3M Company
St. Paul, Minnesota

Remedial Investigation Report

[Soil Supplemental Fluorochemical Data Assessment – Addendum 1]

Oakdale Site

Oakdale, Minnesota

June 2007

WESTON SOLUTIONS

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REMEDIAL INVESTIGATION REPORT

[*SOIL SUPPLEMENTAL FLUOROCHEMICAL DATA ASSESSMENT – ADDENDUM 1*]

OAKDALE SITE

JUNE 2007

Prepared for

3M Company

Prepared by

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Since 1980, the 3M Company (3M) has worked with the Minnesota Pollution Control Agency (MPCA) in the investigation and remediation of the former Oakdale disposal site in Oakdale, Minnesota (Site). The Site consists of three former waste disposal areas, identified as the Abresch, Brockman, and Eberle areas, that had received wastes from the 3M St. Paul area sites, the 3M Cottage Grove, Minnesota facility, and other companies/entities from the 1940s to 1960. Investigations and follow-up actions have been previously completed for the Brockman and Eberle areas. The subject of this report is the Abresch area which will be referred to as the Site.

In the early 1980s, 3M conducted an investigation to characterize the presence of volatile organic compounds (VOCs) in various environmental media and to develop an understanding of Site hydrogeology. In July 1983, 3M entered into a Consent Order with the MPCA and the United States Environmental Protection Agency (USEPA) to perform remedial actions at the site. Subsequently, 3M removed waste materials and impacted soils from the Site and, in 1985, installed a groundwater recovery system to remove shallow groundwater impacted by VOCs and other constituents at, and adjacent to, suspected source areas. 3M has operated the groundwater recovery system continuously since 1985 to contain the shallow groundwater impacted by the VOCs. 3M conducts routine groundwater monitoring to track remediation progress. There are currently seven pumping wells and a monitoring well network. Since the start of the remediation program at the Site, several 5-year reviews have been conducted with the MPCA and USEPA. The groundwater recovery system is effectively capturing shallow groundwater to the south of Highway 5.

More recently, 3M has been working with the MPCA to examine the presence and extent of fluorochemicals (FCs) at the Site. 3M conducted an initial screening level sampling of the Site in 2004 and FCs were detected in the discharge from the groundwater recovery system. Subsequently, 3M directed WESTON to conduct the enhanced sampling activities at the Site. The results of the assessment were presented in the *Groundwater Data Assessment Report Fluorochemical Investigation* (Groundwater Data Assessment

Report), which was submitted to the MPCA in July 2005. MPCA approved the Groundwater Data Assessment Report and had additional requests for investigative work. In October 2005, WESTON prepared the *Supplemental Fluorochemical (FC) Investigation Work Plan for the Oakdale Site* (Supplemental FC Work Plan), which incorporated the recommendations presented in the Groundwater Data Assessment Report and those requested by MPCA. From November 2005 through March 2006, 3M implemented the supplemental FC assessment program at the Site in accordance with the MPCA-approved Supplemental FC Work Plan and further MPCA requests. The results of the program were presented in the *Supplemental Fluorochemical (FC) Data Assessment Report*, which was submitted to the MPCA in September 2006.

The plan for further Site characterization was presented in *Addendum 1 to the Supplemental Fluorochemical (FC) Investigation Work Plan*, which was submitted to MPCA in November 2006. The purpose of this further site characterization was to refine the understanding of site hydrogeology and the groundwater recovery system on the site-wide shallow groundwater and surface water and to collect additional soil data in the Abresch area north of Minnesota State Highway 5 (Highway 5) to evaluate potential interim remedial measures (IRMs) for this area.

The *Assessment of the Effectiveness of the Existing Groundwater Recovery System* report was submitted to the MPCA in April 2007. This Remedial Investigation Report [*Soil Supplemental Data Assessment – Addendum 1*] provides a description of the additional soil characterization activities and a summary of analytical results for the area north of Highway 5. Soil boring sampling locations are shown in Figure ES.

3M has entered into a Settlement Agreement and Consent Order (Consent Order) for the purpose of providing remedial investigations and response actions to address FCs at the Site. The Consent Order became effective on May 22, 2007. It requires that 3M conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release or threatened release of FCs at and from the Site. In the Consent Order, MPCA acknowledges that 3M has already completed a significant amount of work at the Site and that the following documents are in partial satisfaction of the RI/FS requirements:

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

It is further stated in the Consent Order that by June 15, 2007, 3M shall submit a RI report which summarizes the above MPCA-approved investigations, and shall include an FS workplan to address possible response actions. Accordingly, pending MPCA approval, this document is the Remedial Investigation Report, and together with the three documents listed above, constitutes the RI program for the Site. The FS Work Plan will is being submitted concurrently with the RI Report as a separate document.

The following is a summary of key observations from the remedial investigation activities conducted in accordance with *Addendum 1 to the Supplemental Fluorochemical Investigation (FC) Work Plan*:

- FCs levels in soil samples from borings ASB31 through ASB43 confirmed concentrations that were consistent with the 2005 FC data from soil borings GP01 through GP08 (see Figure ES for locations).
- Generally lower FC concentrations were observed for surface soil samples collected. These results are expected since clean fill was brought in and graded during the 1983-1984 remediation at the Site. The range of FC concentrations for five key compounds detected in surface soils north of Highway 5 are as follows: perfluorooctane sulfonate (PFOS) - 24.6 to 1,460 ppb, perfluorooctanoic acid (PFOA) - 0.8 to19.0 ppb, perfluorohexane sulfonate (PFHS) - ND (not detected) to 9.4 ppb, perfluorobutanoic acid (PFBA) - ND to 12.5 ppb, and perfluorobutane sulfonate (PFBS) - ND to 2.8 ppb. No surface samples for VOCs were collected based on the low OVM readings taken at the Site.
- The range of FC concentrations for the December 2006 sampling, for all soil depths, are as follows: PFOS - 20.6 to 108,000 ppb, PFOA - 0.8 to 18,500 ppb, PFHS - ND to 5,585 ppb, PFBA - ND to 1,600 ppb, and PFBS - ND to 224 ppb.
- The FCs with the greatest levels detected were PFOS and PFOA. Concentrations of these two compounds ranged from 0.8 to 108,000 ppb. PFBA, PFBS and PFHS were detected at concentrations ranging from ND to 5,585 ppb. The remaining seven compounds ranged from ND to 1,230 ppb.

- The data generated from samples collected in December 2006 is consistent with that from samples collected in November/December 2005. Taken in combination, this data provides good delineation of FC concentrations in the study area, i.e., the area where soil borings were installed.

- The combined 2005 and 2006 soil data indicates significantly lower concentrations at all depths for samples collected on the western, northern and eastern edges of the study area.

- The highest concentrations for PFOS, PFOA and PFBA were observed in the 3.5 to 9 feet below ground surface (ft bgs) depth range within the study area.

- Soil samples collected from borings ASB31, ASB32, and ASB40 for VOC analysis indicate the presence of VOCs, such as benzene, toluene, ethylbenzene, and xylenes (BTEX), 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-TMB, isopropylbenzene, n-propylbenzene, and p-isopropyltoluene and other VOCs such as 1,1,2-trichloroethane (1,1,2-TCA), 1,2-dichloroethane (1,2-DCA), methyl isobutyl ketone (MIBK), acetone, methyl ethyl ketone (MEK), tetrachloroethylene (PCE), and trichloroethylene (TCE). The VOC compounds observed are consistent with those detected in routine monitoring of the groundwater recovery system that has been in continuous operation at the Site since 1985 to contain and remove such compounds. The groundwater pumped from this system is discharged to the Metropolitan Council of Environmental Services (MCES) sanitary sewer system for treatment.

- According to the Washington County topographic survey, the bottom elevation of the ditches along the north side of Highway 5 is between 1002 and 1004 feet AMSL. Hydrographs for wells W22 and W26 depicting groundwater elevations from 1985 to 2006, indicate that the highest groundwater elevations are lower than the bottom elevation of the ditches. These findings indicate that groundwater from the site is not entering the ditches along the north side of Highway 5.

In accordance with the requirements of the Consent Order Section VI and Exhibit C, Section III.E.3, the development and screening of response action alternatives for the Site soil and groundwater will be based on the List of Possible Technology Types, as endorsed by the MPCA Commissioner in his approval of the RI Report and FS Work Plan, and any other technology types identified by 3M or the MPCA Commissioner prior to the approval of the RI Report.

Possible general response actions have been identified for the Site based on the information and data provided in the RI. In accordance with MPCA and EPA guidance on conducting feasibility studies, the general response actions, response technology type,

and associated process options have been subjected to an initial screening process on the basis of technical implementability. The general response action/technology types and process options that have been retained as the List of Possible Technology Types are as follows:

LIST OF POSSIBLE TECHNOLOGY TYPES

Soil

- Removal - Excavation
- Treatment - Thermal
  - Incineration
- Disposal - Landfill
  - New landfill
  - Existing landfill
- Containment - Cap
  - Soil/clay cap
  - Engineered multilayer cap
- Institutional and Site Controls - Access restrictions
  - Deed restrictions
  - Fencing
- No action

Groundwater

- Collection - Groundwater recovery/Subsurface drain
  - Recovery wells
  - Interceptor trench
- Treatment - Physical
  - Activated carbon
  - Ion exchange resin
  - Reverse osmosis
  - Air stripping
- Discharge - Off-site
  - Off-site POTW
- Containment – Cap/Vertical barriers
  - Soil/clay cap
  - Engineered multilayer cap
  - Slurry wall
  - Sheet piling

- Treatment - Off-site
  - Off-site POTW
- Institutional and Site Controls
  - Deed restrictions
  - Fencing
  - Alternate water supply
  - Monitoring
- No action

Upon approval of the RI Report and FS Work Plan by MPCA, these technology types and associated process options will be assembled into response action alternatives for screening and further evaluation. The FS Work Plan, which provides a description of the response alternative development, screening, and evaluation process, is being submitted concurrently with this RI Report.

1. INTRODUCTION

1.1 BACKGROUND AND SITE ASSESSMENT HISTORY

Since 1980, the 3M Company (3M) has worked with the Minnesota Pollution Control Agency (MPCA) in the investigation and remediation of the former Oakdale disposal site in Oakdale, Minnesota (Site). The Site consists of three former waste disposal areas, identified as the Abresch, Brockman, and Eberle areas, that had received wastes from the 3M St. Paul area sites, the 3M Cottage Grove, Minnesota facility, and other companies/entities from the 1940s to 1960. Investigations and follow-up actions have been previously completed for the Brockman and Eberle areas. The subject of this report is the Abresch area which will be referred to as the Site.

In the early 1980s, 3M conducted an investigation to characterize the presence of volatile organic compounds (VOCs) in various environmental media and to develop an understanding of Site hydrogeology. In July 1983, 3M entered into a Consent Order with the MPCA and the United States Environmental Protection Agency (USEPA) to perform remedial actions at the Site. Subsequently, 3M removed waste materials and impacted soils from the Site and, in 1985, installed a groundwater recovery system to remove shallow groundwater impacted by VOCs and other constituents at, and adjacent to, suspected source areas. 3M has operated the groundwater recovery system continuously since 1985 to contain the shallow groundwater impacted by the VOCs. 3M conducts routine groundwater monitoring to track remediation progress. There are currently seven pumping wells and a monitoring well network. Since the start of the remediation program at the Site, several 5-year reviews have been conducted with the MPCA and USEPA. The groundwater recovery system is effectively capturing shallow groundwater to the south of Highway 5.

More recently, 3M has been working with the MPCA to assess the presence and extent of fluorochemicals (FCs) at the Site. 3M conducted an initial screening level sampling of the Site in 2004 and FCs were detected in the discharge from the groundwater recovery system. Subsequently, the MPCA requested that 3M prepare an enhanced sampling plan

to further assess occurrence of FCs in the Site groundwater. 3M submitted an enhanced sampling plan, prepared by Weston Solutions, Inc. (WESTON®) in February 2005. In March 2005, after receiving MPCA approval, 3M began implementing the enhanced sampling activities at the Site.

The results of the assessment were presented in the *Groundwater Data Assessment Report Fluorochemical Investigation* (Groundwater Data Assessment Report) (WESTON, July 2005), which was submitted to the MPCA in July 2005. Based upon the findings presented in the report, 3M recommended that additional assessment activities be conducted at the site. In a letter to 3M dated 7 September 2005, the MPCA approved the Groundwater Data Assessment Report and had additional requests for assessment work. Accordingly, WESTON prepared the *Supplemental Fluorochemical (FC) Investigation Work Plan for the Oakdale Site* (Supplemental FC Work Plan) (WESTON, October 2005), which incorporated the recommendations presented in the Groundwater Data Assessment Report and those requested by MPCA in the 7 September 2005 correspondence to 3M. The Supplemental FC Work Plan was submitted to the MPCA on 7 October 2005 and approved by the MPCA on 31 October 2005 with requests for additional assessment activities.

From November 2005 through March 2006, 3M implemented the supplemental FC assessment program at the Site in accordance with the MPCA-approved Supplemental FC Work Plan and the subsequent request for additional activities by the MPCA. The results of the program were summarized in the *Supplemental Fluorochemical (FC) Data Assessment Report* (WESTON, September 2006), which was submitted to the MPCA in September 2006.

Addendum 1 to the Supplemental Fluorochemical (FC) Investigation Work Plan (WESTON, November 2006) was submitted to the MPCA in November 2006 and subsequently approved by the MPCA. Under Addendum 1, additional field work was performed by WESTON at the Site in December 2006. The objectives of the additional field work were to:

- Refine the understanding of the site hydrogeology and evaluate the effectiveness of the existing groundwater extraction wells, and
- Collect additional soil samples from the area north of Highway 5 for FC analysis and evaluate possible response actions for this area.

In discussions with the MPCA, it was agreed that two reports would be prepared. The first report would address the effectiveness of the groundwater recovery system. Accordingly, the *Assessment of the Effectiveness of the Existing Groundwater Recovery System* report was submitted to the MPCA on 9 April 2007 (WESTON, April 2007). The second report would present the findings of the remaining Addendum 1 assessment activities along with possible response actions for the Site. Accordingly, this Remedial Investigation Report [*Soil Supplemental FC Data Assessment – Addendum 1*] constitutes the second submittal, which has been prepared to address the remainder of the Addendum 1 assessment activities.

3M has entered into a Settlement Agreement and Consent Order (Consent Order) for the purpose of providing remedial investigations and response actions to address FCs at the Site. The Consent Order became effective on May 22, 2007. It requires that 3M conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release or threatened release of FCs at and from the Site. In the Consent Order, MPCA acknowledges that 3M has already completed a significant amount of work at the Site and that the following documents are in partial satisfaction of the RI/FS requirements:

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documents listed above, constitutes the entire RI program for the Site. The FS Work Plan is being submitted concurrently with the RI report as a separate document.

1.2 REPORT ORGANIZATION

This Remedial Investigation Report is organized into the following sections:

- **Section 1 – Introduction.** This section contains the Site background and assessment history.
- **Section 2 – Site Setting.** This section contains a description of the Site location and geology.
- **Section 3 – Summary of Field Activities.** This section contains a description of the soil sampling activities that were conducted in the area north of Highway 5 in December 2006 and the well abandonment activities on the adjacent Menards retail property.
- **Section 4 – Results of the Assessment.** This section contains an explanation of the data reduction process, a summary of the soil sampling analytical results from the December 2006 soil sampling event, and a discussion of the topography of the area north of Highway 5 with respect to historic groundwater elevation data from monitoring wells W22 and W26.
- **Section 5 – Summary of Observations.** Section 5 contains a summary of key observations from the RI activities conducted in accordance with *Addendum 1 to the Supplemental Fluorochemical (FC) Investigation Work Plan.*
- **Section 6 – Development and Screening of Response Action Alternatives.** This section contains a summary of the initial technology evaluation that was performed to prepare the List of Possible Technology Types to address FCs in soil and groundwater at the Site. It also contains an abbreviated discussion on the FS Work Plan (submitted concurrently with this report), which provides a detailed explanation of the FS process that will be followed so that a response action alternative or alternatives can be selected and implemented at the site.

Tables and figures are provided at the end of the report for ease of review.

2. SITE SETTING

2.1 SITE LOCATION AND DESCRIPTION

The focus of this report is the area north of Minnesota State Highway 5 (Highway 5) at the Abresch area, which is shown in Figure 1. The Abresch area is approximately 55 acres and most of it is owned by 3M. The Thomas Griffith landscaping business is located on the southeast corner of the area, and Highway 5 and associated right-of-way passes through the northern part of the area. The Site is currently undeveloped and generally inaccessible due to wetlands and low-lying drainage areas along with fencing that restricts access to portions of the site property. As shown in Figure 1, the site straddles Highway 5. It is bounded to the north by upper 35th Street; to the east by Hadley Avenue and commercial businesses; to the south by a railroad right-of-way; and to the west by Granada Avenue and commercial property.

The ground surface elevation north of Highway 5 is elevated relative to the neighboring properties. Two small ponds are present in northeast and northwest corners of the property, and a small drainage ditch is present that originates at the pond in the northwest corner of the site, and extends in a southerly direction under Highway 5. This drainage ditch was dry in December 2006 and was observed to contain flowing water during wet seasons and/or following storm events.

2.2 SITE GEOLOGY

Geologic data collected during previous site investigations (Barr, 1982, 1984) indicate that the Site is immediately underlain by a complex system of unconsolidated sediments. An upper (shallow) alluvium composed predominantly of silty sand with interbeds of sandy clay till is encountered in the shallow subsurface, and a lower alluvium composed of clean sand to silty sand. The upper and lower alluvium (basal) sands are separated across most of the Site by a prominent till bed approximately 20 feet in thickness. Borings constructed in the western part of the site indicate a gap in the till allowing contact between the upper and lower sand sequences. The estimated lateral extent of this

gap in the till is reflected by hatch marks shown in Figure 2. The alluvium and glacial till sequences are approximately 65 to 90 feet thick at the Site. Figure 3 presents a north-south cross section through the Site, and the cross section orientation is shown in Figure 2.

The Site is located over the eastern portion of the Twin City Basin, and as a result, the underlying sedimentary bedrock formations dip, generally, to the west. The uppermost subcropping bedrock unit in the vicinity of the Site is the Decorah Shale, which is described as a greenish-gray or olive-gray, fissile, fossiliferous shale. This unit is discontinuous beneath the Site and is no more than 6 to 8 feet thick. Soil boring logs indicate that the Decorah Shale does not extend under the southern half of the area (Figure 2).

The unit underlying the Decorah Shale is the Platteville Limestone. This unit is described as a medium- to very fine-grained dolomite or dolomitic limestone and is approximately 20 to 35 thick in the area of the Site. The Platteville likely subcrops in areas where the Decorah shale is believed to be absent. The Platteville is characterized by fractures and solution channels.

The Platteville Limestone is underlain by the Glenwood Shale, which is described as a green-gray or olive gray, fissile, fossiliferous shale containing scattered limestone beds. The Glenwood acts as a confining unit in the area restricting the vertical movement of groundwater from the Platteville Limestone to the underlying bedrock aquifers. It has a sharp non-erosional contact with the overlying Platteville Limestone, while its lower boundary grades into the underlying St. Peter Sandstone. The reported thickness of the Glenwood Shale is 3 to 6 feet in the area of the Site.

Underlying the Glenwood Shale is the St. Peter Sandstone. This unit is described a light yellow or white, well-sorted, quartzose sandstone. It is an aquifer of importance in the Twin Cities area and is intercepted by industrial, commercial and residential wells in the Twin Cities area. The St. Peter Sandstone is estimated to be between 150 and 165 feet thick in the vicinity of the Site.

The Prairie du Chien Group underlies the St. Peter Sandstone and is predominantly comprised of fine-to medium-grained dolomite and sandy dolomite with some interbedded quartzose sandstone. The Group is 125 to 135 feet thick in the vicinity of the Site. Groundwater flow in the Prairie du Chien Group is controlled by fractures, joints, and solution channels.

The Prairie du Chien Group is underlain by the Jordan Sandstone, which is described as a coarse- to medium-grained quartzose sandstone. Since no aquitard separates the Prairie du Chien and the Jordan sandstone, they are often considered to be one hydrologic unit, although the rate of groundwater movement through the two units can be significantly different. Together, the two units form the primary bedrock aquifer in the Twin Cities area and are used as the source of water by most of the suburban communities that rely on groundwater. Most new municipal and industrial wells constructed for potable water supply purposes are required to be cased through the Praire du Chien Group. The Jordan Sandstone is approximately 80 to 85 thick in the vicinity of the Site.

3. SUMMARY OF FIELD ACTIVITIES

3.1 SOIL SAMPLING

Soil sampling activities were conducted in accordance with the Supplemental FC Work Plan and Addendum 1. Field procedures were consistent with MPCA site characterization and sampling guidance and standard operating procedures (SOPs) previously established under the FC assessment program.

On 4 December and 5 December 2006, WESTON constructed thirteen soil borings at the Site north of Highway 5 using Geoprobe® drilling technology. The soil boring locations for this sampling event (ASB31 to ASB43) and the previous soil sampling event (GP01 to GP08), which was performed in November and December 2005, are presented in Figure 4.

At each boring location, soil samples were collected continuously to a depth of 15 feet below ground surface (ft bgs) for descriptive logging and to vertically evaluate soil conditions. The soil was described by an experienced geologist noting color, texture, moisture content, and any staining, debris, or odors. Aliquots of soil were also screened for total organic vapors using an organic vapor meter (OVM). OVM readings were recorded onto the boring logs. A copy of the boring logs is provided in Appendix A.

Soil samples also were collected for laboratory analyses. In accordance with the Work Plan and Addendum 1, discrete soil samples were collected from the borings at the 0 – 0.5, 1.5 – 2.0, 3.5 – 4, and 5.5 – 6 ft bgs depth intervals. Since a shallow discrete sample from 0-0.5 ft bgs had been collected from previous borings GP04, GP05, and GP08, a sample was not collected from this interval at borings ASB39, ASB41, and ASB43, which were constructed at or near the same locations as GP04, GP05 and GP08, respectively. An additional discrete soil sample was collected from each boring within the 5 – 10 ft bgs interval. The depth selected for this sample was based on OVM measurements and visual soil observations at each location.

The soil samples were submitted to Exygen Research Laboratory of State College, Pennsylvania for FC analysis. Twelve FC parameters were analyzed under Good Laboratory Practices (GLP) Protocol P0002561 that has been established for analyses of all the samples collected as part of the FC assessment programs being conducted at 3M's Minnesota sites. WESTON collected additional samples as part of the investigation quality assurance and quality control (QA/QC) program. These included duplicate samples, equipment rinsate blanks, and trip blanks. A summary of the collected soil and QA/QC samples is presented in Table 1.

Three soil samples also were collected for VOC analysis. The samples were collected at separate boring locations based on significant OVM screening data for the site. The borings selected for VOC sampling included ASB31 (7-8 ft bgs), ASB32 (5-6 ft bgs), and ASB40 (8-9 ft bgs). The samples were submitted to Severn Trent Laboratories (STL) of University Park, Illinois for VOC analysis.

3.2 WELL ABANDONMENT

Three nested wells (RW39, RW40, and PL43) were constructed in the southeastern corner of the Menards retail property for the 2006 assessment activities. Menards has constructed a new store facility on the property and requested that the wells be abandoned and removed upon completion of sampling. The wells have been sampled twice for FCs and the analytical results are summarized in Table 2. As indicated in the table, the FCs were not detected or detected at low concentrations (e.g., the maximum detected FC concentration was 0.0511 ppb PFBS).

In accordance with the MPCA-approved *Addendum 1 to the Supplemental Fluorochemical (FC) Investigation Work Plan* and with the State of Minnesota Water Well Code, wells RW39, RW40, and PL43 were abandoned on December 13, 2006 by American Engineering Testing, Inc., a Minnesota-licensed driller. A copy of the well sealing records is provided in Appendix B.

4. RESULTS OF THE ASSESSMENT

4.1 SUMMARY OF THE ANALYTICAL DATA REDUCTION PROCESS

Analytical data for FCs have been reported in Interim Reports from Exygen Research Laboratory. In instances where quality control (QC) data on spike or surrogate spike recoveries associated with a sample were outside an assessed accuracy of ± 30%, QC data were reviewed and the accuracy assessed on a sample by sample basis. For data outside an assessed accuracy of ± 60%, or where the endogenous concentrations of the analyte in a medium were over three times greater than the highest spike concentration, the data are not reported (NR) because they do not meet data quality objectives. Other data reported with non-numerical values include results that are assigned ND (not detected) because the analyte was not detected at, or above, the Limit of Quantitation (LOQ).

In addition to each primary sample analysis, a duplicate sample analysis was performed. Re-extraction and reanalysis were performed to provide quantitative results or confirm initial analytical results of selected samples. The primary and duplicate results were reduced to a single value in order to simplify reporting. The data reduction process consisted of calculating the average concentration (arithmetic mean) for sets comprised of numeric values. In instances with mixed numeric values and non-numeric values (ND), the numeric values were carried through to represent the media concentrations. It should be noted that this data reduction convention is conservative and may result in overestimation of actual concentrations.

4.2 SOIL SAMPLING ANALYTICAL RESULTS

The FC and VOC analytical results for the soil samples collected north of Highway 5 in December 2006 are summarized in Tables 3 and 4, respectively. Table 5 presents a summary of the OVM readings recorded in the field. A copy of the soil analytical data packages is provided in Appendix C. It should be noted per the agreement with the MPCA, that the FC analytical data packages in Appendix C have been provided without

their appendices due to their large size and to facilitate paper reduction. The data packages including appendices are on file with WESTON and can be provided upon request.

To facilitate a comparison of the data and to be consistent with data presentation in the 2006 Supplemental Data Assessment Report, the FC analytical summarized in Table 3 includes: perfluorobutane sulfonate (PFBS), perfluorohexane sulfonate (PFHS), perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). Since perfluorobutanoic acid (PFBA) is a recent compound of interest, it also is included. A complete data summary table including all 12 FC compounds is provided in Appendix B.

Generally lower concentrations are observed for surface soil samples (0 – 0.5 ft bgs) collected. These results are expected since clean fill was brought in and graded during the 1983-1984 remediation at the Site. The range of FC concentrations for five key compounds detected in surface soils north of Highway 5 are as follows: PFOS - 24.6 to 1,460 ppb, PFOA- 0.8 to19.0 ppb, PFHS - ND (not detected) to 9.4 ppb, PFBA - ND to 12.5 ppb, and PFBS - ND to 2.8 ppb. No surface samples for VOCs were collected based on the low OVM readings taken at the Site and summarized in Table 5.

The range of FC concentrations for the December 2006 sampling, for all soil depths, are as follows: PFOS - 20.6 to 108,000 ppb, PFOA - 0.8 to 18,500 ppb, PFHS - ND to 5,585 ppb, PFBA - ND to 1,600 ppb, and PFBS - ND to 224 ppb.

The FCs with the greatest levels detected in soils were PFOS and PFOA. Concentrations of these two compounds ranged from 0.8 to 108,000 ppb. PFBA, PFBS, and PFHS were detected at concentrations ranging from ND to 5,585 ppb. The remaining seven compounds ranged from ND to 1,230 ppb.

To be consistent with data presentation in the 2006 Supplemental Data Assessment Report, Figure 5 depicts the PFOA and PFOS soil concentrations. Since PFBA is a recent compound of interest, it is also included.

As shown in Table 4, several VOCs were detected in the soil samples. The primary VOCs detected were: benzene, toluene, ethylbenzene, and xylenes (BTEXs), as well as,

1,2,4-trimethylbenzene (TMB), 1,3,5-TMB, isopropylbenzene, n-propylbenzene and p-isopropyltoluene. Other VOCs detected in the soil samples include: 1,1,2-tricholoroethane (TCA), 1,2-dichloroethane (DCA), 4-methyl-2-pentanone (MIBK), acetone, methyl ethyl ketone (MEK), tetrachoroethene (PCE), and trichloroethene (TCE). The VOC compounds observed are consistent with those detected in routine monitoring of the groundwater recovery system that has been in continuous operation at the Site since 1985 to contain and remove such compounds. The groundwater pumped from this system is discharged to the Metropolitan Council of Environmental Services (MCES) sanitary sewer system for treatment.

4.3 TOPOGRAPHIC SURVEY MAP

Topographic survey data for the study area was obtained from the Washington County Survey and Land Management Division. The topography was available at 2 ft contour intervals to aid in establishing ground surface elevations north and south of State Highway 5, and for various surface water and drainage features in the study area. These include the drainage ditches along State Highway 5 and surface elevations for other ditches and wetlands in the area. The topographic survey map, as well as the site monitor and groundwater recovery well network, is shown in Figure 6. An enlarged topographic survey map of the area north of Highway 5 is shown in Figure 7.

A comparison was made between the elevation of drainage ditches along the north side of Highway 5 and historical groundwater elevations observed in monitor wells north of Highway 5 to assess whether groundwater could be discharging to these ditches. As shown in the topographic contours in Figure 7, the lowest elevation of the drainage ditches on the north side of Highway 5 is between 1002 and 1004 feet above mean sea level (ft AMSL). This drainage ditch is between monitor well W26 and Highway 5. A hydrograph depicting historical groundwater elevation data from 1985 through to 2006 for monitor wells W22 and W26 is presented in Figure 8. As shown in Figure 8, the groundwater elevation data for monitor wells W22 and W26 are lower than the estimated elevation of the lowest lying on-site drainage ditch to the north of Highway 5. The actual groundwater elevation beneath the drainage ditch would be lower than the elevation for

monitor well W26 since groundwater elevations decline to the south. To further illustrate this point, cross section A-A' in Figure 9 shows with respect to the ditch, the highest, lowest and average water level elevations recorded at groundwater monitoring well W26 during the period extending from 1985 to 2006. The location of cross section A-A' is shown in Figure 7. As shown in Figure 9, the highest elevation recorded at W26 occurred on October 7, 1985 and the lowest occurred on November 5, 2001. Both of these elevations were below the bottom of the ditch. During the time period extending from 1985 to 2006, groundwater levels at W26 have fluctuated between the two extremes and have averaged 999 feet above mean sea level, well below the bottom of the ditch. These findings indicate that groundwater is not entering the ditches along the north side of Highway 5.

5. SUMMARY OF OBSERVATIONS

The following is a summary of key observations from the RI activities conducted in accordance with *Addendum 1 to the Supplemental Fluorochemical Investigation (FC) Work Plan*:

- FCs levels in soil samples from borings ASB31 through ASB43 confirmed concentrations that were consistent with the 2005 FC data from soil borings GP01 through GP08.

- Generally lower FC concentrations were observed for surface soil samples collected. These results are expected since clean fill was brought in and graded during the 1983-1984 remediation at the Site. The range of FC concentrations for five key compounds detected in surface soils north of Highway 5 are as follows: PFOS - 24.6 to 1,460 ppb, PFOA- 0.8 to19.0 ppb, PFHS - ND (not detected) to 9.4 ppb, PFBA - ND to 12.5 ppb, and PFBS - ND to 2.8 ppb. No surface samples for VOCs were collected based on the low OVM readings taken at the Site.

- The range of FC concentrations for the December 2006 sampling, for all soil depths, are as follows: PFOS - 20.6 to 108,000 ppb, PFOA - 0.8 to 18,500 ppb, PFHS - ND to 5,585 ppb, PFBA - ND to 1,600 ppb, and PFBS - ND to 224 ppb.

- The FCs with the greatest levels detected in soils were PFOS and PFOA. Concentrations of these two compounds ranged from 0.8 to 108,000 ppb. PFBA, PFBS, and PFHS were detected at concentrations ranging from ND to 5,585 ppb. The remaining seven compounds ranged from ND to 1,230 ppb.

- The data generated from samples collected in December 2006 is consistent with that from samples collected in November/December 2005. Taken in combination, this data provides good delineation of FC concentrations in the study area, i.e., the area where soil borings were installed.

- The combined 2005 and 2006 soil data indicates significantly lower concentrations at all depths for samples collected on the western, northern and eastern edges of the study area.

- The highest concentrations for PFOS, PFOA and PFBA were observed in the 3.5 to 9 ft bgs depth range within the study area.

- Soil samples collected from borings ASB31, ASB32, and ASB40 for VOC analysis indicate the presence of VOCs, such as BTEX, 1,2,4-TMB, 1,3,5-TMB, isopropylbenzene, n-propylbenzene, and p-isopropyltoluene and other VOCs such

- as 1,1,2-TCA, 1,2-DCA, MIBK, acetone, MEK, PCE, and TCE. The VOC compounds observed are consistent with those detected in routine monitoring of the groundwater recovery system that has been in continuous operation at the Site since 1985 to contain and remove such compounds. The groundwater pumped from this system is discharged to the MCES sanitary sewer system for treatment.

- According to the Washington County topographic survey, the bottom elevation of the ditches along the north side of Highway 5 is between 1002 and 1004 feet AMSL. Hydrographs for wells W22 and W26 depicting groundwater elevations from 1985 to 2006, indicate that the highest groundwater elevations are lower than the bottom elevation of the ditches. These findings indicate that groundwater from the site is not entering the ditches along the north side of Highway 5.

6. DEVELOPMENT AND SCREENING OF RESPONSE ACTION ALTERNATIVES

In accordance with the requirements of the Consent Order Section VI and Exhibit C, Section III.E.3, the development and screening of response action alternatives for the Site soil and groundwater will be based on the List of Possible Technology Types, as endorsed by the MPCA Commissioner in his approval of the RI Report and FS Work Plan, and any other technology types identified by 3M or the MPCA Commissioner prior to the approval of the RI Report. The following section provides the List of Possible Technology Types for the Site and a description of the process that was used to develop this list.

The FS Work Plan, which is being submitted concurrently with this report, includes a description of how this list will be used to develop response action alternatives, which will be screened for further evaluation. The FS Work Plan also provides an explanation of the screening process and further evaluation of the retained response action alternatives, as well as, a recommendation for implementation of the selected response action alternative and associated conceptual design.

6.1 LIST OF POSSIBLE TECHNOLOGY TYPES

It is important to note that soil and groundwater at the Site are being considered as separate operable units. As such, a technology evaluation is provided for each media so that media-specific technologies can be combined into response action alternatives for each media.

General response actions have been identified for the Site based on the information and data provided in this RI. The general response actions, response technology type, and associated process options are presented in Table 6 for soil and Table 7 for groundwater along with a brief description of the process option and a screening comment. In their guidance, EPA states "During this screening step, process options and entire technology types are eliminated from further consideration on the basis of technical implementability", (EPA,1988). The general response action/technology types and

process options that have been retained as the List of Possible Technology Types from this initial screening are summarized below:

LIST OF POSSIBLE TECHNOLOGY TYPES

Soil

- Removal - Excavation
- Treatment - Thermal
  - Incineration
- Disposal - Landfill
  - New landfill
  - Existing landfill
- Containment - Cap
  - Soil/clay cap
  - Engineered multilayer cap
- Institutional and Site Controls - Access restrictions
  - Deed restrictions
  - Fencing
- No action

Groundwater

- Collection - Groundwater recovery/Subsurface drain
  - Recovery wells
  - Interceptor trench
- Treatment - Physical
  - Activated carbon
  - Ion exchange resin
  - Reverse osmosis
  - Air stripping
- Discharge - Off-site
  - Off-site POTW
- Containment – Cap/Vertical barriers
  - Soil/clay cap
  - Engineered multilayer cap
  - Slurry wall
  - Sheet piling
- Treatment - Off-site
  - Off-site POTW

- Institutional and Site Controls
  - Deed restrictions
  - Fencing
  - Alternate water supply
  - Monitoring
- No action

Upon approval of the RI Report and FS Work Plan by MPCA, these technology types and associated process options will be assembled into response action alternatives for screening and further evaluation. The FS Work Plan, which provides a description of the technology screening and response alternative development, screening and evaluation process, is being submitted concurrently with this RI Report.

7. REFERENCES

Barr Engineering, March 1982. *Hydrogeologic Investigation Phase I & II – Final Report.*

Barr Engineering, May 1984. *Preliminary Design of Shallow Groundwater Pumpout System.*

USEPA, October 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.*

WESTON, July 2005. *Groundwater Data Assessment Report.*

WESTON, October 2005. *Supplemental Fluorochemical (FC) Investigation Work Plan.*

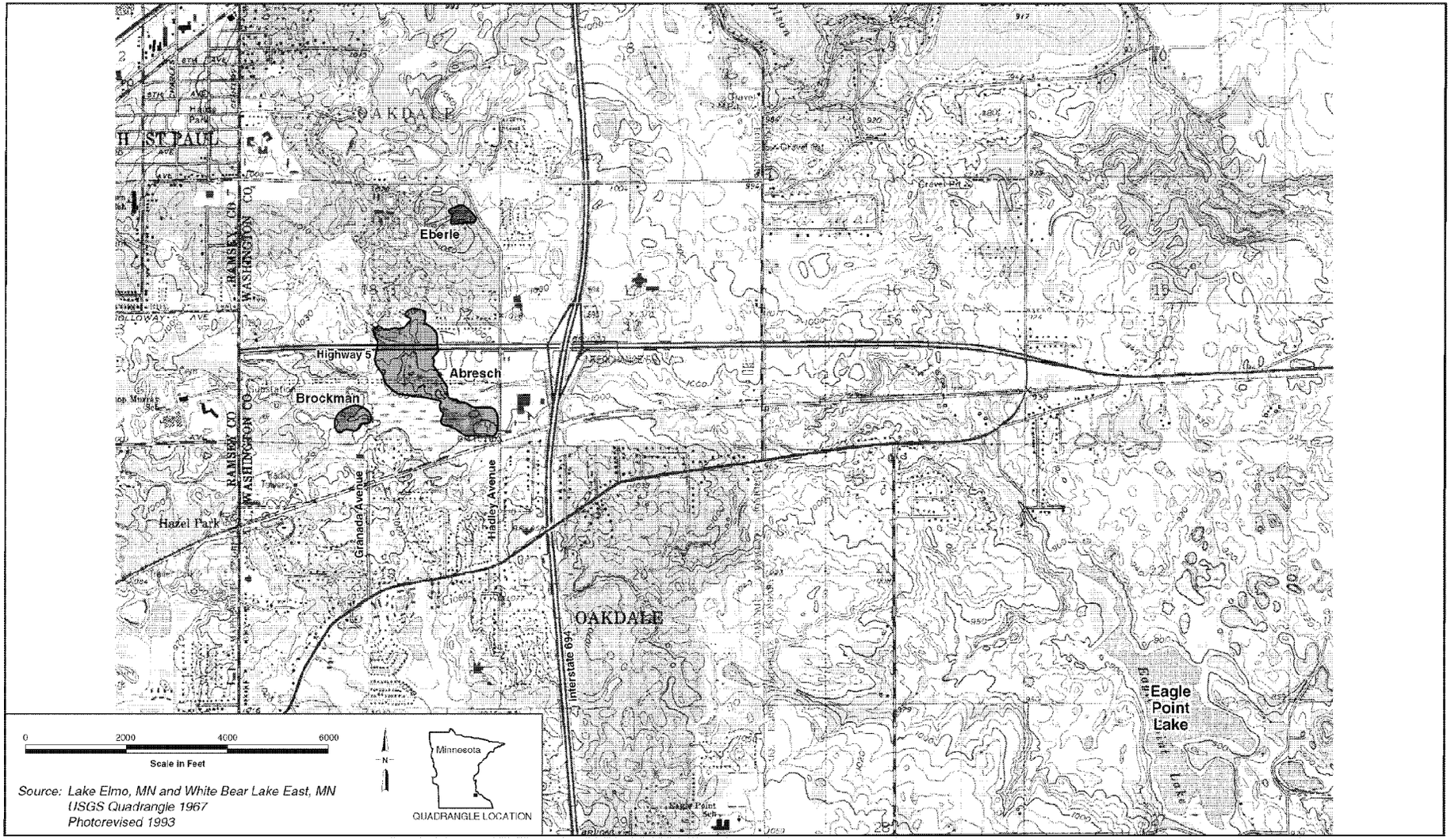
WESTON, September 2006. *Supplemental Fluorochemical (FC) Data Assessment Report – Oakdale Site.*

WESTON, November 2006. *Addendum 1 to the Supplemental Fluorochemical (FC) Investigation Work Plan.*

WESTON, April 2007. *Assessment of the Effectiveness of the Existing Groundwater Recovery System.*

FIGURES


WESTON SOLUTIONS
Legend
Water Table Monitoring Well
Geoprobe Boring Location November/December 2005 (GP-series)
Abandoned
Basal Alluvium Monitoring Well
Base of Surficial Alluvium Monitoring Well
Pump-out Well
Eliminated Pumping at Well
Geoprobe Boring Location December 2006 (ASB-series)
Walking Path
Unpaved Access Road
Drainage Features
Fenceline
Inferred Limits of the Former Abresch Disposal Site Area
ASB39
GP03
ASB40
ASB34
ASB42
GP04
ASB43
ASB38
ASB36
GP05
W21
GP02
ASB33
GP06
W20
W2007
ASB31
W22
GP07
GP01
ASB37
GP08
ASB41
ASB32
W26
ASB35
HIGHWAY 5
W2001
W23
W2006
PW1
PW5
PW7
PW8
PW3
PW2
PW4
PW6
PW9
N
W
E
S
0
100
200
Feet
Figure F.5
Area of North of Highway 5
Geoprobe Sampling Locations
Oakdale Site
Oakdale, Minnesota
File: \\Fswc0\proj0\Oakdale\mxd\samp_locs_N_Hwy5_w_abswells.mxd, 01-Jun-07 08:40, ricksc

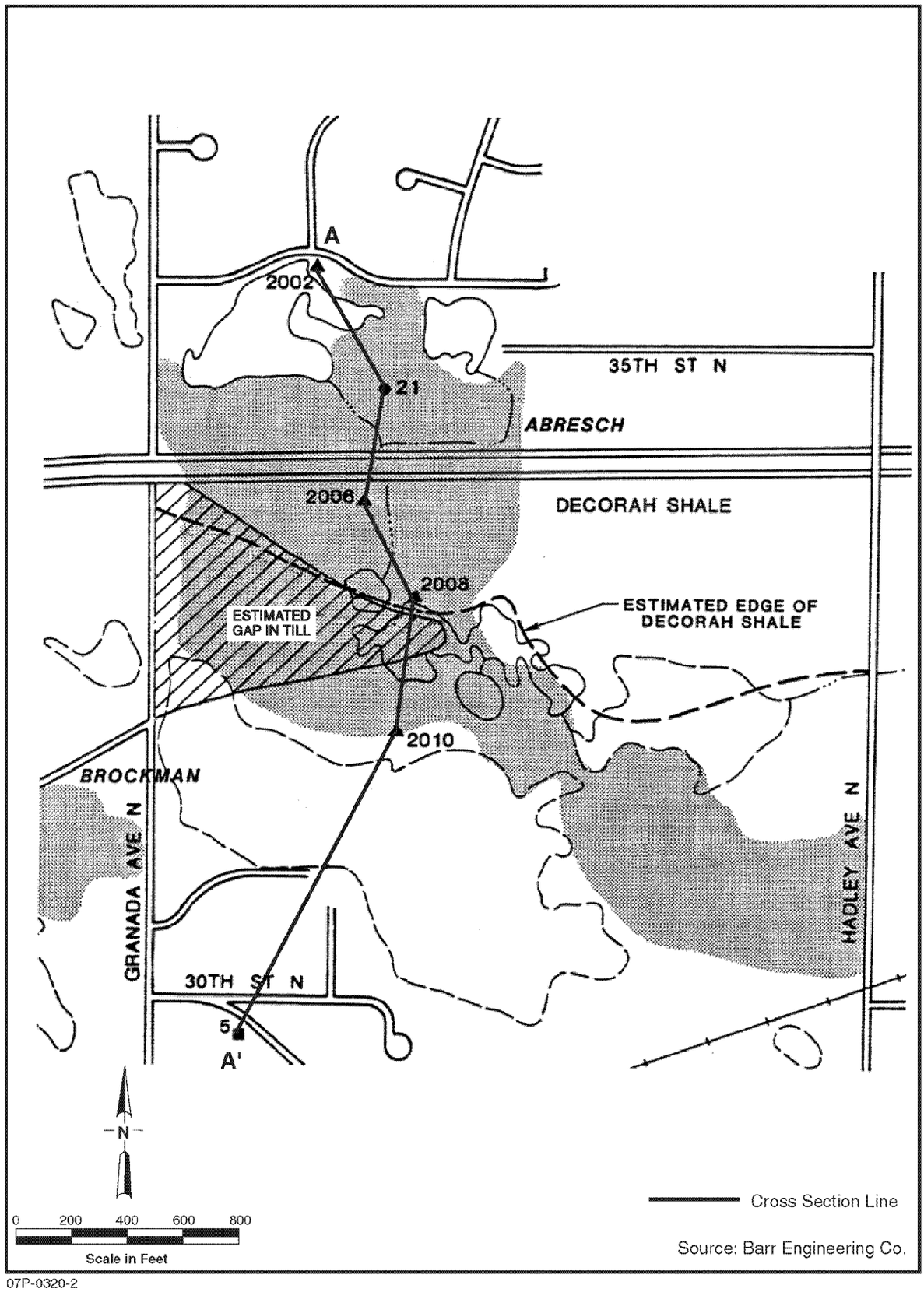


07P-0320-1

FIGURE 1 SITE LOCATION MAP
OAKDALE SITE, MN

3M_MN04969218

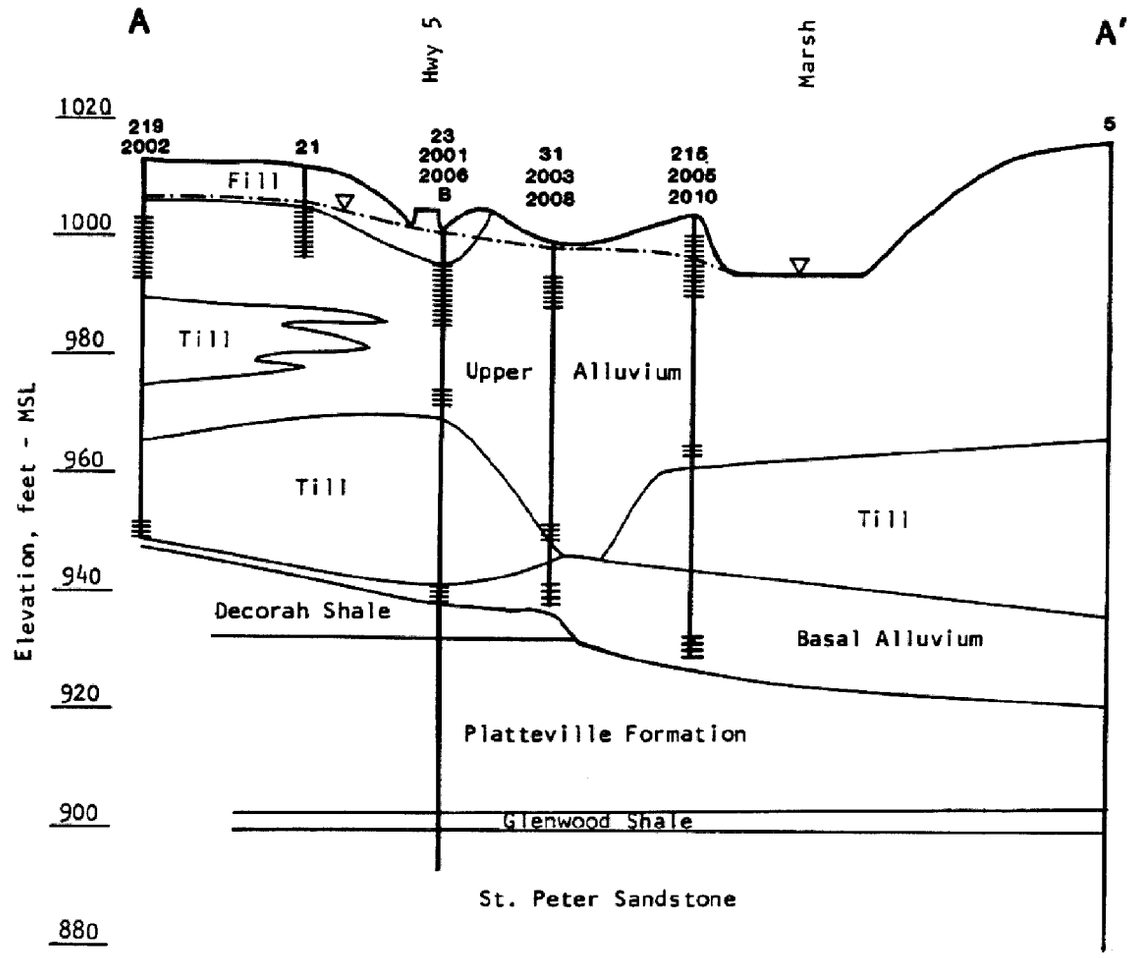
2163.0033



07P-0320-2

FIGURE 2 ESTIMATED GAP IN TILL AND EDGE OF DECORAH SHALE

3M_MN04969219



219
2002 Well Nest Numbers

Well Screen

Approximate Water Table

Source: Barr Engineering Co.

05P-0183-2

FIGURE 3 GEOLOGIC CROSS SECTION A-A'
OAKDALE SITE, MN

3M_MN04969220

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Legend

- Water Table Monitoring Well
- Geoprobe Boring Location November/December 2005 (GP-series)
- Abandoned
- Basal Alluvium Monitoring Well
- Base of Surficial Alluvium Monitoring Well
- Pump-out Well
- Eliminated Pumping at Well
- Geoprobe Boring Location December 2006 (ASB-series)
- Walking Path
- Unpaved Access Road
- Drainage Features
- Fenceline
- Inferred Limits of the Former Abresch Disposal Site Area

N
W
E
S

0 100 200

Feet

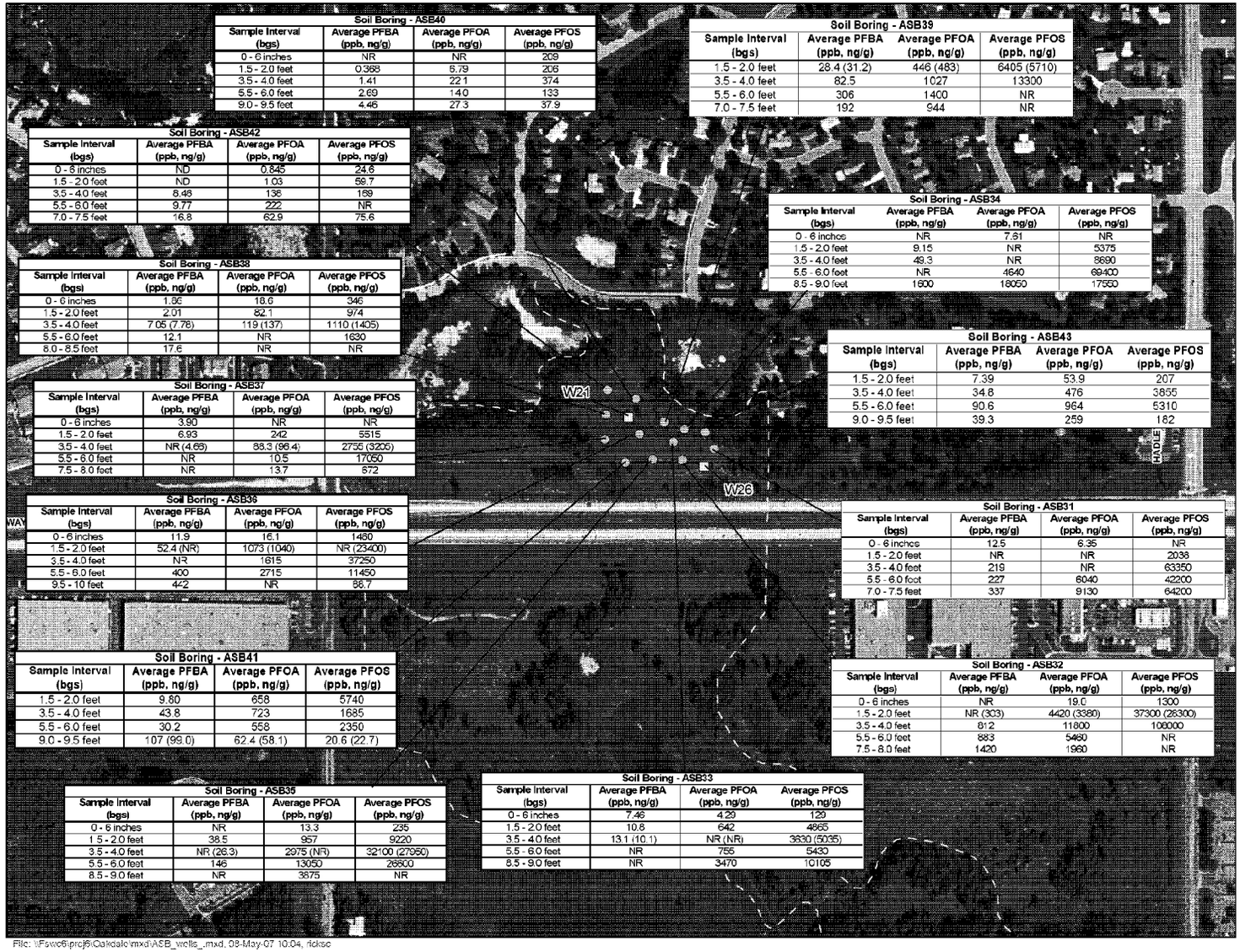
Figure 4

Area of North of Highway 5
Geoprobe Sampling Locations

Oakdale Site
Oakdale, Minnesota

3M_MN04969221

2163.0036



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Legend

- Soil Boring Location
- Water Table Monitoring Well
- Fenceline
- Inferred Limits of the Former Abresch Disposal Site Area

ASB = Abresch site soil boring
bgs = below ground surface
ND = Not detected at, or above, Limit of Quantitation (LOQ) of 0.2 ng/g
NR = Not reported due to quality control failures

Note: Values in parentheses are results from duplicate samples collected in the field.

