REPORT OF INVESTIGATION ACTIVITIES AT SELECT FIREFIGHTING FOAM TRAINING AREAS AND FOAM DISCHARGE SITES IN MINNESOTA

DELTA PROJECT NO. 19382-DEL0

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1.0 INTRODUCTION

1.1 Purpose

Delta Consultants (Delta) was retained and authorized by the Minnesota Pollution Control Agency (MPCA) to conduct site reconnaissance, sampling and other activities related to the use of Class B firefighting foams containing perflourocarbons (PFCs) at select fire training areas and firefighting foam discharge sites in Minnesota. The additional activities were based on information, conclusions and recommendations presented in the following related reports prepared by Delta: *Perfluorocarbon (PFC)-Containing Firefighting Foams and Their Use In Firefighting Training in Minnesota* report dated June 30, 2008 (the June 2008 Report); *Addendum to Perfluorocarbon (PFC)-Containing Firefighting Foams and Their Use In Firefighting Training in Minnesota* report dated October 22, 2008 (the October 2008 Addendum Report); *Firefighting Training Area Site Reconnaissance, Pine Bend Flint Hills Refinery, Marathon Refinery, Burnsville Fire Training Center, and Site Access for 21 Fire Departments* report dated April 3, 2009 (the April 2009 Report); and, *Report of Site Reconnaissance and Sampling at Select Firefighting Foam Training Areas in Minnesota* report dated June 30, 2009 (the June 2009 Report).

The purpose of this report is to present data and findings of interviews, site reconnaissance, and sampling in association with the following current or former Class B firefighting foam training areas and foam discharge sites:

- the firefighting foam training area utilized by the Bemidji Fire Department located at the Bemidji Regional Airport;
- the storm sewer discharge point associated with the foam training area utilized by the Goodview Fire Department located at their fire station;
- the fire training area at the Marathon Refinery in St. Paul Park;
- the former firefighting foam training area utilized by the Richfield Fire Department located behind the Richfield Ice Arena;
- foam discharge sites associated with past fires at the Crystal Airport in Crystal;
- historical firefighting foam training areas utilized by the fire department at MSP Airport;
- the fire training area at the Flint Hills Resources Pine Bend refinery in Rosemount;
- the fire training area at the Emergency Response Training Center operated by the Lake Superior College in Duluth;
- the former foam training area utilized by the Hutchinson Fire Department located at 1300 Adams Street SE in Hutchinson;

- the fire training area utilized by the Maynard Fire Department located at Mable and Sherman Streets in Maynard;
- the foam discharge site associated with a September 2009 fire at the River Grove Marina in Inver Grove Heights; and
- the foam discharge site associated with an October 2009 fire at the Kandiyohi County Landfill in New London.

While site reconnaissance and sampling information for the current or former firefighting foam training areas in Claremont, Fridley, Kenyon, Luverne, Rochester, and MSP Airport were presented in Delta's June 2009 Report, the laboratory results were not available at the time of the June 2009 Report. Therefore, laboratory data for these sites are presented in this report.

1.2 Background

As presented in the June 2008 and October 2008 Addendum Reports, municipal fire departments, airport and refinery fire departments, and colleges with fire training programs were surveyed regarding their firefighting foam use in training exercises. All of the airport and refinery fire departments, all of the colleges with fire training programs, and 522 of 785 municipal fire departments responded to the survey. Of the responding municipal fire departments, approximately 10% do not use any type of firefighting foam, 47% use only Class A fire foams, 22% use Class B foams for fire response but not for training, and 22% use and train with Class B fire foams. Of the municipal fire departments that use and train with Class B foam, only 72%, or 79 municipal fire departments, regularly train, or presumably train, repeatedly at one location. The survey also identified two current and one former petroleum refinery that train with Class B foam on-site, three airport fire departments that train with Class B foam on-site, and three colleges that train with Class B foam.

The June 2008 Report concluded that surfactants used in Class B firefighting foams are manufactured with PFCs. PFC-containing surfactants in the firefighting foams formerly manufactured by 3M were made using a proprietary process and are known to contain or break down to perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). The surfactants in Class B firefighting foams manufactured by companies other than 3M are made using a telomerization process and cannot break down to PFOS, however, they contain and/or may break down to PFOA, perflourobutanoic acid (PFBA), and other PFC compounds. Class A foams and training foams are not made with PFC-based surfactants and are therefore not a source of PFCs in the environment.

In Section 7.2 of the October 2008 Addendum Report, Delta identified 21 "priority" Class B firefighting foam training sites with high potential for PFC impacts to soils, groundwater and surface water, based on

several factors: training site locations in wellhead protection or source water assessment areas; training site locations in karst areas; the presence of surface waters, wetlands or water supply wells near the training sites; and the amount and type of Class B aqueous film-forming foam (AFFF) utilized in training. One of the sites, the Duluth International Airport, is currently under investigation by the MPCA, thus further investigation of this site was excluded from Delta's firefighting foam investigation. The MPCA requested that the Luverne Fire Department training site be added to the "priority" list even though it was not identified as one of the higher priority sites in the October 2008 Addendum Report, since the Minnesota Department of Health (MDH) had a concern regarding proximity of the Luverne Fire Department's training site to public wells in town. The 21 "priority" firefighting foam sites are as follows:

- Minneapolis-St. Paul (MSP) Intl. Airport
- Flint Hills Pine Bend Refinery, Rosemount
- Kenyon Fire Department
- Claremont Fire Department
- Alexandria Fire Department
- Harmony Fire Department
- Fridley Fire Department
- Burnsville Fire Department
- North St. Paul Fire Department
- Richfield Fire Department
- Luverne Fire Department
- Marathon Refinery, St. Paul Park
- South Central College, Mankato
- Pierz Fire Department
- Cottage Grove Fire Department
- Myrtle Fire Department
- Bemidji Fire Department
- Brooklyn Center Fire Department
- Goodview Fire Department
- Preston Fire Department
- Rochester Fire Department

1.2.1 Previous Site Reconnaissance Findings

Delta's April 2009 Report and the June 2009 Report detailed additional interviews with fire department representatives and site reconnaissance findings, as applicable, at the 21 "priority" sites. Further interviewing of fire chiefs or other knowledgeable persons found that Class B AFFF was not used regularly in training at specific locations by the fire departments in Alexandria, Pierz, Cottage Grove, Myrtle, Brooklyn Center and Preston, nor at the South Central College in Mankato. Site reconnaissance visits had been conducted, and sampling locations selected, at the remaining sites by June 30, 2009.

1.2.2 Previous Sampling Findings

The June 2009 report presented information and findings of soil, sediment, and groundwater sampling at the Class B AFFF training areas in Burnsville, Claremont, Fridley, Harmony, Kenyon, Luverne, North St. Paul, Richfield, Rochester, and at the MSP Airport. However, as previously indicated, the laboratory

results for samples collected at the firefighting foam training areas in Claremont, Fridley, Kenyon, Luverne, Rochester and MSP Airport were not available at the time of the June 2009 report.

Previously proposed sampling at the firefighting training areas associated with the Bemidji Fire Department, the Goodview Fire Department, the Marathon Refinery and the Flint Hills Refinery were not completed by June 30, 2009, due to lack of site access at that time.

1.2.3 Additional Firefighting Foam Training and Discharge Sites Identified for Inquiry

As presented in the June 2009 Report, the Brooklyn Center Fire Chief referenced a fire at a hangar at the Crystal Airport in Crystal, Minnesota, to which the Brooklyn Center Fire Department responded. The Brooklyn Center Fire Chief related that, while his department did not use Class B foam at the hangar fire, other responding fire departments may have done so. The MPCA requested further inquiry regarding the hangar fire and Class B AFFF use at the Crystal Airport.

The MPCA also requested further information regarding firefighting training practices and foam use at the Lake Superior College Emergency Response Training Center (ERTC) in Duluth. On more than one occasion the MPCA received inquiries or references to firefighting foam training at the Lake Superior College ERTC.

Two additional Class B firefighting foam training sites were selected for further inquiry and potential sampling based on their ranking and locations-- the firefighting foam training sites utilized by the municipal fire departments in Hutchinson and Maynard. The Hutchinson firefighting foam training area located at 1300 Adams Street SE is located adjacent to the South Fork of the Crow River, and the Maynard training area is located within a source water assessment area.

A fire occurred at the River Grove Marina in Inver Grove Heights on September 26, 2009. The Inver Grove Fire Department responded to the fire with, in part, Ansul-brand Class B alcohol-resistant firefighting foam (AR-AFFF). The MPCA requested further investigation of foam discharge at the River Grove Marina.

A fire occurred at the Kandiyohi County Landfill over several days at the end of October 2009. According to the Willmar Fire Department, which was one of the responding departments, Class B AFFF was used to extinguish the fire. The MPCA requested further investigation of foam discharge at the Kandiyohi County Landfill.

1.3 Scopes of Work

Delta has entered into three contract work orders with the MPCA for this project under Master Contract Number B15536 in Minnesota fiscal year 2009/2010: Work Order SFDE1006, dated July 15, 2009, and two associated Work Order Change Orders dated December 10, 2009 and January 7, 2010; Work Order SFDE1009, dated September 17, 2009, and two associated Work Order Change Orders dated November 19 and December 10, 2009; and, Work Order SFDE1013, dated October 19, 2009. The Work Orders and Change Orders included the following work tasks:

- Soil and groundwater sampling via soil borings at the fire foam training area utilized by the Bemidji Fire Department.
- Surface water and sediment sampling at the storm sewer outflow point in Goodview, where storm water runoff from the fire foam training area in Goodview discharges to the backwaters of the Mississippi River.
- Groundwater sampling of select existing wells at the Marathon Refinery in St. Paul Park.
- Additional soil and groundwater sampling, and surface water sampling, near the former fire foam training area utilized by the Richfield Fire Department.
- Conducting a water well survey for the area located within approximately one-quarter mile of the former Richfield fire foam training area to identify water supply wells.
- Groundwater sampling via a soil boring at the ABLE Fire Training Center in Burnsville.
- Inquiry, site reconnaissance, and sampling of soils, groundwater, and creek sediments at the Crystal Airport.
- Additional groundwater sampling at the MSP Airport via soil borings and existing monitoring wells, as well as sediment and surface water sampling from a storm water retention pond.
- Groundwater sampling of select existing wells at the Flint Hills Resources Pine Bend Refinery in Rosemount.
- Site reconnaissance and sampling of surficial soils, surface waters, and sediments at the Lake Superior College Emergency Response Training Center (ERTC) in Duluth.
- Inquiry, site reconnaissance, and groundwater sampling related to an October 2009 fire at the Kandiyohi County Landfill outside of New London.
- Inquiry, site reconnaissance and sampling of surface water and sediments related to a September 2009 fire at the River Grove Marina, on the Mississippi River, in Inver Grove Heights.
- Additional inquiry of the Hutchinson Fire Department regarding fire foam training.
- Additional inquiry of the Maynard Fire Department regarding fire foam training.

All sample locations and foam discharge areas were added to an existing GIS layer which includes other fire foam training areas and sampling locations from previous scopes of work. Information gathered during the current scopes of work is presented in this report.

The tasks completed during the current scopes of work are described and discussed further in **Sections 2.0, 3.0 and 4.0**.

1.4 Report Presentation

For the purpose of readability and presentation, discussions, data and supporting documents for individual firefighting foam training areas or firefighting foam discharge sites are presented as appendices to this report. The site-specific appendices are as follows:

Appendix A – Claremont Fire Department
Appendix B – Fridley Fire Department
Appendix C – Kenyon Fire Department
Appendix D – Luverne Fire Department
Appendix E – Rochester Fire Department
Appendix F – Bemidji Fire Department
Appendix G – Goodview Fire Department
Appendix H – Marathon Refinery
Appendix I – Richfield Fire Department
Appendix J – Burnsville Fire Department
Appendix K – Crystal Airport
Appendix L – MSP Airport
Appendix M – Flint Hills Pine Bend Refinery
Appendix N – Lake Superior College ERTC
Appendix O – River Grove Marina
Appendix P – Kandiyohi County Landfill

1.5 Limitations

Delta's research and this report are subject to the following limitations:

- Delta obtained, reviewed, and evaluated information provided voluntarily by fire departments and other knowledgeable persons. Delta's services do not include the verification of the accuracy or authenticity of this information.

2.0 ADDITIONAL SITE INQUIRIES

As indicated in **Section 1.2.3**, in addition to the 21 "priority" firefighting foam training sites originally identified with high potential for PFC impacts to soils, groundwater and surface water, several other Class

B AFFF training sites and discharge sites were identified for further inquiry. Details of the inquiries of the fires at the Crystal Airport, the potential former use of Class B foam at Lake Superior College ERTC, the Hutchinson Fire Department's foam training, the Maynard Fire Department's foam training, the fire at the River Grove Marina, and the fire at the Kandiyohi County Landfill are presented in the following sections.

2.1 Crystal Airport Foam Discharge Site

As presented in the June 2009 Report, the Brooklyn Center Fire Chief referenced a fire at a hangar at the Crystal Airport in Crystal, Minnesota, to which the Brooklyn Center Fire Department responded. The Brooklyn Center Fire Chief related that, while his department did not use Class B foam at the hangar fire, other responding fire departments may have. The MPCA requested further inquiry regarding the hangar fire and Class B AFFF use at the Crystal Airport.

Delta interviewed the West Metro Fire District Fire Chief in August 2009 regarding the 2006 hangar fire. The West Metro Fire Chief indicated that the West Metro District Fire Department responded to the hangar fire with Class A foam only; no Class B foam was used. The Fire Chief related that Fire Aide 2000 firefighting foam was used in response to a plane crash at the Crystal Airport in June 2009. Manufacturer information on Fire Aide 2000 indicates that the foam contains no PFOS or PFOA, and that the foam can be used on Class A or Class B fires. The West Metro District Fire Chief recalled that their department responded to three other aircraft crashes at the Crystal Airport, in November 2004, April 2002 and March 2001, but did not know the type or quantity of firefighting foam used at those crashes.

The Brooklyn Park Fire Department also responded to the 2006 hangar fire at Crystal Airport. According to the Deputy Fire Chief with the Brooklyn Park Fire Department, his department would have used Class A foam if any foam was used, since the fire was mainly structural.

Since the firefighting details of the historical plane crashes referenced by the West Metro Fire District Fire Chief are unknown, and in part due to the proximity of Shingle Creek adjacent northeast of the airport, a site reconnaissance was conducted at the Crystal Airport. Details of the site reconnaissance are presented in **Section 3.0** and **Appendix K**.

2.2 Lake Superior College ERTC Firefighting Foam Training Area

The MPCA had received inquiries regarding investigation of firefighting foam use specifically at the Lake Superior College ERTC in Duluth. The Lake Superior College ERTC had not ranked in the top 21 "priority sites" in part due to the reported low volumes of firefighting foam used in training and since it is not located in a wellhead protection area or a source water assessment area. The Lake Superior College ERTC is used by multiple firefighting departments in Minnesota for firefighting training.

The Lake Superior College ERTC Program Supervisor completed a firefighting foam use questionnaire in May 2008, indicating the possible historic use of 3M-brand AFFF and/or AR-AFFF at the ERTC. In a follow-up conversation in August 2009, the Program Supervisor indicated that 3M-brand Class B foam may or may not have been used in on-site training exercises from approximately 1994 through 1996, prior to his tenure. Training foam has been used for training exercises at the ERTC since 1996.

Based on information provided by the Lake Superior College ERTC Program Supervisor, a site reconnaissance was conducted at the ERTC, the details of which are presented in **Section 3.0** and **Appendix N**.

2.3 Hutchinson Fire Department Firefighting Foam Training Area

The Hutchinson Fire Department completed a firefighting foam use questionnaire in April 2008, indicating the historical use of 3M-brand AFFF and AR-AFFF in training at two training sites. The training site located at 1300 Adams Street SE in Hutchinson is situated adjacent to the South Fork of the Crow River. The firefighting foam training site on Adams Street SE was selected for further inquiry and potential sampling based on its ranking and location. A copy of the firefighting foam questionnaire returned by the Hutchinson Fire Department was included in Appendix C of Delta's June 2008 Report.

The Hutchinson Battalion Chief was contacted in September 2009 to confirm the information provided on their questionnaire. The Hutchinson Battalion Chief related that the department has not trained with Class B foam since approximately 1994, and that training with Class B foam was historically done at a 3M facility in Hutchinson, where a burn pit was utilized in training. The training site at 1300 Adams Street SE was historically a city landfill, which was re-developed in 2001 for its current use, but the site was not used for foam training by the Hutchinson Fire Department.

Since training with Class B firefighting foam did not occur at the site at 1300 Adams Street SE, no further investigation was conducted relative to this site.

2.4 Maynard Fire Department Firefighting Foam Training Area

The Maynard Fire Department completed a firefighting foam use questionnaire in April 2008, indicating the historical use of Chemguard-brand firefighting foam in training. However, the type of Chemguard foam was not noted. A copy of the questionnaire returned by the Maynard Fire Department was included in Appendix C of Delta's June 2008 Report. The firefighting foam training location at Mable and Sherman Streets in Maynard is located in a source water assessment area.

A member of the Maynard Fire Department was contacted in October 2009 to inquire about the type of Chemguard foam historically used in training. The Maynard fire fighter stated that the department has only used Class A foam.

Since training with Class B firefighting foam did not occur at the Maynard firefighting foam training site, no further investigation was conducted relative to this site.

2.5 River Grove Marina Foam Discharge Site

A fire occurred at the River Grove Marina in Inver Grove Heights on September 26, 2009. According to news reports, four house boats were destroyed in the fire. The Inver Grove Heights Fire Department Fire Chief was contacted in October 2009 regarding their response to the fire. The Fire Chief indicated that the Inver Grove Heights Fire Department responded to the fire in part with fifteen gallons of Ansul Thunderstorm AR-AFFF. The foam was reportedly discharged directly onto the boats and adjoining docks, and some spent foam and debris washed up onto shore at the boat landing.

Based on information provided by the Inver Grove Heights Fire Chief, a site reconnaissance was conducted at the River Grove Marina in November 2009, the details of which are presented in **Section 3.0** and **Appendix O**.

2.6 Kandiyohi County Landfill Foam Discharge Site

A fire occurred in the C&D area of the Kandiyohi County Landfill over several days starting on October 22, 2009. According to news reports, fire departments from New London, Spicer, Willmar, Sunburg, Pennock, and Belgrade responded to the fire.

In November the Willmar Fire Department Fire Chief was contacted regarding the fire response at the landfill. The Fire Chief indicated that, while mostly Class A foam was used to fight the fire, 3M- and Ansul-brands of Class B foam were also used. The Kandiyohi County Director of Environmental Services confirmed that 545 gallons of Class B foam concentrate were used on the landfill fire.

Based on information provided by the Kandiyohi County Director of Environmental Services and the Willmar Fire Chief, a site reconnaissance was conducted at the Kandiyohi County Landfill in December 2009. Details of the site reconnaissance are presented in **Section 3.0** and **Appendix P**.

3.0 SITE RECONNAISSANCE at FIREFIGHTING FOAM TRAINING AND FOAM DISCHARGE SITES

As a result of further inquiries presented in **Section 2.0**, site reconnaissance visits were made in October, November and December 2009 to the Crystal Airport, the Lake Superior College ERTC, and the sites of

the fires at the River Grove Marina and the Kandiyohi County Landfill. Details of the site reconnaissance visits are presented in the appropriate site-specific appendix.

Based on information gathered during the site reconnaissance visits to all of these sites, sampling of soil, groundwater, surface water and/or sediments potentially impacted by Class B firefighting foam was deemed warranted. In the case of the River Grove Marina, the sampling was conducted at the same time as the site reconnaissance.

4.0 SAMPLING AT FIREFIGHTING FOAM TRAINING AND FOAM DISCHARGE SITES

4.1 Sampling Methodologies

Sampling methods presented in this section are applicable for sampling conducted at all of the firefighting foam training areas or foam discharge fire sites included in this report.

