HB 1036 – Water Trading Work Group
Minutes of
March 21, 2019, Meeting
Troutman Sanders Building, Richmond Virginia

Work Group members present:

HRSD, Represented by Dan Holloway, Jacobs
King George County, Eric Gregory, Hefty, Wiley & Gore
Western Tidewater Water Authority, Justin Curtis, AquaLaw
Eastern Shore Groundwater Committee, Britt McMillan, Arcadis
Mission H2O/Troutman Sanders, Shannon Varner
Virginia Tech, Kurt Stephenson
DEQ, Scott Kudlas
VDH, Office of Drinking Water, Aaron Moses
Virginia Farm Bureau, Ben Rowe
WestRock, Jim Taylor
Virginia Economic Development Partnership, Sandy McNinch

Work Group members absent:

Aqua Virginia
Newport News Waterworks
Middle Peninsula PDC
Virginia Well Drillers Association
VDH, Office of Environmental Health Services

Interested parties attending:

Jesse Boardman, VCU student
David Jurgens, City of Chesapeake
Whitney Katchmark, HRPDC
Christopher Gill, Christion & Barton/ Norfolk
Brandon Bull, DEQ
Richard Grossman, VECTRE

- The meeting began at approximately 2:10 with Work Group members and others in attendance introducing themselves.
- Shannon Varner provided an overview of the agenda topics including learning more about model capabilities from DEQ's consultant Aquaveo, information on other state programs and how this information may inform whether or how the ASR banking strawman may be refined.

- Prior to Aquaveo joining by phone, the work group discussed issues that may impact the ability to withdrawal injected ground water with a central question being "If we put it in, why can't we pull it all out?" Identified potential issues include; the model's ability to detect (or not detect as occurs with the Chesapeake ASR) the input; the overall impact of the withdrawal on other users and aquifer head pressure; the potential for water loss through the aquafer "discharge boundaries" (e.g., into overlying aquifers, to streams and rivers, etc.); and the apparent physical impact of an injection in that the water does not travel far or quickly but the additional water pressure may be increased over a broad area. Members questioned whether the increased pressure from an injection would lead to significant loss through the discharge boundaries in a system that has been drawn down and where the distance to a boundary may be significant.
- Members commented that we should be encouraging injection and that a balance to encourage the practice should be reached.
- DEQ noted that any system needs to be scientifically defensible and allow the agency to fulfill its regulatory mission to provide for beneficial uses while at the same time protecting the resource and users and manage the system in a meaningful way.
- DEQ indicated comfort with short term localized ASR. Chesapeake noted that to meet its needs and make the cost justifiable, more than a short-term ability to withdrawal water is needed. Chesapeake's system is impacted by water availability over many years (10 to 15) that it needs to manage.
- Members also discussed whether the positive and negative impacts of injection and withdrawals don't have the potential to cancel each other out when both activities are conducted over an extended period of time, especially since model runs look at impacts over a 50-year period when making permitting decisions.

Aquaveo

Thomas Griffiths and Alan Lemon of Aquaveo, DEQ's modeling consultant, joined by phone at 2:30. Aquaveo was initially requested to (i) provide more detail on a previously performed hypothetical model run involving a 10 million gallon per day (mgd) injection in James City County and the impacts and potential to withdraw groundwater approximately 23 miles away in West Point, and (ii) discuss the model's ability to perform different model runs with and without the impact of injection as means to provide the benefit to those involved in the injection.

- *James City County/West Point model run*. Aquaveo's model run looked at the impact of a 10 mgd injection in James City County and the related impact of incremental increases in withdrawal up to 10 mgd at West Point over a 50-year model run. The 10 mgd injection lead to a 30-foot increase in water pressure in James City County and an approximate 15-foot head pressure benefit at West Point. A 10 mgd increased West Point withdraw without a James City County injection led to a 60-foot depression at West Point. Aquaveo also looked at incremental increases at West Point withdrawal to see at what level of withdrawal there would be no impact (i.e. the 15 feet of increased head pressure from the James City County injection would be cancelled out). The head pressure benefit was cut by about half with a 1 mgd withdrawal. The "breakeven" point was at about a 2.5 mgd withdrawal. Aquaveo also noted that injection provided increased benefits closer to the injection point.

- *Ability to run different models runs with and without the impact of injection*. Aquaveo indicted that the model could account for different scenarios so that the benefits could be reserved for those who participate in an injection and withdrawal program. Aquaveo could, using the model, remove the impact of injection when analyzing a permittee.

