May 11, 2007

TO: BOARD MEMBERS AND INTERESTED PARTIES

RE: Request for Approval of Settlement Agreement and Consent Order between the 3M Company and Minnesota Pollution Control Agency regarding the Releases and Discharges of Perfluorochemicals at and from Sites in Washington County, and Certain Related Matters

Enclosed is a copy of the Minnesota Pollution Control Agency (MPCA) Citizens’ Board (Board) Item concerning the releases and discharges of Perfluorochemicals (PFCs) from 3M disposal sites in Washington County and other releases of PFCs. The Board Item also includes the negotiated Settlement Agreement and Consent Order, along with site specific exhibits. In addition, copies of the Board Item Cover Sheets for the three 3M disposal sites from the April 24, 2007 Board Meeting are also enclosed.

This Board Item will be presented at the next regular MPCA Board Meeting. Please refer to the enclosed Board Agenda for specific location, date, and time. We encourage your attendance at the Board Meeting.

If you have any questions regarding the enclosed Board Item, please feel free to contact Doug Wetzstein of my staff at 651-297-8609 or myself at 651-296-6676.

Sincerely,

Kathryn J. Sather
Director
Remediation Division

KJS:csa

Enclosures
TITLE OF BOARD ITEM: 3M Company (formerly known as Minnesota Mining and Manufacturing) -

Request for Approval of Settlement Agreement and Consent Order with 3M

Regarding the Releases and Discharges of Perfluorochemicals at and from Sites in

Washington County, Minnesota, and Certain Related Matters

LOCATION:

Cottage Grove, Lake Elmo, Oakdale, Washington County

Woodbury City/Township County

TYPE OF ACTION: Approval of Settlement Agreement and Consent Order

RECOMMENDED ACTION: The Minnesota Pollution Control Agency (MPCA) Commissioner and staff recommend that the MPCA Citizens Board adopt the suggested staff resolution.

ISSUE STATEMENT:

On April 24, 2007, the Minnesota Pollution Control Agency (MPCA) Commissioner and staff recommended the issuance of Requests For Response Actions (RFRAs) to the 3M Company for the releases associated with industrial wastes containing perfluorochemicals (PFCs), specifically perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), at the 3M Cottage Grove (Chemolite) Disposal Site, the 3M Oakdale Disposal Site and the 3M Woodbury Disposal Site.

The MPCA Citizens' Board (Board) voted to postpone consideration of the RFRAs and directed the MPCA Commissioner to enter into negotiations with 3M on Consent Orders for the three Sites which the Commissioner would recommend for approval by the Board at its next regular monthly meeting. The Board also directed the MPCA Commissioner to ensure that negotiations address the following topics:

- Cleanup plans should be rigorous and robust
- Full recognition of MPCA's legal authority
• Provisions for addressing perfluorobutanoic acid (PFBA) in future
• Any additional studies needed on health effects and payment for the state's costs
• Any additional cooperation needed from 3M, in terms of sharing information
• Future RFRA action is not precluded

The MPCA Commissioner and 3M have negotiated a Settlement Agreement and Consent Order which addresses releases and discharges of PFCs at all three disposal Sites, along with other related matters; and which the Commissioner believes meets the above criteria as directed by the Board. A copy of the negotiated Settlement Agreement and Consent Order is attached.

Therefore, the MPCA Commissioner recommends that the MPCA Citizens’ Board approve the attached Settlement Agreement and Consent Order with 3M for the releases and discharges of PFCs at and from sites in Washington County, certain related matters, pursuant to the Minnesota Environmental Response and Liability Act, Minn. Stat. §§ 115B.01 to 115B.20 (2006), the Water Pollution Control Act, Minn. Stat. ch. 115, and Minn. Stat. ch. 116.

ATTACHMENTS:
1. Settlement Agreement and Consent Order
2. Settlement Agreement and Consent Order Exhibits A – F
MINNESOTA POLLUTION CONTROL AGENCY
Remediation Division
Superfund and Emergency Response Section

3M Company (formerly known as Minnesota Mining and Manufacturing) –
Request for Approval of Settlement Agreement and Consent Order with 3M regarding the Releases and
Discharges of Perfluorochemicals at and from Sites in Washington County, Minnesota,
and Certain Related Matters

May 22, 2007

ISSUE STATEMENT

On April 24, 2007, the Minnesota Pollution Control Agency (MPCA) Commissioner and staff
recommended the issuance of Requests For Response Actions (RFRAs) to the 3M Company for the
releases associated with industrial wastes containing perfluorochemicals (PFCs), specifically
perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), at the 3M Cottage Grove
(Chemolite) Disposal Site, the 3M Oakdale Disposal Site and the 3M Woodbury Disposal Site.

The MPCA Citizens' Board (Board) voted to postpone consideration of the RFRAs and directed the
MPCA Commissioner to enter into negotiations with 3M on a Consent Order for the three Sites which the
Commissioner would recommend for approval by the Board at its next regular monthly meeting. The
Board also directed the MPCA Commissioner to ensure that negotiations address the following topics:

- Cleanup plans should be rigorous and robust
- Full recognition of MPCA's legal authority
- Provisions for dealing with affected municipal and private water supplies
- Provisions for addressing perfluorobutanoic acid (PFBA) in future
- Any additional studies needed on health effects and payment for the state's costs
- Any additional cooperation needed from 3M, in terms of sharing information
- Future RFRA action is not precluded

The MPCA Commissioner and 3M have negotiated a Settlement Agreement and Consent Order
(Consent Order) which addresses releases and discharges of PFCs at all three disposal Sites, along with
other related matters; and which the Commissioner believes meets the above criteria as directed by the
Board. 3M has signed the Consent Order. For the reasons outlined in this Board Item, the Commissioner
recommends that the MPCA Citizens’ Board approve the Consent Order and authorize the Commissioner
to execute it on behalf of the Agency. A copy of the negotiated Settlement Agreement and Consent Order,
signed by 3M, is attached.

Therefore, the MPCA Commissioner recommends that the Board approve the attached Settlement
Agreement and Consent Order with 3M for the releases and discharges of PFCs at and from sites in
Washington County, certain related matters, pursuant to the Minnesota Environmental Response and
Liability Act (MERLA), Minn. Stat. §§ 115B.01 to 115B.20 (2006), the Water Pollution Control Act,
1. **DISCUSSION:**

The MPCA Deputy Commissioner and staff, along with staff from the Attorney General’s Office, negotiated the attached Consent Order with 3M at the direction of the Board. The MPCA Commissioner and staff believe this agreement meets the requirements specified by the Board on April 24, 2007, and recommend that the Board approve the Consent Order. This enforceable agreement not only addresses the releases of PFCs from the three disposal sites which were under consideration for issuance of RFRAs, but also addresses other releases of PFCs, as well as the MPCA’s ongoing research on the presence and effects of PFCs in the environment and biota in Minnesota.

Specifically, this agreement includes the following:

- 3M will reimburse the MPCA a total of $598,692 for past costs for the development of surface water quality criteria needed to establish cleanup standards for the 3M Cottage Grove Site, sampling activities at other disposal sites utilized by 3M, and other testing of fish tissue, ground water and surface water for PFCs that is related to 3M’s operations in Minnesota. These are costs that were incurred by the MPCA through April 30, 2007, and are in addition to site specific costs for oversight of 3M work at the 3M Cottage Grove, Oakdale and Woodbury Disposal sites. Site-specific costs have been reimbursed by 3M through the last annual MPCA reimbursement request and future site specific oversight costs will be reimbursed under Part XXIII., Paragraph B of the Consent Order. In addition, under Part XXII., Paragraph C of the Consent Order, 3M will reimburse MPCA for future research, planning and other general costs incurred under MERLA that are associated with releases from 3M locations in Minnesota which falls outside of normal MPCA oversight of site-specific response actions by 3M.

- 3M will provide to MPCA a grant in an amount up to $5 million to assist the MPCA in conducting evaluations as to the presence and effects of PFCs in the environment and not directly connected to the sites.
3M will make a grant payment of $2 million in fiscal year 2008 and additional payments of 50 percent of the cost of research incurred by MPCA up to of $1 million each fiscal year for fiscal years 2009, 2010 and 2011. (Part XXIII., Paragraph D of the Consent Order).

- 3M will provide a grant up to $8 million for the purpose of implementing remedial actions at the Washington County Landfill selected by the MPCA. An initial $5 million payment will be provided once the remedial action has been selected and subsequently, 3M will pay half of the remaining cost up to $3 million. In addition, 3M will provide technical resources and transfer any technology knowledge to the MPCA to assist in identifying possible alternative remedial approaches to the current operation and maintenance program at the Washington County Landfill. (Part V., Paragraph F).

In regards to elements to be included in the Consent Order as directed by the Board, the MPCA Commissioner and staff believe these items have been addressed under the identified sections of the agreement as described below.

1. **Cleanup Plans should be Rigorous and Robust** - Under Part V. Paragraphs A & B, and Parts VI., VII. and VIII. Paragraph C, along with the attached site specific exhibits, 3M is required to evaluate releases of PFCs from the three disposal Sites and propose response actions. The MPCA Commissioner will select the response actions that 3M will be required to implement. Primary consideration in selecting response actions to address sources of ground water contamination at these sites shall be given to excavation and destruction of PFC wastes, or excavation, engineered isolation and containment of PFCs.

2. **Full Recognition of MPCA Legal Authority** - The Consent Order is issued by MPCA pursuant to its legal authorities under MERLA, Minn. Stat. §§ 115B.01-115B.20, the Water Pollution Control Act, Minn. Stat. ch. 115, and other general authority of the MPCA under Minn. Stat. ch. 116. While 3M disputes that releases of PFCs are subject to MERLA, 3M has consented to the issuance of this Settlement Agreement and Consent Order, and to the application of MERLA to the interpretation, performance and enforcement of the agreement, and its terms and conditions. (Part I. of the Consent Order).
3. **Provisions for Dealing with Affected Municipal and Private Water Supplies** - 3M commits to provide alternative drinking water if and when an HBV or HRL is exceeded for any PFC as a result of contamination from the sites. As with the rest of the agreement, this is an enforceable requirement of the proposed Consent Order. This obligation includes contamination caused by PFBA once there is an Health Based Value (HBV) or Health Risk Limits (HRL) for PFBA which has been exceeded. (Part VIII., Paragraph B). Additionally, under the proposed Consent Order, the Agency has sufficient authority to require any ground water investigation and monitoring necessary to fully understand and track the extent of the contamination, including in aquifers used for drinking water.

4. **Provisions for Addressing PFBA in the future** - 3M is required to fully remediate any sources of PFBA and provide alternative drinking water in the same manner as sources of PFOA and PFOS, if and when levels are found above an HBV or HRL. (Part V., Paragraph E). In addition, prior to issuance of HBVs, if there are sources of any PFC other than PFOA and PFOS, such as PFBA, which are not effectively controlled by MERLA response actions addressing PFOA and PFOS, 3M is required to take investigative and other actions to control ongoing discharges of PFBA under standards MPCA may impose pursuant to the Water Pollution Control Act.

5. **Additional Studies needed on Health Effects and Payment for the State’s Costs** - The proposed Consent Order addresses this issue in two ways. Future costs of MPCA research that are connected to releases from 3M operations in Minnesota, not just the three disposal sites, are fully reimbursable to the State. (Part XXIII., Paragraph C; this does not include costs related to the Washington County Landfill). There is no limit to the amount that can be recovered under this provision. 3M is required to reimburse MPCA for past costs associated with this type of research in the amount of $598,692. (Part XXIII., Paragraph A). This includes the Agency’s work investigating the effects of PFCs as part of the MPCA’s development of water quality criteria. As previously noted, 3M will be providing a grant up to $5 million over the next four years to the MPCA for the purpose of evaluating presence and effects of PFCs in the environment and biota not directly connected to 3M sites or operations. (Part XXIII., Paragraph D). In addition, as
outlined in Section V., Part D., 3M has agreed to cooperate in providing information requested by
the MPCA concerning PFCs, and to assist the MPCA and Minnesota Department of Health in
developing health and toxicological studies. A formal commitment is included to complete the
90-day study on PFBA. It is recognized that 3M has already undertaken requests by MPCA to
assist in the development of water quality criteria for discharges of PFCs to surface water, and is
conducting toxicity tests to assist in the determination of drinking water standards for PFBA.

6. Additional Cooperation needed from 3M, in Terms of Sharing Information - Under Part XIII.,
Paragraph B of the Consent Order, 3M is required to establish a process satisfactory to MPCA to
ensure that the Agency has access to all documents within 3M’s possession or control (except
those subject to attorney-client privilege) which relate to: (1) the health or environmental effects
of any PFC; (2) actions or precautions considered or recommended by 3M for managing, treating
or disposing of wastes containing any PFC; and (3) any characteristic of any PFC or PFC waste
that might cause the PFC or waste to be considered a hazardous substance or a hazardous waste
as those terms are used in MERLA or in MPCA’s hazardous waste rules. 3M must provide
MPCA with copies of any such documents upon request and must provide representatives to meet
with MPCA to explain any of the documents. In addition, under the Covenant Not To Sue in
Part XXV. of the Consent Order, 3M is not released from any liability it may have for failing to
disclose information of the type described in Part XIII.B. if it had a duty to disclose it before the
effective date of the Consent Order.

7. Future MPCA Action is not Precluded - The Covenant Not To Sue in Part XXV. of the Consent
Order provides authority for MPCA to take action under MERLA or any other legal authority of
the Agency in the event that 3M fails to perform its obligations under the Consent Order
(Part XXV.A), and expressly allows the MPCA to require additional response actions beyond the
scope of the Consent Order if MPCA discovers any new release not addressed in the Consent
Order or if actions under the Consent Order are not sufficient to protect public health or welfare
or the environment (Part XXV.B.).
In addition, Section X. of the Consent Order outlines procedures for resolving disputes, and authorizes the MPCA to use money from the Remediation Fund to take actions deemed necessary by the Commissioner in the event 3M does not take actions required under the terms and conditions of the Consent Order.

CONCLUSIONS:

On April 24, 2007, the MPCA Citizens’ Board directed the MPCA Commissioner to negotiate an enforceable Consent Order with 3M for the purpose of implementing response actions at the 3M Cottage Grove, Oakdale and Woodbury Disposal Sites. The Board also directed the Commissioner to address a number of other subjects in the negotiations with 3M. The MPCA Commissioner has negotiated a Settlement Agreement and Consent Order which meets the Board’s directive. The Consent Order requires 3M to take response actions related to releases of PFOA and PFOS, and other PFCs for which HBVs or HRLs have been set, at the three sites under standards applicable under MERLA; additional response actions if necessary under the Water Pollution Control Act to address sources of PFCs other than PFOA and PFOS before HBVs or HRLs have been set for those PFCs; pay MPCA’s site specific oversight costs as well as MPCA’s costs to conduct research related to any releases of PFCs to the environment associated with 3M’s operations in Minnesota; provide a grant to MPCA to help pay costs of evaluating more general impacts to public health and the environment from PFCs; provide a grant for additional remedial costs MPCA will incur for the Washington County Landfill as a result of PFC releases at that Landfill; and provide information requested by MPCA related to 3M’s knowledge about health and environmental effects of PFCs, and about management and hazardous characteristics of PFC wastes.

RECOMMENDATION:

The MPCA Commissioner recommends that the MPCA Citizens’ Board adopt the suggested staff resolution.
SUGGESTED STAFF RESOLUTION

BE IT RESOLVED, that the MPCA makes the following determinations:

   WHEREAS, The MPCA and 3M have negotiated a Settlement Agreement and Consent Order
   with the 3M Company regarding response to releases of PFCs and other related matters which meets
   requirements specified by the MPCA Citizens Board on April 24, 2007; and

1. WHEREAS, The Settlement Agreement and Consent Order specifies requirements 3M must
   fulfill to address releases of PFOA and PFOS at and from the 3M Cottage Grove, 3M Oakdale and
   3M Woodbury Disposal Sites, and other releases of PFCs to the environment; and

2. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to assist the MPCA
   with costs associated with response actions taken in regard to releases of PFCs from the Washington
   County Landfill; and

3. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to cooperate with
   and provide financial assistance to the MPCA in the evaluation of impacts to public health and the
   environment from releases of PFCs; and

4. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to provide
   information to MPCA as to potential health and environmental impacts associated with PFCs, and as
   to the management and characteristics of wastes containing PFCs; and

5. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to provide
   alternate drinking water if and when an HBV or HRL is exceeded for any release of PFC from the
   three sites; and

6. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to reimburse the
   MPCA for all reasonable costs associated with the investigation and evaluation of releases of PFCs
   to the environment at the sites; and

7. WHEREAS, 3M agrees under the Settlement Agreement and Consent Order to assist the MPCA
   with costs associated for research on the presence and effects of PFCs found in the environment; and
WHEREAS, the MPCA Commissioner recommends that the MPCA Citizens’ Board approve the Settlement Agreement and Consent Order for the releases and discharges of PFCs at and from Sites in Washington County, and certain related matters, pursuant to MERLA, Minn. Stat. §§ 115B.01 to 115B.20, the Water Pollution Control Act, Minn. Stat. ch 115, and Minn. Stat. ch. 116, as signed by 3M.

NOW THEREFORE BE IT RESOLVED, that the MPCA Citizens’ Board hereby approves the Settlement Agreement and Consent Order between the MPCA and 3M. The Commissioner of the MPCA is authorized to execute this Settlement Agreement and Consent Order and any amendment to the Consent Order which may be necessary.
In the matter of Releases and Discharges of Perfluorochemicals At and From Sites in Washington County, Minnesota, and Certain Related Matters.


Based on the information available to the parties on the effective date of this SETTLEMENT AGREEMENT and CONSENT ORDER, and without trial or adjudication of any issues of fact or law, the parties hereto agree and it is hereby ordered as follows:

I. Jurisdiction

In entering this SETTLEMENT AGREEMENT and issuing this CONSENT ORDER the Minnesota Pollution Control Agency (MPCA) is acting pursuant to the Minnesota Environmental Response and Liability Act, Minn. Stat. §§ 115B.01 to 115B.20 (MERLA), and Minn. Stat. chs. 115 and 116, for the purpose of providing for remedial investigations and response actions to address certain discharges to waters of the State and releases or threatened releases to the environment in order to minimize or abate pollution of waters of the State and to protect public health and welfare and the environment.

A. The parties to this Agreement have disputed and continue to dispute the jurisdiction of MPCA under MERLA with respect to releases and threatened releases of PFCs at
the 3M Cottage Grove Site, the 3M Oakdale Disposal Site and the 3M Woodbury Disposal Site. MPCA asserts that all jurisdictional prerequisites necessary to act under MERLA with respect to releases and threatened releases of certain PFCs at the 3M Cottage Grove Site, the 3M Oakdale Disposal Site and the 3M Woodbury Disposal Site have been met. 3M disagrees with MPCA’s assertion and specifically denies that releases of PFCs at these Sites constitute hazardous substances or pollutants or contaminants as those terms are defined in MERLA. 3M further affirmatively asserts that releases and threatened releases of PFCS at these Sites do not constitute hazardous substances or pollutants or contaminants as defined in MERLA.

B. Notwithstanding the disagreement of the parties as stated in Paragraph A, for purposes of this Agreement from and after its effective date, and for no other purpose whatsoever, 3M consents to the issuance of this Consent Order, and to the application of MERLA to the interpretation, performance and enforcement of this Agreement consistent with the terms and conditions herein. 3M specifically agrees to undertake all actions required of it by the terms and conditions of this Agreement within the timeframes specified herein.

C. In entering this Agreement, MPCA and 3M are settling a disputed matter, and do not waive or compromise their respective legal arguments on MERLA jurisdiction. 3M expressly retains the right to contest the applicability of MERLA to releases and threatened releases of PFCs at these Sites in a proceeding by MPCA to issue a Request For Response Action under MERLA for any of the Sites and in any other proceeding except a proceeding to implement or enforce this Agreement. Nothing in this Agreement shall be construed as an admission by 3M.

D. Nothing in this Paragraph shall preclude 3M from seeking judicial review of a Commissioner’s order as provided in Part X, Paragraph G or H, with respect to whether response
actions required or performed by the Commissioner are reasonable and necessary to protect public health and welfare and the environment. In an action to enforce Part XXIII (Recovery of Expenses), nothing in this Paragraph shall relieve the MPCA of the burden to show that the costs incurred are reasonable and necessary as provided in Part XXIII, Paragraph F.

II.

Parties

This Agreement shall apply to and be binding upon the following parties:

A. 3M Company; and

B. the Minnesota Pollution Control Agency.

Unless specified otherwise in this Agreement, where this Agreement identifies actions to be taken by the MPCA, the action may be taken by the Commissioner or by a person delegated by the Commissioner to take such action.

III.

Statement of Facts

For purposes of this Agreement, the following constitutes a summary of the facts upon which this Agreement is based. None of the facts related herein shall be considered admissions by either party with respect to any person not a party to this Agreement or to any proceeding other than a proceeding to implement or enforce this Agreement. 3M reserves the right to dispute any fact stated herein in a proceeding other than a proceeding to enforce this Agreement, including in any proceeding for the issuance of a Request For Response Action for one or more of the Sites.

A. Facts Related To The 3M Cottage Grove Site.
1. The 3M Cottage Grove Site is located in the City of Cottage Grove, Washington County, Minnesota. A map of the 3M Cottage Grove Site is attached as Attachment 1.

2. The Site was listed on the State’s Superfund Permanent List of Priorities (PLP) in October 1984.

3. On January 22, 1985, the MPCA issued a RFRA to 3M to address VOC contamination as a result of disposal of hazardous substances in disposal pits on the Site.

4. On May 30, 1985, the MPCA and 3M entered into a Consent Order which required 3M to investigate the releases of VOCs and implement appropriate response actions. The terms of the 1985 RFRA and Consent Order do not address the investigation and implementation of response actions concerning the release of PFOA or PFOS at or from the 3M Cottage Grove Site, and the Consent Order does not affect MPCA’s authority to enter into this Agreement.

5. In February 2002, 3M informed the MPCA staff that PFOA and PFOS had been detected in ground-water production wells at the 3M Cottage Grove Site. Subsequent sampling requested by MPCA staff confirmed ground-water contamination by PFOA and PFOS near one of the on-site disposal areas on February 13, 2003. MPCA staff subsequently requested that 3M conduct a facility-wide assessment to determine extent and magnitude of potential releases of PFOA and PFOS to the environment.

6. In December 2004, 3M submitted a facility-wide work plan to assess releases of PFCs at the 3M Cottage Grove facility. This work plan was approved by the MPCA staff in January 2005. 3M implemented this work plan in 2005 and submitted reports to MPCA which documented releases of PFOA and PFOS to ground water, soil, surface water, and sediments at
the 3M Cottage Grove facility and in the adjacent Mississippi River. In June 2006, the MPCA staff requested that 3M conduct a second phase investigation to determine the extent and magnitude of releases of PFOA and PFOS to the environment at the 3M Cottage Grove Site, and to evaluate appropriate response actions to address the releases. This request included the requirement that 3M was to expand the sample analyte list for additional PFCs. This expanded list included PFBA and was to be used for all future investigations at the 3M Cottage Grove Site, the 3M Oakdale Disposal Site and 3M Woodbury Disposal Site.

7. In August, 2006, 3M submitted a phase II work plan in response to MPCA staff’s request. The work plan was approved by MPCA staff in September 2006. Sampling activities have been completed for this second phase.

8. MPCA staff has requested reimbursement of agency oversight costs incurred for 2004 through 2006 related to the PFC investigations at the 3M Cottage Grove Site and 3M has reimbursed the MPCA for these oversight costs through the last annual request for reimbursement.

B. Facts Related To The 3M Oakdale Disposal Site.

1. The 3M Oakdale Disposal Site is in the City of Oakdale, Washington County, Minnesota. A map of the Site is attached to this Agreement as Attachment 2.

2. The 3M Oakdale Disposal Site was listed on the PLP in October 1984. The 3M Oakdale Disposal Site was also listed on the Federal National Priorities List in September 1983.

3. On July 26, 1983, the MPCA and 3M entered into a Response Order by Consent (Consent Order) to investigate and implement response actions at the 3M Oakdale Disposal Site to address releases of VOCs at the Site. This Consent Order was amended on May 22, 1984. The USEPA was also a party to the 1983 Consent Order. The terms of the 1983 Consent Order
do not address the investigation and implementation of response actions concerning the release of PFOA or PFOS at or from the 3M Oakdale Disposal Site, and the Consent Order does not affect MPCA’s authority to enter into this Agreement.

4. In July, 2004, the MPCA staff requested 3M to collect ground water samples from wells at the 3M Oakdale Disposal Site to be analyzed for PFOA and PFOS. In September, 2004, 3M informed the MPCA that PFOA and PFOS had been detected in on-site ground water wells at the 3M Oakdale Disposal Site.

5. MPCA staff subsequently requested 3M to develop a work plan and conduct an investigation to determine ground water impacts from PFOA and PFOS at the 3M Oakdale Disposal Site. This work plan was submitted by 3M and approved by the MPCA in January 2005. 3M implemented this work plan, and submitted a report to MPCA which documented releases of PFOA and PFOS to ground water and surface water at the 3M Oakdale Disposal Site.

6. Based on the information gathered during this 2005 investigation, in September 2005, the MPCA staff requested 3M conduct a supplemental investigation to determine the extent and magnitude of releases of PFOA and PFOS to the environment at the 3M Oakdale Disposal Site. 3M completed this supplemental investigation in September 2006. To assist in determining appropriate response actions to address the releases, 3M proposed additional investigative work to fill in data gaps and the MPCA subsequently approved of this additional work in December 2006. This investigation utilized the expanded PFC sample analyte list as requested by MPCA, which included PFBA. Sampling activities have been completed for this supplemental phase.

7. 3M has reimbursed the MPCA for its oversight costs related to the investigations at the 3M Oakdale Disposal Site.
8. In 2005, 3M entered into an agreement with the City of Oakdale to install a carbon treatment system to reduce the levels of PFOA and PFOS, which had been detected in municipal drinking water wells, to below Health Based Values for PFOA and PFOS set by the Minnesota Department of Health.

C. Facts Related To The 3M Woodbury Disposal Site.

1. The 3M Woodbury Disposal Site lies on the border between the cities of Cottage Grove and Woodbury in Washington County, and is located in the area encompassed by Woodbury Drive (County Road 19) and Cottage Grove Drive. A map of the 3M Woodbury Disposal Site is attached to this Agreement as Attachment 3.

2. The 3M Woodbury Disposal Site is not listed on the PLP, and the MPCA has not entered any settlement, Consent Order, or other agreement with 3M or any other party with respect to the 3M Woodbury Disposal Site.

3. A report entitled “3M Woodbury, Minnesota Site History” dated August 1992 estimated that 3M disposed of approximately 200,000 yards of scrap wastes, including waste adhesive, rolls of film, rags, resins and off-specification materials, approximately 400,000 gallons of liquid waste solvents (of which 200,000 gallons was isopropyl ether), and 18,000 yards of wet scrap, at the 3M Woodbury Disposal Site.

4. 3M installed four “barrier” pumping wells at the 3M Woodbury Disposal Site between 1967 and 1973 and has operated them continuously since installation. The ground water withdrawn at the 3M Woodbury Disposal Site is conveyed in underground piping to the 3M Cottage Grove facility for use as non-contact process water at the facility and is ultimately discharged to the Mississippi River without treatment under a National Pollutant Discharge Elimination System (NPDES) Permit.
5. In 1992, 3M entered the MPCA’s Voluntary Investigation and Cleanup (VIC Program). Under the VIC program, 3M conducted response actions including installation of a soil cap over the former disposal area and ground-water monitoring. In addition, 3M recorded a Declaration of Restrictions and Covenants on the property which requires the approval of the MPCA Commissioner to discontinue the barrier well system or to conduct activities that disturb the soil.

6. In July, 2004, 3M reported to MPCA that pump out water from the 3M Woodbury Disposal Site contained PFCs including PFOA and PFOS.

7. In early 2005, 3M sampled each of the four barrier wells at the 3M Woodbury Disposal Site and the combined discharge from the barrier wells. With the exception of barrier well B-2, all sampling locations detected PFOA and PFOS. In June 2005, the MDH sampled 15 residential wells surrounding the 3M Woodbury Disposal Site for PFOA and PFOS, and neither chemical was detected. In December 2006, barrier and monitoring wells at the 3M Woodbury Disposal Site were sampled for seven PFCs including PFBA. PFBA results ranged from 0.476 to 118 parts per billion (ppb) of PFBA.

8. In 2006, municipal and private drinking water wells in southern Washington County downgradient from the 3M Woodbury Disposal Site were sampled for PFBA. The results showed that PFBA was present in municipal wells in Cottage Grove, Newport and St. Paul Park, and in private wells in that vicinity at concentrations up to 5 ppb.