Since PFCs are present in numerous everyday items, the following precautions were taken during field activities and sample collection: no use of products containing Teflon®, i.e. Teflon® groundwater bailers or tubing, Teflon® tape; no wearing of Tyvek clothing or clothes treated with stain- or water-resistant coatings; no use of Post-It® Notes on site; no fast food wrappers, disposable cups or microwave popcorn on site before or during sampling, and hands must be washed after handing such items; and, no use of blue ice for sample refrigeration. Nitrile gloves were worn during sample collection, and sample matrices were placed directly into laboratory-supplied containers after collection.

Based on a literature search, no field instruments are currently available for field screening soils for PFCs. Correspondence with Dr. Jennifer Field of Oregon State University, who has conducted field research into analytical methodologies for PFCs in soil and groundwater at fire foam training sites, confirmed that she is not aware of any field detectors for PFCs in soil or groundwater. Therefore, soils and groundwater could not be field screened for the presence of PFCs.

4.1.1 Soil Sample Collection

Delta contracted with various State-contracted drilling contractors to conduct drilling as determined during the site reconnaissance in order to obtain soil samples at or down-slope of the fire foam training areas. Soil borings were advanced via push probe method, with one exception: air rotary drilling was utilized to advance one soil boring at the Burnsville fire foam training area. Push probe and air drilling methodologies are included in **Appendix Q**. Borings were advanced to the depth of the water table, where practical, or until drill refusal was experienced. Generally, borings at sites where groundwater was expected to be more than 50 feet below grade surface (bgs) were advanced only to a depth of 8 feet bgs to allow for soil sampling only.

Generally, two composite soil samples were collected from each boring from two intervals: from the surface to four feet bgs, and from four feet to eight feet bgs. Variance from this soil sampling scheme are noted in the sampling discussions of the site-specific appendix, where appropriate. The push probe soil sample collection method is included in **Appendix Q**.

According to research conducted at a fire training area at the Wurtsmith Air Force Base in Michigan, one important factor for the transport of anionic perfluorinated surfactants in soil is the organic content of the soil; soil partition coefficients were found to be linearly related to organic carbon content, and sorption of the anionic perfluorinated surfactants to soil particles increased with increasing perfluorinated chain length (*Occurrence and Persistence of Perfluorooctanesulfonate and Other Perfluorinated Surfactants in Groundwater at a Fire-training Area at Wurtsmith Air Force Base, Michigan, USA,* Cheryl A. Moody, Gretchen N. Hebert, Steven H. Strauss, and Jennifer A. Field, 2003). Therefore, soil samples were also collected from soil borings for laboratory analysis of TOC for potential additional data evaluation in the future.

Surface soil samples were collected at the Lake Superior College ERTC in Duluth and at the Crystal Airport. Surface soil samples were generally collected no more than six inches bgs by hand, except at the Crystal Airport where frost was present to a depth two feet bgs. Surface soil sample methods are included in **Appendix Q**.

4.1.2 Groundwater Sample Collection

Groundwater samples were collected either from soil borings drilled to the depth of the water table, or from existing groundwater monitoring wells which exist in association with other unrelated (non-PFC) purposes.

Groundwater samples collected from soil borings were generally collected through temporary PVC wells using non-Teflon® tubing. The method of groundwater sampling from a soil boring is described in **Appendix Q**. Groundwater samples collected from monitoring wells were collecting using dedicated, disposable, non-Teflon® bailers. Wells were purged of one well volume of groundwater prior to sampling, and depths to water were measured prior to purging and sampling. The groundwater sample collected at the Burnsville ABLE Fire Training Center was collected from boring B-3 using a disposable bailer since B-3 was advanced using an alternative drilling method. The bailer method of groundwater sample collection is described in **Appendix Q**.

4.1.3 Surface Water Sample Collection

Water samples were collected from surface water bodies at or near the fire foam training areas or foam discharge sites in Richfield, Goodview, MSP Airport, the Lake Superior College ERTC in Duluth, and at the River Grove Marina. Surface water samples were collected by dipping the (unpreserved) laboratory-supplied jar at the surface of the water and allowing the jar to slowly fill. Intermediary containers were not used, except at the River Grove Marina, where a clean, plastic, long-handled scoop was used. Surface water sample collection methods are included in **Appendix Q**.

4.1.4 Sediment Sample Collection

Sediment samples were collected from lakes or rivers at or near the fire foam training areas or foam discharge sites in Goodview, Crystal Airport, MSP Airport, the Lake Superior College ERTC in Duluth, and at the River Grove Marina. Sediment samples were generally collected by hand near the edge of the water without the use of equipment, except at the following sites: a clean, plastic, long-handled scoop was used to collect sediments from the river bottom at depth at the River Grove Marina; a stainless steel spoon was used for sediment sample collected from Shingle Creek at the Crystal Airport since the sediments were frozen; and, a disposable acetate push probe sample liner was used to collect the sediment sample at the MSP Airport. Sediment sample collection methods are included in **Appendix Q**.

4.2 Sample Collection at Firefighting Foam Training and Discharge Sites

Soil, groundwater, surface water and/or sediment sampling at the firefighting foam training areas or foam discharge fire sites as described in the following sections. While site reconnaissance and sample collection information for the firefighting foam training areas in Claremont, Fridley, Kenyon, Luverne, Rochester and MSP Airport were presented in the June 2009 Report, the laboratory results were not available at the time of the report. Thus, sampling details at these sites are also being presented in this report.

4.2.1 Claremont Firefighting Foam Training Area Sampling

Based on information provided by the Claremont Fire Department's Assistant Fire Chief, the Claremont Fire Department trains occasionally with firefighting foam on a paved area in front of the fire station. Spent foam and water drains to a nearby storm sewer grate. A one-time firefighting foam demonstration was also conducted behind the fire station in the fall of 2008. Soil samples were collected for PFC analysis from three soil borings advanced in May 2009. Two of the borings were advanced within the fire foam demonstration area behind the fire station, and one boring was located adjacent to the storm sewer grate in front of the fire station. Groundwater samples were not collected, as the estimated depth to groundwater in Claremont is greater than 50 feet. Background and details of the sampling at the Claremont Fire Department's firefighting foam training site are presented in **Appendix A**.

4.2.2 Fridley Firefighting Foam Training Area Sampling

Based on information provided by the Fridley Fire Chief, 3M-brand Class B AR-AFFF was used in fire foam training from at least 1981 through the mid 1990s at the North Metro Fire Training Center in Fridley. The former fire foam training pit has since been filled in, and a fire training building built over the pit. Soil and groundwater samples were collected for PFC analysis from two soil borings around the fire training building, in or near the location of a former fire foam training pit. A sediment sample was also collected from an on-site wetland located down-slope of the training area. Background and details of the sampling at the North Metro Fire Training Center in Fridley are presented in **Appendix B**.

4.2.3 Kenyon Firefighting Foam Training Area Sampling

Based on information provided by the Kenyon Fire Department Fire Chief, the Kenyon Fire Department trains in Slee Street approximately every other year with a variety of Class B firefighting foams including 3M-brand AFFF. Less than five gallons of foam is used per training event. While Slee Street is asphalt-paved, the Kenyon Fire Chief indicated that some spent foam may run onto the grassy right-of-way along Slee Street. The last time the department trained with firefighting foam was approximately five years ago. Soil samples were collected for PFC analysis from two soil borings advanced within the fire foam training area along Slee Street. Groundwater was not encountered prior to experiencing drill refusal at the presumed depth of bedrock. Background and details of the sampling at the Kenyon Fire Department's firefighting foam training site are presented in **Appendix C**.

4.2.4 Luverne Firefighting Foam Training Area Sampling

Based on information provided by the current and former Luverne Fire Department Fire Chiefs, Class B foam was used in training on one occasion, in 2005, at the municipal tree/brush dump. Municipal well 23 is located on the northeast corner of the tree/brush dump, approximately 325 feet northeast of the spot where the burn pan was situated during the 2005 foam training exercise. Soil and groundwater samples were collected for PFC analysis from three soil borings advanced in, and down-slope of, the firefighting foam demonstration area. Background and details of the sampling at the Luverne site are presented in **Appendix D**.

4.2.5 Rochester Firefighting Foam Training Area Sampling

Based on information provided by the Rochester Fire Department Deputy Fire Chief, historical training with 3M-brand Class B foam at the Olmsted County fairgrounds ceased in approximately 2001 or 2002. Five gallons or less of foam concentrate were used per annual training event. Soil samples were collected for PFC analysis from two soil borings advanced within the former fire foam training area located at the Olmsted County Fairgrounds in Rochester. Groundwater was not encountered prior to

experiencing drill refusal at the presumed depth of bedrock. Background and details of the sampling at the former Rochester firefighting foam training site are presented in **Appendix E**.

4.2.6 Bemidji Firefighting Foam Training Area Sampling

Based on information provided by the Bemidji Fire Chief, 3M-brand Class B AFFF is used in annual fire foam training exercises at the Bemidji Regional Airport. Approximately five gallons of foam concentrate are discharged per training event. Soil and groundwater samples were collected for PFC analysis from two soil borings which were advanced within the firefighting foam training area. Background and sampling details for the Bemidji Fire Department's firefighting foam training site are presented in **Appendix F**.

4.2.7 Goodview Firefighting Foam Training Area Sampling

Based on information provided by the Goodview Fire Chief, Ansul-brand Class B AFFF was historically used in fire training exercises in front of the Goodview Fire Station approximately six times in the last twenty years. Five gallons of AFFF were used per training event, and the last training event was in 2004 or 2005. The fire foam training area in front of the Goodview Fire Station is concrete-paved, and the pavement was observed to be in good condition. With no direct path for spent foam to reach soils at or around the fire station, no sampling was done at the fire station.

A potential route for spent foam to the environment was via a storm sewer grate near the fire station. The storm sewer discharges to the backwaters of the Mississippi River at a point approximately ¼-mile northeast of the fire station. A sediment sample and a surface water sample were collected for PFC analysis from a small pool of storm water collected beneath the storm sewer outflow point. Background and sampling details for the Goodview site are presented in **Appendix G**.

4.2.8 Marathon Refinery Firefighting Foam Training Area Sampling

The Marathon Refinery Fire Department has trained with Class B AR-AFFF at their fire training area since 1995. The fire department switched from 3M-brand AR-AFFF to Ansul-brand AR-AFFF for training purposes in approximately 2000. Approximately 50 to 100 gallons of AR-AFFF is used per semi-annual training event, with up to 250 gallons of foam concentrate used annually for training.

In July 2004, approximately 6,500 gallons of Ansul-brand foam were used on a fire at Tank 120 which is located approximately 1,300 feet northeast of the fire training area.

Existing groundwater monitoring wells were selected for sampling based on their proximity to the fire training area and Tank 120. Groundwater samples were collected for PFC analysis from existing groundwater monitoring wells MW-156, SP-11, MW-172, MW-101, and MW-912. The sample collected

from MW-912 was intended to serve as a "background" sample indicative of conditions upgradient of the foam training area and the site of the fire at Tank 120. Background and details of the sampling at the Marathon Refinery firefighting training area are presented in **Appendix H**.

4.2.9 Richfield Firefighting Foam Training Area Sampling and Well Survey

Based on information provided by the Richfield Fire Chief, the Richfield Fire Department historically trained with Class B fire foam behind the Richfield Ice Arena, and the last fire foam training event at that location was approximately ten years ago. 3M-brand AFFF was used. PFC compounds were detected in all of the soil and groundwater samples collected in May 2009 from borings B-1, B-2, and B-3 advanced within and downgradient of the fire foam training area. PFOA concentrations in the B-2 and B-3 groundwater samples were in exceedance of the State drinking water Health Risk Limit (HRL).

Municipal well sampling results reported by the (MDH identified 0.03 micrograms per liter (ug/l) PFBA in Richfield Well #5 and 0.04 ug/l PFBA in Richfield Well #6. Richfield Well #5 is located approximately 500 feet southeast of the fire foam training area in an inferred side-gradient groundwater flow direction, and Richfield Well #6 is located approximately 1/3-mile east-southeast of the fire foam training area, in a potential downgradient groundwater flow direction. MDH municipal well sampling did not identify PFC impacts in Richfield Well #4, which is located approximately 325 feet north (up- to side-gradient) of the Richfield fire foam training area. Additional sampling in connection with the former fire foam training area in Richfield was conducted to better understand the extent of groundwater impacts and the potential for surface water impacts at nearby Legion Lake.

In August 2009 a surface water sample was collected for PFC analysis from Legion Lake. In October 2009 one composite soil sample collected from the surface to eight feet bgs, and a groundwater sample were collected for PFC analysis from soil boring B-4, which was advanced upgradient of the former firefighting foam training area. The soil and groundwater samples collected from B-4 were intended to serve as "background" samples relative to samples collected from previous borings B-1, B-2 and B-3.

A water well survey was conducted for the area adjacent to, or within one-quarter mile to the east, south and southeast of the former Richfield fire foam training area, in reference to the regional easterly to southeasterly groundwater flow direction. The survey identified numerous water supply wells and groundwater monitoring wells in the survey area, all of which were either sealed or abandoned. No active wells were identified.

Background and details of the sampling and well survey conducted in connection with the Richfield Fire Department's former firefighting foam training site are presented in **Appendix I**.

4.2.10 Burnsville ABLE Fire Training Center Sampling

Based on information provided by the Burnsville Fire Department Assistant Fire Chief and the Training Officer, approximately 15 to 30 gallons of Ansul-brand AR-AFFF were discharged by the Burnsville Fire Department at the fire foam training area from 1989 through 2004. According to information provided by other municipal fire departments with joint ownership of the ABLE Fire Training Center, the other fire departments have not trained with Class B AFFF at the training center.

Two soil borings (B-1 and B-2) were advanced within the fire foam training area on April 24, 2009. Laboratory analysis of soil samples collected from depths of 0-4 feet bgs and 4-8 feet bgs from B-1 and B-2 identified PFCs in all four soil samples. Drill refusal was experienced in both borings prior to reaching the water table, thus, groundwater samples were not collected from B-1 or B-2.

Municipal well sampling results reported by the MDH identified 0.02 ug/l PFBA in Burnsville Well #1, which is located approximately 325 feet northeast of the fire foam training area. Additional sampling was conducted to investigate the potential for PFCs in groundwater at the fire foam training area in Burnsville.

In August 2009 a groundwater sample was collected for PFC analysis from a third boring (B-3) advanced adjacent to one of the earlier borings. Background and sampling details for the ABLE Fire Training Center in Burnsville are presented in **Appendix J**.

4.2.11 Crystal Airport Sampling

Site reconnaissance at the Crystal Airport identified the site of a June 2009 plane crash, and the general storm water drainage channels across the airport. Storm water at the airport generally drains to Shingle Creek, which located along the northeast and east sides of the airport. Soil and groundwater samples were collected for PFC analysis from two soil borings that were advanced in January 2010 in two major surface water drainage paths leading from the main operations area of the airport. While the scope of work called for the collection of two surface water samples and two sediment samples from Shingle Creek, the creek was found to be dry at the time of sampling. Hence, only sediment samples were collected from Shingle Creek at two locations, one upstream and one downstream from the main airport activities. A surface soil sample was collected from the area of a June 2009 plane crash where firefighting foam was known to be discharged. Background and sampling details for Crystal Airport are presented in **Appendix K**.

4.2.12 MSP Airport Sampling

Historically the MSP fire department trained with 3M-brand foam at two on-site locations: from 1983 through 2001, fire foam training was conducted at a burn pit located east of Cargo Road, near the present location of the glycol management facility; and, foam training prior to 1983 took place at an area located northeast of the current FedEx facility. Both the pre- and post-1983 former fire foam training areas were re-worked and excavated to some extent during construction associated with the addition of a new airport runway in 2001. In May 2009 borings B-1 and B-2 were advanced through the post-1983 training area, and borings B-3 and B-4 were advanced through the pre-1983 training area. Laboratory analysis detected PFCs in groundwater samples collected from all four borings, with PFOA concentrations exceeding the HRL in all four samples.

In January 2010, groundwater samples were collected from upgradient borings B-5, B-6 and B-7, and from existing downgradient monitoring wells CWN-14A, CWN-15A and Signature MW-2, for PFC analysis. A surface water sample and a sediment sample were collected from MSP storm water pond number one, to which storm water from the portion of the airport where the former fire foam training areas are located drains. Background and sampling details for MSP Airport are presented in **Appendix L**.

4.2.13 Flint Hills Resources Pine Bend Refinery Sampling

According to the Deputy Fire Chief at the Flint Hills Resources (FHR) Pine Bend Refinery, five to ten gallons of Ansul-brand Thunderstorm AR-AFFF are used during each of the 20 to 25 fire foam training exercises performed annually from April through November per year, with up to 300 gallons of foam concentrate used annually for training. In 2005 the department switched from its use of 3M foam to the Ansul-brand foam.

Groundwater samples were collected in January 2010 for PFC analysis from existing groundwater monitoring wells MW-1, MW-3 and MW-111 at the refinery. Well MW-1 was situated roughly upgradient and wells MW-3 and MW-111 were situated roughly downgradient of the refinery's firefighting training area. Background and details of the sampling at the Flint Hills Pine Bend Refinery firefighting training area are presented in **Appendix M**.

4.2.14 Lake Superior College ERTC Sampling

According to the ERTC program supervisor, Class B AFFF may have been used in firefighting training exercises at the Lake Superior College ERTC from approximately 1994 to 1996. Although spent foam and water discharged within the 125-foot diameter burn pit would be collected and routed through an on-site wastewater treatment plan and ultimately to a municipal sewer, foam overspray outside of the burn

pit could potentially reach an adjoining wetland or could infiltrate to an underground, 6-inch drainage pipe that discharges to a nearby small, on-site creek.

A surface soil sample and a sediment sample were collected for PFC analysis near the outflow of the 6-inch drainage pipe that extends below the fire training area, and a surface water sample and a sediment sample were collected from a wetland located adjacent to the fire training area. Background and sampling details for the Lake Superior College ERTC are presented in **Appendix N**.

4.2.15 River Grove Marina Sampling

Based on information provided by the owner/operator of the River Grove Marina and the Inver Grove Heights Fire Chief, fifteen gallons of Ansul-brand Class B AFFF was discharged at a boat and dock fire at the River Grove Marina on September 26, 2009. The River Grove Marina is situated on the west bank of backwaters of the Mississippi River. The majority of the spent foam apparently dissipated in the river, while some washed up on shore near the boat landing.

Two surface water samples, two off-shore sediment samples, and one near-shore sediment sample were collected by hand for PFC analysis at the site of the fire. Sampling details for the fire site at the River Grove Marina are presented in **Appendix O**.

4.2.16 Kandiyohi County Landfill Sampling

A fire occurred at the construction and demolition (C&D) portion of the Kandiyohi County Landfill over several days starting on October 22, 2009. According to news reports, fire departments from New London, Spicer, Willmar, Sunburg, Pennock, and Belgrade responded to the fire. In November 2009 the Willmar Fire Department Fire Chief was contacted regarding the fire response at the landfill. The Fire Chief indicated that, while mostly Class A foam was used to fight the fire, 3M- and Ansul-brands of Class B foam were also used. The Kandiyohi County Director of Environmental Services confirmed that 545 gallons of Class B foam concentrate were used on the landfill fire.

In January 2010 groundwater samples were collected for PFC analysis from existing on-site wells DMW-3, which was located roughly downgradient of the C&D waste area, and DMW-1A, which was located upgradient of the C&D area. Due to deep snow cover and inaccessibility, a proposed new groundwater monitoring well was not installed directly downgradient of the C&D area. Background and details of the sampling conducted at the Kandiyohi County Landfill are presented in **Appendix P**.

5.0 SAMPLING RESULTS AND DATA DISCUSSION

Soil, sediment, groundwater and surface water samples were submitted for laboratory analysis of PFCs to either Axys Analytical Services LTD (Sidney, British Columbia, Canada) or MPI Research (State College, Pennsylvania), or both for laboratory comparison purposes. Copies of the laboratory reports and/or laboratory data are included in **Appendix R**.

