Minnesota 3M PFC Settlement
Agenda for Subgroup 1 Meeting

Wednesday, December 16, 2020
1:00 PM-4:00 PM

Webex link: Join the Meeting

(If using Webex, we request that you connect to the audio using your phone rather than the computer, and use the "Call me" option. Please refer to the Webex instructions for more information.)
Conference line (if not using the Webex "Call me" option): 1-415-655-0002; Access code: 178 314 7080#

Meeting Purpose:

- Update on Project 1007 and implications for the Conceptual Plan
- Open discussion on the Draft Conceptual Plan and recommended options
- Clearly identify a path forward to finalize the Conceptual Plan

1. Welcome a. Webex instructions b. Roll call c. Agenda d. Updates and email follow-up	Gary Krueger – MPCA Jason Moeckel – DNR Emma Glidden Lyon – Abt Associates Mark Lorie – Abt Associates	1:00 PM
2. Update on Project 1007	Gary Krueger – MPCA Jason Moeckel – DNR Rebecca Higgins – MPCA	
3. Public comments and questions	Mark Lorie – Abt Associates	2:15 PM
BREAK	N/A	2:25 PM
4. Discussion of topics selected by the Subgroup	Gary Krueger – MPCA Jason Moeckel – DNR Mark Lorie – Abt Associates	2:35 PM
5. Path forward and next steps	Gary Krueger – MPCA Jason Moeckel – DNR Mark Lorie – Abt Associates	
6. Public comments and questions	Mark Lorie – Abt Associates	3:50 PM
ADJOURN		4:00 PM

Minnesota 3M PFC Settlement

Notes for Drinking Water Supply Technical Subgroup 1 Meeting

Wednesday, December 16, 2020

1:00 p.m. – 4:00 p.m.

Virtual WebEx Meeting

Group members in attendance:

Brian Bachmeier	Brian Davis	Dan DeRudder	Gary Krueger
Greg Johnson	Jack Griffin	Jason Moeckel	Jim Westerman
Jon Herdegen	Karla Peterson	Kristina Handt	Lucas Martin
Marian Appelt	Matt Moore	Richard Thron	Ryan Burfiend
Stephanie Stouter	Stu Grubb		

Presenters:

- Gary Krueger, Minnesota Pollution Control Agency (MPCA)
- Rebecca Higgins, MPCA
- Emma Glidden-Lyon, Abt Associates
- Mark Lorie, Abt Associates

Welcome

Emma Glidden-Lyon (Abt Associates) and Mark Lorie (Abt Associates) welcomed the Subgroup to the meeting. Mark reviewed the agenda. The purpose of the meeting was to hear an update on Project 1007 and receive feedback from the Subgroup members on topics that they suggested to the Co-Trustees.

Update on Project 1007

Rebecca Higgins (MPCA) and Gary Krueger (MPCA) provided an update on Project 1007. The goal of this effort is to understand the complex picture of sources, pathways, and risks in the area, and to better understand how PFAS contaminants have moved throughout the region, in part aided by a flood mitigation system installed by the Valley Branch Watershed District in the 1980's. Project 1007 is covered under Priority 1 of the Settlement, which directs MPCA to conduct a source assessment and feasibility study. According to the Agreement with 3M, any mitigation measures identified in the study will likely be funded by Settlement dollars. The Project 1007 PFAS investigation effort has been collecting samples along the Project 1007 corridor as part of a source assessment analysis and to gather information to build a detailed conceptual site model. Key findings include:

- The Project 1007 system is extremely complex with a high level of interconnection between hydrologic regimes of surface water and groundwater across the entire region. The State is working on a combined drinking and surface water model that will analyze the flow of PFAS contamination in more detail over time. The model will combine above- and below-ground geologic features to provide insights into how PFAS could impact the area's aquifers.

