

B R E W E R
ATTORNEYS & COUNSELORS

July 12, 2017

VIA EMAIL

Mr. John Linc Stine
Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194
John.Stine@state.mn.us

Ms. Kathryn J. Sather
Division Director
Remediation Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194
Kathryn.Sather@state.mn.us

Dear Commissioner Stine and Ms. Sather:

I recently wrote on behalf of 3M to advise the Minnesota Pollution Control Agency (MPCA) that 3M disputes a reimbursement request for certain expenditures incurred by the agency, in significant part, with respect to the Well Water Advisories that were issued by the Minnesota Department of Health (MDH) on August 22, 2016.

Unwarranted Actions

The Well Water Advisories were purportedly in response to the EPA's lifetime health advisory levels (LHAs) for certain perfluorochemicals (PFCs), perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), in drinking water.

We believe, however, the actions of the State were unwarranted and unnecessary. The advisory levels adopted by EPA are non-enforceable and non-regulatory tools which provide technical information about drinking water supplies. These advisories include a margin of protection from a lifetime of exposure to PFOA and PFOS from drinking water – they are not levels at which EPA advises that water is unsafe for the general public to drink.

**Exhibit
2687**

State of Minnesota v. 3M Co.,
Court File No. 27-CV-10-28862

B R E W E R

Commissioner Stine and Ms. Sather

July 12, 2017

Page 2

The Dispute – Lack of Information and No Recognition of Those Who are Responsible for the Impacts in Question

3M initiated the dispute provision of SACO by its letter dated June 28, 2017, that requested substantiation for those expenses referenced in the State's reimbursement request.¹

In accordance with Part X.A of the 2007 Settlement Agreement and Consent Order (SACO), 3M now submits to the MPCA Commissioner this written statement explaining 3M's position in connection with the dispute and a summary of the information 3M relies upon in support of its position. (See attached written statement and affidavit.)

Please note the following observations and concerns that inform 3M's view of the dispute regarding the State's reimbursement request:

1. To date, 3M has not received a response to its request for the State to substantiate those expenses referenced in the State's reimbursement request and, therefore, the company is unable to fully assess its reimbursement obligations;
2. We believe an overall lack of cooperation by the State in connection with the Well Water Advisories is in violation of SACO – and represents an attempt to deny 3M and the public access to information that likely explains the State's motive to issue the advisories in August 2016, when there was no federal or state regulation mandating such action;
3. In correspondence to the MPCA, dated December 15, 2016, 3M requested specific information pertaining to the Well Water Advisories to understand the basis for MPCA's belief that 3M is responsible for the impacts to the drinking water sources in question. The State later submitted only *partial* responses to 3M's inquiries;
4. As noted in a letter from 3M, dated February 2, 2017, the State misinterprets SACO; more specifically, Part XXIII.C, Part V.C., Part VIII.B, and Part XXV.B of that agreement.²
5. The SACO clearly limits 3M's responsibilities to the discharge, release or threatened release of these chemicals "at or from any of the Sites" with which 3M is directly associated; and

¹ This follows other requests for information from 3M, dated December 15, 2016, February 2, 2017, March 20, 2017, May 19, 2017, and June 13, 2017. The State has not fully responded to these information requests.

² SACO commits 3M to PFC-related remedial investigations and response actions relating to "the Sites or to other releases that are associated with wastes generated by 3M facilities in Minnesota."

B R E W E R

Commissioner Stine and Ms. Sather
July 12, 2017
Page 3

6. Significant information has come to light that confirms 3M's conclusion that it is not even remotely responsible for the vast majority of the presence of these chemicals. For example:
 - i. Following correspondence to the MPCA advising that 3M bears no responsibility for the environmental presence of PFCs resulting from the Washington County Landfill, the agency reversed the position it took in a letter to 3M and acknowledged that 3M is not responsible for any activity related to this site.³ The Landfill, managed by the State, is the significant contributor to the environmental presence of PFCs, and yet the public has been provided little, if any, information about the environmental impacts resulting from the State's lack of oversight of this facility;
 - ii. In a *South Washington County Bulletin* article, "Big bill for 3M in Cottage Grove PFC remediation," dated June 20, 2017, MDH Environmental Health Manager James Kelly reportedly admitted to the publication that there is a site near Highway 61 where firefighting efforts may have contributed to the environmental presence of PFCs in Cottage Grove; and
 - iii. A review of the private well locations and Well Water Advisories issued near Cottage Grove demonstrates that 3M is not the source of PFCs, as the wells in question are located *up and cross gradient* from 3M's Cottage Grove facility.

Clearly, determinations must be made about others, and most importantly, the MPCA itself, who are the proximate cause of the impacts to the local area and to what extent such sources are impacting drinking water supplies. As evidenced in the attached affidavit, others, including the State, are likely responsible for PFC-related impacts to the local area.

Looking Ahead – Meeting the Expectations of Private Parties and a Concerned Public

Going forward, we welcome the opportunity to review all the information that was relied upon by the State to enact drinking water guidelines that were not mandated by the State or EPA.

To the extent the State will continue to seek reimbursement costs associated with reactive measures purportedly taken in response to the health-based advisory values (HBVs) for PFOA and PFOS announced in May 2017, we have repeatedly sought information regarding the basis upon which the State has decided no others are responsible for the impacts in question.

³ See letters from Kathryn J. Sather, MPCA, dated April 28, 2017 and June 9, 2017.

B R E W E R

Commissioner Stine and Ms. Sather
July 12, 2017
Page 4

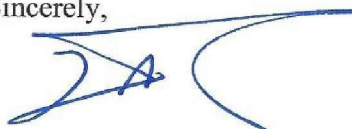
We again request a full explanation as to why the State adopted new HBVs and took various response actions in connection with such a decision, including issuing a Health Risk Advisory for the City of Cottage Grove. We expect that city officials have been advised of the other proximate causes of the PFC impacts to public and private wells in the area.

Against this backdrop, it is important for the public to understand that the State has admitted it is unable to identify anyone who has suffered negative health effects as a result of environmental exposure to PFOA or PFOS. In sum, we do not believe there is a PFC-related public health issue in Minnesota.

As longtime members of the local community, 3M is anxious to resolve the issues in question, comply with its obligations under SACO, and work with others to develop a deeper understanding of local environmental issues.

Thank you in advance for your cooperation and attention to these matters.

Sincerely,



William A. Brewer III

Cc: Jean B. Sweeney, 3M Vice President and Chief Sustainability Officer
Gary Hohenstein, 3M Company
Mary Cullen, Esq, 3M Assistant General Counsel
Ann E. Cohen, Assistant Attorney General, State of Minnesota

ATTACHMENT 1

I.