0 150 300 600
Feet

Figure 5

PFBA, PFOA and PFOS Concentrations in Soil Borings December 2006

Oakdale Site
Oakdale, Minnesota

3M_MN04969222

2163.0037

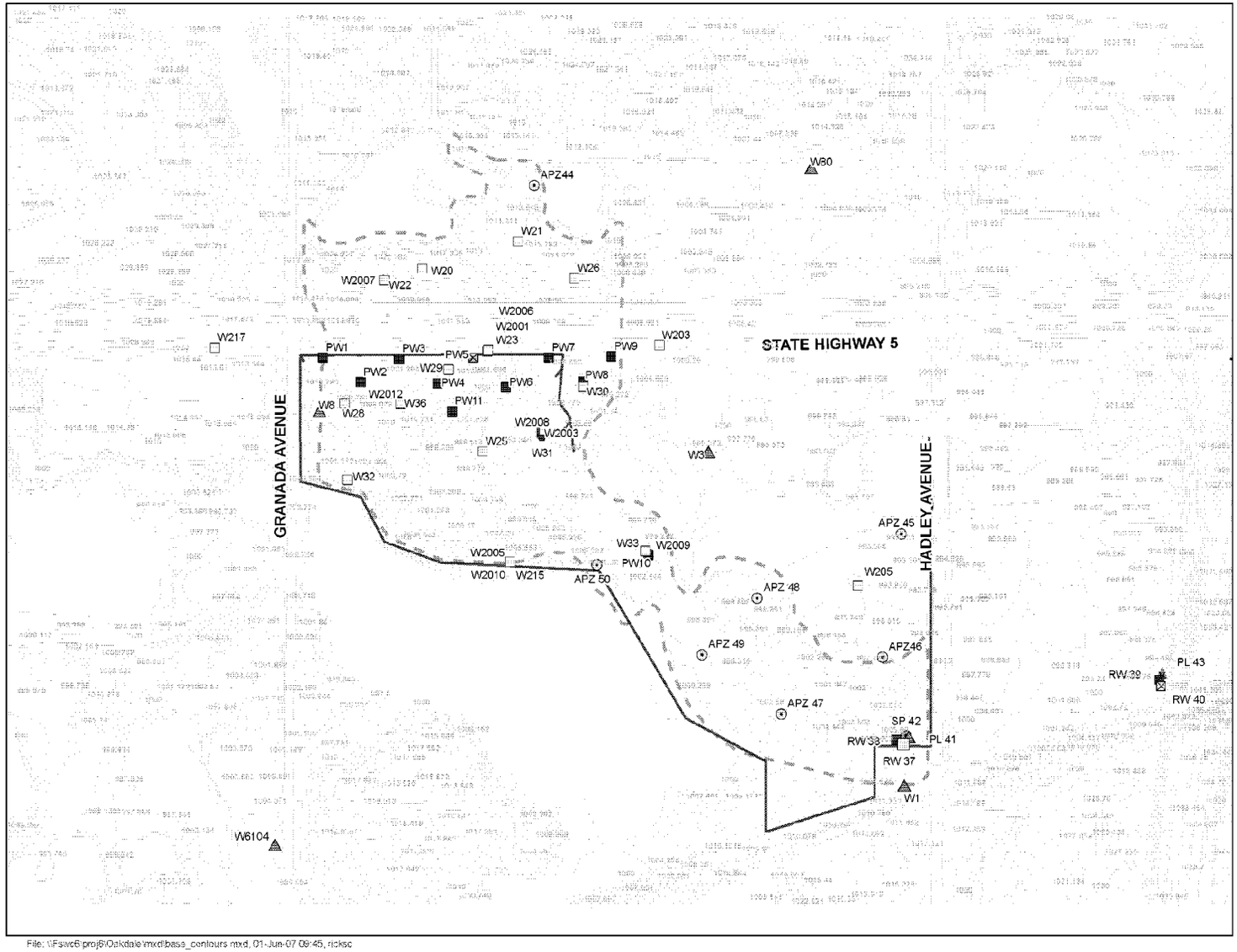

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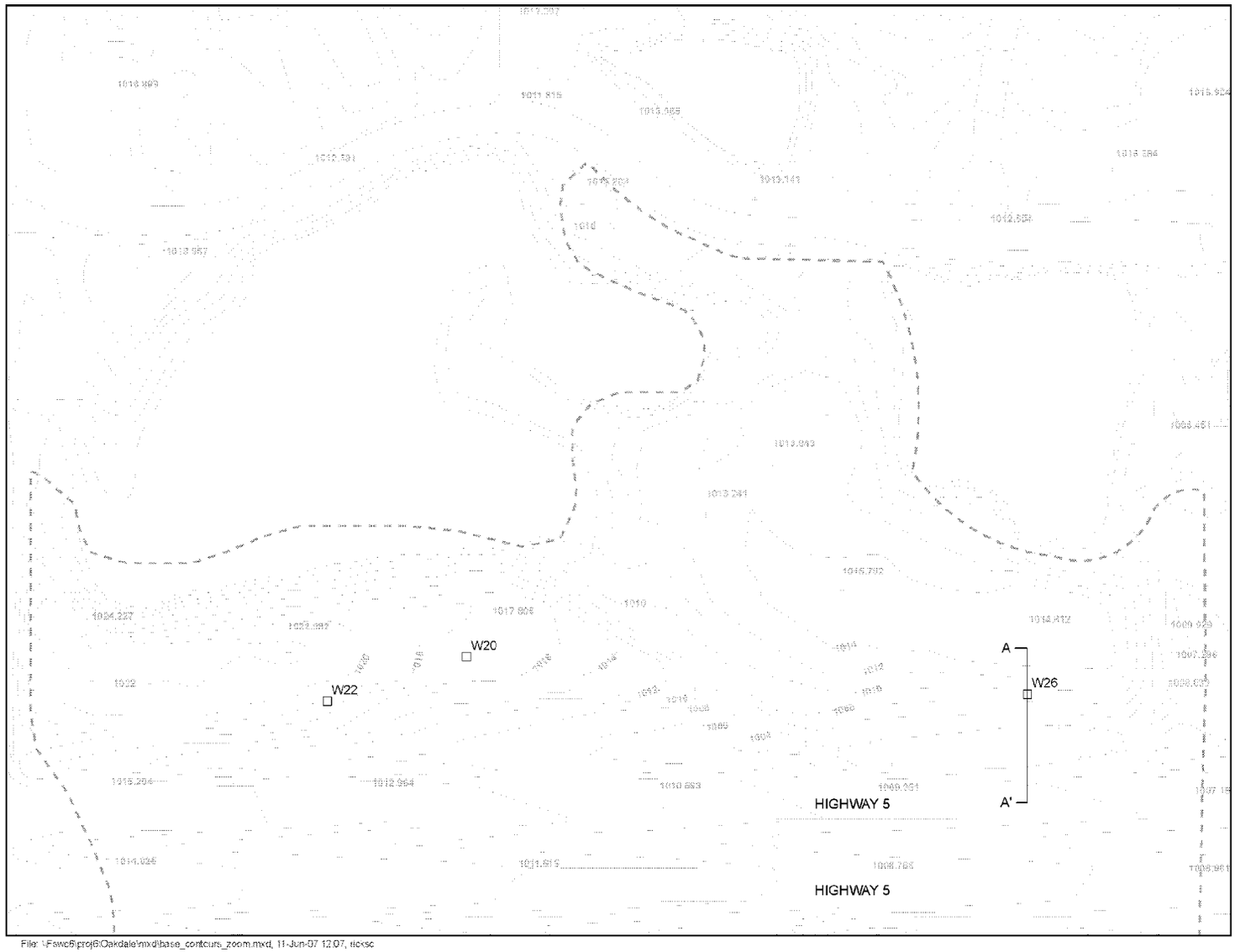
Figure 6

Site Topography
and Well Location Map
Oakdale Site
Oakdale, Minnesota



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Legend

- Water Table Monitoring Well
- Inferred Limits of the Former Abresch Disposal Site Area

N
W
E
S

0 50 100 200 Feet

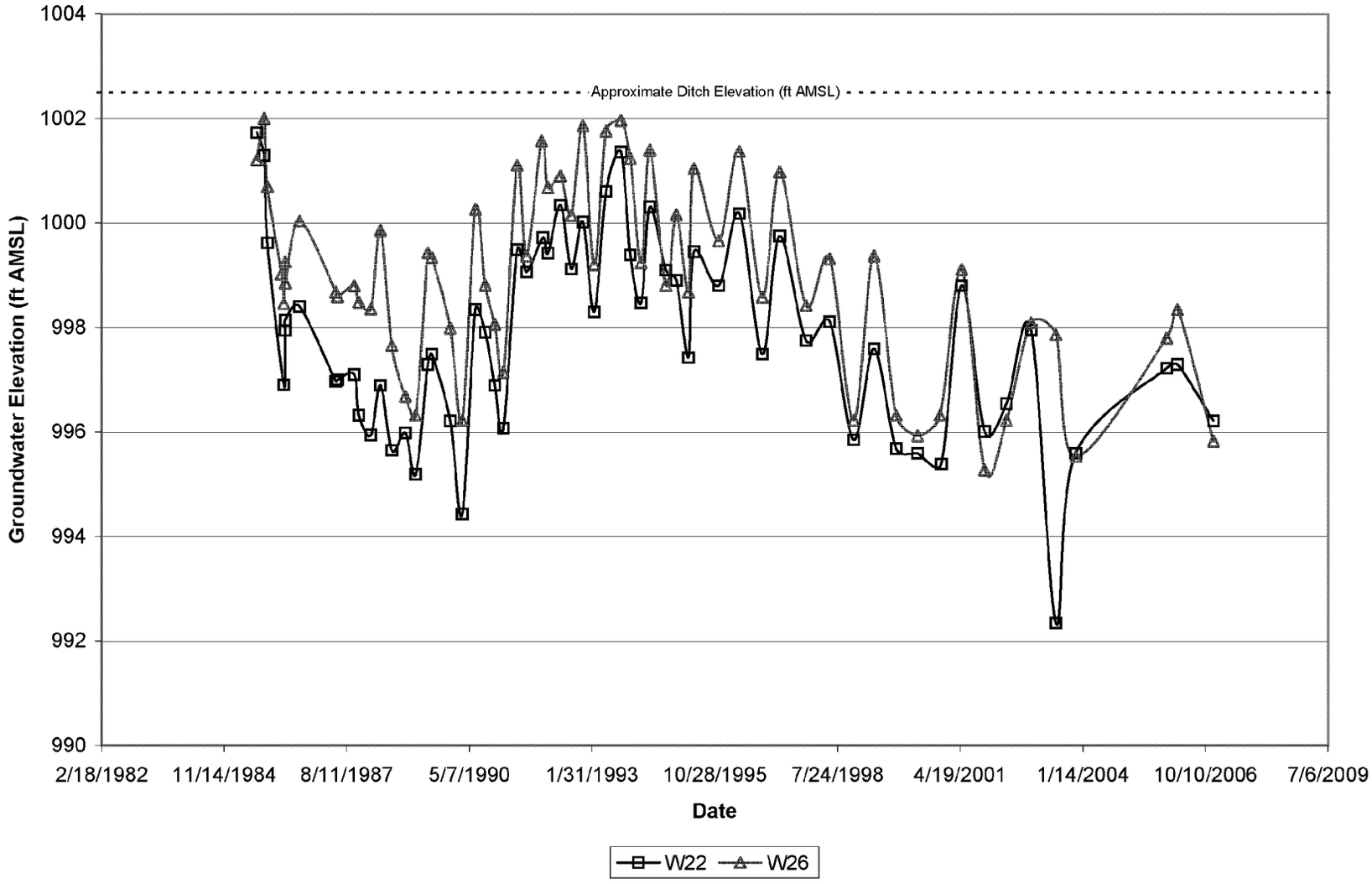
Figure 7

Site Topography
and Well Location Map -
Area North of Highway 5
Oakdale Site
Oakdale, Minnesota

3M_MN04969224

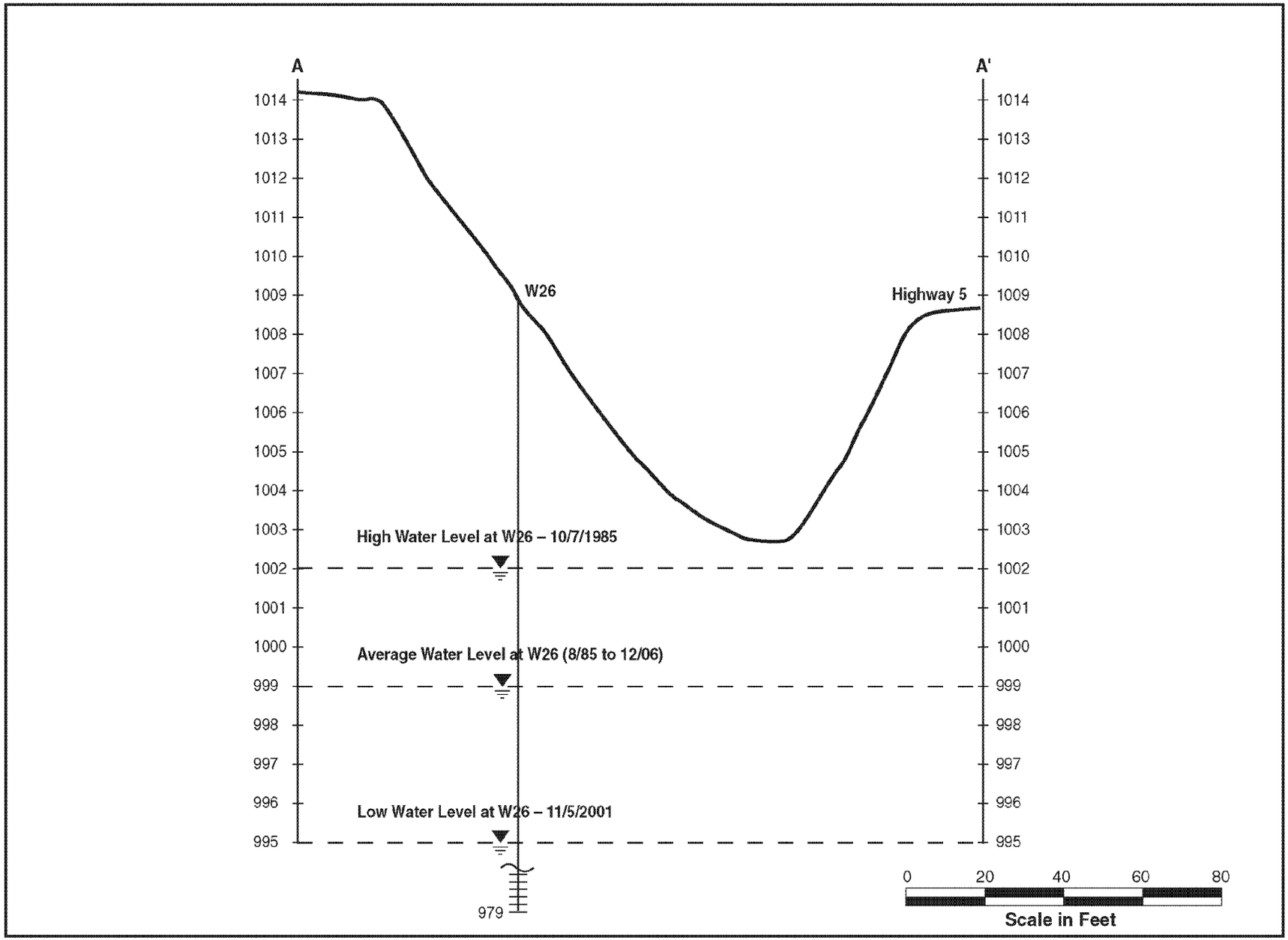
2163.0039

Figure 8
W22 and W26 Hydrograph and
Approximate Drainage Ditch Elevation
Oakdale, MN



Oak_Hist_GWLevels.xlsW22,W26cht

3M_MN04969225



07P-0704-1

FIGURE 9 CROSS SECTION A-A' – WATER LEVEL ELEVATIONS AT MONITORING WELL W26
OAKDALE, MN

3M_MN04969226

TABLES

Table 1 Summary of Soil and QA/QC Samples - December 2006
Area North of Highway 5
Oakdale, MN

Soil Boring	Sample ID	Sample Matrix	Sample Interval (ft bgs)	Date Sampled	Sample Parameter / Type			
					FCs	VOCs	Duplicate	Equipment Rinsate
ASB31	OKMN-SB-ASB31-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB31-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB31-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB31-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB31-0-70	Soil	7.0 - 7.5	4-Dec-06	x			
	OKMN-SB-ASB31-0-61204	Soil	7.5 - 8.0	4-Dec-06		x		
ASB32	OKMN-SB-ASB32-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB32-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB32-DB-15	Soil	1.5 - 2.0	4-Dec-06	x		x	
	OKMN-SB-ASB32-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB32-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB32-0-61204	Soil	5.5 - 6.0	4-Dec-06		x		
	OKMN-SB-ASB32-0-75	Soil	7.5 - 8.0	4-Dec-06	x			
	OKMN-SB-ASB32-RB-61204	Water	--	4-Dec-06	x			x
ASB33	OKMN-SB-ASB33-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB33-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB33-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB33-DB-35	Soil	3.5 - 4.0	4-Dec-06	x		x	
	OKMN-SB-ASB33-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB33-0-85	Soil	8.5 - 9.0	4-Dec-06	x			
ASB34	OKMN-SB-ASB34-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB34-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB34-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB34-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB34-0-85	Soil	8.5 - 9.0	4-Dec-06	x			
ASB35	OKMN-SB-ASB35-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB35-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB35-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB35-DB-35	Soil	3.5 - 4.0	4-Dec-06	x		x	
	OKMN-SB-ASB35-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB35-0-85	Soil	8.5 - 9.0	4-Dec-06	x			
ASB36	OKMN-SB-ASB36-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB36-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB36-DB-15	Soil	1.5 - 2.0	4-Dec-06	x		x	
	OKMN-SB-ASB36-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB36-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB36-0-95	Soil	9.5 - 10.0	4-Dec-06	x			
	OKMN-SB-ASB36-RB-61204	Water	--	4-Dec-06	x			x
ASB37	OKMN-SB-ASB37-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB37-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB37-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB37-DB-35	Soil	3.5 - 4.0	4-Dec-06	x		x	
	OKMN-SB-ASB37-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB37-0-75	Soil	7.0 - 7.5	4-Dec-06	x			

ft bgs = feet below ground surface.

Samples include QA/QC samples consisting of duplicate samples (DB), equipment rinsate samples (RB), and laboratory-prepared trip blanks.

Table 1 Summary of Soil and QA/QC Samples - December 2006 (continued)
Area North of Highway 5
Oakdale, MN

Soil Boring	Sample ID	Matrix	(ft bgs)	Sampled	Sample Parameter / Type			
					FCs	VOCs	Duplicate	Rinsate
ASB38	OKMN-SB-ASB38-0-0	Soil	0-0.5	4-Dec-06	x			
	OKMN-SB-ASB38-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB38-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB38-DB-35	Soil	3.5 - 4.0	4-Dec-06	x		x	
	OKMN-SB-ASB38-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB38-0-80	Soil	8.0 - 8.5	4-Dec-06	x			
ASB39	OKMN-SB-ASB39-0-15	Soil	1.5 - 2.0	5-Dec-06	x			
	OKMN-SB-ASB39-DB-15	Soil	1.5 - 2.0	5-Dec-06	x		x	
	OKMN-SB-ASB39-0-35	Soil	3.5 - 4.0	5-Dec-06	x			
	OKMN-SB-ASB39-0-55	Soil	5.5 - 6.0	5-Dec-06	x			
	OKMN-SB-ASB39-0-70	Soil	7.0 - 7.5	5-Dec-06	x			
ASB40	OKMN-SB-ASB40-0-0	Soil	0-0.5	5-Dec-06	x			
	OKMN-SB-ASB40-0-15	Soil	1.5 - 2.0	5-Dec-06	x			
	OKMN-SB-ASB40-0-35	Soil	3.5 - 4.0	5-Dec-06	x			
	OKMN-SB-ASB40-0-55	Soil	5.5 - 6.0	5-Dec-06	x			
	OKMN-SB-ASB40-0-61205	Soil	8.5 - 9.0	5-Dec-06		x		
	OKMN-SB-ASB40-0-90	Soil	9.0 - 9.5	5-Dec-06	x			
ASB41	OKMN-SB-ASB41-0-15	Soil	1.5 - 2.0	5-Dec-06	x			
	OKMN-SB-ASB41-0-35	Soil	3.5 - 4.0	5-Dec-06	x			
	OKMN-SB-ASB41-0-55	Soil	5.5 - 6.0	5-Dec-06	x			
	OKMN-SB-ASB41-0-90	Soil	9.0 - 9.5	5-Dec-06	x			
	OKMN-SB-ASB41-DB-90	Soil	9.0 - 9.5	5-Dec-06	x		x	
ASB42	OKMN-SB-ASB42-0-0	Soil	0-0.5	5-Dec-06	x			
	OKMN-SB-ASB42-0-15	Soil	1.5 - 2.0	5-Dec-06	x			
	OKMN-SB-ASB42-0-35	Soil	3.5 - 4.0	5-Dec-06	x			
	OKMN-SB-ASB42-0-55	Soil	5.5 - 6.0	5-Dec-06	x			
	OKMN-SB-ASB42-0-70	Soil	7.0 - 7.5	5-Dec-06	x			
	OKMN-SB-ASB42-RB-61204	Water	--	5-Dec-06	x			x
ASB43	OKMN-SB-ASB43-0-15	Soil	1.5 - 2.0	4-Dec-06	x			
	OKMN-SB-ASB43-0-35	Soil	3.5 - 4.0	4-Dec-06	x			
	OKMN-SB-ASB43-0-55	Soil	5.5 - 6.0	4-Dec-06	x			
	OKMN-SB-ASB43-0-90	Soil	9.0 - 9.5	4-Dec-06	x			
TRIP 1	OKMN-SB-TRIP1-0-61204	Water	--	4-Dec-06	x			
	OKMN-SB-TRIP1-LS-61204	Water	--	4-Dec-06	x			
	OKMN-SB-TRIP1-HS-61204	Water	--	4-Dec-06	x			
TRIP 2	OKMN-SB-TRIP2-0-61204	Water	--	4-Dec-06	x			
	OKMN-SB-TRIP2-LS-61204	Water	--	4-Dec-06	x			
	OKMN-SB-TRIP2-HS-61204	Water	--	4-Dec-06	x			

ft bgs = feet below ground surface.

Samples include QA/QC samples consisting of duplicate samples (DB), equipment rinsate samples (RB), and laboratory-prepared trip blanks.

Table 2 Summary of FC Concentrations Detected in Groundwater Samples from Menards Retail Property Wells Oakdale, MN

Sample Location	Sample Date	Average PFBS (ppb, ng/mL)	Average PFHS (ppb, ng/mL)	Average PFOS (ppb, ng/mL)	Average PFOA (ppb, ng/mL)
RW39	02-Mar-06	0.0511	ND	ND	ND
	19-Sep-06	ND*	ND^	ND°	0.0330
RW40	02-Mar-06	ND	ND	ND	0.0366
	19-Sep-06	ND*	ND^	ND°	0.0292
PL43	02-Mar-06	ND	ND	ND	ND
	19-Sep-06	ND*	ND^	ND°	ND

DB = Field Duplicate

ND = Not detected at or above 0.0250 ng/mL
ND* = Not detected at or above 0.0254 ng/mL
ND^ = Not detected at or above 0.0253 ng/mL
ND° = Not detected at or above 0.0393 ng/mL

M:\ECON_530\FOLDERS.0-9\3M-OAKDALE\Dec_2006_Soil_Investigation\Table 2 Oakdale - Menards Wells Data.xls

Table 3 Summary of FC Concentrations Detected in Soil Samples - December 2006
Area North of Highway 5
Oakdale, MN

Sample ID	Sample Location	Sample Interval (ft bgs)	Average* PFBA (ppb, ng/g) Dry Weight	Average* PFBS (ppb, ng/g) Dry Weight	Average* PFHS (ppb, ng/g) Dry Weight	Average* PFOS (ppb, ng/g) Dry Weight	Average* PFOA (ppb, ng/g) Dry Weight
OKMN-SB-ASB31-0-0000	ASB31	0 - 0.5	12.5	NR	NR	NR	6.35
OKMN-SB-ASB31-0-0015		1.5 - 2.0	NR	6.39	NR	2038	NR
OKMN-SB-ASB31-0-0035		3.5 - 4.0	219	40.2	581	63350	NR
OKMN-SB-ASB31-0-0055		5.5 - 6.0	227	19.4	1232	42200	6040
OKMN-SB-ASB31-0-0070		7.0 - 8.0	337	36.7	NR	64200	9130
OKMN-SB-ASB32-0-0000	ASB32	0 - 0.5	NR	2.77	9.35	1300	19.0
OKMN-SB-ASB32-0-0015		1.5 - 2.0	NR (303)	67.5 (86.2)	935 (1174)	37300 (28300)	4420 (3380)
OKMN-SB-ASB32-0-0035		3.5 - 4.0	812	84.7	NR	108000	11800
OKMN-SB-ASB32-0-0055		5.5 - 6.0	883	96.1	1180	NR	5460
OKMN-SB-ASB32-0-0075		7.5 - 8.0	1420	NR	204	NR	1960
OKMN-SB-ASB33-0-0000	ASB33	0 - 0.5	7.46	NR	0.612	129	4.29
OKMN-SB-ASB33-0-0015		1.5 - 2.0	10.8	5.70	NR	4865	642
OKMN-SB-ASB33-0-0035		3.5 - 4.0	13.1 (10.1)	3.78 (NR)	NR (50.7)	3630 (5035)	NR (NR)
OKMN-SB-ASB33-0-0055		5.5 - 6.0	NR	17.3	188	5430	755
OKMN-SB-ASB33-0-0085		8.5 - 9.0	NR	NR	1180	10105	3470
OKMN-SB-ASB34-0-0000	ASB34	0 - 0.5	NR	ND	0.455	NR	7.61
OKMN-SB-ASB34-0-0015		1.5 - 2.0	9.15	NR	22.0	5375	NR
OKMN-SB-ASB34-0-0035		3.5 - 4.0	49.3	8.65	142	8690	NR
OKMN-SB-ASB34-0-0055		5.5 - 6.0	NR	26.3	1035	69400	4640
OKMN-SB-ASB34-0-0085		8.5 - 9.0	1600	224	5585	17550	18050
OKMN-SB-ASB35-0-0000	ASB35	0 - 0.5	NR	0.570	NR	235	13.3
OKMN-SB-ASB35-0-0015		1.5 - 2.0	38.5	12.9	NR	9220	957
OKMN-SB-ASB35-0-0035		3.5 - 4.0	NR (26.3)	22.8 (20.2)	NR (115)	32100 (27950)	2975 (NR)
OKMN-SB-ASB35-0-0055		5.5 - 6.0	146	53.8	445	26600	13050
OKMN-SB-ASB35-0-0085		8.5 - 9.0	NR	98.3	83.3	NR	3875
OKMN-SB-ASB36-0-0000	ASB36	0 - 0.5	11.9	0.434	2.38	1460	16.1
OKMN-SB-ASB36-0-0015		1.5 - 2.0	52.4 (NR)	7.37 (9.42)	62.7 (68.0)	NR (23400)	1073 (1040)
OKMN-SB-ASB36-0-0030		3.5 - 4.0	NR	24.6	NR	37250	1615
OKMN-SB-ASB36-0-0055		5.5 - 6.0	400	22.4	NR	11450	2715
OKMN-SB-ASB36-0-0095		9.5 - 10	442	17.0	11.8	88.7	NR
OKMN-SB-ASB37-0-0000	ASB37	0 - 0.5	3.90	0.599	2.37	NR	NR
OKMN-SB-ASB37-0-0015		1.5 - 2.0	6.93	2.53	16.4	5515	242
OKMN-SB-ASB37-0-0035		3.5 - 4.0	NR (4.66)	0.900 (1.14)	7.68 (10.6)	2755 (3205)	88.3 (96.4)
OKMN-SB-ASB37-0-0055		5.5 - 6.0	NR	1.90	8.08	17050	10.5
OKMN-SB-ASB37-0-0075		7.5 - 8.0	NR	0.178	0.664	672	13.7
OKMN-SB-ASB38-0-0000	ASB38	0 - 0.5	1.86	0.583	1.91	346	18.6
OKMN-SB-ASB38-0-0015		1.5 - 2.0	2.01	0.798	6.04	974	82.1
OKMN-SB-ASB38-0-0035		3.5 - 4.0	7.05 (7.78)	2.01 (2.01)	8.88 (9.47)	1110 (1405)	119 (137)
OKMN-SB-ASB38-0-0055		5.5 - 6.0	12.1	2.58	10.5	1630	NR
OKMN-SB-ASB38-0-0080		8.0 - 8.5	17.6	1.76	NR	NR	NR
OKMN-SB-ASB39-0-0015	ASB39	1.5 - 2.0	28.4 (31.2)	9.13 (11.5)	73.3 (88.5)	6405 (5710)	446 (483)
OKMN-SB-ASB39-0-0035		3.5 - 4.0	82.5	10.6	172	13300	1027
OKMN-SB-ASB39-0-0055		5.5 - 6.0	306	22.7	NR	NR	1400
OKMN-SB-ASB39-0-0070		7.0 - 7.5	192	13.5	208	NR	944
OKMN-SB-ASB40-0-0000	ASB40	0 - 0.5	NR	0.287	ND	209	NR
OKMN-SB-ASB40-0-0015		1.5 - 2.0	0.368	0.504	0.865	206	6.79
OKMN-SB-ASB40-0-0035		3.5 - 4.0	1.41	0.496	2.26	374	22.1
OKMN-SB-ASB40-0-0055		5.5 - 6.0	2.69	0.536	1.01	133	14.0
OKMN-SB-ASB40-0-0090		9.0 - 9.5	4.46	0.513	0.777	37.9	27.3
OKMN-SB-ASB41-0-0015	ASB41	1.5 - 2.0	9.80	6.99	73.6	5740	658
OKMN-SB-ASB41-0-0035		3.5 - 4.0	43.8	11.1	30.5	1685	723
OKMN-SB-ASB41-0-0055		5.5 - 6.0	30.2	7.50	29.5	2350	558
OKMN-SB-ASB41-0-0090		9.0 - 9.5	107 (99.0)	4.19 (4.09)	3.90 (3.68)	20.6 (22.7)	62.4 (58.1)
OKMN-SB-ASB42-0-0000	ASB42	0 - 0.5	ND	ND	ND	24.6	0.845
OKMN-SB-ASB42-0-0015		1.5 - 2.0	ND	0.284	ND	59.7	1.03
OKMN-SB-ASB42-0-0035		3.5 - 4.0	8.46	4.19	11.6	168.5	138
OKMN-SB-ASB42-0-0055		5.5 - 6.0	9.77	4.69	16.7	NR	222
OKMN-SB-ASB42-0-0070		7.0 - 7.5	16.8	4.14	5.16	75.6	62.9
OKMN-SB-ASB43-0-0015	ASB43	1.5 - 2.0	7.39	4.28	14.1	207	53.9
OKMN-SB-ASB43-0-0035		3.5 - 4.0	34.8	6.63	103	3855	476
OKMN-SB-ASB43-0-0055		5.5 - 6.0	90.6	15.7	193	5310	964
OKMN-SB-ASB43-0-0090		9.0 - 9.5	39.3	8.78	29.6	182	259

ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.
* Average values were calculated using the arithmetic mean of the primary and laboratory duplicate sample. In instances where either the primary or laboratory duplicate samples was designated "ND" the value is shown.
Note: Concentrations in parentheses are field duplicate results.

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Table 4
Summary of Volatile Organic Compound (VOCs) Detected in Soil Samples - December 2006
Area North of Highway 5
Oakdale, MN

Parameter	ASB31 7.5 - 8.0 ft bgs (µg/kg, ppb)	ASB32 5.5 - 6.0 ft bgs (µg/kg, ppb)	ASB40 8.5 - 9.0 ft bgs (µg/kg, ppb)
1,1,1,2-Tetrachloroethane	<920	<7900	<1800
1,1,1-Trichloroethane	<460	<3900	<900
1,1,2,2-Tetrachloroethane	<460	<3900	<900
1,1,2-Trichloroethane	3900	<3900	<900
1,1-Dichloroethane	<460	<3900	<900
1,1-Dichloroethene	<460	<3900	<900
1,1-Dichloropropene	<460	<3900	<900
1,2,3-Trichlorobenzene	<920	<7900	<1800
1,2,3-Trichloropropane	<920	<7900	<1800
1,2,4-Trimethylbenzene	12000	68000	61000
1,2-Dibromo-3-chloropropane	<920	<7900	<1800
1,2-Dibromoethane	<920	<7900	<1800
1,2-Dichloroethane	4000	<3900	<900
1,2-Dichloropropane	<460	<3900	<900
1,3,5-Trimethylbenzene	2800	15000	11000
1,3-Dichloropropane	<460	<3900	<900
2,2-Dichloropropane	<460	<3900	<900
2-Chlorotoluene	<460	<3900	<900
2-Hexanone	<920	<7900	<1800
4-Chlorotoluene	<460	<3900	<900
4-Methyl-2-pentanone	43000	70000	26000
Acetone	7900	<16000	12000
Benzene	1300	2900	1200
Bromobenzene	<920	<7900	<1800
Bromochloromethane	<920	<7900	<1800
Bromodichloromethane	<920	<7900	<1800
Bromoform	<920	<7900	<1800
Bromomethane	<920	<7900	<1800
Carbon disulfide	<920	<7900	<1800
Carbon tetrachloride	<460	<3900	<900
Chlorobenzene	<460	<3900	<900
Chloroethane	<920	<7900	<1800
Chloroform	<460	<3900	<900
Chloromethane	<920	<7900	<1800
cis-1,2-Dichloroethene	<460	<3900	<900
cis-1,3-Dichloropropene	<460	<3900	<900
Dibromochloromethane	<920	<7900	<1800
Dibromomethane	<920	<7900	<1800
Dichlorodifluoromethane	<920	<7900	<1800
Ethylbenzene	54000	200000	56000
Isopropylbenzene	1300	<7900	<1800
m&p-Xylenes	120000	450000	120000
Methyl Ethyl Ketone	37000	<7900	<1800
Methylene chloride	<920	<7900	<1800
Methyl-tert-butyl-ether (MTBE)	<920	<7900	<1800
n-Butylbenzene	<460	<3900	<900
n-Propylbenzene	1300	<7900	3300
o-Xylene	50000	170000	51000
p-Isopropyltoluene	1000	<7900	10000
sec-Butylbenzene	<460	<3900	6100
Styrene	<460	<3900	<900
tert-Butylbenzene	<460	<3900	<900
Tetrachloroethene	1200	<3900	1300
Toluene	210000	1100000	420000
trans-1,2-Dichloroethylene	<460	<3900	<900
trans-1,3-Dichloropropene	<460	<3900	<900
Trichloroethene	4100	13000	<450
Trichlorofluoromethane	<920	<7900	<1800
Vinyl Chloride	<230	<2000	<450
Percent Solids	89.0	92.1	82.5

µg/kg = micrograms per kilogram
ppb = parts per billion
< = Result is not detected at or greater than the given reporting limit.

Table 5 Summary of Organic Vapor Meter (OVM) Readings - December 2006
Area North of Highway 5
Oakdale, MN

OVM Screening Data for Soil (parts per million)													
Depth (ft bgs)	**ASB31**	**ASB32**	**ASB33**	**ASB34**	**ASB35**	**ASB36**	**ASB37**	**ASB38**	**ASB39**	**ASB40**	**ASB41**	**ASB42**	**ASB43**
0-1	1.9	3.3	3.3	3.3	4	11	3.3	11.2	3.3	1.9	3.3	3.2	1.9
2-3	435	946	333	599	743	613	33	45	152	1.9	792	40	171
4-5	1054	1241	872	1269	674	567	145	481	705	47	863	15	555
6-7	698	1339	984	1116	603	455	408	94	9	115	324	15	524
8-9	NS	NS	1146	877	892	529	NS	148	5	648	209	24	782
10-11	1213	1202	937	994	756	557	443	391	4.6	820	172	35	173
12-13	341	341	145	207	756	550	504	688	4.6	262	50	23	142
14-15	341	214	45	20	NS	334	226	156	4	66	20	11	50
DTW	NA	12	11.2	13.2	NA	14	12.5	13.2	12.7	8.2	13	10.5	13.2
BTD	15	15	15	15	15	15	15	15	15	15	15	15	15

ft bgs = feet below ground surface
DTW = depth to water (ft bgs)
BTD = boring total depth (ft bgs)

Table 6 Initial Screening of Technologies and Process Options - Soil
Oakdale, MN

General Response Action	Remedial Technology Types	Process Options	Description	Screening Comments
Removal	Excavation	Excavation	Excavate impacted soil from the site	Retained for further screening
Treatment	Chemical treatment	Oxidation/reduction	Treat impacted soil with a chemical oxidation/reduction technology	Not feasible due to the lack of existing technologies proven to effectively treat/destroy FCs
	Physical	Solidification/ stabilization	Mixing of impacted soil with a stabilizing agent such as cement kiln dust (CKD) to prevent the leaching of constituents	Not feasible due to the fact that stabilization has not been proven to reduce leaching of FCs and this technology type would result in a significant volume increase
	Biological	Anaerobic/aerobic	Treat impacted soil with a biological technology to break down constituents using a microbial population	Not feasible as FCs are recalcitrant compounds and to date, there have been no microbial populations identified that can significantly affect the biodegradation of FCs
	Thermal	Incineration	Treat impacted soil by incineration to destroy constituents	Retained for further screening
Disposal	Landfill	New	Dispose impacted soil in a newly constructed/dedicated landfill	Retained for further screening
		Existing	Dispose impacted soil in an existing regulated landfill	Retained for further screening
Containment	Cap	Soil/clay	Installation of soil/clay cover over impacted soil to prevent direct contact and/or reduce infiltration	Retained for further screening
		Engineered cap	Installation of a multilayer engineered cap over impacted soil to prevent direct contact and reduce/eliminate infiltration to impacted soil	Retained for further screening
Institutional Site Controls	Access restrictions	Deed restrictions	Deed for the Site property would include restrictions on soil disturbance	Retained for further screening
		Fencing	Install fence around site to limit acess to impacted soil	Retained for further screening
No Action	None	Not applicable	No action	Retained for a baseline comparison

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Table 7 Initial Screening of Technologies and Process Options - Groundwater
Oakdale, MN

General Response Action	Remedial Technology Types	Process Options	Description	Screening Comments
Collection	Groundwater recovery	Groundwater recovery wells	Install wells for extraction of impacted groundwater	Retained for further screening
	Subsurface drain	Interceptor trench	Install subsurface perforated pipe surrounded by porous media to collect impacted groundwater	Not feasible in areas where there is an ongoing groundwater pumping system operating at the site and this technology would interfere with its effective implementation. Will be considered for areas outside of pumping influence.
Treatment	Physical	Carbon adsorption	Adsorption of constituents onto activated carbon by passing impacted groundwater through vessels containing activated carbon	Retained for further screening
		Ion exchange resin	Adsorption of constituents onto ion exchange resin by passing impacted groundwater through vessels containing ionic resin	Retained for further screening
		Reverse osmosis	Separation process that uses pressure to force water through a membrane that retains the solute on one side and allows water molecules to pass to the other side.	Retained for further screening
		Air stripping	Mix large volumes of air with water in a packed column or tray stripper to promote transfer of constituents to air	Retained for further screening for removal of VOCs
Discharge	On-site	Local stream	Discharge extracted groundwater to a local stream	Not feasible as the existing groundwater extraction system is already set up to discharge to the POTW
	Off-site	POTW	Discharge extracted groundwater to the POTW	Retained for further screening

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Table 7 Initial Screening of Technologies and Process Options - Groundwater (continued)
Oakdale, MN

General Response Action	Remedial Technology Types	Process Options	Description	Screening Comments
Containment	Cap	Soil/clay	Installation of soil/clay cover to reduce infiltration to groundwater	Retained for further screening
		Engineered cap	Installation of a multilayer engineered cap over impacted soil to reduce/eliminate infiltration to groundwater	Retained for further screening
	Vertical barriers	Slurry wall	Trench around impacted groundwater is filled with a soil bentonite slurry to cut off horizontal groundwater flow and contain impacted groundwater	There is an ongoing groundwater pumping system operating at the site and this technology could interfere with its effective implementation. Also, the location of Highway 5 through the subject area would prevent installation of a continuous wall. However, this technology is being retained for further screening for limited application in areas not influenced by pumping.
		Sheet piling	Sheets of steel are driven into bedrock around the impacted groundwater area to cut off horizontal groundwater flow and contain impacted groundwater	There is an ongoing groundwater pumping system operating at the site and this technology could interfere with its effective implementation. Also, the location of Highway 5 through the subject area would prevent installation of a continuous wall. However, this technology is being retained for further screening for limited application in areas not influenced by pumping.

Table 7 Initial Screening of Technologies and Process Options - Groundwater (continued)
Oakdale, MN

General Response Action	Remedial Technology Types	Process Options	Description	Screening Comments
Treatment	Chemical	Oxidation/reduction	Treat impacted groundwater with a chemical oxidation/reduction technology	Not feasible due to the lack of existing technologies proven to effectively treat/destroy FCs
	Biological	Aerobic/anaerobic	Treat impacted groundwater with a biological technology to break down constituents using a microbial population	Not feasible as FCs are recalcitrant compounds and to date, there have been no microbial populations identified that can significantly affect the biodegradation of FCs
	Off-site	POTW	Extracted groundwater discharged to POTW for treatment	Retained for further screening
	In situ	Aeration	Sparging of air down wells into the groundwater to volatilize constituents from the groundwater	Not feasible since FCs do not have Henry's Law Constants in the range acceptable for this technology and do not readily transfer from the water to air phase
		Permeable treatment/reactive barriers	Downgradient trench filled with adsorptive or reactive media (e.g., activated carbon or zero valent iron) to remove constituents from the groundwater.	Not feasible as there is an ongoing groundwater pumping system operating at the site this technology would interfere with its effective implementation; this technology is of uncertain effectiveness and could require multiple replacement of trench materials over time as they are spent
		Chemical injection	Inject chemicals into the groundwater by means of wells to treat impacted groundwater	Not feasible due to the lack of existing technologies proven to effectively treat/destroy FCs and the reduced ability to control injectate flow in a heterogeneous subsurface geology

Table 7 Initial Screening of Technologies and Process Options - Groundwater (continued)
Oakdale, MN

General Response Action	Remedial Technology Types	Process Options	Description	Screening Comments
Institutional Controls	Access restrictions	Deed restrictions	Deed for the Site property would include restrictions on installation of groundwater supply wells	Retained for further screening
		Fencing	Install fence around site to limit access to impacted groundwater/surface water ponds	Retained for further screening
	Alternate water supply	Bottled water/public water	Supply alternate water source	Retained for further screening
	Monitoring	Groundwater monitoring	Continue groundwater monitoring at wells	Retained for further screening
No Action	None	Not applicable	No action	Retained for a baseline comparison

POTW - Publicly-owned treatment works

APPENDIX A
SOIL BORING LOGS – AREA NORTH OF HIGHWAY 5

ASB31 through ASB43 (2006)

GP01 through GP08 (2005)

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB31

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1014.01
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192052.9704
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464631.6899
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15
Logged By:	Tim Walls	Depth to Refusal (ft bgs):	
Site Description:	In cleared area north of Hwy 5.	Boring Diameter (inches):	3

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample interval (ft bgs)		Recovery (%)	Moisture	Color	Grain Size				Strength	OVM	Boring Column	Sampled	Lithic Description
					Munsell	Gr	S	Si	Cl		Units			
0-3	**0**	1									1.9		X	
	1	2											X	
	2	**3**	100	Dry	5YR 6/8	10	60	10	20	Stiff	435.0			Reddish yellow clayey f.g. to m.g. sand
3-5	**3**	4											X	
	4	**5**	95	Dry	10R 4/1	10	55	15	20	Stiff	1054.0			Dark gray silty clayey sand, solvent odor
5-10	**5**	6											X	
	6	7									698.0			
	7	8											X/V	
	8	9									NS			
	9	**10**	50	Dry	5YR 6/8	10	50	10	30	Soft				Reddish yellow clayey sand, solvent odor
10-12	**10**	11									1213.0			
	11	**12**	100	Mst	5YR 6/8	10	60	10	20	Soft				As above, limestone obstruction at base, solvent odor
12-15	**12**	13									341.0			
	13	14												
	14	**15**	75	Mst	5Y 6/1	0	15	20	65	Soft	341.0			Gray silty sandy clay, green staining at 14 fbgs Boring terminated at 15 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0055

3M_MN04969240

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB32

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1011.89
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192019.2212
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464533.8664
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	12
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
		Boring Diameter (inches):	3
Site Description:	In cleared area north of Hwy 5.		

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-5	**0**	1	100	Dry	5YR 4/6	10	75	10	15	Soft	3.3		X	Yellowish red clayey sand
	1	2											X	
	2	3									946.0			
	3	4											X	
	4	**5**	95	Dry	5YR 4/2	10	55	15	20	Stiff	1241.0			Dark reddish gray silty clayey sand, solvent odor
5-10	**5**	6											X/V	
	6	7									1339.0			
	7	8											X	
	8	9									NS			
	9	**10**	100	Mst	10YR 2/1	0	60	30	10	Soft				Black silty sand, odor
10-15	**10**	11	100	Mst	2.5Y 2.5/1	0	40	40	20	Soft	1202.0			Black silty clayey sand
	11	12												
	12	13									341.0			
	13	14												
	14	**15**	70	Wet	5Y 4/2	0	40	5	55	Soft	214.0			Olive gray f.g. sandy clay, wet at 12 fbgs
														Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0056

3M_MN04969241

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB33

Page 1 of 1

CLIENT:	Confidential				
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1013.63	**DATE:**	4-Dec-2006
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192073.9564		
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464506.7783	**Location Type:**	(X) GeoProbe ( ) Well
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	11.2		(X) Soil Boring ( ) Other:
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15	**Completion Zone:**	(X) Overburden ( ) Bedrock
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**		**Completion Type:**	( ) Monitoring Well
		Boring Diameter (inches):	3		(X) Abandoned by Grout
Site Description:	In cleared area north of Hwy 5.				( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color	Grain Size				Strength	OVM	Boring Column	Sampled	Lithic Description
					Munsell	Gr	S	Sl	Cl		Units			
0-5.5	0	1.5	100	Dry	5YR 4/6	10	75	10	15	Soft	3.3		X	Yellowish red clayey sand
	1.5	2											X	
	2	3									333.0			
	3	4											X	
	4	5.5	95	Dry	5YR 4/2	10	55	15	20	Stiff	872.0			Dark reddish gray silty clayey sand, solvent odor
5.5-9.8	5.5	6											X	
	6	7									984.0			
	7	8												
	8	9.8	55	Mst	5YR 4/6	10	65	10	15	Soft	1146.0		X	Yellowish red clayey sand, solvent odor
9.8-10.8	9.8	10.8	100	Mst	2.5Y 2.5/1	0	10	40	50	Soft				Black silty clay
10.8-14.1	10.8	11									937.0			
	11	12												
	12	13									145.0			
	13	14.1	70	Wet	5Y 4/2	0	40	5	55	Soft	45.0			Olive gray f.g. sandy clay, wet at 11.2 fbgs
14.1-15	14	15												Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0057

3M_MN04969242

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB34

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1013.44
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192114.0458
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464541.479
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	13.2
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
		Boring Diameter (inches):	3
Site Description:	In cleared area north of Hwy 5.		

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color (Munsell)	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-2	0	1									3.3		X	
	1	2	100	Dry	5YR 4/6	10	60	10	20	Soft			X	Yellowish red clayey sand
2-5	2	3									599.0			
	3	4											X	
	4	5	75	Mst	5YR 3/2	5	60	15	20	Stiff	1269.0			Dark reddish brown silty clayey sand, strong unknown odor
5-10	5	6											X	
	6	7	100	Mst	5YR 4/6	10	60	10	20	Soft	1116.0			Yellowish red clayey sand, strong odor
	7	8												
	8	9									877.0		X	
	9	10	70	Mst	2.5Y 2.5/1	0	5	80	15	Soft				Black clayey silt, former grass horizon (grade) at 8.5 fbgs, strong
10-12	10	11									994.0			odor, roots
	11	12	100	Mst	5YR 4/6	10	60	10	20	Soft				Yellowish red clayey sand, strong odor
12-15	12	13									207.0			
	13	14												
	14	15	75	Wet	10YR 5/1	0	20	15	5	Soft	20.0			Gray silty sand, wet at 13.2 fbgs, green staining at 12.5, odor
														Boring terminated at 15 fbgs

f, g, m, g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0058

3M_MN0496924 3

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB35

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1010.76
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192021.0826
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464443.6215
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
Site Description:	In cleared area north of Hwy 5.	**Boring Diameter (Inches):**	3

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color (Munsell)	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-1	0	1	100	Dry	5YR 5/6	10	70	10	10	Soft	4.0		X	Yellowish red sand
1-4	1	2	100	Dry	10YR 2/1	0	60	20	10	Stiff			X	Black silty sand, odor
	2	3									743.0			
	3	4											X	
4-5	4	5	70	Mst	5YR 5/6	10	70	15	5	Soft	674.0			Yellowish red silty sand, odor
5-8	5	6	100	Mst	10YR 2/1	0	60	30	10	Soft			X	Black silty sand, odor
	6	7									603.0			
	7	8												
8-9	8	9	95	Mst	Gley2 10G 4/1	0	60	5	35	Soft	892.0		X	Dark greenish gray clayey sand, odor
10-12	9	10	95	Mst	Gley2 10G 4/1	30	50	5	15	Soft				Dark greenish gray sand with oily liquid and debris, strong odor
	10	11									756.0			
	11	12												
12-14	12	13	70	Wet	Gley2 5BG 4/1	5	35	50	10	Soft	756.0			Dark greenish gray silt, wet at 12 fbgs, odor
	13	14												
14-15	14	15	70	Wet	Gley2 5BG 4/1	0	5	85	10	Soft	NS			Dark greenish gray silt, odor
														Boring terminated at 15 fbgs.

f,g, m,g., c,g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0059

3M_MN04969244

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB36

Page 1 of 1

CLIENT:	Confidential			**DATE:**	4-Dec-2006
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1014.37		
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192098.4142		
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464403.8252	Location Type: (X) GeoProbe ( ) Well	
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)		(X) Soil Boring ( ) Other:	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15	Completion Zone: (X) Overburden ( ) Bedrock	
Logged By:	Tim Walls	Depth to Refusal (ft bgs):		Completion Type: ( ) Monitoring Well	
		Boring Diameter (inches):	3	(X) Abandoned by Grout	
Site Description:	In cleared area north of Hwy 5.			( ) Other (Provide Comments)	

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	St	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-3.5	**0**	1									11.0		X	
	1	2											X	
	2	**3.5**	70	Dry	5YR 5/6	10	60	10	20	Soft	613.0			Yellowish red clayey sand with paper and plastic debris
3.5-10	**3.5**	4											X	
	4	5									567.0			
	5	6											X	
	6	7									455.0			
	7	8												
	8	9									529.0			
	9	**10**	100	Mst	5YR 5/6	10	60	10	20	Soft			X	Yellowish red clayey sand with black debris (coal?), strong odor
10-15	**10**	11									557.0			
	11	12												
	12	13									550.0			
	13	14												
	14	**15**	100	Wet	10YR 3/1	0	80	10	10	Soft	334.0			V. dark gray f.g. to m.g. sand, wet at 13 fbgs, red stain at 12.8 fbgs
														Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0060

3M_MN0496924S

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB37

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1011.55
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192083.9139
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464298.4251
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	12.5
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
		Boring Diameter (inches):	3
Site Description:	In cleared area north of Hwy 5.		