- The 3M Oakdale Disposal Site and Washington County Landfill are primary sources of PFAS into the system. There is a gradation of PFAS impacts present throughout the entire Project 1007 corridor that exceed site-specific water quality criteria for PFOS. These water quality criteria are new as of October of 2020 and were developed in-part for this specific area. The site-specific water quality criteria are values protective of fish habitat, ultimately aimed at human protection for fish consumption. This criteria includes a value for fish tissue and for surface water that supports meeting the fish tissue value. Concentrations in sediment and surface water are highest immediately downgradient of the Oakdale Disposal Site. There are also a number of sediment sinks where PFAS has settled and become secondary sources, partly due to hydrologic properties of the water bodies and the organic nature of the quiet portions of the system. An example of a sediment sink is the wetland area immediately downgradient of the Oakdale Disposal Site. Rain storms or other natural events may cause more PFAS to be released from the sediment sink locations, and are referred to as PFAS "pulses". These pulses are most evident in the system after the Project 1007/Raleigh Creek confluence at Tablyn Park after precipitation events.
- Most of the PFAS mixture is made up of PFOS in samples collected to-date in the surface water, sediment and animal tissues. A varied blend of the PFAS signature is present in the groundwater near the disposal sites with PFOA and PFBA making up a greater portion of the total PFAS near the Washington County Landfill as opposed to PFOS dominating the signature from the Oakdale Disposal Site, with some precursor PFAS compounds (including FOSAs, FASEs, and FASAAs).
- PFAS foam can be generated from physical agitation from precipitation, wind, or high turbulence areas, and are found in a variety of forms on surface water bodies: actively accumulating, organic/particulate rich, frozen, deflated, or not-accumulating/small clusters of foam. Residents are encouraged to stay away from foam if they see it and wash their hands immediately after coming into contact. High concentrations of foam do not necessarily correlate with the highest PFAS concentrations in the water in which foam is found. Significantly high concentrations of foam were found in Raleigh Creek and at the outlet of Horseshoe Lake.

Rebecca explained the phases of the investigation, which include:

- Baseline sampling event (occurred in the Fall of 2019)
- Beta phase investigation (occurred from Fall 2019 – Summer 2020). The goal of this effort was to target discrete areas of the system to install a monitoring well network in shallow and deep bedrock and other targeted devices for measuring surface water and groundwater interactions. The beta phase involved installation of shallow and deep monitoring well nests that provided new accuracy in determining where and in what form groundwater connections exist. There are many bedrock units or layers as well as multiple aquifers creating a very complex subsurface system.
- Focused investigation started in the Fall of 2020 and will continue through 2021.
- Source Assessment progression: This involves all components of the conceptual site model. It is not just a phase of the investigation, but will look at multiple components going into a series of investigations that build iteratively upon one another. These components are integrated into understanding the whole of the system.

Rebecca then discussed the merits of using multi-benefit wells as a way to address long-term regional groundwater impacts. Multi-benefit wells could possibly serve long-term municipal drinking water demands while controlling large, regional groundwater plumes. These would be extraction wells in the bedrock to capture and treat PFAS-contaminated water. The combined extraction rate of the multi-benefit wells would represent 67% of 2040 total regional average daily demand. A key component of

multi-benefit wells is managed aquifer recharge through direct injection of the excess treated groundwater. This practice is less common in Minnesota but is common in many other places in the country and across the globe. Long-term remedial actions will be dependent on PFAS presence, concentrations and behaviors, PFAS plume geometry and movement, fate and transport, and PFAS risks and remedies.

Rebecca also discussed interim corrective actions which involve surface water cleanup options. The State expects to consider targeted sediment cleanup assessment in 2021. The interim surface water clean-up option under evaluation is a two-step process involving first, surface activated foam fractionation that aerates contaminated water, forcing PFAS to form foam which is removed and hyper-concentrated. The treated water can be returned to the source. The first tests of the foam fractionation have shown a 79-85% removal of total PFAS, with up to 99% removal of PFOA/PFOS. The second step in the process uses electrochemical oxidation to transform, oxidize and mineralize the hyper-concentrated small volume PFAS liquid, thereby decoupling the carbon-fluorine bonds. Hyper-concentrated PFAS liquid from the Oakey Air Force Base treatment system in Australia is being tested at the AECOM laboratory in Austin, Texas to evaluate the second step in this process. That PFAS liquid is similar in PFAS composition to the Project 1007 surface water.

Rebecca then discussed the Project 1007 next steps. Source assessment work will be ongoing for the next 1-2 years. Modeling and interim corrective actions will begin and occur over the next 1-3 years. The feasibility study will begin in 1-1.5 years and this will address the long-term, regional cleanup options. Cleanup itself will take many years to decades.

Feedback:

One Subgroup member asked how long the interim technology took to remove the PFAS from the system. Rebecca said it took approximately one hour to get the sample of water much cleaner. She explained that PFAS wants to accumulate on the surface in foam, so that is an easy place to target removal.

Another Subgroup member asked if there was foam coming out of the Washington County Landfill site. Rebecca explained that the foam is not so much equated with a source area. Surface water with very low PFAS concentrations can have high amounts of foam because it easily accumulates and can be found across the entire system. Foam can have 20,000-30,000 times higher concentration of PFAS than the surface water in which it accumulates.

Subgroup members asked about the costs of these treatment options and how they fall into the Settlement funds. Gary explained that 3M is in charge of PFAS remedies at the disposal sites, but the Settlement will cover the larger, regional solutions. He said there needs to be further analysis in the feasibility study to discuss specific costs.