Member questions and discussions:

- Does the benefit to head (and the potential availability to withdrawal) increase as one moves closer to point of injection? Aquaveo responded that based on their preliminary look yes, but it does not appear that benefits increase or decrease in a linear manner. The model could more accurately define the impacts with more investigation.
- What is the reason for the difference in 10 mgd injection having a 30-foot benefit at James City County but a same level of withdrawal having a 60-foot negative impact at West Point? Why not 1:1? Does it have to do with storage and/or loss to boundary? Aquaveo did not look at those details in this hypothetical model run, but it may be that the withdrawal creates a steep/narrow depression "cone," while the injection can create a more disperse dome shaped benefit.
- Is the flow rate at the discharge boundary looked at? In general terms, the water initially goes to storage and not much changes. After 50 years, less is going into storage and more/most is going out at boundaries. There is some uncertainty about how much actually goes to storage, especially when inelastic subsidence may be present. A member wondered wither injection may shorten time that we would see a loss through the boundaries but that the end result is the same, it's just a matter of when it occurs.
- What is the amount of boundary loss? That can be calculated to some degree. The confining layers are "leaky" and not homogenous and the model to the extent known simulates transfer between the units depending on where the injection or withdrawal is located. That in turn influences injection head and withdrawal head impacts.
- Is injection always good? It is certainly beneficial where the aquifer has been depleted but has less of an impact and may contribute less to storage and more to boundary discharge when the injection is in an area that is not impacted by withdrawals.
- We currently have a system to deal with different and interlacing withdrawals. Does adding injection and withdrawals at other locations really create too much additional complexity? DEQ needs to manage users and meet statutory and regulatory objectives and address multiple complexities but has not yet seen a realistic way to accomplish that yet in this scenario.
- Members reiterated that while there may not be a 1:1 benefit, there does appear to be a benefit associated with injection and that it should be encouraged. Members also noted that trying to establish some form of trading program where a withdrawer could receive the benefits of an injection some distance away is complicated by other existing withdraws (including between the point of injection and withdrawal), proposed withdraws and by the existing and growing number (and impact) of unpermitted withdraws.
- The model can do most of the things we are asking it to do for this discussion, but the question is whether the information can be used in a way that is scientifically defensible. Concern was expressed that if we move too far from science and get closer to a "gallons in and gallons out" system we won't be able to match that up with model calibration

tools, or other methods the state has developed over that last 30 years to make the model scientifically justifiable to use.

Other state programs

During the Eastern Virginia Groundwater Management Area Advisory Committee discussions Kurt Stephenson created a chart on various state's ASR and trading programs. Kurt updated and expanded that chart for purposes of the HB 1036 Workgroups discussions and provided an overview of the updated chart with an emphasis on how spatial and temporal issues may be addressed.

Of particular interest was a New Jersey program. New Jersey has designated critical depletion areas, has placed a cap on the amount of water than can be withdrawn from those areas and has allocated that amount to existing users. Depending on how the aquifer responds, New Jersey can reduce the overall allowable withdrawal while maintaining individual permittees percentage of the overall allowable withdrawal. Those seeking a new withdrawal, and those who wish to increase their existing withdrawal, must acquire all or a portion of an existing user's allocation. The allocation may not come from certain areas that have been especially drawn down. In addition, the new or increased withdrawal may not draw the aquifer down below a defined level. These trades are approved by the state and may occur through agreements between users or through exchanges established by localities.

Strawman review and discussions

Members reiterated a desire to promote injection and provide withdrawal benefit when appropriate. There was general consensus that localized injection and withdrawal does not implicate significant spatial constraints but there are some questions on the period over which that water may be withdrawn. That period may be influence by the ongoing nature of an injection and considering modeled impacts and benefits over a 50-year period. It was also noted that DEQ's ability to process permits, including the cost of models runs is limited by available funding. Workgroup members agreed that it would be appropriate for those wishing to participate in ASR to pay a fee to address modeling needs. The workgroup concluded by requesting that the strawman developed by the EVGMAC be placed in a more formal form (perhaps a statute), including considerations discussed during the meeting, for consideration during the next workgroup meeting.

Future meetings

Two future meeting dates were set: May 7 and July 22, both at 2:00 in the Troutman Sanders Building.

