Minnesota 3M PFC Settlement

Notes for Technical Subgroup 1 Meeting

Wednesday, February 16, 2022
1 – 4 p.m.

Virtual WebEx meeting

Group members in attendance

- Brian Davis
- James Creaghe
- Gary Krueger
- Greg Johnson
- Jack Griffin
- Jason Moeckel
- Jim Westerman
- Jon Herdegen
- Lucas Martin
- Marian Appelt
- Matt Moore
- Michael Kothe
- Paul Schoenecker
- Richard Burfeind
- Stephanie Souter
- Steve Love
- Stu Grubb

Presenters

- Gary Krueger, Minnesota Pollution Control Agency (MPCA)
- Jason Moeckel, Minnesota Department of Natural Resources (DNR)
- Mark Lorie, Abt Associates
- Heather Hosterman, Abt Associates
- Ryan Burfeind, Cottage Grove
- Ryan Capelle, Stantec
- Henry Croll, Stantec
- Joe Jacangelo, Stantec
- Rebecca Higgins, MPCA
- Al Gorski, AECOM

Welcome and Updates

Mark Lorie (Abt Associates) welcomed Subgroup 1 to the meeting. Gary Krueger (MPCA) also welcomed the Subgroup and provided some brief updates:

1. The Cottage Grove ion exchange (IX) pilot study is concluding. The final report is being produced now and MPCA will post it on the Settlement website when it is ready.
2. The Co-Trustees notified the work group members that they submitted 3M Settlement legislative report and the annual report on residential well sampling activities. Both have been posted online, on the 3M Settlement website and the Well sampling in the East Metro Area website, respectively.

Grant Form Update

Heather Hosterman (Abt) provided an update on changes made to the online 3M Settlement grant form. The Co-Trustees considered that there could be overlap between the planning/design grant form, and the construction grant form. Therefore, one grant form now covers both planning/design and construction. Heather outlined changes to the grant form. New questions include:

- Project type, which asks submitters to specify if the grant form is for planning and design, construction, or both. This will inform how Co-Trustees put together the grant. If construction is selected, the Co-Trustees will include prevailing wages information in the grant.
- A question for submitters to select capital components that are part of their project.
- Whether the submitted project differs from the Conceptual Plan and how.

The new form also includes an updated budget section that has line items related to planning and design and construction (e.g., budget for construction management). Heather then walked through example responses to the changed questions. She also encouraged submitters to send supplemental information whenever possible and to let the Co-Trustees know when a grant form has been submitted. This will help ensure there are no delays or lags.

Cottage Grove Ion Exchange Pilot Study Update

Ryan Burfeind (Cottage Grove) provided a brief history of the Cottage Grove ion exchange (IX) pilot study. The planning process began 2019, the study was underway by winter of 2020, and the project was completed in fall 2021. Since then, Stantec has been drafting the final report.

Ryan Capelle (Stantec) then provided additional details on the pilot study. The purpose of the study was to learn about the long-term impacts of PFAS and evaluate IX as a possible treatment, either alone or in combination with granular activated carbon (GAC). The study looked at the effects of GAC only, IX and GAC, and IX only on several PFAS compounds, individually and combined as the Health Index (HI). The HI changed recently when the Minnesota Department of Health developed a health-based value (HBV) for PFHxA. This change was incorporated into the study results.

Ryan Capelle and Henry Croll (Stantec) described the elements of the pilot study. Groundwater comes in from Cottage Grove well 3, and is held in a series of tanks. The water was run through various water columns containing different types of treatment media. The study ran 24/7 to maximize results in a shorter time frame. A key parameter was understanding the empty bed contact time (the time the water spent in contact with the treatment media). Through the course of the study, over 700 sample were analyzed by Johns Hopkins University. Thirty-two (32) PFAS compounds were measured and 16 were found in Well #3 water. Samples showed that PFBA and PFOA were large contributors to the HI.

The results of the study are shown below:

Treatment Method	Resulting HI
Well #3 raw water (no treatment)	2.78
GAC only	0.42
IX only (Purolite)	0.33
IX only (Evoqua)	0.29
GAC and IX (Purolite)	0.17
GAC and IX (Evoqua)	0.16

To understand the breakthrough of PFAS for each treatment method, Stantec used already-established models. The models showed that the pilot study was a competitive environment for PFAS. PFAS and other co-

contaminants were all competing for space at the absorption site (treatment media). Therefore, some of the compounds that were less hydrophobic would get forced off of the treatment media. Because other models did not account for this, Stantec created their own model to predict PFAS breakthrough. The pilot study showed that GAC and IX had different breakthrough times for different PFAS. For GAC, the relationship between PFAS chain length and breakthrough time is linear. In IX, some of the longer-chain PFAS compounds broke through faster than GAC, but IX performs better on short-chain PFAS compounds.

The pilot study also examined the effects of pre-treatment. There was aggressive iron fouling early into the pilot study. Therefore, pre-treating before the IX resins was recommended. After adding pre-treatment, Stantec saw fouling begin again. They then installed a more aggressive pre-treatment media which ran for 200 days. There were several disruptions throughout the pilot study (e.g., flooding, power outage).

In general, the study showed that IX performed better than GAC. However, there are other considerations that a community must consider when comparing GAC and IX. For example, cost estimates are extremely site-specific given water quality variation. Additionally, capital costs can vary greatly. Operational costs include media change out frequency, media disposal or regeneration, pretreatment costs, and utilities. For the Cottage Grove pilot study, Stantec determined it was approximately twice as expensive to operate GAC compared to IX. This is primarily because the IX media lasts longer than the GAC media. Stantec clarified that a community should do their own cost analysis before making any decisions and consider pre-treatment requirements and other resin brands.