The laboratory reports for select samples were reviewed by the MPCA's Quality Assurance Coordinator of the Environmental Analysis & Outcomes Division. Copies of the review comments made by the Quality Assurance Coordinator for the laboratory reports for the following samples are included at the end of **Appendix R**: soil samples collected at the Bemidji firefighting foam training site; surface water and sediment samples collected in Goodview; the surface water sample collected from Legion Lake in Richfield; and, the groundwater sample collected at the ABLE Fire Training Center in Burnsville.

Laboratory results for samples collected as part of the current scopes of work, and at the fire foam training areas in Claremont, Fridley, Luverne and Rochester, are included in **Table 1 – *Soil and Sediment Analytical Results, PFCs and TOC*** and **Table 2 – *Groundwater and Surface Water Analytical Results, PFCs***, respectively. Laboratory results and reports are also presented and discussed in the individual site appendices. At the time of this report, laboratory data was not received for sampling conducted at the Crystal Airport, the Flint Hills Pine Bend Refinery in Rosemount, and the sampling conducted in January 2010 at MSP Airport.

5.1 Sampling Results – Soils

Analytical results for soil samples collected as part of this scope of work, and at the firefighting training areas in Claremont, Fridley, Kenyon, Luverne and Rochester, are summarized in **Table 1**. Site-specific soil sample results are also presented in the discussions included in the site-specific appendices. The laboratory report was not available at the time of this report for soil samples collected at the Crystal Airport. Analytical results for soil samples collected at the Crystal Airport will be presented in a forthcoming report.

Laboratory analyses results received thus far detected PFC compounds in the following soil samples collected as part of the current scopes of work, and at the fire foam training areas in Claremont, Fridley, Kenyon, Luverne, and Rochester:

- All soil samples collected from the Claremont Fire Department's fire foam training areas in front of and behind the Claremont Fire Station.
- All soil samples collected at the North Metro Fire Training Center in Fridley.

- Only a low concentration of perfluoroheptanoic acid (PFHpA) was detected in one of the four soil samples collected at the Kenyon Fire Department's fire foam training area on Slee Street in Kenyon.
- Only a low concentration of PFOS was detected in one of the six soil samples collected at the Luverne Fire Department's fire foam training area at the Luverne municipal tree/brush dump.
- Shallow soil samples collected from the Rochester Fire Department's former fire foam training area at the Olmsted County Fairgrounds in Rochester. PFCs were not detected in the deep soil samples from this location.
- All soil samples collected from the Bemidji Fire Department's fire foam training area at the Bemidji Airport.
- The composite soil sample collected upgradient of the Richfield Fire Department's former fire training area located behind the Richfield Ice Arena.
- The surficial soil sample collected at the Lake Superior College ERTC near the outflow of the 6-inch perforated pipe that extends below the fire training area.

Laboratory analysis did not detect any PFC compounds above the laboratory detection limits in the following soil samples:

- Kenyon B-1, 4-8 feet
- Kenyon B-2, 0-4 feet
- Kenyon B-2, 4-8 feet
- Luverne B-1, 0-4 feet
- Luverne B-1, 4-8 feet
- Luverne B-2, 4-8 feet
- Luverne B-3, 0-4 feet
- Luverne B-3, 4-8 feet
- Rochester B-1, 4-8 feet
- Rochester B-2, 4-8 feet;

5.2 Soil Laboratory Results versus State PFC Soil Reference Values

The MPCA has defined soil reference values (SRVs) for a number of chemical compounds, which are soil contaminant concentrations above which an unacceptable risk to human health is predicted, dependent upon different exposure scenarios. Tier I SRVs assume human exposure to contaminants is chronic and occurs in a residential site setting. Tier 2 SRVs assume contaminant exposures for industrial and recreational property uses. The MPCA has defined soil Tier 1 Residential SRVs, Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2,100 ng/g	2,600 ng/g	14,000 ng/g
PFOA	2,100 ng/g	2,500 ng/g	13,000 ng/g
PFBA	77,000 ng/g	94,000 ng/g	500,000 ng/g

ng/g: nanograms per gram, which is equivalent to parts-per-billion.

None of the detected PFC soil concentrations reported thus far in any of the soil samples collected during this scope of work met or exceeded any of the MPCA SRVs.

5.3 Sampling Results – Sediments

Analytical results for sediment samples collected as part of the current scopes of work are included in **Table 1**. Site-specific sample results are also presented in the discussions included in the site-specific appendices. Laboratory reports were not available at the time of this report for sediment samples collected at the MSP Airport and the Crystal Airport. Analytical results for sediment samples collected at the MSP and Crystal Airports will be presented in a forthcoming report.

Laboratory analyses results received thus far detected PFC compounds in the following sediment samples collected as part of the current scopes of work:

- Only PFOS was detected in the wetland sediment sample collected at the North Metro Fire Training Center in Fridley, at a concentration of 18.3 ng/g.
- Only PFOS was detected in the sediment sample collected at the storm sewer outflow area in Goodview, at a concentration of 0.332 ug/g.
- Both sediment samples collected from the on-site creek and wetland at the Lake Superior College ERTC.

Laboratory analysis of all three sediment samples collected at the River Grove Marina in Inver Grove Heights did not detect any PFC compounds above the laboratory detection limits.

The MPCA does not define sediment quality standards. Sediment quality targets, adopted for use in the St. Louis River Area of Concern, can be used throughout the State as benchmark values for making comparisons. However, there are no sediment quality targets for any of the PFC compounds.

5.4 Sampling Results - Groundwater

Laboratory results for groundwater samples collected as part of the current scopes of work, and groundwater samples collected May 2009 at the former firefighting training areas in Fridley and Luverne and at the MSP Airport, are summarized in **Table 2**. Site-specific sample results are also presented in the discussions included in the site-specific appendices. Laboratory reports were not available at the time of this report for groundwater samples collected in January 2010 at the fire foam training areas or foam discharge sites at the Crystal Airport, MSP Airport, and the Flint Hills Resources Pine Bend Refinery.

Laboratory analyses results received thus far have detected PFC compounds in 20 of 21 groundwater samples collected as part of the current scopes of work and at the fire foam training areas in Fridley and Luverne, as follows:

- The Richfield B-4 groundwater sample, which was collected at a location upgradient (west-northwest) of the former Richfield fire foam training areas behind the Richfield Ice Arena.
- All three groundwater samples collected at the Luverne fire training area at the municipal tree/brush dump.
- Both groundwater samples collected at the North Metro Fire Training Center in Fridley.
- Groundwater samples collected in May 2009 from borings B-1 through B-4, advanced within the former firefighting foam training areas at the MSP Airport.
- All of the groundwater samples collected from existing wells at the Marathon Refinery in St. Paul Park.
- In the Burnsville B-3 groundwater sample collected at the ABLE Fire Training Center.
- Both groundwater samples collected at the Bemidji fire training area at the Bemidji Airport.
- The downgradient groundwater sample collected from monitoring well DMW-3 at the Kandiyohi County Landfill, where PFBA was the only PFC compound detected.

No PFC compounds were detected in the groundwater sample collected from upgradient monitoring well DMW-1 at the Kandiyohi County Landfill.

5.5 Groundwater Laboratory Results versus State PFC Health Risk Limits and Values

The MDH has defined drinking water values only for the following PFC compounds: PFOS, PFOA, PFBA and perfluorobutanoic sulfonate (PFBS). The State HRL for both PFOS and PFOA in drinking water is 300 nanograms per liter (ng/L), which is equivalent to parts-per-trillion. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7,000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for perfluorohexane sulfonate (PFHxS) does not specify numerical health-based limits or values.

The PFOA HRL was exceeded in several groundwater sample collected during the current scopes of work and previous scopes of work with laboratory results being presented in this report: 1,260 ng/L PFOA was detected in the groundwater sample collected from the Burnsville B-3 boring; and, PFOA concentrations ranging from 958 ng/L to 286,000 ng/L were detected in all four groundwater samples collected in May 2009 from borings B-1 through B-4 at the MSP Airport. PFOA concentrations detected in other groundwater samples collected during the current scopes of work and in Fridley and Luverne were less than 300 ng/L.

The PFOS HRL was exceeded in several samples collected during the current scopes of work: 522 ng/L PFOS was detected in the Burnsville B-3 groundwater sample; 483 ng/L and 789 ng/L PFOS were detected in the Bemidji B-1 and B-2 groundwater samples, respectively; and, PFOS concentrations ranging from 731 ng/L to 14,900 ng/L were detected in five of the six groundwater samples collected at the Marathon Refinery, including the duplicate sample. The only groundwater sample collected at the Marathon Refinery with a PFOS concentration of less than 300 ng/L was MW-101, which is located near Tank 120 upgradient of the firefighting training area. The PFOS concentrations in other groundwater samples collected during the current scopes of work and in Fridley and Luverne were less than 300 ng/L.

None of the groundwater samples collected during the current scopes of work, nor in the groundwater samples collected in Fridley or Luverne or at MSP Airport, exhibited PFBA or PFBS concentrations above the HBV of 7,000 ng/L.

5.6 Sampling Results – Surface Water

Laboratory results for surface water samples collected as part of the current scopes of work are summarized in **Table 2**. Site-specific sample results are also presented in the discussions included in the site-specific appendices. The laboratory report was not available at the time of this report for surface water samples collected at MSP Airport.

Laboratory analyses results received thus far have detected PFC compounds in the surface water samples collected from Legion Lake in Richfield, below the storm water discharge point to the Mississippi River in Goodview, in the Mississippi River water samples collected at the River Grove Marina, and in the wetland surface water sample collected at the Lake Superior College ERTC.

5.7 Surface Water Laboratory Results versus State Surface Water Criteria

The MPCA has developed site-specific ambient surface water quality criteria for only two PFC compounds, PFOA and PFOS, for the surface waters of Lake Calhoun and for a portion of the Mississippi River, in accordance with Minnesota Rules, Chapter 7050.0218, *Methods for Determination of Criteria for Toxic Pollutants, for which Numerical Standards Not Promulgated.* Ambient surface water quality criteria have not been developed for any of the surface water bodies sampled as part of this project.

6.0 GIS MAPPING OF FIRE TRAINING SITE AREAS

As part of the June 2008 Report and the October 2008 Addendum Report, Delta generated a GIS layer illustrating the point locations of the (ranked) fire training sites where Class B firefighting foams are used

repeatedly in training exercises. The layer was constructed using latitude and longitude coordinates for each fire station's location provided by the MPCA. A data attribute table that was integrated with the GIS layer included fire foam use information for each training site, including the types and amounts of foam used in training, the frequency of foam training and the site risk ranking and criteria.

The GIS layer was updated in the March 2009 and June 2009 Reports with latitude and longitude coordinates of the perimeter of the fire training areas collected during site reconnaissance visits, so that the training areas were represented by polygons instead of points on the map. Some boring locations were also added to the GIS layer in the June 2009 Report, for those borings completed by mid-June 2009.

The GIS layer has again been updated with sample locations for samples collected as part of the current scopes of work. The layer was also updated with the approximate areas of the foam discharge at Lake Superior College ERTC, River Grove Marina, and the Kandiyohi County Landfill. The updated GIS layer is attached as **Appendix S** as an electronic file on a compact disc. Individual maps of the fire foam training and foam discharge sites are included in the individual site appendices.

7.0 CONCLUSIONS

7.1 Soil and Sediment Conclusions

PFCs were detected in 24 of the 37 soil and sediment samples collected as part of the current scopes of work (including Claremont, Kenyon, Fridley, Luverne and Rochester) for which laboratory results have been received at this time. The available laboratory data for all soil and sediment samples collected during the current scopes of work are depicted on **Graph 1, *Soil and Sediment PFC Concentrations***. Laboratory data for soil and sediment samples collected at the Crystal Airport and MSP Airport in January 2010 were not received at the time of this report.

In general, the perfluorosulfonates (PFBS, PFHxS, and PFOS) were detected at higher concentrations in the soil and sediment samples than the perfluorocarboxylic acids. This trend is reflected in **Graph 1**.

PFC concentrations for soil samples collected from soil borings from shallow depths (surface to 4 feet bgs) and deeper depths (4 to 8 feet bgs) were graphed in order to compare PFC concentrations and soil depths. This data is presented as **Graph 2, *Soil PFC Concentrations for Shallow vs. Deep Soil Samples***. No trend was obvious in comparing PFC concentrations of shallow soil samples versus deep soil samples.

None of the detected PFC concentrations in soil and sediment samples collected during this scope of work have met or exceeded any of the MPCA's Tier 1 or Tier 2 SRVs.

The MPCA does not define sediment quality standards. Sediment quality targets, adopted for use in the St. Louis River Area of Concern, can be used throughout the State as benchmark values for making comparisons. However, there are no sediment quality targets for any of the PFC compounds.

7.2 Groundwater and Surface Water Conclusions

PFCs were detected in 25 of 26 groundwater or surface water samples collected as part of the current scopes of work for which laboratory results have been received at this point, including samples collected in May 2009 in Fridley, Luverne and Rochester. The available laboratory data for all groundwater and surface water samples collected during the current scopes of work are depicted on **Graph 3, *Groundwater and Surface Water PFC Concentrations***. Laboratory data for groundwater samples collected at the Crystal Airport, Flint Hills Resources Pine Bend Refinery, and MSP Airport in January 2010 were not received at the time of this report. Laboratory data for the surface water sample collected at MSP Airport were not received at the time of this report.

The PFOA HRL of 300 ng/L was exceeded in the following groundwater (GW) or surface water (SW) samples: MSP Airport B-1 GW, MSP Airport B-2 GW, MSP Airport B-3 GW, MSP Airport B-4 GW, Burnsville B-3 GW, and (Lake Superior College) ERTC SW-1. The highest PFOA concentrations detected during the current scopes of work were in the groundwater samples collected from MSP B-3 and MSP B-4 borings, with concentrations of 12,000 ng/L and 286,000 ng/l, respectively. MSP B-3 and MSP B-4 were located in the pre-1983 firefighting foam training area.

The PFOS HRL of 300 ng/L was exceeded in the following groundwater or surface water samples: Marathon MW-912 GW, Marathon SP-11 GW, Marathon MW-172 GW, Marathon MW-156 GW, Marathon MW-156 Duplicate GW, Burnsville B-3 GW, Goodview SW-1, Bemidji B-1 GW, Bemidji B-2 GW, and (Lake Superior College) ERTC SW-1. The highest PFOS concentrations were detected in groundwater samples collected at the Marathon Refinery, with concentrations ranging from 731 ng/L to 14,900 ng/L, and in the surface water sample collected at the Lake Superior College ERTC, where the PFOS concentration was 11,300 ng/L.

The PFBA and PFBS HBVs of 7,000 ng/L were not exceeded in any of the groundwater or surface water samples thus far.

While there is currently no cleanup criteria or numerical health risk criteria for PFHxS, there were several laboratory detections of PFHxS at concentrations greater than 10,000 ng/L: 10,500 ng/L was detected in the Marathon MW-156 GW sample; 21,200 ng/L was detected in the MSP Airport B-3 GW sample; and, 145,000 ng/L was detected in the MSP Airport B-4 GW sample.

The MPCA has not developed site-specific ambient surface water quality criteria at the time of this report for any of the surface water bodies where surface water samples were collected during this scope of work.

Groundwater samples were collected at select sites in locations upgradient of the firefighting foam training or foam discharge areas. An upgradient groundwater sample was collected from boring B-4 in association with the former Richfield firefighting foam training area. The Richfield B-4 GW sample contained concentrations of several PFC compounds, indicating another source of PFCs in the groundwater upgradient of the former Richfield firefighting foam training area. However, groundwater samples collected from Richfield B-1 and Richfield B-2 in the former fire foam training area had concentrations of the shorter chain perfluorocarboxylic acids (PFBA, perfluoro-n-pentanoic acid (PFPeA), perfluorohexanoic acid (PFHxA), and perfluoroheptanoic acid (PFHpA)) more than one magnitude of order greater than the “background” Richfield B-4 GW sample. Analytical results for groundwater samples collected from Richfield B-1 GW, Richfield B-2 GW and Richfield B-3 GW were presented in the June 2009 Report.

The groundwater sample collected from Marathon Refinery well MW-912 was collected upgradient of the fire training area and upgradient of the site of the fire at Tank 120, and was intended to be a “background” groundwater sample for the Marathon Refinery. While the concentrations of PFHxA, PFBS and PFOS were lowest in the Marathon MW-912 GW sample, other PFC compound concentrations in the MW-912 “background” groundwater sample were actually higher than concentrations detected in some of the other wells sampled at Marathon. The Marathon Refinery is situated in an area where groundwater is known to have been contaminated by former 3M dump sites.

The groundwater sample collected from monitoring well DMW-1 at the Kandiyohi County Landfill was intended to be a “background” groundwater sample, collected upgradient of the foam discharge area. No PFCs were detected in the upgradient groundwater sample. Thus the detection of PFBA in the downgradient groundwater sample collected from DMW-3 may be due to the firefighting foam discharged at the C&D portion of the landfill, or from other PFC-containing materials discarded in the C&D landfill.

"Background" groundwater samples were collected in January 2010 at the MSP Airport and the Flint Hills Resources Pine Bend Refinery. The laboratory data for these sites were not received at the time of this report.

8.0 REMARKS

The conclusions contained in this report represent Delta's professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Delta and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Delta's client. Delta will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Delta makes no express or implied warranty as to the contents of this report.