9. In a letter dated February 1, 2007, the MPCA requested that 3M submit a comprehensive Response Action Plan for the 3M Woodbury Disposal Site by March 1, 2007, that addresses the following:
a. Evaluate the current barrier well system’s ability to capture all PFC’s including PFOA and PFOS and enhance the system as necessary.

b. Install a network of sentinel monitoring wells between the 3M Woodbury Disposal Site and adjacent residences.

c. Reassess the feasibility of reducing the volume of PFC-contaminated wastes including PFOA and PFOS remaining in the Northeast Disposal Area of the 3M Woodbury Disposal Site.

d. Determine if the effluent discharge pipeline between the 3M Woodbury Disposal Site and the 3M Cottage Grove facility is leaking.

e. Develop a monitoring plan to conduct quarterly monitoring of PFCs including PFOA and PFOS in residential wells and sentinel wells that surround the 3M Woodbury Disposal Site.

MPCA has conditionally approved Site Reports for the 3M Woodbury Disposal Site which were submitted to MPCA by 3M in a letter dated March 20, 2007. These reports address barrier well capture zone evaluation, sentinel monitoring well installation, assessment of the former northeast disposal area, conveyance line assessment, monitoring plan and reporting and schedule.

D. Other Facts Leading To This Agreement.

1. On November 20, 2002, in response to a request from MPCA, Minnesota Department of Health (MDH) established Interim Soil Reference Values (SRVs) for PFOA and PFOS in soil, and Health Based Values for Groundwater (HBVs) for PFOA and PFOS. Residential SRVs were set at 30 parts per million (ppm) for PFOA and 6 ppm for PFOS. The 2002 HBVs were set at 7 ppb for PFOA and 1 ppb for PFOS. On February 26, 2007, MDH
established more stringent HBVs for PFOA and PFOS. The current MDH HBV for drinking water for PFOA is 0.5 ppb and for PFOS is 0.3 ppb.

2. On April 24, 2007, the MPCA Citizens Board considered the issuance of a Request For Response Action (RFRA) to 3M under MERLA for releases and threatened releases of PFCs at and from the 3M Cottage Grove Site, the 3M Oakdale Disposal Site, and the 3M Woodbury Disposal Site. The Board voted to postpone consideration of the RFRAs and directed the Commissioner to negotiate a consent order to address response actions at the three sites and other related matters with 3M, and to make a recommendation to the Board regarding its approval of such a Consent Order or issuance of the RFRAs at a subsequent Board meeting. This Agreement is the result of those negotiations.

IV.

Definitions

A. Unless otherwise explicitly stated, the definitions provided in Minn. Stat. § 115B.02 shall control the meaning of the terms used in this Agreement.

B. For the purpose of this Agreement:

1. "MPCA Commissioner" or "Commissioner" means the Commissioner of the Minnesota Pollution Control Agency or a person exercising authority delegated by the Commissioner.

2. “Day” means calendar day, provided that when a deadline for an action or submittal under this Agreement falls on a Saturday, Sunday or legal holiday, the action or submittal is timely if taken or received by the first business day after the deadline.
3. “3M Cottage Grove Site” means the site formerly known as the 3M Chemolite Disposal Site in the City of Cottage Grove, Washington County, Minnesota, and shown in the map attached to this Agreement as Attachment 1.

4. “3M Oakdale Site” means the 3M Oakdale Disposal Site in the City of Oakdale, Washington County, Minnesota, and shown in the map attached to this Agreement as Attachment 2.

5. “3M Woodbury Site” means the 3M Woodbury Disposal Site in the City of Woodbury, Washington County, Minnesota, and shown in the map attached to this Agreement as Attachment 3.

6. “Sites” means the 3M Cottage Grove Site, the 3M Oakdale Site and the 3M Woodbury Site.

7. “Each Site” refers individually to the 3M Cottage Grove Site, the 3M Oakdale Site and the 3M Woodbury Site.

8. “Perfluorochemical” or “PFC” means any chemical in a family of synthetic chemicals manufactured by 3M which is a perfluorinated (fully fluorinated) carbon chain consisting of 1 to 16 carbon atoms with a functional end group consisting of at least one double bond.

9. “PFOA” or “perfluorooctanoate” refers to an eight-carbon carboxylate perfluorochemical, including the chemicals identified by Chemical Abstract Service (CAS) numbers in the document entitled “Data For Derivation Of Ground Water Health Based Value (HBV),” which is attached to the February 26, 2007 MDH Memorandum establishing an HBV for PFOA.
10. “PFOS” or “perfluorooctane sulfonate” means an eight-carbon sulfonate perfluorochemical, including the chemicals identified by CAS numbers in the document entitled “Data For Derivation Of Ground Water Health Based Value (HBV),” which is attached to the February 26, 2007 MDH Memorandum establishing an HBV for PFOS.

11. “PFBA” or “Perfluorobutanoate” means a four-carbon caboxylate perfluorochemical.

12. “Health Based Value for Groundwater” or “HBV” means the concentration of a substance or chemical found in ground water which poses little or no risk to health even when consumed daily as drinking water over a lifetime. HBVs are developed by MDH and used as interim advice for human consumption of drinking water in which a substance or chemical has been detected.

13. “Health Risk Limit” or “HRL” means a concentration of a groundwater contaminant, or a mixture of contaminants, that is considered safe when consumed daily in drinking water over a lifetime. An HRL is adopted by MDH by rule under Minn. Stat. § 103H.201.

14. “Volatile organic compounds” or “VOCs” means organic chemicals that have a high vapor pressure and easily form vapors at normal temperature and pressure including organic solvents.

15. “Washington County Landfill” means a closed, formerly MPCA-permitted mixed municipal waste landfill located in the City of Lake Elmo, in Washington County, Minnesota, which is a “qualified facility” as that term is used in Minn. Stat. § 115B.39.
V. Scope of Agreement

A. Obligations of 3M for the Sites.

3M agrees to perform the following response actions to address the releases and threatened release of PFCs at each Site, and the release and threatened release of VOCs for the 3M Woodbury Disposal Site, in accordance with the terms and conditions of this Agreement:

1. Design and implement a Remedial Investigation (RI) as described in Part VI of this Agreement and the appropriate Exhibit referenced in Paragraph B of this Part V;
2. Conduct a Feasibility Study (FS) as described in Part VII of this Agreement and the appropriate Exhibit referenced in Paragraph B of this Part V;
3. Develop a Response Action Plan (RAP) (to include a detailed design for response action) and implement the MPCA-selected Response Actions (RAs) as described in Part VIII of this Agreement and the appropriate Exhibit referenced in Paragraph B of this Part V; and
4. Reimburse the MPCA's costs as provided in Part XXIII of this Agreement.

B. Exhibits.

The Exhibits setting forth the response actions for each Site are as follows:

1. 3M Cottage Grove Site
   a. Exhibit A--Remedial Investigation/Feasibility Study;
   b. Exhibit B--Remedial Design/Response Action Plan

2. 3M Oakdale Site
   a. Exhibit C--Remedial Investigation/Feasibility Study;
   b. Exhibit D--Remedial Design/Response Action Plan
3. 3M Woodbury Site
   a. Exhibit E--Remedial Investigation/Feasibility Study;

Each of Exhibits A to F is appended to and is an integral and enforceable part of this Agreement. In the event of any ambiguity or inconsistency between Parts VI to VIII and the Exhibits to this Agreement, the Exhibits shall govern.

C. Releases of PFCs Included Within Scope of Parts VI to VIII.

   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.

D. Other Obligations of 3M.

   3M agrees to:
   1. Provide information as required in Part XIII.B. of this Agreement.
   2. Cooperate with MPCA and MDH in developing health and toxicological studies and data needed by MDH to develop HBVs and HRLs for PFCs as provided in Part XIII.C of this Agreement.
   3. Take actions with respect to discharges of PFCs other than those described in Part V.C. into waters of the State as provided in this Part V.E.
4. Perform the obligations related to the Washington County Landfill as provided in this Part V.F.

E. Releases of Other PFCs.

In addition to the requirements in Part V.C., if a PFC other than PFOA and PFOS, including PFBA, is detected in a release or threatened release from any of the Sites and the source of the other PFC is not effectively controlled by actions under Parts VI to VIII, 3M shall take reasonable and necessary investigative action as requested by the Commissioner to determine the scope and extent of any release or threatened release of such PFC from the affected Site or Sites. If investigation of the release or threatened release indicates that there is an ongoing discharge of the PFC into the waters of the state, 3M shall take such additional reasonable and necessary response action as requested by the Commissioner to evaluate and implement actions to control, minimize or abate the source of the discharge. The Commissioner shall set a reasonable schedule for submittals and actions under this Part V.E.

F. Washington County Landfill.

Releases and threatened releases of PFCs have been identified and alternative remedies are currently being evaluated by the MPCA at the Washington County Landfill under the Minnesota Landfill Cleanup Act, Minn. Stat. § 115B.39 to 115B.445. In the early 1970s, 3M disposed of wastes containing PFCs at the Washington County Landfill, which also received non-3M industrial waste and municipal waste. The State took over long-term operation and maintenance at the site. 3M has cooperated with the State in the implementation of the Landfill Cleanup Act. Investigations of releases of PFCs at the 3M Oakdale Disposal Site and at the Washington County Landfill indicate that there is a commingling of ground water containing PFCs from the two sites.
3M agrees to provide technical resources and to transfer any technology knowledge, including any proprietary process, to the MPCA to assist in identifying possible alternative remedial approaches to the current operation and maintenance program at the Washington County Landfill. In addition, 3M agrees to provide to the MPCA a grant of up to Eight Million Dollars ($8,000,000) for the purpose of implementing remedial actions at the Washington County Landfill selected by the MPCA. This grant is intended to provide for the incremental cost of the remedial measures attributable to the releases and threatened releases of PFCs. For purposes of this Agreement, the cost of implementing remedial actions includes the cost of design, construction, operation and maintenance of the actions.

3M agrees to pay Five Million Dollars ($5,000,000) of this grant to the MPCA within 30 days after receipt of written notice from the MPCA that the agency has selected remedial actions which MPCA intends to implement at the Washington County Landfill. To the extent that the cost of implementing MPCA’s selected remedial actions for the Washington County Landfill exceeds $5,000,000, 3M agrees to pay 50 percent of that portion of the cost which exceeds $5,000,000, up to an additional amount of $3,000,000. In no event shall the total amount of the grant which 3M is obligated to make under this Paragraph F exceed $8,000,000. Subject to the limitations stated in this Paragraph F, 3M agrees to pay additional amounts for costs exceeding $5,000,000 within 30 days of written notice from MPCA that the agency has incurred obligations exceeding $5,000,000 under one or more contracts entered into by the agency for the implementation of remedial actions for the Washington County Landfill.

3M agrees not to seek reimbursement, indemnification or recovery of its grant or any portion thereof made under this Part V.F whether by a contribution action or by making any insurance claim against an insurer that has settled the liability of its policyholders, including 3M,
for the Washington County Landfill with the State of Minnesota under the Landfill Cleanup Act, as provided in the release given to that insurer under the Landfill Cleanup Act.

VI.

**Remedial Investigation**

3M shall design, propose, initiate, complete and report upon an RI of each Site in accordance with the requirements and time schedules set forth in the appropriate Exhibit referenced in Part V.B. of this Agreement. The purpose of the RI is to identify the source and extent of the releases or threatened releases of PFCs at and from each Site, and VOCs from the 3M Woodbury Site.

VII.

**Feasibility Study**

3M shall propose, initiate, complete, and report upon an FS for each Site in accordance with the requirements and time schedules set forth in the appropriate Exhibit referenced in Part V.B. of this Agreement. The purpose of the FS is to identify and evaluate alternative actions for response to the release or threatened release of PFCs at and from each Site, and VOCs from the 3M Woodbury Site, as identified through the RI conducted pursuant to Part VI of this Agreement.

VIII.

**Response Action Plan and Response Action Implementation**

A. Following completion of the RI and the FS, and selection of RAs by MPCA, 3M shall design and propose a RAP and implement selected RAs for each Site in accordance with the requirements and time schedules set forth in the appropriate Exhibit referenced in Part V.B. of this Agreement. The purpose of the RAP is to provide a detailed design for the
implementation of MPCA-selected RAs. The purpose of implementing the MPCA-selected RAs is to prevent, minimize or eliminate the release or threatened release of PFCs at and from each Site, and VOCs from the 3M Woodbury Site, in order to protect public health and welfare and the environment.

B. 3M’s response action obligations under this Part VIII 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.

C. Notwithstanding anything to the contrary in the remedy selection criteria in the Exhibits referenced in Part V.B, and to the extent consistent with site-specific response action objectives specified by the Commissioner, response actions at the Sites shall address the source of releases and threatened releases of PFCs to ground water. Such response actions shall include (1) excavation and destruction of PFCs, or excavation, engineered isolation and containment of PFCs, and (2) other technically feasible response actions, which are reasonable and necessary to provide for a comprehensive and effective long-term response that protects public health and welfare and the environment. Primary consideration shall be given to alternative (1) consistent with Minn. Stat. § 115B.02, subd. 16 (c). For purposes of implementation of this Agreement, the MPCA agrees that it will not consider any excavated material from the sites to be hazardous wastes under Minnesota or federal law or regulations solely by virtue of the presence of PFCs in
such wastes. Additionally the MPCA agrees to provide expedited permitting and approval processes to facilitate the management of any excavated material.

D. Before selecting a remedy for a Site, MPCA shall hold a public meeting in the affected community to explain and receive public comment on the proposed remedy. This requirement is in addition to the public notice and opportunity for comment required under Minn. Stat. § 115B.17, subd. 2b.

IX.

Review and Approval of Submittals

The review of each submittal, document, report, or schedule (collectively referred to as "Submittal") which is required to be submitted to and reviewed by the MPCA Commissioner under this Agreement shall be as follows:

A. The MPCA Commissioner shall review each Submittal made by 3M within forty-five (45) calendar days of receipt and notify 3M in writing of the Commissioner's approval, disapproval, or modification of the Submittal. If the Submittal is approved, it shall become an integral and enforceable part of this Agreement. If the Submittal is disapproved in whole or part, the MPCA Commissioner shall notify 3M and shall explain the amendments or revisions that are necessary to bring the Submittal into compliance with this Agreement. If the Submittal is modified, the MPCA Commissioner shall notify 3M of the specific modifications made to the Submittal and the reasons for making them.

B. Within thirty (30) calendar days of receipt of any notice of disapproval or modification 3M shall (1) submit revisions necessary to bring the Submittal into compliance with this Agreement, (2) respond to the modifications or (3) state in writing the reasons why the Submittal, as originally submitted, should be approved.
C. If, within thirty (30) calendar days from the date of 3M's submission under paragraph B above, the parties have not reconciled all issues with respect to the Submittal, the MPCA Commissioner shall make final modifications of the Submittal as the Commissioner deems necessary and shall notify 3M of the final modifications. Unless 3M initiates dispute resolution under Part X (Resolution of Disputes) within fourteen (14) days after receipt of notice of the final modifications, the Submittal with the final modifications made by the MPCA Commissioner shall become an integral and enforceable part of this Agreement.

D. All Submittals or final modifications thereto shall be technologically feasible and in accordance with sound engineering practices.

E. The MPCA and 3M shall provide the opportunity to consult with each other during the review of Submittals.

X. Resolution of Disputes

This Part X is intended to provide 3M with a means of seeking to resolve disputes that it may have with MPCA under this Agreement, including disputes regarding any MPCA final modification or disapproval of Submittals. 3M shall continue to implement those portions of the Agreement not in dispute which can be reasonably implemented pending final resolution of the issues in dispute and may request an extension of schedule under Part XXVIII for obligations that 3M believes cannot be reasonably implemented during the dispute.

A. Within fourteen (14) days after the receipt of notice of final modifications of a Submittal, or after the date that a dispute arises regarding any other matter under this Agreement, 3M shall 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.

B. During the fourteen (14) days following the date the Commissioner receives a statement from 3M under Paragraph A of this Part, the MPCA Commissioner shall provide an opportunity to resolve the matter through informal negotiations. The Commissioner may exercise discretion to extend the informal negotiation period.

C. If 3M and the MPCA Commissioner do not agree upon a written resolution of the dispute during the informal negotiation period, the MPCA Commissioner shall issue an order deciding the issues in dispute, which shall include an explanation of the reasons for the decision and a summary of the information upon which the decision is based.

D. Within fourteen (14) days of the date of receipt of the MPCA Commissioner's order, 3M shall notify the MPCA Commissioner either that 3M intends to comply with the MPCA Commissioner's order, or that 3M does not intend to comply with the MPCA Commissioner’s order in whole or in part, and intends to suspend work on those portions of the order that are in dispute. In the event that 3M does not notify the MPCA Commissioner as required in this Paragraph D within fourteen (14) days of the date of receipt of the MPCA Commissioner's order, 3M’s failure shall be construed as a waiver of its right to challenge the order and the MPCA Commissioner's order shall become final and an integral and enforceable part of this Agreement.

E. If the MPCA Commissioner receives a timely notice from 3M that it does not intend to comply with the MPCA Commissioner’s order, the MPCA Commissioner shall notify
3M, within forty-five (45) days of the date that notice was received from 3M, whether the MPCA intends to perform any of the response actions which 3M has suspended or intends to suspend.

F. If the MPCA decides to perform any response actions that 3M has suspended or intends to suspend pursuant to its notice to the Commissioner under Paragraph D, the MPCA may recover any reasonable and necessary expenses incurred by the MPCA to perform the response actions under Part XXIII of this Agreement.

G. If the MPCA decides to perform any response actions which 3M has suspended or intends to suspend, there shall be no judicial review of the MPCA Commissioner's order or of the response actions performed by the MPCA Commissioner unless the MPCA Commissioner brings an action to enforce Part XXIII of this Agreement to recover costs incurred to perform the response actions. In any such action, judicial review of the MPCA Commissioner's order, or of response actions performed by the MPCA Commissioner, shall be limited to review of whether the response actions required under the MPCA Commissioner's order or performed by the MPCA Commissioner are reasonable and necessary to protect the public health and welfare and the environment. The MPCA Commissioner's order shall be affirmed unless 3M shows that the decision of the MPCA Commissioner in the disputed matter is not supported by substantial evidence in the administrative record or is otherwise contrary to law or to any term or condition of this Agreement. Nothing in this Paragraph shall relieve the MPCA of the burden to show that the costs incurred by the MPCA are reasonable and necessary as provided in Part XXIII, Paragraph F.

H. If the MPCA Commissioner notifies 3M that the Commissioner does not intend to perform response actions which 3M has suspended or intends to suspend, 3M may bring an action to review the MPCA Commissioner's order within thirty (30) days after receipt of the
notice from the MPCA Commissioner. Such action shall be brought in Washington County District Court as an action to enforce this Agreement. In any such action, review of the MPCA Commissioner's order shall be limited to review of whether the response actions required under the MPCA Commissioner's order are reasonable and necessary to protect the public health and welfare and the environment. The MPCA Commissioner's order shall be affirmed unless 3M shows that the decision of the MPCA Commissioner in the disputed matter is not supported by substantial evidence in the administrative record or is otherwise contrary to law or to any term or condition of this Agreement. If 3M does not commence such an action within the time provided in this Paragraph H, the MPCA Commissioner's order shall become final and an integral and enforceable part of this Agreement.

I. For the purpose of any review of an MPCA Commissioner’s order as provided in this Part, the administrative record on which review shall be based shall consist of the following documents: this Agreement; any Submittals that have become an integral and enforceable part of this Agreement; any Submittal that is the subject of the dispute including any modifications made by the MPCA Commissioner and any response submitted by 3M under Part IX., Paragraph B; the statement submitted by 3M under Paragraph A of this Part; the MPCA Commissioner’s order issued under Paragraph C of this Part; and any information referenced in 3M’s statement under Paragraph A or in the MPCA Commissioner’s order upon which 3M or the Commissioner have relied for support of their respective positions.

XI. Permits

A. The implementation of this Agreement may require the issuance of governmental permits, authorizations or orders (hereinafter referred to as "permit") by the MPCA, other state or
federal agencies, or other governmental bodies. This Agreement is based upon the expectation that the terms and conditions of any necessary permits will be issued consistent with the response actions required by this Agreement.

B. 3M shall notify the MPCA Commissioner of all non-MPCA permits which are needed to implement the requirements of this Agreement as soon as 3M become aware of the need for the permit. 3M shall provide the MPCA Commissioner with a copy of all such permit applications at the time the application is submitted to the governmental body issuing the permit.

C. If a permit is not issued, or is issued or is renewed in a manner which is materially inconsistent with the requirements of the approved RI, FS, RAP or RAs, 3M shall notify the MPCA Commissioner of its intention to propose modifications to the RI, FS, RAP or RAs. Notification by 3M of its intention to propose modifications shall be submitted to the MPCA Commissioner within seven (7) calendar days of receipt by 3M (1) of notification that (a) a permit will not be issued; or (b) a permit has been issued or reissued; and (2) of notification that a judicial action with respect to issuance of a permit has been filed. Within thirty (30) days after the date it submits its notice of intention, 3M shall submit to the MPCA Commissioner its proposed modifications to the RI, FS, RAP or RAs with an explanation of its reasons in support thereof; however, if 3M decides in its sole discretion to contest the denial of a permit, or if a judicial action concerning the permit has been filed, modifications shall be submitted within fifteen (15) days of 3M’s receipt of notification that a final judicial determination has been entered.

D. The MPCA Commissioner shall review and approve, disapprove or modify 3M’s proposed modifications to the RI, FS, RAP or RAs in accordance with Part IX [Review and Approval of Submittals] of this Agreement.
E. During any judicial review of any permit needed to implement this Agreement or during the MPCA Commissioner's review of any of 3M’s proposed modifications as provided in paragraph D above, and during any subsequent judicial proceedings taken in accordance with the provisions of Part X [Resolution of Disputes], 3M shall continue to implement those portions of the RI, FS, RAP and RAs which can be reasonably implemented pending final resolution of the judicial proceedings.

XII.

Creation of Danger

If the MPCA Commissioner determines that it is necessary to stop implementation of this Agreement because of a danger to the health or welfare of the people on one or more of the Sites or in the surrounding area or to the environment, the MPCA Commissioner may order 3M to stop further implementation of this Agreement for the period of time needed to abate the danger, or may petition a court of appropriate jurisdiction for such an order. 3M shall comply with the order from the MPCA Commissioner upon receipt.

XIII.

Reporting; Information on PFCs; False Statements

A. By 30 days after the end of each calendar quarter 3M shall submit to the MPCA Commissioner a written progress report which describes the actions which 3M has taken during the previous quarter to implement the requirements of this Agreement for each Site and for other obligations under this Agreement. Progress reports shall also describe the activities scheduled to be taken during the upcoming quarter. Progress reports shall be submitted beginning on July 30 following the effective date of this Agreement. The progress reports shall include a detailed statement of the manner and extent to which the requirements and time schedules set out in the
Exhibits to this Agreement are being met. 3M shall propose in the progress reports any additional activities it believes to be necessary which are not included in the approved RI, FS, RAP or RAs and shall describe the impact of the additional activities on the other activities conducted pursuant to this Agreement. The MPCA Commissioner may, in the Commissioner's discretion, direct that progress reports be submitted at extended intervals or that no further reports be submitted.

B. Within 60 days after the effective date of this Agreement, 3M will establish a process satisfactory to MPCA to ensure that MPCA has access to all documents within 3M’s possession or control, except for documents subject to attorney-client privilege or to protection as attorney work product, which address or relate to: (1) the health or environmental effects of any PFC; (2) actions or precautions considered or recommended by 3M for managing, treating or disposing of wastes containing any PFC; and (3) any characteristic of any PFC or PFC waste that might cause the PFC or waste to be considered a hazardous substance or a hazardous waste as those terms are used in MERLA or in the hazardous waste rules of the MPCA, Minn. R. ch. 7045. 3M will provide MPCA with copies of such documents that MPCA may request. 3M agrees to provide representatives to meet with MPCA, whether periodically or on specific request, to explain the context and substance of any documents relating to PFCs for which access or copies have been provided to MPCA under this Paragraph. MPCA agrees to classify any documents provided by 3M under this Paragraph as non-public data as provided in Part XXII of this Agreement.

C. 3M agrees to cooperate with MPCA and MDH in developing and implementing health and toxicological studies needed by MDH to develop HBVs and HRLs for PFCs. It is
anticipated that a final report of the 90 day feeding study for PFBA will be available by March 31, 2008. Preliminary data from this study will be shared with MDH as it becomes available.

D. 3M shall not knowingly make any false statement, representation or certification in any record, report, plan or other document filed or required to be submitted to the MPCA under this Agreement. 3M shall immediately upon discovery report to the MPCA and correct any errors in such record, report, plan or other document.

XIV.

Notification; Primary Contact

All notices required under this Agreement shall be in writing. Unless otherwise specified by MPCA, notices, progress reports and any other Submittals made by 3M pursuant to this Agreement shall be sent by certified mail, return receipt requested or hand delivered to:

Kathy Sather, Director, Remediation Division
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Notices and other documents sent to 3M shall be addressed as follows unless 3M specifies otherwise:

Gary A. Hohenstein
Manager, Special Projects
EHS Operations
3M Company
Building 42-2E-05
St. Paul, MN 55144

XV.

Project Managers

The MPCA and 3M shall each designate a Project Manager and Alternate (hereinafter jointly referred to as Project Manager) for each Site for the purposes of overseeing the
implementation of this Agreement. 3M’s Project Manager for the Sites is Gary A. Hohenstein. Within ten (10) days of the effective date of this Agreement, 3M shall notify the MPCA Commissioner of the name and address of its Alternates.

The MPCA Project Manager and Alternate for each Site are as follows:

1. 3M Cottage Grove Site.
   a. Project Manager--Gary Krueger.
   b. Alternate--Fred Campbell.

2. 3M Oakdale Site.
   a. Project Manager--Gary Krueger.
   b. Alternate--Fred Campbell.

3. 3M Woodbury Site.
   a. Project Manager--Gerald Stahnke.
   b. Alternate--Mike Connolly.

Either party may change its designated Project Managers by notifying the other party, in writing, of the change. To the maximum extent possible, communications between 3M and the MPCA concerning the terms and conditions of this Agreement as they apply to response actions for the Sites shall be directed through the Project Managers. Each Project Manager shall be responsible for assuring that all communications from the other Project Manager are appropriately disseminated and processed.

Each Project Manager shall have the authority to (1) take samples or direct that samples be taken; (2) direct that work at a Site stop for a period not to exceed seventy-two (72) hours if the Project Manager determines that activities at the Site may create a danger to public health or welfare or the environment; (3) observe, take photographs and make such other reports on the
progress of the work as the Project Manager deems appropriate; (4) review records, files and documents relevant to this Agreement; and (5) make or authorize minor field modifications in the RI, FS, RAP or RAs or in techniques, procedures or design utilized in carrying out this Agreement which are necessary to the completion of those activities. Any field modifications shall be approved orally by both Project Managers. Within seventy-two (72) hours following the modification, the Project Manager who requested the modification shall prepare a memorandum detailing the modification and the reasons therefore and shall provide or mail a copy of the memorandum to the other Project Manager.

The MPCA and 3M Project Managers shall either be on the Site or available on call by telephone during all hours of work at the Site. The absence of any Project Manager from the Site shall not be cause for stoppage of work.

XVI.

Sampling Data Availability

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.

XVII.

Retention of Records

Notwithstanding any document retention policy to the contrary, 3M shall retain and preserve for a minimum of three (3) years after termination of this Agreement all records and documents in its possession or in the possession of its divisions, employees, agents, accountants, contractors or attorneys which relate in any way to the presence of PFCs at the Sites or to the implementation of this Agreement. Following the three (3) year document retention period, 3M shall notify the MPCA a minimum of ninety (90) days before destroying any documents and shall relinquish such documents to the MPCA upon request. Should any portion of the work performed hereunder be undertaken through contractors or agents of 3M, then 3M agrees to include in the contract with such contractors and agents a document retention requirement meeting the terms of this paragraph.

XVIII.

Access and Assurances Regarding Response Actions

A. The MPCA and its authorized employees, agents and representatives shall have authority to enter each Site at all times for the purpose of enforcing and overseeing implementation of this Agreement, and 3M shall cooperate with the MPCA in taking such actions, including but not limited to: inspecting records, operating logs, contracts and other documents relevant to implementation of this Agreement; reviewing the progress of 3M in implementing this Agreement; conducting such tests as the MPCA Commissioner or MPCA Project Manager deems necessary; verifying the data submitted to the MPCA by 3M; and taking
response actions in the event that 3M fails to take response actions as required under this Agreement, including response actions suspended as a result of a dispute under Part X (Resolution of Disputes). If records required to be retained under this Agreement are kept at locations other than each Site, the MPCA and its authorized employees, agents or representatives shall have access to such other location at all reasonable times for the purposes of inspecting the records. 3M shall honor all reasonable requests for such access by the MPCA conditioned only upon presentation of proper credentials.

