



3M Company
St. Paul, Minnesota



Future Data Needs Assessment Report

3M Decatur, Alabama Facility PFOA Site-Related Environmental Monitoring Program

January 2008





FUTURE DATA NEEDS ASSESSMENT REPORT

PFOA SITE-RELATED ENVIRONMENTAL MONITORING PROGRAM 3M DECATUR, ALABAMA FACILITY

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1. INTRODUCTION

This *Future Data Needs Assessment Report* for the 3M Decatur, Alabama facility is one of three reports that have been prepared by 3M and its subsidiary, Dyneon, LLC (Dyneon) (hereinafter referred to as 3M) in accordance with the October 2004 *Memorandum of Understanding (MOU) Between the U.S. Environmental Protection Agency and 3M Company and Dyneon LLC for a Perfluorooctanoic Acid (PFOA) Site-related Environmental Assessment Program*. The remaining two reports are the *Data Assessment Report* and the *Screening Level Human Exposure Assessment Report*.

As part of the environmental assessment program, 3M agreed to prepare, among other items, a “screening level exposure assessment” for humans, as defined by EPA guidance, using data collected in and around the Site through the Phase 1 and 2 PFOA monitoring programs. The scope of the environmental assessment program, including the screening level human exposure assessment (SLHEA), was designed specifically to address the following question in the MOU, referred to as “the Charge”:

“Are current PFOA environmental releases and sources of those environmental releases from the Site and the presence of PFOA in environmental media on and around the Site sufficiently understood so that pathways of migration and exposure to PFOA associated with that Site are adequately characterized and assessed on a screening level basis?”

The following is a description of the three reports that have been prepared by 3M as required under the MOU for the PFOA Site-Related Environmental Monitoring and Assessment Program at the 3M Decatur facility:

- The *Data Assessment Report* contains a summary of the PFOA assessment activities that were conducted for the 3M Decatur facility from October 2004 to December 2006 to address the Charge, a summary of the results of these activities, as well as key findings of the PFOA Environmental Monitoring and Assessment Program.
- The *Screening Level Human Exposure Assessment Report* contains a summary of the analytical data and procedures that were used to perform the PFOA SLHEA for the 3M Decatur facility, a summary of the results of this



assessment, as well as identification of data and information that may be required to further refine and enhance it.

- This *Future Data Needs Assessment Report* contains an evaluation of the sufficiency of the data assessment and the screening level human exposure assessment in addressing the Charge. It also identifies additional data and/or appropriate information necessary to fully address the Charge.

In accordance with the MOU, all three reports are being submitted to an Independent Third Party (ITP) who will implement and administer a peer consultation process. The purpose of the peer consultation process is to provide an evaluation of the PFOA Site-Related Environmental Monitoring and Assessment Program. In particular, the peer consultation process provides a forum for scientists and relevant experts to exchange views on the assessments and the recommended data needs and to provide these views to the ITP. The ITP will compile the results of the peer consultation process in a report that will be submitted to EPA and 3M.

This *Future Data Needs Assessment Report* is organized into the following sections:

- **Section 1 – Introduction.** This section contains background information for the report.
- **Section 2 – Data Assessment Report.** This section contains an overview of the *Data Assessment Report*.
- **Section 3 – Screening Level Human Exposure Assessment Report.** This section contains an overview of the *Screening Level Human Exposure Assessment Report*.
- **Section 4 – Future Data Needs and Phase 3 Elements.** Data needs are identified in this section considering the results of both the data assessment and the screening level human exposure assessment. Additional data collection activities are proposed for Phase 3 of the PFOA Site-Related Environmental Monitoring Program to address the identified data needs and an outline for the Phase 3 Work Plan is provided.



2. DATA ASSESSMENT REPORT

In the MOU, 3M proposed a phased approach to data collection at the 3M Decatur facility consisting of three phases. Phase 1 included the commitment to perform monitoring under a March 2003 Letter of Intent (LOI) to the EPA. Phase 2 included the additional monitoring to address the Charge. Phase 3, which is the focus of this *Future Data Needs Assessment Report*, includes follow-on work that may be necessary after the completion of Phases 1 and 2 to fully address the Charge.

3M worked closely with EPA and interested parties to develop the *Phase 2 Work Plan for Sampling Environmental Media for PFOA at the 3M Decatur, AL Plant* (Phase 2 Work Plan). This Work Plan was attached to the MOU as an appendix. From October 2004 to December 2006, 3M conducted field activities in accordance with the Phase 2 Work Plan. Over 1,000 environmental samples were collected for PFOA analysis as well as other ancillary parameters. The following environmental media were sampled:

On-Site

- Groundwater.
- Soil.
- Vegetation.
- Small mammals (serum and liver).
- Surface water.
- Sediment.
- Sanitary wastewater from the 3M facility.
- 3M treated process wastewater from the on-site wastewater treatment plant (sampled at Outfall 001).