Public Comment

There was no public comment and the meeting concluded at approximately 4:45.

Summary of Aquifer Storage and Recovery Programs

Program/Project	Crediting Rate (limits on recovery of stored water)	Credit Time Conditions (Duration)	Spatial Recovery Limits	Water Credit Transfer	Aquifer condition
Arizona Water Banking: Long Term Storage Credits	Deduct 5% "cut to the aquifer" Deduct 3-5% for delivery losses (evaporation, overflow, outflow, etc).	No credit time limit, but rate of withdrawal is regulated by ADWR (ADWR formula for determining each year how much water is available for recovery)	Zonial (predefined area): Recovery must be within the storage area (Active Management Areas, or AMAs)	Yes (within GW Management Areas)	Unconfined Aquifer
Southern Nevada Groundwater Bank	Deduct small percentage at the time of initial injection	No time limit. Max rate of withdrawal of 20,000 AFY	Las Vegas Valley groundwater basin	Yes (within GW basin)	Confined
Other long term Nevada groundwater banks	GW recharge credited in GW storage account: X% of credits deducted annually for storage losses (the amount depends on modelled loss estimates). Loss rate may change (decrease) over time based on new info (model results)	All stored credits lost after 10 years.	Within same GW basin, subject to permit conditions	Yes (within GW basin)	Varied
Other short term Nevada Groundwater banking	1:1 (or nearly so)	1 season	Generally same location	None	Varied
New Jersey ASR	1:1 banking on three year rolling average	3 Water years	One permit applicant has injection and recover wells separated by up to 3miles.	Permit specific	Confined
Delaware ASR	1:1	1 season unless, a utility petitions for water banking	None. The category does not *typically apply to conventional ASR facilities employing dual purpose well*	None	Confined
Florida ASR	1:1*	Multiple seasons, but, permit specific (used for	None. The category does not typically apply to conventional ASR	None	Confined

		seasonal water supply management)	facilities employing dual purpose well		
Kansas	1:1	1 season unless, a utility petitions for water banking	None. The category does not typically apply to conventional ASR facilities employing dual purpose well	None	Confined
North Carolina (planned/experimental ASR projects Cape Fear, Greenville)	1:1	No official policy, but proposals are for seasonal storage	Same location	N/A	Confined
South Carolina		1 season	Same location	N/A	Confined
Texas	1:1 or less, determined on case-by-case basis	Long term option on case by case basis (with loss rate)	Recovery wells must be within a continuous perimeter boundary of one parcel of land or two or more adjacent parcels under common ownership (Sec 27.153.c)		Varied

* In Florida, permittees do not typically withdrawal 1:1. Florida ASR project are injecting into brackish aquifer systems, but permittees only wish to recover the injected freshwater. Recovery rates range from 20-40% following the initial years of ASR operation and increase to 70 to 90% as ASR systems mature and freshwater is built up in the aquifer. **Sources:**

Arizona:

http://www.azwater.gov/azdwr/WaterManagement/Recharge/RechargeCreditsandAccounting.htm
http://www.azleg.state.az.us/ars/45/00852-01.htm
http://www.azwaterbank.gov/Water_Storage/Recharge_and_Facilities.htm#Facilities
http://www.azwaterbank.gov/Plans_and_Reports_Documents/documents/Joint_RecoveryPlan04-14-14withsignedpreface.pdf

Nevada

https://www.snwa.com/ws/future_banking.html
http://water.nv.gov/hearings/past/spring/browseable%5Cexhibits%5CSNWA/511.pdf
https://www.snwa.com/assets/pdf/wr_plan_chapter3.pdf
Personal communication (K. Stephenson) with Adam Sullivan, Nevada Division of Water Resources, April 19th, 2016

Delaware, Florida, Kansas

Personal communication, Daniel Holloway, CH2M, April 2016.
Personal communication (B. Bull) with Joe Haberfeld, Florida Department of Environmental Protection (DEP) and Bob Verrastro, South Florida Water Management District, April 2016.

New Jersey

Personal communication (K. Stephenson), Jennifer Myers, NJDEP Water Allocation, January 2019.

North Carolina

Personal communication (K. Stephenson), Nat Wilson, North Carolina DEQ May 25, 2016.

Texas

Personal communication (K. Stephenson), Ron Ellis Texas Water Development Board, December 19, 2018.
Personal communication (K. Stephenson), Lorrie Council, Texas CEQ, January 2019.