B. With respect to property owned by 3M upon which 3M is obligated under this Agreement to construct, operate, maintain or monitor any wells, treatment facilities or other response actions 3M agrees not to disturb or interfere with the wells, treatment facilities or other response actions that are constructed, and not to convey any title, easement, or other interest in the property without such provision as the MPCA Commissioner deems necessary, including granting and recording by 3M of restrictive covenants or other use restrictions, to assure: (1) completion and continued operation, maintenance and monitoring of the wells, treatment facilities or other response actions required pursuant to this Agreement; (2) long-term effectiveness of the response actions to protect public health and welfare and the environment, including protection from exposure to any residual contamination after implementation of an MPCA-selected remedial action; and (3) access by the MPCA, its employees and contractors to enforce and monitor effectiveness of the response actions and use restrictions. 3M shall notify the MPCA Commissioner, by certified mail, at least thirty (30) days prior to any conveyance of the property, of 3M’s agreement to convey any interest in the property and of the provisions made to assure that 3M’s obligations under this Agreement will be carried out and the response actions will remain protective after the conveyance. The MPCA may require recording of a
restrictive covenant or other institutional control that meets the requirements of this Paragraph B as a condition of termination of this Agreement under Part XXXII.

C. 3M shall use its best efforts to obtain access to property not owned by 3M upon which 3M, its contractors, and the MPCA and its authorized employees, agents or representatives will be required to enter or conduct work in order to carry out the terms of this Agreement. 3M shall be responsible for restoring to substantially its original condition any property to which access has been granted. Access agreements obtained by 3M under this Part shall provide authority for 3M and its employees, contractors, agents, successors and assigns, and for the MPCA and its authorized employees, agents or representatives, to enter the property at all reasonable times for the purpose of implementing their obligations or authorities under this Agreement.

If 3M is unable to obtain access using its best efforts, the MPCA agrees to use its authority under the statutes and regulations it administers to assist 3M in obtaining access to property necessary for the implementation of this Agreement. If MPCA designates 3M, its contractors, employees or agents as agents or representatives of the State in order to obtain access under Minn. Stat. § 115B.17, subd. 4, such designation shall be for the sole purpose of entering the designated property to take actions necessary for the implementation of this Agreement. In the event of such designation, 3M and its assigns shall indemnify and save and hold the State, its agents, and employees harmless from any and all claims or causes of action arising from or on account of the entry on to the designated property or the performance of response actions by 3M, its contractors, employees or agents.

D. If property upon which 3M is obligated under this Agreement to construct, operate, maintain or monitor any wells, treatment facilities or other response actions is not
owned by 3M, any access agreement with the owner obtained by 3M under Paragraph C of this Part XVIII must include provisions by which the owner agrees to the obligations set forth in Paragraph B.

XIX.

Hold Harmless Agreement

A. 3M agrees to indemnify and save and hold the MPCA, its agents and employees, harmless from any and all claims or causes of action arising from or on account of acts or omissions of 3M, its officers, employees, agents, or contractors in implementing this Agreement.

B. Within fourteen (14) working days of receipt by the MPCA Commissioner of notice of any claim or cause of action against MPCA arising from or on account of acts or omissions of 3M, its officers, employees, agents, or contractors in implementing this Agreement (hereinafter referred to in this Part XIX as a "claim"), the MPCA Commissioner shall give written notice to 3M of this claim. Failure of the MPCA to give such notice shall not relieve 3M of any obligation that they may have to the MPCA except to the extent 3M demonstrates that the defense of the claim is prejudiced thereby.

C. 3M shall be entitled to participate in the defense of any claim and may elect to assume the defense if the MPCA and the Minnesota Attorney General's Office give their written approval of counsel employed for such defense. If 3M elects to assume the defense of a claim: (a) the MPCA shall have the right to employ separate counsel at its own expense and to participate in the defense thereof; (b) no compromise or settlement thereof may be effected by 3M without the written consent of the MPCA and the Minnesota Attorney General's Office (which shall not be unreasonably withheld) unless the sole consideration required by the settlement is a sum of money that is paid solely and in full by 3M and MPCA obtains a full
release and discharge of all claims which were or could have been brought against MPCA in the matter; and (c) 3M shall have no liability with respect to any compromise or settlement thereof effected by MPCA unless MPCA obtains written consent of 3M, which consent shall not be unreasonably withheld.

D. If 3M is obligated to indemnify the MPCA but elects not to assume, or fails to assume, the defense of a claim, the MPCA shall be entitled to assume the defense and prosecute or settle the claim with counsel of its own choice, at the expense of 3M.

E. If a claim is asserted against both 3M and the MPCA and there is a conflict of interest which renders it inappropriate for the same counsel to represent both 3M and the MPCA, 3M shall be responsible for paying for separate counsel for the MPCA.

F. Nothing in this Part XIX waives or modifies any immunity from or limitation of liability of the MPCA under the Minnesota Tort Claims Act, Minn. Stat. §§ 3.732, et seq., or other applicable law.

XX.

Other Claims

Nothing herein is intended to bar or release any claims, causes of action or demands in law or equity by MPCA or 3M against any person, firm, partnership or corporation not a signatory to this Agreement for any liability such other person or entity may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, disposal or release of any PFCs at, to, or from the Sites or of VOCs from the 3M Woodbury Disposal Site.

The MPCA shall not be held as a party to any contract entered into by 3M to implement the requirements of this Agreement.
XXI.

Other Applicable Laws

All actions required to be taken pursuant to this Agreement shall be undertaken in accordance with the requirements of all applicable local, state and federal laws and regulations. If there is a conflict in the application of federal, state or local laws or regulations, the most stringent of the conflicting provisions shall apply.

XXII.

Confidential Information

3M may make a request in accordance with the procedural rules of the MPCA for non-public treatment of information submitted pursuant to this Agreement to the extent such treatment is authorized under Minn. Stat. ch. 13 and Sections 115B.17, subd. 5, or 116.075. Information determined to be non-public by the MPCA Commissioner shall be afforded protection as provided in Minn. Stat. ch. 13 and §§ 115B.17, subd. 5 and 116.075 and applicable procedural rules of the MPCA. If no request for non-public treatment accompanies the information when it is submitted to the MPCA Commissioner, the information may be made available to the public by the MPCA Commissioner without further notice to 3M.

XXIII.

Recovery of Expenses

A. Within thirty (30) days of the effective date of this Agreement, 3M shall pay to the State of Minnesota, by check payable to the Minnesota Pollution Control Agency, the sum of Five Hundred Ninety-eight Thousand Six Hundred Ninety-two Dollars ($598,692.00) as reimbursement of the MPCA's costs as provided in Part XXIII.C. Payment of this sum shall be
in full and complete satisfaction of 3M’s obligation to reimburse costs under Part XXIII.C. incurred by MPCA through April 30, 2007.

B. 3M agrees to reimburse the MPCA for reasonable and necessary costs incurred by MPCA to implement or oversee implementation of this Agreement including administrative and legal expenses, including costs incurred to perform response actions which 3M suspends or intends to suspend pending resolution of a dispute under Part X of this Agreement (Resolution of Disputes).

C. 3M agrees to reimburse MPCA for all reasonable and necessary costs incurred by MPCA under Minn. Stat. § 115B.17, subd. 2, 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 Sites or to other releases that are associated with wastes generated by 3M facilities in Minnesota. Releases from the Washington County Landfill are not included in this Part XXIII.C.

D. 3M agrees to provide to MPCA a grant in an amount up to Five Million Dollars ($5,000,000) for expenses not reimbursable under Paragraphs B and C incurred for the purpose of investigating and assessing the presence and effects in the environment and biota of any PFC for which response actions are required under Parts V to VIII of this Agreement, including sampling and analysis of any or all of the following: ground water and leachate at closed and operating landfills; discharges from wastewater treatment plants; ambient air and ground water; and surface water, sediment and biota samples. MPCA will consult with 3M on the scope of such investigation and assessment and will consider 3M’s comments in the selection of appropriate research.
3M agrees to pay $2,000,000 of the grant agreed to in this Paragraph D thirty days after written request for payment by the MPCA. In addition, 3M agrees to pay 50 percent of the cost of research as described in this Paragraph D. incurred by MPCA in State fiscal years 2009 to 2011, up to an additional amount of $1,000,000 in each of those fiscal years. Subject to the limitations as provided in this Paragraph D, 3M agrees to make payments in fiscal years 2009 to 2011 within 30 days of written notice from MPCA that the agency has incurred contract obligations, or staff or administrative costs, in that fiscal year for research as described in this Paragraph D. In no event shall the total amount of the grant which 3M is obligated to make under this Paragraph F exceed $5,000,000.

3M agrees to meet and confer with MPCA during State fiscal year 2011 concerning MPCA’s plans for additional research as described in this Paragraph D and the estimated cost of such additional research and, if requested by MPCA, 3M agrees to enter into discussions concerning 3M’s possible future participation in the cost of such additional research.

E. 3M shall pay any sum required to be reimbursed under Paragraph B or C of this Part to the State of Minnesota by check payable to the Minnesota Pollution Control Agency within sixty (60) days following receipt of the MPCA Commissioner's reimbursement statement. 3M shall pay interest determined pursuant to Minn. Stat. § 549.09, subd. 1(c), on any amounts not paid to the MPCA within the time required in this Part.

F. 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. For costs recoverable under Paragraph B or C, the MPCA is entitled to the presumption provided in MERLA, Minn. Stat. § 115B.17, subd. 6.
XXIV.

Liability Insurance

Within 60 days of the effective date of this Agreement, 3M shall provide the MPCA Commissioner with current certificates of insurance for its work at each Site certifying coverage with respect to each Site for general liability with minimum limits of Three Million Dollars ($3,000,000) per occurrence and with an annual aggregate of at least Six Million Dollars ($6,000,000), exclusive of legal defense costs, for bodily injury and property damage liability that may arise from or on account of acts or omissions of 3M, its officers, employees or contractors in implementing this Agreement. The insurance coverage shall provide that it cannot be canceled for any reason except after thirty (30) days written notice to the MPCA Commissioner. The coverage shall include the MPCA as a named insured and, upon request of the MPCA Commissioner, shall include as a named insured any owner of real property where response actions are to be taken pursuant to this Agreement. These insurance limits are not to be construed as maximum limits. 3M is solely responsible for determining the appropriate amount of insurance 3M should carry for injuries or damages resulting from its activities in the implementation of this Agreement. 3M may satisfy the requirements of this Part XXIV by providing certificates of insurance showing that the required coverage has been provided by contractors retained by 3M to perform the work required under this Agreement, and that 3M is an additional named insured under such insurance.

XXV.

Covenant Not to Sue

A. In consideration for and conditioned upon 3M’s performance of the terms and conditions of this Agreement, subject to the reservations set forth in Paragraph B of this Part
XXV, and based on the information known to the MPCA on the effective date of this Agreement, the MPCA covenants not to bring against 3M any administrative, legal or equitable action available to the MPCA under Minn. Stat. §§ 115.071, 115B.04, 115B.17, subd. 6 (including claims for MPCA administrative and legal expenses), or 115B.18 (including civil penalties), or other state law to require 3M to take or pay the cost of response actions to address any discharge, release or threatened release of PFCs, at or from the Sites known to the MPCA on the effective date of this Agreement.

B. Nothing in this Agreement shall preclude the MPCA from exercising any administrative, legal or equitable remedy available to it to require 3M to take or pay the cost of response actions in addition to the requirements of this Agreement in the event that:

1. MPCA discovers any discharge, release or threatened release of pollutants or hazardous substances at or from any of the Sites which was not known to the MPCA on the effective date of this Agreement; or

2. the implementation of the requirements of this Agreement is insufficient to protect public health or welfare or the environment with respect to any discharge, release or threatened release of hazardous substances at or from any of the Sites which is addressed under this Agreement.

C. This Agreement shall not be construed to release 3M from any liability 3M may have for failing to disclose information responsive to Part XIII.B. to the MPCA before the effective date of this Agreement if 3M had a duty under any law to disclose such information to MPCA before the effective date of this Agreement.

D. Except as specifically identified in Paragraph A, this Agreement shall not be construed as releasing 3M from any liability arising out of or relating to the discharge, release or
threatened release of pollutants or hazardous substances at or from any of the Sites, including any liability for natural resource damages or related assessment costs.

E. Nothing in this Agreement shall limit the authority of the MPCA to seek civil penalties under Minn. Stat. § 115.071, 115B.18, subd. 1, or any other law for noncompliance with this Agreement.

F. 3M covenants not to sue and agrees not to assert any claim, which 3M could have brought against the MPCA at the time of execution of this Agreement and which arises out of or relates to the discharge, release or threatened release of PFCs or VOCs at or from any of the Sites. In addition, as of the effective date of this Agreement: (1) 3M’s April 19, 2007 petition for rulemaking requesting MPCA to engage in rulemaking under Minn. Rule ch. 7045 shall be deemed withdrawn by 3M; and (2) 3M waives any rights which it may have to appeal the MPCA Board’s denial of its April 19, 2007 requests for contested case hearing under Minn. R. 7045.0218 and Minn. R. 7000.1900.

XXVI.

Enforceability

The terms of this Agreement shall be legally enforceable by either party in Minnesota District Court for Washington County.

XXVII.

Failure to Comply With Obligations Under The Agreement

A. For each day that 3M fails to comply with an obligation under this Agreement, within the time required in this Agreement or any Exhibit to this Agreement, or under any other schedule approved or modified by the MPCA Commissioner pursuant to this Agreement, 3M
shall be obligated to pay to the State of Minnesota, by check payable to the Minnesota Pollution Control Agency, the sum of Five Hundred Dollars ($500).

B. 3M shall not be liable for payment under this Part if 3M has submitted to the MPCA Commissioner a timely request for an extension of time to comply with the obligation under Part XXIX (Extension of Schedules) of this Agreement and the request has been granted.

C. Upon determination by the MPCA Commissioner that 3M has failed to comply in a timely manner with an obligation under this Agreement, the MPCA Commissioner shall give written notice to 3M of the failure, specifying the provision of the Agreement which has not been complied with and the date that penalties began to accrue under this Part XXVII. 3M retains the right to dispute under Part X (Resolution of Disputes) the factual basis for the MPCA Commissioner's determination that 3M has failed to comply with an obligation under this Agreement in a timely fashion. Notwithstanding the provisions of Part X, Paragraphs D to H, if 3M initiates a dispute under Part X of this Agreement regarding the MPCA Commissioner’s determination of failure to comply, and the MPCA Commissioner issues an order deciding the dispute under Part X, Paragraph C, 3M shall have fourteen (14) days from receipt of the Commissioner’s order to commence an action to review the Commissioner’s decision. If an action is not commenced within that period, the Commissioner’s order shall become final and an integral and enforceable part of this Agreement. In all other respects, the review of the Commissioner’s decision shall be as provided in Part X, Paragraphs H and I.

D. Penalties under this Part shall accrue from the date on which 3M was required to comply with the obligation. Payments required by this Part shall cease to accrue when 3M complies with the obligation. 3M shall pay the required penalty within thirty (30) days of receipt of the MPCA Commissioner's notice of non-compliance, and shall pay any subsequently
accruing penalties within thirty (30) days after correcting the non-compliance for which the penalties were imposed.

XXVIII.

Extension of Schedules

3M may request an extension of time to comply with any obligation under this Agreement, including any deadline under Exhibits A to F to this Agreement, by submitting the request in writing at least ten days before the scheduled deadline, or as soon as possible before that date if the reason for the extension request arises less than ten days before the deadline. The request shall specify the reason why the extension is needed. Extensions shall only be granted for good cause and for such period of time as the MPCA determines is reasonable under the circumstances. A requested extension shall not be effective until approved by the MPCA.

The burden shall be on 3M to demonstrate that the request for extension is timely and that good cause exists for granting the extension.

Good cause for granting an extension includes, but is not limited to:

A. "Force majeure". For the purposes of this Agreement, "force majeure" is defined as any event arising from causes beyond the control of 3M that cannot be overcome with the exercise of due diligence and that delays or prevents the performance of any obligation under this Agreement. "Force Majeure" shall not include financial considerations such as increased costs of the remedial action or the financial condition of 3M, or the failure to timely apply for any required approvals or to provide all required information therefore in a timely manner;

B. Stoppage of work under Part XII (Creation of Danger) if the work stoppage was not the result of any noncompliance by 3M with this Agreement, including the Exhibits thereto;
C. Delays associated with the good faith invocation by 3M of Part X (Resolution of Disputes) of this Agreement, when portions of this Agreement cannot reasonably be implemented pending resolution of the dispute; and,

D. Delays which are directly attributable to any changes in permit terms or conditions or refusal to issue a permit needed to implement the requirements of this Agreement, as contemplated under Part XI (Permits) of this Agreement, if 3M filed a timely application for the necessary permit.

Good cause for an extension does not include unanticipated costs or delays in MPCA review of Submittals when the Submittals are not provided to MPCA in complete and approvable form.

**XXIX. Financial Responsibility**

Before 3M commences construction of an MPCA-approved remedial action, MPCA may require 3M to submit to the MPCA evidence of financial assurance regarding the financial ability of 3M to complete construction of the remedial action, carry out long-term operation, maintenance and monitoring of the remedial action, and take contingency actions in the event that the remedial action fails to meet remedial objectives or cleanup levels. The amount and form of financial assurance required by this Part are subject to approval by the MPCA.

**XXX. Amendment of Agreement**

This Agreement may be amended only by a written agreement between 3M and the MPCA.
XXXI.

Successors

This Agreement shall be binding upon 3M Company, its successors and assigns, and upon the MPCA, its successors and assigns.

XXXII.

Termination and Survival of Certain Provisions

The provisions of this Agreement shall be deemed satisfied and terminated upon receipt by 3M of written notice from the MPCA Commissioner that 3M has demonstrated to the satisfaction of the MPCA Commissioner that all the terms of this Agreement have been completed. The provisions of Parts XVII (Retention of Records), XIX (Hold Harmless Agreement), XX (Other Claims), XXV (Covenant Not To Sue), XXXI (Successors), and to the extent necessary to enforce those sections, Section XXVI (Enforceability), shall survive the termination of this Agreement.
XXXIII.

Effective Date

This Agreement is effective upon the date that the MPCA executes this Agreement.

BY THEIR SIGNATURES BELOW, THE UNDERSIGNED REPRESENT THAT THEY HAVE AUTHORITY TO BIND THE PARTIES THEY REPRESENT

IT IS SO AGREED:

For 3M Company:

By: Katherine E. Reed
Katherine E. Reed, Ph.D.
Staff Vice-President
Environmental, Health and Safety Operations
3M Company

[Signature]
3/11/07
Date

IT IS SO AGREED AND ORDERED:

By: Brad Moore, Commissioner
Minnesota Pollution Control Agency

Effective Date
CONSENT ORDER

In the matter of Releases and Discharges of Perfluorochemicals at and from Sites in Washington County, Minnesota, and Certain Related Matters

EXHIBIT A
3M COTTAGE GROVE SITE

Remedial Investigation/Feasibility Study

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I. INTRODUCTION, PURPOSE, AND REQUIREMENTS

I.A. Introduction and Background

Part V.B of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) at and from Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit A (Exhibit) is appended, requires 3M to conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release(s) or threatened release(s) of PFCs at and from the 3M Cottage Grove Disposal site (Site). This Exhibit sets forth the requirements for completing the RI/FS and is appended to and made an integral part of the Consent Order.

In February 2002, 3M informed the MPCA staff that PFOA and PFOS had been detected in on-site ground water production wells at the 3M Cottage Grove facility. Subsequent sampling requested by MPCA staff confirmed ground-water contamination by PFOA and PFOS near one of the on-site disposal areas in February 2003. MPCA staff subsequently requested that 3M conduct a facility-wide assessment to determine extent and magnitude of potential releases of PFOA and PFOS to the environment.

In December 2004, 3M submitted a facility-wide work plan, entitled Facility-wide Fluorocchemical (FC) Investigation Work Plan, to assess releases of PFCs at the 3M Cottage Grove facility. This work plan was approved by the MPCA staff in January 2005. This work plan, implemented in 2005, documented releases of PFOA and PFOS to ground water, soil, surface water, and sediments on the 3M Cottage Grove facility and in the adjacent Mississippi River. 3M submitted the report of these findings, entitled Fluorochemical (FC) Data Assessment Report in April 2006. Based on the information gathered during this first PFC investigation, in June 2006 the MPCA staff requested that 3M conduct a second phase investigation to determine the extent and magnitude of releases of PFOA and PFOS to the environment, and to evaluate appropriate response actions to address the releases. This request included the requirement that 3M was to expand the sample analyte list for additional PFCs. This expanded list included Perfluorobutanoic Acid (PFBA); and was to be used for all future investigations at the Cottage Grove Site, the 3M Oakdale Disposal Site and 3M Woodbury Disposal Site.

3M submitted a work plan in August 2006, entitled Phase II FC Assessment Work Plan in response to MPCA staff's request, which was subsequently approved by the MPCA staff in September 2006. Sampling activities have been completed for this second phase.

An RI Report addressing all of the investigative work required under the MPCA approved Phase II FC Assessment Work Plan shall be submitted to MPCA by June 30, 2007. Upon MPCA approval of the RI Report, the approved RI Report and the April 2006 Fluorochemical (FC) Data Assessment Report shall be deemed to meet the RI Report requirements specified in section III. E. of this Exhibit.
This generic RI/FS process is intended to address all aspects of a release or potential release upon
discovery. Given that significant RI work has already been initiated for this Site, certain items outlined in
this Exhibit may be determined by the Commissioner as not applicable or not required.

Supplemental remedial investigations or feasibility studies may be necessary and due dates for submittal
of these reports will be established by the MPCA.

I.B. Purpose

The purpose of conducting an RI/FS is to provide information necessary to enable the
Minnesota Pollution Control Agency (MPCA) Commissioner to select a final remedy for the
Site.

In order to arrive at remedy selection in the most expedient manner, the RI and FS activities
will be conducted concurrently. The RI/FS Work Plan shall propose:

° the RI activities; and
° a list of possible remedial technology types.

The RI Report shall:

° report the results of the RI; and
° document the development and screening of possible response action alternatives.

The FS Report shall present:

° the results of treatability studies; and
° the Detailed Analysis Report (DAR).

I.B.1. Remedial Investigation. The RI activities will (1) provide for the complete characterization of
the release(s) or threatened release(s) of PFCs at or from the Site and the actual or potential
hazard the release(s) or threatened release(s) pose to public health and welfare, and the
environment; (2) produce sufficient data and information to allow 3M to submit the RI and
FS reports (Part III.E and III.F); and (3) produce data of sufficient quantity and adequate
technical content to assess the possible alternative response actions during the FS.

I.B.2. Feasibility Study. The FS activities consist of developing a list of technology types,
development and screening of possible response action alternatives, preparing and conducting
treatability studies, and conducting a detailed analysis of evaluated alternatives. The MPCA
Commissioner will review the FS Report and select the final response action(s) using the
Selection of Remedy Criteria set forth in Part IV.C. of this Exhibit.
I.C. Requirements

The RI/FS shall be conducted according to the provisions of this Exhibit. The United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (October 1988 Interim Final) will provide 3M with specific guidance for completing the actions required under this Exhibit to the extent that this guidance is consistent with the requirements of this Exhibit. The sampling and quality assurance activities (Part III.C.3) shall be consistent with the requirements of the USEPA Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80). Risk assessments (i.e., evaluation, quantitation, tabulation of results, and mechanics of presentation) performed under this Exhibit (Part III.C.6.) shall be based on appropriate MPCA requirements, USEPA's "The Risk Assessment Guidelines of 1986" (EPA/600/8-87/045), "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A, December 1989, Interim Final) and the USEPA Risk Assessment Guidance for Superfund, Vol. 2, Environmental Evaluation Manual (March 1989, Interim Final).

At a minimum, the Site Security and Safety Plan (Part III.C.8) shall incorporate and be consistent with the requirements of:
- OSHA requirements 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response;
- OSHA requirements 29 CFR Part 1910 (General Industry Standards) and 1926 (Construction Industry Standards);

As new versions or future revisions of the documents referenced in this section become available to the public, the latest version of each document shall supersede all previous versions of that document and shall be used for conducting the RI/FS.

II. RETAIN CONSULTANT

3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit. If 3M’s consultant is different from the consultant used for previous RI work at the Site, 3M shall notify the MPCA Project Manager of the name of that consultant.

III. REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

III.A. RI/FS Objectives

The objectives of the RI/FS are to:
- identify all sources of contamination;
- evaluate the nature and extent of soil, sediment, surface water, ground water, and air contamination at the Site and in any adjacent areas affected by contamination at or from the Site;
- identify all existing and potential migration characteristics and pathways for the PFCs identified at the Site, including the direction, rate, and dispersion of contaminant migration;
identify alternative response actions and evaluate the feasibility and effectiveness of implementing those alternative response actions to prevent, minimize, or eliminate release(s) or threatened release(s) of PFCs at or from the Site; and

° collect and evaluate the information necessary to prepare a remedial design/response action plan in accordance with Exhibit B to the Consent Order.

III.B. FS Work Plan Submittal

By June 30, 2007, 3M shall submit to the MPCA Commissioner for approval pursuant to Part IV.B. and IV.B.1. of this Exhibit, a proposed FS Work Plan and implementation schedule which details all of the activities necessary to complete the FS. The proposed FS Work Plan shall be prepared to enable 3M to meet the FS Objectives (Part III.A) and shall, at a minimum, address all of the elements described in Part III.C.4.

III.C. RI/FS Work Plan Contents

The proposed RI/FS Work Plan shall address, at a minimum, each of the following elements:

III.C.1. Project Management. A Project Management section of the RI/FS Work Plan shall describe how the RI/FS will be managed by 3M and its contractors, subcontractors, and consultants. This section shall include an organization chart with the names and titles of key personnel and a description of their individual responsibilities.

III.C.2. Background Evaluation. The RI/FS Work Plan shall include a Background Evaluation that includes these sections: Operational History, Topographic Survey, History of Site Assessment Work and Remedial or Removal Actions, and Identification of Data Gaps.

III.C.2.a. Operational History of The Site. This section shall include a detailed explanation of the operational history of the Site (i.e., all past facilities and a description of their specific operations), including history of property ownership boundaries, and pertinent area and boundary features of the Site. In addition, this section shall include the following detailed information related to the release(s) or threatened release(s) of PFCs at the Site:
° a list of the PFCs that have been stored, used, treated, or disposed of on-Site and their estimated volumes, concentrations, and characteristics;
° a description of what, where, when, how and by whom PFCs were released during the operation of all facilities of record at the Site (e.g., Provide an explanation of how the Site or a specific area became contaminated);
° a description of contaminant source areas and facilities which release or threaten the release of PFCs to soil, sediment, surface water, ground water, or air;
° a Site map delineating each area where such PFCs were disposed, treated, stored, transferred, handled, or used;
° a description of all industrial processes which are or were related to the use or generation of each PFC; and
° a description of past disposal practices for PFCs.

Any historical research needs that have not been met by file review may be met by conducting employee interviews, reviews of 3M's records, and aerial photograph investigations.

III.C.2.b. Topographic Survey. This section shall include a description of the general physiography of the Site and surrounding area and one (1) Site map using a one (1) inch = 1000 feet scale and ten (10) foot contour interval.
Additional maps for each identifiable contaminant source area shall be provided using a one (1) inch = 50 feet scale and a two (2) foot contour interval. Surface water features, drainage direction, buildings, process areas, storage tanks, well locations, forested areas, utilities, paved areas, easements, rights-of-way, pipelines (surface and subsurface), landfills, borrow pits, debris piles, raw material piles, and impoundments shall be shown. The maps shall be of sufficient detail and accuracy to locate all current or proposed future work at the Site.

III.C.2.c. History of Site Assessment Work and Remedial or Removal Actions. This section shall include a history of all previous investigation(s) and response action(s) conducted at the Site including:

° a detailed description of regional and local hydrogeology and geology based on published literature and available technical information. Cross Sections and maps shall be included. Include the type and extent of surface soils as presented in the Soil Conservation Service soil surveys;
° a summary of all soil, surface water, ground water, and air assessment work completed to date, including contaminant source area identification, data reduction and interpretation, and the QA/QC procedures which were followed;
° a description of the nature and extent of the release(s) and/or threatened release(s), including a summary of actual and potential on-Site and off-Site health and/or environmental effects; and
° a summary of any previous remedial or removal actions conducted at the Site. This summary shall include cleanup activities and any related field inspections, sampling surveys, or other related technical investigations.

III.C.2.d. Identification of Data Gaps. Gaps in information (data gaps) necessary to fulfill the RI/FS Objectives (Part III.A) shall be identified and recommendations shall be made for additional RI work necessary to meet the RI/FS Objectives and produce sufficient information to support the screening and detailed analysis of response action alternatives in the RI/FS. For each data gap identified, 3M shall provide a list and description of research and field activities necessary to address that data gap.

III.C.3. Sampling and Investigations. The RI/FS Work Plan shall propose activities and methodologies necessary to conduct the investigations specified in Parts III.C.3.c, d, e and f, III.C.6. and propose the plans specified in Parts III.C.3.a and b.