THE MATTER IN DISPUTE

A. Background

3M Company (“3M”) disputes certain reimbursement costs requested by the Minnesota Pollution Control Agency (“the MPCA”) allegedly required under the Settlement Agreement and Consent Order between 3M and the MPCA (the “SACO”). Specifically, on May 2, 2017, Kathryn Sather, Division Director, Remediation for the MPCA, sent a letter to Gary A. Hohenstein, seeking reimbursement “[f]or costs associated with oversight of 3M activities to investigate and remediate releases of perfluorochemicals from the 3M Cottage Grove, 3M Oakdale and 3M Woodbury Disposal Sites (“Sites”). Three invoices (the Invoices) were submitted for reimbursement as outlined in the table below. 3M disputes the Invoices because the MPCA has not provided sufficient detail for 3M to ascertain its responsibility under SACO and based on the information known, the off-site charges are likely **not** attributable to 3M.

Invoice	Costs
3M Cottage Grove – SR33	\$42,349.57
3M Oakdale – SR55	\$45,896.04
3M Woodbury – SR365	\$287,978.69

Significant detail is missing from the May 2, 2017, correspondence, invoices and accompanying support and, as such, 3M is unable to determine if it is responsible for the costs incurred. 3M sent a letter on June 28, 2017, requesting detailed information regarding the invoices, but the MPCA has not responded. As such, 3M, under its rights and obligations in connection with SACO, wrote a follow-up letter on July 3, 2017, timely notifying MPCA of the dispute effected by the June 28, 2017, letter.

The three invoices are segregated by Site as defined in SACO. However, the expenses that are being billed for off-site GAC installations and monitoring, bottled water and sampling of private wells are likely not attributable to 3M, so it is imperative that all supporting documentation be provided for analysis. There is no evidence that the existence of other contributors has been considered in MPCA’s analysis. MPCA admitted this in its April 28, 2017, letter. Further, the remaining expenses for staff and technical assistance lack significant detail, so it is impossible to ascertain whether the invoices should be paid by 3M.

We believe many of the Invoice charges emanate from the areas surrounding the 2016 and 2017 well advisories. A review of the private well locations and advisories issued near the Cottage Grove Site demonstrates that 3M Cottage Grove cannot be the source of PFCs, as the wells are located up and cross gradient from the 3M facility. Further, there are no known connecting fault structures and these areas are not karst terrain. The MPCA ignores the multiple contributors to the well advisory area to the South and West of the Cottage Grove Site, including Up North Plastics Fire, the Cottage Grove Fire Department and the use of Class B fire-fighting foam (AFFF). The

Written Statement
July 12, 2017

Cottage Grove Fire Department used up to 5 gallons/year of AFFF in fire training exercises. Approximately 4,000 gallons of AFFF was used to extinguish the fire which engulfed truck trailers and piles of plastic debris. Further, there was AFFF use at the Marathon refinery resulting in groundwater contamination at the facility.

It appears that the MPCA is attributing charges in the Northern East Metro Area to Oakdale. However, the Washington County Landfill (“WCL”) is the major contributor. WCL exacerbated the release of PFCs into the environment through spray irrigation, the lack of an effective groundwater control system and through major discharges into the storm sewer system that adversely impacted surface water and groundwater plumes emanating from and downgradient from the WCL.

In regard to the sampling charges, despite its obligations under SACO, 3M was not afforded the opportunity to take split samples. Additionally, MPCA failed to provide work plans, including quality control and quality assurance protocols which render the MPCA’s analyses questionable. It is also impossible to determine whether the sampling was “reasonable and necessary.”

B. 3M’s Obligations under SACO

3M’s obligations under SACO for Releases of PFCs are as follows:

“It is understood and agreed by the Parties that, as of the effective date of this Agreement, the releases and threatened releases of PFCs to be addressed at each Site pursuant to Parts VI to VIII of this Agreement are releases and threatened releases of PFOA and PFOS. The parties further agree that, at such future time as the MDH adopts or issues an HRL or an HBV for purposes of advising the public concerning the safety of drinking water supplies with respect to any PFC other than PFOA and PFOS, including PFBA, the releases and threatened releases to be addressed pursuant to Parts VI to VIII of this Agreement shall include releases and threatened releases of such additional PFC for which an HRL or HBV has been issued and exceeded.”

SACO also states,

“3M’s response action obligations . . . include all response actions, including construction, installation, replacement, and operation and maintenance, that are reasonable and necessary to provide alternative sources of drinking water for all persons whose drinking water is contaminated with PFCs in a concentration that exceeds an HBV or HRL issued or adopted by the Minnesota Department of Health, including water containing two or more PFCs for which HBVs or HRLs have been adopted if the combined PFC levels exceed a Hazard Index of 1.0 based on those HBVs or HRLs and MDH has issued an advisory against human consumption of the water.”

**Written Statement
July 12, 2017**

Further,

“3M agrees to reimburse the MPCA for all reasonable and necessary costs incurred by MPCA . . . which are related to PFCs for which response actions are required as provided in Part V. A to C of this Agreement, whether the costs incurred relate to the Site or to other releases that are associated with wastes generated by 3M facilities in Minnesota. Releases from Washington County Landfill are not included in this Part XXIII.C.”

3M will comply with its obligations in connection with the SACO, dated May 22, 2007. However, 3M is forced to dispute the reimbursement request absent the clarification of expenses noted in the May 2, 2017, correspondence. Based upon the information available to 3M, it is apparent the MPCA and other contributors are responsible for the PFC-related impacts in question.

C. MPCA’s Responsibilities Under SACO

The SACO was negotiated so that the parties would work together and be transparent regarding the assessment of the presence of chemicals. Unfortunately, 3M has not been able to conduct split sampling, nor has it received transparent billing information. Yet the MPCA is required to provide split sampling opportunities.

“The MPCA Commissioner and 3M shall make available to each other the results of sampling, tests or other data generated by either party, or on its behalf, with respect to the implementation of this Agreement. MPCA and 3M agree to allow split or duplicate samples to be taken by the other party during sample collection conducted as part of the implementation of this Agreement. For sampling associated with 3M’s obligations for the Sites under Parts VI to VIII, 3M’s Project Manager for a Site shall endeavor to notify the MPCA Project Manager for that Site not less than ten (10) days in advance of any planned 3M sample collection. If it is not possible to provide ten (10) days prior notification, 3M shall notify the MPCA Project Manager as soon as possible after becoming aware that samples will be collected. For other sampling, a party planning to take samples shall endeavor to notify the other party’s primary contact not less than ten (10) days before planned sample collection.”

“In an action to enforce Paragraph B and C of this Part XXIII, the MPCA shall have the burden to show that the response costs for which MPCA seeks reimbursement are reasonable and necessary.”

Further, exhibits to the SACO provide the requirements, for 3M, prior to undertaking a sampling campaign. For example, the documents that must be prepared include a work plan and a quality assurance project plan (QAP). (Exhibit A, Exhibit C and Exhibit E to SACO). While 3M has routinely provided this information to MPCA, the agency has failed to provide this information to 3M. According to its website, the MPCA requires the development of a Quality Assurance Project Plan prior to undertaking a sampling campaign. Absent this information, it is impossible to determine if the sampling data is reflective of PFC levels that are attributable to 3M. Without a work plan, including quality control and quality assurance protocols, the results of the

Written Statement
July 12, 2017

State's analyses are questionable and it is impossible to determine that the sampling was reasonable and necessary.