Nancy Rodning

Date: February 10, 2010

Nancy Rodning
Project Geologist

Reviewed by:

Date: February 10, 2010

John Estes
Project Manager

TABLES

TABLE 1
Soil and Sediment Analytical Results, PFCs and TOC
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

				Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)	Mean Total Organic Carbon (TOC)
#Perfluorinated Carbon Chains:				**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**	**--**
Tier 1 Residential SRV:				**77000**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**
Tier 2 Recreational SRV:				**94000**	**ND**	**ND**	**ND**	**2500**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2600**	**ND**	**ND**
Tier 2 Industrial SRV:				**500000**	**ND**	**ND**	**ND**	**13000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**14000**	**ND**	**ND**
Sample ID	**Sample Depth**	**Sample Date**	**Laboratory**														
Kenyon B-1 SL 0-4'	0-4 ft.	5/15/2009	Axys	< 0.0963	< 0.0963	< 0.0963	**0.111**	< 0.0963	< 0.0963	< 0.0963	< 0.0963	< 0.0963	< 0.193	< 0.193	< 0.193	< 0.0963	26300
Kenyon B-1 SL 0-4'	0-4 ft.	5/15/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Kenyon B-1 SL 4-8'	4-8 ft.	5/15/2009	Axys	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.0944	< 0.189	< 0.189	< 0.189	< 0.0944	23600
Kenyon B-1 SL 4-8'	4-8 ft.	5/15/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Kenyon B-2 SL 0-4'	0-4 ft.	5/15/2009	Axys	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.0937	< 0.187	< 0.187	< 0.187	< 0.0937	13300
Kenyon B-2 SL 0-4'	0-4 ft.	5/15/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Kenyon B-2 SL 4-8'	4-8 ft.	5/15/2009	Axys	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.0943	< 0.189	< 0.189	< 0.189	< 0.0943	25600
Kenyon B-2 SL 4-8'	4-8 ft.	5/15/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Claremont B-1 SL 0-4'	0-4 ft.	5/15/2009	Axys	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.0907	< 0.181	< 0.181	**0.308**	< 0.0907	217000
Claremont B-1 SL 0-4'	0-4 ft.	5/15/2009	MPI	**0.413**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.773**	<0.2	<0.2	NA
Claremont B-1 SL 4-8'	4-8 ft.	5/15/2009	Axys	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.193	**0.224**	**0.321**	< 0.0966	14800
Claremont B-1 SL 4-8'	4-8 ft.	5/15/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Claremont B-2 SL 0-4'	0-4 ft.	5/15/2009	Axys	< 0.0936	< 0.0936	**0.385**	< 0.0936	**0.154**	< 0.0936	< 0.0936	< 0.0936	< 0.0936	**0.491**	**1.65**	**24.7**	**0.129**	184000
Claremont B-2 SL 4-8'	4-8 ft.	5/15/2009	Axys	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.0958	< 0.192	< 0.192	**0.25**	< 0.0958	7500
Claremont B-3 SL 0-4'	0-4 ft.	5/15/2009	Axys	**0.114**	**0.167**	**0.427**	**0.232**	**0.174**	< 0.0912	< 0.0912	< 0.0912	< 0.0912	**2.39**	**5.25**	**3.46**	< 0.0912	35200
Claremont B-3 SL 4-8'	4-8 ft.	5/15/2009	Axys	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.0935	< 0.187	**0.561**	**0.988**	< 0.0935	453
Luverne B-1 SL 0-4'	0-4 ft.	5/22/2009	Axys	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.0962	< 0.192	< 0.192	< 0.481	< 0.241	12500
Luverne B-1 SL 0-4'	0-4 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Luverne B-1 SL 4-8'	4-8 ft.	5/22/2009	Axys	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.0981	< 0.196	< 0.196	< 0.490	< 0.245	13300
Luverne B-1 SL 4-8'	4-8 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Luverne B-2 SL 0-4'	0-4 ft.	5/22/2009	Axys	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.0954	< 0.191	< 0.191	**0.481**	< 0.239	10300
Luverne B-2 SL 0-4'	0-4 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Luverne B-2 SL 4-8'	4-8 ft.	5/22/2009	Axys	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.200	< 0.200	< 0.500	< 0.250	14400
Luverne B-2 SL 4-8'	4-8 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Luverne B-3 SL 0-4'	0-4 ft.	5/22/2009	Axys	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.0974	< 0.195	< 0.195	< 0.487	< 0.244	7860
Luverne B-3 SL 0-4'	0-4 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA

TABLE 1
Soil and Sediment Analytical Results, PFCs and TOC
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

				Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)	Mean Total Organic Carbon (TOC)
#Perfluorinated Carbon Chains:				**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**	**--**
Tier 1 Residential SRV:				**77000**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**
Tier 2 Recreational SRV:				**94000**	**ND**	**ND**	**ND**	**2500**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2600**	**ND**	**ND**
Tier 2 Industrial SRV:				**500000**	**ND**	**ND**	**ND**	**13000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**14000**	**ND**	**ND**
Sample ID	**Sample Depth**	**Sample Date**	**Laboratory**														
Luverne B-3 SL 4-8'	4-8 ft.	5/22/2009	Axys	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.0984	< 0.197	< 0.197	< 0.492	< 0.246	39500
Luverne B-3 SL 4-8'	4-8 ft.	5/22/2009	MPI	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA
Fridley B-1 SL 0-4'	0-4 ft.	5/27/2009	Axys	**0.242**	**0.422**	**0.413**	**0.27**	**0.291**	**0.144**	< 0.100	< 0.100	< 0.100	< 0.201	**1.25**	**43**	< 0.100	55700
Fridley B-1 SL 4-8'	4-8 ft.	5/27/2009	Axys	< 0.101	< 0.101	< 0.101	< 0.101	< 0.101	< 0.101	< 0.101	< 0.101	< 0.101	< 0.201	< 0.201	**2.45**	< 0.101	1670
Fridley B-2 SL 0-4'	0-4 ft.	5/27/2009	Axys	**1.34**	**1.67**	**2.78**	**0.735**	**0.699**	< 0.102	< 0.102	< 0.102	< 0.102	**3.01**	**23.4**	**3.48**	< 0.102	11400
Fridley B-2 SL 4-8'	4-8 ft.	5/27/2009	Axys	**0.601**	**1.13**	**1.53**	**0.335**	**0.493**	< 0.0950	< 0.0950	< 0.0950	< 0.0950	**1.32**	**14.2**	**1.31**	< 0.0950	19800
Fridley B-3 Sediment 6"	0.5 ft.	5/27/2009	Axys	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.0966	< 0.193	< 0.193	**18.3**	< 0.0966	14800
Rochester B-1 SL 0-4'	0-4 ft.	5/28/2009	Axys	**0.207**	< 0.0979	< 0.0979	< 0.0979	< 0.0979	< 0.0979	< 0.0979	< 0.0979	< 0.0979	< 0.196	**0.361**	**0.559**	< 0.0979	4100
Rochester B-1 SL 4-8'	4-8 ft.	5/29/2009	Axys	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.0957	< 0.191	< 0.191	< 0.191	< 0.0957	1440
Rochester B-2 SL 0-4'	0-4 ft.	5/28/2009	Axys	**0.142**	< 0.0999	**0.173**	< 0.0999	< 0.0999	< 0.0999	< 0.0999	< 0.0999	< 0.0999	< 0.200	**1.7**	**1.12**	< 0.0999	4780
Rochester B-2 SL 4-8'	4-8 ft.	5/29/2009	Axys	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.0949	< 0.190	< 0.190	< 0.190	< 0.0949	431
Richfield B-4 0-8'	0-8 ft.	10/8/2009	Axys	< 0.0956	< 0.0956	< 0.0956	< 0.0956	**0.129**	< 0.0956	< 0.0956	< 0.0956	< 0.0956	< 0.191	**0.236**	**4.52**	< 0.0956	NA
Goodview Sed-1	0-6 in.	10/19/2009	Axys	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.0883	< 0.177	< 0.177	**0.332**	< 0.0883	NA
Bemidji B-1 SL 0-4'	0-4 ft.	11/5/2009	Axys	< 0.0951	< 0.0951	**0.216**	< 0.0951	**0.118**	< 0.0951	< 0.0951	< 0.0951	< 0.0951	< 0.190	**3.12**	**55.7**	**0.112**	6230
Bemidji B-1 SL 4-8'	4-8 ft.	11/5/2009	Axys	< 0.0913	< 0.0913	< 0.0913	< 0.0913	**0.498**	< 0.0913	< 0.0913	< 0.0913	< 0.0913	**0.267**	**3.98**	**56**	< 0.0913	535
Bemidji B-2 SL 0-4'	0-4 ft.	11/5/2009	Axys	**0.184**	**0.322**	**1.44**	**0.143**	**1.31**	**0.099**	< 0.0933	< 0.0933	< 0.0933	< 1.87	**13.9**[(1)]	**1200**[(1)]	**18.5**	3540
Bemidji B-2 SL 4-8'	4-8 ft.	11/5/2009	Axys	< 0.276	< 0.276	**0.411**[(1)]	**0.917**[(1)]	**19.6**[(1)]	< 0.276	< 0.276	< 0.276	< 0.276	**0.957**[(1)]	**147**[(1)]	**606**[(1)]	< 0.276	487
River Grove Sed-1	0-6 in.	11/18/2009	MPI	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.667	<0.667	<0.667	<0.333	NA
River Grove Sed-2	0-6 in.	11/18/2009	MPI	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.667	<0.667	<0.667	<0.333	NA
River Grove Sed-3	0-6 in.	11/18/2009	MPI	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.333	<0.667	<0.667	<0.667	<0.333	NA
ERTC SS-1	0-6 in.	11/25/2009	Axys	< 0.0998	**0.205**	**0.794**	**0.139**	**0.495**	< 0.0998	< 0.0998	< 0.0998	< 0.0998	< 0.200	**3.49**	**83.5**	**4.54**	NA

TABLE 1
Soil and Sediment Analytical Results, PFCs and TOC
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

				Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)	Mean Total Organic Carbon (TOC)
#Perfluorinated Carbon Chains:				**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**	**--**
Tier 1 Residential SRV:				**77000**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2100**	**ND**	**ND**
Tier 2 Recreational SRV:				**94000**	**ND**	**ND**	**ND**	**2500**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2600**	**ND**	**ND**
Tier 2 Industrial SRV:				**500000**	**ND**	**ND**	**ND**	**13000**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**14000**	**ND**	**ND**
Sample ID	**Sample Depth**	**Sample Date**	**Laboratory**														
ERTC Sed-1	0-6 in.	11/25/2009	Axys	< 0.0917	< 0.0917	< 0.0917	< 0.0917	**0.225**	< 0.0917	< 0.0917	< 0.0917	< 0.0917	< 0.183	**1.2**	**57.5**	**6.52**	NA
ERTC Sed-2	0-6 in.	11/25/2009	Axys	**0.218**	**0.536**	**1.72**	**0.268**	**1.26**	**0.184**	**0.101**	**0.174**	< 0.0933	**1.47**	**19.6**	**538**	**181**	NA
MSP Sed-1	0-6 in.	1/19/2010	Axys	Laboratory report not yet received.													NA
Crystal B-1 SL 0-4'	0-4 ft.	1/20/2010	Axys	Laboratory report not yet received.													
Crystal B-1 SL 4-8'	4-8 ft.	1/20/2010	Axys	Laboratory report not yet received.													
Crystal B-2 SL 0-4'	0-4 ft.	1/20/2010	Axys	Laboratory report not yet received.													
Crystal B-2 SL 4-8'	4-8 ft.	1/20/2010	Axys	Laboratory report not yet received.													
Crystal SS-1	2 ft.	1/20/2010	Axys	Laboratory report not yet received.													NA
Crystal Sed-1	0-6 in.	1/20/2010	Axys	Laboratory report not yet received.													NA
Crystal Sed-2	0-6 in.	1/20/2010	Axys	Laboratory report not yet received.													NA

Notes:
PFC results and standards are in nanograms per gram (ng/g), which is equivalent to parts per billion.
TOC results are in milligrams per kilogram (mg/kg), which is equivalent to parts per million.
Tier 1 Residential SRV: Minnesota soil reference value for chronic human exposure in a residential setting.
Tier 2 Recreational SRV: Minnesota soil reference value for exposure in a recreational setting.
Tier 2 Industrial SRV: Minnesota soil reference value for exposure in an industrial setting.
PFC compounds soil results reported on a dry weight basis.
ND: No SRV defined.
Axys: Axys Analytical Services LTD
MPI: MPI Research
TOC analyses performed by Pace Analytical Services.
Bolded type indicates detection above the laboratory method detection limit.
NA: not analyzed
(1) Results based on analysis of a dilution of the sample extract.

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TABLE 2
Groundwater and Surface Water Analytical Results, PFCs
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

			Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)
#Perfluorinated Carbon Chains:			**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**
Health-Based Limits:			**7000[1]**	**ND**	**ND**	**ND**	**300[2]**	**ND**	**ND**	**ND**	**ND**	**7000[1]**	**ND[3]**	**300[2]**	**ND**
Sample ID	**Sample Date**	**Laboratory**													
Luverne B-1 GW 8 ft.	5/22/2009	Axys	< 2.53	< 2.53	< 2.53	< 2.53	< 2.53	< 2.53	< 2.53	< 2.53	< 2.53	< 5.05	**18.1**	< 5.05	< 2.53
Luverne B-1 GW 8 ft.	5/22/2009	MPI	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0[4]	<25.0	<25.0
Luverne B-2 GW 12 ft.	5/22/2009	Axys	< 2.55	< 2.55	**3.78**	< 2.55	**2.73**	< 2.55	< 2.55	< 2.55	< 2.55	< 5.10	**22.8**	**18.4**	< 2.55
Luverne B-2 GW 12 ft.	5/22/2009	MPI	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	**25.1**	<25.0[6]	<25.0
Luverne B-3 GW 12 ft.	5/22/2009	Axys	< 2.53	**3.99**	**11.3**	< 2.53	**3.39**	< 2.53	< 2.53	< 2.53	< 2.53	< 5.07	**21.4**	**20.1**	< 2.53
Luverne B-3 GW 12 ft.	5/22/2009	MPI	<25.0	<25.0	<25.0[5]	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	**28.8**	<25.0[7]	<25.0
Fridley B-1 GW	5/27/2009	Axys	**37.6**	**34**	**27.1**	**23.2**	**32.7**	< 4.27	< 4.27	< 4.27	< 4.27	**15.2**	**98.9**	**21.9**	< 4.27
Fridley B-2 GW	5/27/2009	Axys	**88.3**	**97.2**	**166**	**59.5**	**86.8**	< 5.39	< 5.39	< 5.39	< 5.39	**182**	**1330**	**35**	< 5.39
MSP Airport B-1 GW	5/29/2009	Axys	**279**	**909**	**1640**	**317**	**988**	**42**	< 41.2	< 41.2	< 41.2	**332**	**3090**	< 82.5	< 41.2
MSP Airport B-2 GW	5/29/2009	Axys	**190**	**507**	**817**	**198**	**958**	< 48.8	< 48.8	< 48.8	< 48.8	**286**	**2920**	< 97.6	< 48.8
MSP Airport B-3 GW	5/29/2009	Axys	**151**	**148**	**477**	< 135	**12000**	< 135	< 135	< 135	< 135	< 269	**21200**	**281**	< 135
MSP Airport B-4 GW	5/29/2009	Axys	< 1250	< 1250	**3140**	**5830**	**286000**	< 1250	< 1250	< 1250	< 1250	< 2500	**145000**	< 2500	< 1250
*MSP Airport B-5 GW	1/19/2010	Axys	Laboratory report not yet received.												
*MSP Airport B-6 GW	1/19/2010	Axys	Laboratory report not yet received.												
*MSP Airport B-7 GW	1/19/2010	Axys	Laboratory report not yet received.												
CWN-14A GW	1/19/2010	Axys	Laboratory report not yet received.												
CWN-15A GW	1/19/2010	Axys	Laboratory report not yet received.												
Signature MW-2 GW	1/19/2010	Axys	Laboratory report not yet received.												
MSP SW-1	1/19/2010	Axys	Laboratory report not yet received.												

TABLE 2
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Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

			Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)
#Perfluorinated Carbon Chains:			**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**
Health-Based Limits:			**7000[1]**	**ND**	**ND**	**ND**	**300[2]**	**ND**	**ND**	**ND**	**ND**	**7000[1]**	**ND[3]**	**300[2]**	**ND**
Sample ID	**Sample Date**	**Laboratory**													
Marathon MW-101	8/20/2009	MPI	**183**	**403**	**150**	**12.4**	**36.7**	<2.5	<2.5	<2.5	<2.5	**479**	**3710**	**93.2**	<2.5
*Marathon MW-912	8/20/2009	MPI	**462**	**298**	**51.5**	**21.8**	**17.5**	<2.5	<2.5	<2.5	<2.5	**37.0**	**1580**	**731**	<2.5
Marathon SP-11	8/20/2009	MPI	**182**	**458**	**171**	**52.2**	**35.6**	**20.7**	<2.5	<2.5	<2.5	**369**	**4910**	**5770**	<2.5
Marathon MW-172	8/20/2009	MPI	**59.8**	**245**	**154**	**25.1**	**15.5**	**11.4**	<2.5	<2.5	<2.5	**49.0**	**1220**	**1330**	<2.5
Marathon MW-156	8/20/2009	MPI	**220**	**1730**	**527**	**200**	**73.1**	**26.9**	<2.5	**2.58**	<2.5	**462**	**10500**	**14900**	<2.5
Marathon MW-156 Dupl.	8/20/2009	MPI	**221**	**1660**	**534**	**184**	**81.4**	**23.7**	<2.5	**2.93**	<2.5	**502**	**8930**	**11700**	**2.62**
Burnsville B-3 GW 44.5 ft.	8/27/2009	Axys	**146**	**422**	**281**	**447**	**1260**	**81.7**	**17.8**	< 2.52	< 2.52	**12.8**	**279**	**522**	< 2.52
Legion Lake SW-1	8/27/2009	Axys	**4.02**	<7.21	< 2.51	**3.55**	**5.69**	**3.63**	**3.92**	< 2.51	< 2.51	< 5.02	< 5.02	**13.2**	< 2.51
*Richfield B-4 GW 29 ft.	10/8/2009	Axys	**228**	**10.3**	**10.3**	**5.43**	**38.7**	< 2.48	< 2.48	< 2.48	< 2.48	< 4.96	**71.4**	< 4.96	< 2.48
Goodview SW-1	10/19/2009	Axys	< 2.53	< 2.53	**4.78**	< 2.53	**4.49**	**2.56**	**2.82**	< 2.53	< 2.53	< 5.06	< 5.06	**8.19**	< 2.53
Bemidji B-1 GW 15 ft.	11/5/2009	Axys	**4.14**	**3.85**	**14.5**	**3.75**	**49**	< 2.50	< 2.50	< 2.50	< 2.50	**19.1**	**227**	**483**	< 2.50
Bemidji B-2 GW 15 ft.	11/5/2009	Axys	**21.1**	**55.5**	**340**	**33.8**	**200**	< 12.2	< 12.2	< 12.2	< 12.2	**129**	**1490**	**789**	< 12.2
River Grove SW-1	11/18/2009	MPI	**3.54**	<2.5	<2.5	<2.5	**2.79**	<2.5	<2.5	<2.5	<2.5	**4.00**	<2.5	<2.5	<2.5
*River Grove SW-2	11/18/2009	MPI	**4.23**	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	**3.43**	<2.5	<2.5	<2.5
ERTC SW-1	11/25/2009	Axys	**257**	**537**	**1790**	**348**	**991**	**31.8**	**3.45**	< 2.51	< 2.51	**1870**	**9390**	**11300**	**360**

TABLE 2
Groundwater and Surface Water Analytical Results, PFCs
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

			Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)
#Perfluorinated Carbon Chains:			**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**4**	**6**	**8**	**8**
Health-Based Limits:			**7000**(1)	**ND**	**ND**	**ND**	**300**(2)	**ND**	**ND**	**ND**	**ND**	**7000**(1)	**ND**(3)	**300**(2)	**ND**
Sample ID	**Sample Date**	**Laboratory**													
Kandiyohi DMW-1A	1/12/2010	Axys	< 2.43	< 2.43	< 2.43	< 2.43	< 2.43	< 2.43	< 2.43	< 2.43	< 2.43	< 4.87	< 4.87	< 4.87	< 2.43
Kandiyohi DMW-3	1/12/2010	Axys	**6.1**	< 2.51	< 2.51	< 2.51	< 2.51	< 2.51	< 2.51	< 2.51	< 2.51	< 5.01	< 5.01	< 5.01	< 2.51
Crystal B-1 GW 5.5 ft.	1/20/2010	Axys	Laboratory report not yet received.												
Crystal B-2 GW 6 ft.	1/20/2010	Axys	Laboratory report not yet received.												
*FHR Pine Bend MW-1	1/21/2010	Axys	Laboratory report not yet received.												
FHR Pine Bend MW-3	1/21/2010	Axys	Laboratory report not yet received.												
FHR Pine Bend MW-111	1/21/2010	Axys	Laboratory report not yet received.												