III.C.3.a. Sampling and Analysis Plan. A comprehensive sampling and analysis plan shall be proposed for the investigations required under Parts III.C.3.c, d, e, and f, and III.C.6 below. This plan shall include:

° objectives of the sampling investigation;
° criteria for sampling location selection;
° a map showing all locations that will be sampled;
° a description of the types of samples which will be collected;
° a description of the depth/frequency of sampling at each location;
° a proposed sampling schedule;
identification of all chemical parameters to be analyzed (analytes), selection rationale, and a corresponding list of chemical analytical methodologies (including USEPA or Standard Method numbers and detection limits) to be performed. Prior to determining a final analyte list, analytes of concern should be separated into carcinogens and non-carcinogens. In addition, representative ground water samples shall be analyzed to identify natural chemical constituents that may affect various treatment methods or that may identify upgradient sources of contamination;
abiotic and biotic environmental sampling shall be proposed to complete the assessment process required under Part III.C.6. The technical specifications and procedures for soil sampling methods, drilling methods, borehole and surface geophysical methods, and monitoring well and piezometer installations. ASTM procedures shall be used and referenced where appropriate and available;
provisions for obtaining access to and obtaining samples from the Site and other affected properties (where appropriate);
a description of quality assurance/quality control procedures for the collection, identification, preservation, holding times, and transportation of samples; type and volume of sample containers;
the calibration and maintenance of field instruments; decontamination of sampling equipment; and the processing, verification, storage, calculations and statistics, and reporting of field data including field chain-of-custody procedures, identification of qualified persons conducting the sampling, and identification of a laboratory meeting the requirements of Part III.C.3.b.; and

a description of any computer models to be employed in data analysis. Model descriptions shall include capabilities and limitations, all assumptions or approximations that will be made in calibrating and using the model, specific objectives to be achieved with the model, and justification for use of the model method including a discussion of why the model is the preferred model or method for meeting the objectives stated in the RI/FS Work Plan. The quantities or values that are desired from the model that are not confirmed by direct measurement shall be identified and the sensitivity of the model results to input parameters discussed. All data and programming including any proprietary programs shall be made available to the MPCA staff upon request.

III.C.3.b. Laboratory QA/QC Plan. The RI/FS Work Plan shall include a laboratory QA/QC plan which shall consist of the following sections:

identification of laboratories performing analysis;
description of laboratory sample chain of custody procedures;
description of calibration procedures and frequency;
description of analytical standard operating procedures;
description of data reduction, validation, and reporting procedures;
description of internal quality control checks;
description of performance and system audits;
description of preventative maintenance procedures;
description of specific procedures for routine assessment of data precision, accuracy, completeness, and any necessary corrective action; and
description of quality assurance reports to management.

Refer to EPA QA/QC guidance, which is available through the internet, at http://es.epa.gov/ncer/guidance/qa.html

III.C.3.c. Geologic Investigation. This section of the RI/FS Work Plan shall provide a description of the proposed activities which will be undertaken to characterize the geology and contaminant
distribution at the Site and other affected properties. The geologic investigation shall be conducted in areas of known and suspected disposal and in areas where ground water contamination exists and no known or suspected contaminant source area has been identified. This section shall include the following:

- a proposal to define the stratigraphy of the consolidated and unconsolidated deposits including the identification of high or low permeability lenses of material in the unsaturated (vadose) zone which may affect contaminant migration or the attenuation of contaminants. This proposal shall also include the extent and type of lithologies of respective consolidated units and unconsolidated materials including relative amounts of organic matter, gravel, sand, silt, and clay according to ASTM soils classification scheme or other acceptable standard procedures;
- proposed tests to define the physical and chemical properties which affect the movement or attenuation of contaminants in the stratigraphic units identified above. These properties include: density, organic matter content, cation exchange capacity, percent clay content, vertical hydraulic conductivity, total porosity, effective porosity, and adsorption potential (Kd). See the soil cleanup guidance for additional parameters.
- proposed methods to define the nature and extent of contamination in the vadose zone;
- a proposal to identify areas disturbed by excavations or other activities that may be routes of contaminant migration (e.g., buried pipes, utility corridors, fill areas, tank basins); and
- a proposal to identify ambient concentrations of analytes in the soil.

III.C.3.d. Hydrogeologic Investigation. This section of the proposed RI/FS Work Plan shall provide a description of activities to be undertaken to characterize the local and regional hydrogeology and the contaminant distribution in the ground water at the Site and other affected properties. This section shall include the following:

- a proposal to identify Quaternary (glacial) and bedrock aquifers, aquitards, and perched water zones;
- a proposal for the installation and development of ground water monitoring wells and/or piezometers or other devices needed to clearly define ground water flow conditions in the glacial and bedrock aquifers, aquitards, and perched water zones. All wells shall be surveyed to the National Geodetic Vertical Datum reference elevation, and procedures shall be specified for measuring water elevations in all wells to the nearest hundredth of a foot;
- a proposal for the installation of ground water monitoring wells which shall be used to define ground water quality upgradient, within, and downgradient of suspected and/or identified contaminant source areas and at the interface between ground water and surface water;
- a proposal for a ground water quality monitoring program to be conducted to define the nature and extent of ground water contamination at the Site and other affected properties. Municipal, industrial, agricultural, domestic and monitoring wells, and springs shall be considered for inclusion in the monitoring program. The monitoring program shall have a minimum frequency of quarterly sampling with water level measurements;
- proposed tests (e.g., slug and/or pumping tests to determine the hydraulic properties, including horizontal hydraulic conductivity and secondary porosity, of aquifers and aquitards at the Site and other affected properties) which shall define ground water flow relationships (directions, gradients, and velocities for both vertical and horizontal flow components) including potential aquifer interconnections, recharge areas, discharge areas, and ground water interactions with surface water. In addition, this section shall propose how the flow relationships will be evaluated with respect to contaminant distribution and the potential future movement of contaminants;
- a proposal to define ground water use(s) and the potential effect water use(s) may have on contaminant movement in both horizontal and vertical directions. Include with this proposal an inventory map showing all active, unused, and abandoned municipal,
industrial, agricultural, domestic and monitoring wells, and springs within a one mile radius of the Site, and of high capacity wells and municipal water supply wells within a three mile radius of the Site; and

- a description of visual aids which will be used to present, in the RI Report, the hydrogeologic and hydrogeochemical data gathered during the Hydrogeologic Investigation (e.g., cross sections, piezometric maps, isoconcentration maps, graphical methods, and tables).

III.C.3.e. **Surface Water Investigation.** This section of the RI/FS Work Plan shall identify all surface water bodies within a one mile radius of the Site including rivers, lakes, ponds, wetlands, bogs, calcareous fens, low-flow streams, creeks, springs, and named and unnamed ditches. Both perennial and intermittent surface water features shall be identified. A map showing the locations of all identified surface water bodies and the location of known or suspected releases of contaminants from the Site to surface water bodies shall be included. This section shall include a proposal to evaluate each surface water body identified, evaluate its potential to be impacted by Site contaminants through releases via ground water, surface run-off, drainage, airborne deposition, and other possible pathways. This proposal shall include a plan to identify the benthic sediments and benthic and other aquatic community conditions underlying and within surface water upgradient, adjacent to, and downgradient of the contaminant source area. In addition, methodologies shall be proposed to determine the mass loading of contaminants to the surface water bodies.

The water use classification for the identified surface water body or bodies, in accordance with Minn. R. ch. 7050 and the wetlands classification in accordance with Minn. Stat. §§ 103G.005, subds. 15 and 18 and 103G.201 (1988), shall be included. Identification of the water use characteristics (e.g., agricultural, recreational, and private or municipal water supply) of the identified surface water bodies shall also be included.

III.C.3.f. **Air Investigation.** This section of the RI/FS Work Plan shall propose methodologies for investigations to determine the nature and extent of contaminants that are or may become airborne (e.g., vapors, gases, mists, or particulates) through either natural phenomenon or as a result of activities at the Site.

III.C.4. **List of Possible Technology Types and Proposed Treatability Studies.** The RI/FS Work Plan shall include a comprehensive list of technology types that may be applicable to the release(s) or threatened release(s) at or from the Site. This list shall be developed considering the Remedy Selection Criteria (Part IV.C.). This list shall include: 1) technology types that prevent or eliminate the release(s) or threatened release(s) by completely destroying, detoxifying, or immobilizing PFCs and leave materials on-Site that require no long-term management; 2) technology types that prevent or minimize the release(s) or threatened release(s) by treatment process options that reduce the toxicity, mobility, or volume of the PFCs 3) technology types that control the threats posed by the release(s) or threatened release(s) of PFCs by excavation, isolation and containment; and 4) a general description of the treatability studies necessary to evaluate the respective technology types identified under 1, 2 or 3 above. Where ground water treatment is part of a remedy alternative, activated carbon and anionic resin filtration methods shall be considered.

III.C.5. **Record Retention.** The RI/FS Work Plan shall provide a description of how the data obtained pursuant to this Exhibit will be managed and preserved by 3M in accordance to the Consent Order.

III.C.6. **Risk Assessment.** The RI/FS Work Plan shall provide a detailed description of activities that will be undertaken to conduct separate ecological and human health Baseline Risk
Assessments. Ecological and human health Baseline Risk Assessments are evaluations of the actual and potential threat to public health and welfare, and the environment posed by the release(s) or threatened release(s) of PFCs, in the absence of any remedial action.

The risk assessment activities shall be conducted so as to generate the information necessary to meet the reporting requirements of the Baseline Risk Assessment as specified in Part III.E.2.

Formats, technology, and mathematical symbols used in the Baseline Risk Assessments shall correspond as closely as possible to those presented in EPA's Superfund risk assessment guidance referred to under Part I.C. Any alternative formats, technology, mathematical models shall be proposed in the RI/FS Work Plan.

III.C.7. Site Security and Safety Plan. A Site-specific security and safety plan shall be prepared as a separate part of the RI/FS Work Plan, describing all measures including contingency plans and Site access restrictions which will be implemented during field activities to (1) ensure protection of public health and welfare, and the environment and (2) protect the health and safety of personnel involved in the RI/FS. These measures should consider the recommendations in the February 2005 Health Consultation, prepared by the Minnesota Department of Health.

III.C.8. Community Relations. The RI/FS Work Plan shall include a community relations section providing procedures for (1) informing local residents, municipalities, environmental groups, and interested parties about activities at the Site; (2) responding to inquiries from concerned citizens; and (3) cooperation with the MPCA Community Relations efforts. Refer to the MPCA community relations guidance document, entitled “Community Involvement in Risk Based Decision Making”, located on the MPCA web site at http://www.pca.state.mn.us/cleanup/pubs/coor9_98.pdf.

III.D. FS Work Plan Implementation

Within ninety (90) days of the MPCA Commissioner approval of the RI Report and FS Work Plan, 3M shall submit a FS Report. The FS shall be conducted in accordance with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Minn. Stat. ch. 103I and Minn. R. ch. 4725 for the installation of any ground water monitoring wells.

Any necessary additional RI activities not included in RI/FS Work Plan shall be identified and proposed in the quarterly reports submitted pursuant to Part III.E of the Consent Order. The impact of the additional RI activities on the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4) shall also be described in the quarterly reports. If any additional RI activities will adversely affect work scheduled through the end of the upcoming month or will require significant revisions to the approved RI/FS Work Plan, 3M shall notify the MPCA Project Manager immediately of the situation followed by a written explanation within ten (10) days of the initial notification.

III.E. Remedial Investigation Report

The RI Report shall detail: (1) the data and results of the RI; (2) baseline risk assessment; and (3) screening of possible response action alternatives shall be prepared and submitted to the MPCA Commissioner. The RI Report shall organize and present all data generated as a result of implementation of the approved RI/FS Work Plan including, at a minimum, analytical results, assessment of completion of QA objectives, boring logs, field data sheets,
and test results including data reduction and interpretation of all results. Further, the RI Report shall include:

III.E.1. **Nature and Extent of the Release or Threatened Release.** The RI Report/FS Workplan shall include a description of the following:

° the nature and extent of PFCs released or threatened to be released to the soils, surface water, sediments, ground water, and air;

° the contaminant fate and migration pathways within each media;

° an evaluation of the reliability, and accuracy of the results of any computer models employed for data interpretation.

III.E.2. **Baseline Risk Assessment.** The results of two Baseline Risk Assessments, one addressing human health risks and one addressing ecological risks (Part III.C.6.), shall be reported as separate chapters in the RI Report.

Each chapter of the Baseline Risk Assessment shall include an executive summary written in layman's terms. A narrated videotape walk-through of the Site and surrounding areas shall be included to highlight information presented in the Baseline Risk Assessment text.

The risk assessment reports shall provide:

III.E.2.a. **Data Evaluation.** An evaluation of the results of the RI showing the actual and projected concentrations of PFCs present in relevant media (e.g., soil, surface water, ground water, air, sediment, and biota).

III.E.2.b. **Toxicity Assessment.** An identification of the hazard and toxicological properties of each contaminant identified through sampling and investigations. A comparison between the list of contaminants known to have been deposited on the Site versus those found through analyses. Identification of the chemical specific Applicable or Relevant and Appropriate Requirements (ARARs) for PFCs identified at the Site.

III.E.2.c. **Exposure Assessment.** A comprehensive exposure pathways table. An inclusion/exclusion analysis and supporting rationale shall be included for each pathway. Following the inclusion/exclusion analysis, a determination of the extent and likelihood of exposure to contaminants at or from the Site. Identification of the potential receptor populations. Provide in-depth environmental fate and transport analysis for completed exposure pathways including physical and biological degradation processes and hydrogeologic conditions.

III.E.2.d. **Risk Characterization.** Both a maximum exposure case analysis and a Reasonable Maximum Exposure (RME) shall be provided for each pathway.

III.E.2.e. **Uncertainty and Sensitivity Analysis.** If there is or will be more than one analyte of concern associated with the Site, a chemical mixtures risk assessment addressing additivity and synergism shall be conducted and reported upon.

As part of the uncertainty analysis a Synergistics Effects Uncertainty Analysis (SEUA) shall be conducted and reported upon which assumes risks posed by conditions at the Site may be underestimated by an additivity based risk characterization. The SEUA shall provide modified remediation levels necessary to compensate for possible synergistic effects.

III.E.3. **Development and Screening of Response Action Alternatives.** The RI Report/FS Workplan shall include a Development and Screening of Response Action Alternatives chapter that provides an evaluation of (a) each of the response action alternatives assembled from the List
of Possible Technology Types and Proposed Treatability Studies (Part III.C.4), except for those technology types that have been eliminated from further consideration by the MPCA Commissioner in approving the RI/FS Work Plan, and (b) any other technology types identified by 3M or the MPCA Commissioner prior to approval of the RI Report.

The purpose of this chapter is to document the development of response action alternatives by combining or assembling technology types and their respective process options which will be applied to specific operable units or the Site as a whole. After the response action alternatives have been developed, they will be screened to assure that only those alternatives that will likely achieve the response action objectives and cleanup levels (Part IV.A.) will be retained for further analysis in the DAR.

III.E.3.a. Describe Process Options and Document the Screening of Response Action Alternatives. All development and screening decisions shall be thoroughly documented. This documentation shall include both written description and summary tables.

The development and screening of response action alternatives is accomplished by conducting the following tasks:

Development

From the list of technology types, as approved in the RI/FS Work Plan, develop the response action alternatives by describing the process options for each technology type and assemble the technology types with respective process options into response action alternatives. This step is accomplished by following the procedures outlined below:

- array the technology types and describe all possible process options for each technology type;
- for each process option, list the action and location specific ARARs;
- establish the volumes of contaminants and the volumes and types of contaminated media or areas of the Site to which the response action alternative will be applied (e.g. operable units); and
- assemble one or more technology type(s) and the respective process option into one response action alternative.

Screening

Once the response action alternatives have been developed, the response action alternatives are evaluated and screened using the Site Specific Response Action Objectives and Cleanup Levels (Part IV.A). Those response action alternatives that do not meet the Response Action Objectives and the Cleanup Levels are eliminated from further consideration. Response Action Alternatives that pass this screening are designated as "evaluated alternatives" and shall be further evaluated in the DAR.

3M shall provide its recommendation and rationale regarding which response action alternatives should not be given further consideration for implementation at the Site.

III.E.3.b. Treatability Studies. This chapter of the RI Report shall provide:

- a description of all completed treatability studies and the results of any pilot studies, bench tests, or other activities that were performed to evaluate technology types and process options; and
- proposals, with time frames, for any additional treatability studies that are needed to further evaluate any response action alternatives that pass the screening and are to be further analyzed in the DAR.
III.F. **Feasibility Study Report**

Within ninety (90) days of the MPCA Commissioner's approval of the RI Report/FS Workplan (Part IV.B.2), 3M shall prepare and submit to the MPCA Commissioner an FS Report consisting of the results of any treatability studies and a DAR. The DAR shall address all the evaluated alternatives specified by the MPCA Commissioner in approving or modifying the RI Report.

III.F.1. **Treatability Studies.** This section of the FS Report shall include the results of all completed and ongoing bench or pilot studies identified in the RI Report (Part III.E.3.b). In addition, for each of the technologies that have undergone treatability studies, the following factors shall be addressed and presented:

- effectiveness in treating the PFCs;
- reliability and past successes of the technology under similar conditions to those at the Site; and
- availability of the technology type and specific process option for implementation at the Site.

III.F.2. **Detailed Analysis Report.** This section of the FS Report shall analyze evaluated alternatives in detail considering the Remedy Selection Criteria (Part IV.C.). The DAR shall include the following elements for each evaluated alternative:

III.F.2.a. **Detailed Description.** Each evaluated alternative shall be described and individually assessed against the Balancing Criteria (Part IV.C.2.), namely, long term effectiveness, implementability, short term risks, total cost, and community acceptance. At a minimum, the detailed description for each evaluated alternative shall include:

- the operable unit to which the evaluated alternative would be applied;
- a description of the technology type and process option;
- a description of the engineering considerations required for implementation (e.g., for a pilot treatment facility, any additional studies that may be needed to proceed with final response action design);
- a description of operation, maintenance, and monitoring requirements;
- a description of off-Site disposal needs and transportation plans;
- a description of temporary storage requirements;
- a description of safety requirements associated with implementation, including both on-Site and off-Site health and safety considerations;
- a description of how any of the other evaluated alternatives could be combined with this evaluated alternative and how any of the combinations could best be implemented to produce significant cost savings and/or better achieve the Site Specific Response Action objectives and Cleanup Levels (Part IV.A);
- a description/review of on-Site or off-Site treatment or disposal facilities which could be utilized to ensure compliance with ARARs; and
- a description of the evaluated alternative response action dismantling to be conducted upon completion of response action.
III.F.2.b. **Comparative Analysis of Evaluated Alternatives.** Once the evaluated alternatives have been described and individually assessed against the Balancing Criteria (Part IV.C.2.) a comparative analysis shall be conducted to evaluate the relative performance of each evaluated alternative. The purpose of this comparative analysis is to identify the advantages and disadvantages of each evaluated alternative relative to one another with respect to each of the Balancing Criteria (Part IV.C.2), in order to facilitate selection of an appropriate remedy.

The comparative analysis shall include both a table and a narrative discussion describing the strengths and weaknesses of the evaluated alternatives relative to one another by using each specific component of each Balancing Criterion to evaluate the relative performance of each evaluated alternative. The narrative shall discuss how likely changes in variables could alter each evaluated alternative's relative performance. This section shall be organized in the following manner; under each individual Balancing Criterion, discuss the evaluated alternative that performs the best overall under that Balancing Criterion. Other evaluated alternatives shall be discussed in the order in which they perform. For innovative technologies, their potential advantages in performance or cost and the degree of uncertainty in their expected performance, as compared with more demonstrated technologies, shall also be discussed.

The presentation of differences among the evaluated alternatives can be measured either qualitatively or quantitatively, as appropriate, and shall identify substantive differences (e.g., greater short-term risk concerns or greater cost). Quantitative information that was used to assess the evaluated alternatives (e.g., specific cost estimates, time until the Site-specific response action objectives and cleanup levels are met, and levels of residual contamination) shall be included in these discussions.

III.F.2.c. **Recommended Evaluated Alternative(s) and Conceptual Design.** 3M shall include in the DAR its recommendation of the evaluated alternative (or combination of evaluated alternatives) which should be implemented at the Site. The purpose of preparing a conceptual design is to illustrate all aspects of 3M’s-recommended evaluated alternative (or combination) in sufficient detail to enable the MPCA Commissioner to fully evaluate the RP-recommended evaluated alternative (or combination). The conceptual design for the RP-recommended evaluated alternative (or combination) shall include, but not be limited to, the elements listed below:

- a conceptual plan view drawing of the overall site, showing general locations for response action components;
- conceptual layouts (plan and cross sectional views where required) for the individual components to be installed, or actions to be implemented;
- conceptual design criteria and rationale;
- a description of types of equipment required, including approximate capacity, size, and materials of construction;
- process flow sheets, including chemical consumption estimates and a description of the process;
- an operational description of process units or other components;
- a description of unique structural concepts for components;
- a description of operation and maintenance requirements;
- a discussion of potential construction problems;
- right-of-way requirements;
- additional engineering data required to proceed with design;
- a discussion of permits that are required pursuant to environmental and other statutes, rules, and regulations;
implementation cost estimate;
annual O&M cost estimates;
remedial action dismantling cost; and
estimated implementation schedule.

IV. MPCA COMMISSIONER ACTIONS

IV.A. Establishment of Site Specific Response Action Objectives and Cleanup Levels. The MPCA Commissioner shall assess data as they are obtained through implementation of the RI. When sufficient data exist, the MPCA Commissioner shall specify and notify the 3M of the Site-specific response action objectives and cleanup levels for the contaminants, environmental media of concern, and exposure pathways associated with the Site. The Site-specific objectives and cleanup levels shall be determined using ARARs, the "Compilation of Ground Water Rules and Regulations MPCA Superfund Program," dated March 27, 1991, Attachment I, the MPCA Risk-Based Site Evaluation Manual (available on the MPCA website at http://www.pca.state.mn.us/cleanup/riskbasedoc.html), and documented case studies. The MPCA Commissioner will notify 3M of the Site-specific response action objectives and cleanup levels no later than the approval of the RI Report.

IV.B. Review of Submittals. 3M shall submit to the MPCA Commissioner all work plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, modification, or rejection of submittals shall be in accordance with this Section and Part IX of the Consent Order. Given the MPCA preference for implementing response actions in an expedient manner, the MPCA Commissioner may request implementation of interim response actions at any point during the RI/FS.

IV.B.1. Approval of FS Work Plan. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the FS Work Plan. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the FS Work Plan with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the FS Work Plan that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the FS Work Plan, the Commissioner will: 1) specify the deficiencies in the FS Work Plan that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised FS Work Plan.

As part of reviewing the FS Work Plan, the MPCA Commissioner will eliminate from further consideration any possible technology types that are clearly not feasible or effective considering the Remedy Selection Criteria (Part IV.C.), and may identify other possible technology types and process options.
Site security and safety are the responsibility of 3M. The MPCA Commissioner may comment on the Site Security and Safety Plan but will neither approve nor disapprove that plan. Within ten (10) days of notification of the MPCA Commissioner's approval of the FS Work Plan, 3M shall implement the Site Security and Safety Plan, taking into account the comments of the MPCA Commissioner.

IV.B.2. Approval of the RI Report. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RI Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RI Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional formation.

If the MPCA Commissioner rejects the RI Report, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI Report.

IV.B.2.a. Evaluation of the Response Action Alternatives

The MPCA Commissioner shall, as part of reviewing the RI Report, evaluate the response action alternatives presented in the Development and Screening of Response Action Alternatives chapter (Part III.E.3). In determining whether to eliminate a particular response action alternative from further consideration, the MPCA Commissioner will determine whether that alternative meets the response action objectives and cleanup levels (Part IV.A) specified for the Site. In approving the FS Workplan the MPCA Commissioner will specify the evaluated alternatives to be addressed in the DAR.

IV.B.3. Approval of Feasibility Study Report. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the FS Report. Modifications by the MPCA Commissioner are final. Approval of the FS Report does not constitute approval or selection of any response action alternative recommended by 3M. MPCA shall select response actions as provided in the Consent Order and Part IV.C of this Exhibit.

If the MPCA Commissioner approves the FS Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the need for information necessary to correct the deficiencies; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the revised FS Report.

If the MPCA Commissioner rejects the FS Report, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised FS Report.
IV.C. Remedy Selection Criteria. The purpose of implementing any response action is to protect the public health, welfare, and the environment by preventing, minimizing or eliminating the release(s), or threatened release(s) of PFCs. Protection of public health, welfare, and the environment is best achieved by implementing a permanent remedy for the Site. An implemented remedy is considered permanent when it allows for unrestricted use of all land and natural resources impacted by the contaminants and, except for the purpose of treatment, does not involve removal of the contaminants to another site and minimizes exchange of the contaminants to other environmental media. Refer to the MPCA guidance document on remedy selection, located on the MPCA web site at http://www.pca.state.mn.us/cleanup/pubs/rem9_98.pdf.

Notwithstanding anything to the contrary in the remedy selection criteria in this Exhibit, and to the extent consistent with site-specific response action objectives specified by the Commissioner, response actions at the Sites shall address the source of releases and threatened releases of PFCs to ground water. Such response actions shall include (1) excavation and destruction of PFCs, or excavation, engineered isolation and containment of PFCs, and (2) other technically feasible response actions, which are reasonable and necessary to provide for a comprehensive and effective long-term response that protects public health and welfare and the environment. Primary consideration shall be given to alternative (1) consistent with Minn. Stat. § 115B.02, subd. 16 (c).

The MPCA Commissioner will apply the following threshold, balancing criteria and community acceptance to select a final response action from amongst evaluated alternatives.

IV.C.1. Threshold Criterion. Each response alternative or evaluated alternatives must meet the threshold criterion of providing overall protection for the public health and welfare, and the environment. This criterion is met if the response action alternative or the evaluated alternative will achieve the response action objectives and cleanup levels identified pursuant to the Establishment of Site Specific Response Action Objectives and Cleanup Levels (Part IV.A.) or provides for a permanent remedy.

IV.C.2. Balancing Criteria. Evaluated alternatives that meet the threshold criterion of overall protection of public health and welfare, and the environment shall be evaluated using the Balancing Criteria listed below. The evaluated alternative that provides the best balance among the Balancing Criteria in consideration of the site-specific circumstances shall be selected as the final response action. The Balancing Criteria are listed in order of priority with long-term effectiveness being the most important.

- Long-Term Effectiveness
  Long-term effectiveness is the ability of an evaluated alternative to maintain the desired level of protection of public health and welfare, and the environment over time. Permanent remedies provide absolute long-term effectiveness. In the event a permanent remedy is not feasible, evaluated alternatives that significantly alter the PFCs to produce significant reductions in toxicity, mobility, or volume through treatment will be preferred. In addition, the ability of the alternative to obtain and/or manage treatment residuals, minimize transfer of contaminants to another environmental media, and maintain established response action objectives and cleanup levels over time shall be a major consideration.

- Implementability
  The technical and administrative feasibility of implementing the evaluated alternative and the availability of goods and services needed to implement the evaluated alternative shall be considered.

- Short-Term Risks
  The short-term risks that may be posed as a result of implementing an evaluated alternative shall be considered and weighted against the ultimate long-term benefits of implementing that evaluated alternative.
○ Total Costs

The complete cost breakdown of implementation of the evaluated alternative including the projected costs of any long-term monitoring, operation and maintenance, and response action dismantling shall be considered. The future costs to replace the alternative or respond to a future release shall also be considered in this evaluation.

IV.C.3. Community Acceptance. The degree of community acceptance shall be determined for each evaluated alternative.

The community shall be consulted regularly in regard to the response action alternatives available for remediation at the Site. Efforts will be made to inform the community about the hazards of the Site and the advantages and disadvantages of various approaches to remediation and to gain an understanding of the concerns and preferences of the community with regard to the final remedy for the Site. The community's concerns and response action preferences will be considered when the MPCA Commissioner selects a remedy.

IV.D. Selection of Response Action and Record of Decision

The MPCA Commissioner will select the final response action(s) and will document this selection in a Record of Decision (ROD) or Minnesota Decision Document (MDD). The final RI and FS Reports, as approved by the MPCA Commissioner, will, with the MPCA Site file, form the basis for the selection of the final response action for the Site and will provide the information necessary to support the development of the ROD/MDD. The ROD/MDD will identify the selected evaluated alternative (or combination of evaluated alternatives) to be implemented by 3M pursuant to Exhibit B to the Consent Order. The ROD/MDD shall be appended to and made an integral part of the Consent Order.
CONSENT ORDER

In the matter of Releases and Discharges of Perfluorochemicals at and from Sites in Washington County, Minnesota, and Certain Related Matters

EXHIBIT B
3M COTTAGE GROVE SITE

REMEDIAL DESIGN AND RESPONSE ACTION IMPLEMENTATION

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I. INTRODUCTION

Part V.B. of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) At and From Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit B (Exhibit) is appended, requires that 3M prepare a Remedial Design/Response Action Plan (RD/RA Plan) and implement Response Actions (RAs) to address releases and threatened releases of PFCs at and from the Site. This Exhibit sets forth the requirements for preparing the RD/RA Plan and implementing the RAs, which have been selected by the Minnesota Pollution Control Agency (MPCA) Commissioner pursuant to the Consent Order, and is appended to and made an integral part of the Consent Order.

