

**EASTERN VIRGINIA GROUNDWATER MANAGEMENT
ADVISORY COMMITTEE**

MEETING #3 NOTES - FINAL

MONDAY, DECEMBER 14, 2015

DEQ PIEDMONT REGIONAL OFFICE – TRAINING ROOM

Meeting Attendees

EASTERN VIRGINIA GROUNDWATER MANAGEMENT ADVISORY COMMITTEE MEMBERS	
James Baker – City of Chesapeake	David Paylor – DEQ
Shannon Becker – Aqua Virginia	Chris Pomeroy – Western Tidewater Water Authority
Nina Butler – WestRock	Travis Quesenberry – King George County
Tom Frederick – VA Water and Wastewater Authorities Association	Paul Rogers – Farmer – Member of VA Cotton Board
George Harlow – USGS	Nikki Rovner – The Nature Conservancy
Rhu Harris – Hanover County	Kurt Stephenson – Virginia Tech
Marissa Levine – VDH	Mike Toalson – VA Home Builders Association
Keith Martin – Chamber of Commerce	Brett Vassey – Virginia Manufacturers Association
Randy McFarland – USGS (Representing George Harlow)	Ellis Walton – Farm Bureau
Sandi McNinch – VA Economic Development Partnership	Bob Wayland - Citizen
John O’Dell – VA Well Drillers Association	

NOTE: Advisory Committee Members NOT in attendance:; Bryan Hill – James City County; Chip Jones – Northern Neck Soil & Water Conservation District; Wanda Thornton – Eastern Shore Groundwater Committee; Dennis Treacy – Smithfield Foods

INTERESTED PARTIES ATTENDING MEETING	
John Aulbach – VDH-ODW	Jamie Mitchell - HRSD
Jay Bernas - HRSD	Doug Powell – James City County
Curtis Consolvo – GeoResources, Inc.	Erik Rosenfeldt – Hazen and Sawyer
Robert Crockett – Advantus Strategies	Jeff Scarano – Brown and Caldwell
Jason Early – Consulting Hydrogeologist	Wilmer Stoneman – VA Farm Bureau
Katie Frazier – VA Agribusiness Council	Chris Tabor – Hazen and Sawyer
Ted Henifin - HRSD	
Dan Holloway – CH2M	Shannon Varner – Troutman Sanders
David Jurgens –City of Chesapeake	Michael Vergakis - JCSA
Craig Maples – City of Chesapeake	Christine Wolfe - JLARC

SUPPORT STAFF ATTENDING MEETING	
Elizabeth Andrews - DEQ	Craig Nicol - DEQ
Sharon Baxter - DEQ	Bill Norris - DEQ
Brandon Bull - DEQ	Mark Rubin – VA Center for Consensus Building
Scott Kudlas - DEQ	Jutta Schneider - DEQ
Bill Hayden - DEQ	

1. Welcome & Introductions (Mark Rubin – Meeting Facilitator)

Mark Rubin, Executive Director of the Virginia Center for Consensus Building at VCU, opened the meeting and welcomed everyone to the meeting.

He asked for introductions of those in attendance and asked for the organization that they represent.

Mark reviewed the agenda and outlined the items that would be covered during the meeting.

2. Presentation of Resource/Tool (Scott Kudlas):

Scott Kudlas, Manager of the Water Quantity programs at DEQ, discussed the planning tool and resource map that had been developed by the Hampton Roads PDC and Mission H2O. The map provides a spatial representation of the groundwater resource and the withdrawals and uses that impact that resource. He provided copies of the map for the members of the committee.

3. Presentation – Sustainable Water Recycling Initiative (Ted Henifin):

Ted Henifin, General Manager for the HRSD presented and overview of their Sustainable Water Recycling Initiative. (Copies of the summary information were provided to the committee.) He noted that HRSD proposes to add advanced treatment processes to several of its facilities to produce water that exceeds drinking water standards, and to pump this clean water into the ground to provide a sustainable source of water to meet current and future groundwater needs throughout eastern Virginia. His presentation included the following:

- Why is HRSD Interested?
 - Discharges approaching limits of technology are expensive to build and costly to operate
 - Nutrient loads are fully allocated in Bay watersheds
 - § No room for growth beyond design capacity
 - § Offsets will be required to support expansion of existing economy and any new economic development
 - Regulatory uncertainty – what limits will HRSD ultimately be required to meet?
- Phase I Feasibility Study Goals:
 - Given changing discharge regulations, does it make sense to add advanced treatment to HRSD treatment plants and use that water beneficially? Is recharge feasible in the Eastern Virginia aquifer system?
 - What are the key issues to consider?
 - What will it cost?
- Current state of groundwater in Eastern VA:
 - Currently mining but not replenishing the aquifer
 - § Natural aquifer recharge is not keeping up with withdrawals
 - § Water is cleaned and discharge to local waterways, ultimately to the ocean with no downstream use

- § Aggravating other problems including land subsidence and salt water intrusion
- Groundwater Depletion:
 - Top DEQ priority
 - 177 permits = 147.3 MGD
 - § Currently withdrawing approximately 115 mgd
 - 200,000 unpermitted “domestic” wells
 - § Estimated to be withdrawing approximately 40 mgd
 - Significant pressure drop in excess of 50 meters since 1900
- Land subsidence – we are sinking
 - According to USGS
 - § Up to 50% of sea-level rise may be due to land subsidence
 - § Up to 50% of land subsidence may be due to aquifer compaction
 - Two potential solutions
 - § Reduced withdrawal
 - § Aquifer recharge
 - Hampton Roads is the #2 Largest Population Center at Risk
- Saltwater contamination of groundwater
 - Potentially irreversible contamination
- Proposed cycle of sustainable water recycling
 - HRSD’s concept – replenish the aquifer with clean water to:
 - § Reduce nutrient discharges to the Bay
 - § Provide a sustainable supply of groundwater
 - § Reduce the rate of land subsidence
 - § Protect the groundwater from saltwater contamination
 - § Need to break the aquifer mining cycle by adding an advanced water treatment plant at HRSD’s existing plants sites and injecting clean water back into the aquifer
- Water recycling opportunities:
 - Non-Potable Reuse:
 - § Agricultural irrigation
 - § Landscape irrigation
 - § Industrial uses
 - § Recreational and Environmental Enhancement
 - Potable Reuse:
 - § Indirect Potable Reuse: Drinking water source (reservoir, aquifer, etc.)
 - § Direct Potable Reuse: Pipe to Pipe connection
- Operational water recycling projects in Virginia:
 - UOSA (Upper Occoquan Service Authority)
 - § Inland location
 - § Surface water augmentation

- § Year – 1978
 - § Capacity: 54 mgd
 - § Current Advanced Treatment Process: Lime + GMF + GAC + Cl₂
- Loudoun County
 - § Inland location
 - § Surface water augmentation
 - § Year: 2009
 - § Capacity: 11 mgd
 - § Current Advanced Treatment Process: MBR + GAC + UV
- Water recycling – Surface water augmentation
- Water recycling – Groundwater recharge via direct injection
- Recycled water quality – Functional targets:
 - Two major water quality aspects to consider:
 - § Aquifer “centric” issues
 - Anti-degradation criterion – determined by others (DEQ, stakeholders, EPA)
 - Aquifer compatibility – water chemistry interactions (pH, alkalinity, etc.)
 - § User (human-health) “centric” issues
 - Water quality based on regulatory definitions
 - Drinking water standards (MCLs)
 - Water Reuse standards (no VA injection standard yet)
- Geochemistry and Aquifer Compatibility
 - Water put into aquifer must be compatible with the native groundwater and the aquifer material
 - § Operational issues
 - § Regulatory issues
 - Physical plugging
 - § Disrupting clay particles
 - § Precipitating minerals
 - § Can clog the screen, filterpack and aquifer immediately around the well
 - Dissolution/mobilization of metals
- Geochemical evaluation:
 - Evaluate reactions between treated water and aquifer mineralogy
 - § 99% inert material (quartz, feldspars, etc.)
 - § Remaining material can be problematic (clays)
 - Lessons learned from Chesapeake’s injection well
 - § Injected 28 billion gallons since 1987
- Advance water treatment alternatives
 - Reverse Osmosis (RO)
 - Nanofiltration (NF)