Notes:
All results and standards are in nanograms per liter (ng/L), which is equivalent to parts per trillion.
Axys: Axys Analytical Services LTD
MPI: MPI Research
Bolded type indicates detection above the laboratory method detection limit.
Highlighted concentrations exceed the HBV or HRL for groundwater, or the Surface Water Chronic Criterion for surface water.
(1) Health-Based Value (HBV) for chronic exposure defined by the Minnesota Department of Health.
(2) Health Risk Limit (HRL) for drinking water defined by the Minnesota Department of Health.
(3) Risk Assessment Advise (RAA) set by the Minnesota Department of Health for PFHxS does not specify numeric values.
(4) Chronic criterion specific to surface waters of the Mississippi River, defined by the Minnesota Pollution Control Agency.
ND: No health-based limit defined.
(5) Manually Calculated Result is 18.9

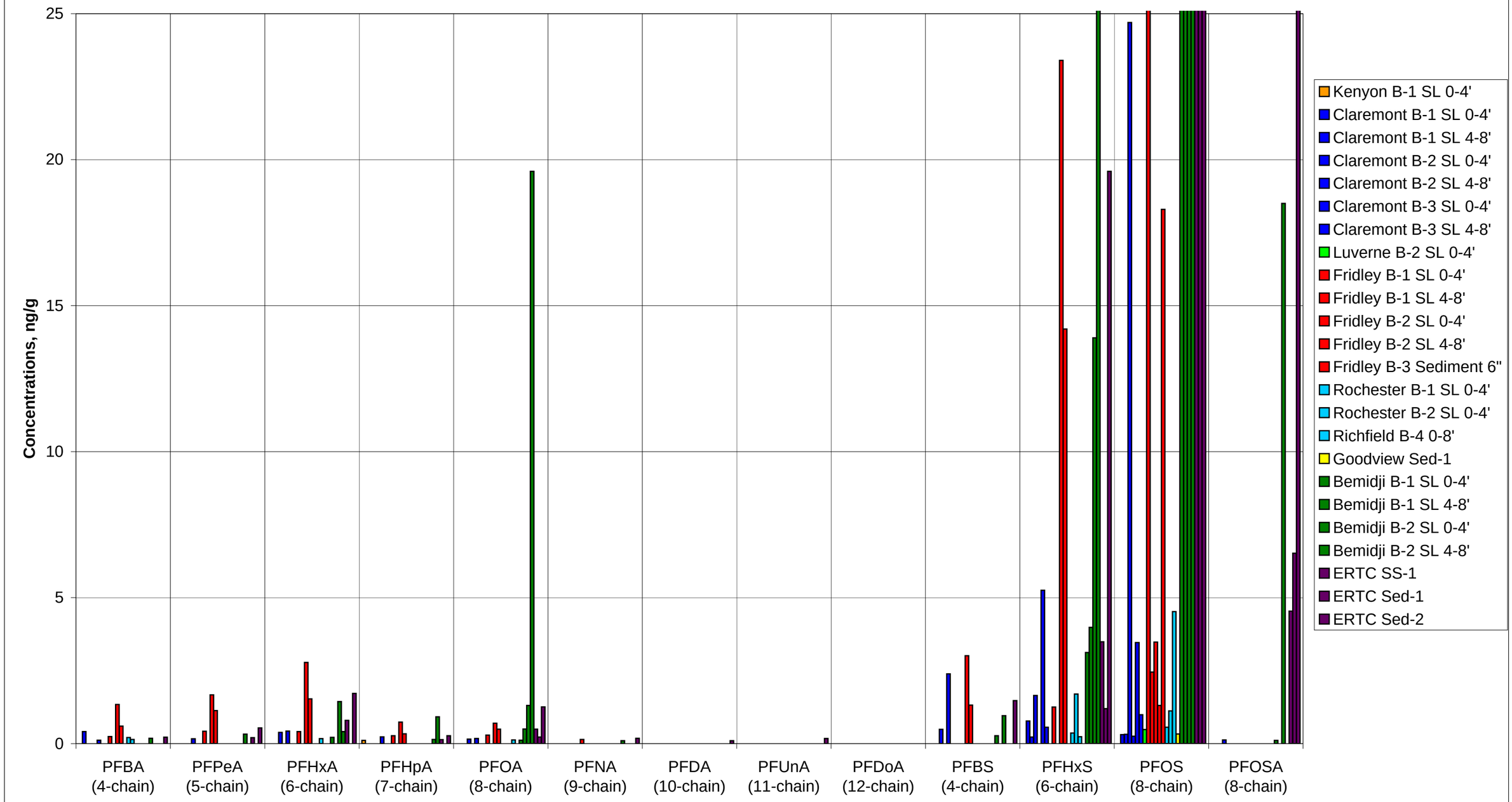
TABLE 2
Groundwater and Surface Water Analytical Results, PFCs
Minnesota Fire Foam Training and Discharge Sites
Delta Project No. 19382DEL0

			Perfluorobutanoic acid (PFBA)	Perfluoro-n-pentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnA)	Perfluorododecanoic acid (PFDoA)	Perfluorobutanoic sulfonate (PFBS)	Perfluorohexane sulfonate (PFHxS)	Perflourooctane sulfonate (PFOS)	Perfluorooctane sulfonylamide (PFOSA)
#Perfluorinated Carbon Chains:			4	5	6	7	8	9	10	11	12	4	6	8	8
Health-Based Limits:			7000[1]	ND	ND	ND	300[2]	ND	ND	ND	ND	7000[1]	ND[3]	300[2]	ND
Sample ID	**Sample Date**	**Laboratory**													
MW-1	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-2	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-3	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-4	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-5	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-6	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-7	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-8	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-9	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-10	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-11	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-12	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-13	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-14	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-15	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-16	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-17	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-18	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-19	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-20	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-21	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-22	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-23	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-24	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-25	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-26	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-27	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-28	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-29	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-30	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-31	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-32	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-33	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-34	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-35	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-36	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-37	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-38	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-39	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-40	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-41	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-42	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-43	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-44	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-45	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-46	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-47	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-48	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-49	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-50	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-51	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-52	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-53	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-54	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-55	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-56	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-57	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-58	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-59	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-60	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-61	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-62	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-63	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-64	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-65	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-66	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-67	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-68	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-69	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-70	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-71	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-72	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-73	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-74	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-75	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-76	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-77	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-78	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-79	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-80	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-81	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-82	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-83	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-84	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-85	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-86	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-87	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-88	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-89	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-90	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-91	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-92	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-93	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-94	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-95	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-96	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-97	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-98	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-99	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
MW-100	10/19/2016	Pace	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1

(6) Manually Calculated Result is 17.1
(7) Manually Calculated Result is 23.3
(8) Manually Calculated Result is 21.7
*Sample collected upgradient of fire foam training or discharge area, intended to act as "background" sample.

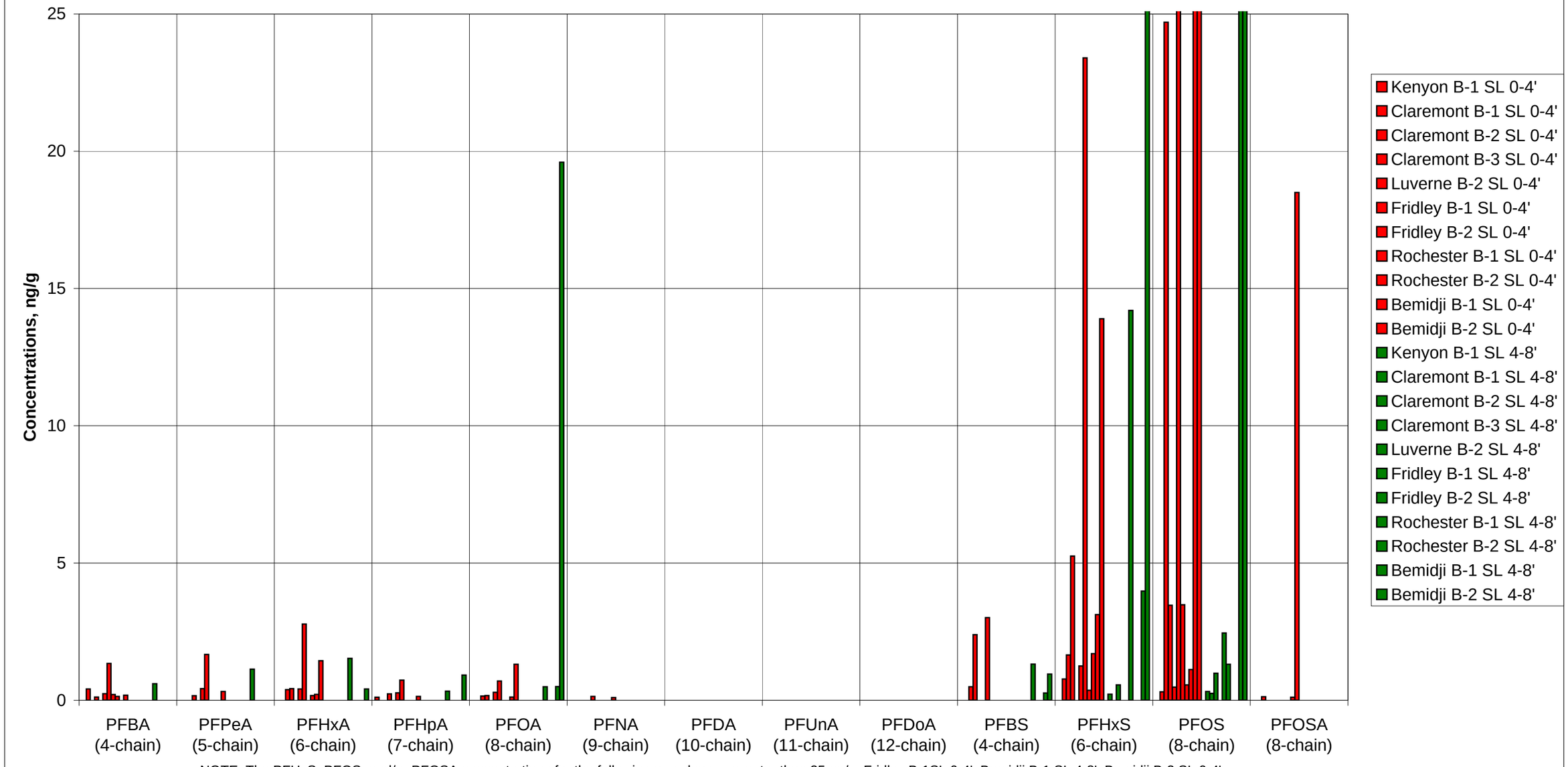
GRAPHS

GRAPH 1
Soil and Sediment PFC Concentrations
Minnesota Firefighting Foam Training and Discharge Sites



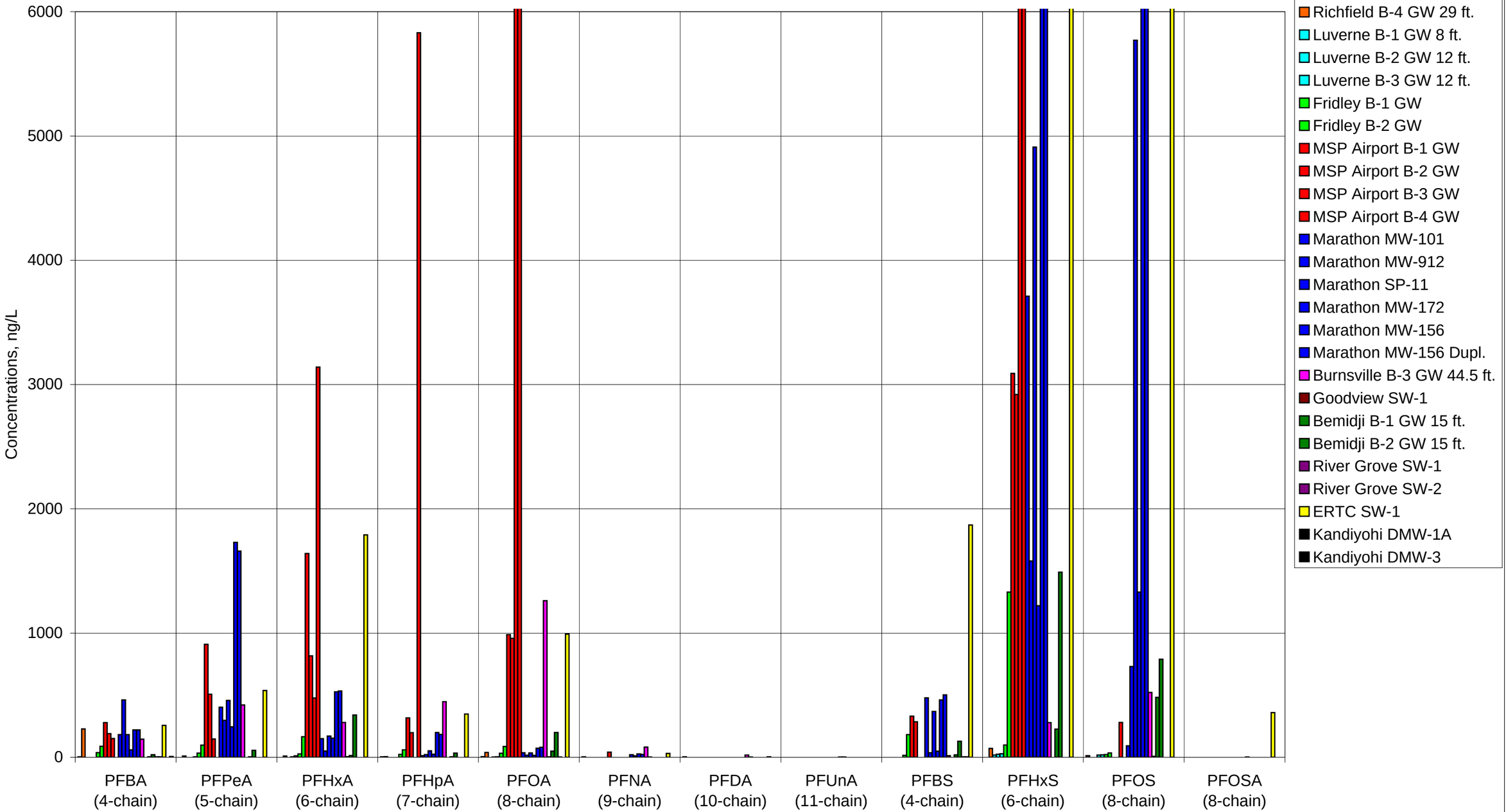
NOTE: The PFHxS, PFOS, and/or PFOSA concentrations for the following samples are greater than 25 ng/g: Fridley B-1SL 0-4', Bemidji B-1 SL 4-8', Bemidji B-2 SL 0-4', Bemidji B-2 SL 4-8'; ERTC SS-1; ERTC Sed-1; and, ERTC Sed-2.

GRAPH 2
Soil PFC Concentrations for Shallow vs. Deep Soil Samples
Minnesota Firefighting Foam Training and Discharge Sites



NOTE: The PFHxS, PFOS, and/or PFOSA concentrations for the following samples are greater than 25 ng/g: Fridley B-1SL 0-4', Bemidji B-1 SL 4-8', Bemidji B-2 SL 0-4', Bemidji B-2 SL 4-8'; ERTC SS-1; ERTC Sed-1; and, ERTC Sed-2.

GRAPH 3
Groundwater and Surface Water PFC Concentrations
Minnesota Firefighting Foam Training and Discharge Sites



Note: The PFOA, PFHxS, and/or PFOS concentrations for the following samples are greater than 6000 ng/L: MSP Airport B-3, MSP Airport B-4, Marathon MW-156, Marathon MW-156 Dupl., and ERTC SW-1.

APPENDIX A

Claremont Fire Foam Training Area Discussion and Supporting Documents

Background - Claremont Fire Foam Training Areas

The Claremont Fire Department 2nd Assistant Fire Chief/Training Officer returned a completed firefighting foam use questionnaire to Delta in April 2008, indicating the department's use of 3M-brand AR-AFFF in annual training exercises conducted in front of the Claremont fire station on Front Street. A copy of the questionnaire was included in Appendix D of Delta's June 2009 Report. The location of the Claremont fire station is shown in **Figure 1, *Fire Foam Training Area Location, Claremont***, included in **Appendix A**. Subsequent communications with the Assistant Fire Chief indicated that training with 3M-brand AR-AFFF has occurred approximately two times in the last six years. Five gallons or less of foam concentrate are used per training event. In the fall of 2008 there was also a fire foam demonstration conducted on an unpaved area behind the fire station, and some training has been conducted at a nearby ethanol plant. The Assistant Fire Chief was not sure which brand of foam was used in the demonstration.

According to the Claremont Assistant Fire Chief, spent foam discharged in front of the fire station drains toward a storm water grate at the northeast corner of the property. The Assistant Fire Chief and the Claremont City Administrator were unsure as to the outflow connection from this storm sewer pipe. The foam demonstration area behind the fire station is relatively flat, with no visual evidence of surface runoff. Photographs of the fire foam training area in front (north) of the Claremont fire station and the foam demonstration area behind the fire station are included in **Appendix A**.

An access agreement was signed by the Claremont City Administrator and the MPCA, allowing access for a site reconnaissance and sampling at both the training and demonstration areas. A copy of the access agreement was included in Appendix D of Delta's June 2009 Report.

As presented in the April 2009 report, the inferred groundwater flow direction in the area of the Claremont Fire Station area is to the south, and the depth to groundwater is estimated to be greater than fifty feet.

Sample Collection – Claremont Fire Foam Training Areas

On May 15, 2009, one soil boring was advanced adjacent to the storm sewer grate in front of the fire station and two borings were advanced in the one-time foam demonstration area behind the fire station. Soil boring locations are shown on the figure ***Claremont Fire Department Fire Training Areas, Claremont***, which is included in **Appendix A**. Soil borings were advanced by Glacier Inc. using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, boring depths, and the GPS locations of the borings are included in **Appendix A**.

Based on area well logs and geological and hydrogeological maps, the depth to groundwater in the area of Claremont was estimated to be greater than fifty feet. Drilling to depths greater than fifty feet was beyond the scope of work, therefore, borings were only advanced to a depth of 8 feet below grade surface (bgs) in order to collect soil samples for laboratory analysis. Groundwater was not encountered in any of the borings. Borings B-1 and B-2 were advanced behind the fire station in the one-time fire foam demonstration area. Boring B-3 was advanced adjacent to the storm sewer grate near the northeast corner of the fire station property. Soils encountered generally consisted of one to five feet of sand and gravel over clay. No staining, or foul or unusual odors were noted in the soils. Upon completion of soil sampling at each boring, the boring was sealed in accordance with applicable State requirements.

Soils samples were collected from all borings from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD. A second set of soil samples collected from B-1 were also submitted to MPI Research for laboratory analysis of PFCs, for laboratory comparison purposes.

Sampling Results – Claremont Fire Foam Training Areas

Laboratory analysis detected PFC compound concentrations in soil samples collected from the Claremont fire foam training areas as listed in the table below. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil Sample PFC Detections – Claremont Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-1	0-4 feet	0.413 ng/g PFBA
		0.773 ng/g PFHxS
		0.308 ng/g PFOS
B-1	4-8 feet	0.224 ng/g PFHxS
		0.321 ng/g PFOS
B-2	0-4 feet	0.385 ng/g PFHxA
		0.154 ng/g PFOA
		0.491 ng/g PFBS
		1.65 ng/g PFHxS
		24.7 ng/g PFOS
		0.129 ng/g PFOSA

Soil Sample PFC Detections – Claremont Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-2	4-8 feet	0.25 ng/g PFOS
B-3	0-4 feet	0.114 ng/g PFBA
		0.167 ng/g PFPeA
		0.427 ng/g PFHxA
		0.232 ng/g PFHpA
		0.174 ng/g PFOA
		2.39 ng/g PFBS
		5.25 ng/g PFHxS
		3.46 ng/g PFOS
B-3	4-8 feet	0.561 ng/g PFHxS
		0.988 ng/g PFOS

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Discussion and Conclusion – Claremont Fire Foam Training Area

Based on information provided by the Claremont Fire Department Assistant Fire Chief, training with 3M-brand AR-AFFF has occurred in front of the fire station approximately two times in the last six years. Five gallons or less of foam concentrate are used per training event. Several PFC compounds were detected in the shallow soil sample collected from B-3 adjacent to the storm sewer grate to which spent foam drains. Only PFOS and PFHxS were detected in the deeper soil sample at B-3, at concentrations lower than those detected in the shallow soil sample.

The fire foam demonstration conducted behind the fire station in the fall of 2008 was a one-time event. The foam brand used in the demonstration is not known. Borings B-1 and B-2 were advanced in the demonstration area. A fewer number of PFC compounds were detected in the soil samples collected from B-1 and B-2 as compared to B-3. PFOS was detected in all of the soil samples collected from B-1 and B-2, and the 4-8 foot soil sample collected from B-2 exhibited the highest PFOS concentration of all soil samples collected in Claremont, at one order of magnitude higher comparatively.