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-2.5	**0**	1											X	
	1	**2.5**	100	Dry	5YR 5/6	10	60	10	20	Soft	3.3		X	Yellowish red clayey sand
2.5-4	**2.5**	3									33.0			
	3	**4**	70	Dry	2.5YR 2.5/1	10	60	10	20	Soft			X	Reddish black clayey sand with abundant plastic debris, odor
4-8	**4**	5									145.0			
	5	6											X	
	6	7									408.0			
	7	**8**	65	Mst	2.5YR 2.5/1	0	70	15	15	Soft			X	Reddish black silty clayey sand with debris, strong odor
8-13	**8**	9									NS			
	9	10												
	10	11									443.0			
	11	12												
	12	**13**	100	Wet	2.5YR 2.5/1	5	75	10	10	Soft	504.0			Reddish black sand, wet at 12.5 fbgs, some debris, strong odor
13-15	**13**	14												
	14	**15**	75	Wet	2.5YR 2.5/1	5	75	10	10	Soft	226.0			Reddish black sand, odor
														Boring terminated at 15 fbgs.

f,g, m,g., c,g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0061

3M_MN04969246

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB38

CLIENT:	Confidential			**DATE:**	4-Dec-2006
SITE NAME:	Oakdale, MN	**ELEV (GND)**[b]	1012.84		
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192157.7692		
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464302.4379	Location Type: (X) GeoProbe ( ) Well	
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)	13.2	(X) Soil Boring ( ) Other:	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15	Completion Zone: (X) Overburden ( ) Bedrock	
Logged By:	Tim Walls	Depth to Refusal (ft bgs):		Completion Type: ( ) Monitoring Well	
		Boring Diameter (inches):	3	(X) Abandoned by Grout	
Site Description:	In cleared area north of Hwy 5.			( ) Other (Provide Comments)	

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-2.5	**0**	1									11.2		X	
	1	**2.5**	50	Dry	5YR 5/6	10	70	5	15	Soft			X	Yellowish red clayey sand
2.5-9.5	**2.5**	3									45.0			
	3	4											X	
	4	5									481.0			
	5	6											X	
	6	7									94.0			
	7	8												
	8	**9.5**	90	Mst	7.5YR 2.5/1	10	70	10	10	Soft	148.0		X	Black sand, odor
9.5-15	**9.5**	10												
	10	11									391.0			
	11	12												
	12	13									688.0			Water table
	13	14												
	14	**15**	70	Wet	2.5YR 2.5/1	10	70	10	10	Soft	156.0			As above, wet at 13.2 fbgs.
														Boring terminated at 15 fbgs.

f,g, m,g., c,g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0062

3M_MN04969247

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB39

CLIENT:	Confidential				
SITE NAME:	Oakdale, MN	ELEV (GND)[b]	1012.81	**DATE:**	4-Dec-2006
PROJECT NO.:	02181-202-005-0001	NORTHING:	192135.8501		
Area Name:	Abresch Site - N. of Hwy 5	EASTING:	464479.5481	Location Type: (X) GeoProbe ( ) Well	
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)	12.7	(X) Soil Boring ( ) Other:	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15	Completion Zone: (X) Overburden ( ) Bedrock	
Logged By:	Tim Walls	Depth to Refusal (ft bgs):		Completion Type: ( ) Monitoring Well	
		Boring Diameter (inches):	3	(X) Abandoned by Grout	
Site Description:	In cleared area north of Hwy 5. Constructed in vicinity of previous boring GP04.			( ) Other (Provide Comments)	

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-3	0	1									3.3			
	1	2											X	
	2	3	100	Dry	5YR 4/6	10	70	10	10	Soft	152.0			Yellowish red f.g. sand
3-5	3	4											X	
	4	5	100	Dry	5YR 4/2	5	60	10	25	Soft	705.0			Dark reddish gray clayey f.g. sand, odor
5-7	5	6											X	
	6	7	100	Mst	5YR 4/6	10	60	10	20	Soft	9.0			Yellowish red clayey f.g. sand, odor
7-9	7	8											X	
	8	9	100	Mst	Gley2 10BG 2.5/1	0	40	10	50	Soft	5.0			Bluish black sandy clay, some debris, odor
9-10	9	10	95	Mst	na	90	10	0	0	Firm				Debris (abrasive disks/pads), plastic
10-11	10	11	100	Mst	Gley1 10GY 5/1	5	80	5	10	Soft	4.6			Gray f.g. to m.g. sand
11-15	11	12												
	12	13									4.6			
	13	14												
	14	15	70	Wet	5YR 4/3	5	80	5	10	Soft	4.0			Reddish brown f.g. to m.g. sand, wet at 12.7 fbgs
														Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0063

3M_MN0496924

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB40

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1010.67
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192206.4476
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	484392.288
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	8.2
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
		Boring Diameter (inches):	3
Site Description:	In cleared area north of Hwy 5.		

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color	Grain Size				Strength	OVM	Boring Column	Sampled	Lithic Description
					Munsell	Gr	S	Si	Cl		Units			
0-5	**0**	1									1.9		X	
	1	2											X	
	2	3									1.9			
	3	4											X	
	4	**5**	100	Dry	5YR 4/4	10	60	10	20	Stiff	46.8			Reddish brown clayey m.g. sand, odor
5-6	**5**	**6**	100	Mst	5YR 4/6	10	60	10	20	Stiff			X	Reddish brown clayey m.g. sand, odor
6-7	**6**	**7**	100	Mst	Gley1 10GY 5/1	5	10	10	75	Soft	115.0			Greenish gray clay, odor
7-10	**7**	8												
	8	9									648.0		V	
	9	**10**	100	Wet	Gley1 10GY 5/1	10	55	10	25	Soft			X	Greenish gray clayey m.g. to c.g. sand, strong odor, wet at 8.2 fbgs
10-15	**10**	11									820.0			
	11	12												
	12	13									262.0			
	13	14												
	14	**15**	100	Wet	5YR 4/2	10	60	10	20	Soft	66.0			Dark reddish gray clayey sand, strong odor
														Boring terminated at 15 fbgs.

f.g. m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0064

3M_MN04969249

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB41

Page 1 of 1

CLIENT:	Confidential			**DATE:**	4-Dec-2006
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1010.12		
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192012.3391		
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464360.6232	Location Type: (X) GeoProbe ( ) Well	
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)	13	(X) Soil Boring ( ) Other:	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15	Completion Zone: (X) Overburden ( ) Bedrock	
Logged By:	Tim Walls	Depth to Refusal (ft bgs):		Completion Type: ( ) Monitoring Well	
		Boring Diameter (inches):	3	(X) Abandoned by Grout	
Site Description:	In cleared area north of Hwy 5. Constructed in vicinity of previous boring GP08.			( ) Other (Provide Comments)	

	Sample interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-1	0	1	100	Dry	5YR 5/6	10	70	10	10	Soft	3.3			Yellowish red sand
1-2	1	2	100	Dry	10YR 2/1	0	60	20	10	Stiff			X	Black silty sand, odor
2-4	2	3									792.0			
	3	4	70	Mst	5YR 5/6	10	70	15	5	Soft			X	Yellowish red silty sand, odor
4-6	4	5									863.0			
	5	6	100	Mst	10YR 2/1	0	60	30	10	Soft			X	Black silty sand, odor
6-9	6	7									324.0			
	7	8												
	8	9	95	Mst	Gley2 10G 4/1	0	60	5	35	Soft	209.0			Dark greenish gray clayey sand, odor
9-15	9	10											X	
	10	11									172.0			
	11	12												
	12	13									50.0			
	13	14												
	14	15	70	Wet	Gley2 5BG 4/1	0	5	85	10	Soft	20.0			Dark greenish gray silt, wet at 13 fbgs
														Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0065

3M_MN04969250

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB42

Page 1 of 1

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1012.58
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192233.6131
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464306.5099
Drilling Contractor:	Matrix Environmental	**Depth to Water (ft bgs)**	10.5
Drilling Equipment:	Track Probe	**Total Boring Depth (ft bgs)**	15
Logged By:	Tim Walls	**Depth to Refusal (ft bgs):**	
		Boring Diameter (inches):	3
Site Description:	In cleared area north of Hwy 5.		

DATE: 4-Dec-2006

Location Type: (X) GeoProbe ( ) Well
(X) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
(X) Abandoned by Grout
( ) Other (Provide Comments)

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color	Grain Size				Strength	OVM	Boring Column	Sampled	Lithic Description
					Munsell	Gr	S	Si	Cl		Units			
0-2	0	1									3.2		X	
	1	2	100	Dry	5YR 5/6	5	70	15	10	Soft			X	Yellowish red silty f.g. sand
2-3.5	2	3.5	65	Mst	5YR 4/2	5	60	15	20	Soft	40.4			Dark reddish gray silty clayey f.g. sand
3.5-9	3.5	4											X	
	4	5									15.1			
	5	6											X	
	6	7									15.3			
	7	8											X	
	8	9	100	Mst	5YR 4/2	5	60	15	20	Stiff	24.4			Dark reddish gray silty clayey f.g. sand with debris
9-15	9	10												
	10	11									35.0			
	11	12												
	12	13									23.1			
	13	14												
	14	15	75	Wet	5YR 4/2	5	70	10	15	Soft	11.2			Dark reddish gray clayey sand, wet at 10.5 fbgs
														Boring terminated at 15 fbgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0066

3M_MN0496925

OKMN Site Assessment Investigation
Oakdale, MN

OVERBURDEN BORING LOG

SITE ID: ASB43

Page 1 of 1

CLIENT:	Confidential			**DATE:**	4-Dec-2006
SITE NAME:	Oakdale, MN	**ELEV (GND)[b]**	1013.83		
PROJECT NO.:	02181-202-005-0001	**NORTHING:**	192104.1943		
Area Name:	Abresch Site - N. of Hwy 5	**EASTING:**	464603.8183	Location Type: (X) GeoProbe ( ) Well	
Drilling Contractor:	Matrix Environmental	Depth to Water (ft bgs)	13.2	(X) Soil Boring ( ) Other:	
Drilling Equipment:	Track Probe	Total Boring Depth (ft bgs)	15	Completion Zone: (X) Overburden ( ) Bedrock	
Logged By:	Tim Walls	Depth to Refusal (ft bgs):		Completion Type: ( ) Monitoring Well	
		Boring Diameter (inches):	3	(X) Abandoned by Grout	
Site Description:	In cleared area north of Hwy 5. Constructed in vicinity of previous boring GP05			( ) Other (Provide Comments)	

	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	Si	Cl	Strength	OVM Units	Boring Column	Sampled	Lithic Description
0-3	**0**	1									1.9			
	1	2											X	
	2	**3**	100	Mst	5YR 4/6	5	50	15	30	Firm	171.0			Yellowish red silty clayey f.g. to m.g. sand
3-5	**3**	4											X	
	4	**5**	95	Dry	5YR 3/2	5	50	25	20	Firm	555.0			Dark reddish brown clayey silty sand, debris present, solvent odor
5-10	**5**	6											X	
	6	7									524.0			
	7	8												
	8	9									782.0			
	9	**10**	100	Mst	5YR 4/6	5	60	5	30	Soft			X	Yellowish red clayey sand, debris, 9-10 fbgs increased clay and
10-15	**10**	11									173.0			black in color, odor
	11	12												
	12	13	100	Mst	5YR 4/6	0	60	15	25	Soft	142.0			Yellowish red silty clayey sand
	13	14												
	14	**15**	95	Wet	5YR 4/6	0	60	15	25	Soft	50.0			Yellowish red silty clayey sand, wet at 13.2 fbgs
														Boring terminated at 15 fbgs.

f.g. m.g., c.g.: Fine-, Medium-, and Coarse-grain size X: FC Sample V: VOC Sample

2163.0067

3M_MN0496925

WESTON

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID: GP01

Page 1 of 2 **DATE: 29 Nov 05**

CLIENT:	Confidential	**ELEV (ftmsl, GND)**	1013.46
SITE NAME:	Oakdale, MN Disposal Facility	**NORTHING:**	2890595.451
PROJECT NO.:	02181-202-002-0001	**EASTING:**	1058162.748
Area Name:	North of Highway 5	**Depth to Water (ft bgs)**	10.59
Drilling Contractor:	American Testing, Inc.	**Total Boring Depth (ft bgs)**	20
Drilling Equipment:	Track-mounted GeoProbe	**Depth to Refusal (ft bgs):**	NA
Logged By:	Barry Crawford	**Boring Diameter (inches):**	2
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN		

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	1	92	Mst	2.5YR 3/4	0	20	60	20	Soft			Dark reddish brown sandy clayey silt
	1	3	100	Dry	5YR 3/3	0	60	20	20	Firm			Dark reddish brown clayey silty sand
	3	4	100	Dry	2.5YR 3/2	0	40	50	10	Firm			Grayish brown sandy silt, strong solvent odor
	4	5				10	20	50	20	Firm	36.1		As above with rounded gravel, solvent odor
	5	9	100	Mst	5YR 3/1	10	20	50	20	Firm			Very dark gray sandy clayey silt with rounded gravel, solvent odor
	9	10	100	Mst	5Y 2.5/1	0	40	40	20	Firm	188.1		Black clayey silty sand to sandy silt, strong solvent odor
	10	11.5	100	Wet	2.5Y 4/2	0	40	30	30	Firm			Dark grayish brown clayey silty sand to sandy clayey silt
						0	20	50	30				
	12	15	100	Sat	10GY 4/1	0	70	20	10	Soft	194.0		Dark greenish grey silty sand
	15	20	100	Sat	AB						106.8		As above
													Boring terminated at 20 feet, temporary well set 9.5-19.5 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID: GP02

 DATE: 30 Nov 05

CLIENT:	Confidential
SITE NAME:	Oakdale, MN Disposal Facility
PROJECT NO.:	02181-202-002-0001
Area Name:	North of Highway 5
Drilling Contractor:	American Testing, Inc.
Drilling Equipment:	Track-mounted GeoProbe
Logged By:	Barry Crawford
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN

ELEV (ftmsl, GND)	1012.11
NORTHING:	2890676.004
EASTING:	1058297.421
Depth to Water (ft bgs)	6.85
Total Boring Depth (ft bgs)	14
Depth to Refusal (ft bgs):	NA
Boring Diameter (inches):	2

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	3	56	Mst	2.5YR 4/2	5	50	30	15	Firm			Weak red clayey silty sand, slight solvent odor
	3	6	100	Mst	10YR 3/1	5	25	50	20	Firm	1.9		Very dark grey clayey sandy silt, solvent odor
	6	7	100	Dry	7.5YR 4/1	0	20	50	30	Firm			Grey sandy clayey silt, solvent odor
	7	9	96	Mst	7.5YR 4/3	5	50	30	15	Firm			Brown clayey silty sand, strong solvent odor
	9	12	96	Wet	7.5YR 3/2	10	50	10	30	Soft	58.5		Dark brown clayey sand, strong solvent odor
	12	14	100	Sat	7.5YR 3/2	10	50	10	30	Soft	104.2		Dark brown clayey sand, strong solvent odor
													Boring terminated at 14 feet. Temporary well set from 4 to 14 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID GP03

Page 1 of 2 **DATE:** 30 Nov 05

CLIENT:	Confidential
SITE NAME:	Oakdale, MN Disposal Facility
PROJECT NO.:	02181-202-002-0001
Area Name:	North of Highway 5
Drilling Contractor:	American Testing, Inc.
Drilling Equipment:	Track-mounted GeoProbe
Logged By:	Barry Crawford
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN

ELEV (ftmsl, GND)	1013.11
NORTHING:	2890771.677
EASTING:	1058431.096
Depth to Water (ft bgs)	10.28
Total Boring Depth (ft bgs)	17
Depth to Refusal (ft bgs):	NA
Boring Diameter (inches):	2

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	2	92	Mst	2.5YR 4/2	5	50	30	15	Soft			Weak red clayey silty sand
	2	6	65	Mst	10YR 3/1	5	25	50	20	Firm	4.9		Very dark grey clayey sandy silt, some gravel, moderate solvent odor
	6	12	100	Mst	7.5YR 4/3	10	30	40	20	Soft	379.0		Brown clayey sandy silt, some gravel, moderate solvent odor
	12	13	100	Mst	7.5YR 4/3	0	50	20	20	Soft			Brown silty clayey sand
	13	17	100	Wet	7.5YR 4/3	0	50	20	20	Soft	20.7		Brown silty clayey sand
													Boring terminated at 17 feet. Set temporary well from 7 to 17 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

6/4/2007

02181.202.002.0001

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GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID: GP04

 DATE: 29 NOV 05

CLIENT:	Confidential	**ELEV (ftmsl, GND)**	1013.2
SITE NAME:	Oakdale, MN Disposal Facility	**NORTHING:**	2890916.861
PROJECT NO.:	02181-202-002-0001	**EASTING:**	1058283.818
Area Name:	North of Highway 5	**Depth to Water (ft bgs)**	10.28
Drilling Contractor:	American Testing, Inc.	**Total Boring Depth (ft bgs)**	20
Drilling Equipment:	Track-mounted GeoProbe	**Depth to Refusal (ft bgs):**	NA
Logged By:	Barry Crawford	**Boring Diameter (inches):**	2
	Tim Walls		
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN		

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	3	92	Dry	2.5YR 2.5/3	5	60	25	10	Firm			Dark reddish brown silty sand, some gravel
	3	6	100	Dry	7.5YR 3/3	10	10	50	30	Firm	32.4		Dark brown clayey silt, some gravel, strong solvent odor
	6	8	100	Mst	2.5YR 3/1	0	20	50	30	Firm			Very dark grey sandy clayey silt, strong solvent odor
	8	11	100	Mst	5YR 3/2	0	60	30	10	Soft	57.9		Dark reddish brown silty sand with debris indicating disturbed soil.
	11	14	100	Wet	5G 5/2	0	20	30	50	Soft	16.3		Greyish green sandy silty clay, wet at 12 feet
	14	16	100	Mst	5YR 3/3	0	30	50	20	Soft			Dark reddish brown clayey sandy silt
	16	19	100	Wet	5YR 3/3	0	60	30	10	Loose			Dark reddish brown silty sand
	19	20		Mst	5YR 3/3	10	70	20	10	Firm			Dark reddish brown silty sand
													Boring terminated at 20 feet bgs. Temporary well set from 9.5 to 19.5
													feet bgs.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID GP05

Page 1 of 2 **DATE:** 30 NOV 05

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN Disposal Facility	**ELEV (ftmsl, GND)**	1014.11
PROJECT NO.:	02181-202-002-0001	**NORTHING:**	2991041.835
Area Name:	North of Highway 5	**EASTING:**	1058253.235
Drilling Contractor:	American Testing, Inc.	**Depth to Water (ft bgs)**	12.11
Drilling Equipment:	Track-mounted GeoProbe	**Total Boring Depth (ft bgs)**	20
Logged By:	Barry Crawford	**Depth to Refusal (ft bgs):**	NA
	Tim Walls	**Boring Diameter (inches):**	2
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN		

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	3	88	Mst	2.5YR 4/2	10	20	30	40	Firm			Weak red sandy silty clay, no odor
	3	6	100	Dry	10YR 3/1	20	30	30	20	Firm	8.8		Very dark grey clayey gravelly silty sand, slight solvent odor
	6	9.5	96	Mst	10YR 3/1	10	30	40	20	Firm	324.0		Very dark grey clayey sandy silt, solvent odor, paper and plastic debris
													at 7.5 feet
	9.5	10	96	Dry	2.5Y 2.5/1	0	50	30	20	Firm			Black clayey silty sand, solvent odor
	10	12	100	Mst	5GY 4/1	10	30	40	20	Firm			Dark greenish gray clayey sandy silt, solvent odor
	12	15	100	Wet	10YR 4/2	0	50	30	20	Firm	77.1		Dark greyish brown clayey silty sand, strong solvent odor
	15	16	100	Wet	10Y 6/1	10	50	10	30	Firm			Greenish grey clayey sand, solvent odor
	16	20	100	Wet	7.5YR 4/2	10	60	10	20	Loose			Brown clayey sand
													Boring terminated at 20 feet. Temporary well set from 10 to 20 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID: GP06

 DATE: 30 NOV 05

CLIENT:	Confidential
SITE NAME:	Oakdale, MN Disposal Facility
PROJECT NO.:	02181-202-002-0001
Area Name:	North of Highway 5
Drilling Contractor:	American Testing, Inc.
Drilling Equipment:	Track-mounted GeoProbe
Logged By:	Barry Crawford Tim Walls
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN

ELEV (ftmsl, GND)	1013.67
NORTHING:	2891138.769
EASTING:	1058213.701
Depth to Water (ft bgs)	15.86
Total Boring Depth (ft bgs)	24
Depth to Refusal (ft bgs):	NA
Boring Diameter (inches):	2

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	2	81	Mst	5YR 3/3	5	25	50	20	Soft			Dark reddish brown clayey sandy silt
	2	5	92	Mst	7.5YR 4/4	0	30	50	20	Firm	6.6		Brown clayey sandy silt
	5	10	81	Mst	7.5YR 3/3	10	50	30	10	Firm	65.7		Dark brown silty sand, strong solvent odor
	10	11		Mst	2.5Y 2.5/1	10	30	40	30	Firm			Black clayey sandy silt, strong solvent odor
	11	14	92	Mst	5GY 3/1	0	20	40	40	Firm	72.5		Very dark greenish gray sandy silty clay, strong solvent odor
	14	19	92	Wet	2.5YR 4/2	5	50	30	15	Soft	16.5		Weak red clayey silty sand, strong solvent odor
	19	20	100	Mst	7.5YR 4/6	0	30	30	40	Firm			Strong brown sandy silty clay, slight solvent odor
	20	24	100	Sat	5YR 4/3	5	60	15	20	Loose			Reddish brown silty clayey sand, no odor
													Boring terminated at 24 feet. Temporary well set from 14 to 24 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

6/4/2007 Moisture: Dry, Moist (Mst), Wet, Saturated (Sat) Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm) 02181.202.002.0001

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID GP07

Page 1 of 2 **DATE:** 30 NOV 05

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN Disposal Facility	**ELEV (ftmsl, GND)**	1008.39
PROJECT NO.:	02181-202-002-0001	**NORTHING:**	2891155.394
Area Name:	North of Highway 5	**EASTING:**	1058147.046
Drilling Contractor:	American Testing, Inc.	**Depth to Water (ft bgs)**	13.62
Drilling Equipment:	Track-mounted GeoProbe	**Total Boring Depth (ft bgs)**	20
Logged By:	Barry Crawford	**Depth to Refusal (ft bgs):**	NA
	Tim Walls	**Boring Diameter (inches):**	2
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN		

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color Munsell	Grain Size Gr	S	M	C	Strength	OVM Units	Well Column	Lithic Description
	0	3	100	Mst	5YR 4/3	0	30	50	20	Firm			Reddish brown clayey sandy silt
	3	5	100	Mst	10YR 4/2	0	50	30	20	Firm	7.4		Dark greyish brown clayey silty sand, solvent odor
	5	6	100	Mst	5GY 4/1	0	10	50	40	Firm			Dark greenish grey clayey silt, strong solvent odor
	6	10		Mst	7.5YR 4/3	0	60	30	10	Firm	29.3		Brown silty sand, strong solvent odor
	10	11	90	Mst	10YR 4/4	0	70	20	10	Soft			Dark yellowish brown silty sand, solvent odor
	11	15	88	Mst	10G 4/1	10	30	30	40	Soft	14.7		Dark greenish grey sandy silty clay, very strong solvent odor
	15	16	100	Mst	10YR 3/4	15	50	30	5	Firm			Very dark greyish brown gravelly silty sand, strong solvent odor
	16	20	100	Sat	10YR 3/4	15	50	30	5	Loose			Very dark greyish brown gravelly silty sand, strong solvent odor
													Boring terminated at 20 feet. Temporary well set from 10 to 20 feet.

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

GW Investigation
Oakdale, Minnesota

OVERBURDEN BORING LOG

SITE ID GP08

 DATE: 29 NOV 05

CLIENT:	Confidential		
SITE NAME:	Oakdale, MN Disposal Facility	**ELEV (ftmsl, GND)**	1011.16
PROJECT NO.:	02181-202-002-0001	**NORTHING:**	2890809.482
Area Name:	North of Highway 5	**EASTING:**	1058164.257
Drilling Contractor:	American Testing, Inc.	**Depth to Water (ft bgs)**	10.28
Drilling Equipment:	Track-mounted GeoProbe	**Total Boring Depth (ft bgs)**	20
Logged By:	Barry Crawford	**Depth to Refusal (ft bgs):**	NA
	Tim Walls	**Boring Diameter (inches):**	2
Location Description:	North of Highway 5, Abresch Site, Oakdale, MN		

Location Type: (X) GeoProbe ( ) Well
( ) Soil Boring ( ) Other:
Completion Zone: (X) Overburden ( ) Bedrock
Completion Type: ( ) Monitoring Well
( ) Abandoned by Grout
(X) Other (Provide Comments)
Temporary Well

ELEV. (ft msl)	Sample Interval (ft bgs)		Recovery (%)	Moisture	Color (Munsell)	Grain Size Gr	S	M	C	Strength	OVM (Units)	Well Column	Lithic Description
	0	2	83	Mst	2.5YR 3/3	5	55	30	10	Soft			Dark reddish brown silty sand, some gravel
	2	6	83	Dry	7.5YR 4/2	5	60	25	10	Firm	36.1		Brown silty sand, some gravel
	6	12	100	Mst	10GY 4/1	0	60	20	20	Firm	214.0		Dark greenish grey clayey silty sand, strong solvent odor
	12	13		Wet	10GY 4/1	0	60	20	20	Firm			Dark greenish grey clayey silty sand, strong solvent odor
	13	16	100	Wet	5Y 4/1	10	50	30	10	Loose	38.4		Dark grey silty sand, strong solvent odor
	16	20	100	Sat	5Y 4/1	10	50	30	10	Loose			Dark grey silty sand, strong solvent odor
													Boring terminated at 20 feet. Temporary well set from 9.5 to 19.5 feet

f.g, m.g., c.g.: Fine-, Medium-, and Coarse-grain size bgs: below ground surface

Depths provided in feet below ground surface

Moisture: Dry, Moist (Mst), Wet, Saturated (Sat)

Strength: Very Soft (V. Sft), Soft, Firm, Very Firm (V. Frm)

6/4/2007

02181.202.002.0001

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3M_MN04969260

APPENDIX B
WELL SEALING RECORDS

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
• ENVIRONMENTAL
• GEOTECHNICAL
• MATERIALS
• FORENSICS

REPORT OF MONITORING WELL ABANDONMENT

PROJECT:

MENARD'S SITE
OAKDALE, MINNESOTA

REPORTED TO:

WESTON SOLUTIONS, INC.
1400 WESTON WAY, BLDG. 5-2
WEST CHESTER, PA 19380

ATTN: JAI KESARI

AET JOB NO.: 01-03287

DATE: DECEMBER 18, 2006

INTRODUCTION

On December 13, 2006, we sealed 3 monitoring wells, at the project site. The wells were sealed in accordance with the State of Minnesota Water Well Code. The work was done as directed by Weston Solutions, Inc.

WELL ABANDONMENT

Abandonment of the wells was done by pumping neat cement grout through a tremmie pipe starting from the bottom of the wells and proceeding to 2' below the ground surface. The riser pipes were cut off approximately 2' below the ground surface. The protective posts and casings were removed.

Attached are the well owner copies of the Minnesota Department of Health Sealing Record. We ask that you forward a copy to the appropriate person at 3M Company.

550 Cleveland Avenue North • St. Paul, MN 55114
Phone 651-659-9001 • Toll Free 800-972-6364 • Fax 651-659-1379 • www.amengtest.com
Offices throughout Florida, Minnesota, South Dakota & Wisconsin

CLOSURE

To protect you, the public, and American Engineering Testing, this report (and all supporting information) is provided for your use for this specific project authorization.

Report Prepared By:

American Engineering Testing, Inc.

Pat Francis
Drilling Department Manager

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING SEALING RECORD

Minnesota Statutes, Chapter 103I

Minnesota Well and Boring Sealing No. H 251544

Minnesota Unique Well No. or W-series No. (Leave blank if not known) 727755

WELL OR BORING LOCATION

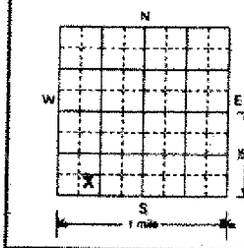
County Name: WASHINGTON

Township Name	Township No.	Range No.	Section No.	Fraction (sm → lg)
	29	21	17	NW SE SW SW

GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds; Longitude ____ degrees ____ minutes ____ seconds

Numerical Street Address or Fire Number and City of Well or Boring Location: 3205 HADLEY AVE NO OAKDALE 55128

Show exact location of well or boring in section grid with "X"



1N

HADLEY AVE

Sketch map of well or boring location, showing property lines, roads, and buildings.

#3205

Date Sealed: 12/13/06

Date Well or Boring Constructed: 2/21/06

Depth Before Sealing: 16 ft.

Original Depth: 16 ft.

AQUIFER(S): [X] Single Aquifer [ ] Multiaquifer

WELL/BORING: [ ] Water Supply Well [X] Monit. Well [ ] Env. Bore Hole [ ] Other

STATIC WATER LEVEL: [X] Measured [ ] Estimated; 12.4 ft. [X] below [ ] above land surface

CASING TYPE(S): [ ] Steel [X] Plastic [ ] Tile [ ] Other

WELLHEAD COMPLETION

Outside: [ ] Well House [ ] Pitless Adapter/Unit [ ] Well Pit [ ] Buried

Inside: [ ] Basement Offset [ ] Well Pit [ ] Buried

6" PROTOP

PROPERTY OWNER'S NAME/COMPANY NAME: MENARD INC

Property owner's mailing address if different than well location address indicated above:
4777 MENARD DR
EAU CLAIRE, WI 54703
ATTN: TIM ENGEART

WELL OWNER'S NAME/COMPANY NAME: 3M COMPANY

Well owner's mailing address if different than property owner's address indicated above:
900 BUSH AVE
ST. PAUL, MN 55106
ATTN: BOB PASCHKE

CASING(S)

Diameter	Depth	Set in oversize hole?	Annular space initially grouted?
2 in.	from +2 to 6 ft.	[X] Yes [ ] No	[X] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown

SCREEN/OPEN HOLE: Screen from 6 to 16 ft. Open Hole from ____ to ____ ft.

OBSTRUCTIONS: [ ] Rods/Drop Pipe [ ] Check Valve(s) [ ] Debris [ ] Fill [X] No Obstruction

Type of Obstructions (Describe): ____

Obstructions removed? [ ] Yes [ ] No Describe: ____

PUMP: Type ____ [ ] Removed [X] Not Present [ ] Other ____

METHOD USED TO SEAL ANNULAR SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:

[X] No Annular Space Exists [ ] Annular space grouted with tremie pipe [ ] Casing Perforation/Removal

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

Type of perforator ____

[ ] Other ____

GROUTING MATERIAL(S) (One bag of cement = 94 lbs., one bag of bentonite = 50 lbs.)

Grouting Material: NEAT CEMENT from 2 to 16 ft. ____ yards ½ bags

____ from ____ to ____ ft. ____ yards ____ bags

____ from ____ to ____ ft. ____ yards ____ bags

GEOLOGICAL MATERIAL	COLOR	HARDNESS OR FORMATION	FROM	TO
If not known, indicate estimated formation log from nearby well or boring				
SILTY SAND	BROWN	MED DENSE	0	16

OTHER WELLS AND BORINGS: Other unsealed and unused well or boring on property? [ ] Yes [X] No How many? ____

REMARKS, SOURCE OF DATA, DIFFICULTIES IN SEALING

MONITORING WELL SEALED BY COMPLETE FILLING WITH TREMIED NEAT CEMENT GROUT FROM BOTTOM OF SCREEN TO [redacted] 2' BELOW GRADE, RISER PIPE AND PROTOP CUT OFF [redacted] 2' BELOW GRADE

LICENSED OR REGISTERED CONTRACTOR CERTIFICATION

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

AMERICAN ENGINEERING TESTING 1795
Contractor Business Name *License or Registration No.*

Kathryn J Kleiter - 996 12/14/06
Authorized Representative Signature *Date*

DENNIS SPERMBAUER
Name of Person Sealing Well or Boring

IMPORTANT-FILE WITH PROPERTY PAPERS-WELL OWNER COPY H 251544

3M_MN04969264

2163.0079

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING SEALING RECORD

Minnesota Statutes, Chapter 103I

Minnesota Well and Boring Sealing No. H 251543

Minnesota Unique Well No. or W-series No. 727754

WELL OR BORING LOCATION

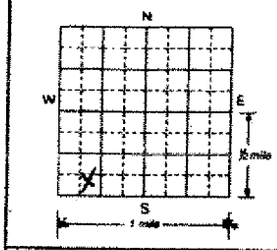
County Name: WASHINGTON

Township Name	Township No.	Range No.	Section No.	Fraction (sm → lg)
	29	21	17	NW SE SW SW

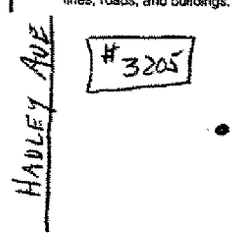
GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds; Longitude ____ degrees ____ minutes ____ seconds

Numerical Street Address or Fire Number and City of Well or Boring Location: 3205 HADLEY AVE NO OAKDALE 55128

Show exact location of well or boring in section grid with "X"



Sketch map of well or boring location, showing property lines, roads, and buildings.



Date Sealed: 12/13/06

Date Well or Boring Constructed: 2/22/06

Depth Before Sealing: 61 ft.

Original Depth: 61 ft.

AQUIFER(S): [X] Single Aquifer [ ] Multiaquifer

WELL/BORING: [ ] Water Supply Well [X] Monit. Well [ ] Env. Bore Hole [ ] Other ____

STATIC WATER LEVEL: [X] Measured [ ] Estimated; 12.6 ft. [X] below [ ] above land surface

CASING TYPE(S): [X] Steel [ ] Plastic [ ] Tile [ ] Other ____

WELLHEAD COMPLETION

Outside: [ ] Well House [ ] Pitless Adapter/Unit [ ] Well Pit [ ] Buried

Inside: [ ] Basement Offset [ ] Well Pit [ ] Buried

6" PROTOP

PROPERTY OWNER'S NAME/COMPANY NAME: MENARD INC

Property owner's mailing address if different than well location address indicated above:
4777 MENARD DR
EAU CLAIRE, WI 54703
ATTN: TIM ENYEART

WELL OWNER'S NAME/COMPANY NAME: 3M COMPANY

Well owner's mailing address if different than property owner's address indicated above:
900 BUSH AVE
ST. PAUL, MN 55106
ATTN: BOB PASCHKE

CASING(S)

Diameter	Depth	Set in oversize hole?	Annular space initially grouted?
2 in.	from +2 to 51 ft.	[X] Yes [ ] No	[X] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown

SCREEN/OPEN HOLE: Screen from 51 to 61 ft. Open Hole from ____ to ____ ft.

OBSTRUCTIONS: [ ] Rods/Drop Pipe [ ] Check Valve(s) [ ] Debris [ ] Fill [X] No Obstruction

Type of Obstructions (Describe) ____

Obstructions removed? [ ] Yes [ ] No Describe ____

PUMP: Type ____ [ ] Removed [X] Not Present [ ] Other ____

METHOD USED TO SEAL ANNULAR SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:

[X] No Annular Space Exists [ ] Annular space grouted with tremie pipe [ ] Casing Perforation/Removal

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

Type of perforator ____

[ ] Other ____

GROUTING MATERIAL(S) (One bag of cement = 94 lbs., one bag of bentonite = 50 lbs.)

Grouting Material: NEAT CEMENT from 2 to 61 ft. ____ yards 1 1/2 bags

____ from ____ to ____ ft. ____ yards ____ bags

____ from ____ to ____ ft. ____ yards ____ bags

OTHER WELLS AND BORINGS: Other unsealed and unused well or boring on property? [ ] Yes [X] No How many? ____

GEOLOGICAL MATERIAL	COLOR	HARDNESS OR FORMATION	FROM	TO
If not known, indicate estimated formation log from nearby well or boring				
SILTY SAND	BROWN	MED DENSE	0	29½
SAND W/ SILT	BROWN	DENSE	29½	57
SANDY LEAN CLAY	BROWN	VERY STIFF	57	61

REMARKS, SOURCE OF DATA, DIFFICULTIES IN SEALING

MONITORING WELL SEALED BY COMPLETE FILLING WITH TREMIED NEAT CEMENT GROUT FROM BOTTOM OF SCREEN TO ~~ABOVE~~ 2' BELOW GRADE. RISER PIPE AND PRO TOP CUT OFF 2' BELOW GRADE

IMPORTANT-FILE WITH PROPERTY PAPERS-WELL OWNER COPY: H 251543

LICENSED OR REGISTERED CONTRACTOR CERTIFICATION

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

AMERICAN ENGINEERING TESTING — Contractor Business Name — License or Registration No. 1795

Kathryn J Clarke -996 — Authorized Representative Signature — Date 12/14/06

DENNIS SPERMBUE — Name of Person Sealing Well or Boring

3M_MN04969265

2163.0080

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING SEALING RECORD

Minnesota Statutes, Chapter 103I

Minnesota Well and Boring Sealing No. H 251545

Minnesota Unique Well No. or W-series No. (Leave blank if not known) 737653

WELL OR BORING LOCATION

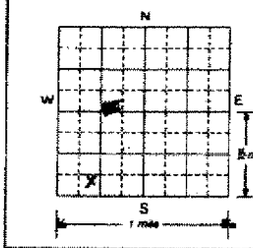
County Name: WASHINGTON

Township Name	Township No.	Range No.	Section No.	Fraction (sm → lg)
	29	21	17	NW SE SW SW

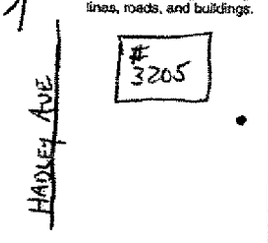
GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds; Longitude ____ degrees ____ minutes ____ seconds

Numerical Street Address or Fire Number and City of Well or Boring Location: 3205 HADLEY AVE NO OAKDALE 55128

Show exact location of well or boring in section grid with "X"



Sketch map of well or boring location, showing property lines, roads, and buildings.



Date Sealed: 12/13/06

Date Well or Boring Constructed: 2/15/06

Depth Before Sealing: 81 ft.

Original Depth: 81 ft.

AQUIFER(S): [X] Single Aquifer [ ] Multiaquifer

WELL/BORING: [ ] Water Supply Well [X] Monit. Well [ ] Env. Bore Hole [ ] Other ____

STATIC WATER LEVEL: [X] Measured [ ] Estimated; 22.5 ft. [X] below [ ] above land surface

CASING TYPE(S): [X] Steel [ ] Plastic [ ] Tile [ ] Other ____

WELLHEAD COMPLETION

Outside: [ ] Well House [ ] Pitless Adapter/Unit [ ] Well Pit [ ] Buried

Inside: [ ] Basement Offset [ ] Well Pit [ ] Buried 6" PROTOP

PROPERTY OWNER'S NAME/COMPANY NAME: MENARD INC

Property owner's mailing address if different than well location address indicated above:
4777 MENARD DR
EAU CLAIRE, WI 54703
ATTN: TIM FENYEART

WELL OWNER'S NAME/COMPANY NAME: 3M COMPANY

Well owner's mailing address if different than property owner's address indicated above:
900 BUSH AVE
ST. PAUL, MN 55106
ATTN: BOB PASCHKE

CASING(S)

Diameter	Depth	Set in oversize hole?	Annular space initially grouted?
2 in.	from +2 to 71 ft.	[X] Yes [ ] No	[X] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown
____ in.	from ____ to ____ ft.	[ ] Yes [ ] No	[ ] Yes [ ] No [ ] Unknown

SCREEN/OPEN HOLE: Screen from 71 to 81 ft. Open Hole from ____ to ____ ft.

OBSTRUCTIONS: [ ] Rods/Drop Pipe [ ] Check Valve(s) [ ] Debris [ ] Fill [X] No Obstruction

Type of Obstructions (Describe): ____

Obstructions removed? [ ] Yes [ ] No Describe ____

PUMP: Type ____ [ ] Removed [X] Not Present [ ] Other ____

METHOD USED TO SEAL ANNULAR SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:

[X] No Annular Space Exists [ ] Annular space grouted with tremie pipe [ ] Casing Perforation/Removal

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

____ in. from ____ to ____ ft. [ ] Perforated [ ] Removed

Type of perforator ____

[ ] Other ____

GROUTING MATERIAL(S) (One bag of cement = 94 lbs., one bag of bentonite = 50 lbs.)

Grouting Material: NEAT CEMENT from 2 to 81 ft. ____ yards 1½ bags

____ from ____ to ____ ft. ____ yards ____ bags

____ from ____ to ____ ft. ____ yards ____ bags

GEOLOGICAL MATERIAL	COLOR	HARDNESS OR FORMATION	FROM	TO
# not known, indicate estimated formation log from nearby well or boring				
SAND / GRAVEL	BROWN		0	15
CLAY / SAND	BROWN		15	30
SAND / GRAVEL	BROWN		30	40
CLAY / SAND	BROWN		40	46
GRAVEL / SAND	BROWN		46	60
CLAY / LIMESTONE	GRAY BROWN		60	62
LIMESTONE	GREY		62	82

REMARKS, SOURCE OF DATA, DIFFICULTIES IN SEALING

MONITORING WELL SEALED BY COMPLETE FILLING WITH TREMIED NEAT CEMENT GROUT FROM BOTTOM OF SCREEN TO [redacted] 2' BELOW GRADE. RISER PIPE AND PROTOP CUT OFF [redacted] 2' BELOW GRADE

OTHER WELLS AND BORINGS

Other unsealed and unused well or boring on property? [ ] Yes [X] No How many? ____

LICENSED OR REGISTERED CONTRACTOR CERTIFICATION

This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

AMERICAN ENGINEERING TESTING 1795
Contractor Business Name *License or Registration No.*

Kathy J Kleiter 996 12/14/06
Authorized Representative Signature *Date*

DENNIS SPERMBAUR
Name of Person Sealing Well or Boring

IMPORTANT-FILE WITH PROPERTY PAPERS-WELL OWNER COPY H 251545

3M_MN04969266

2163.0081

Table III. Summary of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid		C11 Acid PFUnA Perfluoroundecanoic Acid		C12 Acid PFDoA Perfluorododecanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225096	OKMN-SB-ASB35-DB-0035	NR	-	NR	-	11.6[#]	0.20
C0225096 Rep	OKMN-SB-ASB35-DB-0035[*]	NR	-	NR	-	13.5[#]	0.20
C0225097	OKMN-SB-ASB35-0-0055	393	0.20	30.1[#]	0.20	35.8[#]	0.20
C0225097 Rep	OKMN-SB-ASB35-0-0055[*]	353	0.20	23.7[#]	0.20	30.4[#]	0.20
C0225098	OKMN-SB-ASB35-0-0085	333[^#]	2.0	0.322[*1]	0.20	ND[#]	0.20
C0225098 Rep	OKMN-SB-ASB35-0-0085[*]	199[^#]	2.0	ND[*1]	0.20	ND[#]	0.20
C0225099	OKMN-SB-ASB36-0-0000	17.6[^#]	2.0	NR	-	NR	-
C0225099 Rep	OKMN-SB-ASB36-0-0000[*]	26.7[^#]	2.0	NR	-	NR	-
C0225100	OKMN-SB-ASB32-0-0075	0.793[#]	2.0	ND[#]	0.20	ND[#]	0.20
C0225100 Rep	OKMN-SB-ASB32-0-0075[*]	0.934[#]	2.0	ND[#]	0.20	ND[#]	0.20
C0225102	OKMN-SB-ASB33-0-0000	0.685[^#]	0.20	0.465[#]	0.20	0.532[^#]	0.20
C0225102 Rep	OKMN-SB-ASB33-0-0000[*]	0.496[^#]	0.20	0.467[#]	0.20	0.786[^#]	0.20
C0225103	OKMN-SB-ASB33-0-0015	9.67[^#]	0.20	NR	-	NR	-
C0225103 Rep	OKMN-SB-ASB33-0-0015[*]	18.3[^#]	0.20	NR	-	NR	-
C0225104	OKMN-SB-ASB33-0-0035	11.6[#]	0.20	NR	-	NR	-
C0225104 Rep	OKMN-SB-ASB33-0-0035[*]	13.0[#]	0.20	NR	-	NR	-
C0225105	OKMN-SB-ASB33-DB-0035	11.5[#]	0.20	NR	-	NR	-
C0225105 Rep	OKMN-SB-ASB33-DB-0035[*]	9.78[#]	0.20	NR	-	NR	-
C0225106	OKMN-SB-ASB33-0-0055	20.3[#]	0.20	NR	-	NR	-
C0225106 Rep	OKMN-SB-ASB33-0-0055[*]	21.8[#]	0.20	NR	-	NR	-
C0225107	OKMN-SB-ASB33-0-0085	31.8[#]	0.20	3.66[^]	0.40	3.46[^#]	0.40
C0225107 Rep	OKMN-SB-ASB33-0-0085[*]	38.6[#]	0.20	5.14[^]	0.40	5.24[^#]	0.40
C0225108	OKMN-SB-ASB34-0-0000	0.570[#]	0.20	0.497[#]	0.20	0.844[#]	0.20
C0225108 Rep	OKMN-SB-ASB34-0-0000[*]	0.597[#]	0.20	0.555[#]	0.20	1.08[#]	0.20
C0225109	OKMN-SB-ASB34-0-0015	10.1[#]	0.20	NR	-	NR	-
C0225109 Rep	OKMN-SB-ASB34-0-0015[*]	8.93[#]	0.20	NR	-	NR	-
C0225110	OKMN-SB-ASB31-0-0000	0.308[#]	0.20	0.270[*1]	0.20	0.325[^#]	0.20
C0225110 Rep	OKMN-SB-ASB31-0-0000[*]	0.259[#]	0.20	ND[*1]	0.20	0.458[^#]	0.20
C0225111	OKMN-SB-ASB31-0-0015	3.23[^#]	0.20	1.55[#]	0.20	NR	-
C0225111 Rep	OKMN-SB-ASB31-0-0015[*]	5.45[^#]	0.20	1.87[#]	0.20	NR	-
C0225112	OKMN-SB-ASB31-0-0035	NR	-	NR	-	24.4[#]	0.20
C0225112 Rep	OKMN-SB-ASB31-0-0035[*]	NR	-	NR	-	21.6[#]	0.20
C0225113	OKMN-SB-ASB31-0-0055	NR	-	NR	-	NR	-
C0225113 Rep	OKMN-SB-ASB31-0-0055[*]	NR	-	NR	-	NR	-
C0225114	OKMN-SB-ASB31-0-0070	NR	-	NR	-	NR	-
C0225114 Rep	OKMN-SB-ASB31-0-0070[*]	NR	-	NR	-	NR	-
C0225115	OKMN-SB-ASB32-0-0000	2.91[#]	0.20	NR	-	NR	-
C0225115 Rep	OKMN-SB-ASB32-0-0000[*]	2.77[#]	0.20	NR	-	NR	-
C0225116	OKMN-SB-ASB32-0-0015	NR	-	NR	-	9.50[#]	0.20
C0225116 Rep	OKMN-SB-ASB32-0-0015[*]	NR	-	NR	-	10.4[#]	0.20
C0225117	OKMN-SB-ASB32-DB-0015	125	0.20	9.47	0.20	10.8	0.20
C0225117 Rep	OKMN-SB-ASB32-DB-0015[*]	96.5	0.20	7.26	0.20	8.56	0.20
C0225118	OKMN-SB-ASB32-0-0035	139	0.20	8.01	0.20	7.92	0.20
C0225118 Rep	OKMN-SB-ASB32-0-0035[*]	144	0.20	7.61	0.20	7.81	0.20
C0225119	OKMN-SB-ASB32-0-0055	122	0.20	7.29	0.20	9.22	0.20
C0225119 Rep	OKMN-SB-ASB32-0-0055[*]	121	0.20	6.31	0.20	7.54	0.20
C0225120	OKMN-SB-ASB39-0-0035	26.8	0.20	4.55	0.20	6.64	0.20
C0225120 Rep	OKMN-SB-ASB39-0-0035[*]	25.6	0.20	4.51	0.20	6.83	0.20
C0225121	OKMN-SB-ASB39-0-0055	36.2	0.20	4.82	0.20	5.35	0.20
C0225121 Rep	OKMN-SB-ASB39-0-0055[*]	44.5	0.20	4.87	0.20	6.11	0.20

[*]Laboratory Duplicate
[^]Relative Percent Difference > 30%
[#]Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
[1]Relative Percent Difference was not calculated due to the presence of a nondetect and resulting uncertainty.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table III. Summary of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid		C11 Acid PFUnA Perfluoroundecanoic Acid		C12 Acid PFDoA Perfluorododecanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225122	OKMN-SB-ASB39-0-0070	34.3^	0.20	2.47	0.20	2.82	0.20
C0225122 Rep	OKMN-SB-ASB39-0-0070*	23.3^	0.20	2.03	0.20	2.75	0.20
C0225123	OKMN-SB-ASB40-0-0000	0.825	0.40	ND	0.20	ND*	0.20
C0225123 Rep	OKMN-SB-ASB40-0-0000*	0.948	0.40	ND	0.20	ND*	0.20
C0225124	OKMN-SB-ASB40-0-0015	0.999	0.40	0.202'	0.20	ND	0.20
C0225124 Rep	OKMN-SB-ASB40-0-0015*	0.838	0.40	ND'	0.20	ND	0.20
C0225125	OKMN-SB-ASB40-0-0035	0.958^	0.40	ND	0.20	ND	0.20
C0225125 Rep	OKMN-SB-ASB40-0-0035*	1.63^	0.40	ND	0.20	ND	0.20
C0225126	OKMN-SB-ASB40-0-0055	NR	-	ND	0.20	ND*	0.20
C0225126 Rep	OKMN-SB-ASB40-0-0055*	NR	-	ND	0.20	ND*	0.20
C0225127	OKMN-SB-ASB40-0-0090	ND	0.20	ND	0.20	ND	0.20
C0225127 Rep	OKMN-SB-ASB40-0-0090*	ND	0.20	ND	0.20	ND	0.20
C0225128	OKMN-SB-ASB41-0-0015	11.2	0.20	0.508^	0.20	0.252'	0.20
C0225128 Rep	OKMN-SB-ASB41-0-0015*	8.73	0.20	0.371^	0.20	ND'	0.20
C0225129	OKMN-SB-ASB41-0-0035	39.8	0.20	3.14	0.20	2.44^	0.20
C0225129 Rep	OKMN-SB-ASB41-0-0035*	35.8	0.20	2.75	0.20	1.61^	0.20
C0225130	OKMN-SB-ASB41-0-0055	36.7	0.20	2.77	0.20	NR	-
C0225130 Rep	OKMN-SB-ASB41-0-0055*	31.3	0.20	2.29	0.20	NR	-
C0225131	OKMN-SB-ASB41-0-0090	ND	0.20	ND	0.20	ND	0.20
C0225131 Rep	OKMN-SB-ASB41-0-0090*	ND	0.20	ND	0.20	ND	0.20
C0225132	OKMN-SB-ASB41-DB-0090	ND	0.20	ND	0.20	ND	0.20
C0225132 Rep	OKMN-SB-ASB41-DB-0090*	ND	0.20	ND	0.20	ND	0.20
C0225133	OKMN-SB-ASB42-0-0000	ND	0.20	ND	0.20	ND	0.20
C0225133 Rep	OKMN-SB-ASB41-0-0000*	ND	0.20	ND	0.20	ND	0.20
C0225134	OKMN-SB-ASB42-0-0015	ND'	0.20	ND	0.20	ND	0.20
C0225134 Rep	OKMN-SB-ASB41-0-0015*	0.239'	0.20	ND	0.20	ND	0.20
C0225135	OKMN-SB-ASB42-0-0035	0.363	0.20	ND	0.20	0.262'	0.20
C0225135 Rep	OKMN-SB-ASB41-0-0035*	0.274	0.20	ND	0.20	ND'	0.20
C0225136	OKMN-SB-ASB42-0-0055	0.785*	0.20	ND	0.20	0.226*	0.20
C0225136 Rep	OKMN-SB-ASB41-0-0055*	0.972*	0.20	ND	0.20	ND'	0.20
C0225137	OKMN-SB-ASB42-0-0070	0.360^	0.20	ND	0.20	ND	0.20
C0225137 Rep	OKMN-SB-ASB41-0-0070*	0.530^	0.20	ND	0.20	ND	0.20
C0225139	OKMN-SB-ASB43-0-0015	0.867^	0.20	ND	0.20	0.600^	0.20
C0225139 Rep	OKMN-SB-ASB43-0-0015*	0.443^	0.20	ND	0.20	0.197^	0.20
C0225140	OKMN-SB-ASB43-0-0035	13.8^	0.20	3.32	0.20	4.49*	0.20
C0225140 Rep	OKMN-SB-ASB43-0-0035*	8.29^	0.20	2.51	0.20	3.70*	0.20
C0225141	OKMN-SB-ASB43-0-0055	13.0	0.20	2.97*	0.20	2.98	0.20
C0225141 Rep	OKMN-SB-ASB43-0-0055*	10.6	0.20	3.03*	0.20	3.91	0.20
C0225142	OKMN-SB-ASB43-0-0090	0.245^	0.20	ND	0.20	ND	0.20
C0225142 Rep	OKMN-SB-ASB43-0-0090*	0.172^	0.20	ND	0.20	ND	0.20

*Laboratory Duplicate
^Relative Percent Difference > 30%
*Sample results with expanded assessed accuracy between +/- 30% and +/- 50%.
'Relative Percent Difference was not calculated due to the presence of a nondetect and resulting uncertainty.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table IV. Summary of PFBS, PFHS, and PFOS in Soil Samples