D. The Health Advisories

According to correspondence from MPCA to 3M, dated November 3, 2016, “[o]n August 22, 2016, MDH sent letters to residents who have private water supply wells in South Washington County that have shown impacts of perfluorochemicals (PFCs) advising them of the new EPA health advisory values, and issuing Water Well Advisories that water with PFOA and/or PFOS levels above EPA health advisory level should not be used for drinking and cooking.” The letter also reported that MDH issued over 125 new Water Well Advisory letters and that MDH decided to take action to reduce exposure to those who drink water with PFOA and PFOS above the EPA health advisory levels. The letter withheld significant information including:

- The basis for MPCA advising area homeowners that they should no longer drink their water or use it for cooking;
- When the decision-making process began;
- Given MPCA's citation to certain provisions of the 2007 Settlement Agreement and Consent Order (SACO) between 3M and the State in its letter, dated November 3, 2016, why did MPCA not advise 3M of the actions impacting area homeowners;
- The exact location of the impacted wells;
- Whether the State sent notice to others who might be the proximate cause of the impact to the wells in question;
- The status of testing procedures for additional wells noted in the November 3, 2016 letter; and
- At what point did the State decide it would seek reimbursement from 3M?

3M followed up in writing for answers to these questions, but received incomplete information that is impossible to reconcile to the May 2, 2017, Invoice. 3M was not provided a succinct inventory of the sampling activity, the resulting health advisories and/or the provided remedies for the 2016 activity billed on the 2017 Invoice. Further, the MPCA continues its sampling activity and providing remedies in 2017 and not keeping 3M apprised of a complete inventory of its activities. The MPCA fails to provide a clear schedule and audit trail of activity.

In regard to the advisories, in May 2016, the EPA announced lifetime health advisory levels for PFOA and PFOS at 70 parts per trillion (superseding the provisional levels set by EPA in 2009 of 400 parts per trillion for PFOA and 200 parts per trillion for PFOS). Where PFOA and PFOS are found together, the EPA recommended that the concentrations be added together and that the lifetime health advisory for PFOA and PFOS combined also be set at 70 parts per trillion. EPA's

Written Statement

July 12, 2017

health advisories are non-enforceable and non-regulatory and designed to protect the most “vulnerable populations.”

Further, on May 23, 2017, the Minnesota Department of Health (MDH) Commissioner, Dr. Edward Ehlinger, announced new health based values (“HBVs”) for PFOS and PFOA. The updated HBVs are 35 parts per trillion for PFOA and 27 parts per trillion for PFOS. Ehlinger reported during a teleconference that “Drinking water with PFOA and PFOS, even at the levels above the updated values, does not represent an immediate health risk. These values were designed to reduce long-term health risks across the population and are based on multiple safety factors to protect the most vulnerable citizens, which makes them overprotective for most of the residents in our state.”

After the May 23 advisory, 3M was informed on June 9, 2017, that 120 new water well advisories would be issued to private residential homes in South Washington County because of the new HBVs. Additionally, the MPCA was proceeding with providing bottled water to these residents, along with the installation of granular activated carbon (GAC). Consistent with the May invoice, significant detail was missing from this notification from the MPCA.

E. The Dispute Provision Under SACO

The dispute provision of the SACO requires that 3M provide the MPCA Commissioner with a written statement which includes: (1) an explanation of the matter in dispute and of 3M’s position on the matter; (2) a summary of the information 3M is relying upon to support its position; and (3) notice of whether 3M will suspend work on any portions of the response actions required under Parts V to VIII during the dispute. This document serves as 3M’s written statement.

II.

A SUMMARY OF THE INFORMATION 3M RELIES UPON

The May 2, 2017, correspondence fails to provide adequate support for the expenses and the locations of surrounding private wells where there were GAC installations, provisions of bottled water and sampling. It is unclear which costs, if any, are 3M’s responsibility. Here (below) is an analysis of each invoice in question.

A. The Cottage Grove Invoice – SR33

The Cottage Grove Invoice total is \$42,349.57. The invoice is comprised of \$5,172.73 for GAC Operations and Maintenance, \$21,201.84 for PFC Technical Assistance, and \$15,975.00 for MPCA Staff Salaries.

1. Lack of Support provided with the Invoice

GAC Operations and Maintenance

\$5,172.73 of the invoice is for GAC Operations and Maintenance. The contract work orders #3000013892 and #3000016574 for contractor West Central Environmental Consultants,

Written Statement
July 12, 2017

Inc. were referred to as support for this expenditure. The MPCA did not provide contract work order #3000016574 to 3M. Therefore, 3M has no support for the wells for which expenses were incurred under this work order. Work order #3000013892 includes a description “Provide sampling and Granular Activated Carbon treatment of private wells impacted by PFC contamination.” There were no well identification numbers, or locations, provided to 3M for review or verification. There was also no support provided to indicate that the work had actually been performed. A work order is not evidence of work actually being performed.

PFC Technical Assistance

\$21,201.84 of the invoice is for PFC Technical Assistance. The contract work orders #300013931 and #3000016709 for contractor AECOM Tech Services Inc. were referred to as support for this expenditure.

In regard to contract work order #3000013931, the description states, “Provide technical assistance of 3M construction activities at the 3M Oakdale, Woodbury and Cottage Grove Superfund sites.” The portion of the work order that is being billed to 3M is \$13,367.96. There is no explanation of the specific work performed. Further, there is no proof that work was completed.

In regard to contract work order #3000016709, the description states, “The technical support for this project will be split into the following four tasks: Task 1 – Technical support for the Woodbury 3M site; Task 2 – Technical support for the Oakdale 3M site; Task 3 – Technical support for the Cottage Grove 3M site; and, Task 4 – Project management. The services are anticipated to include a review of the monitoring reports, investigation reports, and work plan documents prepared by 3M or their consultant, project related meetings with the MPCA, 3M and third parties (e.g., Minnesota Department of Health, City of Woodbury), and field services for review and assessment of completed site work.” There is no evidence provided that work was ever completed, or any feedback to 3M regarding the MPCA’s analyses.

Superfund Reimbursement – Staff

\$15,975.00 of the invoice is for Superfund Reimbursement – Staff. This is in addition to the PFC Technical Assistance amount billed in the section above. The MPCA provides no support for this amount.

2. The Off-site Charges are not 3Ms.

Since the MPCA has not provided the detail for the wells in question, 3M can only surmise that the wells are in the area of the well advisories issued in 2016 and 2017. **A review of the private well locations and advisories issued near Cottage Grove demonstrates that 3M Cottage Grove cannot be the source of PFCs, as the wells are located up and cross gradient**

Written Statement

July 12, 2017

from the 3M facility. Further, there are no known connecting fault structures and these areas are not karst terrain.

The MPCA ignores other contributors to this area, including the Up North Plastic Fire, the Cottage Grove Fire Department and the use of Class B fire-fighting foam (AFFF).¹ The Cottage Grove Fire Department used up to 5 gallons/year of AFFF in fire training exercises.

