

The Potomac Aquifer Recharge Oversight Committee

Meeting Minutes

February 26, 2025

In attendance: Whitney Katchmark (Committee Chair), Jay Bernas, Charles Bott, Weedon Cloe (remote), Curtis Consolvo (remote), Jason Early (remote), Robert Edelman (remote), Dan Holloway, Preston Kirby, Mark Kram (remote), William Mann, Jamie Mitchell, Mark Nelson (remote), Ivy Ozmon, Charles Paulin (remote), Harold Post (remote), Doug Powell, Paul Retel (remote), Leila Rice (remote), Gary Schafran, Mark Widdowson.

Ms. Katchmark (HRPDC) called the meeting to order at 11:05 a.m.

The minutes of the previous meeting were approved as distributed.

Dr. Widdowson provided updates on Potomac Aquifer Recharge Monitoring Lab (PARML) research for SWIFT and enhanced aquifer recharge (EAR) research for his EPA grant. He shared that PARML, HRSD and their research staff have a multi-day meeting every June to coordinate their strategic research roadmap. Details of that meeting will be reported at the next PAROC meeting. The various research topics of PARML graduate students studying civil engineering, environmental sciences and engineering, or geosciences were reviewed. Graduate student recruitment is ongoing at Virginia Tech (VT) and Old Dominion University (ODU) to continue to expand SWIFT research.

Research related to Dr. Widdowson's EAR EPA grant also continues. He reviewed the methodology and results of recent injection recovery tests, also known as push-pull tests, performed to assess degradation or attenuation of contaminants of interest after exposure to the subsurface. Push-pull testing is commonly used for monitoring the recovery of contaminated water at smaller scale contaminated sites, but has never been used for managed aquifer recharge (MAR) investigations or attempted at the scale of the SWIFT project. Injected water is recovered within 24 to 48 hours to evaluate changes in water quality resulting from biogeochemical reactions in the subsurface environment in and around injection wells. Subsurface microbes are conditioned to native groundwater and SWIFT water injections change oxygen and carbon conditions. Two push-pull tests were conducted without a chemical tracer and one with a tracer. Bromide was used as a conservative tracer in the third test and full recovery of injected SWIFT water with the bromide tracer was achieved. Total organic carbon (TOC) and dissolved oxygen (DO) were also monitored during tests to look at the rate of TOC degradation and changes in DO. Not all TOC was recovered during testing, indicating that some of the TOC is biodegraded in the subsurface environment. Tests revealed that different rates of recovery and removal of TOC are achieved with different levels of DO. That led Dr. Widdowson to conclude that DO must be tightly controlled in the push phases of future tests planned for this summer. Dr. Widdowson said his goal is to publish this research by the end of 2025 because it will be useful for MAR projects everywhere.

Soil aquifer treatment (SAT) column tests are also ongoing for the EAR research to better understand subsurface SWIFT water interactions. Paired SAT columns used in these experiments are 21 feet long, configured for a three-day SWIFT water travel time across the first 8 feet, and a 30-day travel time across the remaining 13 feet of SAT column. SAT columns are one foot in diameter and packed with sediment collected from wells drilled at the James River SWIFT (JR

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SWIFT) facility. Columns will be conditioned with native groundwater collected from the USGS Potomac aquifer monitoring wells near the SWIFT Research Center before starting experiments. SAT experiments will include controls that continue to receive only native groundwater to compare those results to the experimental results. Kickoff for the SAT experiments is planned for mid-May.

Dr. Schafran provided additional updates on PARML's ongoing characterization of SWIFT water and monitoring for its arrival at the USGS Upper Potomac Aquifer (UPA) monitoring well (ID number 59 D36). The USGS UPA well is approximately 1300 feet away from the injection well at the SWIFT Research Center (SRC), and the HRSD UPA monitoring well is about four times closer to the injection well. Dr. Schafran presented previous monitoring and modeling results of groundwater sulfate, chloride, fluoride and TOC concentrations at the HRSD UPA monitoring well. Findings of that research determined that sulfate concentration can be used to distinguish between native groundwater and SWIFT water. He presented 59 D36 well monitoring data collected every March by the USGS since 2017 for sulfate and chloride with data collected by PARML from the same well in February 2025. PARML sulfate and chloride data agreed with USGS data. Sulfate levels fall within native groundwater quality concentrations (25-40 mg/L), indicating that SWIFT water with much higher sulfate (~75 mg/L) has yet to reach well 59 D36. Figures plotting fluoride and magnesium monitoring data over the same period were also presented. Those results have remained steady over time, but are expected to change once SWIFT water reaches the 59 D36 well. A lower fluoride level and a much higher magnesium concentration in SWIFT water can also be used to distinguish between injected water and native groundwater. Dr. Schafran also presented results of 2018-2024 USGS monitoring of stable isotopes unaffected by geochemical reactions: deuterium (2H) and oxygen-18 (^{18}O). Native groundwater and SWIFT water will have distinctly different signatures for 2H and ^{18}O . Deuterium monitoring will be another useful measure for determining when SWIFT water has migrated to the USGS UPA well.