- Biologically-Active Granular Activated Carbon (BAC)/Granular Activated Carbon (GAC)
- Groundwater hydrology – hydrologic cycle
- Hydrogeologic framework
 - Subsurface Geology – sediments (sands, silts, clays, bedrock way down there)
 - Aquifers – geologic units that easily store and transmit water
 - § Unconfined
 - § Confined – pressurized
- Hydrogeologic setting in the Coastal Plain of Virginia
 - Fall Line (around I-95 corridor) to the Ocean
 - Truncated by the Chesapeake Bay Impact Crater (Bolide/Meteor)
 - Essentially no natural recharge
 - § Aquifer water is 40,000 years old
- Unsustainable Aquifer Withdrawals
 - Over-allocated permitted withdrawal
 - § Water levels falling several feet/yr
 - § Some water levels below aquifer tops in western Coastal Plain
 - Total permitted withdrawals are unsustainable
 - § Areas below regulatory criteria
 - § Areas experiencing aquifer dewatering
- Costs
 - Total project in the \$1 billion range (120 mgd)
 - § For 6 or 7 plants (not CE or Atlantic)
 - § York needs additional study to locate injection site
 - Annual operating costs \$21 - \$43 M
 - Operating costs could be recovered with reasonable permitted withdrawal fee
 - § Provides incentive for permits without significant reserves for potential future needs – right sized
 - § Encourages conservation
- Conclusion – Summary of Benefits
 - Significantly reduced discharge into the Chesapeake Bay (only during wet weather)
 - § Creates source of nutrient allocation to support other needs
 - § Increases available oyster grounds
 - Regulatory stability for treatment processes
 - Sustainable source for groundwater replenishment
 - § Supports water needs throughout Eastern Virginia without piping to specific locations (wireless solution)
 - Potential reduction in the rate of land subsidence
 - Protection of groundwater from saltwater contamination
- HRSD Uniquely positioned

- No downstream low-flow issues from HRSD plants
- Daily capacity to make an impact on aquifer
- Large regional political subdivision
- Governor appointed Commissioners
 - § Commission has committed resources to continue to move toward implementation
- 20-Year CIP forecast in excess of \$4 B
 - § Can re-prioritize to include this project
- Next Steps:
 - Engage stakeholders – get input on next phase of study
 - Model and quantify
 - § Impact on saltwater intrusion
 - § Impact on land subsidence
 - § Safe Yield
 - § Spatial analysis and travel time to existing withdrawals
 - Additional water treatment technology analysis and evaluation – pilot-scale
 - Scope demonstration-scale project (1 MGD) – advance treatment & aquifer injection
 - Further evaluation of geochemistry
 - Develop more detailed costs for each plant
- Timeline:
 - Finalize Phase 2 scope – December 1, 2015
 - Complete Phase 2 by end of 2016
 - Room scale pilot projects – evaluation early 2017
 - 2017
 - § Endorsement from DEQ/VDH to move forward
 - § EVGWAC recommends recharge project
 - § EPA agrees to integrated plan to meet CD requirements
 - § Phase 3 WIP includes this project to achieve TMDL goals
 - 2018
 - § Demonstration pilot – well developed, monitored
 - 2020
 - § EPA/DEQ/VDH formally approves CTC for SWR
 - 2020 to 2030 (accelerated to 2025 based on Phase 3 WIP needs)
 - § Construction through phased implementation
 - 2030 Fully operational
 - § 120 MGD of clean water put into the aquifer
- Specific ask of Stakeholders
 - Maintain openness to concept of Sustainable Water Recycling through aquifer replenishment
 - § Additional study, pilot testing, modeling and analysis needed

- Reach out directly to HRSD with concerns
 - § Next phase can be modified to include additional areas of concern

The group discussed the presentation and discussed location of injection sites and safe yield of the aquifer and other topics, such as possible fees; capacity, conservation concepts, and coordination with local governments in the area raised by the presentation of the HRSD concept.