Twenty fire departments responded to the Up North Plastics fire, which is located in close proximity to the area well advisories. Approximately 4,000 gallons of AFFF was used to extinguish the fire which engulfed truck trailers and piles of plastic debris. Witnesses to the fire-fighting effort reported that water and AFFF drained to a ditch, then to a small pond southeast of the Up North site. The Up North Plastics fire is potentially the largest single-event load of PFCs to the environment.

Further, the Marathon refinery used AFFF at the refinery resulting in groundwater contamination at that facility.

B. The Oakdale Invoice – SR55

The Oakdale Invoice total is \$45,896.04. The invoice is comprised of \$36,383.54 for GAC Operations and Maintenance, and \$9,512.50 for MPCA Staff Salaries.

1. Lack of Support provided with the Invoice

GAC Operations and Maintenance

\$36,383.54 of this invoice is for GAC Operations and Maintenance. The contract work orders #3000013903 (\$19,608.57) and #3000016585 (\$16,774.97) for contractor West Central Environmental Consultants, Inc. were referred to as support for this expenditure.

The work specified for Work Order #3000013903 states, “Work plan and cost proposal – Fiscal year 2016, GAC systems change-outs, Lake Elmo (3M Oakdale).” The accompanying purchase order states, “West Central Environmental Consultants to provide sampling and Granular Activated Carbon treatment of private wells impacted by PFC contamination.” There is no evidence provided to indicate that the work was performed, or the specific wells or locations for where the work was performed.

The work specified for Work Order # 3000016585 is accompanied by a letter to Tim Lockrem, Project Manager, Minnesota Pollution Control Agency. The background information in the letter indicates, “The Lake Elmo area has been identified as a site of interest with regard to PFCs. GAC systems were installed at 38 residences with wells potentially above Health Risk

¹ In a South Washington County Bulletin article, “Big bill for 3M in Cottage Grove PFC remediation,” dated June 20, 2017, MDH Environmental Health Manager James Kelly reportedly admitted to the publication that there is a site near Highway 61 where firefighting efforts may have contributed to the environmental presence of PFCs in Cottage Grove.

Written Statement
July 12, 2017

Limits (HRLs) and/or Health Based Values (HBVs).” There is no evidence provided to indicate that the work was performed, or the specific wells or locations for where the work was performed.

Superfund Reimbursement – Staff

\$9,512.50 of the invoice is for Superfund Reimbursement – Staff. The MPCA provides no support for this amount.

2. The Off-site Charges are not 3M's.

The SACO recognizes that there is commingling of groundwater around the Oakdale and Washington County Landfill (“WCL”). What the SACO does not disclose is that the WCL, under management of the state, is the major contributor of PFCs in the surrounding area. The MPCA acknowledges in its letter, dated June 9, 2017, “These requested costs for reimbursement will only be for costs associated with PFC releases from the 3M PFC disposal sites and will not include costs associated with PFC releases from the Washington County Landfill.”

The WCL is the Major Contributor

WCL released PFCs into the environment through its spray irrigation procedure, the lack of an effective groundwater control system, and through major discharges into the storm sewer system that adversely impacted surface water and groundwater plumes emanating from and downgradient from the WCL.

The Spray Irrigation Procedure

In 1981, groundwater monitoring found elevated concentrations of a class of chemicals called volatile organic compounds (VOCs) and some heavy metals in on-site monitoring wells and residential wells near the site. As a result, in October 1984, the MPCA signed a Response Order for the purpose of, among other things, installing and operating a spray-irrigation treatment system to treat VOCs at the landfill. The spraying redistributed PFC-contained in the WCL into the groundwater from directly beneath the landfill and over the surface adjacent to the landfill, and, over time, widened the groundwater plume containing non-volatile compounds (including PFCs) emanating from the landfill. The response order also initiated the monitoring of the groundwater gradient control system.

The Gradient Control System

In 2004, PFCs were detected in the groundwater at the WCL. In 2008, it was reported in the MPCA’s Remedy Decision Document, “[u]nlike currently operating landfills, the WCL does not have an engineered liner and leachate collection system, and some of the waste is believed to be in contact with the ground water. Therefore, the Landfill continues to be a source of groundwater contamination.” Other MPCA reports state that, “[t]he data suggests that operation of the gradient control system is necessary to control both the VOC and PFC plumes and that moving the discharge location south of the flare may reduce contamination to the southeast of the site.” Contrary to MPCA’s own analysis in 2008, the gradient control system was shut down. This

Written Statement

July 12, 2017

strategic call was responsible for increased migration of PFCs. Instead of shutting down the gradient control system it should have continued and the water should have been filtered through a GAC filtration system instead of spraying it. Accordingly, the shutdown of the gradient control system at the WCL led to increase in PFC levels in surrounding groundwater.

The Sewer Discharge

Between 1988 and 1995, in addition to the issues noted above, the WCL, pursuant to a MPCA-issued National Pollution Discharge Elimination Systems (NPDES) permit, routed untreated groundwater containing PFCs from the groundwater remediation system at the WCL to a storm sewer outlet which discharged into Beutal Pond, the unlined Raleigh Creek at Tablyn Park and then into Eagle Point Lake. The untreated groundwater contained ~1,100 lbs PFBA, ~ 75 lbs of PFOA and ~1.5 lb of PFOS. Because Raleigh Creek is unlined, contaminants in the creek water were transported into the groundwater through natural processes. PFCs discharged into Eagle Point Lake were also transported through the subsurface by groundwater movement, and the groundwater data clearly show PFC groundwater plumes emanating to the southwest (down-gradient) of Raleigh Creek and Eagle Point Lake.

Between spray-irrigation, lack of gradient control, and sewer discharges, millions of gallons of groundwater containing VOCs and as much as 1,000 pounds of PFCs from beneath the landfill were spread throughout the Lake Elmo area. This is the responsibility of MPCA – not 3M.

C. The Woodbury Invoice – SR365

1. Lack of Support provided with the Invoice

The Woodbury Invoice total is \$287,978.69. The invoice is comprised of, \$4,131.88 for bottled water – Woodbury, \$36,598.34 for GAC Operations and Maintenance - Woodbury, \$44,917.73 GAC Installs/EPA Advisory – Woodbury/Oakdale, \$11,349.36 for PFC Sampling/Wash. Co. – Woodbury/Oakdale, \$28,868.38 for PFC Sampling/Wash. Co./EPA Advisory – Woodbury/Oakdale, \$128,238.00 for PFC Well Sampling - Woodbury, and \$33,875 for MPCA Staff Salaries.

Bottled Water

\$4,131.88 of this invoice is for bottled water. The contract work orders #3000013936 and #3000016660 for contractor Premium Waters Inc. were referred to as support for this expenditure. The work orders were not provided and there is no other information provided regarding the individuals that were provided with bottled water. We require specific details.

GAC Operations and Maintenance – Woodbury

\$36,598.34 of this invoice is for GAC Operations and Maintenance. The contract work orders #3000013907, #3000016260, and #3000016564 for contractor West Central Environmental Consultants, Inc. were referred to as support for this expenditure.