Dr. Schafran noted other recent PARML activities. The PARML Quality Assurance Manual is complete and under review by a third party with expertise in managing a certified environmental laboratory. The review will entail an evaluation of the PARML lab analyses, data management processes, and quality procedures. Dr. Schafran also shared that PARML and HRSD are drafting the manuscript for publishing the polyfluorinated carbon (PFC) method. Staff from HRSD and PARML will present the work at a conference in August.

Committee members asked if sulfate concentrations are conservative at the distance and travel time between the injection well and the USGS 59 D36 monitoring well. Dr. Widdowson noted that subsurface microbes are heterotrophic and may not have enough carbon to use sulfate for their metabolisms. Committee members also asked if any research into metagenomics is planned and the PARML directors said those results are forthcoming.

The PARML directors updated the committee on the status of the panel review of the laboratory by the National Water Research Institute (NWRI). The goal of the review is to prepare PARML for accommodating monitoring of full-scale SWIFT operations in the future. ODU is establishing a contract with NWRI for a review of PARML by four panel members. PARML directors elected to hold virtual meetings because the cost was considerably less versus in-person meetings with the

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review panel. Panel members will include individuals with expertise in subsurface geochemistry, hydrogeology, advanced water treatment and water reuse, and assessing and managing risks associated with water reuse. The virtual meetings for the NWRI review will include a short meeting to discuss preliminary information provided to the panel before the meeting, and a four-hour review meeting with the panel a few weeks after their initial meeting. Dr. Widdowson noted that NWRI has moved to performing almost all their reviews virtually due to the increase in costs to host panel members in-person, and there is no expected loss in service associated with meeting virtually. NWRI is in the process of recruiting panel members, some of whom were recommended by PAROC members. NWRI received a commitment from Mr. Jason Dadakis, Executive Director of Water Quality and Technical Resources for Orange County Water District, to serve as the review panel chair.

The committee discussed meeting plans for the remainder of 2025. HRPDC staff will distribute scheduling polls to determine the dates for this year's three remaining meetings. Ms. Katchmark asked the committee for agenda topic ideas. The committee mentioned discussing baseline groundwater quality monitoring at the JR SWIFT facility, updates on managed aquifer recharge suitability studies in the Eastern Virginia Groundwater Management Area, and short presentations by ODU and VT PARML students researching aspects of SWIFT. Other ideas included an overview of the underground injection control (UIC) permit application for JR SWIFT, and modifications or additions in the state groundwater monitoring network managed by DEQ and USGS after they assess additional monitoring wells around JR SWIFT. Committee members noted the importance of assessing the existing groundwater monitoring network's adequacy for monitoring water quality responses to SWIFT injections. They recommended a review of monitoring parameters included in routine monitoring, and the frequency of routine monitoring of the state network to determine if SWIFT research partners should consider testing additional water quality analytes of interest. The committee should also discuss a mechanism to fund any additional water quality testing related to SWIFT. They also discussed developing a communications policy for SWIFT, PARML and PAROC. Members acknowledged the need for consistent messaging across the organizations involved, especially when JR SWIFT begins operating and inquiries from the self-supplied groundwater community are expected. Committee members also discussed the need to consider and plan for HRSD's private well testing around JR SWIFT. So far, those efforts have been limited to the private wells near the SRC.

There were no public comments.

The meeting adjourned at 12:44 p.m.

Approved:



Committee Chair

Date:

June 12, 2025

Committee Members:

- Mike Rolband, Director of Virginia DEQ

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- Dr. Karen Shelton, Virginia State Health Commissioner
- Dr. William Mann, Governor Appointee
- Doug Powell, Governor Appointee
- Whitney Katchmark, HRPDC
- Dr. Stanley Grant, Director of Occoquan Watershed Monitoring Laboratory
- Dr. Mark Widdowson, Co-Director of the Potomac Aquifer Recharge Monitoring Lab
- Dr. Gary Schafran, Co-Director of the Potomac Aquifer Recharge Monitoring Lab

Non-voting members:

- Mark Bennett, Director of Virginia and West Virginia Water Science Center, USGS
- Leslie Gillespie-Marthaler, Deputy Director Water Division, US EPA Region 3