4. Workgroup Reports (Mark Rubin):

Mark Rubin provided an overview of the activities of the EVGMAC Workgroups addressing “Alternative Sources of Supply” and “Alternative Management Structures”. He noted the following for each of the workgroups:

- **Workgroup #1 – Alternative Sources of Supply:**

- The group hear a presentation on DEQ’s Water Reclamation and Reuse Program
 - § The sense of the group was that this is a very important program to have – however it is very expensive and has some limitations – you have to have an “end-user” for the water before you can even start a “water reclamation and reuse project” – otherwise it is a big expensive investment.
- Started to focus the work of the group – they have a very large list of possible options for alternative sources of water that need to be explored – the workgroup has started the process of narrowing down that list of options. The group has looked at and discussed:
 - § The HRSD project.
 - § The use of impoundments – not reservoirs, but impoundments that are filled by artificial means – not damming up a river to create a reservoir but the creation of diversions to provide water for future needs. (This will be the subject of the next meeting of Workgroup #1 – Luck Stone to talk about the use of quarries and a Private Land Owner who is interested in having a reservoir on his property and Lessons Learned.)
 - § The use of BMP Pools that are used for stormwater and using those for local irrigation.
 - § Banking.
 - § Desalination – using brackish water.
 - § Direct use of non-potable water for irrigation.
 - § Increased use of surface water – treated and put into the aquifer – use of the aquifer as a distribution system and as a storage reservoir.

- **Workgroup #2A – Alternative Management Structures:**

- The group heard a presentation by DEQ (Elizabeth Andrews) on the Current State of the Law – State Water Control Law. (This presentation will be made available on the DEQ Webpage for the Eastern Virginia Groundwater Advisory Committee.)

- The group discussed whether the current structure had any type of “conflict resolution” mechanism – the thought is that it is available under the law establishing the State Water Commission. This probably needs further discussion.
- The group heard a presentation by Whitney Katchmark about “What are the problems with the Status-Quo in terms of the management structure from a permittee’s perspective? (The presentation will be included on the EVGMAC webpage.)
 - § There are numerous uncertainties in the current process – due partially because of the nature of the resource but also because of the current management structure that we have.
 - § A permitting program is not a planning program.
 - § We now have the Water Resource Supply Plan that provides a picture of where localities have told DEQ where they expect their supplies to be in the future and what their needs are going to be. The problem is that no locality wants to tell the state how much water they have or what they think their needs might be – all the data is “self-reported” – the localities only wanted it use as information.
- The group has discussed the concept and need to have a planning program not just a permitting program.
- There are political uncertainties inherent in the current structure at the state and local and regional government levels.
- There is a need to look at regional projects – regional resources – regional needs – there is nothing that encourages or provides incentives for regional solutions.
- Uncertainty tied to length of permit and availability of the resource.
- No one is sure how much water they are entitled to.
- The group discussed the concepts of fairness and equity – stranded assets.
- The workgroup decided that what they want to discuss is the concept of an “Integrated Water System” – Groundwater; Surface Water; Stormwater; & Reclaimed Water. Stop segmenting the system and have a comprehensive system regarding the resource. They water to look at “Integrated Water Management”.
- The group looked at the concept of having “sub-regions”. Is there anything that drives us to “sub-regions” for management structures? The groups thought was that there ought to be “one” region for a management structure but it needed to be sensitive to sub-regions within the region. Need to be open to looking at geographic sensitivities while managing the resource as a whole.
- Andrea Wortzel provided an overview of information on other states efforts that included significant stakeholder involvement in the decision making process – in the system regarding the management of the resource. She provided several examples but the one that the group focused on the efforts being undertaken in Alabama where they have a 501c3 group, made up of users – no regulatory authority but it is a forum that encourages collaborative projects – hosts conflict resolution forums – there is still a regulatory system in place, but a lot of the decision making is supported by this organization.

EVGMAC member discussions included the following:

- Can't "think of" or manage surface water and groundwater differently – they can't be managed separately.
- The current process for groundwater and surface water are conceptually the same – there is a difference in the permitted time frame.
- For a solution to work it has to be integrated.
- Can't eliminate one option/source without having an alternate source – you have to have a backup plan – needs an integrated solution.
- Different geographic areas or regions have different issues and concerns.
- The regions that are in the water supply plan now are self-selected – they are not necessarily based on hydrology.
- Need to manage area-wide benefits – on certain issues you may need to take it down to smaller regional levels based on technology – regulatory – governance concepts and parameters.