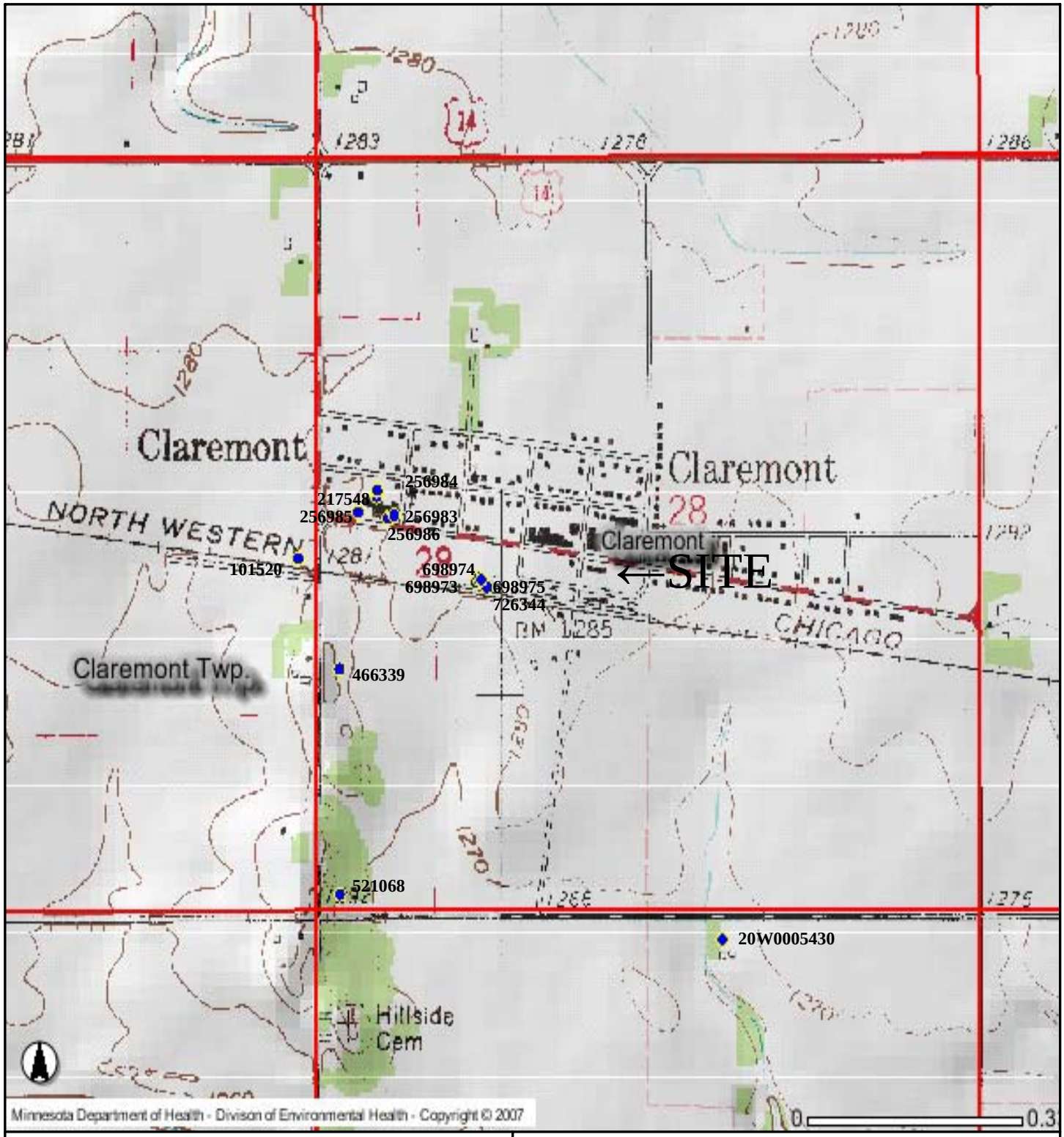
The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFOA	2100 ng/g	2500 ng/g	13000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

None of the detected PFC concentrations in the Claremont soil samples met or exceeded any of the MPCA SRVs.

The following observations were noted in analyzing PFC soil laboratory data and sample depths:

- PFC concentrations were generally higher in the shallow soil samples (0-4 feet) compared to the deep soil samples (4-8 feet), as depicted in **Graph A, *Claremont Soil Samples, Soil Depth vs. PFC Concentration*** included in **Appendix A**. One exception is that the PFOS concentrations in the B-1 soil sample were slightly higher in the shallow sample, at 0.308 ng/g, compared to the deep sample in which 0.321 ng/g PFOS was detected.
- The shorter chain perfluorocarboxylic acids (PFBA, PFPeA, PFHxA, PFHpA and PFOA) were detected in soils while the longer chain compounds (PFNA, PFDA, PFUnA and PFDoA) were not. This trend is apparent in **Graph A**.
- The perfluorosulfonates (PFBS, PFHxS, and PFOS) were detected at higher concentrations than the perfluorocarboxylic acids. This trend is reflected in **Graph A**.



LEGEND:

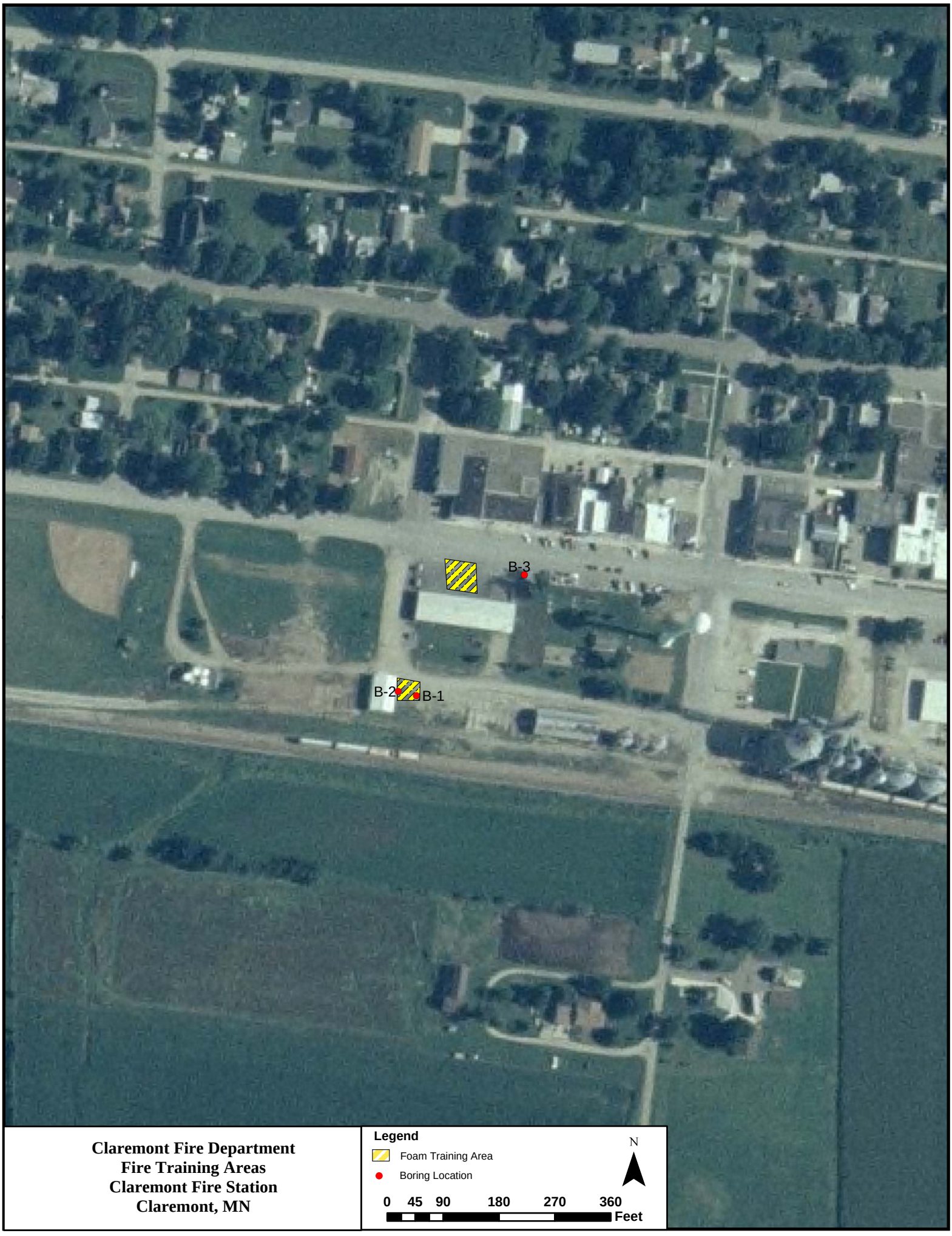
- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
CLAREMONT FIRE STATION
CLAREMONT, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		Claremont-1

DELTA



Claremont Fire Department
Fire Training Areas
Claremont Fire Station
Claremont, MN

Claremont Fire Station
Fire Foam Training Area
April 29, 2009

Photograph 1
Fire foam is sprayed on the asphalt pavement in front of the fire station doors. Spent foam drains toward the storm drain near the northeast corner of the property, near the utility pole in the photo. View facing southwest.

Photograph 2
Close-up of the storm drain in Photograph 1.

Photograph 3
Fire foam was sprayed on the east (left) side of the pole building at right, in and around the area where water is puddled in the photo. View facing south.

Photograph 4
View of the same training area as Photograph 3, view facing north. The Claremont Fire Station is in the background.

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Claremont, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL04**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Kyle Von Spreecken**	Method of Drilling: **Direct Push Probe**
Weather: **Sunny**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/15/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **Dry**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) FILL: Light brown sand and gravel fill. Top 5 ft hand augered.			NA
		(1.00, 1.50) SILTY SAND: Black/dark brown silty sand and gravel, moist.	SM		
		(1.50, 3.50) SAND AND GRAVEL: Brown medium sand and gravel, moist.	SW	Composite Sample from 0' - 4'.	
		(3.50, 4.75) SILTY SAND: Black silty sand, moist.	SM		
5		(4.75, 5.50) CLAY: Dark brown to brown clay, moist	CL		
		(5.50, 8.00) CLAY: Light brown clay, trace of silt, moist/soft.	CL	Composite Sample from 4' - 8'.	

Comments: E.O.B. at 8'.

Boring Location: 44 02.626' N / 92 59.984' W

DELTA

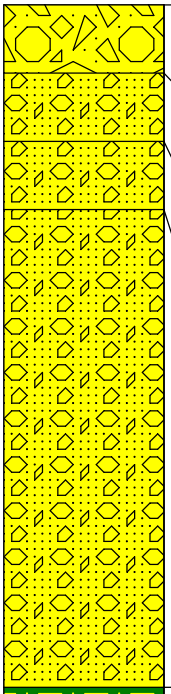
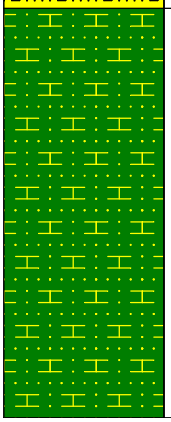
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Claremont, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL04**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Kyle Von Spreecken**	Method of Drilling: **Direct Push Probe**
Weather: **Sunny**	Soil Sampling Method: **5' samplers with liners**
Date Began: **5/15/09**	Surface Elevation (feet): **NA**
Date Completed	Field Screening Instrument: **None**
⧖ Water Level During Drilling: **Dry**	

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 0.50) FILL: Light brown sand and gravel fill. Top 5 ft hand augered.	SW		NA
		(0.50, 1.00) SAND AND GRAVEL: Dark brown to black medium sand and gravel, moist.	SW		
		(1.00, 1.50) SAND AND GRAVEL: Black medium sand and large gravel, moist. Hand auger refusal at 1.5'.	SW		
		(1.50, 5.00) SAND AND GRAVEL: Dark brown medium sand and gravel, moist, limited recovery.		Composite Sample from 0' - 4'.	
5		(5.00, 8.00) CLAY AND SILT: Light brown/rust clay and silty sand, moist/soft.	CL	Composite Sample from 4' - 8'.	

Comments: E.O.B. at 8'.

Boring Location: 44 02.627' N / 92 59.991' W

DELTA

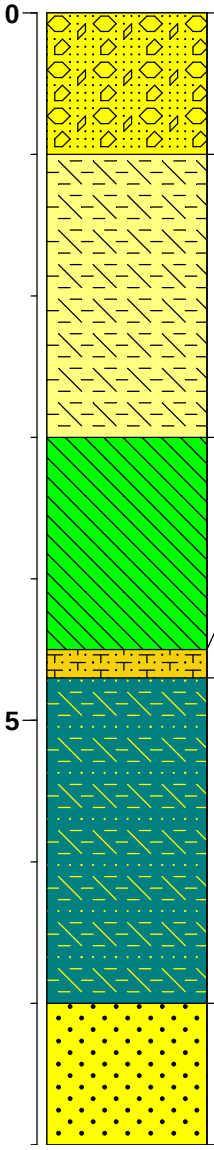
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-3**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Claremont, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL04**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Kyle Von Spreecken**	Method of Drilling: **Direct Push Probe**
Weather: **Sunny**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/15/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **Dry**	Field Screening Instrument: **None**

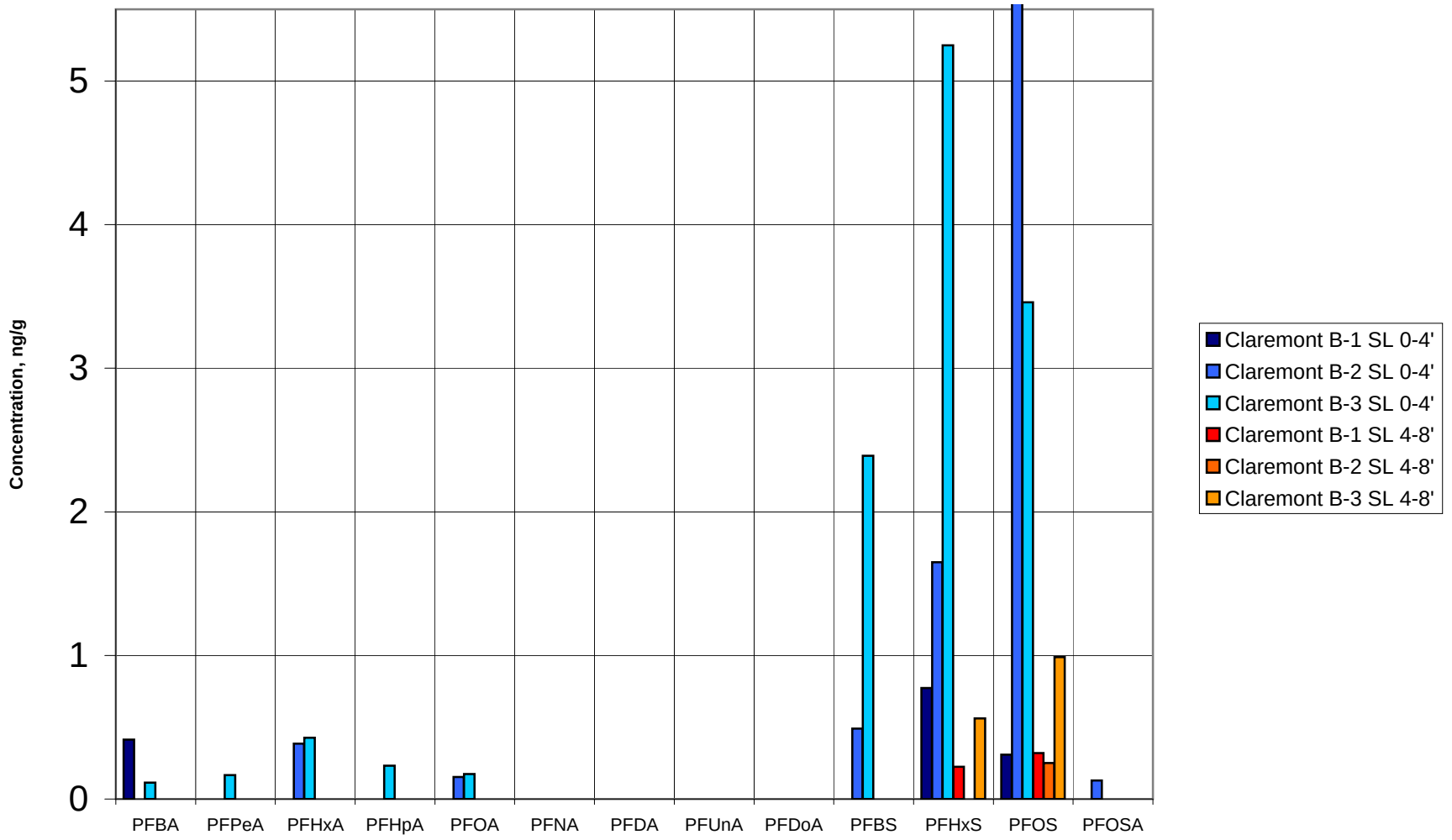


DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) SAND AND GRAVEL: Light brown to dark brown sand and gravel, moist. Top 5 ft hand augered.	SW		NA
		(1.00, 3.00) SILTY CLAY: Dark brown silty clay, trace of sand, moist/soft.	CL	Composite Sample from 0' - 4'.	
		(3.00, 4.50) CLAY: Dark brown/black, clay and some silt, moist/soft.	CL		
		(4.50, 4.70) SILTY SAND: Light brown silt and fine sand, moist/soft.	SM		
5		(4.70, 7.00) SANDY CLAY: Light brown/gray sandy clay, soft/moist.	CL	Composite Sample from 4' - 8'.	
		(7.00, 8.00) SAND: Light brown medium sand, wet.	SW		

Comments: E.O.B. at 8'.

Boring Location: 44 02.658' N / 92 59.941' W

GRAPH A
Claremont Soil Samples
Soil Depth vs. PFC Concentrations



Note: PFOS concentration for Claremont B-2 SL 0-4' is 24.7 ng/g.

APPENDIX B

Fridley Fire Foam Training Area Discussion and Supporting Documents

Background and Access – Fridley Fire Foam Training Area

The Fridley Fire Chief returned a completed firefighting foam use questionnaire to Delta in May 2008, indicating the department's occasional historical use of 3M-brand AR-AFFF in training exercises conducted at the North Metro Fire Training Center in Fridley. A copy of the questionnaire was included in Appendix E of Delta's June 2009 Report. The location of the North Metro Fire Training Center is shown on **Figure 1, *Fire Foam Training Area Location, Fridley***, included in **Appendix B**.

The Fridley Fire Chief related that, prior to construction of the fire training tower/building at the North Metro Fire Training Center in approximately 1994 or 1995, there was a lined pit where the tower/building is currently located. During fire foam training exercises kerosene would be placed in the lined pit, set on fire, and extinguished with Class B AR-AFFF. The Fridley Fire Chief also stated that the department utilized 3M-brand AR-AFFF from at least 1981 through the mid 1990s, and that they disposed of any remaining expired 3M-brand foam in about 2003. The Fridley Fire Department has not trained with Class B foam since 1994 or 1995 when the training tower/building was built, except for a demonstration of F-500 firefighting foam conducted in 2008 on a concrete pad situated south of the fire tower/building. The existing surface grades would result in stormwater runoff toward the south, to an on-site wetland that drains to Rice Creek further to the south. Photographs of the training area are included in **Appendix B**.

An access agreement was signed by the Fridley City Manager and the MPCA, allowing access for a site reconnaissance and sampling at the training center. A copy of the access agreement was included in Appendix E of Delta's June 2009 Report.

As presented in the April 2009 report, the inferred groundwater flow direction in the area of the North Metro Fire Training Center is to the west.

Sample Collection – Fridley Fire Foam Training Area

On May 27, 2009, two soil borings were advanced in the grassy area just south of the fire tower/building at the North Metro Fire Training Center. Soil boring locations are shown on the figure ***Fridley Fire Department Fire Foam Training Area*** included in **Appendix B**. Soil borings were advanced by Glacier Inc. using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, groundwater depths, boring depths, and the GPS locations of the borings are included in **Appendix B**.

Borings B-1 and B-2 were advanced on the south side, or downslope, of the fire tower/building to depths of 20 feet and 18 feet below grade surface (bgs), respectively. Soils encountered in both borings

consisted of approximately 6 feet of silty sand, over clay to a depth of 13 feet, underlain by stiff, sandy clay to the end of the borings. Soil samples were collected from B-1 and B-2 from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis of PFCs. Groundwater was encountered in both borings at an approximate depth of 15.5 feet bgs. No staining, or foul or unusual odors were noted in the soils. Temporary wells with five-foot screens were set to the bottom of the borings for the collection of groundwater samples. Upon completion of groundwater sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

A sediment sample, B-3, was collected from the north edge of the on-site wetland, which is located south of the fire/tower building and south of the concrete pad where the demonstration of F-500 firefighting foam occurred in 2008. The sediment sample consisted of a grab sample collected by hand approximately 6 inches bgs. The sediment consisted of wet sandy gravel.