Exygen ID	Client Sample ID	C4 Sulfonate PFBS Perfluorobutanesulfonate Analyte Found (ppb, ng/g) Dry Weight	C4 Sulfonate PFBS Acceptable LOQ (wet) (ng/g)	C6 Sulfonate PFHS Perfluorohexanesulfonate Analyte Found (ppb, ng/g) Dry Weight	C6 Sulfonate PFHS Acceptable LOQ (wet) (ng/g)	C8 Sulfonate PFOS Perfluorooctanesulfonate Analyte Found (ppb, ng/g) Dry Weight	C8 Sulfonate PFOS Acceptable LOQ (wet) (ng/g)
C0225070	OKMN-SB-ASB37-0-0055	1.51^*	0.20	7.03*	0.20	15200	0.20
C0225070 Rep	OKMN-SB-ASB37-0-0055*	2.28^*	0.20	9.12*	0.20	18900	0.20
C0225071	OKMN-SB-ASB37-0-0075	ND*[1]	0.20	0.688^	0.20	678	0.20
C0225071 Rep	OKMN-SB-ASB37-0-0075*	0.178*[1]	0.20	0.639^	0.20	666	0.20
C0225072	OKMN-SB-ASB38-0-0000	0.896^*	0.20	2.16*	0.20	405^*	0.20
C0225072 Rep	OKMN-SB-ASB38-0-0000*	0.470^*	0.20	1.66*	0.20	287^*	0.20
C0225073	OKMN-SB-ASB38-0-0015	0.661^*	0.20	4.49^*	0.20	588^	0.20
C0225073 Rep	OKMN-SB-ASB38-0-0015*	0.934^*	0.20	7.59^*	0.20	1360^	0.20
C0225074	OKMN-SB-ASB38-0-0035	2.08	0.20	9.16*	0.20	1180	0.20
C0225074 Rep	OKMN-SB-ASB38-0-0035*	1.94	0.20	8.60*	0.20	1040	0.20
C0225075	OKMN-SB-ASB38-DB-0035	1.89*	0.20	9.39*	0.20	1400	0.20
C0225075 Rep	OKMN-SB-ASB38-DB-0035*	2.12*	0.20	9.54*	0.20	1410	0.20
C0225076	OKMN-SB-ASB38-0-0055	2.11^*	0.20	8.77^*	0.20	1280^	0.20
C0225076 Rep	OKMN-SB-ASB38-0-0055*	3.04^*	0.20	12.3^*	0.20	1980^	0.20
C0225077	OKMN-SB-ASB38-0-0080	1.66*	0.20	NR	-	NR	-
C0225077 Rep	OKMN-SB-ASB38-0-0080*	1.86*	0.20	NR	-	NR	-
C0225078	OKMN-SB-ASB39-0-0015	8.88*	0.20	75.6*	0.20	6710	0.20
C0225078 Rep	OKMN-SB-ASB39-0-0015*	9.38*	0.20	70.8*	0.20	6100	0.20
C0225079	OKMN-SB-ASB39-DB-0015	10.4*	0.20	79.3*	0.20	4690^	0.20
C0225079 Rep	OKMN-SB-ASB39-DB-0015*	12.5*	0.20	97.7*	0.20	6730^	0.20
C0225080	OKMN-SB-ASB36-0-0015	8.17*	0.20	73.1^*	0.20	NR	-
C0225080 Rep	OKMN-SB-ASB36-0-0015*	6.56*	0.20	52.2^*	0.20	NR	-
C0225081	OKMN-SB-ASB36-DB-0015	9.47*	0.20	67.0*	0.20	22200	0.20
C0225081 Rep	OKMN-SB-ASB36-DB-0015*	9.36*	0.20	69.0*	0.20	24600	0.20
C0225082	OKMN-SB-ASB36-0-0030	31.2^*	0.20	NR	-	39300	0.20
C0225082 Rep	OKMN-SB-ASB36-0-0030*	17.9^*	0.20	NR	-	35200	0.20
C0225083	OKMN-SB-ASB36-0-0055	20.8*	0.20	NR	-	11900	0.20
C0225083 Rep	OKMN-SB-ASB36-0-0055*	24.0*	0.20	NR	-	11000	0.20
C0225084	OKMN-SB-ASB36-0-0095	17.6*	0.20	9.10^*	0.20	115^	0.20
C0225084 Rep	OKMN-SB-ASB36-0-0095*	16.4*	0.20	14.4^*	0.20	62.3^	0.20
C0225086	OKMN-SB-ASB37-0-0000	ND*[1]	0.20	1.55^*	0.40	NR	-
C0225086 Rep	OKMN-SB-ASB37-0-0000*	0.589*[1]	0.20	3.19^*	0.40	NR	-
C0225087	OKMN-SB-ASB37-0-0015	2.63*	0.20	18.5*	0.40	5920	0.40
C0225087 Rep	OKMN-SB-ASB37-0-0015*	2.42*	0.20	14.3*	0.40	5110	0.40
C0225088	OKMN-SB-ASB37-0-0035	1.01	0.20	8.41	0.40	3100	0.40
C0225088 Rep	OKMN-SB-ASB37-0-0035*	0.790	0.20	6.94	0.40	2410	0.40
C0225089	OKMN-SB-ASB37-DB-0035	1.15*	0.20	10.3*	0.20	3810^*	0.20
C0225089 Rep	OKMN-SB-ASB37-DB-0035*	1.13*	0.20	10.8*	0.20	2660^*	0.20
C0225090	OKMN-SB-ASB34-0-0035	8.08*	0.20	126	0.20	7560	0.20
C0225090 Rep	OKMN-SB-ASB34-0-0035*	9.21*	0.20	158	0.20	9820	0.20
C0225091	OKMN-SB-ASB34-0-0055	24.2*	0.20	1030	0.20	69900*	0.20
C0225091 Rep	OKMN-SB-ASB34-0-0055*	28.3*	0.20	1040	0.20	68900*	0.20
C0225092	OKMN-SB-ASB34-0-0085	224*	0.20	5540	0.20	17800	0.20
C0225092 Rep	OKMN-SB-ASB34-0-0085*	223*	0.20	5630	0.20	17300	0.20
C0225093	OKMN-SB-ASB35-0-0000	0.662^*	0.20	NR	-	207*	0.20
C0225093 Rep	OKMN-SB-ASB35-0-0000*	0.477^*	0.20	NR	-	263*	0.20
C0225094	OKMN-SB-ASB35-0-0015	11.9*	0.20	NR	-	9380	0.20
C0225094 Rep	OKMN-SB-ASB35-0-0015*	13.8*	0.20	NR	-	9060	0.20
C0225095	OKMN-SB-ASB35-0-0035	22.9*	0.20	NR	-	36100	0.20
C0225095 Rep	OKMN-SB-ASB35-0-0035*	22.7*	0.20	NR	-	28100	0.20

*Laboratory Duplicate
^ Relative Percent Difference > 30%
* Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
[1]Relative Percent Difference was not calculated due to the presence of a nondetect and resulting uncertainty.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table IV. Summary of PFBS, PFHS, and PFOS in Soil Samples (continued)

		C4 Sulfonate PFBS Perfluorobutanesulfonate		C6 Sulfonate PFHS Perfluorohexanesulfonate		C8 Sulfonate PFOS Perfluorooctanesulfonate	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225096	OKMN-SB-ASB35-DB-0035	19.7*	0.20	116*	0.20	26900	0.20
C0225096 Rep	OKMN-SB-ASB35-DB-0035*	20.6*	0.20	114*	0.20	26000	0.20
C0225097	OKMN-SB-ASB35-0-0055	56.8*	0.20	482	0.20	27000	0.20
C0225097 Rep	OKMN-SB-ASB35-0-0055*	50.8*	0.20	407	0.20	26200	0.20
C0225098	OKMN-SB-ASB35-0-0085	102*	0.20	94.7^	0.20	NR	-
C0225098 Rep	OKMN-SB-ASB35-0-0085*	94.5*	0.20	71.8^	0.20	NR	-
C0225099	OKMN-SB-ASB36-0-0000	0.573^*	0.20	2.88^	0.20	1290	0.20
C0225099 Rep	OKMN-SB-ASB36-0-0000*	0.295^*	0.20	1.88^	0.20	1630	0.20
C0225100	OKMN-SB-ASB32-0-0075	NR	-	220*	0.20	NR	-
C0225100 Rep	OKMN-SB-ASB32-0-0075*	NR	-	188*	0.20	NR	-
C0225102	OKMN-SB-ASB33-0-0000	NR	-	0.826^	0.20	151^	0.40
C0225102 Rep	OKMN-SB-ASB33-0-0000*	NR	-	0.399^	0.20	106^	0.40
C0225103	OKMN-SB-ASB33-0-0015	5.97*	0.20	NR	-	4530	0.40
C0225103 Rep	OKMN-SB-ASB33-0-0015*	5.42*	0.20	NR	-	5200	0.40
C0225104	OKMN-SB-ASB33-0-0035	4.15*	0.20	NR	-	3780*	0.40
C0225104 Rep	OKMN-SB-ASB33-0-0035*	3.41*	0.20	NR	-	3480*	0.40
C0225105	OKMN-SB-ASB33-DB-0035	NR	-	48.5*	0.20	5080*	0.20
C0225105 Rep	OKMN-SB-ASB33-DB-0035*	NR	-	52.9*	0.20	4990*	0.20
C0225106	OKMN-SB-ASB33-0-0055	18.6*	0.20	215	0.20	5180*	0.20
C0225106 Rep	OKMN-SB-ASB33-0-0055*	16.0*	0.20	161	0.20	5660*	0.20
C0225107	OKMN-SB-ASB33-0-0085	NR	-	1150	0.20	16900^	0.20
C0225107 Rep	OKMN-SB-ASB33-0-0085*	NR	-	1210	0.20	3310^	0.20
C0225108	OKMN-SB-ASB34-0-0000	ND*	0.20	0.469*	0.20	NR	-
C0225108 Rep	OKMN-SB-ASB34-0-0000*	ND*	0.20	0.441*	0.20	NR	-
C0225109	OKMN-SB-ASB34-0-0015	NR	-	22.2*	0.20	5560	0.20
C0225109 Rep	OKMN-SB-ASB34-0-0015*	NR	-	21.7*	0.20	5190	0.20
C0225110	OKMN-SB-ASB31-0-0000	NR	-	NR	-	NR	-
C0225110 Rep	OKMN-SB-ASB31-0-0000*	NR	-	NR	-	NR	-
C0225111	OKMN-SB-ASB31-0-0015	4.92^*	0.20	NR	-	3190^	0.20
C0225111 Rep	OKMN-SB-ASB31-0-0015*	7.85^*	0.20	NR	-	885^	0.20
C0225112	OKMN-SB-ASB31-0-0035	27.7^	0.20	911^	0.20	88500^	0.20
C0225112 Rep	OKMN-SB-ASB31-0-0035*	12.5^	0.20	250^	0.20	38200^	0.20
C0225113	OKMN-SB-ASB31-0-0055	14.9^*	0.20	303^*	0.20	36900	0.20
C0225113 Rep	OKMN-SB-ASB31-0-0055*	23.8^*	0.20	2160^*	0.20	47500	0.20
C0225114	OKMN-SB-ASB31-0-0070	36.8*	0.20	NR	-	73100	0.20
C0225114 Rep	OKMN-SB-ASB31-0-0070*	36.5*	0.20	NR	-	55300	0.20
C0225115	OKMN-SB-ASB32-0-0000	3.35^*	0.20	11.6^*	0.20	1330	0.20
C0225115 Rep	OKMN-SB-ASB32-0-0000*	2.19^*	0.20	7.09^*	0.20	1270	0.20
C0225116	OKMN-SB-ASB32-0-0015	57.0^*	0.20	840	0.20	33900	0.20
C0225116 Rep	OKMN-SB-ASB32-0-0015*	78.0^*	0.20	1030	0.20	40700	0.20
C0225117	OKMN-SB-ASB32-DB-0015	125^	0.20	1490^	0.40	33900^	0.40
C0225117 Rep	OKMN-SB-ASB32-DB-0015*	47.4^	0.20	858^	0.40	22700^	0.40
C0225118	OKMN-SB-ASB32-0-0035	74.9	0.20	NR	-	101000*	0.40
C0225118 Rep	OKMN-SB-ASB32-0-0035*	94.5	0.20	NR	-	115000*	0.40
C0225119	OKMN-SB-ASB32-0-0055	102	0.20	1240*	0.40	NR	-
C0225119 Rep	OKMN-SB-ASB32-0-0055*	90.1	0.20	1120*	0.40	NR	-
C0225120	OKMN-SB-ASB39-0-0035	10.2	0.20	159	0.20	13900	0.20
C0225120 Rep	OKMN-SB-ASB39-0-0035*	10.9	0.20	185	0.20	12700	0.20
C0225121	OKMN-SB-ASB39-0-0055	20.6	0.20	NR	-	NR	-
C0225121 Rep	OKMN-SB-ASB39-0-0055*	24.8	0.20	NR	-	NR	-

*Laboratory Duplicate
^ Relative Percent Difference > 30%
* Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table IV. Summary of PFBS, PFHS, and PFOS in Soil Samples (continued)

		C4 Sulfonate PFBS Perfluorobutanesulfonate		C6 Sulfonate PFHS Perfluorohexanesulfonate		C8 Sulfonate PFOS Perfluorooctanesulfonate	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225122	OKMN-SB-ASB39-0-0070	14.3	0.20	199	0.20	NR	-
C0225122 Rep	OKMN-SB-ASB39-0-0070*	12.6	0.20	217	0.20	NR	-
C0225123	OKMN-SB-ASB40-0-0000	0.260	0.20	ND	0.20	193	0.20
C0225123 Rep	OKMN-SB-ASB40-0-0000*	0.313	0.20	ND	0.20	224	0.20
C0225124	OKMN-SB-ASB40-0-0015	0.463	0.20	0.760	0.20	223^	0.20
C0225124 Rep	OKMN-SB-ASB40-0-0015*	0.544	0.20	0.970	0.20	188^	0.20
C0225125	OKMN-SB-ASB40-0-0035	0.324^	0.20	1.75^	0.20	271^*	0.20
C0225125 Rep	OKMN-SB-ASB40-0-0035*	0.668^	0.20	2.76^	0.20	476^*	0.20
C0225126	OKMN-SB-ASB40-0-0055	0.485	0.20	0.873*	0.20	119	0.20
C0225126 Rep	OKMN-SB-ASB40-0-0055*	0.586	0.20	1.14*	0.20	146	0.20
C0225127	OKMN-SB-ASB40-0-0090	0.539*	0.20	0.880	0.20	37.5	0.20
C0225127 Rep	OKMN-SB-ASB40-0-0090*	0.487*	0.20	0.674	0.20	38.2	0.20
C0225128	OKMN-SB-ASB41-0-0015	7.45	0.20	79.0	0.20	6530	0.20
C0225128 Rep	OKMN-SB-ASB41-0-0015*	6.53	0.20	68.2	0.20	4950	0.20
C0225129	OKMN-SB-ASB41-0-0035	11.2	0.20	31.5	0.20	1880*	0.20
C0225129 Rep	OKMN-SB-ASB41-0-0035*	11.0	0.20	29.5	0.20	1490*	0.20
C0225130	OKMN-SB-ASB41-0-0055	8.18	0.20	32.2	0.20	2300	0.20
C0225130 Rep	OKMN-SB-ASB41-0-0055*	6.81	0.20	26.7	0.20	2400	0.20
C0225131	OKMN-SB-ASB41-0-0090	4.31	0.20	3.73	0.20	19.0	0.20
C0225131 Rep	OKMN-SB-ASB41-0-0090*	4.07	0.20	4.06	0.20	22.2	0.20
C0225132	OKMN-SB-ASB41-DB-0090	4.50	0.20	4.13	0.20	29.6	0.20
C0225132 Rep	OKMN-SB-ASB41-DB-0090*	3.87	0.20	3.22	0.20	15.8	0.20
C0225133	OKMN-SB-ASB42-0-0000	ND	0.20	ND	0.20	23.5	0.20
C0225133 Rep	OKMN-SB-ASB41-0-0000*	ND	0.20	ND	0.20	25.7	0.20
C0225134	OKMN-SB-ASB42-0-0015	0.289	0.20	ND	0.20	44.2	0.20
C0225134 Rep	OKMN-SB-ASB41-0-0015*	0.278	0.20	ND	0.20	75.2	0.20
C0225135	OKMN-SB-ASB42-0-0035	4.13*	0.20	12.9	0.20	196^	0.20
C0225135 Rep	OKMN-SB-ASB41-0-0035*	4.25*	0.20	10.2	0.20	141^	0.20
C0225136	OKMN-SB-ASB42-0-0055	4.33	0.20	15.4	0.20	NR	-
C0225136 Rep	OKMN-SB-ASB41-0-0055*	5.05	0.20	18.0	0.20	NR	-
C0225137	OKMN-SB-ASB42-0-0070	4.14	0.20	5.09	0.20	73.0	0.20
C0225137 Rep	OKMN-SB-ASB41-0-0070*	4.14	0.20	5.23	0.20	78.1	0.20
C0225139	OKMN-SB-ASB43-0-0015	4.61*	0.20	16.3^	0.20	264^	0.20
C0225139 Rep	OKMN-SB-ASB43-0-0015*	3.94*	0.20	11.8^	0.20	150^	0.20
C0225140	OKMN-SB-ASB43-0-0035	7.66^	0.20	112	0.20	4540^*	0.20
C0225140 Rep	OKMN-SB-ASB43-0-0035*	5.60^	0.20	94.0	0.20	3170^*	0.20
C0225141	OKMN-SB-ASB43-0-0055	16.1	0.20	240^	0.20	6280^*	0.20
C0225141 Rep	OKMN-SB-ASB43-0-0055*	15.3	0.20	146^	0.20	4340^*	0.20
C0225142	OKMN-SB-ASB43-0-0090	8.27	0.20	27.4	0.20	167	0.20
C0225142 Rep	OKMN-SB-ASB43-0-0090*	9.28	0.20	31.7	0.20	196	0.20

*Laboratory Duplicate
^ Relative Percent Difference > 30%
* Sample results with expanded assessed accuracy between +/- 30% and +/- 50%
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table V. Summary of PFBA, PFPeA, and PFHA in Water Samples

		C4 Acid PFBA Perfluorobutanoic Acid		C5 Acid PFPeA Perfluoropentanoic Acid		C6 Acid PFHA Perfluorohexanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)
C0225085	OKMN-SB-ASB36-RB-061204	ND	0.050	ND	0.050	ND	0.050
C0225101	OKMN-SB-ASB32-RB-061204	ND	0.050	ND	0.050	ND	0.050
C0225138	OKMN-SB-ASB42-RB-061205	ND	0.050	ND	0.050	ND	0.050
C0225143	OKMN-SB-TRIP1-0-061204	ND	0.050	ND	0.050	ND	0.050
C0225146	OKMN-SB-TRIP2-0-061204	ND	0.050	ND	0.050	ND	0.050

ND = Not detected at or above the acceptable LOQ.

Table VI. Summary of PFHpA, PFOA, and PFNA in Water Samples

		C7 Acid PFHpA Perfluoroheptanoic Acid		C8 Acid PFOA Perfluorooctanoic Acid		C9 Acid PFNA Perfluorononanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)
C0225085	OKMN-SB-ASB36-RB-061204	ND	0.10	ND	0.050	ND	0.050
C0225101	OKMN-SB-ASB32-RB-061204	ND	0.10	ND	0.050	ND	0.050
C0225138	OKMN-SB-ASB42-RB-061205	ND	0.10	ND	0.050	ND	0.050
C0225143	OKMN-SB-TRIP1-0-061204	ND	0.10	ND	0.050	ND	0.050
C0225146	OKMN-SB-TRIP2-0-061204	ND	0.10	ND	0.050	ND	0.050

ND = Not detected at or above the acceptable LOQ.

Table VII. Summary of PFDA, PFUnA, and PFDoA in Water Samples

		C10 Acid PFDA Perfluorodecanoic Acid		C11 Acid PFUnA Perfluoroundecanoic Acid		C12 Acid PFDoA Perfluorododecanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)
C0225085	OKMN-SB-ASB36-RB-061204	ND	0.20	ND	0.050	ND	0.050
C0225101	OKMN-SB-ASB32-RB-061204	ND	0.20	ND	0.050	ND	0.050
C0225138	OKMN-SB-ASB42-RB-061205	ND	0.20	ND	0.050	ND	0.050
C0225143	OKMN-SB-TRIP1-0-061204	ND	0.20	ND	0.050	ND	0.050
C0225146	OKMN-SB-TRIP2-0-061204	ND	0.20	ND	0.050	ND	0.050

ND = Not detected at or above the acceptable LOQ.

Table VIII. Summary of PFBS, PFHS, and PFOS in Water Samples

		C4 Sulfonate PFBS Perfluorobutanesulfonate		C6 Sulfonate PFHS Perfluorohexanesulfonate		C8 Sulfonate PFOS Perfluorooctanesulfonate	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)	Analyte Found (ppb, ng/mL)	Acceptable LOQ (ng/mL)
C0225085	OKMN-SB-ASB36-RB-061204	ND	0.050	ND	0.050	ND	0.050
C0225101	OKMN-SB-ASB32-RB-061204	ND	0.050	ND	0.050	ND	0.050
C0225138	OKMN-SB-ASB42-RB-061205	ND	0.050	ND	0.050	ND	0.050
C0225143	OKMN-SB-TRIP1-0-061204	ND	0.050	ND	0.050	ND	0.050
C0225146	OKMN-SB-TRIP2-0-061204	ND	0.050	ND	0.050	ND	0.050

ND = Not detected at or above the acceptable LOQ.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	5.58	NA	NA
OKMN-SB-ASB37-0-0055 (C0225070 Spk D, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	5.58	109	52
OKMN-SB-ASB37-0-0075 (C0225071 Spk E, 2 ppb Spike)	2	NR	NR	NR	0.472	1.34	43	0.981	1.79	40
OKMN-SB-ASB37-0-0075 (C0225071 Spk F, 200 ppb Spike)	200	NR	NR	NR	0.472	NA	NA	0.981	NA	NA
OKMN-SB-ASB38-0-0000 (C0225072 Spk G, 2 ppb Spike)	2	1.71	3.26	78	1.14	2.80	83	NR	NR	NR
OKMN-SB-ASB38-0-0000 (C0225072 Spk H, 200 ppb Spike)	200	1.71	NA	NA	1.14	NA	NA	NR	NR	NR
OKMN-SB-ASB38-0-0015 (C0225073 Spk C, 2 ppb Spike)	2	1.82	2.64	41	1.09	2.00	46	NR	NR	NR
OKMN-SB-ASB38-0-0015 (C0225073 Spk D, 200 ppb Spike)	200	1.82	NA	NA	1.09	NA	NA	NR	NR	NR
OKMN-SB-ASB38-0-0035 (C0225074Spk E, 2 ppb Spike)	2	6.40	NA	NA	2.77	3.91	57	7.25	NA	NA
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 200 ppb Spike)	200	6.40	104	49	2.77	NA	NA	7.25	106	49
OKMN-SB-ASB38-DB-0035 (C0225076 Spk G, 2 ppb Spike)	2	7.03	NA	NA	3.01	4.04	52	8.20	NA	NA
OKMN-SB-ASB38-DB-0035 (C0225075 Spk H, 200 ppb Spike)	200	7.03	101	47	3.01	NA	NA	8.20	103	47
OKMN-SB-ASB38-0-0055 (C0225076 Spk C, 2 ppb Spike)	2	11.0	NA	NA	4.66	NA	NA	14.5	NA	NA
OKMN-SB-ASB38-0-0055 (C0225076 Spk D, 200 ppb Spike)	200	11.0	101	45	4.66	102	49	14.5	106	46
OKMN-SB-ASB38-0-0080 (C0225077 Spk E, 2 ppb Spike)	2	16.1	NA	NA	5.95	NA	NA	19.5	NA	NA
OKMN-SB-ASB38-0-0080 (C0225077 Spk F, 200 ppb Spike)	200	16.1	112	48	5.95	105	50	19.5	115	48
OKMN-SB-ASB39-0-0015 (C0225078 Spk G, 2 ppb Spike)	2	26.6	NA	NA	11.7	NA	NA	24.4	NA	NA
OKMN-SB-ASB39-0-0015 (C0225078 Spk H, 200 ppb Spike)	200	26.6	123	48	11.7	108	48	24.4	124	50
OKMN-SB-ASB39-DB-0015 (C0225079 Spk C, 2 ppb Spike)	2	29.2	NA	NA	14.1	NA	NA	29.8	NA	NA
OKMN-SB-ASB39-DB-0015 (C0225079 Spk D, 200 ppb Spike)	200	29.2	132	51	14.1	114	50	29.8	133	52
OKMN-SB-ASB36-0-0015 (C0225080 Spk E, 2 ppb Spike)	2	48.7	NA	NA	12.5	NA	NA	54.3	NA	NA
OKMN-SB-ASB36-0-0015 (C0225080 Spk F, 200 ppb Spike)	200	48.7	152	52	12.5	120	54	54.3	169	57
OKMN-SB-ASB36-DB-0015 (C0225081 Spk G, 2 ppb Spike)	2	NR	NR	NR	16.9	NA	NA	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk H, 200 ppb Spike)	200	NR	NR	NR	16.9	112	48	NR	NR	NR

NR = Not reported due to quality control failure.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C4 Acid PFBA Perfluorobutanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C5 Acid PFPeA Perfluoropentanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C6 Acid PFHA Perfluorohexanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB36-0-0030 (C0225082 Spk C, 2 ppb Spike)	2	NR	NR	NR	33.3	NA	NA	147	NA	NA
OKMN-SB-ASB36-0-0030 (C0225082 Spk D, 200 ppb Spike)	200	NR	NR	NR	33.3	134	50	147	229	41
OKMN-SB-ASB36-0-0055 (C0225083 Spk E, 2 ppb Spike)	2	361	NA	NA	58.4	NA	NA	204	NA	NA
OKMN-SB-ASB36-0-0055 (C0225083 Spk F, 200 ppb Spike)	200	361	500	70	58.4	163	52	204	310	53
OKMN-SB-ASB36-0-0095 (C0225084 Spk G, 2 ppb Spike)	2	396	NA	NA	41.1	NA	NA	118	NA	NA
OKMN-SB-ASB36-0-0095 (C0225084 Spk H, 200 ppb Spike)	200	396	516	60	41.1	146	52	118	256	69
OKMN-SB-ASB37-0-0000 (C0225086 Spk C, 2 ppb Spike)	2	3.48	5.37	95	1.74	3.09	68	NR	NR	NR
OKMN-SB-ASB37-0-0000 (C0225086 Spk D, 200 ppb Spike)	200	3.48	NA	NA	1.74	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0015 (C0225087 Spk E, 2 ppb Spike)	2	6.38	NA	NA	3.67	4.76	55	10.1	NA	NA
OKMN-SB-ASB37-0-0015 (C0225087 Spk F, 200 ppb Spike)	200	6.38	96.6	45	3.67	NA	NA	10.1	116	53
OKMN-SB-ASB37-0-0035 (C0225088 Spk G, 2 ppb Spike)	2	NR	NR	NR	1.52	3.05	77	4.58	NA	NA
OKMN-SB-ASB37-0-0035 (C0225088 Spk H, 200 ppb Spike)	200	NR	NR	NR	1.52	NA	NA	4.58	106	51
OKMN-SB-ASB37-DB-0035 (C0225089 Spk C, 2 ppb Spike)	2	4.26	NA	NA	2.00	3.04	52	6.14	NA	NA
OKMN-SB-ASB37-DB-0035 (C0225089 Spk D, 200 ppb Spike)	200	4.26	114	55	2.00	NA	NA	6.14	136	65
OKMN-SB-ASB34-0-0035 (C0225090 Spk E, 2 ppb Spike)	2	44.5	NA	NA	14.0	NA	NA	24.3	NA	NA
OKMN-SB-ASB34-0-0035 (C0225090 Spk F, 200 ppb Spike)	200	44.5	140	48	14.0	122	54	24.3	132	54
OKMN-SB-ASB34-0-0055 (C0225091 Spk G, 2 ppb Spike)	2	NR	NR	NR	95.3	NA	NA	150	NA	NA
OKMN-SB-ASB34-0-0055 (C0225091 Spk H, 200 ppb Spike)	200	NR	NR	NR	95.3	182	43	150	236	43
OKMN-SB-ASB34-0-0085 (C0225092 Spk C, 2 ppb Spike)	2	1160	RE	RE	NR	NR	NR	730	RE	RE
OKMN-SB-ASB34-0-0085 (C0225092 Spk D, 200 ppb Spike)	200	1160	RE	RE	NR	NR	NR	730	RE	RE
OKMN-SB-ASB35-0-0000 (C0225093 Spk E, 2 ppb Spike)	2	NR	NR	NR	2.15	3.85	80	2.34	4.67	127
OKMN-SB-ASB35-0-0000 (C0225093 Spk F, 200 ppb Spike)	200	NR	NR	NR	2.15	NA	NA	2.34	NA	NA
OKMN-SB-ASB35-0-0015 (C0225094 Spk G, 2 ppb Spike)	2	35.5	NA	NA	23.8	NA	NA	31.5	NA	NA
OKMN-SB-ASB35-0-0015 (C0225094 Spk H, 200 ppb Spike)	200	35.5	133	49	23.8	124	50	31.5	137	53

NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB35-0-0035 (C0225095 Spk C, 2 ppb Spike)	2	NR	NR	NR	24.3	NA	NA	78.6	NA	NA
OKMN-SB-ASB35-0-0035 (C0225095 Spk D, 200 ppb Spike)	200	NR	NR	NR	24.3	110	43	78.6	175	48
OKMN-SB-ASB35-DB-0035 (C0225096 Spk E, 2 ppb Spike)	2	24.6	NA	NA	NR	NR	NR	68.2	NA	NA
OKMN-SB-ASB35-DB-0035 (C0225096 Spk F, 200 ppb Spike)	200	24.6	114	45	NR	NR	NR	68.2	159	45
OKMN-SB-ASB35-0-0055 (C0225097 Spk G, 2 ppb Spike)	2	135	NA	NA	87.5	NA	NA	619	RE	RE
OKMN-SB-ASB35-0-0055 (C0225097 Spk H, 200 ppb Spike)	200	135	249	57	87.5	190	51	619	RE	RE
OKMN-SB-ASB35-0-0085 (C0225098 Spk C, 2 ppb Spike)	2	NR	NR	NR	64.0	NA	NA	999	RE	RE
OKMN-SB-ASB35-0-0085 (C0225098 Spk D, 200 ppb Spike)	200	NR	NR	NR	64.0	186	51	999	RE	RE
OKMN-SB-ASB36-0-0000 (C0225099 Spk E, 2 ppb Spike)	2	9.84	NA	NA	2.28	3.31	52	2.56	3.76	60
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 200 ppb Spike)	200	9.84	98.8	44	2.28	NA	NA	2.56	NA	NA
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2 ppb Spike)	2	1320	RE	RE	NR	NR	NR	538	RE	RE
OKMN-SB-ASB32-0-0075 (C0225100 Spk H, 200 ppb Spike)	200	1320	RE	RE	NR	NR	NR	538	RE	RE
OKMN-SB-ASB33-0-0000 (C0225102 Spk C, 2 ppb Spike)	2	6.78	NA	NA	NR	NR	NR	1.25	2.93	84
OKMN-SB-ASB33-0-0000 (C0225102 Spk D, 200 ppb Spike)	200	6.78	89.4	41	NR	NR	NR	1.25	NA	NA
OKMN-SB-ASB33-0-0015 (C0225103 Spk E, 2 ppb Spike)	2	10.1	NA	NA	5.08	NA	NA	8.63	NA	NA
OKMN-SB-ASB33-0-0015 (C0225103 Spk F, 200 ppb Spike)	200	10.1	112	51	5.08	94.1	45	8.63	106	49
OKMN-SB-ASB33-0-0035 (C0225104 Spk G, 2 ppb Spike)	2	11.9	NA	NA	6.01	NA	NA	9.44	NA	NA
OKMN-SB-ASB33-0-0035 (C0225104 Spk H, 200 ppb Spike)	200	11.9	100	44	6.01	92.3	43	9.44	101	46
OKMN-SB-ASB33-DB-0035 (C0225105 Spk C, 2 ppb Spike)	2	9.21	NA	NA	6.88	NA	NA	7.87	NA	NA
OKMN-SB-ASB33-DB-0035 (C0225105 Spk D, 200 ppb Spike)	200	9.21	90.9	41	6.88	141	67	7.87	119	56
OKMN-SB-ASB33-0-0055 (C0225106 Spk E, 2 ppb Spike)	2	NR	NR	NR	20.7	NA	NA	NR	NR	NR
OKMN-SB-ASB33-0-0055 (C0225106 Spk F, 200 ppb Spike)	200	NR	NR	NR	20.7	133	56	NR	NR	NR
OKMN-SB-ASB33-0-0085 (C0225107 Spk G, 2 ppb Spike)	2	NR	NR	NR	29.3	NA	NA	NR	NR	NR
OKMN-SB-ASB33-0-0085 (C0225107 Spk H, 200 ppb Spike)	200	NR	NR	NR	29.3	110	40	NR	NR	NR

NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0000 (C0225108 Spk C, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	0.405	1.34	47
OKMN-SB-ASB34-0-0000 (C0225108 Spk D, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	0.405	NA	NA
OKMN-SB-ASB34-0-0015 (C0225109 Spk E, 2 ppb Spike)	2	8.53	NA	NA	NR	NR	NR	6.59	NA	NA
OKMN-SB-ASB34-0-0015 (C0225109 Spk F, 200 ppb Spike)	200	8.53	104	48	NR	NR	NR	6.59	99.2	46
OKMN-SB-ASB31-0-0000 (C0225110 Spk G, 2 ppb Spike)	2	10.5	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0000 (C0225110 Spk H, 200 ppb Spike)	200	10.5	101	45	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0015 (C0225111 Spk C, 2 ppb Spike)	2	NR	NR	NR	6.56	NA	NA	12.8	NA	NA
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 200 ppb Spike)	200	NR	NR	NR	6.56	107	50	12.8	93.5	40
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2 ppb Spike)	2	199	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 200 ppb Spike)	200	199	328	65	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0055 (C0225113 Spk G, 2 ppb Spike)	2	206	NA	NA	79.9	NA	NA	NR	NR	NR
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 200 ppb Spike)	200	206	320	57	79.9	179	50	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk C, 2 ppb Spike)	2	309	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk D, 200 ppb Spike)	200	309	408	50	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk E, 2 ppb Spike)	2	NR	NR	NR	4.67	NA	NA	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk F, 200 ppb Spike)	200	NR	NR	NR	4.67	96.2	46	NR	NR	NR
OKMN-SB-ASB32-0-0015 (C0225116 Spk G, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0015 (C0225116 Spk H, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-DB-0015 (C0225117 Spk C, 2 ppb Spike)	2	285	NA	NA	69.4	NA	NA	154	NA	NA
OKMN-SB-ASB32-DB-0015 (C0225117 Spk D, 200 ppb Spike)	200	285	548	132	69.4	245	88	154	316	81
OKMN-SB-ASB32-0-0035 (C0225118 Spk E, 2 ppb Spike)	2	759	RE	RE	145	NA	NA	NR	NR	NR
OKMN-SB-ASB32-0-0035 (C0225118 Spk F, 200 ppb Spike)	200	759	RE	RE	145	263	59	NR	NR	NR
OKMN-SB-ASB32-0-0055 (C0225119 Spk G, 2 ppb Spike)	2	816	RE	RE	165	NA	NA	NR	NR	NR
OKMN-SB-ASB32-0-0055 (C0225119 Spk H, 200 ppb Spike)	200	816	RE	RE	165	284	60	NR	NR	NR

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NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0035 (C0225120 Spk C, 2 ppb Spike)	2	74.7	NA	NA	16.7	NA	NA	26.3	NA	NA
OKMN-SB-ASB39-0-0035 (C0225120 Spk D, 200 ppb Spike)	200	74.7	234	80	16.7	202	93	26.3	219	96
OKMN-SB-ASB39-0-0055 (C0225121 Spk E, 2 ppb Spike)	2	274	NA	NA	36.3	NA	NA	90.6	NA	NA
OKMN-SB-ASB39-0-0055 (C0225121 Spk F, 200 ppb Spike)	200	274	419	73	36.3	211	86	90.6	253	81
OKMN-SB-ASB39-0-0070 (C0225122 Spk G, 2 ppb Spike)	2	173	NA	NA	23.5	NA	NA	36.7	NA	NA
OKMN-SB-ASB39-0-0070 (C0225122 Spk H, 200 ppb Spike)	200	173	295	61	23.5	188	82	36.7	204	84
OKMN-SB-ASB40-0-0000 (C0225123 Spk C, 2 ppb Spike)	2	NR	NR	NR	1.01	3.11	105	0.343	2.56	111
OKMN-SB-ASB40-0-0000 (C0225123 Spk D, 200 ppb Spike)	200	NR	NR	NR	1.01	NA	NA	0.343	NA	NA
OKMN-SB-ASB40-0-0015 (C0225124 Spk E, 2 ppb Spike)	2	0.365	1.58	61	0.364^	2.47	105	0.705	2.78	104
OKMN-SB-ASB40-0-0015 (C0225124 Spk F, 200 ppb Spike)	200	0.365	NA	NA	0.364^	NA	NA	0.705	NA	NA
OKMN-SB-ASB40-0-0035 (C0225125 Spk G, 2 ppb Spike)	2	1.28	2.16	44	0.587	2.30	86	1.30	2.73	72
OKMN-SB-ASB40-0-0035 (C0225125 Spk H, 200 ppb Spike)	200	1.28	NA	NA	0.587	NA	NA	1.30	NA	NA
OKMN-SB-ASB40-0-0055 (C0225126 Spk C, 2 ppb Spike)	2	2.43	4.51	104	0.897	3.17	114	3.31	5.86	128
OKMN-SB-ASB40-0-0055 (C0225126 Spk D, 200 ppb Spike)	200	2.43	NA	NA	0.897	NA	NA	3.31	NA	NA
OKMN-SB-ASB40-0-0090 (C0225127 Spk E, 2 ppb Spike)	2	3.93	5.63	85	2.68	4.81	107	19.4	NA	NA
OKMN-SB-ASB40-0-0090 (C0225127 Spk F, 200 ppb Spike)	200	3.93	NA	NA	2.68	NA	NA	19.4	206	93
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 2 ppb Spike)	2	8.84	NA	NA	7.14	NA	NA	15.6	NA	NA
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 200 ppb Spike)	200	8.84	202	97	7.14	184	88	15.6	207	96
OKMN-SB-ASB41-0-0035 (C0225129 Spk C, 2 ppb Spike)	2	39.5	NA	NA	15.1	NA	NA	54.5	NA	NA
OKMN-SB-ASB41-0-0035 (C0225129 Spk D, 200 ppb Spike)	200	39.5	205	83	15.1	192	88	54.5	205	75
OKMN-SB-ASB41-0-0055 (C0225130 Spk E, 2 ppb Spike)	2	27.6	NA	NA	11.5	NA	NA	35.2	NA	NA
OKMN-SB-ASB41-0-0055 (C0225130 Spk F, 200 ppb Spike)	200	27.6	221	97	11.5	220	104	35.2	193	79
OKMN-SB-ASB41-0-0090 (C0225131 Spk G, 2 ppb Spike)	2	94.0	NA	NA	13.9	NA	NA	30.5	NA	NA
OKMN-SB-ASB41-0-0090 (C0225131 Spk H, 200 ppb Spike)	200	94.0	268	87	13.9	183	85	30.5	183	76

^Sample reported as ND on Table I but sample result was used to calculate the matrix spike recovery.

NR = Not reported due to quality control failure.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table IX. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB41-DB-0090 (C0225132 Spk C, 2 ppb Spike)	2	88.3	NA	NA	12.3	NA	NA	NR	NR	NR
OKMN-SB-ASB41-DB-0090 (C0225132 Spk D, 200 ppb Spike)	200	88.3	324	118	12.3	196	92	NR	NR	NR
OKMN-SB-ASB42-0-0000 (C0225133 Spk E, 2 ppb Spike)	2	ND	2.02	101	0.231	1.64	70	ND	1.59	80
OKMN-SB-ASB42-0-0000 (C0225133 Spk F, 200 ppb Spike)	200	ND	NA	NA	0.231	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0015 (C0225134 Spk G, 2 ppb Spike)	2	ND	1.66	83	ND	2.4	120	0.357	1.88	76
OKMN-SB-ASB42-0-0015 (C0225134 Spk H, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	0.357	NA	NA
OKMN-SB-ASB42-0-0035 (C0225135 Spk C, 2 ppb Spike)	2	7.93	NA	NA	3.14	5.42	114	16.4	NA	NA
OKMN-SB-ASB42-0-0035 (C0225135 Spk D, 200 ppb Spike)	200	7.93	172	82	3.14	NA	NA	16.4	214	99
OKMN-SB-ASB42-0-0055 (C0225136 Spk E, 2 ppb Spike)	2	8.85	NA	NA	3.21	5.25	102	16.2	NA	NA
OKMN-SB-ASB42-0-0055 (C0225136 Spk F, 200 ppb Spike)	200	8.85	199	95	3.21	NA	NA	16.2	208	96
OKMN-SB-ASB42-0-0070 (C0225137 Spk G, 2 ppb Spike)	2	15.0	NA	NA	4.22	NA	NA	20.8	NA	NA
OKMN-SB-ASB42-0-0070 (C0225137 Spk H, 200 ppb Spike)	200	15.0	183	84	4.22	195	95	20.8	212	96
OKMN-SB-ASB43-0-0015 (C0225138 Spk C, 2 ppb Spike)	2	6.77	NA	NA	4.69	NA	NA	8.76	NA	NA
OKMN-SB-ASB43-0-0015 (C0225139 Spk D, 200 ppb Spike)	200	6.77	177	85	4.69	199	97	8.76	181	86
OKMN-SB-ASB43-0-0035 (C0225140 Spk E, 2 ppb Spike)	2	31.7	NA	NA	13.1	NA	NA	15.5	NA	NA
OKMN-SB-ASB43-0-0035 (C0225140 Spk F, 200 ppb Spike)	200	31.7	217	93	13.1	217	102	15.5	175	80
OKMN-SB-ASB43-0-0055 (C0225141 Spk G, 2 ppb Spike)	2	81.1	NA	NA	24.5	NA	NA	31.5	NA	NA
OKMN-SB-ASB43-0-0055 (C0225141 Spk H, 200 ppb Spike)	200	81.1	216	67	24.5	213	94	31.5	188	78
OKMN-SB-ASB43-0-0090 (C0225142 Spk C, 2 ppb Spike)	2	35.3	NA	NA	18.3	NA	NA	36.2	NA	NA
OKMN-SB-ASB43-0-0090 (C0225142 Spk D, 200 ppb Spike)	200	35.3	233	99	18.3	195	88	36.2	205	84
			Average:	67		Average:	70		Average:	69
			Standard Deviation:	23		Standard Deviation:	24		Standard Deviation:	23

ND = Not detected at or above the acceptable LOQ reported on Table I.
NR = Not reported due to quality control failure.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples

		C7 Acid PFHpA Perfluoroheptanoic Acid			C8 Acid PFOA Perfluorooctanoic Acid			C9 Acid PFNA Perfluorononanoic Acid		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 2 ppb Spike)	2	6.94	NA	NA	9.32	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0055 (C0225070 Spk D, 200 ppb Spike)	200	6.94	104	49	9.32	191	91	NR	NR	NR
OKMN-SB-ASB37-0-0075 (C0225071 Spk E, 2 ppb Spike)	2	NR	NR	NR	12.6	NA	NA	ND	1.01	51
OKMN-SB-ASB37-0-0075 (C0225071 Spk F, 200 ppb Spike)	200	NR	NR	NR	12.6	106	47	ND	NA	NA
OKMN-SB-ASB38-0-0000 (C0225072 Spk G, 2 ppb Spike)	2	1.93	4.13	110	17.1	NA	NA	0.175	0.974	40
OKMN-SB-ASB38-0-0000 (C0225072 Spk H, 200 ppb Spike)	200	1.93	NA	NA	17.1	106	44	0.175	NA	NA
OKMN-SB-ASB38-0-0015 (C0225073 Spk C, 2 ppb Spike)	2	NR	NR	NR	73.9	NA	NA	NR	NR	NR
OKMN-SB-ASB38-0-0015 (C0225073 Spk D, 200 ppb Spike)	200	NR	NR	NR	73.9	170	48	NR	NR	NR
OKMN-SB-ASB38-0-0035 (C0225074Spk E, 2 ppb Spike)	2	8.11	NA	NA	107	NA	NA	NR	NR	NR
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 200 ppb Spike)	200	8.11	102	47	107	218	56	NR	NR	NR
OKMN-SB-ASB38-DB-0035 (C0225075 Spk G, 2 ppb Spike)	2	8.02	NA	NA	123	NA	NA	NR	NR	NR
OKMN-SB-ASB38-DB-0035 (C0225075 Spk H, 200 ppb Spike)	200	8.02	100	46	123	220	49	NR	NR	NR
OKMN-SB-ASB38-0-0055 (C0225076 Spk C, 2 ppb Spike)	2	19.7	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB38-0-0056 (C0225076 Spk D, 200 ppb Spike)	200	19.7	106	43	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB38-0-0080 (C0225077 Spk E, 2 ppb Spike)	2	14.7	NA	NA	NR	NR	NR	ND	0.866	43
OKMN-SB-ASB38-0-0080 (C0225077 Spk F, 200 ppb Spike)	200	14.7	97.5	41	NR	NR	NR	ND	NA	NA
OKMN-SB-ASB39-0-0015 (C0225078 Spk G, 2 ppb Spike)	2	30.7	NA	NA	418	RE	RE	NR	NR	NR
OKMN-SB-ASB39-0-0015 (C0225078 Spk H, 200 ppb Spike)	200	30.7	124	47	418	RE	RE	NR	NR	NR
OKMN-SB-ASB39-DB-0015 (C0225079 Spk C, 2 ppb Spike)	2	59.8	NA	NA	452	RE	RE	NR	NR	NR
OKMN-SB-ASB39-DB-0015 (C0225079 Spk D, 200 ppb Spike)	200	59.8	155	48	452	RE	RE	NR	NR	NR
OKMN-SB-ASB36-0-0015 (C0225080 Spk E, 2 ppb Spike)	2	108	NA	NA	997	RE	RE	NR	NR	NR
OKMN-SB-ASB36-0-0015 (C0225080 Spk F, 200 ppb Spike)	200	108	208	50	997	RE	RE	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk G, 2 ppb Spike)	2	NR	NR	NR	959	RE	RE	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk H, 200 ppb Spike)	200	NR	NR	NR	959	RE	RE	NR	NR	NR

ND = Not detected at or above the acceptable LOQ reported on Table II.

NR = Not reported due to quality control failure.

RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples (continued)

Sample Description	C7 Acid PFHpA Perfluoroheptanoic Acid				C8 Acid PFOA Perfluorooctanoic Acid			C9 Acid PFNA Perfluorononanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB36-0-0030 (C0225082 Spk C, 2 ppb Spike)	2	165	NA	NA	1500	RE	RE	NR	NR	NR
OKMN-SB-ASB36-0-0030 (C0225082 Spk D, 200 ppb Spike)	200	165	255	45	1500	RE	RE	NR	NR	NR
OKMN-SB-ASB36-0-0055 (C0225083 Spk E, 2 ppb Spike)	2	185	NA	NA	2450	RE	RE	4.45	NA	NA
OKMN-SB-ASB36-0-0055 (C0225083 Spk F, 200 ppb Spike)	200	185	298	57	2450	RE	RE	4.45	89.0	42
OKMN-SB-ASB36-0-0095 (C0225084 Spk G, 2 ppb Spike)	2	55.3	NA	NA	NR	NR	NR	ND	1.15	58
OKMN-SB-ASB36-0-0095 (C0225084 Spk H, 200 ppb Spike)	200	55.3	220	82	NR	NR	NR	ND	NA	NA
OKMN-SB-ASB37-0-0000 (C0225086 Spk C, 2 ppb Spike)	2	1.91	4.37	123	NR	NR	NR	0.281	1.18	45
OKMN-SB-ASB37-0-0000 (C0225086 Spk D, 200 ppb Spike)	200	1.91	NA	NA	NR	NR	NR	0.281	NA	NA
OKMN-SB-ASB37-0-0015 (C0225087 Spk E, 2 ppb Spike)	2	16.7	NA	NA	222	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0015 (C0225087 Spk F, 200 ppb Spike)	200	16.7	120	52	222	312	45	NR	NR	NR
OKMN-SB-ASB37-0-0035 (C0225088 Spk G, 2 ppb Spike)	2	7.00	NA	NA	81.9	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0035 (C0225088 Spk H, 200 ppb Spike)	200	7.00	109	51	81.9	201	60	NR	NR	NR
OKMN-SB-ASB37-DB-0035 (C0225089 Spk C, 2 ppb Spike)	2	8.29	NA	NA	88.2	NA	NA	NR	NR	NR
OKMN-SB-ASB37-DB-0035 (C0225089 Spk D, 200 ppb Spike)	200	8.29	109	50	88.2	265	88	NR	NR	NR
OKMN-SB-ASB34-0-0035 (C0225090 Spk E, 2 ppb Spike)	2	37.0	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB34-0-0035 (C0225090 Spk F, 200 ppb Spike)	200	37.0	144	54	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB34-0-0055 (C0225091 Spk G, 2 ppb Spike)	2	156	NA	NA	4230	RE	RE	NR	NR	NR
OKMN-SB-ASB34-0-0055 (C0225091 Spk H, 200 ppb Spike)	200	156	246	45	4230	RE	RE	NR	NR	NR
OKMN-SB-ASB34-0-0085 (C0225092 Spk C, 2 ppb Spike)	2	884	RE	RE	13100	RE	RE	12.2	NA	NA
OKMN-SB-ASB34-0-0085 (C0225092 Spk D, 200 ppb Spike)	200	884	RE	RE	13100	RE	RE	12.2	96.4	42
OKMN-SB-ASB35-0-0000 (C0225093 Spk E, 2 ppb Spike)	2	1.18	3.08	95	11.5	NA	NA	NR	NR	NR
OKMN-SB-ASB35-0-0000 (C0225093 Spk F, 200 ppb Spike)	200	1.18	NA	NA	11.5	100	44	NR	NR	NR
OKMN-SB-ASB35-0-0015 (C0225094 Spk G, 2 ppb Spike)	2	34.1	NA	NA	884	RE	RE	NR	NR	NR
OKMN-SB-ASB35-0-0015 (C0225094 Spk H, 200 ppb Spike)	200	34.1	144	55	884	RE	RE	NR	NR	NR

ND = Not detected at or above the acceptable LOQ reported on Table II.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C7 Acid PFHpA Perfluoroheptanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C8 Acid PFOA Perfluorooctanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C9 Acid PFNA Perfluorononanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB35-0-0035 (C0225095 Spk C, 2 ppb Spike)	2	NR	NR	NR	2770	RE	RE	NR	NR	NR
OKMN-SB-ASB35-0-0035 (C0225095 Spk D, 200 ppb Spike)	200	NR	NR	NR	2770	RE	RE	NR	NR	NR
OKMN-SB-ASB35-DB-0035 (C0225096 Spk E, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB35-DB-0035 (C0225096 Spk F, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB35-0-0055 (C0225097 Spk G, 2 ppb Spike)	2	824	RE	RE	12000	RE	RE	25.0	NA	NA
OKMN-SB-ASB35-0-0055 (C0225097 Spk H, 200 ppb Spike)	200	824	RE	RE	12000	RE	RE	25.0	110	43
OKMN-SB-ASB35-0-0085 (C0225098 Spk C, 2 ppb Spike)	2	1080	RE	RE	3300	RE	RE	4.41	NA	NA
OKMN-SB-ASB35-0-0085 (C0225098 Spk D, 200 ppb Spike)	200	1080	RE	RE	3300	RE	RE	4.41	121	58
OKMN-SB-ASB36-0-0000 (C0225099 Spk E, 2 ppb Spike)	2	1.38	2.78	70	13.3	NA	NA	NR	NR	NR
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 200 ppb Spike)	200	1.38	NA	NA	13.3	104	46	NR	NR	NR
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2 ppb Spike)	2	172	NA	NA	1820	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0075 (C0225100 Spk H, 200 ppb Spike)	200	172	274	51	1820	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0000 (C0225102 Spk C, 2 ppb Spike)	2	0.556	1.97	71	3.91	6.91	150	0.200	1.25	53
OKMN-SB-ASB33-0-0000 (C0225102 Spk D, 200 ppb Spike)	200	0.556	NA	NA	3.91	NA	NA	0.200	NA	NA
OKMN-SB-ASB33-0-0015 (C0225103 Spk E, 2 ppb Spike)	2	14.0	NA	NA	599	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0015 (C0225103 Spk F, 200 ppb Spike)	200	14.0	111	49	599	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0035 (C0225104 Spk G, 2 ppb Spike)	2	12.7	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0035 (C0225104 Spk H, 200 ppb Spike)	200	12.7	104	46	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-DB-0035 (C0225105 Spk C, 2 ppb Spike)	2	8.58	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-DB-0035 (C0225105 Spk D, 200 ppb Spike)	200	8.58	138	65	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0055 (C0225106 Spk E, 2 ppb Spike)	2	41.5	NA	NA	671	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0055 (C0225106 Spk F, 200 ppb Spike)	200	41.5	142	50	671	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0085 (C0225107 Spk G, 2 ppb Spike)	2	NR	NR	NR	3140	RE	RE	NR	NR	NR
OKMN-SB-ASB33-0-0085 (C0225107 Spk H, 200 ppb Spike)	200	NR	NR	NR	3140	RE	RE	NR	NR	NR

NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples (continued)

		C7 Acid PFHpA Perfluoroheptanoic Acid			C8 Acid PFOA Perfluorooctanoic Acid			C9 Acid PFNA Perfluorononanoic Acid		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0000 (C0225108 Spk C, 2 ppb Spike)	2	0.302	1.20	45	6.89	NA	NA	ND	0.918	46
OKMN-SB-ASB34-0-0000 (C0225108 Spk D, 200 ppb Spike)	200	0.302	NA	NA	6.89	117	55	ND	NA	NA
OKMN-SB-ASB34-0-0015 (C0225109 Spk E, 2 ppb Spike)	2	6.02	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB34-0-0015 (C0225109 Spk F, 200 ppb Spike)	200	6.02	90.8	42	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0000 (C0225110 Spk G, 2 ppb Spike)	2	0.629	1.35	36	5.32	NA	NA	ND	1.04	52
OKMN-SB-ASB31-0-0000 (C0225110 Spk H, 200 ppb Spike)	200	0.629	NA	NA	5.32	119	57	ND	NA	NA
OKMN-SB-ASB31-0-0015 (C0225111 Spk C, 2 ppb Spike)	2	9.47	NA	NA	NR	NR	NR	0.734	1.77	52
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 200 ppb Spike)	200	9.47	95.9	43	NR	NR	NR	0.734	NA	NA
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0055 (C0225113 Spk G, 2 ppb Spike)	2	NR	NR	NR	5490	RE	RE	NR	NR	NR
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 200 ppb Spike)	200	NR	NR	NR	5490	RE	RE	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk C, 2 ppb Spike)	2	NR	NR	NR	8360	RE	RE	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk D, 200 ppb Spike)	200	NR	NR	NR	8360	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk E, 2 ppb Spike)	2	NR	NR	NR	16.2	NA	NA	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk F, 200 ppb Spike)	200	NR	NR	NR	16.2	106	45	NR	NR	NR
OKMN-SB-ASB32-0-0015 (C0225116 Spk G, 2 ppb Spike)	2	NR	NR	NR	4130	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0015 (C0225116 Spk H, 200 ppb Spike)	200	NR	NR	NR	4130	RE	RE	NR	NR	NR
OKMN-SB-ASB32-DB-0015 (C0225117 Spk C, 2 ppb Spike)	2	150	NA	NA	3170	RE	RE	7.47	NA	NA
OKMN-SB-ASB32-DB-0015 (C0225117 Spk D, 200 ppb Spike)	200	150	284	67	3170	RE	RE	7.47	109	51
OKMN-SB-ASB32-0-0035 (C0225118 Spk E, 2 ppb Spike)	2	249	NA	NA	11000	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0035 (C0225118 Spk F, 200 ppb Spike)	200	249	351	51	11000	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0055 (C0225119 Spk G, 2 ppb Spike)	2	NR	NR	NR	5050	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0055 (C0225119 Spk H, 200 ppb Spike)	200	NR	NR	NR	5050	RE	RE	NR	NR	NR