5. BREAK

6. Trading – Presentation (Kurt Stephenson):

Kurt Stephenson with the Department of Agricultural and Applied Economics at Virginia Tech provided an overview of the concept of Trading and the work of Workgroup #2B – Trading. His presentation on "Water Quantity Trading & Banking" included the following:

- Groundwater Trading
 - What is GW trading?
 - Why trading?
 - What is needed to make trading work?
- Groundwater Management Under Scarcity
 - What GW goal?
 - Who gets what and when?
- What makes a "good" groundwater management system?
 - Achieve resource management goals
 - Cost effective investments
 - Incentives for water efficiency & reliability
 - Maximize value of the resource
 - Minimize 3rd party impacts
 - Equitable, "fair"
- Administered Permit System – State permits multiple users.

- Groundwater Trading – State issues allowances (permission to withdraw a given quantity of GW) to permittees (users) – the permittees could then trade (sell) allowances with a Bank or between users or a permittee could inject water into a ASR system and get allowances back out of the system and a permittee could trade allowances with a new user – the sum of the allowances equals the aquifer “cap” – Except for different terminology this is what the state does now – the state issues permits for permission to withdraw specific amounts of GW – what we are discussing is to what extent are additional choices granted to users over the permissions to withdraw. – Devolve some decisions to the users: allow for selling of allowances; allow users to determine withdrawal amounts; allow users to save allowances (A bank for allowances – a Savings account) – incentive to conserve now to use at a future time; Instead of banking allowances you could physically store water (claim on amount of stored water for future use – not necessarily a 1 to 1 basis) – secure claim on water based on amount of “stored” water; “cap” closed system – a trading system could allow for that use – need to have a mechanism for “buy-in” to the system for future users.
- Rational for Groundwater Trading
 - Achieve GW management goals
 - Incentives to reduce GW withdrawals
 - Incentives to use aquifer for storage
 - Provides information on value of GW
 - Water goes to highest valued uses
 - Allow for economic growth given scarcity
- Requirements for an Effective GW Trading Program
 - Allowance limited in supply (system “closed”)
 - Clearly defined conditions on allowance use
 - Monitored and enforceable
 - Ownership interest secure * predictable
 - Transaction costs relatively low
- Issues under Discussion
 - Spatial extent of GW trades
 - Banking (extent of allowance banking and banking of injected water)
 - Initial assignment of GW allowances
 - Groundwater allocation time period and allocation across time periods

EVGMAC discussions and questions raised that need to be addressed included the following:

- Need for clearly defined conditions for “allowances”.
- Given the physical constraints of a confined aquifer how would allowances work?
- How would banking work?
- How do you get the system started?
- How do you allocate the groundwater resource?
- How long are the allocations available?

- There needs to be planning stability around the volume of those allocations and how long they would be available.
- How would an initial allocation be determined? First come/first served.
- Who owns the groundwater? Under the Groundwater Management Act there is a public use doctrine – there may be some legal issues that will need to be resolved.
- There needs to be flexibility in the system.
- There needs to be an adaptive management component to any proposed management approach.
- If you are a permitted user you would fall under this management concept.
- What does the number of unpermitted users and wells do to this approach? The best thing would be to have a totally closed system – but it would be politically difficult to do.
- All of the workgroups will need to address the concept of how do you account for those unpermitted users.
- How do we encourage more folks to encourage more folks to do projects similar to that being undertaken by HRSD?
- How do we create incentives to promote trading? What type of incentives would be feasible?
- Any injection water would have to be treated to drinking water standards.
- One of the trading program concepts that were raised was that it would essentially be shifting some of the decision making out of the state into the private sector. This is an important concept to understand and whether that is a good thing or a bad thing will need more discussion.
- Need to keep some allowances for future economic development.
- Might be able to take some lessons from the Nutrient Trading Program.
- Would the allowances be permanent? Perpetuity probably not a good idea but there might be some option for “carry-over” for the allowances from permit period to permit period. But it would impact the value of the “trade” of an allowance.
- If you have an “integrated water management” system – how would that impact the “trading” concept?

7. Next Steps (Mark Rubin):

One of the workgroups will be meeting before the session and then the others will try to meet sometime after “Cross-Over” for the General Assembly Session sometime after the middle of February. For this group, we probably won’t have anything to bring to the group probably until late March.

8. Public Comment: No public comment was offered.

9. Meeting Adjournment: Mark Rubin thanked everyone for their attendance and participation in today's meeting. The meeting was adjourned at 3:20 P.M.