Written Statement

July 12, 2017

The work specified under #3000013907 states, “Work plan and cost proposal – Fiscal year 2016, GAC systems change-outs, Cottage Grove/Woodbury.” The accompanying purchase order states, “West Central Environmental Consultants to provide sampling & Granular Activated Carbon treatment of private wells impacted by PFC contamination.” There is no evidence provided to indicate that the work was performed, or the specific wells or locations for where the work was performed.

We were not provided with any documents regarding #3000016260.

Work order #3000016564 has an accompanying letter that states, “Two areas in Cottage Grove (Langdon and River Acres neighborhoods) have been identified as sites of interest with regard to PFCs. GAC systems were installed at 28 residences with wells potentially above Health Risk Limits (HRLs) and/or Health Based Values (HBVs).” There is no evidence provided in the May 2, 2017 correspondence to indicate that the work was performed, or a complete list of the wells or locations for where the work was performed.

GAC Installs/EPA Advisory Woodbury/Oakdale

Work order #3000017150 in the amount of \$44,917.73 was referred to as support for the GAC Installs/EPA Advisory Woodbury/Oakdale. This work order was accompanied by a letter that stated, “The purpose of the proposed work is to coordinate the installation and servicing of 90-lb GAC vessels as needed. WCEC was authorized to complete this Work Plan by MPCA’s Remediation Division, Site Remediation and Redevelopment Section. . . The Cottage Grove area has been identified as an area of interest with regard to PFCs. Numerous GAC systems have been installed at residences with wells potentially above Health Risk Limits (HRLs) and/or Health Based Value (HBVs). Additional GAC system installations may be necessary.” There is no evidence provided on the work order to indicate that the work was performed, or the specific wells or locations for where the work was performed.

In correspondence received from the MPCA to 3M dated April 28, 2017 there was a table of GAC installations dated April 21, 2017. This table provided a listing by address and installation date. It also indicated what State Contract Order Form (P.O. No.) each work item was charged against. We noted that 12 of the 47 locations allocated to P.O. No. 3000017150 are for Lake Elmo or Lakeland Township addresses. The current reimbursement request does not make clear which locations qualify for payment under the terms of the SACO. It should be noted that we do not know if the April 28, 2017 table is a comprehensive list of GAC installations.

PFC Sampling/Wash. Co – Woodbury/Oakdale

Work Order #3000014671 in the amount of \$11,349.36 was referred to as support for the PFC Sampling in Washington County. However, the State fails to provide well locations. Nor does it provide the analysis as to why these wells were selected for sampling.

Written Statement
July 12, 2017

PFC Sampling/Wash. Co./EPA Advisory – Woodbury/Oakdale

Work Order #3000016795 in the amount of \$28,868.38 was referred to as support for the PFC Sampling in Washington County EPA Advisory – Woodbury/Oakdale. A letter that accompanied the Contract Work Order stated, “The purpose of the proposed work is to fill potential gaps in the current PFC ground water database and to resample a selected number of wells with a focus on areas of the Prairie du Chien and Jordan aquifers that show elevated concentrations of PFCs. . . . The proposed work is a continuation of work completed in prior fiscal years.” There is no evidence provided to indicate that the work was performed, or the specific wells or locations for where the work was performed.

2016 PFC Sampling by Month

3M was charged \$128,238 for sampling for 402 samples collected for perfluorochemicals (PFCs) each month during 2016 by West Central Environmental Consultants, Inc. The costs represent 402 samples collected from 313 unique wells. Of these only 27 of the samples were collected from 3M Sites, the remainder have no work plan or QA/QC to justify the “*the burden to show that the response costs for which MPCA seeks reimbursement are reasonable and necessary.*”(SACO Section XXIII.F).

Further, at least two wells that the State billed 3M for are not in the East Metro area. For example, according to the State on-line well index, well #537601 is located in Minneapolis while well #745219 is located even further west in Lake Park.

Superfund Reimbursement – staff

\$33,875 of the invoice is for Superfund Reimbursement – Staff. The MPCA provides no support for this amount.

2. *The Off-site Charges are not 3M’s*

It is unclear why Woodbury and Oakdale GAC systems are accounted for in the Woodbury invoice. As we have already discussed, the major contributor in Northern Washington County in the vicinity of Oakdale is WCL. Further, it is unclear why the 402 well sampling event is billed under the Woodbury invoice. This sampling event contains wells throughout the East Metro Area.

Further, several of the wells tested appear to be to the West of Cottage Grove which indicate that 3M’s Cottage Grove Site cannot be a contributor. Finally, other potential source activities have not been recognized, such as fire-fighting activities and biosolid applications.

III.

NOTICE OF WHETHER 3M WILL SUSPEND WORK (PAY)

3M has always abided by its responsibilities under SACO. It is the MPCA’s responsibility to provide the support for incurred expenditures prior to receiving payment. According to the

Written Statement
July 12, 2017

SACO, the MPCA shall have the burden to show that the response costs for which MPCA seeks reimbursement are reasonable and necessary and should be fully allocated to 3M.

ATTACHMENT 2

**Settlement Agreement and Consent Order
(SACO), dated May 22, 2007**

) **AFFIDAVIT OF ANDY DAVIS**
) **IN SUPPORT OF WRITTEN**
) **STATEMENT ISSUED 7/12/2017**

Before me, the undersigned authority, personally appeared Andy Davis, who, being duly sworn and of sound mind, testified as follows:

1. I am employed as the President of Geomega, Inc., which is located at 2585 Central Avenue, Suite 200, Boulder, Colorado 80301.

2. I was retained by 3M to perform consulting services in connection with the MPCA correspondence and invoices 10000028883 for \$42,349.57, 10000028884 for \$287,978.69, and 10000028885 for \$45,896.04 dated May 2, 2017 and billed in connection with SACO.

3. I have worked as an expert in the field of hydrogeochemistry, primarily evaluating the fate and transport of chemical compounds during investigations at contaminated sites across the United States and abroad. I am familiar with techniques for sampling, testing, and analyzing for the presence of chemical compounds. I have experience with a variety of computer models, including geochemical, unsaturated zone, surface water, and groundwater transport models, and have been responsible for their use in predicting the fate and transport of chemical compounds in the environment. In addition, I have used classical statistics and statistical estimation techniques to compare spatial (varying in geographic location) and temporal (varying in time) data of multiple monitoring wells at contaminated facilities. I have published widely in peer-reviewed scientific literature on groundwater modeling, fate and transport and forensic geochemistry, and taught The Fate and Transport of Organic Compounds at the University of Colorado.

4. My testimony, as presented in this affidavit, has been made to a reasonable degree of scientific certainty. It has been developed through careful review of environmental data including lithologic logs, water level data, water quality data, and information regarding chemical properties.