ND = Not detected at or above the acceptable LOQ reported on Table II.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level, see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples (continued)

Sample Description	C7 Acid PFHpA Perfluoroheptanoic Acid				C8 Acid PFOA Perfluorooctanoic Acid			C9 Acid PFNA Perfluorononanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0035 (C0225120 Spk C, 2 ppb Spike)	2	28.3	NA	NA	931	RE	RE	4.11	NA	NA
OKMN-SB-ASB39-0-0035 (C0225120 Spk D, 200 ppb Spike)	200	28.3	228	100	931	RE	RE	4.11	130	63
OKMN-SB-ASB39-0-0055 (C0225121 Spk E, 2 ppb Spike)	2	108	NA	NA	1260	RE	RE	4.11	NA	NA
OKMN-SB-ASB39-0-0055 (C0225121 Spk F, 200 ppb Spike)	200	108	243	68	1260	RE	RE	4.11	106	51
OKMN-SB-ASB39-0-0070 (C0225122 Spk G, 2 ppb Spike)	2	53.0	NA	NA	855	RE	RE	4.37	NA	NA
OKMN-SB-ASB39-0-0070 (C0225122 Spk H, 200 ppb Spike)	200	53.0	213	80	855	RE	RE	4.37	140	68
OKMN-SB-ASB40-0-0000 (C0225123 Spk C, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	ND	1.72	86
OKMN-SB-ASB40-0-0000 (C0225123 Spk D, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	ND	NA	NA
OKMN-SB-ASB40-0-0015 (C0225124 Spk E, 2 ppb Spike)	2	0.446	2.57	106	6.09	NA	NA	ND	1.72	86
OKMN-SB-ASB40-0-0015 (C0225124 Spk F, 200 ppb Spike)	200	0.446	NA	NA	6.09	233	113	ND	NA	NA
OKMN-SB-ASB40-0-0035 (C0225125 Spk G, 2 ppb Spike)	2	1.17	2.32	58	20.1	NA	NA	ND	1.71	86
OKMN-SB-ASB40-0-0035 (C0225125 Spk H, 200 ppb Spike)	200	1.17	NA	NA	20.1	179	79	ND	NA	NA
OKMN-SB-ASB40-0-0055 (C0225126 Spk C, 2 ppb Spike)	2	2.39	5.47	154	12.6	NA	NA	ND	1.81	91
OKMN-SB-ASB40-0-0055 (C0225126 Spk D, 200 ppb Spike)	200	2.39	NA	NA	12.6	223	105	ND	NA	NA
OKMN-SB-ASB40-0-0090 (C0225127 Spk E, 2 ppb Spike)	2	13.2	NA	NA	24.1	NA	NA	ND	2.34	117
OKMN-SB-ASB40-0-0090 (C0225127 Spk F, 200 ppb Spike)	200	13.2	206	96	24.1	153	64	ND	NA	NA
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 2 ppb Spike)	2	27.0	NA	NA	594	RE	RE	2.37	3.26	45
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 200 ppb Spike)	200	27.0	224	99	594	RE	RE	2.37	NA	NA
OKMN-SB-ASB41-0-0035 (C0225129 Spk C, 2 ppb Spike)	2	75.4	NA	NA	651	RE	RE	1.92	3.06	57
OKMN-SB-ASB41-0-0035 (C0225129 Spk D, 200 ppb Spike)	200	75.4	254	89	651	RE	RE	1.92	NA	NA
OKMN-SB-ASB41-0-0055 (C0225130 Spk E, 2 ppb Spike)	2	52.6	NA	NA	511	RE	RE	2.18	3.01	42
OKMN-SB-ASB41-0-0055 (C0225130 Spk F, 200 ppb Spike)	200	52.6	214	81	511	RE	RE	2.18	NA	NA
OKMN-SB-ASB41-0-0090 (C0225131 Spk G, 2 ppb Spike)	2	16.4	NA	NA	55.1	NA	NA	ND	2.04	102
OKMN-SB-ASB41-0-0090 (C0225131 Spk H, 200 ppb Spike)	200	16.4	162	73	55.1	270	107	ND	NA	NA

ND = Not detected at or above the acceptable LOQ reported on Table II.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table X. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C7 Acid PFHpA Perfluoroheptanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C8 Acid PFOA Perfluorooctanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C9 Acid PFNA Perfluorononanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB41-DB-0090 (C0225132 Spk C, 2 ppb Spike)	2	17.1	NA	NA	51.8	NA	NA	ND	2.32	116
OKMN-SB-ASB41-DB-0090 (C0225132 Spk D, 200 ppb Spike)	200	17.1	227	105	51.8	262	105	ND	NA	NA
OKMN-SB-ASB42-0-0000 (C0225133 Spk E, 2 ppb Spike)	2	ND	2.52	126	0.731	2.13	70	ND	1.53	77
OKMN-SB-ASB42-0-0000 (C0225133 Spk F, 200 ppb Spike)	200	ND	NA	NA	0.731	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0015 (C0225134 Spk G, 2 ppb Spike)	2	0.188	2.67	124	0.949	3.68	137	ND	1.54	77
OKMN-SB-ASB42-0-0015 (C0225134 Spk H, 200 ppb Spike)	200	0.188	NA	NA	0.949	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0035 (C0225135 Spk C, 2 ppb Spike)	2	12.2	NA	NA	90.2	NA	NA	0.273	1.90	81
OKMN-SB-ASB42-0-0035 (C0225135 Spk D, 200 ppb Spike)	200	12.2	211	99	90.2	388	149	0.273	NA	NA
OKMN-SB-ASB42-0-0055 (C0225136 Spk E, 2 ppb Spike)	2	13.8	NA	NA	201	NA	NA	0.439	1.91	74
OKMN-SB-ASB42-0-0055 (C0225136 Spk F, 200 ppb Spike)	200	13.8	214	100	201	385	92	0.439	NA	NA
OKMN-SB-ASB42-0-0070 (C0225137 Spk G, 2 ppb Spike)	2	11.7	NA	NA	56.0	NA	NA	ND	1.78	89
OKMN-SB-ASB42-0-0070 (C0225137 Spk H, 200 ppb Spike)	200	11.7	208	98	56.0	243	94	ND	NA	NA
OKMN-SB-ASB43-0-0015 (C0225139 Spk C, 2 ppb Spike)	2	4.77	NA	NA	49.4	NA	NA	0.221	2.06	92
OKMN-SB-ASB43-0-0015 (C0225139 Spk D, 200 ppb Spike)	200	4.77	181	88	49.4	258	104	0.221	NA	NA
OKMN-SB-ASB43-0-0035 (C0225140 Spk E, 2 ppb Spike)	2	15.5	NA	NA	432	RE	RE	2.61	3.61	50
OKMN-SB-ASB43-0-0035 (C0225140 Spk F, 200 ppb Spike)	200	15.6	204	94	432	RE	RE	2.61	NA	NA
OKMN-SB-ASB43-0-0055 (C0225141 Spk G, 2 ppb Spike)	2	31.2	NA	NA	865	RE	RE	NR	NR	NR
OKMN-SB-ASB43-0-0055 (C0225141 Spk H, 200 ppb Spike)	200	31.2	227	98	865	RE	RE	NR	NR	NR
OKMN-SB-ASB43-0-0090 (C0225142 Spk C, 2 ppb Spike)	2	26.2	NA	NA	232	NA	NA	0.924	3.05	106
OKMN-SB-ASB43-0-0090 (C0225142 Spk D, 200 ppb Spike)	200	26.2	220	97	232	514	141	0.924	NA	NA
			Average:	72		Average:	82		Average:	67
			Standard Deviation:	28		Standard Deviation:	35		Standard Deviation:	23

ND = Not detected at or above the acceptable LOQ reported on Table II.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level, see Table XIII for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples

Sample Description	C10 Acid PFDA Perfluorodecanoic Acid				C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 2 ppb Spike)	2	13.1	NA	NA	NR	NR	NR	1.08	1.92	42
OKMN-SB-ASB37-0-0055 (C0225070 Spk D, 200 ppb Spike)	200	13.1	124	55	NR	NR	NR	1.08	NA	NA
OKMN-SB-ASB37-0-0075 (C0225071 Spk E, 2 ppb Spike)	2	1.04	2.34	65	ND	1.49	75	ND	1.32	66
OKMN-SB-ASB37-0-0075 (C0225071 Spk F, 200 ppb Spike)	200	1.04	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB38-0-0000 (C0225072 Spk G, 2 ppb Spike)	2	0.875	2.04	58	ND	1.23	62	0.197	1.33	57
OKMN-SB-ASB38-0-0000 (C0225072 Spk H, 200 ppb Spike)	200	0.875	NA	NA	ND	NA	NA	0.197	NA	NA
OKMN-SB-ASB38-0-0015 (C0225073 Spk C, 2 ppb Spike)	2	NR	NR	NR	0.252	1.21	48	0.224	1.16	47
OKMN-SB-ASB38-0-0015 (C0225073 Spk D, 200 ppb Spike)	200	NR	NR	NR	0.252	NA	NA	0.224	NA	NA
OKMN-SB-ASB38-0-0035 (C0225074Spk E, 2 ppb Spike)	2	4.52	NA	NA	0.478	1.43	48	0.702	1.94	62
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 200 ppb Spike)	200	4.52	115	55	0.478	NA	NA	0.702	NA	NA
OKMN-SB-ASB38-DB-0035 (C0225075 Spk G, 2 ppb Spike)	2	5.19	NA	NA	0.582	1.63	52	0.801	2.00	60
OKMN-SB-ASB38-DB-0035 (C0225075 Spk H, 200 ppb Spike)	200	5.19	110	52	0.582	NA	NA	0.801	NA	NA
OKMN-SB-ASB38-0-0055 (C0225076 Spk C, 2 ppb Spike)	2	8.27	NA	NA	0.791	1.69	45	0.930	2.21	64
OKMN-SB-ASB38-0-0055 (C0225076 Spk D, 200 ppb Spike)	200	8.27	102	47	0.791	NA	NA	0.930	NA	NA
OKMN-SB-ASB38-0-0080 (C0225077 Spk E, 2 ppb Spike)	2	NR	NR	NR	0.276	1.07	40	0.188	1.19	50
OKMN-SB-ASB38-0-0080 (C0225077 Spk F, 200 ppb Spike)	200	NR	NR	NR	0.276	NA	NA	0.188	NA	NA
OKMN-SB-ASB39-0-0015 (C0225078 Spk G, 2 ppb Spike)	2	10.7	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB39-0-0015 (C0225078 Spk H, 200 ppb Spike)	200	10.7	110	50	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB39-DB-0015 (C0225079 Spk C, 2 ppb Spike)	2	10.2	NA	NA	1.72	2.64	46	1.49	2.5	53
OKMN-SB-ASB39-DB-0015 (C0225079 Spk D, 200 ppb Spike)	200	10.2	111	50	1.72	NA	NA	1.49	NA	NA
OKMN-SB-ASB36-0-0015 (C0225080 Spk E, 2 ppb Spike)	2	34.2	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB36-0-0015 (C0225080 Spk F, 200 ppb Spike)	200	34.2	145	55	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk G, 2 ppb Spike)	2	33.6	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk H, 200 ppb Spike)	200	33.6	150	58	NR	NR	NR	NR	NR	NR

ND = Not detected at or above the acceptable LOQ reported on Table III.

NR = Not reported due to quality control failure.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

Sample Description	C10 Acid PFDA Perfluorodecanoic Acid				C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB36-0-0030 (C0225082 Spk C, 2 ppb Spike)	2	1140	RE	RE	85.2	NA	NA	104	NA	NA
OKMN-SB-ASB36-0-0030 (C0225082 Spk D, 200 ppb Spike)	200	1140	RE	RE	85.2	232	73	104	245	71
OKMN-SB-ASB36-0-0055 (C0225083 Spk E, 2 ppb Spike)	2	111	NA	NA	4.36	NA	NA	5.67	NA	NA
OKMN-SB-ASB36-0-0055 (C0225083 Spk F, 200 ppb Spike)	200	111	224	57	4.36	115	55	5.67	134	64
OKMN-SB-ASB36-0-0095 (C0225084 Spk G, 2 ppb Spike)	2	0.246	1.30	53	ND	1.05	53	ND	1.02	51
OKMN-SB-ASB36-0-0095 (C0225084 Spk H, 200 ppb Spike)	200	0.246	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB37-0-0000 (C0225086 Spk C, 2 ppb Spike)	2	NR	NR	NR	1.38	2.28	45	NR	NR	NR
OKMN-SB-ASB37-0-0000 (C0225086 Spk D, 200 ppb Spike)	200	NR	NR	NR	1.38	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0015 (C0225087 Spk E, 2 ppb Spike)	2	13.2	NA	NA	NR	NR	NR	1.33	2.33	50
OKMN-SB-ASB37-0-0015 (C0225087 Spk F, 200 ppb Spike)	200	13.2	109	48	NR	NR	NR	1.33	NA	NA
OKMN-SB-ASB37-0-0035 (C0225088 Spk G, 2 ppb Spike)	2	6.31	NA	NA	0.767	1.63	53	0.903	1.98	54
OKMN-SB-ASB37-0-0035 (C0225088 Spk H, 200 ppb Spike)	200	6.31	102	48	0.767	NA	NA	0.903	NA	NA
OKMN-SB-ASB37-DB-0035 (C0225089 Spk C, 2 ppb Spike)	2	9.68	NA	NA	1.24	2.43	60	1.56	3.05	75
OKMN-SB-ASB37-DB-0035 (C0225089 Spk D, 200 ppb Spike)	200	9.68	119	55	1.24	NA	NA	1.56	NA	NA
OKMN-SB-ASB34-0-0035 (C0225090 Spk E, 2 ppb Spike)	2	22.6	NA	NA	5.30	NA	NA	6.54	NA	NA
OKMN-SB-ASB34-0-0035 (C0225090 Spk F, 200 ppb Spike)	200	22.6	134	56	5.30	128	61	6.54	128	61
OKMN-SB-ASB34-0-0055 (C0225091 Spk G, 2 ppb Spike)	2	29.4	NA	NA	9.83	NA	NA	11.5	NA	NA
OKMN-SB-ASB34-0-0055 (C0225091 Spk H, 200 ppb Spike)	200	29.4	187	79	9.83	149	70	11.5	139	64
OKMN-SB-ASB34-0-0085 (C0225092 Spk C, 2 ppb Spike)	2	34.4	NA	NA	NR	NR	NR	0.410	1.32	46
OKMN-SB-ASB34-0-0085 (C0225092 Spk D, 200 ppb Spike)	200	34.4	139	52	NR	NR	NR	0.410	NA	NA
OKMN-SB-ASB35-0-0000 (C0225093 Spk E, 2 ppb Spike)	2	5.51	NA	NA	2.02	3.07	53	2.69	3.56	44
OKMN-SB-ASB35-0-0000 (C0225093 Spk F, 200 ppb Spike)	200	5.51	93.6	44	2.02	NA	NA	2.69	NA	NA
OKMN-SB-ASB35-0-0015 (C0225094 Spk G, 2 ppb Spike)	2	NR	NR	NR	6.48	NA	NA	6.61	NA	NA
OKMN-SB-ASB35-0-0015 (C0225094 Spk H, 200 ppb Spike)	200	NR	NR	NR	6.48	104	48	6.61	99.8	47

ND = Not detected at or above the acceptable LOQ reported on Table III.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIV for extraction results.
NA = Not applicable, matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid			C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB35-0-0035 (C0225095 Spk C, 2 ppb Spike)	2	NR	NR	NR	5.73	NA	NA	22.5	NA	NA
OKMN-SB-ASB35-0-0035 (C0225095 Spk D, 200 ppb Spike)	200	NR	NR	NR	5.73	87.0	41	22.5	167	72
OKMN-SB-ASB35-DB-0035 (C0225096 Spk E, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	11.7	NA	NA
OKMN-SB-ASB35-DB-0035 (C0225096 Spk F, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	11.7	149	69
OKMN-SB-ASB35-0-0055 (C0225097 Spk G, 2 ppb Spike)	2	343	NA	NA	24.8	NA	NA	30.5	NA	NA
OKMN-SB-ASB35-0-0055 (C0225097 Spk H, 200 ppb Spike)	200	343	499	78	24.8	116	46	30.5	160	65
OKMN-SB-ASB35-0-0085 (C0225098 Spk C, 2 ppb Spike)	2	227	NA	NA	0.237	1.35	56	NC	1.16	58
OKMN-SB-ASB35-0-0085 (C0225098 Spk D, 200 ppb Spike)	200	227	307	40	0.237	NA	NA	ND	NA	NA
OKMN-SB-ASB36-0-0000 (C0225099 Spk E, 2 ppb Spike)	2	18.4	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 200 ppb Spike)	200	18.4	130	56	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2 ppb Spike)	2	0.802	2.11	65	ND	1.24	62	ND	1.09	55
OKMN-SB-ASB32-0-0075 (C0225100 Spk H, 200 ppb Spike)	200	0.802	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB33-0-0000 (C0225102 Spk C, 2 ppb Spike)	2	0.538	1.49	48	0.424	1.46	53	0.600	1.59	50
OKMN-SB-ASB33-0-0000 (C0225102 Spk D, 200 ppb Spike)	200	0.538	NA	NA	0.424	NA	NA	0.600	NA	NA
OKMN-SB-ASB33-0-0015 (C0225103 Spk E, 2 ppb Spike)	2	13.0	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0015 (C0225103 Spk F, 200 ppb Spike)	200	13.0	108	48	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0035 (C0225104 Spk G, 2 ppb Spike)	2	11.2	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0035 (C0225104 Spk H, 200 ppb Spike)	200	11.2	98.6	44	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-DB-0035 (C0225105 Spk C, 2 ppb Spike)	2	9.72	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-DB-0035 (C0225105 Spk D, 200 ppb Spike)	200	9.72	139	65	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0055 (C0225106 Spk E, 2 ppb Spike)	2	18.7	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0055 (C0225106 Spk F, 200 ppb Spike)	200	18.7	138	60	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB33-0-0085 (C0225107 Spk G, 2 ppb Spike)	2	31.9	NA	NA	3.99	5.54	78	3.94	5.32	69
OKMN-SB-ASB33-0-0085 (C0225107 Spk H, 200 ppb Spike)	200	31.9	165	67	3.99	NA	NA	3.94	NA	NA

ND = Not detected at or above the acceptable LOQ reported on Table III.
NR = Not reported due to quality control failure.
NA = Not applicable, matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

Sample Description	C10 Acid PFDA Perfluorodecanoic Acid				C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0000 (C0225108 Spk C, 2 ppb Spike)	2	0.529	1.43	45	0.476	1.40	46	0.873	1.70	41
OKMN-SB-ASB34-0-0000 (C0225108 Spk D, 200 ppb Spike)	200	0.529	NA	NA	0.476	NA	NA	0.873	NA	NA
OKMN-SB-ASB34-0-0015 (C0225109 Spk E, 2 ppb Spike)	2	8.85	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB34-0-0015 (C0225109 Spk F, 200 ppb Spike)	200	8.85	98.9	45	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0000 (C0225110 Spk G, 2 ppb Spike)	2	0.237	1.23	50	0.212	1.26	52	0.328	1.39	53
OKMN-SB-ASB31-0-0000 (C0225110 Spk H, 200 ppb Spike)	200	0.237	NA	NA	0.212	NA	NA	0.328	NA	NA
OKMN-SB-ASB31-0-0015 (C0225111 Spk C, 2 ppb Spike)	2	4.00	6.90	145	1.57	2.44	44	NR	NR	NR
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 200 ppb Spike)	200	4.00	NA	NA	1.57	NA	NA	NR	NR	NR
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	21.0	NA	NA
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	21.0	100	40
OKMN-SB-ASB31-0-0055 (C0225113 Spk G, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk C, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0070 (C0225114 Spk D, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk E, 2 ppb Spike)	2	2.43	3.38	48	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0000 (C0225115 Spk F, 200 ppb Spike)	200	2.43	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB32-0-0015 (C0225116 Spk G, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	9.32	NA	NA
OKMN-SB-ASB32-0-0015 (C0225116 Spk H, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	9.32	113	52
OKMN-SB-ASB32-DB-0015 (C0225117 Spk C, 2 ppb Spike)	2	104	NA	NA	7.86	NA	NA	9.12	NA	NA
OKMN-SB-ASB32-DB-0015 (C0225117 Spk D, 200 ppb Spike)	200	104	267	82	7.86	184	88	9.12	199	95
OKMN-SB-ASB32-0-0035 (C0225118 Spk E, 2 ppb Spike)	2	132	NA	NA	7.30	NA	NA	7.35	NA	NA
OKMN-SB-ASB32-0-0035 (C0225118 Spk F, 200 ppb Spike)	200	132	277	73	7.30	165	79	7.35	183	88
OKMN-SB-ASB32-0-0055 (C0225119 Spk G, 2 ppb Spike)	2	112	NA	NA	6.29	NA	NA	7.76	NA	NA
OKMN-SB-ASB32-0-0055 (C0225119 Spk H, 200 ppb Spike)	200	112	276	82	6.29	167	80	7.76	174	83

NR = Not reported due to quality control failure.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

Sample Description	C10 Acid PFDA Perfluorodecanoic Acid				C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0035 (C0225120 Spk C, 2 ppb Spike)	2	23.8	NA	NA	4.11	NA	NA	6.10	NA	NA
OKMN-SB-ASB39-0-0035 (C0225120 Spk D, 200 ppb Spike)	200	23.8	233	105	4.11	182	89	6.10	217	105
OKMN-SB-ASB39-0-0055 (C0225121 Spk E, 2 ppb Spike)	2	36.3	NA	NA	4.35	NA	NA	5.15	NA	NA
OKMN-SB-ASB39-0-0055 (C0225121 Spk F, 200 ppb Spike)	200	36.3	238	101	4.35	157	76	5.15	170	82
OKMN-SB-ASB39-0-0070 (C0225122 Spk G, 2 ppb Spike)	2	26.1	NA	NA	2.04	3.61	79	2.52	4.77	113
OKMN-SB-ASB39-0-0070 (C0225122 Spk H, 200 ppb Spike)	200	26.1	195	84	2.04	NA	NA	2.52	NA	NA
OKMN-SB-ASB40-0-0000 (C0225123 Spk C, 2 ppb Spike)	2	0.736	2.83	105	ND	2.30	115	ND	2.72	136
OKMN-SB-ASB40-0-0000 (C0225123 Spk D, 200 ppb Spike)	200	0.736	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB40-0-0015 (C0225124 Spk E, 2 ppb Spike)	2	0.825	2.87	102	0.191	2.14	97	ND	2.28	114
OKMN-SB-ASB40-0-0015 (C0225124 Spk F, 200 ppb Spike)	200	0.825	NA	NA	0.191	NA	NA	ND	NA	NA
OKMN-SB-ASB40-0-0035 (C0225125 Spk G, 2 ppb Spike)	2	1.17	3.27	105	ND	2.47	124	ND	1.92	96
OKMN-SB-ASB40-0-0035 (C0225125 Spk H, 200 ppb Spike)	200	1.17	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB40-0-0055 (C0225126 Spk C, 2 ppb Spike)	2	NR	NR	NR	ND	2.37	119	ND	2.94	147
OKMN-SB-ASB40-0-0055 (C0225126 Spk D, 200 ppb Spike)	200	NR	NR	NR	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB40-0-0090 (C0225127 Spk E, 2 ppb Spike)	2	ND	2.26	113	ND	2.21	111	ND	2.19	110
OKMN-SB-ASB40-0-0090 (C0225127 Spk F, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 2 ppb Spike)	2	9.01	NA	NA	0.397	2.45	103	0.213	2.60	119
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 200 ppb Spike)	200	9.01	194	92	0.397	NA	NA	0.213	NA	NA
OKMN-SB-ASB41-0-0035 (C0225129 Spk C, 2 ppb Spike)	2	34.1	NA	NA	2.65	4.44	90	1.83	3.78	98
OKMN-SB-ASB41-0-0035 (C0225129 Spk D, 200 ppb Spike)	200	34.1	237	101	2.65	NA	NA	1.83	NA	NA
OKMN-SB-ASB41-0-0055 (C0225130 Spk E, 2 ppb Spike)	2	31.1	NA	NA	2.32	4.14	91	NR	NR	NR
OKMN-SB-ASB41-0-0055 (C0225130 Spk F, 200 ppb Spike)	200	31.1	216	92	2.32	NA	NA	NR	NR	NR
OKMN-SB-ASB41-0-0090 (C0225131 Spk G, 2 ppb Spike)	2	ND	2.15	108	ND	1.85	93	ND	1.78	89
OKMN-SB-ASB41-0-0090 (C0225131 Spk H, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	ND	NA	NA

ND = Not detected at or above the acceptable LOQ reported on Table III.
NR = Not reported due to quality control failure.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XI. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid			C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB41-DB-0090 (C0225132 Spk C, 2 ppb Spike)	2	ND	2.26	113	ND	1.99	100	ND	2.10	105
OKMN-SB-ASB41-DB-0090 (C0225132 Spk D, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0000 (C0225133 Spk E, 2 ppb Spike)	2	ND	1.73	87	ND	2.10	105	ND	2.39	120
OKMN-SB-ASB42-0-0000 (C0225133 Spk F, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0015 (C0225134 Spk G, 2 ppb Spike)	2	0.210	1.93	86	ND	2.05	103	ND	2.36	118
OKMN-SB-ASB42-0-0015 (C0225134 Spk H, 200 ppb Spike)	200	0.210	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB42-0-0035 (C0225135 Spk C, 2 ppb Spike)	2	0.299	2.59	115	ND	2.36	118	0.232	2.38	107
OKMN-SB-ASB42-0-0035 (C0225135 Spk D, 200 ppb Spike)	200	0.299	NA	NA	ND	NA	NA	0.232	NA	NA
OKMN-SB-ASB42-0-0055 (C0225136 Spk E, 2 ppb Spike)	2	0.796	3.98	159	ND	2.18	109	0.202	2.41	110
OKMN-SB-ASB42-0-0055 (C0225136 Spk F, 200 ppb Spike)	200	0.796	NA	NA	ND	NA	NA	0.202	NA	NA
OKMN-SB-ASB42-0-0070 (C0225137 Spk G, 2 ppb Spike)	2	0.396	2.49	105	ND	2.29	115	ND	2.21	111
OKMN-SB-ASB42-0-0070 (C0225137 Spk H, 200 ppb Spike)	200	0.396	NA	NA	ND	NA	NA	ND	NA	NA
OKMN-SB-ASB43-0-0015 (C0225139 Spk C, 2 ppb Spike)	2	0.601	2.77	108	ND	2.54	127	0.365	2.69	116
OKMN-SB-ASB43-0-0015 (C0225139 Spk D, 200 ppb Spike)	200	0.601	NA	NA	ND	NA	NA	0.365	NA	NA
OKMN-SB-ASB43-0-0035 (C0225140 Spk E, 2 ppb Spike)	2	10.0	NA	NA	2.65	4.10	73	3.72	4.83	56
OKMN-SB-ASB43-0-0035 (C0225140 Spk F, 200 ppb Spike)	200	10.0	192	91	2.65	NA	NA	3.72	NA	NA
OKMN-SB-ASB43-0-0055 (C0225141 Spk G, 2 ppb Spike)	2	10.6	NA	NA	2.69	3.91	61	3.09	4.53	72
OKMN-SB-ASB43-0-0055 (C0225141 Spk H, 200 ppb Spike)	200	10.6	166	78	2.69	NA	NA	3.09	NA	NA
OKMN-SB-ASB43-0-0090 (C0225142 Spk C, 2 ppb Spike)	2	0.187	2.49	115	ND	2.12	106	ND	2.49	125
OKMN-SB-ASB43-0-0090 (C0225142 Spk D, 200 ppb Spike)	200	0.187	NA	NA	ND	NA	NA	ND	NA	NA
			Average:	75		Average:	75		Average:	77
			Standard Deviation:	28		Standard Deviation:	26		Standard Deviation:	29

NR = Not reported due to quality control failure.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples

		C4 Sulfonate PFBS Perfluorobutanesulfonate			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 2 ppb Spike)	2	1.68	4.50	141	7.18	NA	NA	15200	RE	RE
OKMN-SB-ASB37-0-0055 (C0225070 Spk D, 200 ppb Spike)	200	1.68	NA	NA	7.18	102	47	15200	RE	RE
OKMN-SB-ASB37-0-0075 (C0225071 Spk E, 2 ppb Spike)	2	0.182	1.19	50	0.614	1.56	47	622	RE	RE
OKMN-SB-ASB37-0-0075 (C0225071 Spk F, 200 ppb Spike)	200	0.182	NA	NA	0.614	NA	NA	622	RE	RE
OKMN-SB-ASB38-0-0000 (C0225072 Spk G, 2 ppb Spike)	2	0.536	1.57	52	1.76	2.70	62	318	NA	NA
OKMN-SB-ASB38-0-0000 (C0225072 Spk H, 200 ppb Spike)	200	0.536	NA	NA	1.76	NA	NA	318	451	67
OKMN-SB-ASB38-0-0015 (C0225073 Spk C, 2 ppb Spike)	2	0.720	1.66	47	5.45	NA	NA	878	RE	RE
OKMN-SB-ASB38-0-0015 (C0225073 Spk D, 200 ppb Spike)	200	0.720	NA	NA	5.45	103	49	878	RE	RE
OKMN-SB-ASB38-0-0035 (C0225074Spk E, 2 ppb Spike)	2	1.62	3.52	86	8.05	NA	NA	1010	RE	RE
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 200 ppb Spike)	200	1.82	NA	NA	8.05	114	53	1010	RE	RE
OKMN-SB-ASB38-DB-0035 (C0225075 Spk G, 2 ppb Spike)	2	1.81	2.96	58	8.55	NA	NA	1270	RE	RE
OKMN-SB-ASB38-DB-0035 (C0225075 Spk H, 200 ppb Spike)	200	1.81	NA	NA	8.55	118	54	1270	RE	RE
OKMN-SB-ASB38-0-0055 (C0225076 Spk C, 2 ppb Spike)	2	2.35	3.32	49	9.60	NA	NA	1490	RE	RE
OKMN-SB-ASB38-0-0055 (C0225076 Spk D, 200 ppb Spike)	200	2.35	NA	NA	9.60	102	46	1490	RE	RE
OKMN-SB-ASB38-0-0080 (C0225077 Spk E, 2 ppb Spike)	2	1.61	2.47	43	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB38-0-0080 (C0225077 Spk F, 200 ppb Spike)	200	1.61	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB39-0-0015 (C0225078 Spk G, 2 ppb Spike)	2	8.55	NA	NA	68.7	NA	NA	6000	RE	RE
OKMN-SB-ASB39-0-0015 (C0225078 Spk H, 200 ppb Spike)	200	8.55	109	50	68.7	169	50	6000	RE	RE
OKMN-SB-ASB39-DB-0015 (C0225079 Spk C, 2 ppb Spike)	2	10.7	NA	NA	82.8	NA	NA	5350	RE	RE
OKMN-SB-ASB39-DB-0015 (C0225079 Spk D, 200 ppb Spike)	200	10.7	116	52	82.8	171	44	5350	RE	RE
OKMN-SB-ASB36-0-0015 (C0225080 Spk E, 2 ppb Spike)	2	6.85	NA	NA	58.3	NA	NA	NR	NR	NR
OKMN-SB-ASB36-0-0015 (C0225080 Spk F, 200 ppb Spike)	200	6.85	103	48	58.3	148	45	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk G, 2 ppb Spike)	2	8.68	NA	NA	62.7	NA	NA	21600	RE	RE
OKMN-SB-ASB36-DB-0015 (C0225081 Spk H, 200 ppb Spike)	200	8.68	110	51	62.7	143	40	21600	RE	RE

NR = Not reported due to quality control failure.

RE = Re-extraction required at a higher fortification level; see Table XIV for extraction results.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples (continued)

		C4 Sulfonate PFBS Perfluorobutanesulfonate			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB36-0-0030 (C0225082 Spk C, 2 ppb Spike)	2	22.6	NA	NA	NR	NR	NR	34300	RE	RE
OKMN-SB-ASB36-0-0030 (C0225082 Spk D, 200 ppb Spike)	200	22.6	113	45	NR	NR	NR	34300	RE	RE
OKMN-SB-ASB36-0-0055 (C0225083 Spk E, 2 ppb Spike)	2	20.2	NA	NA	NR	NR	NR	10300	RE	RE
OKMN-SB-ASB36-0-0055 (C0225083 Spk F, 200 ppb Spike)	200	20.2	115	47	NR	NR	NR	10300	RE	RE
OKMN-SB-ASB36-0-0095 (C0225084 Spk G, 2 ppb Spike)	2	15.2	NA	NA	10.5	NA	NA	79.3	NA	NA
OKMN-SB-ASB36-0-0095 (C0225084 Spk H, 200 ppb Spike)	200	15.2	121	53	10.6	132	61	79.3	267	94
OKMN-SB-ASB37-0-0000 (C0225086 Spk C, 2 ppb Spike)	2	0.368	1.50	57	2.11	5.16	153	NR	NR	NR
OKMN-SB-ASB37-0-0000 (C0225086 Spk D, 200 ppb Spike)	200	0.368	NA	NA	2.11	NA	NA	NR	NR	NR
OKMN-SB-ASB37-0-0015 (C0225087 Spk E, 2 ppb Spike)	2	2.32	3.23	46	15.1	NA	NA	5080	RE	RE
OKMN-SB-ASB37-0-0015 (C0225087 Spk F, 200 ppb Spike)	200	2.32	NA	NA	15.1	114	49	5080	RE	RE
OKMN-SB-ASB37-0-0035 (C0225088 Spk G, 2 ppb Spike)	2	0.835	2.65	91	7.12	NA	NA	2550	RE	RE
OKMN-SB-ASB37-0-0035 (C0225088 Spk H, 200 ppb Spike)	200	0.835	NA	NA	7.12	102	47	2550	RE	RE
OKMN-SB-ASB37-DB-0035 (C0225089 Spk C, 2 ppb Spike)	2	1.04	1.91	44	9.67	NA	NA	2930	RE	RE
OKMN-SB-ASB37-DB-0035 (C0225089 Spk D, 200 ppb Spike)	200	1.04	NA	NA	9.67	125	58	2930	RE	RE
OKMN-SB-ASB34-0-0035 (C0225090 Spk E, 2 ppb Spike)	2	7.80	NA	NA	128	NA	NA	7840	RE	RE
OKMN-SB-ASB34-0-0035 (C0225090 Spk F, 200 ppb Spike)	200	7.80	103	48	128	306	89	7840	RE	RE
OKMN-SB-ASB34-0-0055 (C0225091 Spk G, 2 ppb Spike)	2	23.9	NA	NA	945	RE	RE	63200	RE	RE
OKMN-SB-ASB34-0-0055 (C0225091 Spk H, 200 ppb Spike)	200	23.9	120	48	945	RE	RE	63200	RE	RE
OKMN-SB-ASB34-0-0085 (C0225092 Spk C, 2 ppb Spike)	2	162	NA	NA	4060	RE	RE	12800	RE	RE
OKMN-SB-ASB34-0-0085 (C0225092 Spk D, 200 ppb Spike)	200	162	261	50	4060	RE	RE	12800	RE	RE
OKMN-SB-ASB35-0-0000 (C0225093 Spk E, 2 ppb Spike)	2	0.496	1.85	68	NR	NR	NR	205	NA	NA
OKMN-SB-ASB35-0-0000 (C0225093 Spk F, 200 ppb Spike)	200	0.496	NA	NA	NR	NR	NR	205	288	42
OKMN-SB-ASB35-0-0015 (C0225094 Spk G, 2 ppb Spike)	2	11.9	NA	NA	NR	NR	NR	8510	RE	RE
OKMN-SB-ASB36-0-0015 (C0225094 Spk H, 200 ppb Spike)	200	11.9	103	46	NR	NR	NR	8510	RE	RE

NR = Not reported due to quality control failure.

RE = Re-extraction required at a higher fortification level; see Table XIV for extraction results.

NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples (continued)

	C4 Sulfonate PFBS Perfluorobutanesulfonate				C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB35-0-0035 (C0225095 Spk C, 2 ppb Spike)	2	21.2	NA	NA	NR	NR	NR	29800	RE	RE
OKMN-SB-ASB35-0-0035 (C0225095 Spk D, 200 ppb Spike)	200	21.2	112	45	NR	NR	NR	29800	RE	RE
OKMN-SB-ASB35-DB-0035 (C0225096 Spk E, 2 ppb Spike)	2	18.8	NA	NA	107	NA	NA	26100	RE	RE
OKMN-SB-ASB35-DB-0035 (C0225096 Spk F, 200 ppb Spike)	200	18.8	109	45	107	197	45	26100	RE	RE
OKMN-SB-ASB36-0-0055 (C0225097 Spk G, 2 ppb Spike)	2	49.5	NA	NA	409	RE	RE	24500	RE	RE
OKMN-SB-ASB36-0-0055 (C0225097 Spk H, 200 ppb Spike)	200	49.5	165	58	409	RE	RE	24500	RE	RE
OKMN-SB-ASB35-0-0085 (C0225098 Spk C, 2 ppb Spike)	2	83.4	NA	NA	70.8	NA	NA	NR	NR	NR
OKMN-SB-ASB35-0-0085 (C0225098 Spk D, 200 ppb Spike)	200	83.4	169	43	70.8	161	45	NR	NR	NR
OKMN-SB-ASB36-0-0000 (C0225099 Spk E, 2 ppb Spike)	2	0.360	1.29	47	1.97	3.64	84	1210	RE	RE
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 200 ppb Spike)	200	0.360	NA	NA	1.97	NA	NA	1210	RE	RE
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2 ppb Spike)	2	NR	NR	NR	189	NA	NA	NR	NR	NR
OKMN-SB-ASB32-0-0075 (C0225100 Spk H, 200 ppb Spike)	200	NR	NR	NR	189	305	58	NR	NR	NR
OKMN-SB-ASB33-0-0000 (C0225102 Spk C, 2 ppb Spike)	2	NR	NR	NR	0.557	2.17	81	117	NA	NA
OKMN-SB-ASB33-0-0000 (C0225102 Spk D, 200 ppb Spike)	200	NR	NR	NR	0.557	NA	NA	117	257	70
OKMN-SB-ASB33-0-0015 (C0225103 Spk E, 2 ppb Spike)	2	5.31	NA	NA	NR	NR	NR	4070	RE	RE
OKMN-SB-ASB33-0-0015 (C0225103 Spk F, 200 ppb Spike)	200	5.31	86.7	41	NR	NR	NR	4070	RE	RE
OKMN-SB-ASB33-0-0035 (C0225104 Spk G, 2 ppb Spike)	2	3.43	4.79	68	NR	NR	NR	3290	RE	RE
OKMN-SB-ASB33-0-0035 (C0225104 Spk H, 200 ppb Spike)	200	3.43	NA	NA	NR	NR	NR	3290	RE	RE
OKMN-SB-ASB33-DB-0035 (C0225105 Spk C, 2 ppb Spike)	2	NR	NR	NR	46.4	NA	NA	4610	RE	RE
OKMN-SB-ASB33-DB-0035 (C0225105 Spk D, 200 ppb Spike)	200	NR	NR	NR	46.4	180	67	4610	RE	RE
OKMN-SB-ASB33-0-0055 (C0225106 Spk E, 2 ppb Spike)	2	15.4	NA	NA	167	NA	NA	4820	RE	RE
OKMN-SB-ASB33-0-0055 (C0225106 Spk F, 200 ppb Spike)	200	15.4	117	51	167	339	86	4820	RE	RE
OKMN-SB-ASB33-0-0085 (C0225107 Spk G, 2 ppb Spike)	2	NR	NR	NR	1070	RE	RE	22600	RE	RE
OKMN-SB-ASB33-0-0085 (C0225107 Spk H, 200 ppb Spike)	200	NR	NR	NR	1070	RE	RE	22600	RE	RE

NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level, see Table XIV for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples (continued)

		C4 Sulfonate PFBS Perfluorobutanesulfonate			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0000 (C0225108 Spk C, 2 ppb Spike)	2	ND	1.00	50	0.412	1.52	55	NR	NR	NR
OKMN-SB-ASB34-0-0000 (C0225108 Spk D, 200 ppb Spike)	200	ND	NA	NA	0.412	NA	NA	NR	NR	NR
OKMN-SB-ASB34-0-0015 (C0225109 Spk E, 2 ppb Spike)	2	NR	NR	NR	20.4	NA	NA	5010	RE	RE
OKMN-SB-ASB34-0-0015 (C0225109 Spk F, 200 ppb Spike)	200	NR	NR	NR	20.4	120	50	5010	RE	RE
OKMN-SB-ASB31-0-0000 (C0225110 Spk G, 2 ppb Spike)	2	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0000 (C0225110 Spk H, 200 ppb Spike)	200	NR	NR	NR	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB31-0-0015 (C0225111 Spk C, 2 ppb Spike)	2	5.89	NA	NA	NR	NR	NR	1880	RE	RE
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 200 ppb Spike)	200	5.89	111	53	NR	NR	NR	1880	RE	RE
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2 ppb Spike)	2	18.2	NA	NA	827	RE	RE	57500	RE	RE
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 200 ppb Spike)	200	18.2	172	77	827	RE	RE	57500	RE	RE
OKMN-SB-ASB31-0-0055 (C0225113 Spk G, 2 ppb Spike)	2	17.6	NA	NA	1120	RE	RE	38300	RE	RE
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 200 ppb Spike)	200	17.6	128	55	1120	RE	RE	38300	RE	RE
OKMN-SB-ASB31-0-0070 (C0225114 Spk C, 2 ppb Spike)	2	33.5	NA	NA	NR	NR	NR	58800	RE	RE
OKMN-SB-ASB31-0-0070 (C0225114 Spk D, 200 ppb Spike)	200	33.5	155	61	NR	NR	NR	58800	RE	RE
OKMN-SB-ASB32-0-0000 (C0225115 Spk E, 2 ppb Spike)	2	2.37	3.30	47	8.02	NA	NA	1110	RE	RE
OKMN-SB-ASB32-0-0000 (C0225115 Spk F, 200 ppb Spike)	200	2.37	NA	NA	8.02	87.9	40	1110	RE	RE
OKMN-SB-ASB32-0-0015 (C0225116 Spk G, 2 ppb Spike)	2	63.1	NA	NA	876	RE	RE	34500	RE	RE
OKMN-SB-ASB32-0-0015 (C0225116 Spk H, 200 ppb Spike)	200	63.1	149	43	876	RE	RE	34500	RE	RE
OKMN-SB-ASB32-DB-0015 (C0225117 Spk C, 2 ppb Spike)	2	81.1	NA	NA	1100	RE	RE	26500	RE	RE
OKMN-SB-ASB32-DB-0015 (C0225117 Spk D, 200 ppb Spike)	200	81.1	225	72	1100	RE	RE	26500	RE	RE
OKMN-SB-ASB32-0-0035 (C0225118 Spk E, 2 ppb Spike)	2	79.1	NA	NA	NR	NR	NR	101000	RE	RE
OKMN-SB-ASB32-0-0035 (C0225118 Spk F, 200 ppb Spike)	200	79.1	313	117	NR	NR	NR	101000	RE	RE
OKMN-SB-ASB32-0-0055 (C0225119 Spk G, 2 ppb Spike)	2	89.1	NA	NA	1090	RE	RE	NR	NR	NR
OKMN-SB-ASB32-0-0055 (C0225119 Spk H, 200 ppb Spike)	200	89.1	239	75	1090	RE	RE	NR	NR	NR

ND = Not detected at or above the acceptable LOQ reported on Table IV.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIV for extraction results.
NA = Not applicable; matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C4 Sulfonate PFBS Perfluorobutanesulfonate			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
		Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0035 (C0225120 Spk C, 2 ppb Spike)	2	9.57	NA	NA	156	NA	NA	12100	RE	RE
OKMN-SB-ASB39-0-0035 (C0225120 Spk D, 200 ppb Spike)	200	9.57	182	86	156	347	96	12100	RE	RE
OKMN-SB-ASB39-0-0055 (C0225121 Spk E, 2 ppb Spike)	2	20.4	NA	NA	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB39-0-0055 (C0225121 Spk F, 200 ppb Spike)	200	20.4	193	86	NR	NR	NR	NR	NR	NR
OKMN-SB-ASB39-0-0070 (C0225122 Spk G, 2 ppb Spike)	2	12.2	NA	NA	188	NA	NA	NR	NR	NR
OKMN-SB-ASB39-0-0070 (C0225122 Spk H, 200 ppb Spike)	200	12.2	182	85	188	360	86	NR	NR	NR
OKMN-SB-ASB40-0-0000 (C0225123 Spk C, 2 ppb Spike)	2	0.238	2.29	103	ND	2.58	129	173	NA	NA
OKMN-SB-ASB40-0-0000 (C0225123 Spk D, 200 ppb Spike)	200	0.238	NA	NA	ND	NA	NA	173	394	111
OKMN-SB-ASB40-0-0015 (C0225124 Spk E, 2 ppb Spike)	2	0.452	1.96	75	0.777	2.97	110	185	NA	NA
OKMN-SB-ASB40-0-0015 (C0225124 Spk F, 200 ppb Spike)	200	0.452	NA	NA	0.777	NA	NA	185	429	122
OKMN-SB-ASB40-0-0035 (C0225125 Spk G, 2 ppb Spike)	2	0.451	2.58	106	2.05	3.50	73	339	NA	NA
OKMN-SB-ASB40-0-0035 (C0225125 Spk H, 200 ppb Spike)	200	0.451	NA	NA	2.05	NA	NA	339	456	59
OKMN-SB-ASB40-0-0055 (C0225126 Spk C, 2 ppb Spike)	2	0.483	2.30	91	0.908	3.69	139	120	NA	NA
OKMN-SB-ASB40-0-0055 (C0225126 Spk D, 200 ppb Spike)	200	0.483	NA	NA	0.908	NA	NA	120	290	85
OKMN-SB-ASB40-0-0090 (C0225127 Spk E, 2 ppb Spike)	2	0.453	1.65	60	0.686	2.60	96	33.4	NA	NA
OKMN-SB-ASB40-0-0090 (C0225127 Spk F, 200 ppb Spike)	200	0.453	NA	NA	0.686	NA	NA	33.4	216	91
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 2 ppb Spike)	2	6.30	NA	NA	66.4	NA	NA	5180	RE	RE
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 200 ppb Spike)	200	6.30	186	90	66.4	240	87	5180	RE	RE
OKMN-SB-ASB41-0-0035 (C0225129 Spk C, 2 ppb Spike)	2	10.1	NA	NA	27.5	NA	NA	1520	RE	RE
OKMN-SB-ASB41-0-0035 (C0225129 Spk D, 200 ppb Spike)	200	10.1	195	92	27.5	240	106	1520	RE	RE
OKMN-SB-ASB41-0-0055 (C0225130 Spk E, 2 ppb Spike)	2	6.86	NA	NA	27.0	NA	NA	2150	RE	RE
OKMN-SB-ASB41-0-0055 (C0225130 Spk F, 200 ppb Spike)	200	6.86	194	94	27.0	263	118	2150	RE	RE
OKMN-SB-ASB41-0-0090 (C0225131 Spk G, 2 ppb Spike)	2	3.70	5.96	113	3.44	5.82	119	18.2	NA	NA
OKMN-SB-ASB41-0-0090 (C0225131 Spk H, 200 ppb Spike)	200	3.70	NA	NA	3.44	NA	NA	18.2	214	98

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NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level; see Table XIV for extraction results.
NA = Not applicable, matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Soil Samples (continued)

Sample Description	C4 Sulfonate PFBS Perfluorobutanesulfonate				C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB41-DB-0090 (C0225132 Spk C, 2 ppb Spike)	2	3.64	5.14	75	3.28	4.84	78	20.2	NA	NA
OKMN-SB-ASB41-DB-0090 (C0225132 Spk D, 200 ppb Spike)	200	3.64	NA	NA	3.28	NA	NA	20.2	216	98
OKMN-SB-ASB42-0-0000 (C0225133 Spk E, 2 ppb Spike)	2	ND	2.07	104	ND	1.76	88	21.3	NA	NA
OKMN-SB-ASB42-0-0000 (C0225133 Spk F, 200 ppb Spike)	200	ND	NA	NA	ND	NA	NA	21.3	223	101
OKMN-SB-ASB42-0-0015 (C0225134 Spk G, 2 ppb Spike)	2	0.261	2.36	105	ND	2.29	115	54.9	NA	NA
OKMN-SB-ASB42-0-0015 (C0225134 Spk H, 200 ppb Spike)	200	0.261	NA	NA	ND	NA	NA	54.9	267	106
OKMN-SB-ASB42-0-0035 (C0225135 Spk C, 2 ppb Spike)	2	3.93	5.25	66	10.8	NA	NA	158	NA	NA
OKMN-SB-ASB42-0-0035 (C0225135 Spk D, 200 ppb Spike)	200	3.93	NA	NA	10.8	201	95	158	399	121
OKMN-SB-ASB42-0-0055 (C0225136 Spk E, 2 ppb Spike)	2	4.25	NA	NA	15.2	NA	NA	NR	NR	NR
OKMN-SB-ASB42-0-0055 (C0225136 Spk F, 200 ppb Spike)	200	4.25	182	89	15.2	213	99	NR	NR	NR
OKMN-SB-ASB42-0-0070 (C0225137 Spk G, 2 ppb Spike)	2	3.69	5.51	91	4.60	NA	NA	67.3	NA	NA
OKMN-SB-ASB42-0-0070 (C0225137 Spk H, 200 ppb Spike)	200	3.69	NA	NA	4.60	182	89	67.3	227	80
OKMN-SB-ASB43-0-0015 (C0225139 Spk C, 2 ppb Spike)	2	3.92	4.97	53	12.9	NA	NA	190	NA	NA
OKMN-SB-ASB43-0-0015 (C0225139 Spk D, 200 ppb Spike)	200	3.92	NA	NA	12.9	181	84	190	352	81
OKMN-SB-ASB43-0-0035 (C0225140 Spk E, 2 ppb Spike)	2	6.03	NA	NA	93.7	NA	NA	3510	RE	RE
OKMN-SB-ASB43-0-0035 (C0225140 Spk F, 200 ppb Spike)	200	6.03	208	101	93.7	292	99	3510	RE	RE
OKMN-SB-ASB43-0-0055 (C0225141 Spk G, 2 ppb Spike)	2	14.1	NA	NA	173	NA	NA	4760	RE	RE
OKMN-SB-ASB43-0-0055 (C0225141 Spk H, 200 ppb Spike)	200	14.1	194	90	173	316	72	4760	RE	RE
OKMN-SB-ASB43-0-0090 (C0225142 Spk C, 2 ppb Spike)	2	7.87	NA	NA	26.6	NA	NA	NR	NR	NR
OKMN-SB-ASB43-0-0090 (C0225142 Spk D, 200 ppb Spike)	200	7.87	199	96	26.6	233	103	NR	NR	NR
			Average:	68		Average:	77		Average:	89
: = Not reported due to quality control failure.			Standard Deviation:	24		Standard Deviation:	29		Standard Deviation:	22

ND = Not detected at or above the acceptable LOQ reported on Table IV.
NR = Not reported due to quality control failure.
RE = Re-extraction required at a higher fortification level, see Table XIV for extraction results.
NA = Not applicable: matrix spike level outside the relevant range for the endogenous concentration in the sample. 2 ng/g spike relevant for 0.2 ng/g to less than 4 ng/g endogenous level in the sample and 200 ng/g spike relevant for 4.0 ng/g to less than 400 ng/g endogenous level in the sample.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIII. Matrix Spike Recovery of PFBA, PFHA, PFHpA, and PFOA in Re-extracted Soil Samples

Sample Description	Amount Spiked (ng/g)	C4 Acid PFBA Perfluorobutanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C6 Acid PFHA Perfluorohexanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C7 Acid PFHpA Perfluoroheptanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C8 Acid PFOA Perfluorooctanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB37-0-0075 (C0225071 Spk D, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0015 (C0225073 Spk E, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB38-DB-0035 (C0225075 Spk G, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB38-0-0035 (C0225076 Spk H, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0015 (C0225078 Spk I, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	418	1160	93
OKMN-SB-ASB39-0-0015 (C0225078 Spk J, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-DB-0015 (C0225079 Spk K, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	452	1300	106
OKMN-SB-ASB39-DB-0015 (C0225079 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0015 (C0225080 Spk M, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	997	2550	78
OKMN-SB-ASB36-0-0015 (C0225080 Spk N, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-DB-0015 (C0225081 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	959	3940	149
OKMN-SB-ASB36-DB-0015 (C0225081 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0030 (C0225082 Spk E, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	1500	3390	95
OKMN-SB-ASB36-0-0030 (C0225082 Spk F, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0055 (C0225083 Spk G, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	2450	5470	76
OKMN-SB-ASB36-0-0055 (C0225083 Spk H, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB37-0-0015 (C0225087 Spk I, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB37-0-0035 (C0225088 Spk J, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB37-DB-0035 (C0225089 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0035 (C0225090 Spk L, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB34-0-0035 (C0225090 Spk M, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIII. Matrix Spike Recovery of PFBA, PFHA, PFHpA, and PFOA in Re-extracted Soil Samples (continued)