Off-Site

- Groundwater.
- Soil.
- Surface water (Tennessee River and Bakers Creek).
- Sediment (Tennessee River and Bakers Creek).
- Porewater (Tennessee River sediment).
- Fish (two species, whole body and fillet from Tennessee River and Bakers Creek).
- Clams (Tennessee River and Bakers Creek).
- Public water treatment plants at six locations along the Tennessee River.



- Decatur Utilities (Dry Creek) wastewater treatment plant influent, effluent and sludge.
- Morgan County Landfill leachate.

Additionally, in accordance with the Phase 2 Work Plan, 3M conducted a review of off-site waste disposal facilities that had been used by the 3M Decatur facility during its period of operation and a survey of off-site water supply wells in the vicinity of the Site as well as in the vicinity of selected off-site waste disposal locations.

The data and information generated under the Phase 2 Work Plan were collected using scientific practices, protocols and procedures that have been designed to ensure data of high quality, objectivity, utility and integrity. Analytical data and ancillary information collected under Phase 1 and Phase 2 of the PFOA Site-Related Environmental Monitoring and Assessment Program have been used to prepare the *Screening Level Human Exposure Assessment Report* as required by the MOU.



3. SCREENING LEVEL HUMAN EXPOSURE ASSESSMENT REPORT

As part of the environmental assessment program to be conducted in accordance with the MOU, 3M agreed to prepare, among other items, a “screening level exposure assessment” using data collected in the Phase 1 and 2 PFOA monitoring programs. The scope of the environmental assessment program, including the SLHEA, was designed specifically to address the Charge.

As it pertains to the screening level exposure assessment, the following narrative from the MOU describes what is meant by “exposure to PFOA associated with that Site” and also defines the scope of the assessment:

“Exposure to PFOA Associated With The Site,” as used in the Charge, refers to current exposures and the potential for future exposures from the presence of PFOA in Environmental Media as a result of Current or Past Manufacturing Activities at the site, but does not include an assessment of exposures that may have occurred in the past. The Screening Level Exposure Assessment of current human Exposure to PFOA Associated With The Site shall include a quantitative assessment for any exposure pathway for which the data allow quantitative assessment, and a qualitative or semi-quantitative description of exposure where the data do not allow quantitative assessment. The Screening Level Exposure Assessment will be based on data necessary to understand sources of release associated with the site and Pathways of Migration of those releases. Although the Screening Level Exposure Assessment will focus primarily on human exposure, it will characterize the presence of PFOA in Environmental Media, including biota, on and off the site as a result of Current or Past Manufacturing Activities.”

In accordance with MOU requirements and EPA guidance, the screening level human exposure assessment evaluates the current potential exposure of human receptors to PFOA in various on-site and off-site media resulting from historical manufacturing and waste disposal activities at the 3M facility in Decatur, Alabama. This assessment, as directed by the MOU, evaluates human exposure associated with the Site only and does not address exposure relating to articles of commerce or to workers involved in chemical production at the Site.



Analytical data and other information collected under Phase 1 and Phase 2 of the PFOA Site-Related Environmental Monitoring Program and summarized in the *Data Assessment Report* were used to prepare the *Screening Level Human Exposure Assessment*. The environmental monitoring program has resulted in a comprehensive PFOA database. The database from which the SLHEA was developed includes several hundred analytical results from a variety of media including:

- On-site and off-site soils (to a depth of 6 feet below ground surface [ft bgs]).
- Off-site groundwater (except the off-site marsh pumping well).
- Off-site municipal supply water.
- Off-site formerly used residential well water.
- On-site and off-site surface water.
- On-site and off-site sediment.
- Fillet tissues of two fish species from the Tennessee River.

To assess human exposure with these activities, potential receptors were broadly categorized into those individuals who might be exposed to PFOA on-site, i.e., within the boundaries of the 3M facility, and those individuals who might be exposed to PFOA beyond the limits of the facility. Local land use and demographic data were obtained to determine the likelihood of types of commercial, residential and agricultural activities in the vicinity of the 3M facility and to aid in the selection of appropriate receptors.

3.1 POTENTIAL ON-SITE RECEPTORS

Potential receptors exposed to PFOA in on-site soils, surface water and sediment (i.e., within the 3M facility boundary) included:

- Groundskeeper/Maintenance Worker.
- Construction/Utility Worker.
- Trespasser on the former sludge incorporation area.



3.2 POTENTIAL OFF-SITE RECEPTORS

Potential receptors exposed to PFOA in off-site soils, groundwater, surface water, sediment and fish (i.e., outside the 3M facility boundary) included:

- Local resident exposed to PFOA in soil only.
- Local resident exposed to PFOA in soil and groundwater.
- Resident exposed to municipal water.
- Recreational angler.
- Recreational boater.
- Trespasser in the off-site marsh area located adjacent to the former sludge incorporation area.