A. Background

5. I reviewed documents relating to the State of Minnesota Pollution Control Agency (“MPCA”) invoices (“claim”) requesting re-imbusement totaling \$376,224.30 for investigation costs and response actions in the Cottage Grove, Oakdale and Woodbury areas, other correspondence between the MPCA and 3M in 2016 and 2017¹ and other references defined in Section F.

6. The MPCA states its basis for billing is the Settlement Agreement and Consent Order (SACO) of 2007 entered into by 3M and the MPCA with respect to potential releases of perfluorocarbon (PFC) compounds at the 3M Cottage Grove, Oakdale and Woodbury Sites (“Sites”).

7. PFCs were used by 3M and others for several decades in several products and services, including fabric coatings, surfactants, dispersants, non-stick products, anti-reflective coatings, stain removers, lubricants, photolithographic chemicals, semiconductors, aqueous film-forming-foam (AFFF), textiles, paper fiber treatment, leather treatment, waxes, polishes, paints, varnishes, cleaning products, chrome plating chemicals, and insecticides (Lindstrom et al. 2011,

¹ Letter from Kathryn Sather, MPCA to Gary Hohenstein, dated November 3, 2016, Letter from Jean B. Sweeney to Kathryn Sather, MPCA, dated December 15, 2016, Letter from Jean B. Sweeney to Kathryn Sather, dated February 2, 2017, Letter from Kathryn Sather to Jean B. Sweeney dated March 3, 2017, Letter from Jean B. Sweeney to Kathryn Sather dated March 20, 2017, Letter from Kathryn Sather to Jean B. Sweeney dated April 28, 2017, Letter from Jean B. Sweeney to Kathryn Sather dated May 19, 2017, Letter from Kathryn Sather to Gary Hohenstein dated June 9, 2017, Letter from Tom Hogan to Dr. Carol Ley dated June 14, 2017, Letter from Jean B. Sweeney to Kathryn Sather dated June 28, 2017, Letter from William A. Brewer III to John Linc Stine and Kathryn Sather dated July 3, 2017.

Kelly and Solem 2008, Yingling 2006). Through use and disposal their distribution in the environment appears widespread (Hu et al 2016).

8. In May 2017, the Minnesota Department of Health (“MDH”) adopted health-based values (HBVs) that resulted in a Hazard Index (HI). Five PFCs (PFBA, PFBS, PFHxS, PFOA and PFOS) are included in the MPCA HI calculation. If the HI exceeds 1.0, the State issued a well advisory. Prior to May 2017, 3M was notified that the MPCA was issuing well advisories based upon HI calculations using the EPA Lifetime Health Advisories (“LHAs”).²

9. If the HI exceeded one, the MPCA provided residences with bottled water and offered to install a granular activated carbon (GAC) system that requires periodic maintenance. These constitute the “response actions.”

10. The MPCA billed for the following items in its May 2, 2017, correspondence:

Invoice	Location	Service	Amount
10000028883	Cottage Grove	GAC Oper. & Mtn.	\$5,172.73
10000028883	Cottage Grove	PFC Technical Assistance	\$21,201.84
10000028883	Cottage Grove	MPCA Staff Salaries	\$15,975.00
10000028885	Oakdale	GAC Oper. & Mtn	\$36,383.54
10000028885	Oakdale	MPCA Staff Salaries	\$9,512.50
10000028884	Woodbury	GAC Oper. & Mtn. - Woodbury	\$36,598.34
10000028884	Woodbury	GAC Installs/EPA Adv- Woodbury/Oakdale	\$44,917.73
10000028884	Woodbury	Bottled Water - Woodbury	\$4,131.88
10000028884	Woodbury	PFC Well Sampling Woodbury	\$128,238.00
10000028884	Woodbury	PFC Sampling Wash Co./Woodbury/Oakdale	\$11,349.36
10000028884	Woodbury	PFC Sampling/ Wash. Co./ EPA Advisory Woodbury/Oakdale	\$28,868.38
10000028884	Woodbury	MPCA Staff Salaries	\$33,875.00
Total			\$376,224.30

² Letter from Kathryn Sather to Gary Hohenstein, dated November 3, 2016.

11. The MPCA states that these charges are related to PFC releases from 3M Sites; however, no analysis has been presented to support this conclusion. There are many non-3M sources of PFCs in the East Metro Area, including the Washington County Landfill (which MPCA manages), AFFF use and training areas, and biosolid applications. Consequently, any service billed entirely to 3M must include scientific evidence demonstrating that a 3M disposal site is the sole source. While the MPCA has neglected to provide a comprehensive list of locations for all services in the bill, I have assessed the distribution of the available locations and identified potential and documented releases of PFCs that are not related to 3M (Figure 1). Wells located in the northern portion of the East Metro Area are primarily impacted by PFCs emanating from the WCL. Locations west of the 3M Cottage Grove facility cannot be related to the facility because they are up- or cross-gradient. In light of the record and scientific evidence, it is clear that the MPCA has: 1) not verified the actual source of PFCs in the domestic wells; and therefore, 2) inflated the responsibility of 3M for the claimed response cost.

B. Analysis: Cottage Grove Expenditures

12. Cottage Grove Expenditures included MPCA staff costs and PFC Technical Assistance, for which there is limited description of service, and GAC services at unspecified locations.

13. There is no information as to which Cottage Grove wells received GAC operations and maintenance. However, a review of the Cottage Grove private well locations demonstrates that 3M could not be the source of domestic PFCs in Areas A or B on Figure 1 because they are up- or cross-gradient from the 3M Cottage Grove facility (“facility”). Further, there are no known connecting fault structures (Figure 1 inset) or karst features which could act as a conduit between the facility and Areas A and B.

14. Ostensibly, all GAC system services would be applied to wells that had well advisories issued by MDH. Based upon hydrogeologic characteristics, the wells for which issued health advisories were issued in the Southern portion of the East Metro Area by MDH in 2016 and 2017, cannot be associated with 3M Cottage Grove for the reasons above. The MPCA has made no effort to specify whether these GAC systems were associated with well advisories, nor have they provided proof that they are related to Cottage Grove. Kathryn Sather claims in a letter dated April 28, 2017, “*As in the past, MPCA has only billed 3M for the costs associated with releases from the Oakdale, Woodbury and Cottage Grove sites.*” However, it is clear that they have made no attempt to identify other potential sources of PFCs in the area, or to exclude response costs in their request relating to these sources.

15. MDH and MPCA have acknowledged additional PFC sources in the Cottage Grove vicinity.³ These include the widespread use of Class B fire-fighting foam (AFFF) in fire training exercises and at fires throughout the Southern portion of the East Metro Area which contain a suite of PFCs (Delta 2010a and b).

16. The Cottage Grove fire department (located at C on Figure 1) indicated it used up to 5 gallons/year of AFFF for fire training exercises (Delta 2008).

17. Twenty fire departments responded to the Up North Plastics fire in 2007 (MDH 2012) located at D on Figure 1. In sum, they used approximately 4,000 gallons of AFFF to extinguish the fire which engulfed truck trailers and piles of plastic debris (MDH 2012). Witnesses to the fire-fighting effort reported that water and AFFF drained to a ditch, then to a small pond southeast of the Up North site (MPCA 2009a).