Feedback:

One Subgroup member asked about pre-treatment. Stantec explained that they originally used a berm media for iron and manganese removal. However, after they saw this media was breaking down, they switched to a product that does not require chemical addition and can still remove iron and manganese. The Subgroup member also asked where in the process iron fouling was occurring. Stantec said that they are not sure if oxidation was occurring in the treatment columns or prior to the column.

Another Subgroup member asked if pre-treatment was included in the capital costs. Stantec explained the capital costs in their estimate included silica sand and chemical addition pre-treatment. Rebecca explained that PFAS contamination is worsened in the East Metro because of the hydrogeological complexity of the area.

Project 1007 Update

Rebecca Higgins (MPCA) provided an update on Project 1007. The Co-Trustees are currently evaluating near-term actions for mitigating PFAS in the East Metro. This evaluation will inform a larger feasibility study and be used to recommend long-term drinking water protection options. Rebecca explained that the East Metro area is hydrologically complicated because there are multiple groundwater divides, which allows contamination to spread in more directions. Activities under Project 1007 help better understand the complex water system. To date, Project 1007 has:

- Analyzed samples for 40 PFAS compounds using sampling methods that take a detailed look into the chemistry of PFAS in the water (e.g., isomer ratios, multivariate statistics)
- Sampled different media for PFAS including surface water, groundwater, soil, sediment, foam, and tissue
- Installed wells to show how PFAS travels deeper into aquifers

- Used statistical analysis and geologic modeling to show PFAS is widespread and travels differently than other contaminants due to its physical and chemical properties

Rebecca explained that there are two distinctive PFAS signatures in the East Metro. One is prominently PFOS and comes from the Oakdale Disposal Site. The other is primarily PFBA and comes from the Washington County Landfill. The two signatures then mix throughout the system in surface water. Analysis also shows that the signatures are mixed in aquifers. Additionally, the PFAS mixture is present in both high and low flow conditions. Understanding the makeup of PFAS in the East Metro helps target treatment and remediation.

Rebecca also discussed the presence of PFAS-containing foam found throughout the East Metro water systems. There are different types of foams that can be seen (e.g., actively accumulating, wind generated, deflated). When looking at a breakdown of PFAS foam, PFOS is in the driving constituent. PFOS foam is very concentrated and can last a long time in the environment.

Rebecca reviewed the results found from Project 1007 work, including:

- Risk assessments, which are available on the Project 1007 3M Settlement webpage. PFOS was found to be the driver in terms of the makeup of PFAS found in the area and toxicological factors. There were population-level risks from PFOS exposure identified in great blue heron, muskrat, and mink. There were also individual-level risks from PFOS exposure identified for tree swallow, spotted sandpiper, great blue heron, muskrat, little brown bat, and mink. Of the 25 species identified, seven are considered threatened or are on the special status list, which is important to consider when planning remedial goals and objectives. DNR also collected 50 deer liver, however there is no data yet. DNR will also be collecting birds and geese this summer from the Lake Elmo Preserve for additional analysis. Lastly, AECOM has collected plant tissue for analysis and expects data will be available in spring 2022.
- The combined surface water and groundwater model is currently being developed. This is important for regional drinking water protection since the water systems in the East Metro are so interconnected. Multiple groundwater divides cause PFAS to travel far. Water from the area also enters the Mississippi and St. Croix Rivers.
- Multi-benefit wells (MBW) aim to reduce PFAS contamination in groundwater to achieve long term drinking water protection goals while providing municipal drinking water supply to some communities. The Project 1007 team is working on MBW placement to understand how they integrate with the surface water/groundwater model. Multi-benefit wells are still in the preliminary phase and no decisions have been finalized regarding their use or placement.
- Aquifer pumping tests have been/are being conducted to help inform the surface water/groundwater model. Two of three aquifer pumping tests are complete (both in the Jordan Aquifer). The third is planned for spring 2022. This will help with MBW placement. The Project 1007 team partnered with the University of Minnesota to develop injection capacity estimates, but more pumping data is needed to improve the accuracy.

Rebecca also reviewed near-term actions for Project 1007. Currently, Project 1007 is in the process of procuring foam fractionation technology, which helps remove PFAS from surface water. This process will be tested in multiple areas around the East Metro. The team is also using drone imagery to determine where remediation actions are taking place and where future actions need to occur. Lastly, Rebecca reviewed estimated costs associated with Project 1007 activities until fiscal year 2052.

Feedback:

One Subgroup member asked if the surface water study and related activities were within the scope of the Settlement. Gary Krueger (MPCA) explained that those investigations are needed as a part of the feasibility study, which is under the scope of the Settlement.

A Subgroup member asked if funding for the Project 1007 work was coming from the $70 million reserved for drinking water protection. Gary responded that it will likely draw from that funding soon.

Another Subgroup member asked if the ecological study data was available to the public. Rebecca explained that the information is confidential and privileged at the moment and does not know when all Project 1007 data will be made available. However, the Baseline Ecological Risk Assessment finalized in October 2021 is available on the Project 1007 website.

Another Subgroup member asked if Ravine Lake and Vandenberg wetland in Cottage Grove were tested for contaminants. Rebecca explained that it was outside of the original Project 1007 boundary.

Public Comments and Questions

A member of the public expressed concern about the use of multi-benefit wells. They did not want groundwater and surface water to be mixed and reinjected together as they felt this could help spread contamination. Rebecca explained that multi-benefit wells are part of the feasibility study under Project 1007, and that those details would be studied, but no remedial actions had been finalized at this point.