II. RETAIN CONSULTANT

3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit. 3M shall retain the consultant and notify the MPCA project manager of the name of that consultant within thirty (30) days of notification of approval of the FS Report by the MPCA Commissioner.

III. REMEDIAL DESIGN/RESPONSE ACTION PLAN

III.A. RD/RA Plan Submittal

Within ninety (90) days of notification of selection of response actions by the MPCA Commissioner, 3M shall prepare and submit to the MPCA Commissioner for review and approval a RD/RA Plan which shall be based on the approved RI/FS reports and the Record of Decision (ROD) or Minnesota Decision Document (MDD) issued by the MPCA Commissioner.

III.B. RD/RA Plan Contents

The purpose of the RD/RA Plan is to provide a detailed design, an implementation schedule, and a monitoring plan for the RAs specified in the ROD/MDD which, upon implementation, will protect the public health and welfare, and the environment from the release or threatened release of PFCs, at or from the Site.

The RD/RA Plan shall set forth in detail the steps necessary to implement the Site remedy specified in ROD/MDD. The RD/RA Plan shall include a restatement of the response action objectives and cleanup levels specified in the ROD/MDD. The RD/RA Plan shall include, at a minimum, the following:
III.B.1. Remedial Design. The purpose of the remedial design is to specify detailed methods and time schedules for the implementation of the RAs specified in the ROD/MDD. This section shall include, at a minimum, the following elements:

- design criteria and rationale;
- a plan view drawing of the overall Site, showing general locations for response action components;
- technical and operational plans and engineering designs for implementation of the response action including plan and cross sectional views for the individual components to be installed or actions to be implemented;
- a description of the types of equipment to be employed, including capacity, size, and materials or construction;
- an operational description of process units or other RA components;
- process flow sheets, including process material (e.g., chemical or activated carbon) consumption rates, and a description of the process;
- a discussion of potential construction problems and respective contingency plans;
- a schedule for implementing the construction phase;
- a Site-specific PFC waste transportation plan (if necessary);
- the identity of all contractors, transporters, or other persons conducting removal or response actions at the Site;
- a description of any permits or licenses required to implement the RA;
- a description of the post RA operation and maintenance procedures and schedules; and
- a description of activities to be undertaken by 3M during RA implementation to fulfill the requirements of Part III, Sections C.1. (Project Management), C.3. (Sampling and Investigations), C.5. (Record Retention), C.8. (Site Security and Safety Plan), and C.9. (Community Relations) of Exhibit A to the Consent Order as they pertain to the removal or response actions and operation and maintenance activities.

III.B.2. RA Monitoring Plan. The RD/RA Plan shall propose an RA monitoring plan for the Site. The purpose of post-RA implementation monitoring is to determine the status and effectiveness of the implemented RAs. The RA monitoring plan shall, at a minimum, contain the following in order to determine that the cleanup levels specified in the ROD/MDD are achieved:

III.B.2.a. Environmental Media and Analytical Parameter List. The environmental media (soil, ground water, surface water, sediments, biota, and air) and a corresponding list of analytes to be monitored shall be proposed, along with the selection rationale, and a corresponding list of chemical analytical methodologies (including EPA or Standard Method numbers and detection limits) to be performed.

III.B.2.b. Monitoring Facility Location and Design. The design and location of all monitoring facilities/locations shall be proposed.
III.B.2.c. **Sampling Schedule.** A sampling schedule for the analytical parameters proposed in the RA monitoring plan for all monitoring locations shall be proposed. Sampling shall, at a minimum, be conducted on a quarterly basis.

III.B.2.d. **Reporting Plan.** A schedule for reporting the results of long-term monitoring to the MPCA shall be proposed. The schedule shall, at a minimum, contain the following:

**Quarterly Monitoring Reports.** 3M shall submit quarterly analytical results to the MPCA Commissioner. The reporting schedule shall comply with the Consent Order.

1. **Annual Monitoring Reports.** 3M shall submit an Annual Monitoring Report to the MPCA Commissioner on or before January 1st of each year. Any remedial technology employed in implementation of the RD/RA Plan shall be left in place and operated by 3M until the MPCA Commissioner authorizes 3M in writing to discontinue, move, or modify some or all of the remedial technology. 3M may request discontinuation of the remedial technologies in the annual report, when the cleanup levels set forth in the ROD/MDD have been achieved. 3M shall move or modify the remedial technology when the movement or modifications, as approved by the MPCA Commissioner, may better achieve the remedial action objectives set forth in the ROD/MDD.

The Annual Monitoring Report shall contain the following:

- a Site map showing all monitoring locations;
- the results of all parameter analyses for the previous year;
- the results of all water level measurements for the previous year;
- regional and Site specific ground water piezometric maps for each aquifer including surface water elevations;
- cross section(s) indicating relative communication between aquifers;
- a map for each sampling event showing each monitoring location with contaminant concentrations and isoconcentration lines for selected parameters;
- graphs and tables illustrating the concentrations over time using data from each sampling event (these graphs and tables shall be cumulative showing parameter analyses for all previous years as well as the reporting year); and
- a sampling plan for the next year with an assessment of the monitoring parameters, sampling frequencies, and the need for the addition or deletion of monitoring locations and parameters.

III.C. **RD/RA Plan Implementation**

Within thirty (30) days of the MPCA Commissioner approval of the RD/RA plan, 3M shall initiate the RA. The purpose of RA implementation is to take those actions that will protect public health and welfare, and the environment, from the release or threatened release of PFCs at or from the Site.
The RD/RA Plan, as approved or modified by the MPCA Commissioner shall be implemented in accordance with the Consent Order and Part III.B. of this Exhibit. The implementation of RAs shall be conducted in accordance with all applicable federal and state ARARs, and local laws, rules, regulations, and ordinances.

During implementation of the RD/RA Plan, the MPCA Commissioner may specify such additions and/or revisions to the RD/RA Plan as the Commissioner deems necessary to protect public health and welfare, and the environment.

### III.D. RA Implementation Report

Within sixty (60) days of the completion of implementation of the RAs specified in the approved RD/RA Plan, a RA Implementation Report which includes the following elements shall be submitted to the MPCA Commissioner:

- the data and results of the RA implementation;
- the follow-up actions, if any, to be taken in the following one-year period;
- a certification that all work plans, specifications, and schedules have been implemented and completed in accordance with the RD/RA Plan as approved or modified by the MPCA Commissioner;
- discussion of difficulties encountered during the implementation that may alter and/or impair or otherwise reduce the effectiveness of the RA implementation to prevent, eliminate, or minimize the release or threatened release of PFCs, at or from the Site, or which may require unanticipated operational or maintenance actions to maintain the effectiveness of any of the implemented RAs; and
- a discussion of any necessary modifications to the operation and maintenance procedures as approved.

### IV. REPORT ON COMPLETION OF RA

Within sixty (60) days of notification, by the MPCA Commissioner, that all Site-specific Response Action Objectives and Cleanup Levels (Exhibit A, Part IV.A.) have been met, a Report on Completion of RA, which includes the following elements, shall be submitted to the MPCA Commissioner.

- a summary of the response action objectives and cleanup levels and a history of how they were met;
- certification that all RAs have been properly dismantled, including supporting documentation (e.g., monitoring well sealing records);
- a summary of any ongoing institutional controls (e.g., deed restrictions);
- a final cost summary.
V. MPCA COMMISSIONER ACTIONS

3M shall submit to the MPCA Commissioner all plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, approval with modifications and/or a request for additional information, or rejection of submittals shall be in accordance with the Consent Order. The Site Safety and Security Plan does not require MPCA Commissioner approval.

V.A. Approval Of The RD/RA Plan, RA Implementation Report, And Report On Completion Of RA

The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RD/RA Plan, RA Implementation Report, and the Report on Completion of RA based on the requirements of Parts III.B, III.D, and IV respectively. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or Completion of RA Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the information necessary to correct the deficiencies.
CONSENT ORDER
In the matter of Releases and Discharges of Perfluorochemicals at and from Sites in Washington County, Minnesota, and Certain Related Matters

EXHIBIT C
3M OAKDALE SITE
Remedial Investigation/Feasibility Study

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I. INTRODUCTION, PURPOSE, AND REQUIREMENTS

I.A. Introduction

Part V.B of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) at and from Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit A (Exhibit) is appended, requires 3M to conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release(s) or threatened release(s) of PFCs at and from the 3M Oakdale Disposal site (Site). This Exhibit sets forth the requirements for completing the RI/FS and is appended to and made an integral part of the Consent Order.

The Minnesota Pollution Control Agency (MPCA) acknowledges that 3M has already completed a significant amount of work at the Site that satisfies some of the requirements for the RI/FS. Therefore, in the specific context of perfluorochemical (PFC) contamination at the Site, the following previously submitted documents are in partial satisfaction of the RI/FS requirements as described in this exhibit:

- Ground Water Data Assessment Report Fluorochemical Investigation (July 2005)
- Supplemental Fluorochemical Data Assessment Report (September 2006)
- Assessment of the Effectiveness of the Existing Ground Water Recovery System (April 2007)

By June 15, 2007, 3M shall submit a RI report which summarizes the above MPCA approved investigations, and shall include a FS workplan to address proposed response actions. Upon MPCA approval of this RI Report, the RI Report shall be deemed to meet the RI Report requirements specified in section III.E. of this Exhibit.

This generic RI/FS process is intended to address all aspects of a release or potential release upon discovery. Given that significant RI work has already been initiated for this Site, certain items outlined in this Exhibit may be determined by the Commissioner as not applicable or not required.

3M shall complete feasibility studies to evaluate response actions at the Site in accordance with terms outlined in Section VII. of the Consent Order. Supplemental remedial investigation or feasibility study reports may be submitted to meet requirements specified in this exhibit, with deadlines for such submittals set by the MPCA.

I.B. Purpose

The purpose of conducting an RI/FS is to provide information necessary to enable the MPCA Commissioner to select a final remedy for the Site.

In order to arrive at remedy selection in the most expedient manner, the RI and FS activities will be conducted concurrently. The RI/FS Work Plan shall propose:

- the RI activities; and
- a list of possible remedial technology types.

The RI Report shall:

- report the results of the RI; and
- document the development and screening of possible response action alternatives.
The FS Report shall present:
° the results of treatability studies; and
° the Detailed Analysis Report (DAR).

I.B.1. **Remedial Investigation.** The RI activities will (1) provide for the complete characterization of the release(s) or threatened release(s) of PFCs at or from the Site and the actual or potential hazard the release(s) or threatened release(s) pose to public health and welfare, and the environment; (2) produce sufficient data and information to allow 3M to submit the RI and FS reports (Part III.E and III.F); and (3) produce data of sufficient quantity and adequate technical content to assess the possible alternative response actions during the FS.

I.B.2. **Feasibility Study.** The FS activities consist of developing a list of technology types, development and screening of possible response action alternatives, preparing and conducting treatability studies, and conducting a detailed analysis of evaluated alternatives. The MPCA Commissioner will review the FS Report and select the final response action(s) using the Selection of Remedy Criteria set forth in Part IV.C. of this Exhibit.

I.C. **Requirements**

The RI/FS shall be conducted according to the provisions of this Exhibit. The United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (October 1988 Interim Final) will provide 3M with specific guidance for completing the actions required under this Exhibit to the extent that this guidance is consistent with the requirements of this Exhibit. The sampling and quality assurance activities (Part III.C.3) shall be consistent with the requirements of the USEPA Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80). Risk assessments (i.e., evaluation, quantitation, tabulation of results, and mechanics of presentation) performed under this Exhibit (Part III.C.6.) shall be based on appropriate MPCA requirements, USEPA's "The Risk Assessment Guidelines of 1986" (EPA/600/8-87/045), "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Pt. A, December 1989, Interim Final) and the USEPA Risk Assessment Guidance for Superfund, Vol. 2, Environmental Evaluation Manual (March 1989, Interim Final).

At a minimum, the Site Security and Safety Plan (Part III.C.8) shall incorporate and be consistent with the requirements of:
° OSHA requirements 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response;
° OSHA requirements 29 CFR Part 1910 (General Industry Standards) and 1926 (Construction Industry Standards);
As new versions or future revisions of the documents referenced in this section become available to the public, the latest version of each document shall supersede all previous versions of that document and shall be used for conducting the RI/FS.

II. RETAIN CONSULTANT

Within thirty (30) days of the effective date of the Consent Order, 3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit and shall notify the MPCA Project Manager of the name of that consultant.

III. REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

III.A. RI/FS Objectives

The objectives of the RI/FS are to:
° identify all sources of contamination;
° evaluate the nature and extent of soil, sediment, surface water, ground water, and air contamination at the Site and in any adjacent areas affected by contamination at or from the Site;
° identify all existing and potential migration characteristics and pathways for the PFCs identified at the Site, including the direction, rate, and dispersion of contaminant migration;
° identify alternative response actions and evaluate the feasibility and effectiveness of implementing those alternative response actions to prevent, minimize, or eliminate release(s) or threatened release(s) of PFCs at or from the Site; and
° collect and evaluate the information necessary to prepare a remedial design/response action plan in accordance with Exhibit D to the Consent Order.

III.B. FS Work Plan Submittal and Schedule

By June 15, 2007, 3M shall submit to the MPCA Commissioner for approval pursuant to Part IV.B. and IV.B.1. of this Exhibit, a proposed FS Work Plan and implementation schedule which details the remaining activities necessary to complete the FS. The proposed FS Work Plan shall be prepared to enable 3M to meet the FS Objectives (Part III.A) and shall, at a minimum, address all of the elements described in Part III.C.4.

III.C. RI Report and FS Work Plan Contents

The proposed RI/FS Work Plan shall address, at a minimum, each of the following elements:

III.C.1. Project Management. A Project Management section of the RI Report shall describe how the RI/FS will be managed by 3M and its contractors, subcontractors, and consultants. This section shall include an organization chart with the names and titles of key personnel and a description of their individual responsibilities.

III.C.2. Background Evaluation. The RI Report shall include a Background Evaluation that includes these sections: Operational History, Topographic Survey, History of Site Assessment Work and Remedial or Removal Actions, and Identification of Data Gaps.
III.C.2.a. Operational History of The Site. This section shall include a detailed explanation of the operational history of the Site (i.e., all past facilities and a description of their specific operations), including history of property ownership boundaries, and pertinent area and boundary features of the Site. In addition, this section shall include the following detailed information related to the release(s) or threatened release(s) of PFCs at the Site:

- a list of the PFCs that have been stored, used, treated, or disposed of on-Site and their estimated volumes, concentrations, and characteristics;
- a description of what, where, when, how and by whom PFCs were released during the operation of all facilities of record at the Site (e.g., Provide an explanation of how the Site or a specific area became contaminated);
- a description of contaminant source areas and facilities which release or threaten the release of PFCs to soil, sediment, surface water, ground water, or air;
- a Site map delineating each area where such PFCs were disposed, treated, stored, transferred, handled, or used;
- a description of all industrial processes which are or were related to the use or generation of each PFC; and
- a description of past disposal practices for PFCs.

Any historical research needs that have not been met by file review may be met by conducting employee interviews, reviews of the 3M’s records, and aerial photograph investigations.

III.C.2.b. Topographic Survey. This section shall include a description of the general physiography of the Site and surrounding area and one (1) Site map using a one (1) inch = 1000 feet scale and ten (10) foot contour interval.

Additional maps for each identifiable contaminant source area shall be provided using a one (1) inch = 50 feet scale and a two (2) foot contour interval. Surface water features, drainage direction, buildings, process areas, storage tanks, well locations, forested areas, utilities, paved areas, easements, rights-of-way, pipelines (surface and subsurface), landfills, borrow pits, debris piles, raw material piles, and impoundments shall be shown. The maps shall be of sufficient detail and accuracy to locate all current or proposed future work at the Site.

III.C.2.c. History of Site Assessment Work and Remedial or Removal Actions. This section shall include a history of all previous investigation(s) and response action(s) conducted at the Site including:

- a detailed description of regional and local hydrogeology and geology based on published literature and available technical information. Cross Sections and maps shall be included. Include the type and extent of surface soils as presented in the Soil Conservation Service soil surveys;
- a summary of all soil, surface water, ground water, and air assessment work completed to date, including contaminant source area identification, data reduction and interpretation, and the QA/QC procedures which were followed;
- a description of the nature and extent of the release(s) and/or threatened release(s), including a summary of actual and potential on-Site and off-Site health and/or environmental effects; and
- a summary of any previous remedial or removal actions conducted at the Site. This summary shall include cleanup activities and any related field inspections, sampling surveys, or other related;
III.C.2.d. **Identification of Data Gaps.** Gaps in information (data gaps) necessary to fulfill the RI/FS Objectives (Part III.A) shall be identified and recommendations shall be made for additional RI work necessary to meet the RI/FS Objectives and produce sufficient information to support the screening and detailed analysis of response action alternatives in the RI/FS. For each data gap identified, 3M shall provide a list and description of research and field activities necessary to address that data gap.

III.C.3. **Sampling and Investigations.** The RI/FS Work Plan shall propose activities and methodologies that were conducted to complete the investigations specified in Parts III.C.3.c, d, e and f, III.C.6. and shall also discuss the plans specified in Parts III.C.3.a and b.

III.C.3.a. **Sampling and Analysis Plan.** A comprehensive sampling and analysis plan shall be utilized for the investigations required under Parts III.C.3.c, d, e, and f, and III.C.6 below. This plan shall include:

- objectives of the sampling investigation;
- criteria for sampling location selection;
- a map showing all locations that will be sampled;
- a description of the types of samples which will be collected;
- a description of the depth/frequency of sampling at each location;
- a proposed sampling schedule;
- identification of all chemical parameters to be analyzed (analytes), selection rationale, and a corresponding list of chemical analytical methodologies (including USEPA or Standard Method numbers and detection limits) to be performed. Prior to determining a final analyte list, analytes of concern should be separated into carcinogens and non-carcinogens. In addition, representative ground water samples shall be analyzed to identify natural chemical constituents that may affect various treatment methods or that may identify upgradient sources of contamination;
- abiotic and biotic environmental sampling shall be proposed to complete the assessment process required under Part III.C.6. The technical specifications and procedures for soil sampling methods, drilling methods, borehole and surface geophysical methods, and monitoring well and piezometer installations. ASTM procedures shall be used and referenced where appropriate and available;
- provisions for obtaining access to and obtaining samples from the Site and other affected properties (where appropriate);
- a description of quality assurance/quality control procedures for the collection, identification, preservation, holding times, and transportation of samples; type and volume of sample containers;
- the calibration and maintenance of field instruments; decontamination of sampling equipment; and the processing, verification, storage, calculations and statistics, and reporting of field data including field chain-of-custody procedures, identification of qualified persons conducting the sampling, and identification of a laboratory meeting the requirements of Part III.C.3.b.; and

- a description of any computer models to be employed in data analysis. Model descriptions shall include capabilities and limitations, all assumptions or approximations that will be made in calibrating and using the model, specific objectives to be achieved with the model, and justification for use of the model method including a discussion of why the model is the preferred model or method for meeting the objectives stated in the RI/FS Work Plan. The quantities or values that are desired from the model that are not confirmed by direct measurement shall be identified and the sensitivity of the model
results to input parameters discussed. All data and programming including any proprietary programs shall be made available to the MPCA staff upon request.

III.C.3.b. Laboratory QA/QC Plan. The RI/FS Work Plan shall include a laboratory QA/QC plan which shall consist of the following sections:
- identification of laboratories performing analysis;
- description of laboratory sample chain of custody procedures;
- description of calibration procedures and frequency;
- description of analytical standard operating procedures;
- description of data reduction, validation, and reporting procedures;
- description of internal quality control checks;
- description of performance and system audits;
- description of preventative maintenance procedures;
- description of specific procedures for routine assessment of data precision, accuracy, completeness, and any necessary corrective action; and
- description of quality assurance reports to management.

Refer to EPA QA/QC guidance, which is available through the internet, at http://es.epa.gov/ncer/guidance/qa.html

III.C.3.c. Geologic Investigation. This section of the RI Report shall provide a description of the activities which were completed to characterize the geology and contaminant distribution at the Site and other affected properties. The geologic investigation shall be conducted in areas of known and suspected disposal and in areas where ground water contamination exists and no known or suspected contaminant source area has been identified. This section shall include the following:
- a summary to define the stratigraphy of the consolidated and unconsolidated deposits including the identification of high or low permeability lenses of material in the unsaturated (vadose) zone which may affect contaminant migration or the attenuation of contaminants. This proposal shall also include the extent and type of lithologies of respective consolidated units and unconsolidated materials including relative amounts of organic matter, gravel, sand, silt, and clay according to ASTM soils classification scheme or other acceptable standard procedures;
- completed tests to define the physical and chemical properties which affect the movement or attenuation of contaminants in the stratigraphic units identified above. These properties include: density, organic matter content, cation exchange capacity, percent clay content, vertical hydraulic conductivity, total porosity, effective porosity, and adsorption potential (Kd). See the soil cleanup guidance for additional parameters.
- proposed methods to define the nature and extent of contamination in the vadose zone;
- a proposal to identify areas disturbed by excavations or other activities that may be routes of contaminant migration (e.g., buried pipes, utility corridors, fill areas, tank basins); and
- a proposal to identify ambient concentrations of analytes in the soil.
III.C.3.d. **Hydrogeologic Investigation.** This section of the proposed RI/FS Work Plan shall provide a description of activities to be undertaken to characterize the local and regional hydrogeology and the contaminant distribution in the ground water at the Site and other affected properties. This section shall include the following:

- a proposal to identify Quaternary (glacial) and bedrock aquifers, aquitards, and perched water zones;
- a proposal for the installation and development of ground water monitoring wells and/or piezometers or other devices needed to clearly define ground water flow conditions in the glacial and bedrock aquifers, aquitards, and perched water zones. All wells shall be surveyed to the National Geodetic Vertical Datum reference elevation, and procedures shall be specified for measuring water elevations in all wells to the nearest hundredth of a foot;
- a proposal for the installation of ground water monitoring wells which shall be used to define ground water quality upgradient, within, and downgradient of suspected and/or identified contaminant source areas and at the interface between ground water and surface water;
a proposal for a ground water quality monitoring program to be conducted to define the nature and extent of ground water contamination at the Site and other affected properties. Municipal, industrial, agricultural, domestic and monitoring wells, and springs shall be considered for inclusion in the monitoring program. The monitoring program shall have a minimum frequency of quarterly sampling with water level measurements;

proposed tests (e.g., slug and/or pumping tests to determine the hydraulic properties, including horizontal hydraulic conductivity and secondary porosity, of aquifers and aquitards at the Site and other affected properties) which shall define ground water flow relationships (directions, gradients, and velocities for both vertical and horizontal flow components) including potential aquifer interconnections, recharge areas, discharge areas, and ground water interactions with surface water. In addition, this section shall propose how the flow relationships will be evaluated with respect to contaminant distribution and the potential future movement of contaminants;

a proposal to define ground water use(s) and the potential effect water use(s) may have on contaminant movement in both horizontal and vertical directions. Include with this proposal an inventory map showing all active, unused, and abandoned municipal, industrial, agricultural, domestic and monitoring wells, and springs within a one mile radius of the Site, and of high capacity wells and municipal water supply wells within a three mile radius of the Site; and

description of visual aids which will be used to present, in the RI Report, the hydrogeologic and hydrogeochemical data gathered during the Hydrogeologic Investigation (e.g., cross sections, piezometric maps, isoconcentration maps, graphical methods, and tables).

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III.C.3.e. Surface Water Investigation. This section of the RI/FS Work Plan shall identify all surface water bodies within a one mile radius of the Site including rivers, lakes, ponds, wetlands, bogs, calcareous fens, low-flow streams, creeks, springs, and named and unnamed ditches. Both perennial and intermittent surface water features shall be identified. A map showing the locations of all identified surface water bodies and the location of known or suspected releases of contaminants from the Site to surface water bodies shall be included. This section shall include a proposal to evaluate each surface water body identified, evaluate its potential to be impacted by Site contaminants through releases via ground water, surface run-off, drainage, airborne deposition, and other possible pathways. This proposal shall include a plan to identify the benthic sediments and benthic and other aquatic community conditions underlying and within surface water upgradient, adjacent to, and downgradient of the contaminant source area. In addition, methodologies shall be proposed to determine the mass loading of contaminants to the surface water bodies.

The water use classification for the identified surface water body or bodies, in accordance with Minn. R. ch. 7050 and the wetlands classification in accordance with Minn. Stat. §§ 103G.005, subds. 15 and 18 and 103G.201 (1988), shall be included. Identification of the water use characteristics (e.g., agricultural, recreational, and private or municipal water supply) of the identified surface water bodies shall also be included.

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III.C.3.f. Air Investigation. This section of the RI/FS Work Plan shall propose methodologies for investigations to determine the nature and extent of contaminants that are or may become airborne (e.g., vapors, gases, mists, or particulates) through either natural phenomenon or as a result of activities at the Site.
III.C.4. **List of Possible Technology Types and Proposed Treatability Studies.** The FS Work Plan shall include a comprehensive list of technology types that may be applicable to the release(s) or threatened release(s) at or from the Site. This list shall be developed considering the Remedy Selection Criteria (Part IV.C.). This list shall include: 1) technology types that prevent or eliminate the release(s) or threatened release(s) by completely destroying, detoxifying, or immobilizing PFCS and leave materials on-Site that require no long-term management; 2) technology types that prevent or minimize the release(s) or threatened release(s) by treatment process options that reduce the toxicity, mobility, or volume of PFCs; 3) technology types that control the threats posed by the release(s) or threatened release(s) of PFCs by containment; and 4) a general description of the treatability studies necessary to evaluate the respective technology types identified under 1, 2 or 3 above. At a minimum, excavation and capping remedies for soils and activated carbon or anionic resin filtration remedies for ground water shall be considered.

III.C.5. **Record Retention.** The RI/FS Work Plan shall provide a description of how the data obtained pursuant to this Exhibit will be managed and preserved by 3M in accordance with the Consent Order.

III.C.6. **Risk Assessment.** The RI/FS Work Plan shall provide a detailed description of activities that will be undertaken to conduct separate ecological and human health Baseline Risk Assessments. Ecological and human health Baseline Risk Assessments are evaluations of the actual and potential threat to public health and welfare, and the environment posed by the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants, in the absence of any remedial action.

The risk assessment activities shall be conducted so as to generate the information necessary to meet the reporting requirements of the Baseline Risk Assessment as specified in Part III.E.2.

Formats, technology, and mathematical symbols used in the Baseline Risk Assessments shall correspond as closely as possible to those presented in USEPA's Superfund risk assessment guidance referred to under Part I.C. Any alternative formats, technology, mathematical models shall be proposed in the RI/FS Work Plan.
III.C.7. **Site Security and Safety Plan.** A Site-specific security and safety plan shall be prepared as a separate part of the RI/FS Work Plan, describing all measures including contingency plans and Site access restrictions which will be implemented during field activities to (1) ensure protection of public health and welfare, and the environment and (2) protect the health and safety of personnel involved in the RI/FS. These measures should consider the recommendations in the April 1989 Health Assessment and February 1993 Site Update, prepared by the Agency for Toxic Substances and Disease Registry, even though these documents did not identify perfluorochemicals as contaminants of concern.

III.C.8. **Community Relations.** The RI/FS Work Plan shall include a community relations section providing procedures for (1) informing local residents, municipalities, environmental groups, and interested parties about activities at the Site; (2) responding to inquiries from concerned citizens; and (3) cooperation with the MPCA Community Relations efforts. Refer to the MPCA community relations guidance document, entitled “Community Involvement in Risk Based Decision Making”, located on the MPCA web site at http://www.pca.state.mn.us/cleanup/pubs/coor9_98.pdf.

III.D. **FS Work Plan Implementation**

Within ninety (90) days of the MPCA Commissioner approval of the RI Report and FS Work Plan, 3M shall submit a FS Report. The FS shall be conducted in accordance with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Minn. Stat. ch. 103I and Minn. R. ch. 4725 for the installation of any ground water monitoring wells.

Any necessary additional RI activities not included in RI Report and FS Work Plan shall be identified and proposed in the quarterly reports submitted pursuant to the Consent Order. The impact of the additional RI activities on the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4) shall also be described in the quarterly reports. If any additional RI activities will adversely affect work scheduled through the end of the upcoming month or will require significant revisions to the approved FS Work Plan, the 3M shall notify the MPCA Project Manager immediately of the situation followed by a written explanation within ten (10) days of the initial notification.