³ <http://www.health.state.mn.us/divs/eh/hazardous/topics/pfcs/afff.html>

18. The MPCA fails to determine how much of the PFC contamination in Areas C and D could be sourced from the Cottage Grove fire department and the Up North Plastics fire which ARE hydrogeologically upgradient of Areas C and D.

19. The Marathon Refinery also used AFFF at the refinery, resulting in groundwater contamination at that facility (Delta Consultants 2010a, 2010b). However, the MPCA fails to consider whether the residences located near E on Figure 1, with no apparent nexus to a 3M source, could have been contaminated by refinery fire-fighting activities.

C. Analysis: Oakdale Expenditures

20. Oakdale Expenditures include MPCA staff costs for which there is limited description of service and GAC services at undisclosed locations.

21. The MPCA manages, and takes responsibility for the Washington County Landfill (WCL). (MPCA June 9, 2017 letter to 3M). The WCL impacts to the Northern portion of the East Metro Area (Area F on Figure 1) are predominantly due to: a) the WCL storm sewer, b) spray irrigation, and c) loss of groundwater gradient control.

22. *a) The WCL Storm Sewer.* Between 1988 and 1995, Washington County routed untreated groundwater containing ~1,100 lbs PFBA, ~75 lbs PFOA and ~1.5 lb PFOS from the groundwater collection system at the WCL to the storm sewer outlet, which then discharged into the unlined Raleigh Creek at Tablyn Park (Figure 1), then into Eagle Point Lake (MDH 2008). When Eagle Point Lake rises above the 896.5 foot level, water flows into an overflow structure and then into a 42-inch diameter pipe which discharges directly to Lake Elmo and then to Horseshoe Lake. During the period of the PFC release from the WCL, Eagle Point Lake overflow occurred over at least three time periods, from August until October of 1993 following above-average precipitation, and again in 2001 and 2002 (Barr 2015).

23. The MPCA recognizes that there is “commingling of groundwater” containing PFCs from the WCL and Oakdale (SACO V.F).

24. There is no information as to which Oakdale wells received GAC operations and maintenance; however, PFCs in the Northern portion of the East Metro Area (Area F on Figure 1) are predominantly due to the WCL. The MPCA is unclear in its correspondence as to which wells 3M is responsible for.

25. The unlined Raleigh Creek and Eagle Point Lake discharges to groundwater which migrates to the south-west. All the residences in Area F1 on Figure 1 would be the recipients of PFCs from WCL and Oakdale, however the MPCA provides no accounting for WCL impacts in their claim for cost reimbursement.

26. ***b) The WCL Spray Irrigation.*** Washington County also spray-irrigated PFC-contaminated groundwater onto Treatment Area 2 between July 1988 through 1991 at the north-east corner of the WCL. While volatile compounds would have been treated, PFCs would not. *“Use of Treatment Area 2 was terminated in November 1991 due to MPCA staff concerns regarding overland flow of effluent from Treatment Area 2 to a nearby natural pond northeast of the landfill.”*(MPCA 1994).

27. PFCs entering this pond would have discharged to groundwater and migrated towards Lake Elmo (Path G on Figure 1).

28. Virginia Yingling recognized in 2015 (Yingling 2015) that there is a groundwater pathway from the north-east corner of WCL to the west side of Lake Elmo, and thence to the residences in Area F2 on Figure 1. The MPCA provides no indication of the fractional impact from WCL on Area F2.

29. *c) The WCL loss of gradient control.* When recovery wells were turned off in 2009 there was a loss of groundwater gradient control at the WCL, resulting in flow direction resuming to the south (MPCA 2008, 2009b). This led to PFCs percolating from landfill leachate to escape confinement and migrate downgradient with groundwater (Path I on Figure 1) This WCL release would have combined with releases from Raleigh Creek to also impact Area F1.

30. There are three wells north of the Woodbury Site that have HI advisories (Area I Figure 1). These wells are co-located in a section where biosolids were land-farmed. The MPCA knew that biosolids contain PFCs (MPCA 2008) however, MPCA does not account for this non-3M source in their re-imburement claim.

D. Analysis: Woodbury Expenditures

31. There are claims for Superfund reimbursements for staff, bottled water, GAC installation, GAC O&M and PFC sampling in Washington County, for which there is only limited backup for these expenditures. Location specific information has been provided for sample-related lab expenses.

32. The SACO states that, *“MPCA and 3M agree to allow split or duplicate samples to be taken by the other party during sample collection conducted as part of the implementation of this Agreement”*, and *“(f)or other sampling, a party planning to take samples shall endeavor to notify the other party’s primary contact not less than ten days before planned sample collection.”* To the best of my knowledge, 3M was not afforded the opportunity to take split samples.

33. MPCA requires the development of Quality Assurance Project Plan prior to undertaking a sampling campaign (MPCA 2012). To the best of my knowledge, such a document was not shared with 3M prior to the MPCA’s domestic sampling campaign. An absence of such

documentation along with a lack of quality control data, render the very data leading to the reimbursement claim suspect.

34. According to MPCA's May 2, 2017 bill, a total of 402 samples were collected from 304 unique residential wells and 27 other locations in the aforementioned areas (Figure 1). These samples were then analyzed for the HI PFCs. There was no rationale provided by MPCA explaining their logic as to why sampling of the 304 residences were billed to 3M, nor why all well sampling analytical costs were billed under the Woodbury invoice. In fact, these residences are not confined to the Woodbury vicinity, but are spread throughout the entire East Metro area (Figure 1). Many fall within the areas which may be impacted by the WCL, AFFF applications, and/or biosolids.


35. Additionally, at least two of the wells for which the MPCA sampled and billed 3M are not in the East Metro area. For example, according to the State on-line well index, well #537601 is located in Minneapolis, while well #745219 is located even further west in Lake Park.

36. As in previously discussed invoices, documents included in support of GAC installation, GAC O&M, and bottled water charges do not provide a complete nor detailed accounting of the locations, or the basis for the charges.

E. Conclusion

37. The MPCA attributes all \$376,224.30 of their response action cost claim solely to 3M. However, it is unclear from the documents provided by the MPCA that the expenses are due to 3M because a source-receptor analysis demonstrates that the majority of the PFC impacts to residences are from sources unrelated to the 3M Sites.


I declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge and belief.



Andy Davis, Ph.D.

STATE OF COLORADO)
) ss.
COUNTY OF BOULDER)

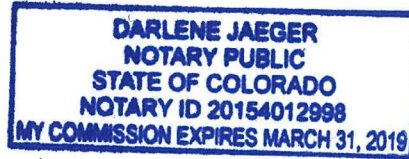
SWORN TO AND SUBSCRIBED before me this 12th day of July, 2017.