The SLHEA was prepared in accordance with the requirements of the MOU and generally follows the procedures contained in the MOU-referenced *Guidelines for Exposure Assessment* (EPA, 1992, EPA/600Z-92/001) as well as a number of agency guidance documents. As such, the estimation of PFOA doses to individual receptors often required assumptions regarding the pathways, extent and duration of exposure. Consequently, the estimated doses do not represent the actual PFOA exposure to any particular individual, but rather the potential exposure to a hypothetical individual based on the specified assumptions.

3.3 RESULTS

3.3.1 Potential On-Site PFOA Exposure

Based on the results of the SLHEA, human exposure to PFOA is likely to occur to on-site workers engaged in groundskeeping and construction activities that take place in the former sludge incorporation area fields. Trespassing on these fields will also result in some degree of exposure to PFOA. The extent of exposure is both activity- and location-specific due to the varying frequency and duration of exposure and the variable concentrations of PFOA in soils in those fields where sludge was previously applied. Details on how the exposure doses were calculated, based on the assumptions made, are provided in the *Screening Level Human Exposure Assessment Report*.



3.3.2 Potential Off-Site PFOA Exposure

Off-site receptors are potentially exposed to PFOA in off-site soils, groundwater, municipal water, fish from the Tennessee River, surface water and sediments in the Tennessee River, and soils/sediments in the off-site marsh area. Details on how the exposure doses were calculated, based on the assumptions made, are provided in the *Screening Level Human Exposure Assessment Report*.



4. FUTURE DATA NEEDS AND PHASE 3 ELEMENTS

Conservative assumptions were used in the SLHEA in the absence of empirical data to estimate the exposure doses to potentially exposed receptor populations. The use of these assumptions results in the creation of uncertainty in the assessment of exposure. The use of some of these assumptions could be significant and in other cases, could have only marginal effects on the outcome. Potential pathways also were excluded for lack of empirical data or plausible estimating/modeling tools. An analysis was performed to integrate the assessment of uncertainty conducted as part of the screening level human exposure assessment and to identify as data needs those elements that may significantly affect the exposure estimates.

Accordingly, the following subsections identify data needs for the PFOA Environmental Monitoring Program at the 3M Decatur facility and proposed actions to address them in Phase 3.

4.1 OFF-SITE GROUNDWATER

- Data from off-site monitoring of PFOA in groundwater are limited to a single round of samples. A more robust set of groundwater data would enhance the confidence in an exposure point concentration (EPC) used to represent potential residential exposure to groundwater.

Proposed Action - Additional off-site groundwater sampling will be conducted in the remaining existing wells and any new monitoring wells which are installed off-site.

- Although the off-site water supply well survey involved a thorough search of electronic databases for public water utility customer records and service districts, discussions with public water utility employees, and conducting a windshield survey, there may be a small number of water supply wells that were not found.

Proposed Action - Additional follow-up investigation in the field and with the utilities will either confirm earlier findings or indicate the locations of wells not previously identified.

- The PFOA concentrations and flow gradients of shallow bedrock groundwater northwest, west, southwest and east of the site are not well-defined.



Proposed Action - Installation of additional off-site monitoring wells in these areas and sampling will be conducted to better define the concentrations and flow gradients. To the extent that the location of any off-site water supply wells can be obtained through water supply utilities or a more intensive field reconnaissance of the properties off-site and downgradient, these supply wells may require sampling.

4.2 OFF-SITE SOIL

- Some data exist for off-site soil locations adjacent to the facility. However, no soil data have been obtained off-site at a distance greater than approximately 2,900 feet from the facility boundary (soil boring 605).
- Only four samples of PFOA in off-site soils were available with which to estimate residential exposure. Because of this, the EPC defaulted to the maximum detected concentration. A more robust set of off-site soil data adjacent to the facility would enhance the confidence in an EPC used to represent potential residential exposure.

Proposed Action - Additional off-site soil samples will be collected.

4.3 BIOTA

Vegetation/Agricultural Products

- Vegetation data were limited to a few species and were collected only on-site.
- Some residents in the area of the 3M Decatur facility have vegetable gardens and/or fruit trees, and agriculture is an observed land use. Cattle currently graze at a property adjacent to the 3M property, and common forage crops are planted on an annual basis on other agricultural parcels. In addition, windshield surveys indicate that at least one of the neighboring residents raises chickens. Due to the physical and chemical properties of PFOA, data are not available to model the uptake of PFOA in these products.

Proposed Action

- A literature review will be conducted to obtain information to estimate the potential for uptake of PFOA in vegetation such as fruits, vegetables, forage and feed crops, and in farm animals.
- A survey of home vegetable gardening and commercial agricultural production in the area of the facility will be performed. Information will be obtained on the types of products that are produced and consumed.