		C4 Acid PFBA Perfluorobutanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid			C7 Acid PFHpA Perfluoroheptanoic Acid			C8 Acid PFOA Perfluorooctanoic Acid		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0055 (C0225091 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0055 (C0225091 Spk D, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	4230	16400	152
OKMN-SB-ASB34-0-0055 (C0225091 Spk E, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0085 (C0225092 Spk F, 2000 ppb Spike)	2000	1160	2870	86	730	2480	88	884	2720	92	-	-	-
OKMN-SB-ASB34-0-0085 (C0225092 Spk G, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0085 (C0225092 Spk H, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	13100	35700	113
OKMN-SB-ASB35-0-0015 (C0225094 Spk I, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	884	2700	91
OKMN-SB-ASB35-0-0015 (C0225094 Spk J, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-0-0035 (C0225095 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	2770	6210	86
OKMN-SB-ASB35-0-0035 (C0225095 Spk L, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-DB-0035 (C0225096 Spk M, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB35-DB-0035 (C0225096 Spk N, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-0-0055 (C0225097 Spk C, 2000 ppb Spike)	2000	-	-	-	619	2510	95	824	2990	108	-	-	-
OKMN-SB-ASB35-0-0055 (C0225097 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	12000	34700	114
OKMN-SB-ASB35-0-0085 (C0225098 Spk E, 4000 ppb Spike)	4000	-	-	-	999	4160	79	1080	4290	80	3300	4980	42
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2000 ppb Spike)	2000	1320	3000	84	538	2590	103	-	-	-	1820	3760	97
OKMN-SB-ASB33-0-0015 (C0225103 Spk H, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	599	1180	73
OKMN-SB-ASB33-0-0015 (C0225103 Spk I, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB33-0-0035 (C0225104 Spk J, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB33-DB-0035 (C0225105 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB33-0-0055 (C0225106 Spk L, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	671	2390	86
OKMN-SB-ASB33-0-0085 (C0225107 Spk M, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	3140	7330	105
OKMN-SB-ASB33-0-0085 (C0225107 Spk N, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIII. Matrix Spike Recovery of PFBA, PFHA, PFHpA, and PFOA in Re-extracted Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C4 Acid PFBA Perfluorobutanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C6 Acid PFHA Perfluorohexanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C7 Acid PFHpA Perfluoroheptanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C8 Acid PFOA Perfluorooctanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0015 (C0225109 Spk C, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB31-0-0035 (C0225112 Spk G, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0055 (C0225113 Spk I, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	5490	10400	61
OKMN-SB-ASB31-0-0055 (C0225113 Spk J, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0070 (C0225114 Spk K, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0070 (C0225114 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	8360	16400	101
OKMN-SB-ASB31-0-0070 (C0225114 Spk M, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0000 (C0225115 Spk N, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0015 (C0225116 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0015 (C0225116 Spk D, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	4130	15500	142
OKMN-SB-ASB32-0-0015 (C0225116 Spk E, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-DB-0015 (C0225117 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	3170	5580	121
OKMN-SB-ASB32-DB-0015 (C0225117 Spk G, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0035 (C0225118 Spk H, 2000 ppb Spike)	2000	759	2060	65	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0035 (C0225118 Spk I, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	11000	30800	98
OKMN-SB-ASB32-0-0035 (C0225118 Spk J, 80000 ppb Spike)	80000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0055 (C0225119 Spk K, 2000 ppb Spike)	2000	816	1900	54	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0055 (C0225119 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	5050	14500	118
OKMN-SB-ASB32-0-0055 (C0225119 Spk M, 40000 ppb Spike)	40000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0035 (C0225120 Spk N, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	931	3690	138
OKMN-SB-ASB39-0-0035 (C0225120 Spk O, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIII. Matrix Spike Recovery of PFBA, PFHA, PFHpA, and PFOA in Re-extracted Soil Samples (continued)

Sample Description	Amount Spiked (ng/g)	C4 Acid PFBA Perfluorobutanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C6 Acid PFHA Perfluorohexanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C7 Acid PFHpA Perfluoroheptanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	C8 Acid PFOA Perfluorooctanoic Acid: Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0055 (C0225121 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	1260	4440	159
OKMN-SB-ASB39-0-0055 (C0225121 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0070 (C0225122 Spk E, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	855	1850	124
OKMN-SB-ASB39-0-0070 (C0225122 Spk F, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	594	1600	126
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB41-0-0035 (C0225129 Spk I, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	651	1270	77
OKMN-SB-ASB41-0-0055 (C0225130 Spk J, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	511	1300	99
OKMN-SB-ASB41-0-0055 (C0225130 Spk K, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB43-0-0035 (C0225140 Spk L, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	432	1500	134
OKMN-SB-ASB43-0-0035 (C0225140 Spk M, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB43-0-0055 (C0225141 Spk N, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-	865	1470	76
OKMN-SB-ASB43-0-0055 (C0225141 Spk O, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-	-	-	-
			Average:	72		Average:	91		Average:	93		Average:	104
			Standard Deviation:	15		Standard Deviation:	10		Standard Deviation:	14		Standard Deviation:	28

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIV. Matrix Spike Recovery of PFDA, PFHS, and PFOS in Re-extracted Soil Samples

		C10 Acid PFDA Perfluorodecanoic Acid			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB37-0-0055 (C0225070 Spk C, 20000 ppb Spike)	20000	-	-	-	-	-	-	15200	32000	84
OKMN-SB-ASB37-0-0075 (C0225071 Spk D, 800 ppb Spike)	800	-	-	-	-	-	-	622	1300	85
OKMN-SB-ASB38-0-0015 (C0225073 Spk E, 2000 ppb Spike)	2000	-	-	-	-	-	-	878	3130	113
OKMN-SB-ASB38-0-0035 (C0225074 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	1010	3270	113
OKMN-SB-ASB38-DB-0035 (C0225075 Spk G, 2000 ppb Spike)	2000	-	-	-	-	-	-	1270	3330	103
OKMN-SB-ASB38-0-0035 (C0225076 Spk H, 2000 ppb Spike)	2000	-	-	-	-	-	-	1490	3620	107
OKMN-SB-ASB39-0-0015 (C0225078 Spk I, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0015 (C0225078 Spk J, 8000 ppb Spike)	8000	-	-	-	-	-	-	6000	12500	81
OKMN-SB-ASB39-DB-0015 (C0225079 Spk K, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-DB-0015 (C0225079 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	5350	13900	107
OKMN-SB-ASB36-0-0015 (C0225080 Spk M, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0015 (C0225080 Spk N, 20000 ppb Spike)	20000	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB36-DB-0015 (C0225081 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-DB-0015 (C0225081 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	21600	44800	115
OKMN-SB-ASB36-0-0030 (C0225082 Spk E, 2000 ppb Spike)	2000	1140	2950	91	-	-	-	-	-	-
OKMN-SB-ASB36-0-0030 (C0225082 Spk F, 40000 ppb Spike)	40000	-	-	-	-	-	-	34300	78400	110
OKMN-SB-ASB36-0-0055 (C0225083 Spk G, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0055 (C0225083 Spk H, 20000 ppb Spike)	20000	-	-	-	-	-	-	10300	30700	102
OKMN-SB-ASB37-0-0015 (C0225087 Spk I, 8000 ppb Spike)	8000	-	-	-	-	-	-	5080	13800	109
OKMN-SB-ASB37-0-0035 (C0225088 Spk J, 4000 ppb Spike)	4000	-	-	-	-	-	-	2550	6800	106
OKMN-SB-ASB37-DB-0035 (C0225089 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	2930	8710	145
OKMN-SB-ASB34-0-0035 (C0225090 Spk L, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0035 (C0225090 Spk M, 8000 ppb Spike)	8000	-	-	-	-	-	-	7840	16900	113

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIV. Matrix Spike Recovery of PFDA, PFHS, and PFOS in Re-extracted Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0055 (C0225091 Spk C, 2000 ppb Spike)	2000	-	-	-	945	3100	108	-	-	-
OKMN-SB-ASB34-0-0055 (C0225091 Spk D, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0055 (C0225091 Spk E, 40000 ppb Spike)	40000	-	-	-	-	-	-	63200	117000	135
OKMN-SB-ASB34-0-0085 (C0225092 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB34-0-0085 (C0225092 Spk G, 8000 ppb Spike)	8000	-	-	-	4060	11200	89	-	-	-
OKMN-SB-ASB34-0-0085 (C0225092 Spk H, 20000 ppb Spike)	20000	-	-	-	-	-	-	12800	38000	126
OKMN-SB-ASB35-0-0015 (C0225094 Spk I, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-0-0015 (C0225094 Spk J, 20000 ppb Spike)	20000	-	-	-	-	-	-	8510	30200	108
OKMN-SB-ASB35-0-0035 (C0225095 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-0-0035 (C0225095 Spk L, 40000 ppb Spike)	40000	-	-	-	-	-	-	29800	78300	121
OKMN-SB-ASB35-DB-0035 (C0225096 Spk M, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB35-DB-0035 (C0225096 Spk N, 40000 ppb Spike)	40000	-	-	-	-	-	-	26100	70900	112
OKMN-SB-ASB35-0-0055 (C0225097 Spk C, 2000 ppb Spike)	2000	-	-	-	409	2730	116	-	-	-
OKMN-SB-ASB35-0-0055 (C0225097 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	24500	47500	115
OKMN-SB-ASB35-0-0085 (C0225098 Spk E, 4000 ppb Spike)	4000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB36-0-0000 (C0225099 Spk F, 2000 ppb Spike)	2000	-	-	-	-	-	-	1210	3290	104
OKMN-SB-ASB32-0-0075 (C0225100 Spk G, 2000 ppb Spike)	2000	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB33-0-0015 (C0225103 Spk H, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB33-0-0015 (C0225103 Spk I, 4000 ppb Spike)	4000	-	-	-	-	-	-	4070	7410	84
OKMN-SB-ASB33-0-0035 (C0225104 Spk J, 4000 ppb Spike)	4000	-	-	-	-	-	-	3290	9430	154
OKMN-SB-ASB33-DB-0035 (C0225105 Spk K, 4000 ppb Spike)	4000	-	-	-	-	-	-	4810	7380	69
OKMN-SB-ASB33-0-0055 (C0225106 Spk L, 2000 ppb Spike)	2000	-	-	-	-	-	-	4820	6020	60
OKMN-SB-ASB33-0-0085 (C0225107 Spk M, 4000 ppb Spike)	4000	-	-	-	1070	5940	122	-	-	-
OKMN-SB-ASB33-0-0085 (C0225107 Spk N, 20000 ppb Spike)	20000	-	-	-	-	-	-	22600	36600	70

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIV. Matrix Spike Recovery of PFDA, PFHS, and PFOS in Re-extracted Soil Samples (continued)

		C10 Acid PFDA Perfluorodecanoic Acid			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB34-0-0015 (C0225109 Spk C, 8000 ppb Spike)	8000	-	-	-	-	-	-	5010	13700	109
OKMN-SB-ASB31-0-0015 (C0225111 Spk D, 2000 ppb Spike)	2000	-	-	-	-	-	-	1880	3780	95
OKMN-SB-ASB31-0-0035 (C0225112 Spk E, 2000 ppb Spike)	2000	-	-	-	827	2960	107	-	-	-
OKMN-SB-ASB31-0-0035 (C0225112 Spk F, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0035 (C0225112 Spk G, 40000 ppb Spike)	40000	-	-	-	-	-	-	57500	98600	103
OKMN-SB-ASB31-0-0055 (C0225113 Spk H, 2000 ppb Spike)	2000	-	-	-	1120	2380	63	-	-	-
OKMN-SB-ASB31-0-0055 (C0225113 Spk I, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0055 (C0225113 Spk J, 40000 ppb Spike)	40000	-	-	-	-	-	-	38300	66400	70
OKMN-SB-ASB31-0-0070 (C0225114 Spk K, 2000 ppb Spike)	2000	-	-	-	NR	NR	NR	-	-	-
OKMN-SB-ASB31-0-0070 (C0225114 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB31-0-0070 (C0225114 Spk M, 40000 ppb Spike)	40000	-	-	-	-	-	-	56800	91400	82
OKMN-SB-ASB32-0-0000 (C0225115 Spk N, 2000 ppb Spike)	2000	-	-	-	-	-	-	1110	3380	114
OKMN-SB-ASB32-0-0015 (C0225116 Spk C, 2000 ppb Spike)	2000	-	-	-	876	2550	84	-	-	-
OKMN-SB-ASB32-0-0015 (C0225116 Spk D, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0015 (C0225116 Spk E, 40000 ppb Spike)	40000	-	-	-	-	-	-	34500	64600	75
OKMN-SB-ASB32-DB-0015 (C0225117 Spk F, 2000 ppb Spike)	2000	-	-	-	1100	3050	98	-	-	-
OKMN-SB-ASB32-DB-0015 (C0225117 Spk G, 20000 ppb Spike)	20000	-	-	-	-	-	-	26600	52200	129
OKMN-SB-ASB32-0-0035 (C0225118 Spk H, 2000 ppb Spike)	2000	-	-	-	NR	NR	NR	-	-	-
OKMN-SB-ASB32-0-0035 (C0225118 Spk I, 20000 ppb Spike)	20000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0035 (C0225118 Spk J, 80000 ppb Spike)	80000	-	-	-	-	-	-	101000	142000	51
OKMN-SB-ASB32-0-0055 (C0225119 Spk K, 2000 ppb Spike)	2000	-	-	-	1090	2160	51	-	-	-
OKMN-SB-ASB32-0-0055 (C0225119 Spk L, 8000 ppb Spike)	8000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB32-0-0055 (C0225119 Spk M, 40000 ppb Spike)	40000	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB39-0-0035 (C0225120 Spk N, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0035 (C0225120 Spk O, 20000 ppb Spike)	20000	-	-	-	-	-	-	12100	29600	88

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XIV. Matrix Spike Recovery of PFDA, PFHS, and PFOS in Re-extracted Soil Samples (continued)

Sample Description	C10 Acid PFDA Perfluorodecanoic Acid				C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
	Amount Spiked (ng/g)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)	Amt Found in Sample (ng/g)	Amount Recovered (ng/g)	Recovery (%)
OKMN-SB-ASB39-0-0055 (C0225121 Spk C, 2000 ppb Spike)	2000	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0055 (C0225121 Spk D, 20000 ppb Spike)	20000	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB39-0-0070 (C0225122 Spk E, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB39-0-0070 (C0225122 Spk F, 4000 ppb Spike)	4000	-	-	-	-	-	-	NR	NR	NR
OKMN-SB-ASB41-0-0015 (C0225128 Spk G, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB41-0-0015 (C0225128 Spk H, 8000 ppb Spike)	8000	-	-	-	-	-	-	5180	13700	107
OKMN-SB-ASB41-0-0035 (C0225129 Spk I, 800 ppb Spike)	800	-	-	-	-	-	-	1520	2070	69
OKMN-SB-ASB41-0-0055 (C0225130 Spk J, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB41-0-0055 (C0225130 Spk K, 2000 ppb Spike)	2000	-	-	-	-	-	-	2150	4100	98
OKMN-SB-ASB43-0-0035 (C0225140 Spk L, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB43-0-0035 (C0225140 Spk M, 4000 ppb Spike)	4000	-	-	-	-	-	-	3510	9550	151
OKMN-SB-ASB43-0-0055 (C0225141 Spk N, 800 ppb Spike)	800	-	-	-	-	-	-	-	-	-
OKMN-SB-ASB43-0-0055 (C0225141 Spk O, 8000 ppb Spike)	8000	-	-	-	-	-	-	4760	16200	143
						Average:	93		Average:	103
						Standard Deviation:	24		Standard Deviation:	24

NR = Not reported due to quality control failure.
Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.

Table XV. Matrix Spike Recovery of PFBA, PFPeA, and PFHA in Water Samples

Sample Description	C4 Acid PFBA Perfluorobutanoic Acid				C5 Acid PFPeA Perfluoropentanoic Acid			C6 Acid PFHA Perfluorohexanoic Acid		
	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
OKMN-SB-TRIP1-LS-061204 (C0225144, 0.25 ppb Spike)	0.25	ND	0.272	109	ND	0.210	84	ND	0.225	90
OKMN-SB-TRIP1-HS-061204 (C0225145, 5.0 ppb Spike)	5.0	ND	5.23	105	ND	4.96	99	ND	5.10	102
OKMN-SB-TRIP2-LS-061204 (C0225147, 0.25 ppb Spike)	0.25	ND	0.285	114	ND	0.281	112	ND	0.253	101
OKMN-SB-TRIP2-HS-061204 (C0225148, 5.0 ppb Spike)	5.0	ND	6.05	121	ND	5.07	101	ND	4.40	88
			Average:	112		Average:	99		Average:	95
			Standard Deviation:	7		Standard Deviation:	12		Standard Deviation:	7

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.
ND = Not detected at or above the acceptable LOQ reported on Table V.

Table XVI. Matrix Spike Recovery of PFHpA, PFOA, and PFNA in Water Samples

Sample Description	C7 Acid PFHpA Perfluoroheptanoic Acid				C8 Acid PFOA Perfluorooctanoic Acid			C9 Acid PFNA Perfluorononanoic Acid		
	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
OKMN-SB-TRIP1-LS-061204 (C0225144, 0.25 ppb Spike)	0.25	ND	0.180	72	ND	0.320	128	ND	0.220	88
OKMN-SB-TRIP1-HS-061204 (C0225145, 5.0 ppb Spike)	5.0	ND	4.35	87	ND	5.67	113	ND	5.42	108
OKMN-SB-TRIP2-LS-061204 (C0225147, 0.25 ppb Spike)	0.25	ND	0.188	75	ND	0.270	108	ND	0.257	103
OKMN-SB-TRIP2-HS-061204 (C0225148, 5.0 ppb Spike)	5.0	ND	4.70	94	ND	6.02	120	ND	4.91	98
			Average:	**82**		**Average:**	**117**		**Average:**	**99**
			Standard Deviation:	**10**		**Standard Deviation:**	**9**		**Standard Deviation:**	**9**

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.
ND = Not detected at or above the acceptable LOQ reported on Table VI.

Table XVII. Matrix Spike Recovery of PFDA, PFUnA, and PFDoA in Water Samples

		C10 Acid PFDA Perfluorodecanoic Acid			C11 Acid PFUnA Perfluoroundecanoic Acid			C12 Acid PFDoA Perfluorododecanoic Acid		
Sample Description	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
OKMN-SB-TRIP1-LS-061204 (C0225144, 0.25 ppb Spike)	0.25	ND	0.236	94	ND	0.290	116	ND	0.186	74
OKMN-SB-TRIP1-HS-061204 (C0225145, 5.0 ppb Spike)	5.0	ND	5.11	102	ND	5.33	107	ND	5.29	106
OKMN-SB-TRIP2-LS-061204 (C0225147, 0.25 ppb Spike)	0.25	ND	0.316	126	ND	0.267	107	ND	0.240	96
OKMN-SB-TRIP2-HS-061204 (C0225148, 5.0 ppb Spike)	5.0	ND	5.83	117	ND	5.94	119	ND	4.79	96
			Average:	110		Average:	112		Average:	93
			Standard Deviation:	14		Standard Deviation:	6		Standard Deviation:	13

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.
ND = Not detected at or above the acceptable LOQ reported on Table VII.

Table XVIII. Matrix Spike Recovery of PFBS, PFHS, and PFOS in Water Samples

		C4 Sulfonate PFBS Perfluorobutanesulfonate			C6 Sulfonate PFHS Perfluorohexanesulfonate			C8 Sulfonate PFOS Perfluorooctanesulfonate		
Sample Description	Amount Spiked (ng/mL)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)	Amt Found in Sample (ng/mL)	Amount Recovered (ng/mL)	Recovery (%)
OKMN-SB-TRIP1-LS-061204 (C0225144, 0.25 ppb Spike)	0.25	ND	0.233	93	ND	0.280	112	ND	0.211	84
OKMN-SB-TRIP1-HS-061204 (C0225145, 5.0 ppb Spike)	5.0	ND	4.16	83	ND	5.12	102	ND	3.94	79
OKMN-SB-TRIP2-LS-061204 (C0225147, 0.25 ppb Spike)	0.25	ND	0.276	110	ND	0.260	104	ND	0.182	73
OKMN-SB-TRIP2-HS-061204 (C0225148, 5.0 ppb Spike)	5.0	ND	4.82	96	ND	5.44	109	ND	4.51	90
			Average:	96		Average:	107		Average:	82
			Standard Deviation:	11		Standard Deviation:	4		Standard Deviation:	7

Note: Since this summary table shows rounded results, recovery values may vary slightly from the values in the raw data.
ND = Not detected at or above the acceptable LOQ reported on Table VIII.

Table XIX. Total Percent Solids for Soil Samples

Exygen ID	Client Sample ID	Total Percent Solids (%)
C0225070	OKMN-SB-ASB37-0-0055	88.85
C0225071	OKMN-SB-ASB37-0-0075	92.63
C0225072	OKMN-SB-ASB38-0-0000	91.90
C0225073	OKMN-SB-ASB38-0-0015	90.28
C0225074	OKMN-SB-ASB38-0-0035	90.70
C0225075	OKMN-SB-ASB38-DB-0035	90.37
C0225076	OKMN-SB-ASB38-0-0055	91.16
C0225077	OKMN-SB-ASB38-0-0080	91.45
C0225078	OKMN-SB-ASB39-0-0015	93.69
C0225079	OKMN-SB-ASB39-DB-0015	93.58
C0225080	OKMN-SB-ASB36-0-0015	93.03
C0225081	OKMN-SB-ASB36-DB-0015	92.13
C0225082	OKMN-SB-ASB36-0-0030	92.17
C0225083	OKMN-SB-ASB36-0-0055	90.29
C0225084	OKMN-SB-ASB36-0-0095	89.67
C0225086	OKMN-SB-ASB37-0-0000	89.26
C0225087	OKMN-SB-ASB37-0-0015	92.06
C0225088	OKMN-SB-ASB37-0-0035	92.71
C0225089	OKMN-SB-ASB37-DB-0035	91.50
C0225090	OKMN-SB-ASB34-0-0035	90.20
C0225091	OKMN-SB-ASB34-0-0055	91.10
C0225092	OKMN-SB-ASB34-0-0085	72.66
C0225093	OKMN-SB-ASB35-0-0000	87.00
C0225094	OKMN-SB-ASB35-0-0015	92.24
C0225095	OKMN-SB-ASB35-0-0035	92.98
C0225096	OKMN-SB-ASB35-DB-0035	93.49
C0225097	OKMN-SB-ASB35-0-0055	92.01
C0225098	OKMN-SB-ASB35-0-0085	85.07
C0225099	OKMN-SB-ASB36-0-0000	82.83
C0225100	OKMN-SB-ASB32-0-0075	92.84
C0225102	OKMN-SB-ASB33-0-0000	91.02
C0225103	OKMN-SB-ASB33-0-0015	93.28
C0225104	OKMN-SB-ASB33-0-0035	90.80
C0225105	OKMN-SB-ASB33-DB-0035	91.46

Table XIX. Total Percent Solids for Soil Samples (continued)

Exygen ID	Client Sample ID	Total Percent Solids (%)
C0225106	OKMN-SB-ASB33-0-0055	88.77
C0225107	OKMN-SB-ASB33-0-0085	90.62
C0225108	OKMN-SB-ASB34-0-0000	90.59
C0225109	OKMN-SB-ASB34-0-0015	93.19
C0225110	OKMN-SB-ASB31-0-0000	83.81
C0225111	OKMN-SB-ASB31-0-0015	92.16
C0225112	OKMN-SB-ASB31-0-0035	90.80
C0225113	OKMN-SB-ASB31-0-0055	90.88
C0225114	OKMN-SB-ASB31-0-0070	91.58
C0225115	OKMN-SB-ASB32-0-0000	85.68
C0225116	OKMN-SB-ASB32-0-0015	93.54
C0225117	OKMN-SB-ASB32-DB-0015	93.93
C0225118	OKMN-SB-ASB32-0-0035	93.45
C0225119	OKMN-SB-ASB32-0-0055	92.51
C0225120	OKMN-SB-ASB39-0-0035	90.63
C0225121	OKMN-SB-ASB39-0-0055	89.85
C0225122	OKMN-SB-ASB39-0-0070	90.57
C0225123	OKMN-SB-ASB40-0-0000	83.06
C0225124	OKMN-SB-ASB40-0-0015	89.85
C0225125	OKMN-SB-ASB40-0-0035	90.82
C0225126	OKMN-SB-ASB40-0-0055	90.21
C0225127	OKMN-SB-ASB40-0-0090	88.24
C0225128	OKMN-SB-ASB41-0-0015	90.19
C0225129	OKMN-SB-ASB41-0-0035	90.16
C0225130	OKMN-SB-ASB41-0-0055	91.51
C0225131	OKMN-SB-ASB41-0-0090	88.38
C0225132	OKMN-SB-ASB41-DB-0090	89.18
C0225133	OKMN-SB-ASB42-0-0000	86.50
C0225134	OKMN-SB-ASB42-0-0015	91.96
C0225135	OKMN-SB-ASB42-0-0035	93.79
C0225136	OKMN-SB-ASB42-0-0055	90.56
C0225137	OKMN-SB-ASB42-0-0070	89.06
C0225139	OKMN-SB-ASB43-0-0015	91.69
C0225140	OKMN-SB-ASB43-0-0035	90.90
C0225141	OKMN-SB-ASB43-0-0055	89.60
C0225142	OKMN-SB-ASB43-0-0090	89.72

FIGURES

Figure 1. Typical Non-Extracted Calibration Curve for PFBA in 50:50 Acetonitrile:Water

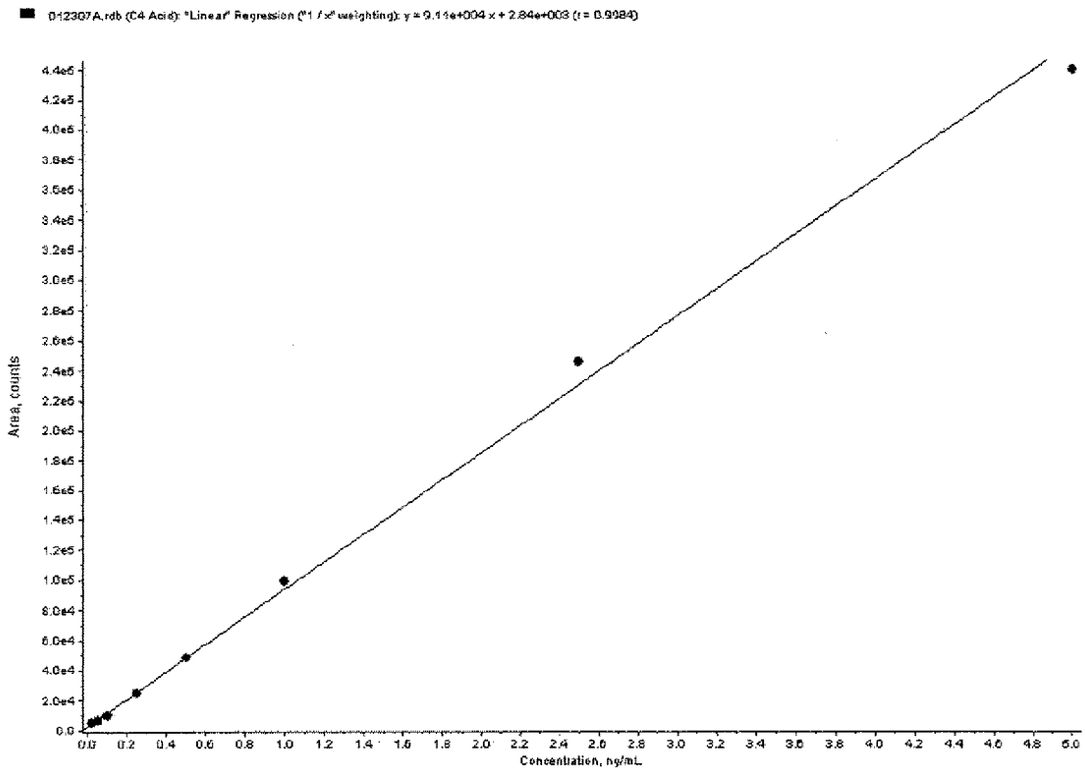


Figure 2. Non-Extracted Standards of PFBA in 50:50 Acetonitrile:Water, 0.025 ng/mL and 0.05 ng/mL, Respectively

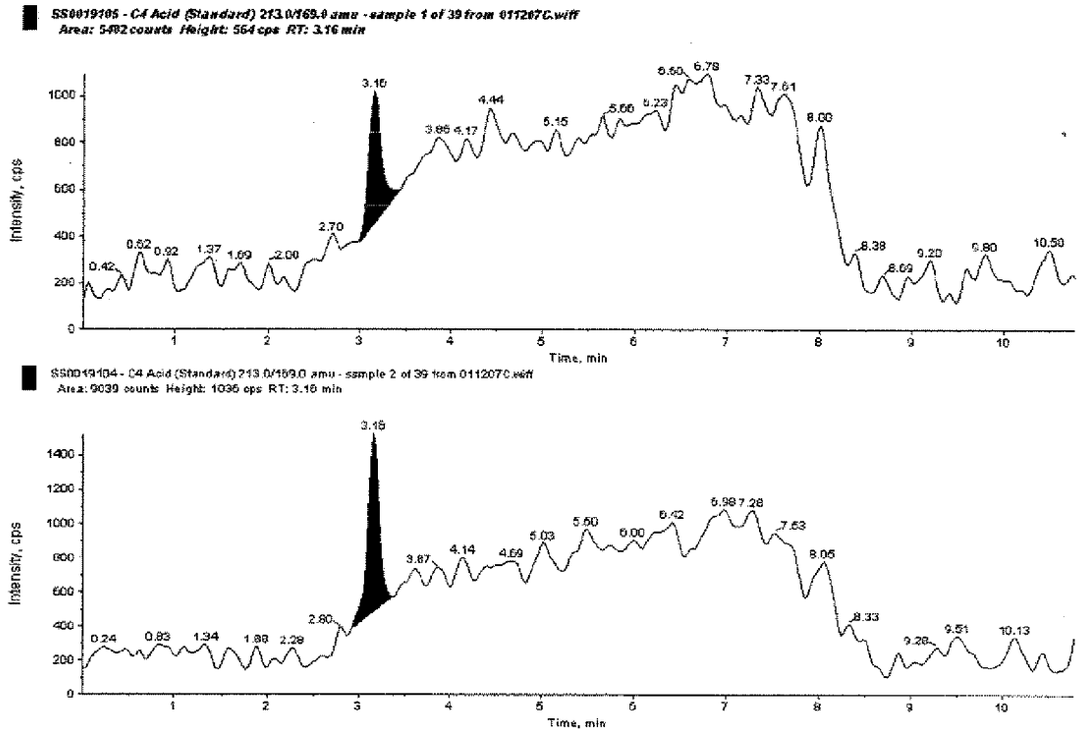


Figure 3. PFBA in a Control Blank, a 2.0 ng/g Fortified Control Spike A, and a 20 ng/g Fortified Control Spike B, Respectively

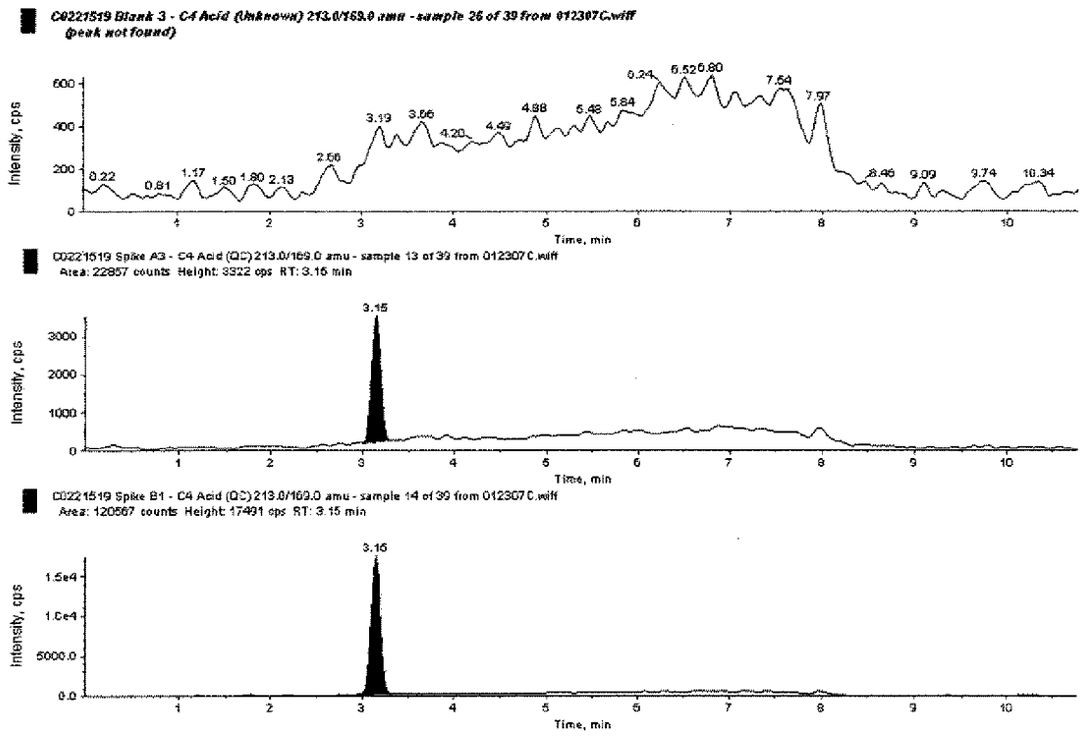


Figure 4. Chromatogram Representing a Soil Sample Analyzed for PFBA (Exygen ID: C0225092, Data Set: 011207A)

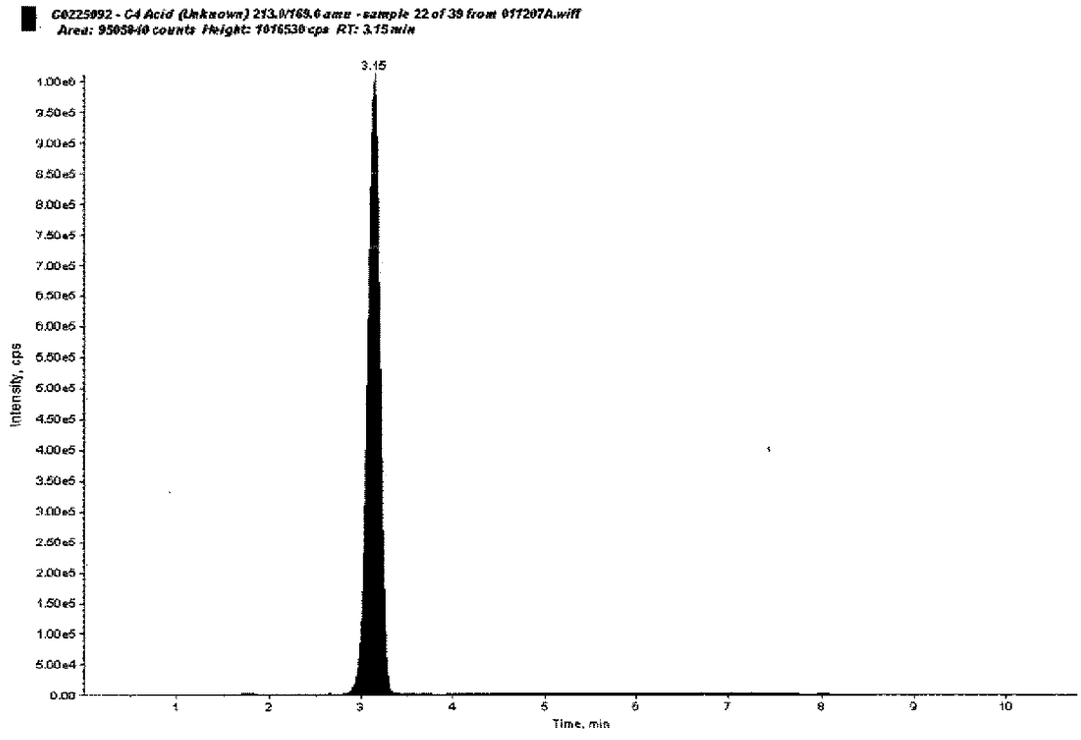


Figure 5. PFBA in a Reagent Blank, a 0.25 ng/mL Fortified Reagent Spike A, and a 2.5 ng/mL Fortified Reagent Spike B, Respectively

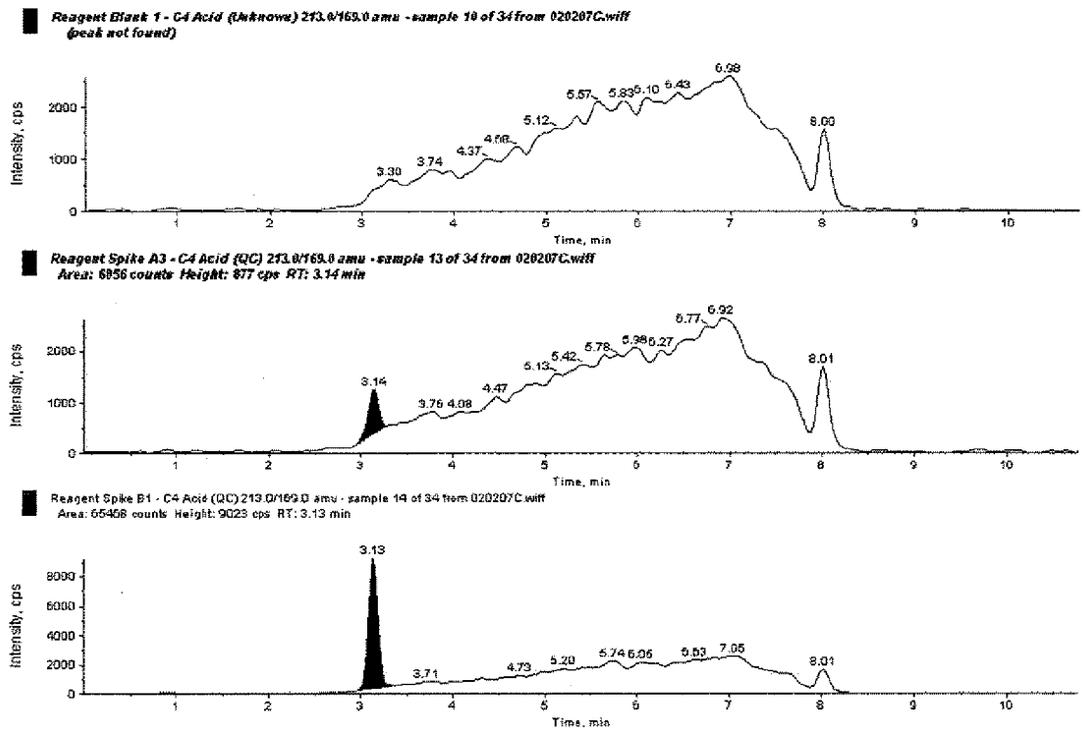


Figure 6. Chromatogram Representing a Water Sample Analyzed for PFBA (Exygen ID: C0225143, Data Set: 020207C)

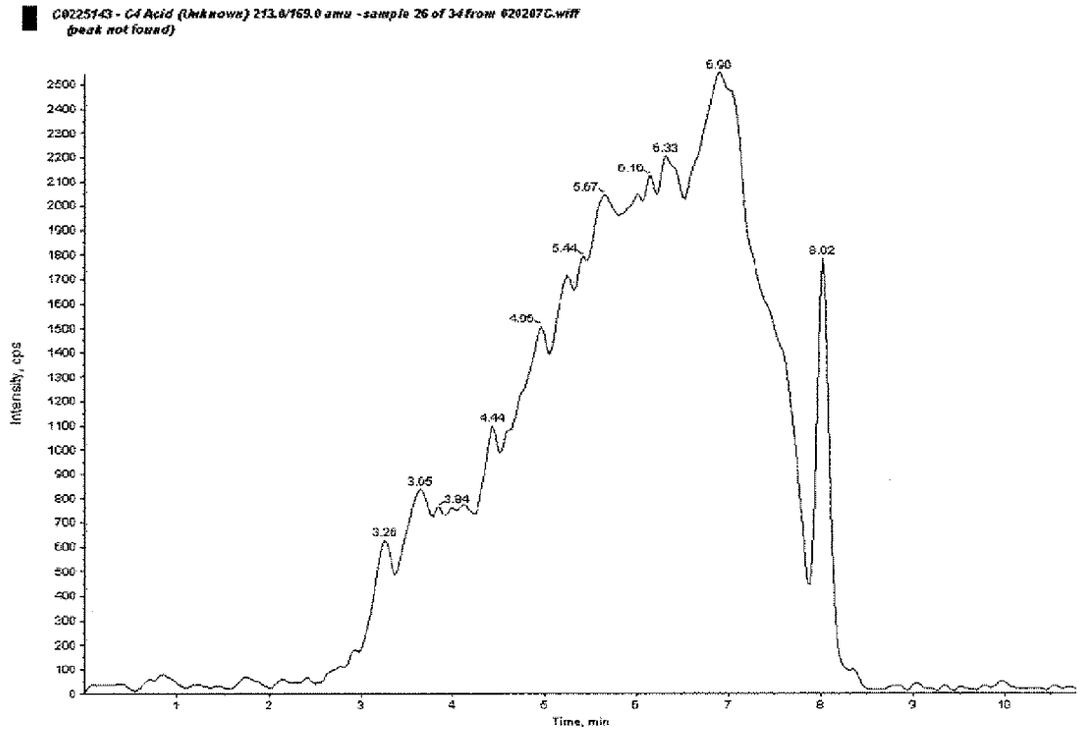


Figure 7. Typical Non-Extracted Calibration Curve for PFPeA in 50:50 Acetonitrile:Water

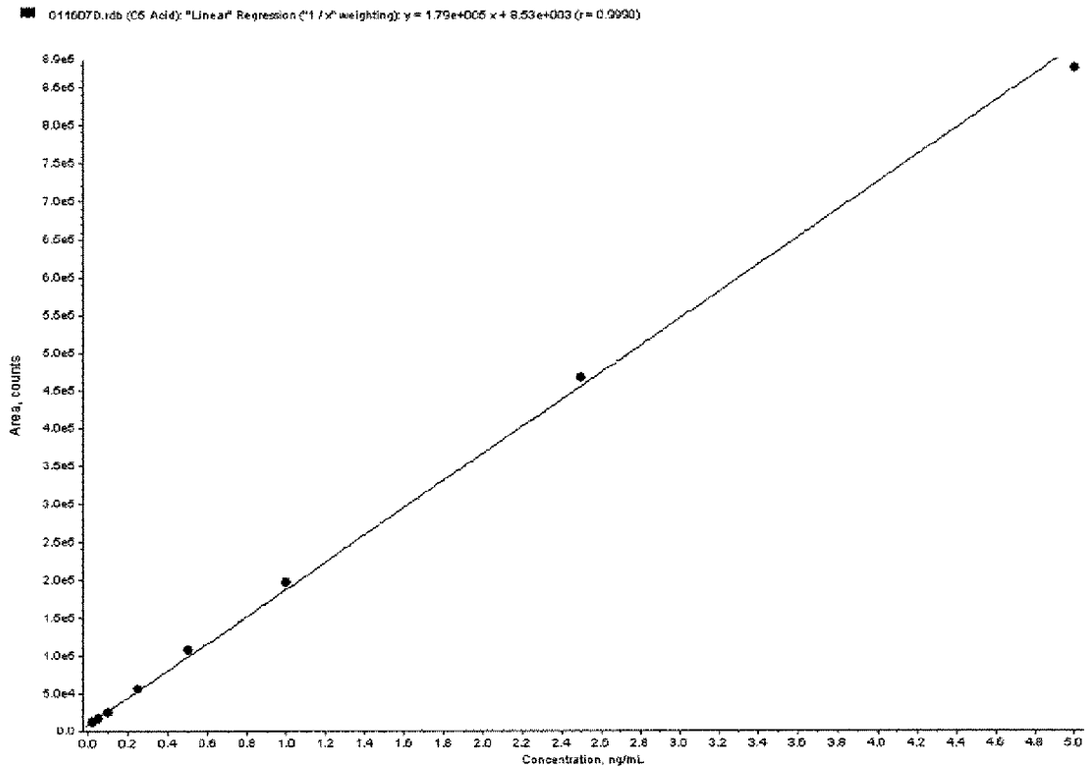


Figure 8. Non-Extracted Standards of PFPeA in 50:50 Acetonitrile:Water, 0.025 ng/mL and 0.05 ng/mL, Respectively

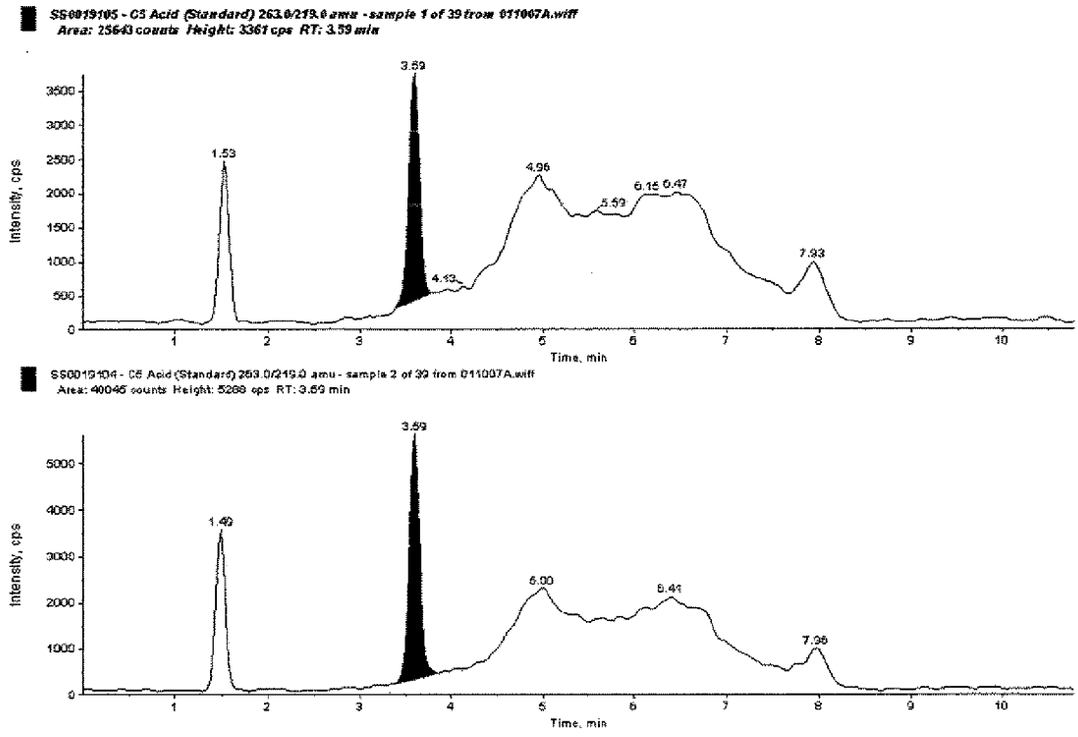


Figure 9. PFPeA in a Control Blank, a 2.0 ng/g Fortified Control Spike A, and a 20 ng/g Fortified Control Spike B, Respectively

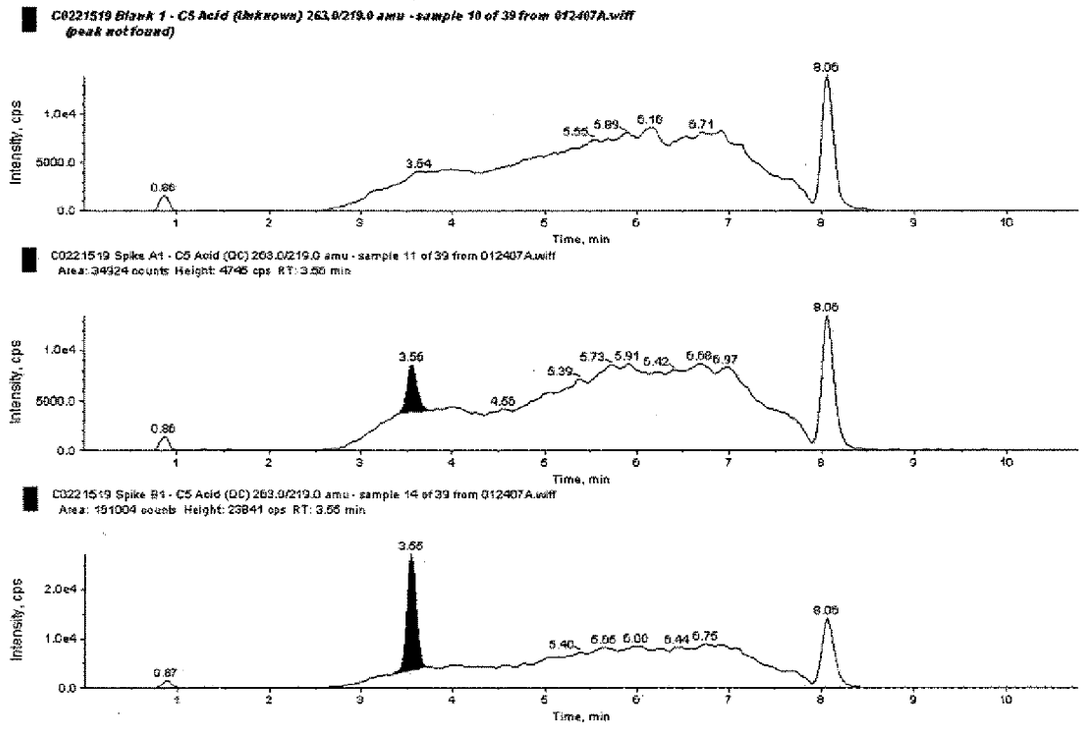


Figure 10. Chromatogram Representing a Soil Sample Analyzed for PFPeA (Exygen ID: C0225092, Data Set: 011207A)

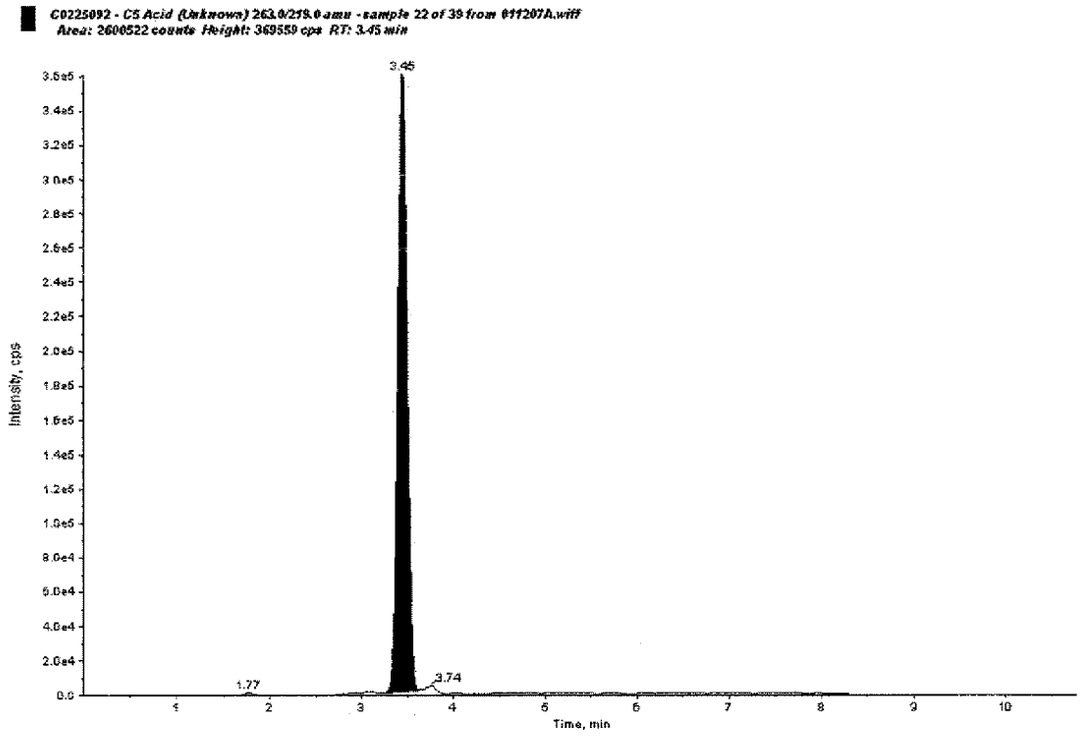


Figure 11. PFPeA in a Reagent Blank, a 0.25 ng/mL Fortified Reagent Spike A, and a 2.5 ng/mL Fortified Reagent Spike B, Respectively

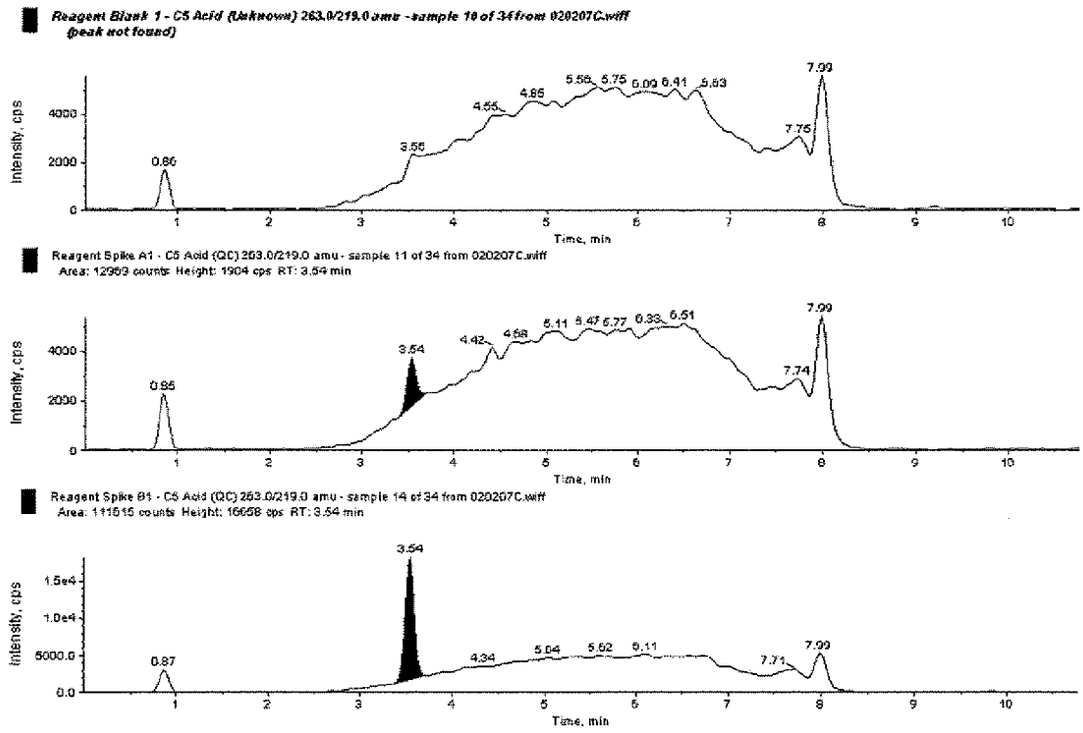


Figure 12. Chromatogram Representing a Water Sample Analyzed for PFPeA (Exygen ID: C0225101, Data Set: 020207C)