One Subgroup member felt this information was being presented too late. They were concerned that the goals of the multi-benefit wells were already being reached through the installation of other wells in the area. They agreed there was an opportunity with the multi-benefit wells to reduce treatment down

the road, but want to ensure that the capital costs for drinking water infrastructure are covered first. If funding was unlimited, they would support multi-benefit wells.

Another Subgroup member brought up the issue of White Bear Lake. If Lake Elmo is unable to drill new wells, then why are new multi-benefit wells being proposed in the same region? Gary acknowledged that White Bear Lake was certainly part of the equation. They will have to deal with White Bear Lake but still want to look at all of the options. Other concerns about the placement of the multi-benefit wells included rising water levels and flooding. The Project 1007 team said that these were simply options they considered but still had to do more analysis. A representative from MDH was concerned that placing wells up-gradient of Washington County Landfill could introduce new contaminants into the system.

One Subgroup member expressed the importance of long-term costs for this work. Normally, efforts such as this have long-term funding associated with them. They do not feel $70 million for drinking water protection will cover this effort. Gary explained that if long-term groundwater control wells are needed and the Settlement funds are depleted, the Consent Order may come back into play and cover those necessary efforts.

One Subgroup member asked why the State could not just remove the contaminated sediment right now. Rebecca explained that while this may be a viable interim corrective action, sediment removal should be coupled with larger groundwater treatment. Another Subgroup member reminded everyone that these efforts would not clean up the aquifer overnight. For example, the pump and treat systems at the Woodbury Disposal Site have been doing a moderately good job, but they view pump and treat as more of a plume control technology than a large-scale remediation technology.

Discussion of topics selected by the Subgroup

The Subgroup members decided which topics to discuss during the meeting.

Public comments and questions

There were no questions or comments from the public at this time.

Discussion of topics selected by the Subgroup

Acceptability of options

The Subgroup members first discussed the acceptability of Options 1, 2, and 3 as laid out in the draft Conceptual Plan. The results of the discussion are below:

- Most of the Subgroup members support Option 2 since it has the lowest health index (HI) treatment threshold (0.3) of all of the options. They feel this option provides the most flexibility to deal with changing HI values.
- Some Subgroup members will not support an option until their local government leaders made a decision.

- One Subgroup member expressed support for supplying GAC systems to people in communities that have different geology (e.g., West Lakeland, Newport). They think the GAC filters are working fine as is and feel a municipal water system in these areas may be too expensive.
- One Subgroup member was comfortable with Option 1 because they feel HI of 0.5 as a treatment threshold is protective enough.

Disposal and Liability

The Subgroup asked about communities' responsibility and liability in disposing of PFAS treatment media. The Co-Trustees explained that the chain of custody could depend on the vendor. The City of Cottage Grove works with Evoqua, which sends proof that the media was disposed of properly. However, that is the city's only proof and they still could be liable if something went wrong. Woodbury has a similar process where they are on the chain of custody even though another company manages and transports the waste. Gary explained that the Settlement covers disposal costs relating to long-term treatment objectives. However, as far as liability, the State cannot indemnify a community. Another Subgroup member brought up the concern about disposing of PFAS in low-income areas, and asked what happens if a disposal facility shuts down. They do not want communities to be responsible if closed disposal facilities became a secondary source. They advocated for more conversation on the topic.

Early access to funds

Subgroup members also discussed access to early funds to complete tasks like land acquisition for treatment plants. Woodbury is especially interested in a piece of land for their proposed new treatment plant, especially given the limited public land available in Woodbury. They understand they would return the funds to the State if the land was not purchased. Gary said the Co-Trustees would continue discussing this topic.

Centralized water softening

The group discussed centralized water softening, which may be an option for treatment systems that require pre-treatment. Centralized water softening could reduce water use and represent savings to homeowners that would not need to buy water softeners anymore. Centralized treatment would soften water at the source instead of having in-house softeners, which lead to an increase of chloride concentration in the water. Treatment can be done more effectively to scale at a municipal level. Subgroup members generally supported ongoing conversations on this topic. A representative from MDH explained there could be health impacts of municipal water softening. MDH is working on a white paper on this topic now.

Next steps

Mark discussed next steps for the Subgroup. The public comment period ended on December 10th and the State and consultants are working through the feedback now to find common themes. They are also reviewing Subgroup comments. There will be no work group meetings in January. The February meetings, and possibly the March meetings, will focus on a summary of the feedback received and options for updating and finalizing the Conceptual Plan. In March, the Co-Trustees plan to have another

round of one-on-one meetings to discuss updates to the options. The final decision is slated for April and information will be disseminated to the public through Subgroup members, Subgroup meetings, and public meetings.

Public comments and questions

There were no questions or comments from the public at this time.