III.E. **Remedial Investigation Report**

The RI Report detailing: (1) the data and results of the RI; (2) baseline risk assessment; and (3) screening of possible response action alternatives shall be prepared and submitted to the MPCA Commissioner. The RI Report shall organize and present all data generated as a result of implementation of the approved RI/FS Work Plan including, at a minimum, analytical results, assessment of completion of QA objectives, boring logs, field data sheets, and test results including data reduction and interpretation of all results. Further, the RI Report shall include:

III.E.1. **Nature and Extent of the Release or Threatened Release.** The RI Report shall include a description of the following:

- the nature and extent of PFCs released or threatened to be released to the soils, surface water, sediments, ground water, and air;
- the contaminant fate and migration pathways within each media;
- an evaluation of the reliability, and accuracy of the results of any computer models employed for data interpretation.
III.E.2. **Baseline Risk Assessment.** The results of two Baseline Risk Assessments, one addressing human health risks and one addressing ecological risks (Part III.C.6.), shall be reported as separate chapters in the RI Report.

Each chapter of the Baseline Risk Assessment shall include an executive summary written in layman's terms. A narrated videotape walk-through of the Site and surrounding areas shall be included to highlight information presented in the Baseline Risk Assessment text.

The risk assessment reports shall provide:

III.E.2.a. **Data Evaluation.** An evaluation of the results of the RI showing the actual and projected concentrations of PFCs present in relevant media (e.g., soil, surface water, ground water, air, sediment, and biota).

III.E.2.b. **Toxicity Assessment.** An identification of the hazard and toxicological properties of each contaminant identified through sampling and investigations. A comparison between the list of contaminants known to have been deposited on the Site versus those found through analyses. Identification of the chemical specific Applicable or Relevant and Appropriate Requirements (ARARs) for PFCs identified at the Site.

III.E.2.c. **Exposure Assessment.** A comprehensive exposure pathways table. An inclusion/exclusion analysis and supporting rationale shall be included for each pathway. Following the inclusion/exclusion analysis, a determination of the extent and likelihood of exposure to contaminants at or from the Site. Identification of the potential receptor populations. Provide in-depth environmental fate and transport analysis for completed exposure pathways including physical and biological degradation processes and hydrogeologic conditions.

III.E.2.d. **Risk Characterization.** Both a maximum exposure case analysis and a Reasonable Maximum Exposure (RME) shall be provided for each pathway.

III.E.2.e. **Uncertainty and Sensitivity Analysis.** If there is or will be more than one analyte of concern associated with the Site, a chemical mixtures risk assessment addressing additivity and synergism shall be conducted and reported upon.

As part of the uncertainty analysis a Synergistics Effects Uncertainty Analysis (SEUA) shall be conducted and reported upon which assumes risks posed by conditions at the Site may be underestimated by an additivity based risk characterization. The SEUA shall provide modified remediation levels necessary to compensate for possible synergistic effects.
III.E.3. Development and Screening of Response Action Alternatives. The RI Report shall include a Development and Screening of Response Action Alternatives chapter that provides an evaluation of (a) each of the response action alternatives assembled from the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4), except for those technology types that have been eliminated from further consideration by the MPCA Commissioner in approving the RI/FS Work Plan, and (b) any other technology types identified by 3M or the MPCA Commissioner prior to approval of the RI Report.

The purpose of this chapter is to document the development of response action alternatives by combining or assembling technology types and their respective process options which will be applied to specific operable units or the Site as a whole. After the response action alternatives have been developed, they will be screened to assure that only those alternatives that will likely achieve the response action objectives and cleanup levels (Part IV.A.) will be retained for further analysis in the DAR.

III.E.3.a. Describe Process Options and Document the Screening of Response Action Alternatives. All development and screening decisions shall be thoroughly documented. This documentation shall include both written description and summary tables.

The development and screening of response action alternatives is accomplished by conducting the following tasks:

Development

From the list of technology types, as approved in the RI/FS Work Plan, develop the response action alternatives by describing the process options for each technology type and assemble the technology types with respective process options into response action alternatives. This step is accomplished by following the procedures outlined below:

- array the technology types and describe all possible process options for each technology type;
- for each process option, list the action and location specific ARARs;
- establish the volumes of contaminants and the volumes and types of contaminated media or areas of the Site to which the response action alternative will be applied (e.g. operable units); and
- assemble one or more technology type(s) and the respective process option into one response action alternative.

Screening

Once the response action alternatives have been developed, the response action alternatives are evaluated and screened using the Site Specific Response Action Objectives and Cleanup Levels (Part IV.A). Those response action alternatives that do not meet the Response Action Objectives and the Cleanup Levels are eliminated from further consideration. Response Action Alternatives that pass this screening are designated as "evaluated alternatives" and shall be further evaluated in the DAR.

3M shall provide its recommendation and rationale regarding which response action alternatives should not be given further consideration for implementation at the Site.
III.E.3.b. Treatability Studies. This chapter of the RI Report shall provide:
○ a description of all completed treatability studies and the results of any pilot studies, bench tests, or other activities that were performed to evaluate technology types and process options; and
○ proposals, with time frames, for any additional treatability studies that are needed to further evaluate any response action alternatives that pass the screening and are to be further analyzed in the DAR.

III.F. Feasibility Study Report

Within ninety (90) days of the MPCA Commissioner's approval of the RI Report/FS Workplan (Part IV.B.2), 3M shall prepare and submit to the MPCA Commissioner an FS Report consisting of the results of any treatability studies and a DAR. The DAR shall address all the evaluated alternatives specified by the MPCA Commissioner in approving or modifying the RI Report.

III.F.1. Treatability Studies. This section of the FS Report shall include the results of all completed and ongoing bench or pilot studies identified in the RI Report (Part III.E.3.b). In addition, for each of the technologies that have undergone treatability studies, the following factors shall be addressed and presented:
○ effectiveness in treating the PFCs;
○ reliability and past successes of the technology under similar conditions to those at the Site; and
○ availability of the technology type and specific process option for implementation at the Site.

III.F.2. Detailed Analysis Report. This section of the FS Report shall analyze evaluated alternatives in detail considering the Remedy Selection Criteria (Part IV.C.). The DAR shall include the following elements for each evaluated alternative:

III.F.2.a. Detailed Description. Each evaluated alternative shall be described and individually assessed against the Balancing Criteria (Part IV.C.2.), namely, long term effectiveness, implementability, short term risks, total cost, and community acceptance. At a minimum, the detailed description for each evaluated alternative shall include:
○ the operable unit to which the evaluated alternative would be applied;
○ a description of the technology type and process option;
○ a description of the engineering considerations required for implementation (e.g., for a pilot treatment facility, any additional studies that may be needed to proceed with final response action design);
○ a description of operation, maintenance, and monitoring requirements;
○ a description of off-Site disposal needs and transportation plans;
○ a description of temporary storage requirements;
○ a description of safety requirements associated with implementation, including both on-Site and off-Site health and safety considerations;
○ a description of how any of the other evaluated alternatives could be combined with this evaluated alternative and how any of the combinations could best be implemented to produce significant cost savings and/or better achieve the Site Specific Response Action objectives and Cleanup Levels (Part IV.A);
III.F.2.b. Comparative Analysis of Evaluated Alternatives. Once the evaluated alternatives have been described and individually assessed against the Balancing Criteria (Part IV.C.2.) a comparative analysis shall be conducted to evaluate the relative performance of each evaluated alternative. The purpose of this comparative analysis is to identify the advantages and disadvantages of each evaluated alternative relative to one another with respect to each of the Balancing Criteria (Part IV.C.2), in order to facilitate selection of an appropriate remedy.

The comparative analysis shall include both a table and a narrative discussion describing the strengths and weaknesses of the evaluated alternatives relative to one another by using each specific component of each Balancing Criterion to evaluate the relative performance of each evaluated alternative. The narrative shall discuss how likely changes in variables could alter each evaluated alternative's relative performance.

This section shall be organized in the following manner; under each individual Balancing Criterion, discuss the evaluated alternative that performs the best overall under that Balancing Criterion. Other evaluated alternatives shall be discussed in the order in which they perform. For innovative technologies, their potential advantages in performance or cost and the degree of uncertainty in their expected performance, as compared with more demonstrated technologies, shall also be discussed.

The presentation of differences among the evaluated alternatives can be measured either qualitatively or quantitatively, as appropriate, and shall identify substantive differences (e.g., greater short-term risk concerns or greater cost). Quantitative information that was used to assess the evaluated alternatives (e.g., specific cost estimates, time until the Site-specific response action objectives and cleanup levels are met, and levels of residual contamination) shall be included in these discussions.

III.F.2.c. Recommended Evaluated Alternative(s) and Conceptual Design. 3M shall include in the DAR its recommendation of the evaluated alternative (or combination of evaluated alternatives) which should be implemented at the Site. The purpose of preparing a conceptual design is to illustrate all aspects of 3M-recommended evaluated alternative (or combination) in sufficient detail to enable the MPCA Commissioner to fully evaluate the 3M-recommended evaluated alternative (or combination). The conceptual design for the 3M-recommended evaluated alternative (or combination) shall include, but not be limited to, the elements listed below:

- a conceptual plan view drawing of the overall site, showing general locations for response action components;
- conceptual layouts (plan and cross sectional views where required) for the individual components to be installed, or actions to be implemented;
- conceptual design criteria and rationale;
- a description of types of equipment required, including approximate capacity, size, and materials of construction;
- process flow sheets, including chemical consumption estimates and a description of the process;
° an operational description of process units or other components;
° a description of unique structural concepts for components;
° a description of operation and maintenance requirements;
° a discussion of potential construction problems;
° right-of-way requirements;
° additional engineering data required to proceed with design;
° a discussion of permits that are required pursuant to environmental and other statutes, rules, and regulations;
° implementation cost estimate;
° annual O&M cost estimates;
° remedial action dismantling cost; and
° estimated implementation schedule.

IV. MPCA COMMISSIONER ACTIONS

IV.A. Establishment of Site Specific Response Action Objectives and Cleanup Levels. The MPCA Commissioner shall assess data as they are obtained through implementation of the RI. When sufficient data exist, the MPCA Commissioner shall specify and notify 3M of the Site-specific response action objectives and cleanup levels for the contaminants, environmental media of concern, and exposure pathways associated with the Site. The Site-specific objectives and cleanup levels shall be determined using ARARs, the "Compilation of Ground Water Rules and Regulations MPCA Superfund Program," dated March 27, 1991, Attachment I, the MPCA Risk-Based Site Evaluation Manual (available on the MPCA web site at http://www.pca.state.mn.us/cleanup/riskbasedoc.html), and documented case studies. The MPCA Commissioner will notify 3M of the Site-specific response action objectives and cleanup levels no later than the approval of the RI Report.

IV.B. Review of Submittals. 3M shall submit to the MPCA Commissioner all work plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, modification, or rejection of submittals shall be in accordance with the Consent Order. Given the MPCA preference for implementing response actions in an expedient manner, the MPCA Commissioner may request implementation of an IRA at any point during the RI/FS.

IV.B.1. Approval of FS Work Plan. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the FS Work Plan. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the FS Work Plan with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the FS Work Plan that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.
If the MPCA Commissioner rejects the FS Work Plan, the Commissioner will: 1) specify the deficiencies in the FS Work Plan that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised FS Work Plan.

As part of reviewing the FS Work Plan, the MPCA Commissioner will eliminate from further consideration any possible technology types that are clearly not feasible or effective considering the Remedy Selection Criteria (Part IV.C.), and may identify other possible technology types and process options.

Site security and safety are the responsibility of 3M. The MPCA Commissioner may comment on the Site Security and Safety Plan but will neither approve nor disapprove that plan. Within ten (10) days of notification of the MPCA Commissioner's approval of the FS Work Plan, 3M shall implement the Site Security and Safety Plan, taking into account the comments of the MPCA Commissioner.

IV.B.2. Approval of the RI Report. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RI Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RI Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional formation.

If the MPCA Commissioner rejects the RI Report, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI Report.

IV.B.2.a. Evaluation of the Response Action Alternatives

The MPCA Commissioner shall, as part of reviewing the RI Report, evaluate the response action alternatives presented in the Development and Screening of Response Action Alternatives chapter (Part III.E.3). In determining whether to eliminate a particular response action alternative from further consideration, the MPCA Commissioner will determine whether that alternative meets the response action objectives and cleanup levels (Part IV.A) specified for the Site. In approving the FS Work Plan the MPCA Commissioner will specify the evaluated alternatives to be addressed in the DAR.
IV.B.3. **Approval of Feasibility Study Report.** The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the FS Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the FS Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the need for information necessary to correct the deficiencies; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the revised FS Report.

If the MPCA Commissioner rejects the FS Report, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised FS Report.

IV.C. **Remedy Selection Criteria.** The purpose of implementing any response action is to protect the public health, welfare, and the environment by preventing, minimizing or eliminating the release(s), or threatened release(s) of PFCs. Protection of public health, welfare, and the environment is best achieved by implementing a permanent remedy for the Site. An implemented remedy is considered permanent when it allows for unrestricted use of all land and natural resources impacted by the contaminants and, except for the purpose of treatment, does not involve removal of the contaminants to another site and minimizes exchange of the contaminants to other environmental media. Refer to the MPCA guidance document on remedy selection, located on the MPCA website at [http://www.pca.state.mn.us/cleanup/pubs/rem9_98.pdf](http://www.pca.state.mn.us/cleanup/pubs/rem9_98.pdf)

Notwithstanding anything to the contrary in the remedy selection criteria in this Exhibit, and to the extent consistent with site-specific response action objectives specified by the Commissioner, response actions at the Sites shall address the source of releases and threatened releases of PFCs to ground water. Such response actions shall include (1) excavation and destruction of PFCs, or excavation, engineered isolation and containment of PFCs, and (2) other technically feasible response actions, which are reasonable and necessary to provide for a comprehensive and effective long-term response that protects public health and welfare and the environment. Primary consideration shall be given to alternative (1) consistent with Minn. Stat. § 115B.02, subd. 16 (c).

The MPCA Commissioner will apply the following threshold, balancing criteria and community acceptance to select a final response action from amongst evaluated alternatives.

IV.C.1. **Threshold Criterion.** Each response alternative or evaluated alternatives must meet the threshold criterion of providing overall protection for the public health and welfare, and the environment. This criterion is met if the response action alternative or the evaluated alternative will achieve the response action objectives and cleanup levels identified pursuant to the Establishment of Site Specific Response Action Objectives and Cleanup Levels (Part IV.A.) or provides for a permanent remedy.

IV.C.2. **Balancing Criteria.** Evaluated alternatives that meet the threshold criterion of overall protection of public health and welfare, and the environment shall be evaluated using the Balancing Criteria listed below. The evaluated alternative that provides the best balance among the Balancing Criteria in consideration of the site-specific circumstances shall be selected as the final response action. The Balancing Criteria are listed in order of priority with long-term effectiveness being the most important.
○ Long-Term Effectiveness
Long-term effectiveness is the ability of an evaluated alternative to maintain the desired level of protection of public health and welfare, and the environment over time. Permanent remedies provide absolute long-term effectiveness. In the event a permanent remedy is not feasible, evaluated alternatives that significantly alter the PFCs to produce significant reductions in toxicity, mobility, or volume through treatment will be preferred.

In addition, the ability of the alternative to obtain and/or manage treatment residuals, minimize transfer of contaminants to another environmental media, and maintain established response action objectives and cleanup levels over time shall be a major consideration;

○ Implementability
The technical and administrative feasibility of implementing the evaluated alternative and the availability of goods and services needed to implement the evaluated alternative shall be considered;

○ Short-Term Risks
The short-term risks that may be posed as a result of implementing an evaluated alternative shall be considered and weighted against the ultimate long-term benefits of implementing that evaluated alternative;

○ Total Costs
The complete cost breakdown of implementation of the evaluated alternative including the projected costs of any long-term monitoring, operation and maintenance, and response action dismantling shall be considered. The future costs to replace the alternative or respond to a future release shall also be considered in this evaluation.

IV.C.3. Community Acceptance
The degree of community acceptance shall be determined for each evaluated alternative.

The community shall be consulted regularly in regard to the response action alternatives available for remediation at the Site. Efforts will be made to inform the community about the hazards of the Site and the advantages and disadvantages of various approaches to remediation and to gain an understanding of the concerns and preferences of the community with regard to the final remedy for the Site. The community's concerns and response action preferences will be considered when the MPCA Commissioner selects a remedy.

IV.D. Selection of Response Action and Record of Decision

The MPCA Commissioner will select the final response action(s) and will document this selection in a Record of Decision (ROD) or Minnesota Decision Document (MDD). The final RI and FS Reports, as approved by the MPCA Commissioner, will, with the MPCA Site file, form the basis for the selection of the final response action for the Site and will provide the information necessary to support the development of the ROD/MDD. The ROD/MDD will identify the selected evaluated alternative (or combination of evaluated alternatives) to be implemented by 3M pursuant to Exhibit D to the Consent Order. The ROD/MDD shall be appended to and made an integral part of the Consent Order.
CONSENT ORDER

In the matter of Releases and Discharges of Perfluorochemicals at and from Sites in Washington County, Minnesota, and Certain Related Matters

EXHIBIT D
3M OAKDALE SITE

Remedial Design/Remedial Action Implementation

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I. INTRODUCTION

Part V.B. of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) At and From Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit is appended, requests that 3M to prepare a Remedial Design/Response Action Plan (RD/RA Plan) and implement Response Actions (RAs) at the Site. This Exhibit sets forth the requirements for preparing the RD/RA Plan and implementing the RAs, which have been selected by the Minnesota Pollution Control Agency (MPCA) Commissioner pursuant to the Consent Order, and is appended to and made an integral part of the Consent Order.

II. RETAIN CONSULTANT

3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit. If 3M retains the same consultant used to complete RI/FS activities, 3M shall proceed immediately with preparation of the RD/RA Plan. If 3M chooses to retain a different consultant, 3M shall retain the consultant and notify the MPCA project manager of the name of that consultant within thirty (30) days of notification of approval of the FS Report by the MPCA Commissioner.

III. REMEDIAL DESIGN/RESPONSE ACTION PLAN

III.A. RD/RA Plan Submittal

Within 90 days of notification of selection of response actions by the MPCA Commissioner, 3M shall prepare and submit to the MPCA Commissioner for review and approval a RD/RA Plan which shall be based on the approved RI/FS reports and the Record of Decision (ROD) or Minnesota Decision Document (MDD) issued by the MPCA Commissioner.

III.B. RD/RA Plan Contents

The purpose of the RD/RA Plan is to provide a detailed design, an implementation schedule, and a monitoring plan for the RAs specified in the ROD/MDD which, upon implementation, will protect the public health and welfare, and the environment from the release or threatened release of PFCs, at or from the Site.

The RD/RA Plan shall set forth in detail the steps necessary to implement the Site remedy specified in ROD/MDD. The RD/RA Plan shall include a restatement of the response action objectives and cleanup levels specified in the ROD/MDD. The RD/RA Plan shall include, at a minimum, the following:

III.B.1. Remedial Design. The purpose of the remedial design is to specify detailed methods and time schedules for the implementation of the RAs specified in the ROD/MDD. This section shall include, at a minimum, the following elements:

- design criteria and rationale;
- a plan view drawing of the overall Site, showing general locations for response action components;
- technical and operational plans and engineering designs for implementation of the response action including plan and cross sectional views for the individual components to be installed or actions to be implemented;
- a description of the types of equipment to be employed, including capacity, size, and materials or construction;
- an operational description of process units or other RA components;
process flow sheets, including process material (e.g., chemical or activated carbon) consumption rates, and a description of the process;
° a discussion of potential construction problems and respective contingency plans;
° a schedule for implementing the construction phase;
° a Site-specific PFC waste transportation plan (if necessary);
° the identity of all contractors, transporters, or other persons conducting removal or response actions at the Site;
° a description of any permits or licenses required to implement the RA;
° a description of the post RA operation and maintenance procedures and schedules; and
° a description of activities to be undertaken by 3M during RA implementation to fulfill the requirements of Part III, Sections C.1. (Project Management), C.3. (Sampling and Investigations), C.5. (Record Retention), C.8. (Site Security and Safety Plan), and C.9. (Community Relations) of the Consent Order, as they pertain to the removal or response actions and operation and maintenance activities.

III.B.2. RA Monitoring Plan. The RD/RA Plan shall propose an RA monitoring plan for the Site. The purpose of post-RA implementation monitoring is to determine the status and effectiveness of the implemented RAs. The RA monitoring plan shall, at a minimum, contain the following in order to determine that the cleanup levels specified in the ROD/MDD are achieved:

III.B.2.a. Environmental Media and Analytical Parameter List. The environmental media (soil, ground water, surface water, sediments, biota, and air) and a corresponding list of analytes to be monitored shall be proposed, along with the selection rationale, and a corresponding list of chemical analytical methodologies (including United States Environmental Protection Agency or Standard Method numbers and detection limits) to be performed.

III.B.2.b. Monitoring Facility Location and Design. The design and location of all monitoring facilities/locations shall be proposed.

III.B.2.c. Sampling Schedule. A sampling schedule for the analytical parameters proposed in the RA monitoring plan for all monitoring locations shall be proposed. Sampling shall, at a minimum, be conducted on a quarterly basis.

III.B.2.d. Reporting Plan. A schedule for reporting the results of long-term monitoring to the MPCA shall be proposed. The schedule shall, at a minimum, contain the following:

1. Quarterly Monitoring Reports. 3M shall submit quarterly analytical results to the MPCA Commissioner. The reporting schedule shall comply with the Consent Order.

2. Annual Monitoring Reports. 3M shall submit an Annual Monitoring Report to the MPCA Commissioner on or before April 1, 2008, and each April 1st thereafter. Any remedial technology employed in implementation of the RD/RA Plan shall be left in place and operated by 3M until the MPCA Commissioner authorizes 3M in writing to discontinue, move, or modify some or all of the remedial technology. 3M may request discontinuation of the remedial technologies in the annual report, when the cleanup levels set forth in the ROD/MDD have been achieved. 3M shall move or modify the remedial technology when the movement or modifications, as approved by the MPCA Commissioner, may better achieve the remedial action objectives set forth in the ROD/MDD.

The Annual Monitoring Report shall contain the following:
° a Site map showing all monitoring locations;
° the results of all parameter analyses for the previous year;
° the results of all water level measurements for the previous year;
○ regional and Site specific ground water piezometric maps for each aquifer including surface water elevations;
○ cross section(s) indicating relative communication between aquifers;
○ a map for each sampling event showing each monitoring location with contaminant concentrations and isoconcentration lines for selected parameters;
○ graphs and tables illustrating the concentrations over time using data from each sampling event (these graphs and tables shall be cumulative showing parameter analyses for all previous years as well as the reporting year); and
○ a sampling plan for the next year with an assessment of the monitoring parameters, sampling frequencies, and the need for the addition or deletion of monitoring locations and parameters.

III.C. **RD/RA Plan Implementation**

Within thirty (30) days of the MPCA Commissioner approval of the RD/RA plan, 3M shall initiate the RA. The purpose of RA implementation is to take those actions that will protect public health and welfare, and the environment, from the release or threatened release of PFCs at or from the Site.

The RD/RA Plan, as approved or modified by the MPCA Commissioner shall be implemented in accordance with the time schedules set forth in the Consent Order and Part III.B. of this Exhibit. The implementation of RAs shall be conducted in accordance with all applicable federal and state ARARs, and local laws, rules, regulations, and ordinances.

During implementation of the RD/RA Plan, the MPCA Commissioner may specify such additions and/or revisions to the RD/RA Plan as the Commissioner deems necessary to protect public health and welfare, and the environment.

III.D. **RA Implementation Report**

Within sixty (60) days of the completion of implementation of the RAs specified in the approved RD/RA Plan, a RA Implementation Report which includes the following elements, shall be submitted to the MPCA Commissioner:

○ the data and results of the RA implementation;
○ the follow-up actions, if any, to be taken in the following one-year period;
○ a certification that all work plans, specifications, and schedules have been implemented and completed in accordance with the RD/RA Plan as approved or modified by the MPCA Commissioner;
○ discussion of difficulties encountered during the implementation that may alter and/or impair or otherwise reduce the effectiveness of the RA implementation to prevent, eliminate, or minimize the release or threatened release of PFCs, at or from the Site, or which may require unanticipated operational or maintenance actions to maintain the effectiveness of any of the implemented RAs; and
○ a discussion of any necessary modifications to the operation and maintenance procedures as approved.

IV. **REPORT ON COMPLETION OF RA**

Within sixty (60) days of notification, by the MPCA Commissioner, that all Site-specific Response Action Objectives and Cleanup Levels (Exhibit A, Part IV.A.) have been met, a Report on Completion of RA, which includes the following elements, shall be submitted to the MPCA Commissioner.
a summary of the response action objectives and cleanup levels and a history of how they were met;
• certification that all RAs have been properly dismantled, including supporting documentation (e.g., monitoring well sealing records);
• a summary of any ongoing institutional controls (e.g., deed restrictions);
• a final cost summary.

V. MPCA COMMISSIONER ACTIONS

3M shall submit to the MPCA Commissioner all plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, approval with modifications and/or a request for additional information, or rejection of submittals shall be in accordance the Consent Order. The Site Safety and Security Plan does not require MPCA Commissioner approval.

V.A. Approval of the RD/RA Plan, RA Implementation Report, and Report on Completion of RA

The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RD/RA Plan, RA Implementation Report, and the Report on Completion of RA based on the requirements of Parts III.B, III.D, and IV respectively. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or Completion of RA Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the information necessary to correct the deficiencies.
CONSENT ORDER

In the matter of Releases and Discharges
of Perfluorochemicals and VOCs at and from
Sites in Washington County, Minnesota,
and Certain Related Matters

EXHIBIT E

3M Woodbury Disposal Site

Remedial Investigation/Feasibility Study

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Exhibit E
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

I. INTRODUCTION, PURPOSE, AND REQUIREMENTS

I.A. Introduction and Background

Part V.B of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) at and from Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit E (Exhibit) is appended, requires 3M to conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release(s) or threatened release(s) of PFCs and VOCs at and from the 3M Woodbury Disposal site (Site). This Exhibit sets forth the requirements for completing the RI/FS and is appended to and made an integral part of the Consent Order.

The MPCA has conditionally approved Site Reports for this Site which were submitted by 3M in a letter dated March 20, 2007. These reports address barrier well capture zone evaluation, sentinel monitoring well installation, assessment of the former northeast disposal area, conveyance line assessment, monitoring plan and reporting and schedule.

For purposes of this Consent Order, the MPCA considers the activities taken by 3M to date to meet the requirements of III.C.2a, and III.C.2b of this Exhibit. Subsequent submittals from 3M shall meet the following timetable:

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<td>Within 30 days of effective date of the Consent Order</td>
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<tr>
<td>Prepare RI/FS Work Plan</td>
<td>Within 60 days of effective date of the Consent Order</td>
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<tr>
<td>Initiate RI/FS Work Tasks</td>
<td>Within 30 days of approval of the RI/FS Work Plan</td>
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<td>Complete RI/FS Work</td>
<td>Within 120 days of approval of the RI/FS Work Plan</td>
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<tr>
<td>Submit RI/FS Report</td>
<td>Within 180 days of approval of the RI/FS Work Plan</td>
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This generic RI/FS process is intended to address all aspects of a release or potential release upon discovery. Given that significant RI work has already been initiated for this Site, certain items outlined in this Exhibit may be determined by the Commissioner as not applicable or not required. Supplemental remedial investigation or feasibility study reports may be submitted to meet requirements specified in this Exhibit, with deadlines for such submittals set by the MPCA.

I.B. Purpose

The purpose of conducting an RI/FS is to provide information necessary to enable the Minnesota Pollution Control Agency (MPCA) Commissioner to select a final remedy for the Site.

In order to arrive at remedy selection in the most expedient manner, the RI and FS activities
will be conducted concurrently. The RI/FS Work Plan shall propose:
  ° the RI activities; and
  ° a list of possible remedial technology types.

The RI components of the RI/FS Report shall:
  ° report the results of the RI; and
  ° document the development and screening of possible response action alternatives.

The FS components of the RI/FS Report shall present:
  ° the results of treatability studies; and
  ° the Detailed Analysis Report (DAR).

I.B.1. Remedial Investigation. The RI component activities of the RI/FS will (1) provide for the complete characterization of the release(s) or threatened release(s) of PFC’s and VOCs at or from the Site and the actual or potential hazard the release(s) or threatened release(s) pose to public health and welfare, and the environment; (2) produce sufficient data and information to allow the 3M to submit the RI and FS reports (Part III.E and III.F); and (3) produce data of sufficient quantity and adequate technical content to assess the possible alternative response actions during the RI/FS.

I.B.2. Feasibility Study. The FS component activities of the RI/FS consist of developing a list of technology types, development and screening of possible response action alternatives, preparing and conducting treatability studies, and conducting a detailed analysis of evaluated alternatives. The MPCA Commissioner will review the RI/FS Report and select the final response action(s) using the Selection of Remedy Criteria set forth in Part IV.C. of this Exhibit.