Notary Public

My Commission Expires:

3-31-19



F. References

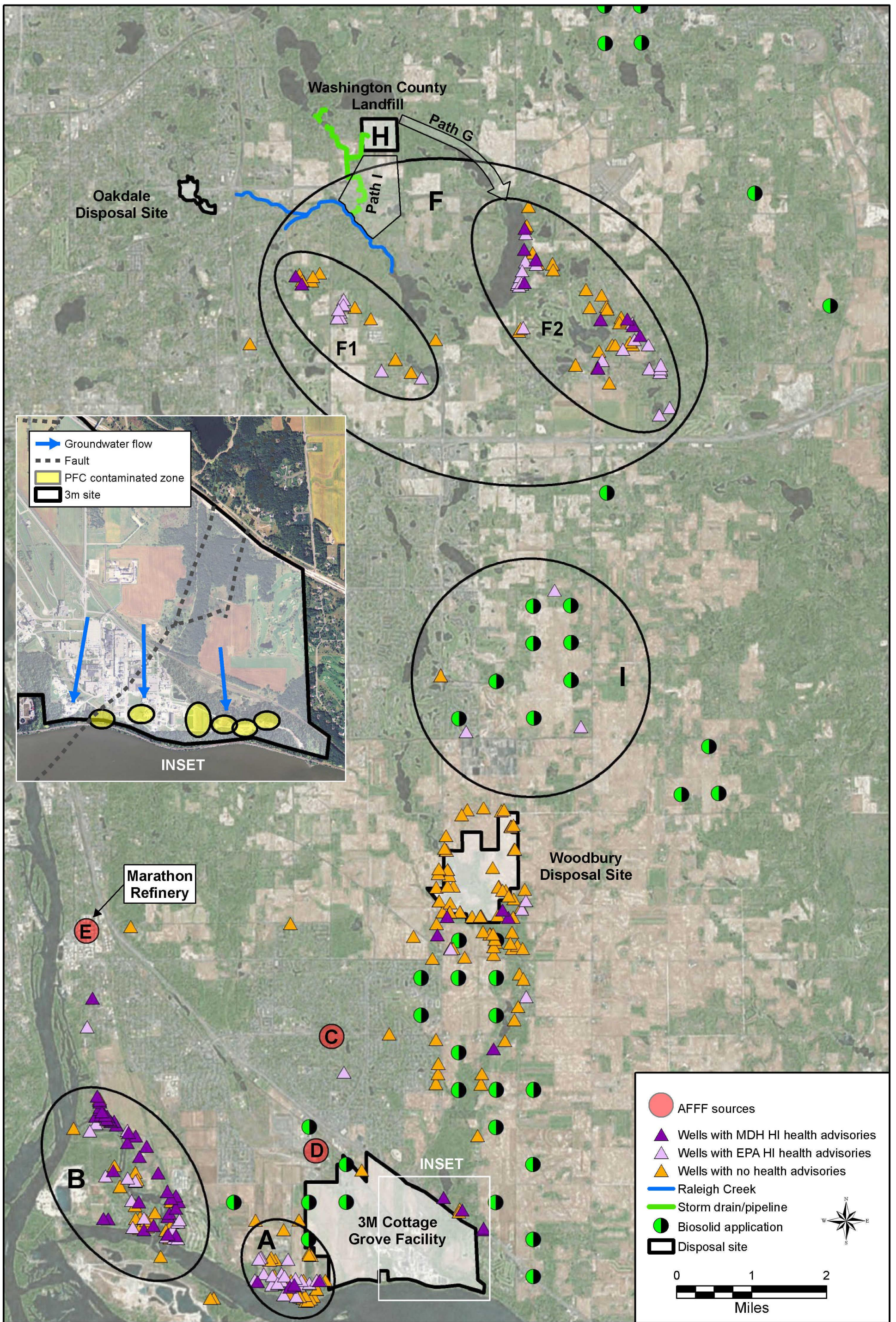
- Barr. 2015. Valley Branch Watershed District 2015-2025 Plan.
<http://www.vbwd.org/wmp/index.html> (accessed July 12, 2017).
- Delta Consultants. 2008. Perfluorocarbon (PFC)-containing firefighting foams and their use in firefighting training in Minnesota. June 30. Report prepared for Minnesota Pollution Control Agency (MPCA). Shoreview, MN: Delta Consultants.
- Delta Consultants. 2010a. Report of investigation activities at select firefighting foam training areas and foam discharge sites in Minnesota. February 10. Report prepared for Minnesota Pollution Control Agency (MPCA). Shoreview, MN: Delta Consultants.
- Delta Consultants. 2010b. Perfluorocarbon (PFC) containing firefighting foams and their use in Minnesota: well receptor surveys for selected sites and follow-up sampling at Crystal Airport and Kandiyohi County Landfill. November 15.
- Hu, X.C., Andrews, D.Q., Lindstrom, A.B., Bruton, T.A., Schaider, L.A., Grandjean, P., Lohmann, R., Carignan, C.C., Blum, A., Balan, S.A., Higgins, C.P., Sunderland, E.M. 2016. Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants. *Environmental Science and Technology Letters*. 3(10):344-350.
- Kelly, J., Solem, L. 2008. Identification of a major source of perfluorooctane sulfonate (PFOS) at a wastewater treatment plant in Brainerd, Minnesota. *Epidemiology* 19(6):S303-S304.
- Lindstrom, A.B., Strynar, M.J., Libelo, E.L. 2011. Polyfluorinated Compounds: Past, Present, and Future. *Environmental Science & Technology* 45(10):7954-7961.
- MDH 2008. Perfluorochemical Contamination in Lake Elmo and Oakdale, Washington County, Minnesota. August 29. U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR).
- MDH. 2012. Public Health Assessment: Perfluorochemical contamination in southern Washington County, northern Dakota County, and southeastern Ramsey County, Minnesota. EPA Facility ID: MN980679385. Prepared with U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR). St. Paul: Minnesota Department of Health.
- MPCA 1994. Five-Year Review Report: Washington County Landfill Site Lake Elmo, Minnesota. January. St. Paul, MN: Minnesota Pollution Control Agency.
- MPCA. 2008. PFCs in Minnesota's ambient environment: 2008 Progress Report.
<http://www.pca.state.mn.us/index.php/view-document.html?gid=2855>
- MPCA. 2009a. Notes from Up North Plastics fire, June 23. STATE_00765509

MPCA. 2009b. Five-Year Review Report: Washington County Landfill Site Lake Elmo, Minnesota. March. St. Paul, MN: Minnesota Pollution Control Agency.

MPCA. 2012. Minnesota Pollution Control Agency Quality Assurance Project Plan Guidance. February. St. Paul, MN: Minnesota Pollution Control Agency.

Yingling, V. 2006. Perfluorinated chemicals in Minnesota: unraveling the trail of a very persistent and mobile emerging contaminant. Presentation to Groundwater Resources Association of California Symposium on Emerging Contaminants. June 8. Minnesota Department of Health.

Yingling, V. 2015. Karst Influence in the Creation of a PFC Megaplume. 14th Sinkhole Conference. NCKRI Symposium 5. Minnesota Department of Health.



Locations of residential well samples associated with the May 2, 2017 bill. Areas A through I are referenced in the text.

Figure 1