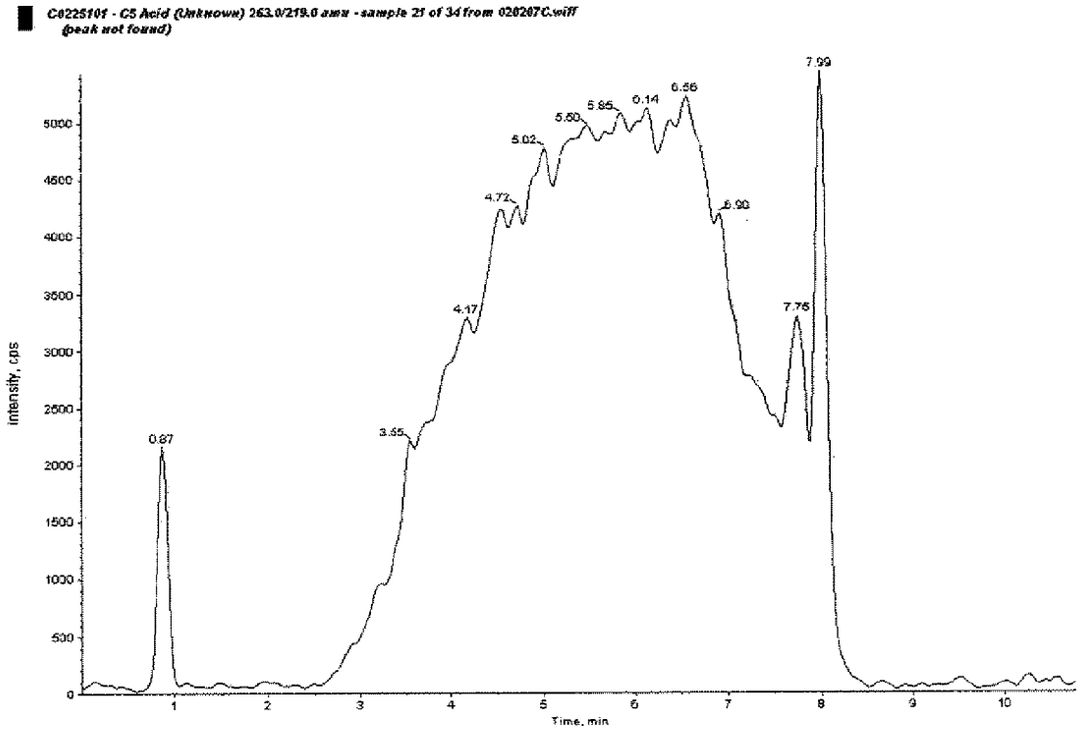


Figure 13. Typical Non-Extracted Calibration Curve for PFHA in 50:50 Acetonitrile:Water

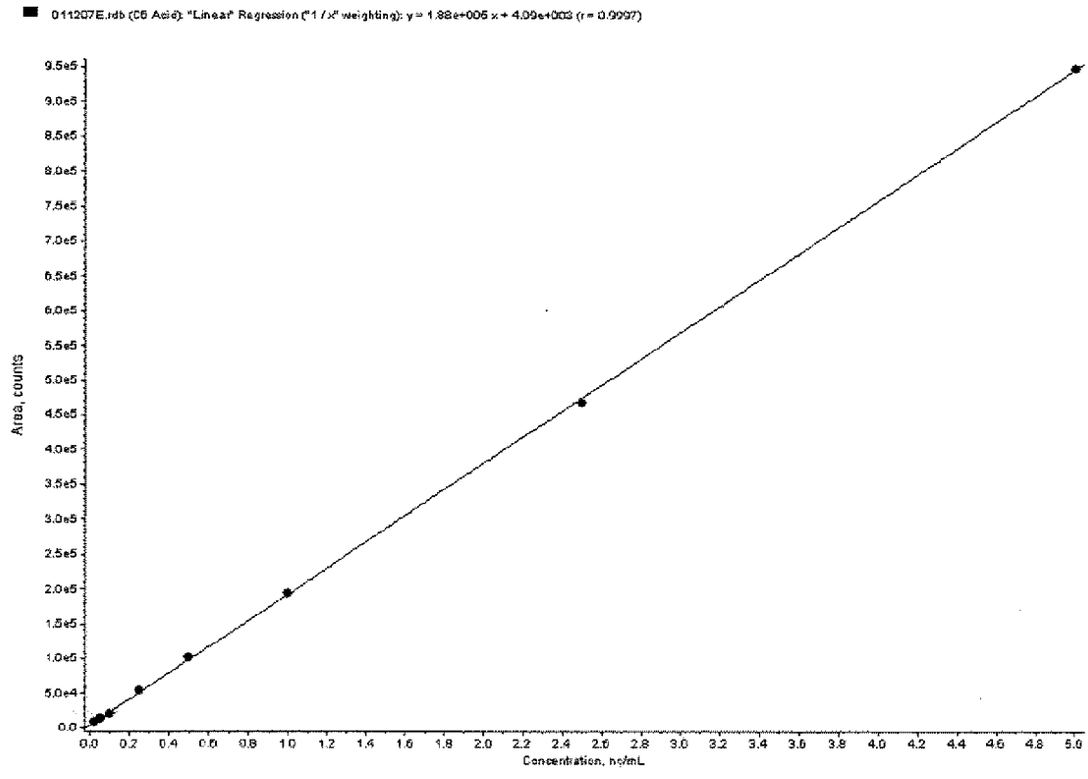


Figure 14. Non-Extracted Standards of PFHA in 50:50 Acetonitrile:Water, 0.025 ng/mL and 0.05 ng/mL, Respectively

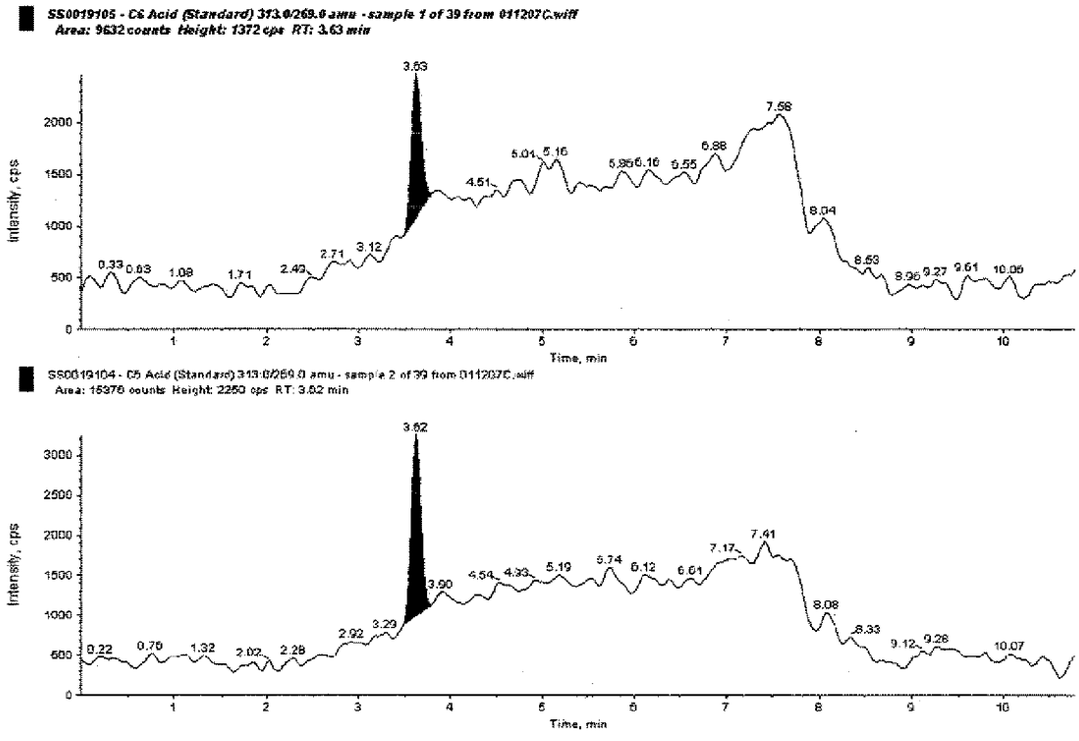


Figure 15. PFHA in a Control Blank, a 2.0 ng/g Fortified Control Spike A, and a 20 ng/g Fortified Control Spike B, Respectively

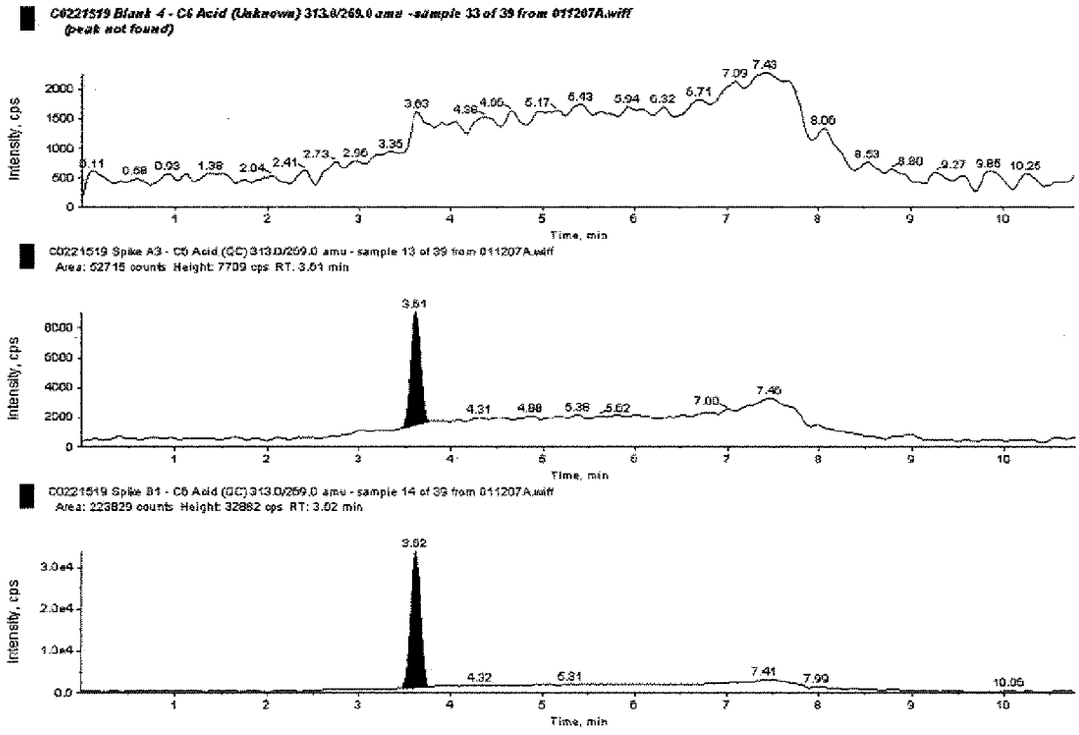


Figure 16. Chromatogram Representing a Soil Sample Analyzed for PFHA (Exygen ID: C0225092, Data Set: 011207A)

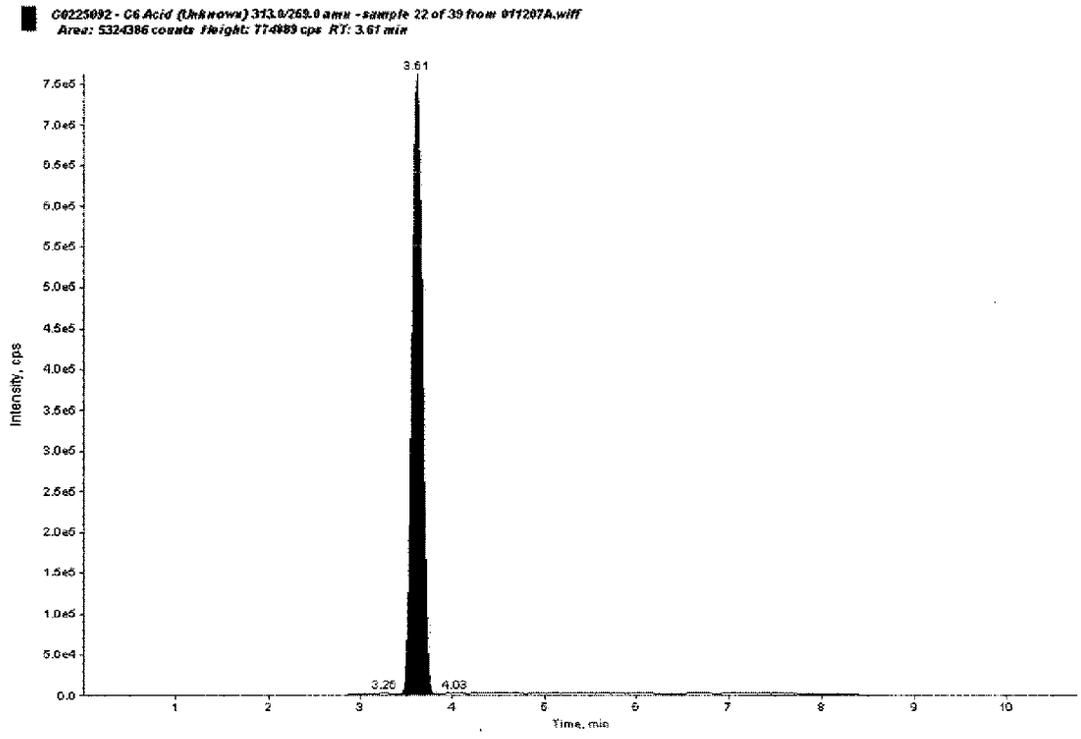
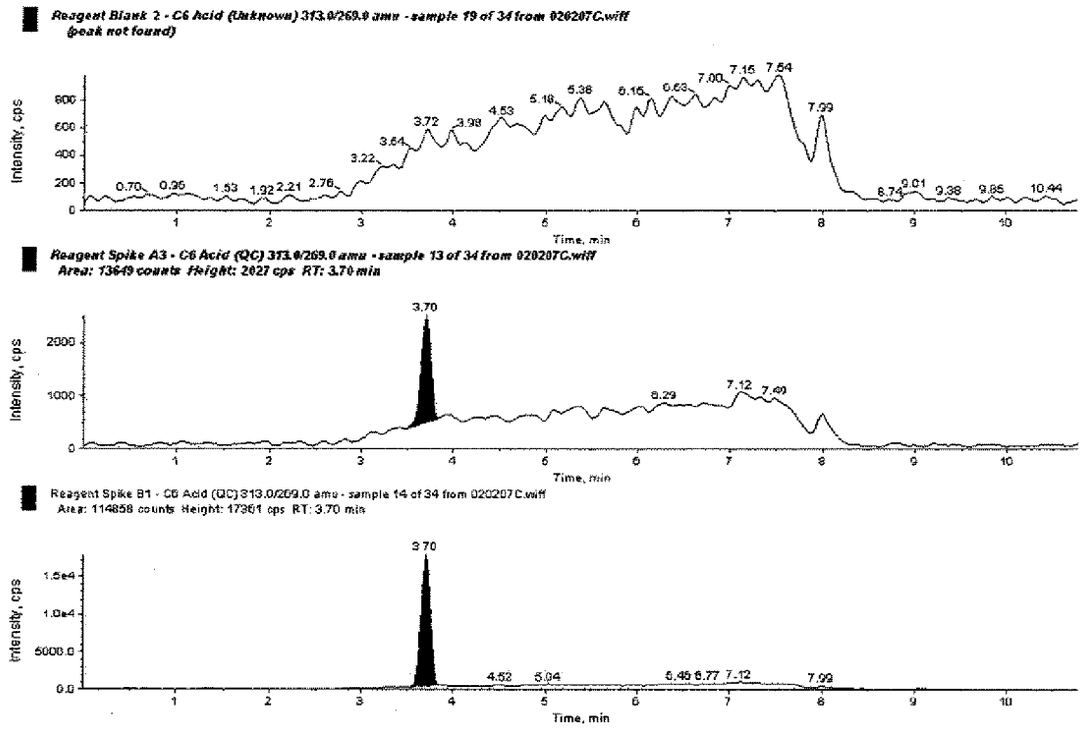


Figure 17. PFHA in a Reagent Blank, a 0.25 ng/mL Fortified Reagent Spike A, and a 2.5 ng/mL Fortified Reagent Spike B, Respectively



APPENDIX C
FC ANALYTICAL DATA SUMMARY
AND
LABORATORY ANALYTICAL DATA PACKAGES

Summary of FC Soil Analytical Data - December 2006
Area North of Highway 5
Oakdale, MN

Sample ID	Avg PFBA (ppb, ng/g) Dry Weight	Avg PFPeA (ppb, ng/g) Dry Weight	Avg PFHA (ppb, ng/g) Dry Weight	Avg PFHpA (ppb, ng/g) Dry Weight	Avg PFOA (ppb, ng/g) Dry Weight	Avg PFNA (ppb, ng/g) Dry Weight	Avg PFDA (ppb, ng/g) Dry Weight	Avg PFUnA (ppb, ng/g) Dry Weight	Avg PFDoA (ppb, ng/g) Dry Weight	Avg PFBS (ppb, ng/g) Dry Weight	Avg PFHS (ppb, ng/g) Dry Weight	Avg PFOS (ppb, ng/g) Dry Weight
OKMN-SB-ASB31-0-0000	12.5	NR	NR	0.750	6.35	ND	0.284	0.270	0.392	NR	NR	NR
OKMN-SB-ASB31-0-0015	NR	7.14	13.9	10.3	NR	0.798	4.34	1.71	NR	6.39	NR	2038
OKMN-SB-ASB31-0-0035	219	NR	NR	NR	NR	NR	NR	NR	23.1	40.2	581	63350
OKMN-SB-ASB31-0-0055	227	87.9	NR	NR	6040	NR	NR	NR	NR	19.4	1232	42200
OKMN-SB-ASB31-0-0070	337	NR	NR	NR	9130	NR	NR	NR	NR	36.7	NR	64200
OKMN-SB-ASB32-0-0000	NR	5.45	NR	NR	19.0	NR	2.84	NR	NR	2.77	9.35	1300
OKMN-SB-ASB32-0-0015	NR	NR	NR	NR	4420	NR	NR	NR	9.95	67.5	935	37300
OKMN-SB-ASB32-0-0035	812	155	NR	267	11800	NR	142	7.81	7.87	84.7	NR	108000
OKMN-SB-ASB32-0-0055	883	178	NR	NR	5460	NR	122	6.80	8.38	96.1	1180	NR
OKMN-SB-ASB32-0-0075	1420	NR	580	186	1960	NR	0.864	ND	ND	NR	204	NR
OKMN-SB-ASB32-DB-0015	303	73.9	164	160	3380	7.95	111	8.37	9.68	86.2	1174	28300
OKMN-SB-ASB33-0-0000	7.46	NR	1.38	0.611	4.29	0.220	0.591	0.466	0.659	NR	0.612	129
OKMN-SB-ASB33-0-0015	10.8	5.45	9.25	15.0	642	NR	14.0	NR	NR	5.70	NR	4865
OKMN-SB-ASB33-0-0035	13.1	6.63	10.4	14.0	NR	NR	12.3	NR	NR	3.78	NR	3630
OKMN-SB-ASB33-0-0055	NR	23.4	NR	46.7	755	NR	21.1	NR	NR	17.3	188	5430
OKMN-SB-ASB33-0-0085	NR	32.4	NR	NR	3470	NR	35.2	4.40	4.35	NR	1180	10105
OKMN-SB-ASB33-DB-0035	10.1	7.52	8.60	9.38	NR	NR	10.6	NR	NR	NR	50.7	5035
OKMN-SB-ASB34-0-0000	NR	NR	0.448	0.334	7.61	ND	0.584	0.526	0.962	ND	0.455	NR
OKMN-SB-ASB34-0-0015	9.15	NR	7.08	6.46	NR	NR	9.52	NR	NR	NR	22.0	5375
OKMN-SB-ASB34-0-0035	49.3	15.5	27.0	41.1	NR	NR	25.1	5.88	7.25	8.65	142	8690
OKMN-SB-ASB34-0-0055	NR	105	165	172	4640	NR	32.3	10.8	12.7	26.3	1035	69400
OKMN-SB-ASB34-0-0085	1600	NR	1008	1215	18050	16.8	47.4	NR	0.565	224	5585	17550
OKMN-SB-ASB35-0-0000	NR	2.47	2.69	1.35	13.3	NR	6.34	2.33	3.10	0.570	NR	235
OKMN-SB-ASB35-0-0015	38.5	25.8	34.2	37.0	957	NR	NR	7.03	7.17	12.9	NR	9220
OKMN-SB-ASB35-0-0035	NR	26.1	84.5	NR	2975	NR	NR	6.16	24.2	22.8	NR	32100
OKMN-SB-ASB35-0-0055	146	95.4	673	896	13050	27.2	373	26.9	33.1	53.8	445	26600
OKMN-SB-ASB35-0-0085	NR	98.5	1175	1275	3875	5.19	266	0.322	ND	98.3	83.3	NR
OKMN-SB-ASB35-DB-0035	26.3	NR	72.9	NR	NR	NR	NR	NR	12.6	20.2	115	27950
OKMN-SB-ASB36-0-0000	11.9	2.76	3.09	1.67	16.1	NR	22.2	NR	NR	0.434	2.38	1460
OKMN-SB-ASB36-0-0015	52.4	13.4	58.4	116	1073	NR	36.8	NR	NR	7.37	62.7	NR
OKMN-SB-ASB36-0-0030	NR	36.1	160	179	1615	NR	1230	92.4	112	24.6	NR	37250
OKMN-SB-ASB36-0-0055	400	64.7	226	205	2715	4.94	123	4.84	6.28	22.4	NR	11450
OKMN-SB-ASB36-0-0095	442	45.8	132	61.6	NR	ND	0.274	ND	ND	17.0	11.8	88.7
OKMN-SB-ASB36-DB-0015	NR	18.4	NR	NR	1040	NR	36.6	NR	NR	9.42	68.0	23400
OKMN-SB-ASB37-0-0000	3.90	1.96	NR	2.14	NR	0.315	NR	1.56	NR	0.599	2.37	NR
OKMN-SB-ASB37-0-0015	6.93	3.98	11.0	18.2	242	NR	14.3	NR	1.45	2.53	16.4	5515
OKMN-SB-ASB37-0-0035	NR	1.65	4.94	7.55	88.3	NR	6.81	0.828	0.974	0.900	7.68	2755
OKMN-SB-ASB37-0-0055	NR	NR	6.29	7.81	10.5	NR	14.8	NR	1.21	1.90	8.08	17050
OKMN-SB-ASB37-0-0075	NR	0.509	1.06	NR	13.7	ND	1.13	ND	ND	0.178	0.664	672
OKMN-SB-ASB37-DB-0035	4.66	2.18	6.71	9.06	96.4	NR	10.6	1.36	1.71	1.14	10.6	3205
OKMN-SB-ASB38-0-0000	1.86	1.24	NR	2.11	18.6	0.191	0.950	ND	0.211	0.583	1.91	346
OKMN-SB-ASB38-0-0015	2.01	1.21	NR	NR	82.1	NR	NR	0.337	0.275	0.798	6.04	974
OKMN-SB-ASB38-0-0035	7.05	3.06	8.00	8.94	119	NR	4.98	0.527	0.774	2.01	8.88	1110
OKMN-SB-ASB38-0-0055	12.1	5.12	15.9	20.4	NR	NR	9.05	0.869	1.02	2.58	10.5	1630
OKMN-SB-ASB38-0-0080	17.6	6.51	21.3	16.0	NR	ND	NR	0.302	0.206	1.76	NR	NR
OKMN-SB-ASB38-DB-0035	7.78	3.33	9.08	8.88	137	NR	5.74	0.645	0.886	2.01	9.47	1405
OKMN-SB-ASB39-0-0015	28.4	12.5	26.1	32.7	446	NR	11.5	NR	NR	9.13	73.3	6405

ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Summary of FC Soil Analytical Data - December 2006
Area North of Highway 5
Oakdale, MN

Sample ID	Avg PFBA (ppb, ng/g) Dry Weight	Avg PFPeA (ppb, ng/g) Dry Weight	Avg PFHA (ppb, ng/g) Dry Weight	Avg PFHpA (ppb, ng/g) Dry Weight	Avg PFOA (ppb, ng/g) Dry Weight	Avg PFNA (ppb, ng/g) Dry Weight	Avg PFDA (ppb, ng/g) Dry Weight	Avg PFUnA (ppb, ng/g) Dry Weight	Avg PFDoA (ppb, ng/g) Dry Weight	Avg PFBS (ppb, ng/g) Dry Weight	Avg PFHS (ppb, ng/g) Dry Weight	Avg PFOS (ppb, ng/g) Dry Weight
OKMN-SB-ASB39-0-0035	82.5	18.4	29.0	31.2	1027	4.54	26.2	4.53	6.74	10.6	172	13300
OKMN-SB-ASB39-0-0055	306	42.7	101	120	1400	4.57	40.4	4.85	5.73	22.7	NR	NR
OKMN-SB-ASB39-0-0070	192	26.0	40.6	58.5	944	4.83	28.8	2.25	2.79	13.5	208	NR
OKMN-SB-ASB39-DB-0015	31.2	15.0	31.9	63.9	483	NR	10.9	1.85	1.59	11.5	88.5	5710
OKMN-SB-ASB40-0-0000	NR	1.22	0.413	NR	NR	ND	0.887	ND	ND	0.287	ND	209
OKMN-SB-ASB40-0-0015	0.368	ND	0.785	0.497	6.79	ND	0.919	0.202	ND	0.504	0.865	206
OKMN-SB-ASB40-0-0035	1.41	0.834	1.43	1.29	22.1	ND	1.29	ND	ND	0.496	2.26	374
OKMN-SB-ASB40-0-0055	2.69	0.994	3.53	2.65	14.0	ND	NR	ND	ND	0.536	1.01	133
OKMN-SB-ASB40-0-0090	4.46	3.04	22.0	15.0	27.3	ND	ND	ND	ND	0.513	0.777	37.9
OKMN-SB-ASB41-0-0015	9.80	7.92	17.3	30.0	658	2.63	9.97	0.440	0.252	6.99	73.6	5740
OKMN-SB-ASB41-0-0035	43.8	16.8	60.4	83.6	723	2.13	37.8	2.95	2.03	11.1	30.5	1685
OKMN-SB-ASB41-0-0055	30.2	12.6	38.4	57.5	558	2.38	34.0	2.53	NR	7.50	29.5	2350
OKMN-SB-ASB41-0-0090	107	15.7	34.5	18.6	62.4	ND	ND	ND	ND	4.19	3.90	20.6
OKMN-SB-ASB41-DB-0090	99.0	13.9	NR	19.2	58.1	ND	ND	ND	ND	4.09	3.68	22.7
OKMN-SB-ASB42-0-0000	ND	0.303	ND	ND	0.845	ND	ND	ND	ND	ND	ND	24.6
OKMN-SB-ASB42-0-0015	ND	ND	0.389	0.191	1.03	ND	0.239	ND	ND	0.284	ND	59.7
OKMN-SB-ASB42-0-0035	8.46	3.35	17.5	13.1	138	0.291	0.319	ND	0.282	4.19	11.6	168.5
OKMN-SB-ASB42-0-0055	9.77	3.55	18.0	15.3	222	0.485	0.879	ND	0.226	4.69	16.7	NR
OKMN-SB-ASB42-0-0070	16.8	4.74	23.4	13.2	62.9	ND	0.445	ND	ND	4.14	5.16	75.6
OKMN-SB-ASB43-0-0015	7.39	5.11	9.56	5.21	53.9	0.265	0.655	ND	0.399	4.28	14.1	207
OKMN-SB-ASB43-0-0035	34.8	14.5	17.1	17.1	476	2.87	11.0	2.92	4.10	6.63	103	3855
OKMN-SB-ASB43-0-0055	90.6	27.3	35.2	34.9	964	NR	11.8	3.00	3.45	15.7	193	5310
OKMN-SB-ASB43-0-0090	39.3	20.5	40.3	29.2	259	1.03	0.209	ND	ND	8.78	29.6	182

ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

INTERIM REPORT #4 – Analysis of Oakdale Soil and Water Samples Amendment Number 1

STUDY TITLE

Analysis of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment Using LC/MS/MS for the 3M Cottage Grove Monitoring Program Phase 2

DATA REQUIREMENTS

EPA TSCA Good Laboratory Practice Standards 40 CFR 792

STUDY DIRECTOR

Jaisimha Kesari P.E., DEE
Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380
Phone: 610-701-3761

INTERIM REPORT COMPLETION DATE

April 18, 2007 and June 8, 2007

PERFORMING LABORATORY

Exygen Research
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State College, PA 16801
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STUDY SPONSOR

3M Company
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St. Paul, MN 55144
Phone: 651-778-5200

PROJECT

Protocol Number: P0002561
Exygen Study Number: P0002561

Total Pages: 224

GOOD LABORATORY PRACTICE COMPLIANCE STATEMENT

Exygen Study Number P0002561, entitled "Analysis of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment Using LC/MS/MS for the 3M Cottage Grove Monitoring Program Phase 2," conducted for 3M Company, is being performed in compliance with EPA TSCA Good Laboratory Practice Standards 40 CFR 792 by Exygen Research.

Charles Simons
Principal Investigator
Exygen Research, a division of MPI Research, Inc.

6/8/07
Date

Jaisimha Kesari P.E., DEE
Study Director
Weston Solutions, Inc.

6/13/07
Date

Robert A. Paschke
Sponsor Representative
3M Company

6/13/07
Date

AMENDED QUALITY ASSURANCE STATEMENT

Exygen Research's Quality Assurance Unit reviewed Exygen Study Number P0002561, entitled, "Analysis of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment Using LC/MS/MS for the 3M Cottage Grove Monitoring Program Phase 2". All reviewed phases[1] were inspected for conduct according to Exygen Research's Standard Operating Procedures, the Study Protocol, the Study Method, and all applicable Good Laboratory Practice Standards. All findings were reported to the Exygen Principal Investigator and Management and to the Study Director.

Phase	Date Inspected	Date Reported to Principal Investigator	Date Reported to Exygen Management	Date Reported to Study Director
12) Draft Interim Report and Raw Data Review	04/13/07	04/17/07	04/18/07	04/19/07
14) Final Report Review	04/17/07	04/18/07	04/18/07	04/19/07
18) Amended Raw Data Review and Amended Final Interim Report Review	06/04/07	06/05/07	06/05/07	06/08/07

Lynann Porter
Senior Quality Assurance Research Auditor, Quality Assurance Unit

8 June 07
Date

[1]Note: All in-lab inspections and the protocol review will be documented in the QA statement for the final analytical report at the conclusion of the study. This QA statement involves only the review of the interim report and associated raw data.

CERTIFICATION OF AUTHENTICITY

This interim report, for Exygen Study Number P0002561, is a true and complete representation of the raw data.

Submitted by: Exygen Research
A division of MPI Research, Inc.
3058 Research Drive
State College, PA 16801
(814) 272-1039

Principal Investigator, Exygen:

Charles Simons
Director, Analytical Laboratory Operations
Exygen Research, a division of MPI Research, Inc.

6/8/07
Date

Exygen Research Facility Management:

for Rick Grazzini

Richard A. Grazzini
Executive Director of Analytical Sciences
Exygen Research, a division of MPI Research, Inc.

8-Jun-07
Date

Study Director, Weston Solutions, Inc.

Jaisimha Kesari P.E., DEE
Weston Solutions, Inc.

6/13/07
Date

Sponsor Representative, 3M Company:

R.A. Paschke

Robert A. Paschke
Manager, 3M Corporate Environmental Programs

6/13/07
Date

STUDY IDENTIFICATION

Analysis of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment Using LC/MS/MS for the 3M Cottage Grove Monitoring Program Phase 2

PROTOCOL NUMBER:	P0002561
EXYGEN STUDY NUMBER:	P0002561
TYPE OF STUDY:	Residue
SAMPLE MATRIX:	Soil and Water
TEST SUBSTANCES:	Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS)
SPONSOR:	3M Company 3M Building 42-02-E-27 St. Paul, MN 55144
STUDY DIRECTOR:	Jaisimha Kesari P.E., DEE Weston Solutions, Inc. 1400 Weston Way West Chester, PA 19380
STUDY MONITOR:	Robert A. Paschke 3M Company 3M Building 42-02-E-27 St. Paul, MN 55144
PERFORMING LABORATORY:	Exygen Research A division of MPI Research, Inc. 3058 Research Drive State College, PA 16801

ANALYTICAL PHASE TIMETABLE:	
Study Initiation Date:	10/20/06
Interim Analytical Start Date:	01/10/07
Interim Analytical Termination Date:	04/10/07
Interim Report Completion Date:	04/18/07
Amended Report Completion Date:	06/08/07

PROJECT PERSONNEL

The Study Director for this project is Jaisimha Kesari at Weston Solutions, Inc. The following personnel from Exygen Research were associated with various phases of this interim portion of the study:

Name	Title
Charles Simons	Director, Analytical Laboratory Operations
John Flaherty	Senior Director, Analytical Services
Mark Ammerman	Project Leader, Sample Control
Eric Edwards	Sample Custodian 1
Brian McAllister	Sample Custodian 1
Karen Risha	Manager Analytical
Amy Sheehan	Group Leader
Christine Edwards	Project Leader
Krista Gallant	Research Chemist Associate 1
Cameala Graybill	Research Chemist Associate 1
Ellen Dashem	Research Chemist Associate 1
Ling Ling Liu	Research Chemist Associate 2
Jessica Tillia	Research Associate 1
Natalie Cleaver	Research Associate 1

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF APPENDICES

SUMMARY OF CHANGES AND REASON FOR AMENDMENT

The limits of quantitation (LOQ's) for the water samples analyzed in this interim report were incorrect. When the water samples were prepared for extraction and analysis, the samples were diluted by a factor of 2 in the initial preparation. The calibration standards did not receive the same preparation before analysis therefore the dilution was not factored into the original LOQ's calculated for the data sets. After reviewing the data sets and the results obtained for the equipment rinseate blank and trip blank water samples, it was determined to raise all LOQ values for each data set by a factor of 2. The incorrect LOQ values for the blank samples had no affect on the overall results reported for the soil samples.

1.0 SUMMARY

Exygen Research extracted and analyzed soil and water samples for the determination of perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPeA), perfluorohexanoic acid (PFHA), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnA), perfluorododecanoic acid (PFDoA), perfluorobutanesulfonate (PFBS), perfluorohexanesulfonate (PFHS), and perfluorooctanesulfonate (PFOS) according to 3M Environmental Laboratory Method ETS-8-012.1 (**Appendix B**).

The limit of quantitation (LOQ) for the analytes in the soil samples are listed in **Tables I, II, III,** and **IV**. The target LOQ for the method for soil samples was 0.2 ng/g. The limit of quantitation (LOQ) for the analytes in the water samples are listed in **Tables V, VI, VII,** and **VIII**. The nominal LOQ for the method for water samples was 0.050 ng/mL. After evaluation of the reagent blanks (method blanks) for each analyte used for the analysis, the LOQ was determined. In some cases, the LOQ was raised due to the evaluation. A discussion of the process used to evaluate the reagent blanks can be found in subsection 6.4.

Analytical results for the analysis of PFBA, PFPeA, and PFHA found in the soil samples are summarized in **Table I.** Fortification recoveries for PFBA, PFPeA, and PFHA in the soil samples are detailed in **Table IX**. The average percent recoveries ± standard deviations for PFBA, PFPeA, and PFHA in the soil samples were 67 ± 23%, 70 ± 24%, and 69 ± 23%, respectively. Analytical results for the analysis of PFHpA, PFOA, and PFNA found in the soil samples are summarized in **Table II.** Fortification recoveries for PFHpA, PFOA, and PFNA in the soil samples are detailed in **Table X**. The average percent recoveries ± standard deviations for PFHpA, PFOA, and PFNA in the soil samples were 72 ± 28%, 82 ± 35%, and 67 ± 23%, respectively. Analytical results for the analysis of PFDA, PFUnA, and PFDoA found in the soil samples are summarized in **Table III.** Fortification recoveries for PFDA, PFUnA, and PFDoA in the soil samples are detailed in **Table XI**. The average percent recoveries ± standard deviations for PFDA, PFUnA, and PFDoA in the soil samples were 75 ± 28%, 75 ± 26%, and 77 ±

29%, respectively. Analytical results for the analysis of PFBS, PFHS, and PFOS found in the soil samples are summarized in **Table IV.** Fortification recoveries for PFBS, PFHS, and PFOS in the soil samples are detailed in **Table XII**. The average percent recoveries ± standard deviations for PFBS, PFHS, and PFOS in the soil samples were 68 ± 24%, 77 ± 29%, and 89 ± 22%, respectively.

A total of 48 samples needed re-extraction and re-analysis due to the significantly high endogenous analyte residues found in the samples relative to initial matrix spike concentrations. The samples required a higher fortification level to obtain fortification recoveries. Fortification recoveries for PFBA, PFHA, PFHpA and PFOA in the re-extracted soil samples are detailed in **Table XIII**. The average percent recoveries ± standard deviations for PFBA, PFHA, PFHpA and PFOA in the re-extracted soil samples were 72 ± 15%, 91 ± 10%, 93 ± 14%, and 104 ± 28%, respectively. Fortification recoveries for PFDA, PFHS and PFOS in the re-extracted soil samples are detailed in **Table XIV**. Only one sample was re-extracted and re-analyzed for PFDA, and its fortification recovery was 91%. The average percent recoveries ± standard deviations for PFHS and PFOS in the re-extracted soil samples were 93 ± 24% and 103 ± 24%, respectively.

The assessed accuracy for the majority of the samples reported is +/- 30%. The accuracies were assessed for each sample by reviewing the matrix spike whose spiking level most closely matches the endogenous concentration found in the sample. Due to the number of samples with matrix spike recoveries outside the 70% to 130% recovery range of acceptance for +/- 30% accuracy for the Oakdale study site, some samples have an expanded assessed accuracy ranging up to +/- 60% as noted in Tables I – IV.

Quantitative results were obtained for the majority of soil samples and analytes. The percentage of results reported for soil samples for PFBA, PFPeA, and PFHA were 77.1%, 84.3%, and 78.6%, respectively. The percentage of results reported for soil samples for PFHpA, PFOA, and PFNA were 81.4%, 82.9%, and 50.0%, respectively. The percentage of results reported for soil samples for PFDA, PFUnA, and PFDoA were 84.3%, 74.3%, and 78.6%, respectively. The percentage of results reported for soil samples for PFBS, PFHS, and PFOS were 91.4%, 81.4%, and 84.3%, respectively. All other results were designated as not reported (NR) due to quality control failures.

Analytical results for the analysis of PFBA, PFPeA, and PFHA found in the water samples are summarized in **Table V.** Fortification recoveries for PFBA, PFPeA, and PFHA in the water samples are detailed in **Table XV**. The average percent recoveries ± standard deviations for PFBA, PFPeA, and PFHA in the water samples were 112 ± 7%, 99 ± 12%, and 95 ± 7%, respectively. Analytical results for the analysis of PFHpA, PFOA, and PFNA found in the water samples are summarized in **Table VI.** Fortification recoveries for PFHpA, PFOA, and PFNA in the water samples are detailed in **Table XVI**. The average percent recoveries ± standard deviations for PFHpA, PFOA, and PFNA in the water samples were 82 ± 10%, 117 ± 9%, and 99 ± 9%, respectively. Analytical results for the analysis of PFDA, PFUnA, and PFDoA found in the water samples are

summarized in **Table VII.** Fortification recoveries for PFDA, PFUnA, and PFDoA in the water samples are detailed in **Table XVII**. The average percent recoveries ± standard deviations for PFDA, PFUnA, and PFDoA in the water samples were 110 ± 14%, 112 ± 6%, and 93 ± 13%, respectively. Analytical results for the analysis of PFBS, PFHS, and PFOS found in the water samples are summarized in **Table VIII.** Fortification recoveries for PFBS, PFHS, and PFOS in the water samples are detailed in **Table XVIII**. The average percent recoveries ± standard deviations for PFBS, PFHS, and PFOS in the water samples were 96 ± 11%, 107 ± 4%, and 82 ± 7%, respectively. Quantitative results were obtained for all water samples and analytes.

Total percent solid results for the soil samples are detailed in **Table XIX**.

2.0 OBJECTIVE

The objective of the analytical part of this study was to determine levels of perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPeA), perfluorohexanoic acid (PFHA), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnA), perfluorododecanoic acid (PFDoA), perfluorobutanesulfonate (PFBS), perfluorohexanesulfonate (PFHS), and perfluorooctanesulfonate (PFOS) in soil and water according to Protocol P0002561 (**Appendix A**).

3.0 INTRODUCTION

This report details the results of the analysis for the determination of PFBA, PFPeA, PFHA, PFHpA, PFOA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHS, and PFOS in soil and water using the 3M Environmental Laboratory analytical method ETS-8-012.1 entitled, "Method of Analysis for the Determination of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment by LC/MS/MS."

The study was initiated on October 20, 2006, when the study director signed protocol number P0002561. The analytical start date for this interim report was January 10, 2007, and the analytical termination date for this interim report was April 10, 2007.

4.0 ANALYTICAL TEST SAMPLES

A total of seventy-nine samples (Exygen ID C0225070 – C0225148 from login ID L00010298), seventy soils and nine waters, were received at ambient temperature on December 11, 2006 from Tim Frinak at Weston Solutions, Inc. The nine water samples represented three rinse blanks, two trip blanks, and four associated trip blank field spikes. All samples were logged in by Exygen personnel and placed in refrigerated storage.

Sample identification (ID) codes for the soil samples are of the form OKMN-SB-ASBxx-x(x)-xxxx and are composed of the strings described below:

The first string defines the general sampling area where OKMN = Oakdale disposal site.

The second string defines the sample type where SB = soil boring.

The third string indicates the sampling location where ASBxx defines the soil boring location.

The fourth string describes the sample aliquot where 0 = primary sample volume, DB = duplicate sample and RB = equipment rinseate blank.

The final string is the topmost portion of the sampling interval (i.e. 0000 = 0.0 feet, 0015 = 1.5 feet, 0030 = 3.0 feet, etc.).

Sample log-in and chain of custody information is located in the raw data package associated with this interim report. Storage records will be kept at Exygen Research.

5.0 REFERENCE MATERIAL

The requisition information for the reference materials used in this study is listed below.

Compound	Exygen Inventory No.	Supplier	Received Date
PFBA	SP0008071	Oakwood Products, Inc.	09/08/06
PFPeA	SP0003847	Sigma-Aldrich, Inc.	01/07/04
PFHA	SP0008073	Oakwood Products, Inc.	09/08/06
PFHpA	SP0008069	Oakwood Products, Inc.	09/08/06
PFOA	SP0008065	Oakwood Products, Inc.	09/08/06
PFNA	SP0008066	Oakwood Products, Inc.	09/08/06
PFDA	SP0008064	Oakwood Products, Inc.	09/08/06
PFUnA	SP0008067	Oakwood Products, Inc.	09/08/06
PFDoA	SP0008068	Oakwood Products, Inc.	09/08/06
PFBS	SP0008058	3M Environmental Laboratory	09/06/06
PFBS	SP0008956	3M Environmental Laboratory	02/19/07

Compound	Exygen Inventory No.	Supplier	Received Date
PFHS	SP0008057	3M Environmental Laboratory	09/05/06
PFHS	SP0008961	3M Environmental Laboratory	02/19/07
PFOS	SP0002694	Fluka Corporation	04/23/03

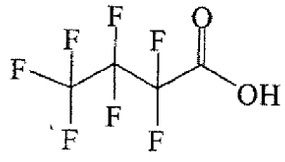
The lots, purities, and expiration dates for the reference materials are listed below. All materials were stored refrigerated except for PFBS and PFHS which were stored frozen.

Compound	Exygen Inventory No.	Lot #	Purity (%)	Expiration Date
PFBA	SP0008071	U02C	99	09/08/08
PFPeA	SP0003847	20524JB	99.1	01/07/09
PFHA	SP0008073	3131	98	09/08/08
PFHpA	SP0008069	H3002	99	09/08/08
PFOA	SP0008065	Y16G	98	09/08/08
PFNA	SP0008066	H7568	99	09/08/08
PFDA	SP0008064	Y31J	98	09/08/08
PFUnA	SP0008067	U11N	99	09/08/08
Compound	Exygen Inventory No.	Lot #	Purity (%)	Expiration Date
PFDoA	SP0008068	Y01J	98	09/08/08
PFBS	SP0008058	2	97.3	01/17/08
PFBS	SP0008956	2	97.3	01/18/17
PFHS	SP0008057	NB 120067-69	98.6	10/18/07
PFHS	SP0008961	NB 120067-69	98.6	10/18/16
PFOS	SP0002694	430180/1	101.2	10/31/07

The molecular structures of the standards are given on the following pages:

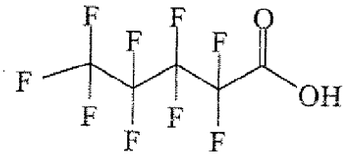
PFBA

Chemical Name: Perfluorobutanoic Acid or Heptafluorobutyric Acid
Molecular Weight: 214
Transitions Monitored: 213 → 169
Structure:



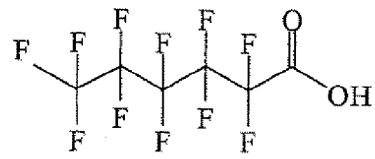
PFPeA

Chemical Name: Perfluoropentanoic Acid or Nonafluoropentanoic Acid
Molecular Weight: 264
Transitions Monitored: 263 → 219
Structure:



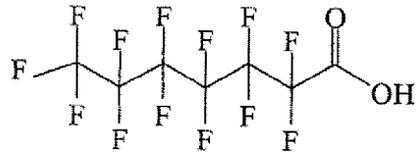
PFHA

Chemical Name: Perfluorohexanoic Acid
Molecular Weight: 314
Transitions Monitored: 313 → 269
Structure:



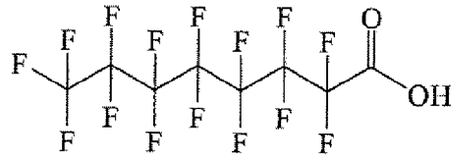
PFHpA

Chemical Name: Perfluoroheptanoic Acid
Molecular Weight: 364
Transitions Monitored: 363 → 319
Structure:



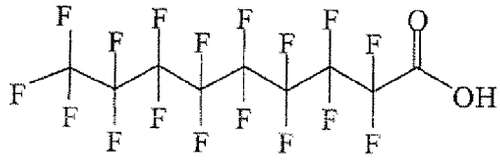
PFOA

Chemical Name: Perfluorooctanoic acid
Molecular Weight: 414
Transitions Monitored: 413 → 369
Structure:



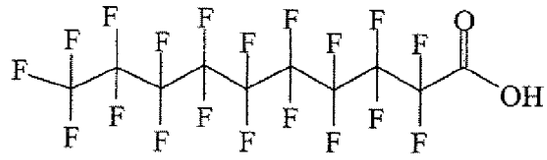
PFNA

Chemical Name: Perfluorononanoic acid
Molecular Weight: 464
Transitions Monitored: 463 → 419
Structure:



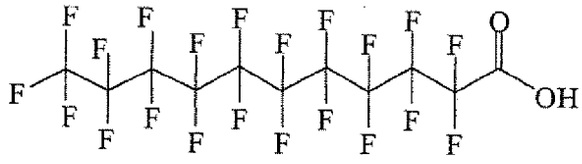
PFDA

Chemical Name: Perfluorodecanoic acid
Molecular Weight: 514
Transitions Monitored: 513 → 469
Structure:



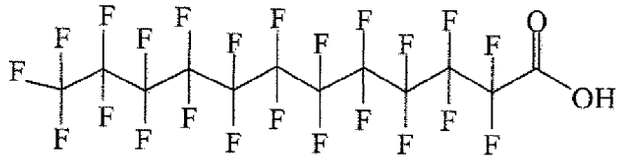
PFUnA

Chemical Name: Perfluoroundecanoic acid
Molecular Weight: 564
Transitions Monitored: 563 → 519
Structure:



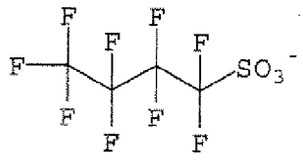
PFDoA

Chemical Name: Perfluorododecanoic acid
Molecular Weight: 614
Transitions Monitored: 613 → 569
Structure:



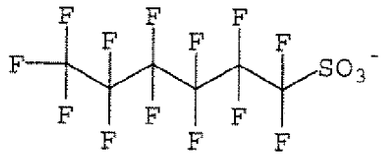
PFBS

Chemical Name: Perfluorobutanesulfonate
Molecular Weight: 338 supplied as the potassium salt ($C_4F_9SO_3^-K^+$)
Transitions Monitored: 299 → 80, 99
Structure:



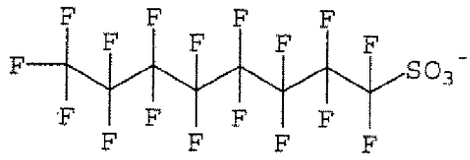
PFHS

Chemical Name: Perfluorohexanesulfonate
Molecular Weight: 438 supplied as the potassium salt ($C_6F_{13}SO_3^-K^+$)
Transitions Monitored: 399 → 80, 99
Structure:



PFOS

Chemical Name: Perfluorooctanesulfonate
Molecular Weight: 538 supplied as the potassium salt ($C_8F_{17}SO_3^-K^+$)
Transitions Monitored: 499 → 80, 99
Structure:



6.0 DESCRIPTION OF ANALYTICAL METHOD

The 3M Environmental Laboratory analytical method ETS-8-012.1 entitled, "Method of Analysis for the Determination of Perfluorobutanoic Acid (PFBA), Perfluoropentanoic Acid (PFPeA), Perfluorohexanoic Acid (PFHA), Perfluoroheptanoic Acid (PFHpA), Perfluorooctanoic Acid (PFOA), Perfluorononanoic Acid (PFNA), Perfluorodecanoic Acid (PFDA), Perfluoroundecanoic Acid (PFUnA), Perfluorododecanoic Acid (PFDoA), Perfluorobutanesulfonate (PFBS), Perfluorohexanesulfonate (PFHS), and Perfluorooctanesulfonate (PFOS) in Water, Soil and Sediment by LC/MS/MS" was used for sample analysis in this study.

6.1 Extraction Procedure for Soil

A 1 gram aliquot of the soil sample was used for the extraction procedure. The sample was weighed into a 15 mL polypropylene centrifuge tube. The appropriate samples were fortified and 8 mL of 80:20 acetonitrile:water was added. The samples were capped tightly and shaken. The samples were placed into an ultrasonic bath at room temperature for ~2 hours. The samples were then centrifuged at ~3000 rpm for 10 minutes. A portion of the supernate was then transferred to an autosampler vial. Each sample was analyzed by LC/MS/MS electrospray.

6.2 Extraction Procedure for Water

A 10 mL aliquot of the water sample was used for the extraction procedure. The sample was measured into a 50 mL polypropylene centrifuge tube. The appropriate samples were fortified and 10 mL of acetonitrile was added. The samples were capped tightly and shaken. The samples were placed into an ultrasonic bath at room temperature for ~2 hours. The samples were then centrifuged at ~3000 rpm for 10 minutes. A portion of the supernate was then transferred to an autosampler vial. Each sample was analyzed by LC/MS/MS electrospray.

6.3 Preparation of Standards and Fortification Solutions

A stock standard solution of each analyte was prepared as specified in the method. The stock standard solutions were prepared at a concentration of 10,000 µg/mL by dissolving 1.0 g of the standards (corrected for purity and salt content, if necessary) in acetonitrile. From these solutions, a 1000 µg/mL mixed fortification standard solution was prepared by taking 10 mL of the stocks and bringing the volume up to 100 mL with acetonitrile. By taking 10 mL of the 1000 µg/mL mixed fortification standard and bringing the volume up to 100 mL with acetonitrile, a 100 µg/mL mixed fortification standard was prepared. By taking 10 mL of the 100 µg/mL mixed fortification standard and bringing the volume up to 100 mL with acetonitrile, a 10 µg/mL mixed fortification standard was prepared. By taking 10 mL of the 10 µg/mL mixed fortification standard and bringing the volume up to 100 mL with acetonitrile, a 1.0 µg/mL mixed fortification standard was prepared. By taking 10 mL of the 1.0 µg/mL mixed fortification standard and bringing the volume up to 100 mL with acetonitrile, a 0.1 µg/mL mixed fortification standard was prepared. By taking 10 mL of the 0.1 µg/mL mixed fortification standard and bringing the volume up to 100 mL with acetonitrile, a 0.01 µg/mL mixed fortification standard was prepared. A set of external calibration standards containing all analytes were prepared in 50:50 acetonitrile:water. The following concentrations were prepared:

Conc. of Fort Solution (ng/mL)	Aliquot Volume (mL)	Final Volume of Solution (mL)	Final Conc. of Calibration Std. (ng/mL)
100	5.0	100	5.0
100	2.5	100	2.5
100	1.0	100	1.0
5.0	10	100	0.50
2.5	10	100	0.25
1.0	10	100	0.10
0.5	10	100	0.05
0.25	10	100	0.025

The stock standard solution and the 1000 µg/mL standard solution were stored in a freezer (-20° ± 5°C) when not in use. All other fortification and calibration standard solutions were stored in a refrigerator (4° ± 2°C) when not in use. Documentation of standard preparation is located in the raw data package associated with this interim report.

