpose
• Hydrogeology
• Administration of the water itself
Important Background

- Colorado groundwater; connected to surface streams, “Tributary,”
- Law presumes all groundwater is tributary to surface streams,
- Groundwater is in a transient state,
  - Must treat it that way administratively
- Difficult to actually “store” water in aquifers,
- Exceptions: Denver Basin bedrock aquifers, other “nontributary” formations.
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Purpose

Aquifer Storage and Recovery ¹

- Solution, Strategy
  - Solution to what?
- Includes:
  - Available water, Infrastructure, Injection/Infiltration, Underground formation, Administration and Accounting, Need, Withdrawal or Accretion,
  - Recharge? (To what end?)
  - Augmentation or Replacement?

1. Colorado Water Plan, Section 6.5
Purpose

All can be considered part of Aquifer Storage and Recovery

• Available water,
• Infrastructure,
• Injection/Infiltration,
• Underground formation,
• Administration and Accounting,
• Need,
• Withdrawal or Accretion.
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What Happens to the Water?

- Store water indefinitely in some formations,
  - relatively static, not moving
- Most formations, transient;
  - groundwater held temporarily,
  - migrates down gradient,
  - usually to a river or stream,
  - More difficult to administer or regulate.
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What Happens to the Water?

• Regulation in tributary formations
  • Accounting
    • Amount of water delivered
    • Losses (evaporation, ET)
  • Migration
    • Time
    • Location
• Withdrawal/Accretion
  • What if water is not recovered?
Now Consider All Aspects

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Aquifer Storage and Recovery

- Why place water in the ground?
- What is the purpose?
  - If tributary, can’t “store” indefinitely,
    - Transient
  - Place water in the ground to meet a known obligation?
  - Place excess water in the ground to avoid losing it?
Considerations when using an Aquifer to Hold Water

What is aquifer storage?

- Use pore space in a geologic formation to hold water,
- Why?

Like 100 years ago, we have water available, but not at the time or place we need it.
**Perspective on the Use of an Aquifer**

Two different ways to use that pore space:

1. **Static groundwater**
   - As a *bank*, to store water indefinitely,
Perspective on the Use of an Aquifer

Static groundwater
1. As a *bank*, to store water indefinitely,
Perspective on the Use of an Aquifer

Two different ways we could use that pore space in Colorado:

Static groundwater
1. As a *bank*, to store water indefinitely,

Transient groundwater
2. As an underground location to *temporarily hold* water; even as the ground acts as a *pipeline* to carry water to the river.
Perspective on the Use of an Aquifer

Transient groundwater

2. As an underground location to *temporarily hold* water; even as the ground acts as a *pipeline* to carry water to the river.
Summary

Aquifer Storage and Recovery

• Solution to Water Supply/Infrastructure Needs,
• Several components: water, infrastructure, hydrogeology, engineering, regulation, beneficial use,
• Noted in Colorado Water Plan,
• Noted in South Platte Storage Study (HB16-1256),
• Aquifers can be used different ways,
  • Is each ASR?
Summary

We can use underground formations to hold or convey water in two different ways:

1. Nontributary and lined alluvial storage
   • Objective: store water,
   • Legal and administrative structure is in place,
   • Water users are doing it,
   • Rules do not address non-Denver Basin formations.
Summary

We can use underground formations to hold or convey water in two different ways:

2. Underground location to *temporarily hold* water; ground acts as a *pipeline* to the river,
   - Objective: meet an obligation at the stream
     - Legal, administrative, and engineering framework is in place,
     - Water users are doing it,
   - Objective: capture excess water,
     - Legal and administrative framework is not certain,
     - We are not currently doing it,
     - Speculation concern.
Summary

We can use underground formations to hold or convey water in two different ways:

2. Underground location to *temporarily hold* water; ground acts as a *pipeline* to the river,
   - Objective: meet an obligation at the stream
     - Legal, administrative, and engineering framework is in place,
     - Water users are doing it,
   - Objective: *capture excess water*,
     - Legal and administrative framework is not certain,
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   - Speculation concern.
Recent

Relevant Activity:

• Nontributary Injection Rules
  • HB17-1076
• Upper Arkansas Multi-Use Project
• Designated Basins
  • HB18-1199 (Section 37-90-107.6)