The soil samples, and groundwater and sediment samples, were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Fridley Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in soil samples collected at the North Metro Fire Training Center in Fridley as listed in the table below. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil Sample PFC Detections – Fridley Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-1	0-4 feet	0.242 ng/g PFBA
		0.422 ng/g PFPeA
		0.413 ng/g PFHxA
		0.27 ng/g PFHpA
		0.291 ng/g PFOA
		0.144 ng/g PFNA
		1.25 ng/g PFHxS
		43 ng/g PFOS
B-1	4-8 feet	2.45 ng/g PFOS

Soil Sample PFC Detections – Fridley Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-2	0-4 feet	1.34 ng/g PFBA
		1.67 ng/g PFPeA
		2.78 ng/g PFHxA
		0.735 ng/g PFHpA
		0.699 ng/g PFOA
		3.01 ng/g PFBS
		23.4 ng/g PFHxS
		3.48 ng/g PFOS
B-2	4-8 feet	0.601 ng/g PFBA
		1.13 ng/g PFPeA
		1.53 ng/g PFHxA
		0.335 ng/g PFHpA
		0.493 ng/g PFOA
		1.32 ng/g PFBS
		14.2 ng/g PFHxS
		1.31 ng/g PFOS
B-3 Sediment	0-6 inches	18.3 ng/g PFOS

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Laboratory analysis of groundwater samples detected PFC compound concentrations both groundwater samples collected from the North Metro Fire Training Center in Fridley, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*.**

Groundwater Sample PFC Detections – Fridley Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-1	37.6 ng/L PFBA
	34 ng/L PFPeA
	27.1 ng/L PFHxA
	23.2 ng/L PFHpA

Groundwater Sample PFC Detections – Fridley Fire Foam Training Area	
Soil Boring	**Compound Concentration**
	32.7 ng/L PFOA
	15.2 ng/L PFBS
	98.9 ng/L PFHxS
	21.9 ng/L PFOS
B-2	88.3 ng/L PFBA
	97.2 ng/L PFPeA
	166 ng/L PFHxA
	59.5 ng/L PFHpA
	86.8 ng/L PFOA
	182 ng/L PFBS
	1330 ng/L PFHxS
	35 ng/L PFOS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Fridley Fire Foam Training Area

Based on information provided by the Fridley Fire Chief, 3M-brand Class B AR-AFFF was used in fire foam training from at least 1981 through the mid 1990s. Prior to construction of the existing fire training tower/building at the North Metro Fire Training Center in approximately 1994 or 1995, there was a lined pit where the tower/building is currently situated where kerosene would be placed in the lined pit, set on fire, and extinguished with Class B AR-AFFF. The Fridley Fire Department has not trained with Class B foam since construction of the fire training tower/building. Several PFC compounds were detected in the shallow (0-4 feet) and deep (4-8 feet) soil samples collected from B-1 and B-2, which were advanced south (downslope) of the fire training tower/building. PFC concentrations were higher in the shallow soil samples than those detected in the deep soil samples. Only PFOS was detected in the sediment sample collected from the wetland.

The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFOA	2100 ng/g	2500 ng/g	13000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

None of the detected PFC concentrations in the Fridley soil and sediment samples met or exceeded any of the MPCA SRVs.

The MPCA does not define sediment quality standards. Sediment quality targets, adopted for use in the St. Louis River Area of Concern, can be used throughout the State as benchmark values for making comparisons. However, there are no sediment quality targets for any of the PFC compounds.

The same PFC compounds were detected in both the B-1 and B-2 groundwater samples. The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values.

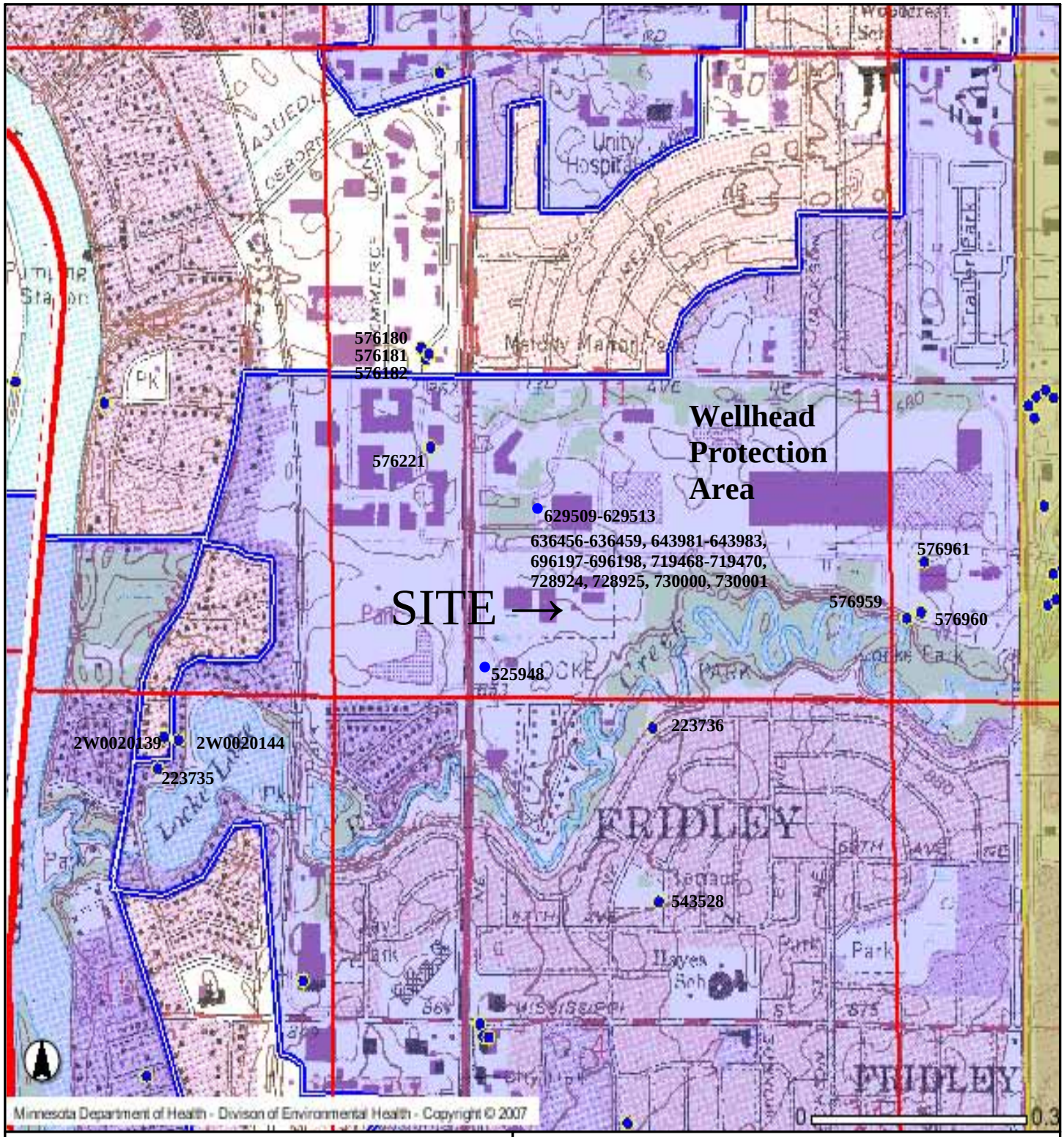
The detected PFC concentrations in the Fridley groundwater samples did not meet or exceed the HRLs for PFOS or PFOA nor the HBVs for PFBA or PFBS.

The following observations were noted in analyzing PFC laboratory data and sample depths:

- PFC concentrations were higher in the shallow soil samples (0-4 feet) compared to the deep soil samples (4-8 feet), as depicted in **Graph A, *Fridley Soil Samples, Soil Depth vs. PFC Concentration*** included in **Appendix B**.
- The shorter chain perfluorocarboxylic acids (PFBA, PFPeA, PFHxA, PFHpA and PFOA) were detected in soils while the longer chain compounds (PFNA, PFDA, PFUnA and PFDoA) generally were not. One exception to this is that 0.144 ng/g PFNA was detected in the Fridley B-1 SL 0-4 ft. sample. This trend is apparent in **Graph A**.
- The perfluorosulfonates (PFBS, PFHxS, and PFOS) were detected at higher concentrations in soils than the perfluorocarboxylic acids. This trend is reflected in **Graph A**.

The shorter chain perfluorocarboxylic acids were detected in the groundwater samples, while the longer chain compounds were not. No other trends were apparent in analyzing the groundwater data. The

groundwater data is presented in **Graph B, *Fridley Groundwater Samples, PFC Concentrations*** included in **Appendix B**.



LEGEND:

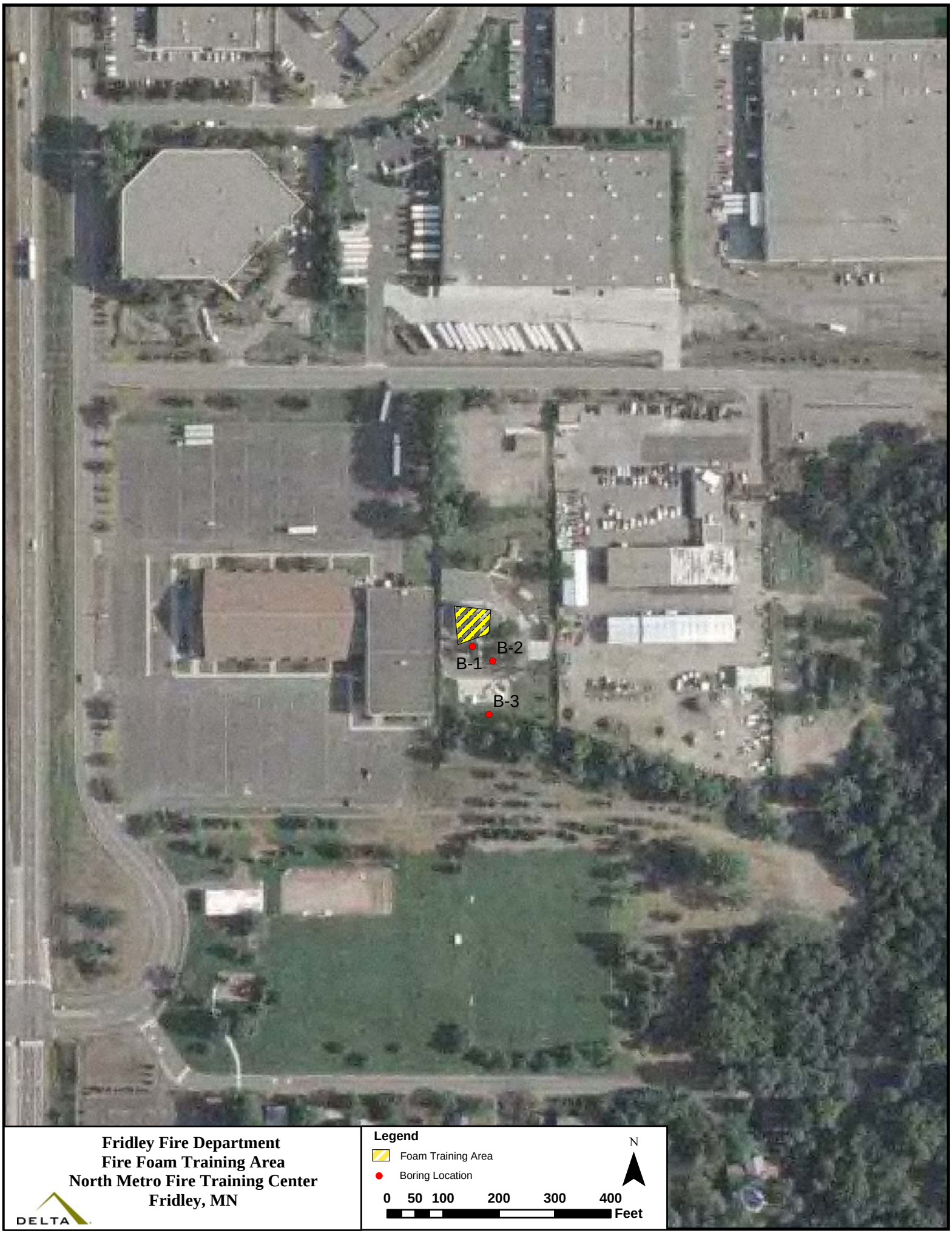
- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
NORTH METRO FIRE TRAINING CENTER
FRIDLEY, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
6/5/09		Fridley-1

DELTA



Fridley Fire Department
Fire Foam Training Area
North Metro Fire Training Center
Fridley, MN

DELTA

North Metro Fire Training Center
300 71st Avenue, Fridley
Fridley Fire Department Fire Foam Training Area
May 2009

Photograph 1
The fire tower/building is (approximately) situated over a historical burn pit, where Class B foam was sprayed in fire training exercises. The temporary well casing in the foreground marks the location of boring B-2. View facing northwest.

Photograph 2
The wooden stake off of the southwest corner of the fire tower/building marks the location of soil boring B-1.

North Metro Fire Training Center
300 71st Avenue, Fridley
Fridley Fire Department Fire Foam Training Area
May 2009

Photograph 3
A wetland is located south of a concrete pad on the south side of the fire tower/building. A sediment sample (B-3) was collected from the north edge of the wetland. View facing south.

Photograph 4
The north side of fire training building, view facing southeast.

DELTA

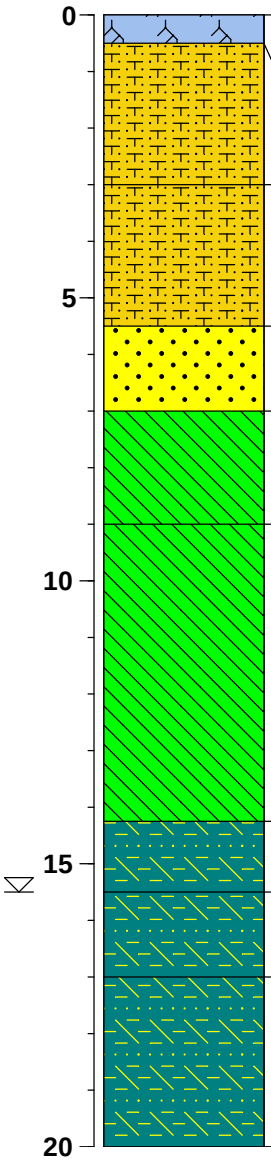
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **20'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Fridley, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL03**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **Partly Cloudy**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/27/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **15.5'**	Field Screening Instrument: **None**



DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 0.50) TOPSOIL: Grass and topsoil. Top 5' hand augered.	PT		NA
		(0.50, 3.00) SILTY SAND: Brown silty sand, dry.	SM	Composite Sample from 0' - 4'.	
5		(3.00, 5.50) SILTY SAND: Light brown silty sand, moist.	SM		
		(5.50, 7.00) SAND: Brown medium sand, moist.	SW	Composite Sample from 4' - 8'.	
		(7.00, 9.00) CLAY: Gray clay, soft, moist.	CH		
10		(9.00, 14.25) CLAY: Dark gray clay, medium-stifff.	CL		
15		(14.25, 15.50) SANDY CLAY: Gray sandy clay, moist.	CL		
⧖		(15.50, 17.00) SANDY CLAY: Gray sandy clay, very moist to wet.	CL		
		(17.00, 20.00) SANDY CLAY: Gray sandy clay, stiff, slightly moist.	CL	Water Sample from 15' - 20'.	
20					

Comments: E.O.B. at 20'.

Boring Location: 45 05.728' N / 93 15.621' W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **18'**

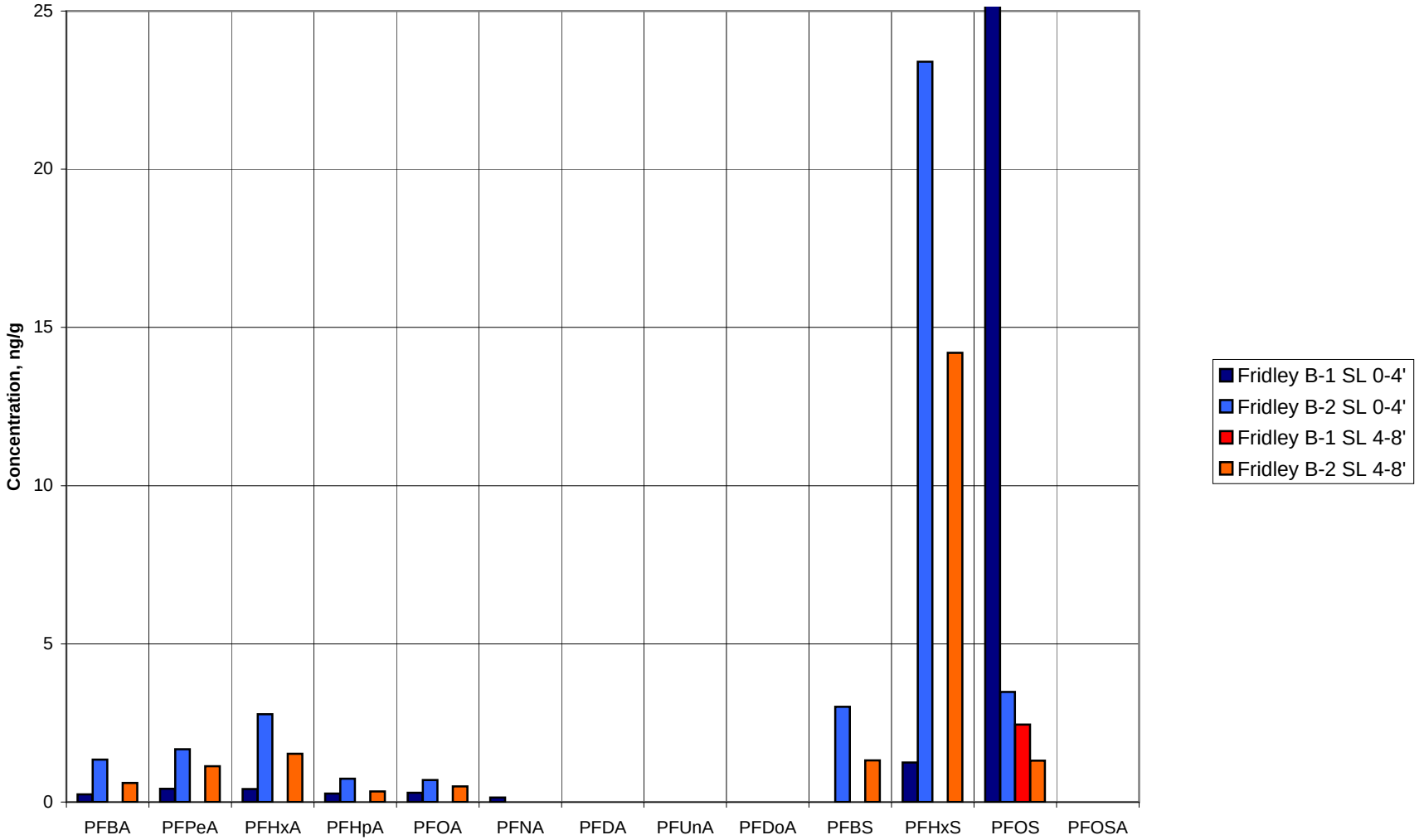
PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Fridley, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL03**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **Partly Cloudy**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/27/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **15.75'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass and topsoil. Top 5' hand augered.	PT		NA
		(1.00, 2.00) SILTY SAND: Brown silty sand, dry.	SM		
		(2.00, 3.50) SAND: Light brown sand, moist.	SW	Composite Sample from 0' - 4'.	
		(3.50, 5.00) SILTY SAND: Light brown silty sand, moist.	SM		
5		(5.00, 6.00) SILTY SAND: Light brown silty sand and clay, moist.	SC		
		(6.00, 8.00) CLAY: Light brown clay, moist, semi-stiff.	CL	Composite Sample from 4' - 8'.	
		(8.00, 9.50) CLAY: Light brown clay, semi-stiff.	CL		
10		(9.50, 15.00) CLAY: Light brown clay, soft, moist.	CL		
15		(15.00, 17.00) SANDY CLAY: Brown sandy clay, moist, wet at 15.75'.	CL	Water Sample from 13' - 18'.	
⧖		(17.00, 18.00) SANDY CLAY: Dark gray sandy clay, stiff.	CL		

Comments: E.O.B. at 18'.