6.4 Chromatography

Quantification of the analytes was accomplished by LC/MS/MS electrospray. The retention time of all analytes can be found in Section 6.6. Method blanks prepared for each data set were used to determine the LOQ. In instances where there were no peaks in the method blanks, the LOQ was determined by the concentration of the lowest standard injected in the analytical run that met the 70–130% recovery range of its known value. In instances where there were peaks detected in the method blanks, the blanks were evaluated. If the average of the responses of all the method blanks was less than 50 % of the response of the lowest standard meeting the recovery criteria, then the LOQ was determined by the lowest standard. If the average of the responses of all the method blanks was greater than 50 % of the response of the lowest standard meeting the recovery criteria, then the LOQ was raised to the standard that met the less than 50 % criteria.

6.5 Instrument Sensitivity

The smallest standard amount injected during the chromatographic run had a concentration of 0.025 ng/mL of all analytes.

6.6 Description of LC/MS/MS Instruments and Operating Conditions

Instruments:	API 5000 Biomolecular Mass Analyzer
	API 4000 Biomolecular Mass Analyzer
Interface:	SCIEX Turbo Ion Spray Liquid Introduction Interface
Computer:	DELL Precision 360
	DELL OptiPlex GX400
Software:	PE SCIEX Analyst 1.4.1
HPLC:	Hewlett Packard (HP) Series 1200
	Hewlett Packard (HP) Series 1100
	HP Quat Pump
	HP Vacuum Degasser
	HP Autosampler
	HP Column Oven
HPLC Column:	Phenomenex Luna C8 (2) Mercury, 2mm x 4 mm, 3μm
Column Temp.:	~35° C
Injection Vol.:	10 μL
Mobile Phase (A):	2 mM Ammonium Acetate in water
Mobile Phase (B):	Methanol

Time (min)	% A	% B
0.0	90	10
0.5	90	10
2.0	10	90
5.0	10	90
5.1	0	100
6.0	0	100

Time (min)	% A	% B
6.1	90	10
10.0	90	10

Total run time: ~10 min
Flow Rate: 0.75 mL/min
Ions monitored:

Analyte	Mode	Transition Monitored	Retention Time (min)
PFBA	negative	213 → 169	~3.1 min.
PFPeA	negative	263 → 219	~3.6 min.
PFHA	negative	313 → 269	~3.6 min.
PFHpA	negative	363 → 319	~3.7 min.
PFOA	negative	413 → 369	~3.8 min.
PFNA	negative	463 → 419	~4.0 min.
PFDA	negative	513 → 469	~4.1 min.
PFUnA	negative	563 → 519	~4.2 min.
PFDoA	negative	613 → 569	~4.3 min.
PFBS	negative	299 → 80, 99	~3.6 min.
PFHS	negative	399 → 80, 99	~3.8 min.
PFOS	negative	499 → 80, 99	~3.9 min.

6.7 Quantitation and Example Calculation

Ten microliters of sample or calibration standard was injected into the LC/MS/MS. The peak area was measured and the standard curve was generated (using 1/x fit weighted linear regression) by Analyst software using eight concentrations of standards. The concentration was determined from the following equations.

Equation 1 calculated the amount of analyte found (in ng/mL, based on peak area) using the standard curve (linear regression parameters) generated by the Analyst software program.

Equation 1:

$$\text{Analyte found (ng/mL)} = \frac{(\text{Peak area} - \text{intercept})}{\text{slope}} \times \text{EDF} \times \text{PEDF}$$

Where: EDF = Extraction Dilution Factor, factor by which the sample volume was diluted during the extraction (EDF =2 for water samples and EDF =1 for soil samples).
PEDF = Post Extraction Dilution Factor, factor by which the final volume was diluted, if necessary.

For the soil sample, equation 2 was used to convert the amount of analyte found in ng/mL to ng/g (ppb).

Equation 2:

$$\text{Analyte found (ppb)} = \frac{[\text{analyte found (ng/mL)} \times \text{volume extracted (8 mL)}]}{\text{sample weight (1 g)}}$$

Equation 3 was then used to calculate the amount of analyte found in ppb based on dry weight.

Equation 3:

$$\text{Analyte found (ppb) dry weight} = \text{analyte found (ppb)} \times [100\% / \text{total solids(\%)}]$$

NOTE: Total solids (%) = [dry weight (g) / wet weight (g)] × 100%

For samples fortified with known amounts of analyte prior to extraction, Equation 4 was used to calculate the percent recovery.

Equation 4:
For water samples:
Recovery (%) =

$$\frac{(\text{total analyte found (ng/mL)} - \text{average analyte in sample (ng/mL)})}{\text{analyte added (ng/mL)}} \times 100\%$$

For soil samples (based on wet weight):
Recovery (%) =

$$\frac{(\text{total analyte found (ng/g)} - \text{average analyte in sample (ng/g)})}{\text{analyte added (ng/g)}} \times 100\%$$

An example of a calculation using an actual sample follows:

Soil sample Exygen ID: C0225127 Spike F (Set: 012407C), fortified at 200 ng/g with PFHpA where:

peak area	=	512736
intercept	=	4230
slope	=	197000
extraction dilution factor	=	1
post extraction dilution factor	=	10
ng/g PFDoA added (fort level)	=	200 ng/g
average amt in corresponding sample	=	13.2 ng/g (Set: 012407C)
total percent solid	=	88.24 %

From equation 1:

$$\text{Analyte found (ng/mL)} = \frac{[512736 - 4230] \times 1 \times 10}{197000}$$

$$= 25.8 \text{ ng/mL}$$

From equation 2:

Analyte found, wet weight (ng/g) = $\frac{(25.8\ ng/mL \times 8\ mL)}{1\ g}$

= 206 ng/g

From equation 3:

Analyte found (ng/g, ppb) dry weight = 206 ng/g × [100% / 88.24%]

= 233 ng/g

From equation 4:

% Recovery = $\frac{(206\ ng/g - 13.2\ ng/g)}{200\ ng/g} \times 100\%$

= 96 %

NOTE: Numbers may differ slightly from raw data due to rounding.

7.0 EXPERIMENTAL DESIGN

For water samples designated as trip blank field matrix spikes, all analytes were added at a known concentration to the bottles in the laboratory before being shipped to the field. The samples were filled to a 100 mL volumetric fill line in the field. For the soil samples designated as laboratory matrix spikes, all analytes were added to the samples after they were aliquotted in the laboratory, before the extraction solvent was added to the samples.

The soil samples were extracted in thirty-one sets. Each set included four control blanks (method blanks), three control blanks fortified at one lower level and three control blanks fortified at one higher level of known concentrations. Twenty-three of the sets contained three sample sites, one set contained one sample site, and the last seven sets contained re-extractions of soil samples that required a higher fortification level. For each sample site, a sample, a laboratory replicate, and two laboratory matrix spikes were prepared and extracted.

The water samples were extracted in one set. The set included four reagent blanks (method blanks), three reagent blanks fortified at one lower level and three reagent blanks fortified at one higher level of known concentrations. The set contained three rinse blanks, two trip blanks, and four associated trip blank field spikes.

8.0 RESULTS

Analytical results for the analysis of PFBA, PFPeA, and PFHA found in the soil samples are summarized in **Table I.** Fortification recoveries for PFBA, PFPeA, and PFHA in the soil samples are detailed in **Table IX**. The average percent recoveries ± standard

deviations for PFBA, PFPeA, and PFHA in the soil samples were 67 ± 23%, 70 ± 24%, and 69 ± 23%, respectively. Analytical results for the analysis of PFHpA, PFOA, and PFNA found in the soil samples are summarized in **Table II.** Fortification recoveries for PFHpA, PFOA, and PFNA in the soil samples are detailed in **Table X.** The average percent recoveries ± standard deviations for PFHpA, PFOA, and PFNA in the soil samples were 72 ± 28%, 82 ± 35%, and 67 ± 23%, respectively. Analytical results for the analysis of PFDA, PFUnA, and PFDoA found in the soil samples are summarized in **Table III.** Fortification recoveries for PFDA, PFUnA, and PFDoA in the soil samples are detailed in **Table XI.** The average percent recoveries ± standard deviations for PFDA, PFUnA, and PFDoA in the soil samples were 75 ± 28%, 75 ± 26%, and 77 ± 29%, respectively. Analytical results for the analysis of PFBS, PFHS, and PFOS found in the soil samples are summarized in **Table IV.** Fortification recoveries for PFBS, PFHS, and PFOS in the soil samples are detailed in **Table XII.** The average percent recoveries ± standard deviations for PFBS, PFHS, and PFOS in the soil samples were 68 ± 24%, 77 ± 29%, and 89 ± 22%, respectively.

A total of 48 samples needed re-extraction and re-analysis due to the significantly high endogenous analyte residues found in the samples relative to initial matrix spike concentrations. The samples required a higher fortification level to obtain fortification recoveries. Fortification recoveries for PFBA, PFHA, PFHpA and PFOA in the re-extracted soil samples are detailed in **Table XIII.** The average percent recoveries ± standard deviations for PFBA, PFHA, PFHpA and PFOA in the re-extracted soil samples were 72 ± 15%, 91 ± 10%, 93 ± 14%, and 104 ± 28%, respectively. Fortification recoveries for PFDA, PFHS and PFOS in the re-extracted soil samples are detailed in **Table XIV.** Only one sample was re-extracted and re-analyzed for PFDA, and its fortification recovery was 91%. The average percent recoveries ± standard deviations for PFHS and PFOS in the re-extracted soil samples were 93 ± 24% and 103 ± 24%, respectively.

The assessed accuracy for the majority of the samples reported is +/- 30%. The accuracies were assessed for each sample by reviewing the matrix spike whose spiking level most closely matches the endogenous concentration found in the sample. Due to the number of samples with matrix spike recoveries outside the 70% to 130% recovery range of acceptance for +/- 30% accuracy for the Oakdale study site, some samples have an expanded assessed accuracy ranging up to +/- 60% as noted in Tables I – IV.

Quantitative results were obtained for the majority of soil samples and analytes. The percentage of results reported for soil samples for PFBA, PFPeA, and PFHA were 77.1%, 84.3%, and 78.6%, respectively. The percentage of results reported for soil samples for PFHpA, PFOA, and PFNA were 81.4%, 82.9%, and 50.0%, respectively. The percentage of results reported for soil samples for PFDA, PFUnA, and PFDoA were 84.3%, 74.3%, and 78.6%, respectively. The percentage of results reported for soil samples for PFBS, PFHS, and PFOS were 91.4%, 81.4%, and 84.3%, respectively. All other results were designated as not reported (NR) due to quality control failures.

Analytical results for the analysis of PFBA, PFPeA, and PFHA found in the water samples are summarized in **Table V.** Fortification recoveries for PFBA, PFPeA, and PFHA in the water samples are detailed in **Table XV**. The average percent recoveries ± standard deviations for PFBA, PFPeA, and PFHA in the water samples were 112 ± 7%, 99 ± 12%, and 95 ± 7%, respectively. Analytical results for the analysis of PFHpA, PFOA, and PFNA found in the water samples are summarized in **Table VI.** Fortification recoveries for PFHpA, PFOA, and PFNA in the water samples are detailed in **Table XVI.** The average percent recoveries ± standard deviations for PFHpA, PFOA, and PFNA in the water samples were 82 ± 10%, 117 ± 9%, and 99 ± 9%, respectively. Analytical results for the analysis of PFDA, PFUnA, and PFDoA found in the water samples are summarized in **Table VII.** Fortification recoveries for PFDA, PFUnA, and PFDoA in the water samples are detailed in **Table XVII**. The average percent recoveries ± standard deviations for PFDA, PFUnA, and PFDoA in the water samples were 110 ± 14%, 112 ± 6%, and 93 ± 13%, respectively. Analytical results for the analysis of PFBS, PFHS, and PFOS found in the water samples are summarized in **Table VIII.** Fortification recoveries for PFBS, PFHS, and PFOS in the water samples are detailed in **Table XVIII**. The average percent recoveries ± standard deviations for PFBS, PFHS, and PFOS in the water samples were 96 ± 11%, 107 ± 4%, and 82 ± 7%, respectively. Quantitative results were obtained for all water samples and analytes.

Total percent solid results for the sediment samples are detailed in **Table XIX.**

9.0 CONCLUSIONS

Except as noted above, the soil and water samples were successfully extracted and analyzed for PFBA, PFPeA, PFHA, PFHpA, PFOA, PFNA, PFDA, PFUnA, PFDoA, PFBS, PFHS, and PFOS according 3M Environmental Laboratory analytical method ETS-8-012.1.

10.0 RETENTION OF DATA AND SAMPLES

All original paper data generated by Exygen Research that pertains to this interim report will be shipped to the study director. This does not include facility-specific raw data such as instrument or temperature logs. Exact copies of all raw data, as well as a signed copy of the final analytical report and all original facility-specific raw data, will be retained in the Exygen Research archives for the period of time specified in EPA TSCA Good Laboratory Practice Standards 40 CFR 792.

TABLES

Table I. Summary of PFBA, PFPeA, and PFHA in Soil Samples

		C4 Acid PFBA Perfluorobutanoic Acid		C5 Acid PFPeA Perfluoropentanoic Acid		C6 Acid PFHA Perfluorohexanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225070	OKMN-SB-ASB37-0-0055	NR	-	NR	-	5.84*	0.40
C0225070 Rep	OKMN-SB-ASB37-0-0055*	NR	-	NR	-	6.73*	0.40
C0225071	OKMN-SB-ASB37-0-0075	NR	-	0.527*	0.20	0.980*	0.40
C0225071 Rep	OKMN-SB-ASB37-0-0075*	NR	-	0.491*	0.20	1.14*	0.40
C0225072	OKMN-SB-ASB38-0-0000	2.05	0.40	1.39	0.20	NR	-
C0225072 Rep	OKMN-SB-ASB38-0-0000*	1.67	0.40	1.09	0.20	NR	-
C0225073	OKMN-SB-ASB38-0-0015	1.75*	0.40	1.01^*	0.20	NR	-
C0225073 Rep	OKMN-SB-ASB38-0-0015*	2.27*	0.40	1.40^*	0.20	NR	-
C0225074	OKMN-SB-ASB38-0-0035	7.88*	0.40	3.35*	0.20	8.82*	0.40
C0225074 Rep	OKMN-SB-ASB38-0-0035*	6.22*	0.40	2.76*	0.20	7.17*	0.40
C0225075	OKMN-SB-ASB38-DB-0035	7.69*	0.40	3.25*	0.20	8.57*	0.40
C0225075 Rep	OKMN-SB-ASB38-DB-0035*	7.87*	0.40	3.41*	0.20	9.58*	0.40
C0225076	OKMN-SB-ASB38-0-0055	11.9*	0.40	4.72*	0.20	14.7*	0.40
C0225076 Rep	OKMN-SB-ASB38-0-0055*	12.3*	0.40	5.51*	0.20	17.0*	0.40
C0225077	OKMN-SB-ASB38-0-0080	17.3*	0.40	6.36*	0.20	20.5*	0.40
C0225077 Rep	OKMN-SB-ASB38-0-0080*	17.8*	0.40	6.65*	0.20	22.1*	0.40
C0225078	OKMN-SB-ASB39-0-0015	28.3*	0.40	11.9*	0.20	24.8*	0.40
C0225078 Rep	OKMN-SB-ASB39-0-0015*	28.4*	0.40	13.1*	0.20	27.3*	0.40
C0225079	OKMN-SB-ASB39-DB-0015	27.2*	0.40	13.0*	0.40	27.4*	0.40
C0225079 Rep	OKMN-SB-ASB39-DB-0015*	35.2*	0.40	17.0*	0.40	36.3*	0.40
C0225080	OKMN-SB-ASB36-0-0015	56.4*	0.40	15.3*	0.40	76.6^*	0.40
C0225080 Rep	OKMN-SB-ASB36-0-0015*	46.3*	0.40	11.5*	0.40	40.2^*	0.40
C0225081	OKMN-SB-ASB36-DB-0015	NR	-	20.4*	0.40	NR	-
C0225081 Rep	OKMN-SB-ASB36-DB-0015*	NR	-	16.3*	0.40	NR	-
C0225082	OKMN-SB-ASB36-0-0030	NR	-	39.8*	0.20	174*	0.40
C0225082 Rep	OKMN-SB-ASB36-0-0030*	NR	-	32.4*	0.20	145*	0.40
C0225083	OKMN-SB-ASB36-0-0055	421	0.80	66.9*	0.20	245*	0.40
C0225083 Rep	OKMN-SB-ASB36-0-0055*	379	0.80	62.5*	0.20	207*	0.40
C0225084	OKMN-SB-ASB36-0-0095	404*	0.80	44.9*	0.20	122*	0.40
C0225084 Rep	OKMN-SB-ASB36-0-0095*	480*	0.80	46.6*	0.20	141*	0.40
C0225086	OKMN-SB-ASB37-0-0000	3.31	0.80	1.03^*	0.20	NR	-
C0225086 Rep	OKMN-SB-ASB37-0-0000*	4.49	0.80	2.88^*	0.20	NR	-
C0225087	OKMN-SB-ASB37-0-0015	6.71*	0.80	3.84*	0.20	11.0*	0.40
C0225087 Rep	OKMN-SB-ASB37-0-0015*	7.15*	0.80	4.12*	0.20	10.9*	0.40
C0225088	OKMN-SB-ASB37-0-0035	NR	-	1.70	0.20	4.91	0.40
C0225088 Rep	OKMN-SB-ASB37-0-0035*	NR	-	1.59	0.20	4.96	0.40
C0225089	OKMN-SB-ASB37-DB-0035	4.81*	0.80	2.20*	0.20	6.92*	0.80
C0225089 Rep	OKMN-SB-ASB37-DB-0035*	4.50*	0.80	2.16*	0.20	6.49*	0.80
C0225090	OKMN-SB-ASB34-0-0035	42.4*	0.80	14.3*	0.20	25.2*	0.80
C0225090 Rep	OKMN-SB-ASB34-0-0035*	56.2*	0.80	16.7*	0.20	28.7*	0.80
C0225091	OKMN-SB-ASB34-0-0055	NR	-	104*	0.20	148*	0.80
C0225091 Rep	OKMN-SB-ASB34-0-0055*	NR	-	105*	0.20	184*	0.80
C0225092	OKMN-SB-ASB34-0-0085	1610	0.40	NR	-	995	0.40
C0225092 Rep	OKMN-SB-ASB34-0-0085*	1590	0.40	NR	-	1020	0.40
C0225093	OKMN-SB-ASB35-0-0000	NR	-	2.95^	0.20	3.73^	0.40
C0225093 Rep	OKMN-SB-ASB35-0-0000*	NR	-	1.99^	0.20	1.64^	0.40
C0225094	OKMN-SB-ASB35-0-0015	41.5*	0.40	29.2*	0.20	34.7*	0.40
C0225094 Rep	OKMN-SB-ASB35-0-0015*	35.4*	0.40	22.4*	0.20	33.7*	0.40
C0225095	OKMN-SB-ASB35-0-0035	NR	-	27.0*	0.40	90.6*	0.20
C0225095 Rep	OKMN-SB-ASB35-0-0035*	NR	-	25.2*	0.40	78.4*	0.20

*Laboratory Duplicate
^Relative Percent Difference > 30%
*Sample results with expanded assessed accuracy between +/- 30% and +/- 50%.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table I. Summary of PFBA, PFPeA, and PFHA in Soil Samples (continued)

		C4 Acid PFBA Perfluorobutanoic Acid		C5 Acid PFPeA Perfluoropentanoic Acid		C6 Acid PFHA Perfluorohexanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225096	OKMN-SB-ASB35-DB-0035	26.1*	0.20	NR	-	69.5*	0.20
C0225096 Rep	OKMN-SB-ASB35-DB-0035*	26.4*	0.20	NR	-	76.3*	0.20
C0225097	OKMN-SB-ASB35-0-0055	137*	0.20	82.7^	0.40	678	0.20
C0225097 Rep	OKMN-SB-ASB35-0-0055*	155*	0.20	108*	0.40	668	0.20
C0225098	OKMN-SB-ASB35-0-0085	NR	-	103*	0.40	1230	0.20
C0225098 Rep	OKMN-SB-ASB35-0-0085*	NR	-	94.0*	0.40	1120	0.20
C0225099	OKMN-SB-ASB36-0-0000	13.6*	0.20	3.38^*	0.40	3.87^*	0.20
C0225099 Rep	OKMN-SB-ASB36-0-0000*	10.2*	0.20	2.13^*	0.40	2.31^*	0.20
C0225100	OKMN-SB-ASB32-0-0075	1250	0.20	NR	-	536	0.20
C0225100 Rep	OKMN-SB-ASB32-0-0075*	1590	0.20	NR	-	624	0.20
C0225102	OKMN-SB-ASB33-0-0000	7.85*	0.20	NR	-	1.45	0.20
C0225102 Rep	OKMN-SB-ASB33-0-0000*	7.06*	0.20	NR	-	1.31	0.20
C0225103	OKMN-SB-ASB33-0-0015	8.21^*	0.20	4.80*	0.40	8.19*	0.20
C0225103 Rep	OKMN-SB-ASB33-0-0015*	13.4^*	0.20	6.09*	0.40	10.3*	0.20
C0225104	OKMN-SB-ASB33-0-0035	16.0^*	0.20	8.25^*	0.40	12.5^*	0.20
C0225104 Rep	OKMN-SB-ASB33-0-0035*	10.2^*	0.20	4.99^*	0.40	8.29^*	0.20
C0225105	OKMN-SB-ASB33-DB-0035	9.53^*	0.20	7.52*	0.40	8.85*	0.20
C0225105 Rep	OKMN-SB-ASB33-DB-0035*	11.6^*	0.20	7.51*	0.40	8.35*	0.20
C0225106	OKMN-SB-ASB33-0-0055	NR	-	23.2*	0.40	NR	-
C0225106 Rep	OKMN-SB-ASB33-0-0055*	NR	-	23.5*	0.40	NR	-
C0225107	OKMN-SB-ASB33-0-0085	NR	-	30.7*	0.40	NR	-
C0225107 Rep	OKMN-SB-ASB33-0-0085*	NR	-	34.0*	0.40	NR	-
C0225108	OKMN-SB-ASB34-0-0000	NR	-	NR	-	0.349^*	0.40
C0225108 Rep	OKMN-SB-ASB34-0-0000*	NR	-	NR	-	0.546^*	0.40
C0225109	OKMN-SB-ASB34-0-0015	6.55*	0.20	NR	-	7.24*	0.40
C0225109 Rep	OKMN-SB-ASB34-0-0015*	9.75*	0.20	NR	-	6.92*	0.40
C0225110	OKMN-SB-ASB31-0-0000	12.9*	0.20	NR	-	NR	-
C0225110 Rep	OKMN-SB-ASB31-0-0000*	12.1*	0.20	NR	-	NR	-
C0225111	OKMN-SB-ASB31-0-0015	NR	-	4.07^*	0.40	8.80^*	0.20
C0225111 Rep	OKMN-SB-ASB31-0-0015*	NR	-	10.2^*	0.40	18.9^*	0.20
C0225112	OKMN-SB-ASB31-0-0035	205*	0.40	NR	-	NR	-
C0225112 Rep	OKMN-SB-ASB31-0-0035*	233*	0.40	NR	-	NR	-
C0225113	OKMN-SB-ASB31-0-0055	231*	0.40	80.2*	0.40	NR	-
C0225113 Rep	OKMN-SB-ASB31-0-0055*	222*	0.40	95.6*	0.40	NR	-
C0225114	OKMN-SB-ASB31-0-0070	348*	0.20	NR	-	NR	-
C0225114 Rep	OKMN-SB-ASB31-0-0070*	326*	0.20	NR	-	NR	-
C0225115	OKMN-SB-ASB32-0-0000	NR	-	5.48*	0.20	NR	-
C0225115 Rep	OKMN-SB-ASB32-0-0000*	NR	-	5.42*	0.20	NR	-
C0225116	OKMN-SB-ASB32-0-0015	NR	-	NR	-	NR	-
C0225116 Rep	OKMN-SB-ASB32-0-0015*	NR	-	NR	-	NR	-
C0225117	OKMN-SB-ASB32-DB-0015	309*	0.20	86.7^	0.40	187	0.20
C0225117 Rep	OKMN-SB-ASB32-DB-0015*	296*	0.20	61.1^	0.40	141	0.20
C0225118	OKMN-SB-ASB32-0-0035	628*	0.20	150*	0.40	NR	-
C0225118 Rep	OKMN-SB-ASB32-0-0035*	796*	0.20	160*	0.40	NR	-
C0225119	OKMN-SB-ASB32-0-0055	886*	0.20	192*	0.40	NR	-
C0225119 Rep	OKMN-SB-ASB32-0-0055*	877*	0.20	164*	0.40	NR	-
C0225120	OKMN-SB-ASB39-0-0035	73.9	0.20	17.5	0.40	27.9	0.20
C0225120 Rep	OKMN-SB-ASB39-0-0035*	91.0	0.20	19.3	0.40	30.0	0.20
C0225121	OKMN-SB-ASB39-0-0055	286	0.20	40.5	0.40	95.3	0.20
C0225121 Rep	OKMN-SB-ASB39-0-0055*	331	0.20	44.8	0.40	106	0.20

*Laboratory Duplicate
^Relative Percent Difference > 30%
*Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table I. Summary of PFBA, PFPeA, and PFHA in Soil Samples (continued)

Exygen ID	Client Sample ID	C4 Acid PFBA Perfluorobutanoic Acid		C5 Acid PFPeA Perfluoropentanoic Acid		C6 Acid PFHA Perfluorohexanoic Acid	
		Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225122	OKMN-SB-ASB39-0-0070	186°	0.20	25.6	0.40	41.6	0.20
C0225122 Rep	OKMN-SB-ASB39-0-0070*	197°	0.20	26.3	0.40	39.5	0.20
C0225123	OKMN-SB-ASB40-0-0000	NR	-	1.24	0.40	0.415	0.20
C0225123 Rep	OKMN-SB-ASB40-0-0000*	NR	-	1.20	0.40	0.411	0.20
C0225124	OKMN-SB-ASB40-0-0015	ND^1	0.40	ND	0.40	0.764	0.20
C0225124 Rep	OKMN-SB-ASB40-0-0015*	0.368^1	0.40	ND	0.40	0.806	0.20
C0225125	OKMN-SB-ASB40-0-0035	1.01^°	0.40	ND^	0.40	0.779^	0.20
C0225125 Rep	OKMN-SB-ASB40-0-0035*	1.81^°	0.40	0.834^	0.40	2.09^	0.20
C0225126	OKMN-SB-ASB40-0-0055	2.69	0.20	0.897	0.40	3.25	0.20
C0225126 Rep	OKMN-SB-ASB40-0-0055*	2.69	0.20	1.09	0.40	3.81	0.20
C0225127	OKMN-SB-ASB40-0-0090	3.77^	0.20	3.14	0.40	22.1	0.20
C0225127 Rep	OKMN-SB-ASB40-0-0090*	5.15^	0.20	2.93	0.40	21.8	0.20
C0225128	OKMN-SB-ASB41-0-0015	9.74	0.20	8.29	0.40	18.0	0.20
C0225128 Rep	OKMN-SB-ASB41-0-0015*	9.86	0.20	7.54	0.40	16.6	0.20
C0225129	OKMN-SB-ASB41-0-0035	43.8	0.20	17.6	0.20	63.1	0.20
C0225129 Rep	OKMN-SB-ASB41-0-0035*	43.7	0.20	15.9	0.20	57.7	0.20
C0225130	OKMN-SB-ASB41-0-0055	34.6	0.20	12.3	0.20	35.7	0.20
C0225130 Rep	OKMN-SB-ASB41-0-0055*	25.8	0.20	12.8	0.20	41.1	0.20
C0225131	OKMN-SB-ASB41-0-0090	109	0.20	16.0	0.20	33.9	0.20
C0225131 Rep	OKMN-SB-ASB41-0-0090*	104	0.20	15.4	0.20	35.0	0.20
C0225132	OKMN-SB-ASB41-DB-0090	129^	0.20	16.2^	0.20	NR	-
C0225132 Rep	OKMN-SB-ASB41-DB-0090*	88.9^	0.20	11.5^	0.20	NR	-
C0225133	OKMN-SB-ASB42-0-0000	ND	0.20	ND^	0.20	ND	0.40
C0225133 Rep	OKMN-SB-ASB41-0-0000*	ND	0.20	0.303^	0.20	ND	0.40
C0225134	OKMN-SB-ASB42-0-0015	ND	0.20	ND	0.20	0.331^	0.40
C0225134 Rep	OKMN-SB-ASB41-0-0015*	ND	0.20	ND	0.20	0.446^	0.40
C0225135	OKMN-SB-ASB42-0-0035	9.22	0.20	3.50	0.40	17.6	0.20
C0225135 Rep	OKMN-SB-ASB41-0-0035*	7.70	0.20	3.19	0.40	17.3	0.20
C0225136	OKMN-SB-ASB42-0-0055	9.88	0.20	3.47	0.40	18.3	0.20
C0225136 Rep	OKMN-SB-ASB41-0-0055*	9.66	0.20	3.63	0.40	17.6	0.20
C0225137	OKMN-SB-ASB42-0-0070	15.0	0.20	4.53	0.40	22.1	0.20
C0225137 Rep	OKMN-SB-ASB41-0-0070*	18.5	0.20	4.95	0.40	24.7	0.20
C0225139	OKMN-SB-ASB43-0-0015	8.15	0.20	5.52	0.20	10.7	0.20
C0225139 Rep	OKMN-SB-ASB43-0-0015*	6.62	0.20	4.70	0.20	8.42	0.20
C0225140	OKMN-SB-ASB43-0-0035	41.0^	0.20	17.5^	0.20	20.5^	0.20
C0225140 Rep	OKMN-SB-ASB43-0-0035*	28.6^	0.20	11.4^	0.20	13.7^	0.20
C0225141	OKMN-SB-ASB43-0-0055	96.5°	0.20	28.0	0.20	35.6	0.20
C0225141 Rep	OKMN-SB-ASB43-0-0055*	84.6°	0.20	26.6	0.20	34.7	0.20
C0225142	OKMN-SB-ASB43-0-0090	37.1	0.40	20.9	0.40	40.8	0.20
C0225142 Rep	OKMN-SB-ASB43-0-0090*	41.5	0.40	20.0	0.40	39.8	0.20

*Laboratory Duplicate
^Relative Percent Difference > 30%
°Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
'Relative Percent Difference was not calculated due to the presence of a nondetect and resulting uncertainty.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table II. Summary of PFHpA, PFOA, and PFNA in Soil Samples

		C7 Acid PFHpA Perfluoroheptanoic Acid		C8 Acid PFOA Perfluorooctanoic Acid		C9 Acid PFNA Perfluorononanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225070	OKMN-SB-ASB37-0-0055	7.42*	0.20	9.56	0.20	NR	-
C0225070 Rep	OKMN-SB-ASB37-0-0055*	8.19*	0.20	11.5	0.20	NR	-
C0225071	OKMN-SB-ASB37-0-0075	NR	-	13.2*	0.20	ND*	0.20
C0225071 Rep	OKMN-SB-ASB37-0-0075*	NR	-	14.1*	0.20	ND*	0.20
C0225072	OKMN-SB-ASB38-0-0000	2.37	0.20	21.6^*	0.20	0.214*	0.20
C0225072 Rep	OKMN-SB-ASB38-0-0000*	1.84	0.20	15.6^*	0.20	0.167*	0.20
C0225073	OKMN-SB-ASB38-0-0015	NR	-	58.1^	0.20	NR	-
C0225073 Rep	OKMN-SB-ASB38-0-0015*	NR	-	106^	0.20	NR	-
C0225074	OKMN-SB-ASB38-0-0035	10.2*	0.20	130*	0.20	NR	-
C0225074 Rep	OKMN-SB-ASB38-0-0035*	7.68*	0.20	107*	0.20	NR	-
C0225075	OKMN-SB-ASB38-DB-0035	9.47*	0.20	147*	0.20	NR	-
C0225075 Rep	OKMN-SB-ASB38-DB-0035*	8.29*	0.20	126*	0.20	NR	-
C0225076	OKMN-SB-ASB38-0-0055	14.1^*	0.80	NR	-	NR	-
C0225076 Rep	OKMN-SB-ASB38-0-0055*	26.6^*	0.80	NR	-	NR	-
C0225077	OKMN-SB-ASB38-0-0080	14.7*	0.80	NR	-	ND*	0.20
C0225077 Rep	OKMN-SB-ASB38-0-0080*	17.3*	0.80	NR	-	ND*	0.20
C0225078	OKMN-SB-ASB39-0-0015	31.7*	0.80	453	0.20	NR	-
C0225078 Rep	OKMN-SB-ASB39-0-0015*	33.7*	0.80	439	0.20	NR	-
C0225079	OKMN-SB-ASB39-DB-0015	53.3^*	0.40	382^	0.20	NR	-
C0225079 Rep	OKMN-SB-ASB39-DB-0015*	74.5^*	0.40	584^	0.20	NR	-
C0225080	OKMN-SB-ASB36-0-0015	135^*	0.40	1340^	0.20	NR	-
C0225080 Rep	OKMN-SB-ASB36-0-0015*	97.4^*	0.40	806^	0.20	NR	-
C0225081	OKMN-SB-ASB36-DB-0015	NR	-	1020*	0.20	NR	-
C0225081 Rep	OKMN-SB-ASB36-DB-0015*	NR	-	1060*	0.20	NR	-
C0225082	OKMN-SB-ASB36-0-0030	197*	0.40	1880	0.20	NR	-
C0225082 Rep	OKMN-SB-ASB36-0-0030*	161*	0.40	1350	0.20	NR	-
C0225083	OKMN-SB-ASB36-0-0055	205*	0.40	2810	0.20	4.97	0.20
C0225083 Rep	OKMN-SB-ASB36-0-0055*	204*	0.40	2620	0.20	4.90	0.20
C0225084	OKMN-SB-ASB36-0-0095	67.0	0.40	NR	-	ND*	0.20
C0225084 Rep	OKMN-SB-ASB36-0-0095*	56.2	0.40	NR	-	ND*	0.20
C0225086	OKMN-SB-ASB37-0-0000	0.845^	0.20	NR	-	0.189^*	0.20
C0225086 Rep	OKMN-SB-ASB37-0-0000*	3.43^	0.20	NR	-	0.441^*	0.20
C0225087	OKMN-SB-ASB37-0-0015	19.0*	0.20	266*	0.20	NR	-
C0225087 Rep	OKMN-SB-ASB37-0-0015*	17.3*	0.20	227*	0.20	NR	-
C0225088	OKMN-SB-ASB37-0-0035	8.22*	0.20	103^*	0.20	NR	-
C0225088 Rep	OKMN-SB-ASB37-0-0035*	6.86*	0.20	73.5^*	0.20	NR	-
C0225089	OKMN-SB-ASB37-DB-0035	9.50*	0.20	99.5	0.20	NR	-
C0225089 Rep	OKMN-SB-ASB37-DB-0035*	8.61*	0.20	93.3	0.20	NR	-
C0225090	OKMN-SB-ASB34-0-0035	38.1*	0.20	NR	-	NR	-
C0225090 Rep	OKMN-SB-ASB34-0-0035*	44.0*	0.20	NR	-	NR	-
C0225091	OKMN-SB-ASB34-0-0055	159*	0.20	4880*	0.20	NR	-
C0225091 Rep	OKMN-SB-ASB34-0-0055*	185*	0.20	4420*	0.20	NR	-
C0225092	OKMN-SB-ASB34-0-0085	1190	0.20	16000	0.20	17.2*	0.20
C0225092 Rep	OKMN-SB-ASB34-0-0085*	1240	0.20	18100	0.20	16.3*	0.20
C0225093	OKMN-SB-ASB35-0-0000	1.87^	0.20	17.4^*	0.20	NR	-
C0225093 Rep	OKMN-SB-ASB35-0-0000*	0.838^	0.20	9.16^*	0.20	NR	-
C0225094	OKMN-SB-ASB35-0-0015	34.1*	0.20	853	0.20	NR	-
C0225094 Rep	OKMN-SB-ASB35-0-0015*	39.8*	0.20	1060	0.20	NR	-
C0225095	OKMN-SB-ASB35-0-0035	NR	-	3330	0.40	NR	-
C0225095 Rep	OKMN-SB-ASB35-0-0035*	NR	-	2620	0.40	NR	-

*Laboratory Duplicate
^Relative Percent Difference > 30%
*Sample results with expanded assessed accuracy between +/- 30% and +/- 50%.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table II. Summary of PFHpA, PFOA, and PFNA in Soil Samples (continued)

Exygen ID	Client Sample ID	C7 Acid PFHpA Perfluoroheptanoic Acid		C8 Acid PFOA Perfluorooctanoic Acid		C9 Acid PFNA Perfluorononanoic Acid	
		Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225096	OKMN-SB-ASB35-DB-0035	NR	-	NR	-	NR	-
C0225096 Rep	OKMN-SB-ASB35-DB-0035*	NR	-	NR	-	NR	-
C0225097	OKMN-SB-ASB35-0-0055	904	0.20	14900	0.40	29.5*	0.20
C0225097 Rep	OKMN-SB-ASB35-0-0055*	868	0.20	11200	0.40	24.8*	0.20
C0225098	OKMN-SB-ASB35-0-0085	1460	0.20	4500^*	0.20	6.27^*	0.20
C0225098 Rep	OKMN-SB-ASB35-0-0085*	1090	0.20	3250^*	0.20	4.10^*	0.20
C0225099	OKMN-SB-ASB36-0-0000	1.99^	0.20	18.8^*	0.20	NR	-
C0225099 Rep	OKMN-SB-ASB36-0-0000*	1.35^	0.20	13.3^*	0.20	NR	-
C0225100	OKMN-SB-ASB32-0-0075	188*	0.20	2210	0.20	NR	-
C0225100 Rep	OKMN-SB-ASB32-0-0075*	183*	0.20	1710	0.20	NR	-
C0225102	OKMN-SB-ASB33-0-0000	0.734^	0.20	5.32^*	0.20	0.300^*	0.20
C0225102 Rep	OKMN-SB-ASB33-0-0000*	0.487^	0.20	3.26^*	0.20	0.140^*	0.20
C0225103	OKMN-SB-ASB33-0-0015	14.4*	0.20	419^	0.20	NR	-
C0225103 Rep	OKMN-SB-ASB33-0-0015*	15.6*	0.20	864^	0.20	NR	-
C0225104	OKMN-SB-ASB33-0-0035	15.8*	0.20	NR	-	NR	-
C0225104 Rep	OKMN-SB-ASB33-0-0035*	12.2*	0.20	NR	-	NR	-
C0225105	OKMN-SB-ASB33-DB-0035	9.25*	0.20	NR	-	NR	-
C0225105 Rep	OKMN-SB-ASB33-DB-0035*	9.50*	0.20	NR	-	NR	-
C0225106	OKMN-SB-ASB33-0-0055	49.4*	0.20	774	0.20	NR	-
C0225106 Rep	OKMN-SB-ASB33-0-0055*	44.0*	0.20	736	0.20	NR	-
C0225107	OKMN-SB-ASB33-0-0085	NR	-	3680	0.20	NR	-
C0225107 Rep	OKMN-SB-ASB33-0-0085*	NR	-	3260	0.20	NR	-
C0225108	OKMN-SB-ASB34-0-0000	0.289*	0.20	7.13*	0.20	ND*	0.20
C0225108 Rep	OKMN-SB-ASB34-0-0000*	0.378*	0.20	8.09*	0.20	ND*	0.20
C0225109	OKMN-SB-ASB34-0-0015	5.51*	0.20	NR	-	NR	-
C0225109 Rep	OKMN-SB-ASB34-0-0015*	5.41*	0.20	NR	-	NR	-
C0225110	OKMN-SB-ASB31-0-0000	0.760*	0.20	5.67*	0.20	ND*	0.20
C0225110 Rep	OKMN-SB-ASB31-0-0000*	0.740*	0.20	6.82*	0.20	ND*	0.20
C0225111	OKMN-SB-ASB31-0-0015	7.76^*	0.20	NR	-	0.335^*	0.20
C0225111 Rep	OKMN-SB-ASB31-0-0015*	12.8^*	0.20	NR	-	1.26^*	0.20
C0225112	OKMN-SB-ASB31-0-0035	NR	-	NR	-	NR	-
C0225112 Rep	OKMN-SB-ASB31-0-0035*	NR	-	NR	-	NR	-
C0225113	OKMN-SB-ASB31-0-0055	NR	-	6620*	0.20	NR	-
C0225113 Rep	OKMN-SB-ASB31-0-0055*	NR	-	5460*	0.20	NR	-
C0225114	OKMN-SB-ASB31-0-0070	NR	-	9430	0.20	NR	-
C0225114 Rep	OKMN-SB-ASB31-0-0070*	NR	-	8830	0.20	NR	-
C0225115	OKMN-SB-ASB32-0-0000	NR	-	17.3*	0.20	NR	-
C0225115 Rep	OKMN-SB-ASB32-0-0000*	NR	-	20.6*	0.20	NR	-
C0225116	OKMN-SB-ASB32-0-0015	NR	-	3300^*	0.20	NR	-
C0225116 Rep	OKMN-SB-ASB32-0-0015*	NR	-	5540^*	0.20	NR	-
C0225117	OKMN-SB-ASB32-DB-0015	179*	0.20	3930^	0.20	9.58*	0.20
C0225117 Rep	OKMN-SB-ASB32-DB-0015*	140*	0.20	2930^	0.20	7.32*	0.20
C0225118	OKMN-SB-ASB32-0-0035	256*	0.20	11400	0.20	NR	-
C0225118 Rep	OKMN-SB-ASB32-0-0035*	275*	0.20	12200	0.20	NR	-
C0225119	OKMN-SB-ASB32-0-0055	NR	-	5610	0.20	NR	-
C0225119 Rep	OKMN-SB-ASB32-0-0055*	NR	-	5310	0.20	NR	-
C0225120	OKMN-SB-ASB39-0-0035	31.1	0.20	943*	0.20	4.51*	0.20
C0225120 Rep	OKMN-SB-ASB39-0-0035*	31.3	0.20	1110*	0.20	4.66*	0.20
C0225121	OKMN-SB-ASB39-0-0055	112*	0.20	1350*	0.20	4.33*	0.20
C0225121 Rep	OKMN-SB-ASB39-0-0055*	127*	0.20	1450*	0.20	4.80*	0.20

*Laboratory Duplicate
^Relative Percent Difference > 30%
*Sample results with expanded assessed accuracy between +/- 30% and +/- 60%.
ND = Not detected at or above acceptable LOQ.
NR = Not reported due to quality control failures.

Table II. Summary of PFHpA, PFOA, and PFNA in Soil Samples (continued)

		C7 Acid PFHpA Perfluoroheptanoic Acid		C8 Acid PFOA Perfluorooctanoic Acid		C9 Acid PFNA Perfluorononanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225122	OKMN-SB-ASB39-0-0070	76.0^	0.20	926	0.20	5.32*	0.20
C0225122 Rep	OKMN-SB-ASB39-0-0070*	41.0*	0.20	961	0.20	4.33*	0.20
C0225123	OKMN-SB-ASB40-0-0000	NR	-	NR	-	ND	0.20
C0225123 Rep	OKMN-SB-ASB40-0-0000*	NR	-	NR	-	ND	0.20
C0225124	OKMN-SB-ASB40-0-0015	0.420^	0.20	7.33	0.20	ND	0.20
C0225124 Rep	OKMN-SB-ASB40-0-0015*	0.573^	0.20	6.24	0.20	ND	0.20
C0225125	OKMN-SB-ASB40-0-0035	0.654^1	0.20	12.1^	0.20	ND	0.20
C0225125 Rep	OKMN-SB-ASB40-0-0035*	1.92^1	0.20	32.1^	0.20	ND	0.20
C0225126	OKMN-SB-ASB40-0-0055	2.47*	0.20	12.4	0.20	ND	0.20
C0225126 Rep	OKMN-SB-ASB40-0-0055*	2.82*	0.20	15.6	0.20	ND	0.20
C0225127	OKMN-SB-ASB40-0-0090	15.0	0.20	27.4*	0.20	ND	0.20
C0225127 Rep	OKMN-SB-ASB40-0-0090*	14.9	0.20	27.2*	0.20	ND	0.20
C0225128	OKMN-SB-ASB41-0-0015	31.8	0.20	728	0.20	2.76*	0.20
C0225128 Rep	OKMN-SB-ASB41-0-0015*	28.1	0.20	586	0.20	2.50*	0.20
C0225129	OKMN-SB-ASB41-0-0035	88.9	0.20	749	0.20	2.08*	0.20
C0225129 Rep	OKMN-SB-ASB41-0-0035*	78.3	0.20	696	0.20	2.18*	0.20
C0225130	OKMN-SB-ASB41-0-0055	55.3	0.20	578	0.20	2.32*	0.20
C0225130 Rep	OKMN-SB-ASB41-0-0055*	59.7	0.20	538	0.20	2.44*	0.20
C0225131	OKMN-SB-ASB41-0-0090	18.0	0.20	60.8	0.20	ND	0.20
C0225131 Rep	OKMN-SB-ASB41-0-0090*	19.2	0.20	63.9	0.20	ND	0.20
C0225132	OKMN-SB-ASB41-DB-0090	21.4	0.20	75.3^	0.20	ND	0.20
C0225132 Rep	OKMN-SB-ASB41-DB-0090*	16.9	0.20	40.8^	0.20	ND	0.20
C0225133	OKMN-SB-ASB42-0-0000	ND	0.20	0.620^	0.20	ND	0.20
C0225133 Rep	OKMN-SB-ASB41-0-0000*	ND	0.20	1.07^	0.20	ND	0.20
C0225134	OKMN-SB-ASB42-0-0015	ND[1]	0.20	0.874^*	0.20	ND	0.20
C0225134 Rep	OKMN-SB-ASB41-0-0015*	0.191[1]	0.20	1.19^*	0.20	ND	0.20
C0225135	OKMN-SB-ASB42-0-0035	13.5	0.20	154^*	0.20	0.309	0.20
C0225135 Rep	OKMN-SB-ASB41-0-0035*	12.6	0.20	121^*	0.20	0.272	0.20
C0225136	OKMN-SB-ASB42-0-0055	15.3	0.20	211	0.20	0.460	0.20
C0225136 Rep	OKMN-SB-ASB41-0-0055*	15.3	0.20	232	0.20	0.509	0.20
C0225137	OKMN-SB-ASB42-0-0070	13.1	0.20	64.3	0.20	ND	0.20
C0225137 Rep	OKMN-SB-ASB41-0-0070*	13.3	0.20	61.5	0.20	ND	0.20
C0225139	OKMN-SB-ASB43-0-0015	0.21^	0.20	65.8^	0.20	0.265[1]	0.20
C0225139 Rep	OKMN-SB-ASB43-0-0015*	4.20^	0.20	41.9^	0.20	ND[1]	0.20
C0225140	OKMN-SB-ASB43-0-0035	19.2	0.20	696^*	0.20	3.05*	0.20
C0225140 Rep	OKMN-SB-ASB43-0-0035*	14.9	0.20	355^*	0.20	2.68*	0.20
C0225141	OKMN-SB-ASB43-0-0055	38.1	0.20	1190^	0.20	NR	-
C0225141 Rep	OKMN-SB-ASB43-0-0055*	31.6	0.20	737^	0.20	NR	-
C0225142	OKMN-SB-ASB43-0-0090	28.2	0.20	233*	0.20	1.08	0.20
C0225142 Rep	OKMN-SB-ASB43-0-0090*	30.2	0.20	284*	0.20	0.975	0.20

*Laboratory Duplicate
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[1]Relative Percent Difference was not calculated due to the presence of a nondetect and resulting uncertainty.
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Table III. Summary of PFDA, PFUnA, and PFDoA in Soil Samples

		C10 Acid PFDA Perfluorodecanoic Acid		C11 Acid PFUnA Perfluoroundecanoic Acid		C12 Acid PFDoA Perfluorododecanoic Acid	
Exygen ID	Client Sample ID	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)	Analyte Found (ppb, ng/g) Dry Weight	Acceptable LOQ (wet) (ng/g)
C0225070	OKMN-SB-ASB37-0-0055	13.2*	0.20	NR	-	0.913^*	0.20
C0225070 Rep	OKMN-SB-ASB37-0-0055*	16.3*	0.20	NR	-	1.51^*	0.20
C0225071	OKMN-SB-ASB37-0-0075	1.17*	0.20	ND	0.20	ND*	0.20
C0225071 Rep	OKMN-SB-ASB37-0-0075*	1.09*	0.20	ND	0.20	ND*	0.20
C0225072	OKMN-SB-ASB38-0-0000	1.11^*	0.20	ND*	0.20	0.211^*	0.20
C0225072 Rep	OKMN-SB-ASB38-0-0000*	0.790^^	0.20	ND*	0.20	ND^*	0.20
C0225073	OKMN-SB-ASB38-0-0015	NR	-	ND^*	0.20	ND^*	0.20
C0225073 Rep	OKMN-SB-ASB38-0-0015*	NR	-	0.337^*	0.20	0.275^*	0.20
C0225074	OKMN-SB-ASB38-0-0035	5.63*	0.20	0.561*	0.20	0.748*	0.20
C0225074 Rep	OKMN-SB-ASB38-0-0035*	4.33*	0.20	0.493*	0.20	0.800*	0.20
C0225075	OKMN-SB-ASB38-DB-0035	5.84*	0.20	0.619*	0.20	0.826*	0.20
C0225075 Rep	OKMN-SB-ASB38-DB-0035*	5.63*	0.20	0.670*	0.20	0.946*	0.20
C0225076	OKMN-SB-ASB38-0-0055	5.90^*	0.20	0.618^*	0.20	0.842^*	0.20
C0225076 Rep	OKMN-SB-ASB38-0-0055*	12.2^*	0.20	1.12^*	0.20	1.20^*	0.20
C0225077	OKMN-SB-ASB38-0-0080	NR	-	0.255^*	0.20	0.206*	0.20
C0225077 Rep	OKMN-SB-ASB38-0-0080*	NR	-	0.348^*	0.20	0.206*	0.20
C0225078	OKMN-SB-ASB39-0-0015	11.4*	0.20	NR	-	NR	-
C0225078 Rep	OKMN-SB-ASB39-0-0015*	11.5*	0.20	NR	-	NR	-
C0225079	OKMN-SB-ASB39-DB-0015	9.92*	0.20	1.64*	0.20	1.39*	0.20
C0225079 Rep	OKMN-SB-ASB39-DB-0015*	11.8*	0.20	2.05*	0.20	1.79*	0.20
C0225080	OKMN-SB-ASB36-0-0015	41.2*	0.20	NR	-	NR	-
C0225080 Rep	OKMN-SB-ASB36-0-0015*	32.3*	0.20	NR	-	NR	-
C0225081	OKMN-SB-ASB36-DB-0015	35.5*	0.20	NR	-	NR	-
C0225081 Rep	OKMN-SB-ASB36-DB-0015*	37.6*	0.20	NR	-	NR	-
C0225082	OKMN-SB-ASB36-0-0030	1200	0.20	91.4	0.20	112	0.20
C0225082 Rep	OKMN-SB-ASB36-0-0030*	1260	0.20	93.4	0.20	112	0.20
C0225083	OKMN-SB-ASB36-0-0055	131*	0.20	5.19*	0.20	6.69*	0.20
C0225083 Rep	OKMN-SB-ASB36-0-0055*	115*	0.20	4.48*	0.20	5.87*	0.20
C0225084	OKMN-SB-ASB36-0-0095	0.200^*	0.20	ND*	0.20	ND*	0.20
C0225084 Rep	OKMN-SB-ASB36-0-0095*	0.348^*	0.20	ND*	0.20	ND*	0.20
C0225086	OKMN-SB-ASB37-0-0000	NR	-	1.51*	0.20	NR	-
C0225086 Rep	OKMN-SB-ASB37-0-0000*	NR	-	1.60*	0.20	NR	-
C0225087	OKMN-SB-ASB37-0-0015	15.1*	0.20	NR	-	1.58*	0.20
C0225087 Rep	OKMN-SB-ASB37-0-0015*	13.5*	0.20	NR	-	1.32*	0.20
C0225088	OKMN-SB-ASB37-0-0035	7.37*	0.20	0.893*	0.20	1.04*	0.20
C0225088 Rep	OKMN-SB-ASB37-0-0035*	6.25*	0.20	0.762*	0.20	0.908*	0.20
C0225089	OKMN-SB-ASB37-DB-0035	11.4*	0.20	1.41*	0.20	1.67	0.20
C0225089 Rep	OKMN-SB-ASB37-DB-0035*	9.79*	0.20	1.30*	0.20	1.55	0.20
C0225090	OKMN-SB-ASB34-0-0035	21.9*	0.20	5.17*	0.20	6.42*	0.20
C0225090 Rep	OKMN-SB-ASB34-0-0035*	28.3*	0.20	6.56*	0.20	8.07*	0.20
C0225091	OKMN-SB-ASB34-0-0055	32.5	0.20	10.9	0.20	12.6*	0.20
C0225091 Rep	OKMN-SB-ASB34-0-0055*	32.0	0.20	10.7	0.20	12.7*	0.20
C0225092	OKMN-SB-ASB34-0-0085	48.2*	0.40	NR	-	0.618*	0.20
C0225092 Rep	OKMN-SB-ASB34-0-0085*	46.5*	0.40	NR	-	0.511*	0.20
C0225093	OKMN-SB-ASB35-0-0000	8.88^*	0.40	2.65*	0.20	3.28*	0.20
C0225093 Rep	OKMN-SB-ASB35-0-0000*	3.79^*	0.40	2.00*	0.20	2.92*	0.20
C0225094	OKMN-SB-ASB35-0-0015	NR	-	6.78*	0.20	6.43*	0.20
C0225094 Rep	OKMN-SB-ASB35-0-0015*	NR	-	7.27*	0.20	7.90*	0.20
C0225095	OKMN-SB-ASB35-0-0035	NR	-	6.67*	0.20	26.7	0.20
C0225095 Rep	OKMN-SB-ASB35-0-0035*	NR	-	5.65*	0.20	21.6	0.20

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