I.C. Requirements

The RI/FS shall be conducted according to the provisions of this Exhibit. The United States Environmental Protection Agency (USEPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (October 1988 Interim Final) will provide 3M with specific guidance for completing the actions required under this Exhibit to the extent that this guidance is consistent with the requirements of this Exhibit. The sampling and quality assurance activities (Part III.C.3) shall be consistent with the requirements of the EPA Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80). Risk assessments (i.e., evaluation, quantitation, tabulation of results, and mechanics of presentation) performed under this Exhibit (Part III.C.6.) shall be based on appropriate MPCA requirements, USEPA EPA's "The Risk Assessment Guidelines of 1986" (EPA/600/8-87/045), "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Pt. A, December 1989, Interim Final) and the USEPA EPA Risk Assessment Guidance for Superfund, Vol. 2, Environmental Evaluation Manual (March 1989, Interim Final).

At a minimum, the Site Security and Safety Plan (Part III.C.8) shall incorporate and be consistent with the requirements of:
  ° OSHA requirements 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response;
  ° OSHA requirements 29 CFR Part 1910 (General Industry Standards) and 1926 (Construction Industry Standards);
  ° Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities,

As new versions or future revisions of the documents referenced in this section become available to the public, the latest version of each document shall supersede all previous versions of that document and shall be used for conducting the RI/FS.

II. RETAIN CONSULTANT

Within thirty days of the effective date of this Consent Order, 3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit and shall notify the MPCA Project Manager of the name of that consultant.

III. REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

III.A. RI/FS Objectives

The objectives of the RI/FS are to:
- identify all sources of contamination;
- evaluate the nature and extent of soil, sediment, surface water, ground water, and air contamination at the Site and in any adjacent areas affected by contamination at or from the Site;
- identify all existing and potential migration characteristics and pathways for the PFC’s and VOCs identified at the Site, including the direction, rate, and dispersion of contaminant migration;
- identify alternative response actions and evaluate the feasibility and effectiveness of implementing those alternative response actions to prevent, minimize, or eliminate release(s) or threatened release(s) of PFC’s and VOCs at or from the Site; and
- collect and evaluate the information necessary to prepare a remedial design/response action plan in accordance with Exhibit B to the Consent Order.

III.B. RI/FS Work Plan Submittal

Within sixty (60) days of the effective date of the Consent Order, 3M shall submit to the MPCA Commissioner for approval pursuant to Part IV.B. and IV.B.1. of this Exhibit, a proposed RI/FS Work Plan and implementation schedule which details all of the activities necessary to complete the RI/FS. The proposed RI/FS Work Plan shall be prepared to enable 3M to meet the RI/FS Objectives (Part III.A) and shall, at a minimum, address all of the elements described in the RI/FS Work Plan Contents (Part III.C.).

III.C. RI/FS Work Plan Contents

The proposed RI/FS Work Plan shall address, at a minimum, each of the following elements:

III.C.1. Project Management. A Project Management section of the RI/FS Work Plan shall describe how the RI/FS will be managed by 3M and its contractors, subcontractors, and consultants. This section shall include an organization chart with the names and titles of key personnel and a description of their individual responsibilities.

III.C.2. Background Evaluation. The RI/FS Work Plan shall include a Background Evaluation that includes these sections: Operational History, Topographic Survey, History of Site Assessment Work and Remedial or Removal Actions, and Identification of Data Gaps.
III.C.2.a. **Operational History of The Site.** This section shall include a detailed explanation of the operational history of the Site (i.e., all past facilities and a description of their specific operations), including history of property ownership boundaries, and pertinent area and boundary features of the Site. In addition, this section shall include the following detailed information related to the release(s) or threatened release(s) of PFC’s and VOCs at the Site:

- a list of the PFC’s and VOCs that have been stored, used, treated, or disposed of on-Site and their estimated volumes, concentrations, and characteristics;
- a description of what, where, when, how and by whom PFC’s and VOCs were released during the operation of all facilities of record at the Site (e.g., Provide an explanation of how the Site or a specific area became contaminated);
- a description of contaminant source areas and facilities which release or threaten the release of PFC’s and VOCs to soil, sediment, surface water, ground water, or air;
- a Site map delineating each area where such PFC’s and VOCs were disposed, treated, stored, transferred, handled, or used;
- a description of all industrial processes which are or were related to the use or generation of each PFC and VOC; and
- a description of past disposal practices for PFC’s and VOCs.

Any historical research needs that have not been met by file review may be met by conducting employee interviews, reviews of 3M's records, and aerial photograph investigations.

III.C.2.b. **Topographic Survey.** This section shall include a description of the general physiography of the Site and surrounding area and one (1) Site map using a one (1) inch = 1000 feet scale and ten (10) foot contour interval.

Additional maps for each identifiable contaminant source area shall be provided using a one (1) inch = 50 feet scale and a two (2) foot contour interval. Surface water features, drainage direction, buildings, process areas, storage tanks, well locations, forested areas, utilities, paved areas, easements, rights-of-way, pipelines (surface and subsurface), landfills, borrow pits, debris piles, raw material piles, and impoundments shall be shown. The maps shall be of sufficient detail and accuracy to locate all current or proposed future work at the Site.

III.C.2.c. **History of Site Assessment Work and Remedial or Removal Actions.** This section shall include a history of all previous investigation(s) and response action(s) conducted at the Site including:

- a detailed description of regional and local hydrogeology and geology based on published literature and available technical information. Cross Sections and maps shall be included. Include the type and extent of surface soils as presented in the Soil Conservation Service soil surveys;
- a summary of all soil, surface water, ground water, and air assessment work completed to date, including contaminant source area identification, data reduction and interpretation, and the QA/QC procedures which were followed;
- a description of the nature and extent of the release(s) and/or threatened release(s), including a summary of actual and potential on-Site and off-Site health and/or environmental effects; and
a summary of any previous remedial or removal actions conducted at the Site. This summary shall include cleanup activities and any related field inspections, sampling surveys, or other related technical investigations.

III.C.2.d. Identification of Data Gaps. Gaps in information (data gaps) necessary to fulfill the RI/FS Objectives (Part III.A) shall be identified and recommendations shall be made for additional RI work necessary to meet the RI/FS Objectives and produce sufficient information to support the screening and detailed analysis of response action alternatives in the RI/FS. For each data gap identified, 3M shall provide a list and description of research and field activities necessary to address that data gap.

III.C.3. Sampling and Investigations. The RI/FS Work Plan shall propose activities and methodologies necessary to conduct the investigations specified in Parts III.C.3.c, d, e and f, III.C.6. and propose the plans specified in Parts III.C.3.a and b.

III.C.3.a. Sampling and Analysis Plan. A comprehensive sampling and analysis plan shall be proposed for the investigations required under Parts III.C.3.c, d, e and f, and III.C.6 below. This plan shall include:

- objectives of the sampling investigation;
- criteria for sampling location selection;
- a map showing all locations that will be sampled;
- a description of the types of samples which will be collected;
- a description of the depth/frequency of sampling at each location;
- a proposed sampling schedule;
- identification of all chemical parameters to be analyzed (analytes), selection rationale, and a corresponding list of chemical analytical methodologies (including USEPA or Standard Method numbers and detection limits) to be performed. Prior to determining a final analyte list, analytes of concern should be separated into carcinogens and non-carcinogens. In addition, representative ground water samples shall be analyzed to identify natural chemical constituents that may affect various treatment methods or that may identify upgradient sources of contamination;
- abiotic and biotic environmental sampling shall be proposed to complete the assessment process required under Part III.C.6. The technical specifications and procedures for soil sampling methods, drilling methods, borehole and surface geophysical methods, and monitoring well and piezometer installations. ASTM procedures shall be used and referenced where appropriate and available;
- provisions for obtaining access to and obtaining samples from the Site and other affected properties (where appropriate);
- a description of quality assurance/quality control procedures for the collection, identification, preservation, holding times, and transportation of samples; type and volume of sample containers;
- the calibration and maintenance of field instruments; decontamination of sampling equipment; and the processing, verification, storage, calculations and statistics, and reporting of field data including field chain-of-custody procedures, identification of qualified persons conducting the sampling, and identification of a laboratory meeting the requirements of Part III.C.3.b.; and
a description of any computer models to be employed in data analysis. Model
descriptions shall include capabilities and limitations, all assumptions or approximations
that will be made in calibrating and using the model, specific objectives to be achieved
with the model, and justification for use of the model method including a discussion of
why the model is the preferred model or method for meeting the objectives stated in the
RI/FS Work Plan. The quantities or values that are desired from the model that are not
confirmed by direct measurement shall be identified and the sensitivity of the model
results to input parameters discussed. All data and programming including any
proprietary programs shall be made available to the MPCA staff upon request.

III.C.3.b. Laboratory QA/QC Plan. The RI/FS Work Plan shall include a laboratory QA/QC plan which
shall consist of the following sections:
° identification of laboratories performing analysis;
° description of laboratory sample chain of custody procedures;
° description of calibration procedures and frequency;
° description of analytical standard operating procedures;
° description of data reduction, validation, and reporting procedures;
° description of internal quality control checks;
° description of performance and system audits;
° description of preventative maintenance procedures;
° description of specific procedures for routine assessment of data precision, accuracy,
completeness, and any necessary corrective action; and
° description of quality assurance reports to management.
Refer to USEPA QA/QC guidance, which is available through the internet, at
http://es.epa.gov/ncer/guidance/qa.html

III.C.3.c. Geologic Investigation. This section of the RI/FS Work Plan shall provide a description of
the proposed activities which will be undertaken to characterize the geology and contaminant
distribution at the Site and other affected properties. The geologic investigation shall be
conducted in areas of known and suspected disposal and in areas where ground water
contamination exists and no known or suspected contaminant source area has been identified.
This section shall include the following:
° a proposal to define the stratigraphy of the consolidated and unconsolidated deposits
including the identification of high or low permeability lenses of material in the
unsaturated (vadose) zone which may affect contaminant migration or the attenuation of
contaminants. This proposal shall also include the extent and type of lithologies of
respective consolidated units and unconsolidated materials including relative amounts of
organic matter, gravel, sand, silt, and clay according to ASTM soils classification scheme
or other acceptable standard procedures;
° proposed tests to define the physical and chemical properties which affect the movement
or attenuation of contaminants in the stratigraphic units identified above. These properties
include: density, organic matter content, cation exchange capacity, percent clay content,
vertical hydraulic conductivity, total porosity, effective porosity, and adsorption potential
(Kd). See the soil cleanup guidance for additional parameters;
° proposed methods to define the nature and extent of contamination in the vadose zone;
° a proposal to identify areas disturbed by excavations or other activities that may be routes
of contaminant migration (e.g., buried pipes, utility corridors, fill areas, tank basins); and
° a proposal to identify ambient concentrations of analytes in the soil.
III.C.3.d. **Hydrogeologic Investigation.** This section of the proposed RI/FS Work Plan shall provide a description of activities to be undertaken to characterize the local and regional hydrogeology and the contaminant distribution in the ground water at the Site and other affected properties. This section shall include the following:

- A proposal to identify Quaternary (glacial) and bedrock aquifers, aquitards, and perched water zones;
- A proposal for the installation and development of ground water monitoring wells and/or piezometers or other devices needed to clearly define ground water flow conditions in the glacial and bedrock aquifers, aquitards, and perched water zones. All wells shall be surveyed to the National Geodetic Vertical Datum reference elevation, and procedures shall be specified for measuring water elevations in all wells to the nearest hundredth of a foot;
- A proposal for the installation of ground water monitoring wells which shall be used to define ground water quality upgradient, within, and downgradient of suspected and/or identified contaminant source areas and at the interface between ground water and surface water;
- A proposal for a ground water quality monitoring program to be conducted to define the nature and extent of ground water contamination at the Site and other affected properties. Municipal, industrial, agricultural, domestic and monitoring wells, and springs shall be considered for inclusion in the monitoring program. The monitoring program shall have a minimum frequency of quarterly sampling with water level measurements;
- Proposed tests (e.g., slug and/or pumping tests to determine the hydraulic properties, including horizontal hydraulic conductivity and secondary porosity, of aquifers and aquitards at the Site and other affected properties) which shall define ground water flow relationships (directions, gradients, and velocities for both vertical and horizontal flow components) including potential aquifer interconnections, recharge areas, discharge areas, and ground water interactions with surface water. In addition, this section shall propose how the flow relationships will be evaluated with respect to contaminant distribution and the potential future movement of contaminants;
- A proposal to define ground water use(s) and the potential effect water use(s) may have on contaminant movement in both horizontal and vertical directions. Include with this proposal an inventory map showing all active, unused, and abandoned municipal, industrial, agricultural, domestic and monitoring wells, and springs within a one mile radius of the Site, and of high capacity wells and municipal water supply wells within a three mile radius of the Site; and
- A description of visual aids which will be used to present, in the RI Report, the hydrogeologic and hydrogeochemical data gathered during the Hydrogeologic Investigation (e.g., cross sections, piezometric maps, isoconcentration maps, graphical methods, and tables).

III.C.3.e. **Surface Water Investigation.** This section of the RI/FS Work Plan shall identify all surface water bodies within a one mile radius of the Site including rivers, lakes, ponds, wetlands, bogs, calcareous fens, low-flow streams, creeks, springs, and named and unnamed ditches. Both perennial and intermittent surface water features shall be identified. A map showing the locations of all identified surface water bodies and the location of known or suspected releases of contaminants from the Site to surface water bodies shall be included. This section shall include a proposal to evaluate each surface water body identified, evaluate its potential to be impacted by Site contaminants through releases via ground water, surface run-off, drainage, airborne deposition, and other possible pathways.
This proposal shall include a plan to identify the benthic sediments and benthic and other aquatic community conditions underlying and within surface water upgradient, adjacent to, and downgradient of the contaminant source area. In addition, methodologies shall be proposed to determine the mass loading of contaminants to the surface water bodies.

The water use classification for the identified surface water body or bodies, in accordance with Minn. R. ch. 7050 and the wetlands classification in accordance with Minn. Stat. §§ 103G.005, subs. 15 and 18 and 103G.201 (2006), shall be included. Identification of the water use characteristics (e.g., agricultural, recreational, and private or municipal water supply) of the identified surface water bodies shall also be included.

III.C.3.f. Air Investigation. This section of the RI/FS Work Plan shall propose methodologies for investigations to determine the nature and extent of contaminants that are or may become airborne (e.g., vapors, gases, mists, or particulates) through either natural phenomenon or as a result of activities at the Site.

III.C.4. List of Possible Technology Types and Proposed Treatability Studies. The RI/FS Work Plan shall include a comprehensive list of technology types that may be applicable to the release(s) or threatened release(s) at or from the Site. This list shall be developed considering the Remedy Selection Criteria (Part IV.C.). This list shall include: 1) technology types that prevent or eliminate the release(s) or threatened release(s) by completely destroying, detoxifying, or immobilizing PFC’s and VOCs and leave materials on-Site that require no long-term management; 2) technology types that prevent or minimize the release(s) or threatened release(s) by treatment process options that reduce the toxicity, mobility, or volume of the PFC’s and VOCs; 3) technology types that control the threats posed by the release(s) or threatened release(s) of PFC’s and VOCs by excavation, isolation and containment; and 4) a general description of the treatability studies necessary to evaluate the respective technology types identified under 1, 2 or 3 above. Where ground water treatment is part of a remedy, activated carbon or anionic resin filtration remedies shall be considered.

III.C.5. Record Retention. The RI/FS Work Plan shall provide a description of how the data obtained pursuant to this Exhibit will be managed and preserved by 3M in accordance with Part II.D of the Consent Order.

III.C.6. Risk Assessment. The RI/FS Work Plan shall provide a detailed description of activities that will be undertaken to conduct separate ecological and human health Baseline Risk Assessments. Ecological and human health Baseline Risk Assessments are evaluations of the actual and potential threat to public health and welfare, and the environment posed by the release(s) or threatened release(s) of PFC’s and VOCs, in the absence of any remedial action.

The risk assessment activities shall be conducted so as to generate the information necessary to meet the reporting requirements of the Baseline Risk Assessment as specified in Part III.E.2.

Formats, technology, and mathematical symbols used in the Baseline Risk Assessments shall

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1 An RP lacking significant risk assessment experience should be prepared to subcontract such work to qualified organization. The Baseline Risk Assessment shall be thoroughly reviewed by a technical editor to ensure that the text will be understandable by the MPCA technical staff, the MPCA Board, and the interested public.
correspond as closely as possible to those presented in EPA's Superfund risk assessment guidance referred to under Part I.C. Any alternative formats, technology, mathematical models shall be proposed in the RI/FS Work Plan.

III.C.7. Interim Response Actions. The RI/FS Work Plan shall propose any Interim Response Action (IRA) that can be implemented prior to completion of the RI/FS to stabilize, contain, and/or mitigate any release(s) or threatened release(s) of PFC’s and VOCs, which is reasonable and necessary to protect public health or welfare, or the environment.

III.C.8. Site Security and Safety Plan. A Site-specific security and safety plan shall be prepared as a separate part of the RI/FS Work Plan, describing all measures including contingency plans and Site access restrictions which will be implemented during field activities to (1) ensure protection of public health and welfare, and the environment and (2) protect the health and safety of personnel involved in the RI/FS.

III.C.9. Community Relations. The RI/FS Work Plan shall include a community relations section providing procedures for (1) informing local residents, municipalities, environmental groups, and interested parties about activities at the Site; (2) responding to inquiries from concerned citizens; and (3) cooperation with the MPCA Community Relations efforts. Refer to the MPCA community relations guidance document, entitled “Community Involvement in Risk Based Decision Making”, located on the MPCA web site at http://www.pca.state.mn.us/cleanup/pubs/coor9_98.pdf.

III.C.10. Schedule. The RI/FS Work Plan shall propose a schedule that provides specific time frames and dates for completion of each activity and report conducted or submitted under the RI/FS Work Plan. The proposed schedule shall reflect the timelines specified in this Exhibit, for conducting the RI and FS activities.

III.D. RI/FS Work Plan Implementation

Within thirty (30) days of the MPCA Commissioner approval of the RI/FS Work Plan, 3M shall initiate the RI/FS and development and screening of response action alternatives. 3M shall complete the RI/FS within 90 days of initiating the RI/FS activities. The RI/FS shall be conducted in accordance with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Minn. Stat. ch. 103I and Minn. R. ch. 4725 for the installation of any ground water monitoring wells.

Completed RI/FS Work Plan activities and any necessary additional RI/FS activities not included in RI/FS Work Plan shall be identified and proposed in monthly progress reports submitted to the MPCA. The impact of the additional RI/FS activities on the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4) shall also be described in the monthly reports. If any additional RI/FS activities will adversely affect work scheduled through the end of the upcoming month or will require significant revisions to the approved RI/FS Work Plan, 3M shall notify the MPCA Project Manager immediately of the situation followed by a written explanation within ten (10) days of the initial notification.
III.E. Remedial Investigation

Within one hundred twenty (120) days after completion of the RI/FS, an RI/FS Report detailing: (1) the data and results of the RI; (2) baseline risk assessment; and (3) screening of possible response action alternatives shall be prepared and submitted to the MPCA Commissioner. The RI/FS Report shall organize and present all data generated as a result of implementation of the approved RI/FS Work Plan including, at a minimum, analytical results, assessment of completion of QA objectives, boring logs, field data sheets, and test results including data reduction and interpretation of all results. Further, the RI/FS Report shall include:

III.E.1. Nature and Extent of the Release or Threatened Release. The RI/FS Report shall include a description of the following:
  ° the nature and extent of PFC’s and VOCs released or threatened to be released to the soils, surface water, sediments, ground water, and air;
  ° the contaminant fate and migration pathways within each media;
  ° an evaluation of the reliability, and accuracy of the results of any computer models employed for data interpretation.

III.E.2. Baseline Risk Assessment. The results of two Baseline Risk Assessments, one addressing human health risks and one addressing ecological risks (Part III.C.6.), shall be reported as separate chapters in the RI Report.

Each chapter of the Baseline Risk Assessment shall include an executive summary written in layman's terms. A narrated videotape walk-through of the Site and surrounding areas shall be included to highlight information presented in the Baseline Risk Assessment text.

The risk assessment reports shall provide:

III.E.2.a. Data Evaluation. An evaluation of the results of the RI/FS showing the actual and projected concentrations of PFCs and VOCs present in relevant media (e.g., soil, surface water, ground water, air, , and biota).

III.E.2.b. Toxicity Assessment. An identification of the hazard and toxicological properties of each contaminant identified through sampling and investigations. A comparison between the list of contaminants known to have been deposited on the Site versus those found through analyses. Identification of the chemical specific Applicable or Relevant and Appropriate Requirements (ARARs) for PFCs and VOCs identified at the Site.

III.E.2.c. Exposure Assessment. A comprehensive exposure pathways table. An inclusion/exclusion analysis and supporting rationale shall be included for each pathway. Following the inclusion/exclusion analysis, a determination of the extent and likelihood of exposure to contaminants at or from the Site. Identification of the potential receptor populations. Provide in-depth environmental fate and transport analysis for completed exposure pathways including physical and biological degradation processes and hydrogeologic conditions.

III.E.2.d. Risk Characterization. Both a maximum exposure case analysis and a Reasonable Maximum Exposure (RME) shall be provided for each pathway.
III.E.2.e. **Uncertainty and Sensitivity Analysis.** If there is or will be more than one analyte of concern associated with the Site, a chemical mixtures risk assessment addressing additivity and synergism shall be conducted and reported upon.

As part of the uncertainty analysis a Synergistics Effects Uncertainty Analysis (SEUA) shall be conducted and reported upon which assumes risks posed by conditions at the Site may be underestimated by an additivity based risk characterization. The SEUA shall provide modified remediation levels necessary to compensate for possible synergistic effects.

III.E.3. **Development and Screening of Response Action Alternatives.** The RI/FS Report shall include a Development and Screening of Response Action Alternatives chapter that provides an evaluation of (a) each of the response action alternatives assembled from the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4), except for those technology types that have been eliminated from further consideration by the MPCA Commissioner in approving the RI/FS Work Plan, and (b) any other technology types identified by 3M or the MPCA Commissioner prior to approval of the RI/FS Report.

The purpose of this chapter is to document the development of response action alternatives by combining or assembling technology types and their respective process options which will be applied to specific operable units or the Site as a whole. After the response action alternatives have been developed, they will be screened to assure that only those alternatives that will likely achieve the response action objectives and cleanup levels (Part IV.A.) will be retained for further analysis in the DAR.

III.E.3.a. **Describe Process Options and Document the Screening of Response Action Alternatives.** All development and screening decisions shall be thoroughly documented. This documentation shall include both written description and summary tables.

The development and screening of response action alternatives is accomplished by conducting the following tasks:

**Development**

From the list of technology types, as approved in the RI/FS Work Plan, develop the response action alternatives by describing the process options for each technology type and assemble the technology types with respective process options into response action alternatives. This step is accomplished by following the procedures outlined below:

- array the technology types and describe all possible process options for each technology type;
- for each process option, list the action and location specific ARARs;
- establish the volumes of contaminants and the volumes and types of contaminated media or areas of the Site to which the response action alternative will be applied (e.g. operable units); and
- assemble one or more technology type(s) and the respective process option into one response action alternative.
Screening

Once the response action alternatives have been developed, the response action alternatives are evaluated and screened using the Site Specific Response Action Objectives and Cleanup Levels (Part IV.A). Those response action alternatives that do not meet the Response Action Objectives and the Cleanup Levels are eliminated from further consideration. Response Action Alternatives that pass this screening are designated as "evaluated alternatives" and shall be further evaluated in the DAR.

3M shall provide its recommendation and rationale regarding which response action alternatives should not be given further consideration for implementation at the Site.

III.E.3.b. Treatability Studies. This chapter of the RI/FS Report shall provide:

° a description of all completed treatability studies and the results of any pilot studies, bench tests, or other activities that were performed to evaluate technology types and process options; and
° proposals, with time frames, for any additional treatability studies that are needed to further evaluate any response action alternatives that pass the screening and are to be further analyzed in the DAR.

III.F. Feasibility Study

Within ninety (90) days of the MPCA Commissioner's approval of the RI/FS Work Plan 3M shall prepare and submit to the MPCA Commissioner an RI/FS Report consisting of the results of any treatability studies and a DAR. The DAR shall address all the evaluated alternatives specified by the MPCA Commissioner in approving or modifying the RI/FS Work Plan.

III.F.1. Treatability Studies. This section of the RI/FS Report shall include the results of all completed and ongoing bench or pilot studies identified in the RI/FS Report (Part III.E.3.b). In addition, for each of the technologies that have undergone treatability studies, the following factors shall be addressed and presented:

° effectiveness in treating the PFCs and VOCs;
° reliability and past successes of the technology under similar conditions to those at the Site; and
° availability of the technology type and specific process option for implementation at the Site.

III.F.2. Detailed Analysis Report. This section of the RI/FS Report shall analyze evaluated alternatives in detail considering the Remedy Selection Criteria (Part IV.C.). The DAR shall include the following elements for each evaluated alternative:

III.F.2.a. Detailed Description. Each evaluated alternative shall be described and individually assessed against the Balancing Criteria (Part IV.C.2.), namely, long term effectiveness, implementability, short term risks, total cost, and community acceptance. At a minimum, the detailed description for each evaluated alternative shall include:

° the operable unit to which the evaluated alternative would be applied;
° a description of the technology type and process option;
a description of the engineering considerations required for implementation (e.g., for a pilot treatment facility, any additional studies that may be needed to proceed with final response action design);

- a description of operation, maintenance, and monitoring requirements;

- a description of off-Site disposal needs and transportation plans;

- a description of temporary storage requirements;

- a description of safety requirements associated with implementation, including both on-Site and off-Site health and safety considerations;

- a description of how any of the other evaluated alternatives could be combined with this evaluated alternative and how any of the combinations could best be implemented to produce significant cost savings and/or better achieve the Site Specific Response Action objectives and Cleanup Levels (Part IV.A);

- a description/review of on-Site or off-Site treatment or disposal facilities which could be utilized to ensure compliance with ARARs; and

- a description of the evaluated alternative response action dismantling to be conducted upon completion of response action.

III.F.2.b. Comparative Analysis of Evaluated Alternatives. Once the evaluated alternatives have been described and individually assessed against the Balancing Criteria (Part IV.C.2.) a comparative analysis shall be conducted to evaluate the relative performance of each evaluated alternative. The purpose of this comparative analysis is to identify the advantages and disadvantages of each evaluated alternative relative to one another with respect to each of the Balancing Criteria (Part IV.C.2), in order to facilitate selection of an appropriate remedy.

The comparative analysis shall include both a table and a narrative discussion describing the strengths and weaknesses of the evaluated alternatives relative to one another by using each specific component of each Balancing Criterion to evaluate the relative performance of each evaluated alternative. The narrative shall discuss how likely changes in variables could alter each evaluated alternative's relative performance. This section shall be organized in the following manner; under each individual Balancing Criterion, discuss the evaluated alternative that performs the best overall under that Balancing Criterion. Other evaluated alternatives shall be discussed in the order in which they perform. For innovative technologies, their potential advantages in performance or cost and the degree of uncertainty in their expected performance, as compared with more demonstrated technologies, shall also be discussed.

The presentation of differences among the evaluated alternatives can be measured either qualitatively or quantitatively, as appropriate, and shall identify substantive differences (e.g., greater short-term risk concerns or greater cost). Quantitative information that was used to assess the evaluated alternatives (e.g., specific cost estimates, time until the Site-specific response action objectives and cleanup levels are met, and levels of residual contamination) shall be included in these discussions.

III.F.2.c. Recommended Evaluated Alternative(s) and Conceptual Design. 3M shall include in the DAR its recommendation of the evaluated alternative (or combination of evaluated alternatives) which should be implemented at the Site. The purpose of preparing a conceptual design is to illustrate all aspects of 3M-recommended evaluated alternative (or combination) in sufficient detail to enable the MPCA Commissioner to fully evaluate 3M-recommended evaluated alternative (or combination).
The conceptual design for 3M-recommended evaluated alternative (or combination) shall include, but not be limited to, the elements listed below:

- A conceptual plan view drawing of the overall site, showing general locations for response action components;
- Conceptual layouts (plan and cross sectional views where required) for the individual components to be installed, or actions to be implemented;
- Conceptual design criteria and rationale;
- A description of types of equipment required, including approximate capacity, size, and materials of construction;
- Process flow sheets, including chemical consumption estimates and a description of the process;
- An operational description of process units or other components;
- A description of unique structural concepts for components;
- A description of operation and maintenance requirements;
- Right-of-way requirements;
- Additional engineering data required to proceed with design;
- A discussion of permits that are required pursuant to environmental and other statutes, rules, and regulations;
- Implementation cost estimate;
- Annual O&M cost estimates;
- Remedial action dismantling cost; and
- Estimated implementation schedule.

