Groundwater Trading in Virginia

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Background

Original Groundwater Management Areas (est. 1992)
Eastern Virginia Groundwater Management Areas

Coastal plain aquifers: largely confined aquifers with limited recharge.

Groundwater permitting system (> 300,000 gallon / month). VDEQ issues 10 yr permits

Over 110 mgd permitted withdrawals with an average withdrawal of ~78 mgd (2003-2012) in original GWMA. Unpermitted withdrawals ~30 mgd.
EVMGMA Expanded in 2014

COMMONWEALTH OF VIRGINIA
GROUNDWATER MANAGEMENT AREAS (GWMA)

Effective: January 1, 2014
Prepared by Virginia Department of Environmental Quality
Groundwater Withdrawal Permitting Program
Groundwater Management Challenges

Groundwater levels declining throughout GWMA

**Consequences:**
- Reduction of future availability of water supply
- Loss of GW storage capacity
- Land subsidence
- Declining GW quality (ex. saltwater intrusion)

State desire to reduce overall amount of GW withdrawals
Eastern Virginia Groundwater Management Advisory Committee (SB1341, 2015)

EVGWAC shall examine

- options for developing long-term alternative water sources
- funding options
- “alternative management structures, such as a water resource trading program”
- potential future ground water permitting criteria

Recommendations to VDEQ by August 2017
Administered Permit System

The State

Reg. GW User 1

Reg. GW User 2

Reg. GW User 3

Permit
Permit
Permit
**Groundwater Trading**

**Allowance** = permission to withdraw a given quantity of GW

**The State**

*Sum of allowances equals aquifer “cap”*

- **Reg. GW User 1**
- **Reg. GW User 2**
- **Reg. GW User 3**
- **Bank**
- **ASR**
- **New GW user**
Aquifer Storage and Recovery (ASR)

Interest in creating incentives for “banking” surplus water in aquifer for later use and/or recharging GW levels.

Storage is a key limiting factor

In EGMA water must be injected (permitting issues)
Interest in Aquifer Storage and Recovery/Replenishment in Virginia

City of Chesapeake ASR project (nearly 3 billion gallons injected since 2006 from its Northwest River System). First (and only) injection operation in VA.

Other potential interested parties

HRSD “Aquifer Replenishment System” Proposal
Hampton Roads Sanitation District

Legend
- Localities Served by HRSD
  - Major Treatment Plants (1)
  - Small Communities Treatment Plants (A)

Area: 3,100 Square Miles

HRSD’s Major Treatment Plants

1. Atlantic, Virginia Beach
2. Chesapeake-Elizabeth, Virginia Beach
3. Army Base, Norfolk
4. Virginia Initiative Plant, Norfolk
5. Nansemond, Suffolk
6. Boat Harbor, Newport News
7. James River, Newport News
8. Williamsburg, James City County
9. York River, York County

HRSD’s Small Communities Treatment Plants

A. West Point, King William County
B. King William, King William County
C. Central Middlesex, Middlesex County
D. Urbanna, Middlesex County
Aquifer Replenishment System

Proposed

Adv Wastewater Treatment Plant

Water Reclamation Plant

Up to 120 mgd

Treated effluent discharge

Potable Reuse
Indirect: aquifer or reservoir
Direct: pipe-to-pipe

Virginia Tech
Invent the Future
Potential Impact of Injection
Aquifer Storage and Recovery

Explore opportunities to clarify “claims” (access and use) of injected water:

• % of injected water that may be recovered (after accounting for aquifer storage losses, uncertainty, recharge req, etc)
• Duration
• Spatial conditions (injection relative to recovery)
• Transfers between parties
Illustration:

Water Banking in Arizona
Arizona Water Banking

- Arizona Department of Water Resources (ADWR) issues water storage & recharge permits
- Storage occurs in designated GW “Active Management Areas Areas (AMA)
- Arizona Water Banking Authority (AWBA)

Arizona receives Colorado River water through the Central Arizona Project (CAP). AWBA created to store and deliver surplus CAP water for a number of purposes (costs paid for by pumping fees)
Arizona Water Banking

Direct Recharge (Underground storage facility or USF) via infiltration basins or direct injection

Indirect Recharge (Groundwater Savings Facility or GSF). GW irrigators use surface water instead of GW
Arizona Water Banking

ADWR certifies long-term storage credits.

Credit is given for water that reaches the aquifer (3-5% delivery loss) minus a 5% “cut to the aquifer”

Credits can be used to recover water anytime (subject to permit conditions) and can be traded.

Water recovery must occur in same AMA where recharge occurred
Information on Advisory Committee Progress

Virginia DEQ, Eastern Virginia Groundwater Management Advisory Committee webpage