- Based on the above information, the nature and scope of any sampling to characterize PFOA in homegrown produce and commercial agricultural products will be determined. Any sampling and analysis would be based on the spatial extent of detectable concentrations of PFOA in off-site soils (from additional sampling described in Subsection 4.2), the information from the literature review and the agricultural production survey.

Fish and Clams

- Additional fish and clam samples from the Phase 1 and Phase 2 locations were collected in December 2006, but the analytical results were not completed in time to be included in these MOU reports.

Proposed Action - When available, analytical results from these locations will be compared to the 2004 results to evaluate possible trends in the Tennessee River fish concentrations that may have occurred over time or since the PFOA production ceased.

4.4 SURFACE WATER AND SEDIMENT

- Additional surface water and sediment samples from the Phase 1 and Phase 2 locations were collected in December 2006, but the analytical results were not completed in time to be included in these MOU reports.

Proposed Action - When available, analytical results from these locations will be compared with the 2004 results to evaluate possible trends in the Tennessee River that may have occurred over time or since PFOA production ceased.

- Sediment data are limited to samples collected from the former pond area of the off-site marsh (OSM). Because there are hiking/walking trails throughout the off-site marsh area that may have been affected by the former off-site marsh well discharges and stormwater runoff containing PFOA, the potential exists for exposure to PFOA for individuals using these trails.

Proposed Action - Sediment samples have been collected from the former pond area and swamp. When available, analytical results from these samples will be used to calculate exposure for trespassers, to compare to the estimates in the SLHEA.

4.5 OFF-SITE WASTE DISPOSAL LOCATIONS

- The Morgan County Landfill, the BFI Landfill, and the Mallard Creek/Bert Jefferies Landfill are locations that have received 3M waste, which may have contained PFOA. The BFI and Morgan County Landfills currently (and in the past) receive sludge from the 3M facility wastewater treatment plant. The



Mallard Creek/Bert Jefferies Landfill is inactive but had received waste in the past.

Proposed Action - Additional water supply well searches/field reconnaissance will be conducted around these landfills to identify any potential users of groundwater in the vicinity. With site owner permission, groundwater sampling will be conducted at existing monitoring wells located at the BFI and Morgan County Landfills. The Mallard Creek/Bert Jefferies Landfill in Lawrence County has been inactive for many years and was the site of some previous surficial cleanup. Any additional site records and field reconnaissance will be reviewed to see if any further field follow-up or investigation is needed to define possible PFOA and associated exposure.

4.6 EXPOSURE PATHWAYS

The following analysis presents those elements associated with needed information on actual pathways by which individuals may be exposed to PFOA:

- Some residents may supplement their vegetable and fruit consumption by raising their own, but the extent to which that occurs is not currently known.
- A windshield survey of the land use proximate to the 3M Decatur facility resulted in a single observation of chicken-rearing and cattle grazing.
- Irrigation of agricultural fields and watering of livestock occurs in the area. The source of the irrigation/feed water is not known but is believed to be either groundwater or surface water from the Tennessee River.

Proposed Action -The agricultural production survey described in Section 4.3 will determine the nature and extent of home vegetable gardening and animal raising activities and will include an evaluation of irrigation water sources.

- In the SLHEA, an evaluation of a trespasser on the off-site marsh area was performed.

Proposed Action - Additional information will be collected to obtain a more thorough understanding of the current and future use and activities for this area. This additional site use information, along with additional sampling data from the off-site marsh and swamp, will be used to refine the exposure assessment for this pathway.

The following is an outline for the *Phase 3 PFOA Site-Related Environmental Monitoring Work Plan* (Phase 3 Work Plan) that will provide a description of the activities that will be performed to address the identified data needs.



Phase 3 Work Plan Outline
3M Decatur, Alabama Facility

1.0 Introduction – This section of the Work Plan will contain a brief overview of the PFOA Environmental Monitoring and Assessment Program at the 3M Decatur facility and the focus of Phase 3 activities.

1.1 Background

1.2 Organization of this Document

2.0 Environmental Setting – This section of the Work Plan will contain a description of site geology and hydrogeology, an understanding of which is integral in planning for Phase 3 activities.

2.1 Geology

2.2 Hydrogeology

3.0 Phase 3 Sampling Program and Other Activities – This section of the Work Plan will contain a description of the activities that will be conducted; the locations, types and numbers of samples to be collected; rationale for sample collection; method of collection; and any additional activities that will be conducted to address data needs identified in the *Future Data Needs Assessment Report*.

3.1 Groundwater

3.2 Soil

3.3 Biota

3.4 Additional Activities

4.0 Schedule – A schedule for completing the Work Plan activities will be provided in this section.

5.0 Reporting – This section will contain a description of the report that will be prepared for the Phase 3 data that are generated under the Work Plan.