IV. MPCA COMMISSIONER ACTIONS

IV.A. Establishment of Site Specific Response Action Objectives and Cleanup Levels. The MPCA Commissioner shall assess data as they are obtained through implementation of the RI. When sufficient data exist, the MPCA Commissioner shall specify and notify 3M of the Site-specific response action objectives and cleanup levels for the contaminants, environmental media of concern, and exposure pathways associated with the Site. The Site-specific objectives and cleanup levels shall be determined using ARARs, the "Compilation of Ground Water Rules and Regulations MPCA Superfund Program," dated March 27, 1991, Attachment I, the MPCA Risk-Based Site Evaluation Manual (available on the MPCA website at http://www.pca.state.mn.us/cleanup/riskbasedoc.html), and documented case studies. The MPCA Commissioner will notify 3M of the Site-specific response action objectives and cleanup levels no later than the approval of the RI/FS Report.

IV.B. Review of Submittals. 3M shall submit to the MPCA Commissioner all work plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, modification, or rejection of submittals shall be in accordance with this Section and Part IX of the Consent Order. Given the MPCA preference for implementing response actions in an expedient manner, the MPCA Commissioner may request implementation of an IRA at any point during the RI/FS.

IV.B.1. Approval of RI/FS Work Plan. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RI/FS Work Plan. Modifications by the MPCA Commissioner are final.
If the MPCA Commissioner approves the RI/FS Work Plan with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI/FS Work Plan that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RI/FS Work Plan, the Commissioner will: 1) specify the deficiencies in the RI/FS Work Plan that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI/FS Work Plan.

As part of reviewing the RI/FS Work Plan, the MPCA Commissioner will eliminate from further consideration any possible technology types that are clearly not feasible or effective considering the Remedy Selection Criteria (Part IV.C.), and may identify other possible technology types and process options to be analyzed in the Development and Screening of Response Action Alternatives chapter (Part III.E.3) of the RI/FS Report.

Site security and safety are the responsibility of 3M. The MPCA Commissioner may comment on the Site Security and Safety Plan but will neither approve nor disapprove that plan. Within ten (10) days of notification of the MPCA Commissioner's approval of the RI/FS Work Plan, 3M shall implement the Site Security and Safety Plan, taking into account the comments of the MPCA Commissioner.

**IV.B.2. Approval of the Remedial Investigation.** The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the Remedial Investigation Components of the RI/FS Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RI/FS Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI/FS Report that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional formation.

If the MPCA Commissioner rejects the RI/FS Report, the Commissioner will: 1) specify the deficiencies in the RI/FS Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI/FS Report.
IV.B.2.a. Evaluation of the Response Action Alternatives

The MPCA Commissioner shall, as part of reviewing the RI/FS Report, evaluate the response action alternatives presented in the Development and Screening of Response Action Alternatives chapter (Part III.E.3). In determining whether to eliminate a particular response action alternative from further consideration, the MPCA Commissioner will determine whether that alternative meets the response action objectives and cleanup levels (Part IV.A) specified for the Site. In approving the RI/FS Report the MPCA Commissioner will specify the evaluated alternatives to be addressed in the DAR.

IV.B.3. Approval of Feasibility Study. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the Feasibility Study components of the RI/FS Report. Modifications by the MPCA Commissioner are final. Approval of the RI/FS Report does not constitute approval or selection of any response action alternative recommended by 3M. MPCA shall select response actions as provided in the Consent Order and Part IV.C of this Exhibit.

If the MPCA Commissioner approves the RI/FS Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI/FS Report that necessitate the need for information necessary to correct the deficiencies; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the revised RI/FS Report.

If the MPCA Commissioner rejects the RI/FS Report, the Commissioner will: 1) specify the deficiencies in the RI/FS Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI/FS Report.

IV.C. Remedy Selection Criteria. The purpose of implementing any response action is to protect the public health, welfare, and the environment by preventing, minimizing or eliminating the release(s), or threatened release(s) of PFCs and VOCs. Protection of public health, welfare, and the environment is best achieved by implementing a permanent remedy for the Site. An implemented remedy is considered permanent when it allows for unrestricted use of all land and natural resources impacted by the contaminants and, except for the purpose of treatment, does not involve removal of the contaminants to another site and minimizes exchange of the contaminants to other environmental media. Refer to the MPCA guidance document on remedy selection, located on the MPCA web site at http://www.pca.state.mn.us/cleanup/pubs/rem9_98.pdf.

Notwithstanding anything to the contrary in the remedy selection criteria in this Exhibit, and to the extent consistent with site-specific response action objectives specified by the Commissioner, response actions at the Sites shall address the source of releases and threatened releases of Paces to ground water. Such response actions shall include (1) excavation and destruction of PFCs, or excavation, engineered isolation and containment of PFCs, and (2) other technically feasible response actions, which are reasonable and necessary to provide for a comprehensive and effective long-term response that protects public health and welfare and the environment. Primary consideration shall be given to alternative (1) consistent with Minn. Stat. § 115B.02, subd. 16 (c).
The MPCA Commissioner will apply the following threshold, balancing criteria and community acceptance to select a final response action from amongst evaluated alternatives.

IV.C.1. **Threshold Criterion.** Each response alternative or evaluated alternatives must meet the threshold criterion of providing overall protection for the public health and welfare, and the environment. This criterion is met if the response action alternative or the evaluated alternative will achieve the response action objectives and cleanup levels identified pursuant to the Establishment of Site Specific Response Action Objectives and Cleanup Levels (Part IV.A.) or provides for a permanent remedy.

IV.C.2. **Balancing Criteria.** Evaluated alternatives that meet the threshold criterion of overall protection of public health and welfare, and the environment shall be evaluated using the Balancing Criteria listed below. The evaluated alternative that provides the best balance among the Balancing Criteria in consideration of the site-specific circumstances shall be selected as the final response action. The Balancing Criteria are listed in order of priority with long-term effectiveness being the most important.

- **Long-Term Effectiveness**
  Long-term effectiveness is the ability of an evaluated alternative to maintain the desired level of protection of public health and welfare, and the environment over time. Permanent remedies provide absolute long-term effectiveness. In the event a permanent remedy is not feasible, evaluated alternatives that significantly alter the PFC’s and VOCs to produce significant reductions in toxicity, mobility, or volume through treatment will be preferred. In addition, the ability of the alternative to obtain and/or manage treatment residuals, minimize transfer of contaminants to another environmental media, and maintain established response action objectives and cleanup levels over time shall be a major consideration.

- **Implementability**
  The technical and administrative feasibility of implementing the evaluated alternative and the availability of goods and services needed to implement the evaluated alternative shall be considered.

- **Short-Term Risks**
  The short-term risks that may be posed as a result of implementing an evaluated alternative shall be considered and weighted against the ultimate long-term benefits of implementing that evaluated alternative.

- **Total Costs**
  The complete cost breakdown of implementation of the evaluated alternative including the projected costs of any long-term monitoring, operation and maintenance, and response action dismantling shall be considered. The future costs to replace the alternative or respond to a future release shall also be considered in this evaluation.

IV.C.3. **Community Acceptance.** The degree of community acceptance shall be determined for each evaluated alternative.

The community shall be consulted regularly in regard to the response action alternatives available for remediation at the Site. Efforts will be made to inform the community about the hazards of the Site and the advantages and disadvantages of various approaches to remediation and to gain an understanding of the concerns and preferences of the community with regard to the final remedy for the Site. The community's concerns and response action preferences will be considered when the MPCA Commissioner selects a remedy.
IV.D. Selection of Response Action and Record of Decision

The MPCA Commissioner will select the final response action(s) and will document this selection in a Record of Decision (ROD) or Minnesota Decision Document (MDD). The final RI and FS Reports, as approved by the MPCA Commissioner, will, with the MPCA Site file, form the basis for the selection of the final response action for the Site and will provide the information necessary to support the development of the ROD/MDD. The ROD/MDD will identify the selected evaluated alternative (or combination of evaluated alternatives) to be implemented by 3M pursuant to Exhibit F to the Consent Order. The ROD/MDD shall be appended to and made an integral part of the Consent Order.
CONSENT ORDER

In the Matter of Releases and Discharges
of Perfluorochemicals and Solvents at and from
Sites in Washington County, Minnesota
and Certain Related Matters

EXHIBIT F
3M Woodbury Disposal Site

REMEDIAL DESIGN AND RESPONSE ACTION IMPLEMENTATION

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Exhibit F

REMEDIAL DESIGN AND RESPONSE ACTION IMPLEMENTATION

I. INTRODUCTION

Part V.B. of the SETTLEMENT AGREEMENT AND CONSENT ORDER In the matter of Releases and Discharges of Perfluorochemicals (PFCs) At and From Sites in Washington County, Minnesota, and Certain Related Matters (Consent Order), to which this Exhibit is appended, requires the Responsible Party (RP) to prepare a Remedial Design/Response Action Plan (RD/RA Plan) and implement Response Actions (RAs) at the Site. This Exhibit sets forth the requirements for preparing the RD/RA Plan and implementing the RAs, which have been selected by the Minnesota Pollution Control Agency (MPCA) Commissioner pursuant to Part IV.D. of Exhibit E to the Consent Order, and is appended to and made an integral part of the Consent Order.

II. RETAIN CONSULTANT

3M shall retain a consultant qualified to undertake and complete the requirements of this Exhibit. 3M shall retain the consultant and notify the MPCA project manager of the name of it’s consultant within thirty (30) days of notification of approval of the RI/FS Report by the MPCA Commissioner. Subsequent submittals under this Exhibit shall meet the following timetable.

<table>
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<tr>
<th>Retain Consultant to Complete the Requirements of Exhibit F</th>
<th>Within 30 days of Commissioner’s approval of the RI/FS Report</th>
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<tbody>
<tr>
<td>Submit RD/RA Work Plan</td>
<td>Within 90 days of Notification of MPCA Commissioner’s issuance of a Minnesota Decision Document (MDD) for the Site</td>
</tr>
<tr>
<td>Initiate RA</td>
<td>Within 30 days of Notification of MPCA Commissioner’s approval of RD/RA Work Plan</td>
</tr>
<tr>
<td>Report Results of RA Implementation</td>
<td>Within 60 days of written determination by the MPCA Commissioner that all of the RA objectives and cleanup levels have been met</td>
</tr>
</tbody>
</table>

III. REMEDIAL DESIGN/RESPONSE ACTION PLAN

III.A. RD/RA Plan Submittal

Within ninety (90) days of notification of issuance of a MDD for the Site by the MPCA Commissioner, 3M shall prepare and submit to the MPCA Commissioner for review and approval a RD/RA Plan which shall be based on the approved RI/FS reports and the MDD issued by the MPCA Commissioner under Exhibit E to the Consent Order.
III.B. **RD/RA Plan Contents**

The purpose of the RD/RA Plan is to provide a detailed design, an implementation schedule, and a monitoring plan for the RAs specified in the MDD which, upon implementation, will protect the public health and welfare, and the environment from the release or threatened release of hazardous substances, pollutants or contaminants, at or from the Site.

The RD/RA Plan shall set forth in detail the steps necessary to implement the Site remedy specified in the MDD. The RD/RA Plan shall include a restatement of the response action objectives and cleanup levels specified in the MDD. The RD/RA Plan shall include, at a minimum, the following:

III.B.1. **Remedial Design.** The purpose of the remedial design is to specify detailed methods and time schedules for the implementation of the RAs specified in the MDD. This section shall include, at a minimum, the following elements:

- design criteria and rationale;
- a plan view drawing of the overall Site, showing general locations for response action components;
- technical and operational plans and engineering designs for implementation of the response action including plan and cross sectional views for the individual components to be installed or actions to be implemented;
- a description of the types of equipment to be employed, including capacity, size, and materials or construction;
- an operational description of process units or other RA components;
- process flow sheets, including process material (e.g., chemical or activated carbon) consumption rates, and a description of the process;
- a discussion of potential construction problems and respective contingency plans;
- a schedule for implementing the construction phase;
- a Site-specific hazardous waste transportation plan (if necessary);
- the identity of all contractors, transporters, or other persons conducting removal or response actions at the Site;
- a description of any permits or licenses required to implement the RA;
- a description of the post RA operation and maintenance procedures and schedules; and
- a description of activities to be undertaken by 3Ms during RA implementation to fulfill the requirements of Part III, Sections C.1. (Project Management), C.3. (Sampling and Investigations), C.5. (Record Retention), C.8. (Site Security and Safety Plan), and C.9. (Community Relations) of Exhibit E to the Consent Order as they pertain to the removal or response actions and operation and maintenance activities.

III.B.2. **RA Monitoring Plan.** The RD/RA Plan shall propose an RA monitoring plan for the Site. The purpose of post-RA implementation monitoring is to determine the status and effectiveness of the implemented RAs. The RA monitoring plan shall, at a minimum, contain the following in order to determine that the cleanup levels specified in the MDD are achieved:
III.B.2.a. Environmental Media and Analytical Parameter List. The environmental media (soil, ground water, surface water and air) and a corresponding list of analytes to be monitored shall be proposed, along with the selection rationale, and a corresponding list of chemical analytical methodologies (including United States Environmental Protection Agency or Standard Method numbers and detection limits) to be performed.

III.B.2.b. Monitoring Facility Location and Design. The design and location of all monitoring facilities/locations shall be proposed.

III.B.2.c. Sampling Schedule. A sampling schedule for the analytical parameters proposed in the RA monitoring plan for all monitoring locations shall be proposed. Sampling shall, at a minimum, be conducted on a quarterly basis.

III.B.2.d. Reporting Plan. A schedule for reporting the results of long-term monitoring to the MPCA shall be proposed. The schedule shall, at a minimum, contain the following:

1. Quarterly Monitoring Reports. 3M shall submit analytical results to the MPCA Commissioner quarterly by 45 days following the sampling completed during the previous quarter.

2. Annual Monitoring Reports. 3M shall submit an Annual Monitoring Report to the MPCA Commissioner on or before January 1, 2008, and each January 1st thereafter. Any remedial technology employed in implementation of the RD/RA Plan shall be left in place and operated by 3M until the MPCA Commissioner authorizes 3M in writing to discontinue, move, or modify some or all of the remedial technology. 3M may request discontinuation of the remedial technologies in the annual report, when the cleanup levels set forth in the MDD have been achieved. 3M shall move or modify the remedial technology when the movement or modifications, as approved by the MPCA Commissioner, may better achieve the remedial action objectives set forth in the MDD.

The Annual Monitoring Report shall contain the following:
- a Site map showing all monitoring locations;
- the results of all parameter analyses for the previous year;
- the results of all water level measurements for the previous year;
- regional and Site specific ground water piezometric maps for each aquifer including surface water elevations;
- cross section(s) indicating relative communication between aquifers;
- a map for each sampling event showing each monitoring location with contaminant concentrations and isoconcentration lines for selected parameters;
- graphs and tables illustrating the concentrations over time using data from each sampling event (these graphs and tables shall be cumulative showing parameter analyses for all previous years as; 
- well as the reporting year); and
- a sampling plan for the next year with an assessment of the monitoring parameters, sampling frequencies, and the need for the addition or deletion of monitoring locations and parameters.
III.C. **RD/RA Plan Implementation**

Within thirty (30) days of the MPCA Commissioner approval of the RD/RA plan, 3M shall initiate the RA. The purpose of RA implementation is to take those actions that will protect public health and welfare, and the environment, from the release or threatened release of hazardous substances or pollutants or contaminants at or from the Site.

The RD/RA Plan, as approved or modified by the MPCA Commissioner shall be implemented in accordance with the time schedules set forth in the approved RD/RA Plan. The implementation of RAs shall be conducted in accordance with all applicable federal and state ARARs, and local laws, rules, regulations, and ordinances.

During implementation of the RD/RA Plan, the MPCA Commissioner may specify such additions and/or revisions to the RD/RA Plan as the Commissioner deems necessary to protect public health and welfare, and the environment.

III.D. **RA Implementation Report**

Within sixty (60) days of the completion of implementation of the RAs specified in the approved RD/RA Plan, a RA Implementation Report which includes the following elements, shall be submitted to the MPCA Commissioner:

- the data and results of the RA implementation;
- the follow-up actions, if any, to be taken in the following one-year period;
- a certification that all work plans, specifications, and schedules have been implemented and completed in accordance with the RD/RA Plan as approved or modified by the MPCA Commissioner;
- discussion of difficulties encountered during the implementation that may alter and/or impair or otherwise reduce the effectiveness of the RA implementation to prevent, eliminate, or minimize the release or threatened release of hazardous substances or pollutants or contaminants, at or from the Site, or which may require unanticipated operational or maintenance actions to maintain the effectiveness of any of the implemented RAs; and
- a discussion of any necessary modifications to the operation and maintenance procedures as approved.
IV. REPORT ON COMPLETION OF RA

Within sixty (60) days of notification, by the MPCA Commissioner, that all Site-specific Response Action Objectives and Cleanup Levels (Exhibit E, Part IV.A.) have been met, a Report on Completion of RA, which includes the following elements, shall be submitted to the MPCA Commissioner.

- a summary of the response action objectives and cleanup levels and a history of how they were met;
- certification that all RAs have been properly dismantled, including supporting documentation (e.g., monitoring well abandonment logs);
- a summary of any ongoing institutional controls (e.g., deed restrictions);
- a final cost summary.

V. MPCA COMMISSIONER ACTIONS

3M shall submit to the MPCA Commissioner all plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, approval with modifications and/or a request for additional information, or rejection of submittals shall be in accordance with this section and Part IV of the Consent Order. The Site Safety and Security Plan does not require MPCA Commissioner approval.

V.A. Approval Of The RD/RA Plan, RA Implementation Report, And Report On Completion Of RA

The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RD/RA Plan, RA Implementation Report, and the Report on Completion of RA based on the requirements of Parts III.B, III.D, and IV respectively. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or Completion of RA Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which 3M shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the information necessary to correct the deficiencies.
COPY OF MATERIAL WAS PROVIDED WITH THE APRIL 24, 2007 BOARD AGENDA.
DECISION ON THIS ITEM WAS POSTPONED ON APRIL 24, 2007 UNTIL THE MAY 22, 2007
CITIZENS’ BOARD MEETING

MINNESOTA POLLUTION CONTROL AGENCY

Remediation Division
Superfund and Emergency Response Section

Board Item Cover Sheet

MEETING DATE:        April 24, 2007        DATE MAILED:        April 13, 2007

Presenter(s):        Gary Krueger         Phone Number:       651-296-6139
Supervisor:          Doug Wetzstein        Phone Number:       651-297-8609
Manager:             Michael Kanner        Phone Number:       651-297-8564
Attorney:            Alan Williams         Phone Number:       651-296-7200

TITLE OF BOARD ITEM:
3M Company (formerly known as Minnesota Mining and Manufacturing)
Request for Issuance of a Request for Response Action for the Release and
Threatened Release of Perfluorooctanoic Acid and Perfluorooctane
Sulfonate from the 3M Chemolite Disposal Site

LOCATION: Cottage Grove Washington
City/Township County

TYPE OF ACTION: Issuance of a Request for Response Action

RECOMMENDED ACTION: The Minnesota Pollution Control Agency (MPCA) Commissioner and staff recommend that the MPCA Citizens Board adopt the suggested staff resolution.

ISSUE STATEMENT:
The 3M Chemolite Disposal Site (Site) (also known as the 3M Cottage Grove facility), in the city of Cottage Grove, Washington County, Minnesota, is a Site where industrial wastes containing perfluorochemicals (PFCs), specifically perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), have been disposed and where PFOA and PFOS have been released into the environment. The Site was listed on the State’s Superfund Permanent List of Priorities (State Superfund List) in October 1984. On January 22, 1985, the Minnesota Pollution Control Agency (MPCA) issued a Request for Response Action (RFRA) to 3M under the Minnesota Environmental Response and Liability Act (MERLA) to address contamination by volatile organic compounds (VOCs) as a result of disposal of hazardous substances in disposal pits on the Site. On May 30, 1985, the MPCA and 3M entered into a Response Order by Consent (Consent Order) under MERLA which required 3M to investigate the releases of VOCs and implement appropriate response actions. Neither the RFRA nor the Consent Order addressed the investigation and implementation of response actions concerning the release of PFOA or PFOS or other PFCs, because releases of those substances, and the potential hazards of such releases to human health or the environment,
were not known to the MPCA at the time the RFRA was issued and the Consent Order entered into.

In February 2002, 3M informed the MPCA that PFOA and PFOS had been detected in on-site ground water production wells. Subsequent investigations conducted by 3M, with oversight by the MPCA, in 2005 and 2006 documented releases of PFOA and PFOS to ground water, soil, surface water and sediments on the Site and in the adjacent Mississippi River.

The MPCA staff has reviewed information that provides evidence and support for the issuance of a RFRA to 3M to address the release and threatened release of PFOA and PFOS at and from the Site. For the reasons set forth in this Board Item, the MPCA Commissioner recommends that the MPCA Citizens’ Board (Board) issue a RFRA to 3M for the release of PFOA and PFOS at and from the Site pursuant to the MERLA, Minn. Stat. §§ 115B.01 to 115B.20 (2006). The RFRA requests 3M to complete Remedial Investigations and Feasibility Studies, prepare Remedial Designs, and to implement appropriate Response Actions for the release of PFOA and PFOS at and from the Site.

**ATTACHMENTS:**
1. Site Location Map
2. RFRA with Schedule and Exhibits
3. Definitions
4. January 22, 1985 RFRA
5. May 30, 1985 Consent Order
6. 3M Report Executive Summaries and MPCA Correspondence
7. Commissioner Notice Letter and 3M Response
8. Minnesota Department of Health (MDH) Information
9. PFC Health Information from other agencies
10. MPCA/MDH Memorandum of Agreement Information
**OVERVIEW OF BOARD ITEM**

### Board Item Cover Sheet

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<td>3M Company (formerly known as Minnesota Mining and Manufacturing Company) Request for Issuance of a Request For Response Action for the Release of Volatile Organic Compounds, Perfluorooctanoic Acid, and Perfluorooctane Sulfonate from the 3M Woodbury Disposal Site</td>
<td>Woodbury Washington County</td>
<td>Issuance of a Request for Response Action</td>
<td>The Minnesota Pollution Control Agency (MPCA) Commissioner and staff recommend that the MPCA Citizens Board adopt the suggested staff resolution.</td>
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**ISSUE STATEMENT:**

The 3M Woodbury Disposal Site (Site) located in the city of Woodbury, Washington County, Minnesota is a Site where industrial wastes containing volatile organic compounds (VOCs) and perfluorochemicals (PFCs), including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), have been disposed and where VOCs and PFCs have been released into the environment. From March 1992 until March 2007, 3M has addressed the 3M Woodbury Disposal Site under the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) Program and has conducted remedial investigations, feasibility studies and response actions related to known identified releases of hazardous substances (primarily solvents) found at the Site. Although 3M provided information to the MPCA staff in 1992 about hydrofluoric (HF) wastes disposed of in the Northeast Disposal Area (described below), 3M did not provide information about PFC disposal at the Site until 2006. The HF wastes were considered to be contaminants of concern at the Site because of their acidity. A fax report from 3M Environmental Operations submitted to the MPCA staff on July 26, 2004, showed that the pump out water from 3M Woodbury Disposal Site contained PFCs including PFOA and PFOS. In addition, a report from 3M Company’s consultant, Weston Solutions, Inc, entitled Fluorochemical (FC Data Assessment Report for the 3M Cottage Grove, Minnesota Facility (dated April 2006) stated that fluorocarbon (FC) wastes remain buried at the Site. Since 2006, 3M has been working with the MPCA VIC staff to address releases of PFCs including PFOA.
and PFOS at the 3M Woodbury Disposal Site.

On February 1, 2007, the MPCA staff requested 3M Company to take additional response actions related to releases of PFCs at and from the Site and the potential hazards of such releases to human health and the environment, including submission of a response action plan by March 1, 2007. Reports submitted by 3M Company for the 3M Woodbury Disposal Site pursuant to the February 1, 2007, letter were approved by the MPCA on March 20, 2007.

The MPCA staff has reviewed information that provides evidence and support for the issuance of a Request for Response Action (RFRA) to 3M to address the release and threatened release of VOCs and PFCs, including PFOA and PFOS. For the reasons set forth in this Memorandum, the MPCA Commissioner recommends that the MPCA Citizens’ Board (Board) issue a RFRA to 3M for the release and threatened release of VOCs, PFOA and PFOS at and from the 3M Woodbury Disposal Site pursuant to the Minnesota Environmental Response and Liability Act (MERLA), Minn. Stat. §§ 115B.01 to 115 B.20 (2006).

ATTACHMENTS:
1. Site Location Map
2. RFRA with Schedule and Exhibits
3. Definitions
4. 3M Woodbury List of Reports and Studies
5. MPCA Letter of February 1, 2007 requesting RAP
6. MPCA Letter of March 20, 2007 Approving RAP
7. Commissioner Notice and 3M Response
8. 3M Weston Work Plan Tables 3-2 and 3-3
9. 3M Woodbury VOC’s which are Hazardous Substances
10. Minnesota Dept of Health (MDH) Information
11. PFC Information from other Agencies
12. MPCA/MDH Memorandum of Agreement Information
COPY OF MATERIAL WAS PROVIDED WITH THE APRIL 24, 2007 BOARD AGENDA. DECISION ON THIS ITEM WAS POSTPONED ON APRIL 24, 2007 UNTIL THE MAY 22, 2007 CITIZENS’ BOARD MEETING

MINNESOTA POLLUTION CONTROL AGENCY

Remediation Division
Superfund and Emergency Response Section

Board Item Cover Sheet

MEETING DATE: April 24, 2007 DATE MAILED: April 13, 2007

Presenter(s): Gary Krueger Phone Number: 651-296-6139
Supervisor: Doug Wetzstein Phone Number: 651-297-8609
Manager: Michael Kanner Phone Number: 651-297-8564
Attorney: Alan Williams Phone Number: 651-296-7200

TITLE OF BOARD ITEM: 3M Company (formerly known as Minnesota Mining and Manufacturing) -
Request for Issuance of a Request for Response Action for the Release and
Threatened Release of Perfluorooctanoic Acid and
Perfluorooctane Sulfonate from the 3M Oakdale Disposal Site

LOCATION: Oakdale Washington City/Township County

TYPE OF ACTION: Issuance of a Request for Response Action

RECOMMENDED ACTION: The Minnesota Pollution Control Agency (MPCA) Commissioner and staff recommend that the MPCA Citizens Board adopt the suggested staff resolution.

ISSUE STATEMENT: The 3M Oakdale Disposal Site (also known as the Oakdale Dump Site) (Site), in the city of Oakdale, Washington County, Minnesota, is a Site where industrial wastes from the 3M Chemolite - Cottage Grove facility containing perfluorochemicals (PFCs), specifically perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), have been disposed and where PFOA and PFOS have been released into the environment. The Site is comprised of three waste disposal sites (known by the names of the former owners of the property where the sites were located: Abresch, Brockman and Eberle) which were used by 3M for the disposal of liquid and solid industrial wastes from 3M facilities including the 3M Chemolite facility in Cottage Grove. 3M currently owns the Abresch and Brockman disposal sites. The Minnesota Pollution Control Agency (MPCA) and 3M entered into a Response Order by Consent (Consent Order) under the Minnesota Environmental Response and Liability Act (MERLA) on July 26, 1983, (amended on May 22, 1984) to investigate and implement response actions to address contamination by volatile organic compounds (VOCs) at the Site.
The U.S. Environmental Protection Agency (USEPA) was also a party to the 1983 Consent Order. The Site was listed on the State’s Superfund Permanent List of Priorities (PLP) in October 1984.

The Site is also listed on the Federal Superfund National Priorities List. Neither the Consent Order nor the Consent Order Amendment addressed the release of PFOA or PFOS or other PFCs, because releases of those substances, and the potential hazards of such releases to human health or the environment, were not known to the MPCA or USEPA when the Consent Order was entered into.

In July 2004, based on information from 3M that industrial wastes from the 3M Chemolite facility in Cottage Grove contained PFOA and PFOS, the MPCA requested 3M to collect ground-water samples from wells at the Site to be analyzed for PFOA and PFOS. In September 2004, 3M informed the MPCA that PFOA and PFOS was detected in ground water in these wells at the Site. Subsequent investigations conducted by 3M, with MPCA oversight, documented releases of PFOA and PFOS to ground water, soil, surface water, and sediments at and near the Site. The MPCA staff has reviewed information that provides evidence and support for the issuance of a Request for Response Action (RFRA) to 3M to address the release and threatened release of PFOA and PFOS at and from the Site. For the reasons set forth in this Board Item, the MPCA Commissioner recommends that the MPCA Citizens’ Board (Board) issue a RFRA to 3M for the release of PFOA and PFOS pursuant to the MERLA, Minn. Stat. §§ 115B.01 to 115 B.20 (2006) (MERLA). The RFRA requests 3M to complete Remedial Investigations and Feasibility Studies, prepare Remedial Designs, and to implement appropriate Response Actions for the release of PFOA and PFOS at and from the Site.

ATTACHMENTS:

1. Site Location Map
2. RFRA with Schedule and Exhibits
3. Definitions
4. May 22, 1984 Consent Order
5. 3M Reports and MPCA Correspondence
6. Memorandum of Agreement between city of Oakdale and 3M
7. Commissioner Notice Letter and 3M Response
8. Minnesota Department of Health (MDH) Information
9. PFC Health Information from other agencies