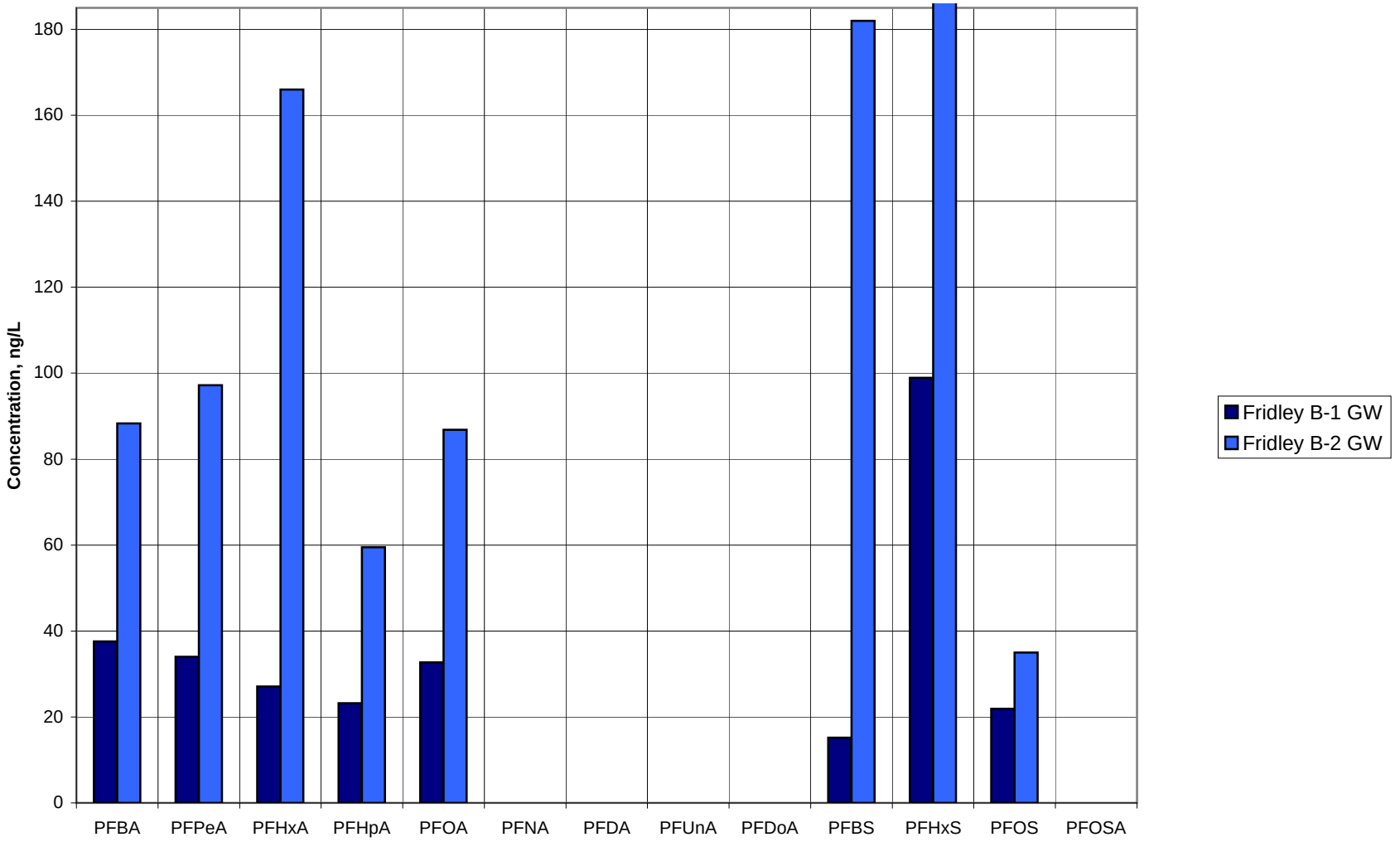
Boring Location: 45 05.724' N / 93 15.612' W

GRAPH A
Fridley Soil Samples
Soil Depth vs. PFC Concentrations



Note: PFOS concentration for Fridley B-1 SL 0-4' is 43 ng/g.

GRAPH B
Fridley Groundwater Samples
PFC Concentrations



Note: PFHxS concentration for Fridley B-2 GW is 1330 ng/L.

APPENDIX C

Kenyon Fire Foam Training Area Discussion and Supporting Documents

Background – Kenyon Fire Foam Training Area

The former Kenyon Fire Department Fire Chief completed a firefighting foam use questionnaire via a telephone interview in September 2008, indicating the department's use of a variety of Class B firefighting foams in training exercises, including 3M-brand AFFF. The Fire Chief indicated that less than five gallons of foam is used per training event. A copy of the questionnaire was included in Appendix H of Delta's June 2009 Report.

The former Fire Chief indicated on the questionnaire that they train with foam approximately every other year at the fire station. In a follow-up telephone conversation with the current Fire Chief, he stated that the foam training is actually conducted on Slee Street, between Cross and Pine Streets at the east end of town. The current fire chief has been with the department for twenty years. The location of the fire training area on Slee Street is shown on **Figure 1, *Fire Foam Training Area Location, Kenyon***, included in **Appendix C**. Slee Street is asphalt-paved, with a slight grade to the north. The Kenyon Fire Chief indicated that some foam may run over the street into the grassy right-of-way along the street. The last time the department trained with firefighting foam was approximately five years ago. Photographs of the training area are included in **Appendix C**.

An access agreement was signed by the Kenyon City Administrator, the Kenyon Mayor, and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area. A copy of the access agreement was included in Appendix H of Delta's June 2009 Report.

As presented in the April 2009 report, the inferred groundwater flow direction in the area of the Kenyon Fire Department's fire foam training area is to the north.

Sample Collection – Kenyon Fire Foam Training Area

On May 15, 2009, two soil borings were advanced in the grassy right-of-way within two to three feet of the east edge of Slee Street. Soil boring locations are shown on the figure ***Kenyon Fire Department Fire Training Area*** included in **Appendix C**. Soil borings were advanced by Glacier Inc. using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, boring depths, and the GPS locations of the borings are included in **Appendix C**.

Borings B-1 and B-2 were advanced to depths of 20 feet and 15 feet below grade surface (bgs), respectively. Soils encountered in both borings consisted of varying layers of silty sand, silty clay and sandy silt to an approximate depth of 15 feet bgs, where weathered shale bedrock was encountered.

Boring B-2 was advanced five feet into the weathered bedrock; groundwater was not encountered in either boring. Upon completion of soil sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

Soils samples were collected from both borings from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD. A second set of soil samples were also submitted to MPI Research for laboratory analysis of PFCs, for laboratory comparison purposes.

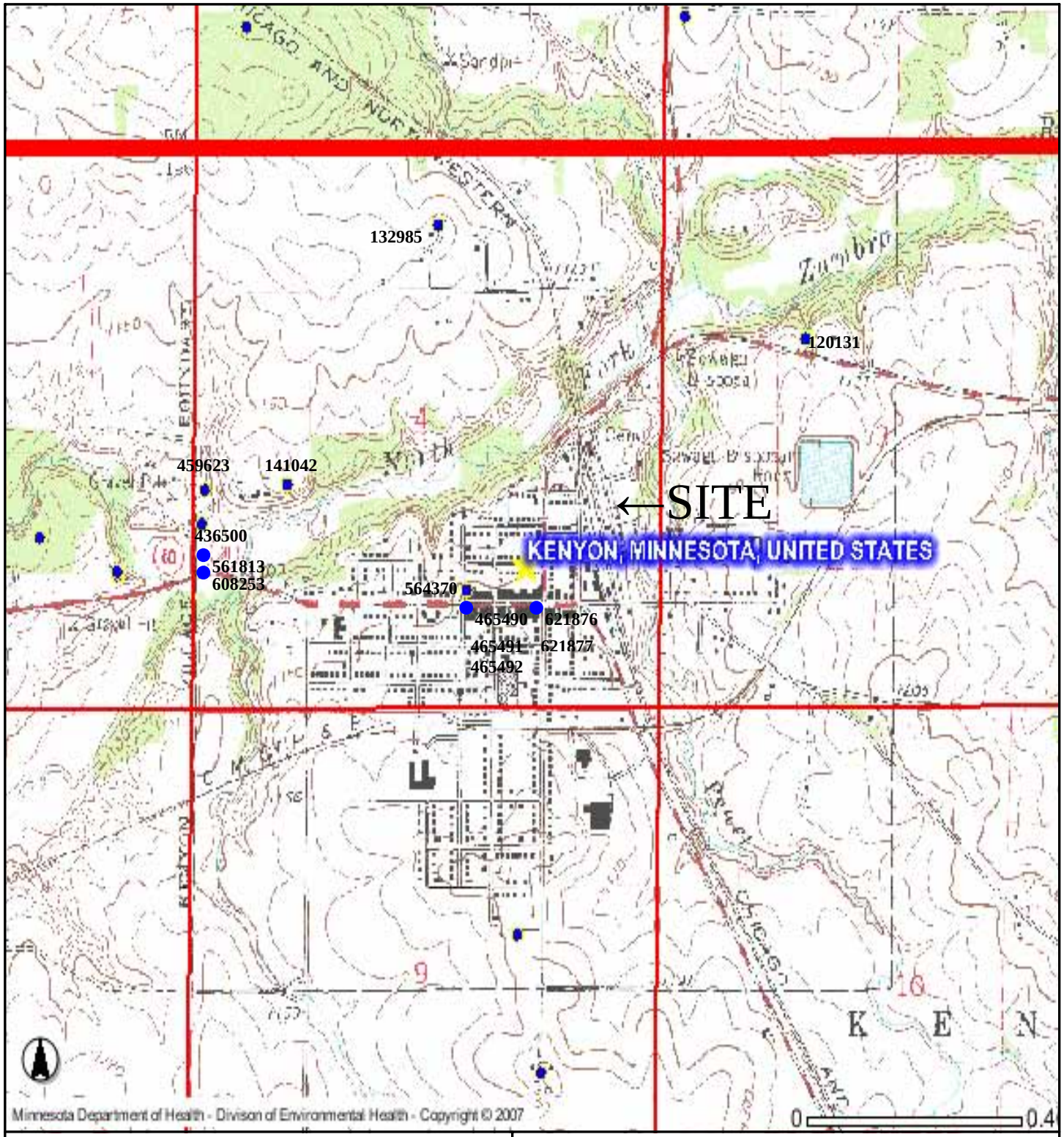
Sampling Results – Kenyon Fire Foam Training Area

Laboratory analysis detected only one PFC compound in only one soil sample: 0.111 nanograms per gram (ng/g) PFHpA were detected in the soil sample collected from B-1 from a depth of 0-4 feet bgs. Ng/g is is equivalent to parts-per-billion. No other PFC compounds were detected in any of the Kenyon soil samples. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Discussion and Conclusion – Kenyon Fire Foam Training Area

Based on information provided by the Kenyon Fire Department Fire Chief, the Kenyon Fire Department trains in Slee Street approximately every other year with a variety of Class B firefighting foams including 3M-brand AFFF. Less than five gallons of foam is used per training event. While Slee Street is asphalt-paved, the Kenyon Fire Chief indicated that some spent foam may run onto the grassy right-of-way along Slee Street. The last time the department trained with firefighting foam was approximately five years ago.

The only PFC compound detected in any of the soil samples collected from the Kenyon fire foam training area was 0.111 ng/g PFHpA detected in the 0-4 foot sample collected from B-1. There are currently no soil or groundwater health risk values associated with PFHpA.



LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
SLEE STREET
KENYON, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		Kenyon-1

DELTA

Kenyon Fire Department
Fire Training Area
Slee Street
Kenyon, MN

DELTA

Slee Street, Kenyon, MN

Kenyon Fire Department Fire Foam Training Area
April 29, 2009

Photograph 1
Fire foam was sprayed on the east (left) side of the Slee Street, between Cross and and Pine Streets. View from north of the training area facing south.

Photograph 2
View of the same training area along the east (right) side of Slee Street, from the south facing north.

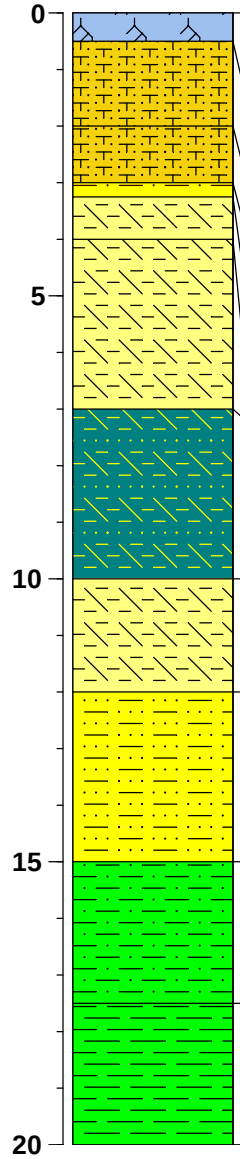
DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **20'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Kenyon, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL04**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Kyle Von Spreecken**	Method of Drilling: **Direct Push Probe**
Weather: **Sunny**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/15/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **Dry**	Field Screening Instrument: **None**



DEPTH	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0	(0.00, 0.50) TOPSOIL: Grass and black topsoil. Top 5 ft hand augered.	PT SM		NA
	(0.50, 2.00) SILTY SAND: Dark brown silty sand, trace of gravel <1/2", moist.	SM	Composite Sample from 0' - 4'.	
	(2.00, 3.00) SILTY SAND: Brown silty sand and gravel, moist.	ML CL		
	(3.00, 3.25) SILT: Dark brown/black silt, trace of clay, moist.			
5	(3.25, 4.00) SILTY CLAY: Light brown silty clay, trace of sand, moist.	CL		
	(4.00, 7.00) SILTY CLAY: Brown silty clay, trace of sand, moist.		Composite Sample from 4' - 8'.	
	(7.00, 10.00) SANDY CLAY: Light brown sandy clay, moist/soft.	CL		
10	(10.00, 12.00) SILTY CLAY: Light brown/rust silty clay, wet	CL		
	(12.00, 15.00) SANDY SILT: Light brown sandy silt, trace of clay, moist to dry.	SM		
15	(15.00, 17.50) SILTACEOUS SHALE: Light brown/gray silt, some weathered bedrock (shale), dry.	ML		
	(17.50, 20.00) SHALE: Gray, weathered bedrock, trace of silt, dry, crumbly.			
20				

Comments: E.O.B. and refusal at 20'.

Boring Location: 44 16.481' N / 92 58.952' W

DELTA

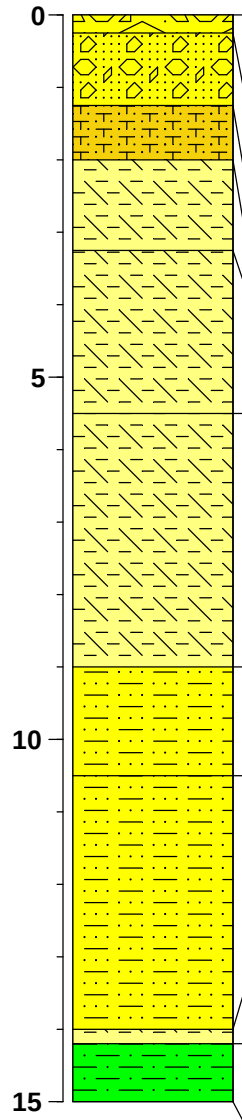
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **15'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier Drilling**
Site Location: **Kenyon, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL04**	Rig Type: **Remote Controlled Track Geoprobe**
Logged By: **Kyle Von Spreecken**	Method of Drilling: **Direct Push Probe**
Weather: **Sunny**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/15/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **Dry**	Field Screening Instrument: **None**



DEPTH	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0	(0.00, 0.25) FILL: Light brown sand and gravel fill. Top 5 ft hand augered.	SW		NA
	(0.25, 1.25) SAND AND GRAVEL: Brown sand and gravel, dry/moist.	SM		
	(1.25, 2.00) SILTY SAND: Dark brown silty sand, moist.	CL	Composite Sample from 0' - 4'.	
	(2.00, 3.25) SILTY CLAY: Black silty clay, moist.	CL		
	(3.25, 5.50) SILTY CLAY: Brown silty clay, moist.			
5	(5.50, 9.00) SILTY CLAY: Light brown silty clay, moist/soft.	CL	Composite Sample from 4' - 8'.	
10	(9.00, 10.50) SANDY SILT: Light brown/rust sandy silt, dry to moist, hard.	SM		
	(10.50, 14.00) SANDY SILT: Light brown/gray sandy silt, trace of gravel < 1/2", dry/moist.	SM		
	(14.00, 14.20) SILTY CLAY: Brown silty clay, moist.	CL		
15	(14.20, 15.00) SILTACEOUS SHALE: Ligth brown/gray silt and weathered bedrock (shale), dry, hard.	ML		

Comments: E.O.B. and refusal at 15'.

Boring Location: 44 16.498' N / 92 58.958' W

APPENDIX D

Luverne Fire Foam Training Area Discussion and Supporting Documents

Background – Luverne Fire Foam Training Area

The former Luverne Fire Department Fire Chief completed a firefighting foam use questionnaire via a telephone interview in September 2008, indicating the department's occasional use of AR-AFFF for training at a tree/brush dump situated one-half mile south of town, on the east side of Highway 75. A copy of the questionnaire was included in Appendix I of Delta's June 2009 Report. The location of the fire foam training area is shown on **Figure 1, *Fire Foam Training Area Location, Luverne***, included in **Appendix D**. The former Fire Chief was unsure of the AR-AFFF foam brand. In a follow-up conversation with the current Luverne Fire Chief, he indicated that the training with AR-AFFF at the tree/brush dump was a one-time event that occurred in approximately 2005, and that a burn pan was used for the training fire. The burn pan was placed toward the east end of an unpaved driveway leading to the brush/tree pile, on the south side of the driveway. The site is relatively flat, with a slight downward grade from the area where the burn pan was used toward a south-adjoining pond. The pond is located approximately 150 feet south of the area where the burn pan was placed. Photographs of the training area are included in **Appendix D**.

An access agreement was signed by the current Luverne Fire Chief and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area. A copy of the access agreement was included in appendix I of Delta's June 2009 Report.

As presented in the April 2009 report, the inferred groundwater flow direction in the area of the fire foam training area is easterly in the surficial deposits aquifer, and southerly in the uppermost bedrock aquifer. A municipal well labeled "Well 2A" was observed on the northeast corner of the tree/brush dump, approximately 325 feet northeast of the spot where the burn pan was situated during the foam training exercise. While this well was labeled 2A, a map provided by the Minnesota Department of Health indicates this is municipal well 23. A residential well was also observed on the north-adjoining property.

Sample Collection – Luverne Fire Foam Training Area

On May 22, 2009, three soil borings were advanced at the Luverne tree/brush dump. Soil boring locations are shown on the figure ***Luverne Fire Department Fire Foam Training Area*** included in **Appendix D**. Soil borings were advanced by West Central Environmental Consultants using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, groundwater depths, boring depths, and the GPS locations of the borings are included in **Appendix D**.

Boring B-2 was located at the approximate spot where the burn pan was situated and was advanced to a depth of 12 feet below the ground surface (bgs). Soils in B-2 consisted of one foot of topsoil and sandy clay to a depth of 4 feet bgs, over gravelly sand; groundwater was encountered at a depth of 9 feet bgs. B-1 and B-3 were located to the north and south of B-2, respectively. B-1 was advanced to a depth of 8 feet bgs, and B-3 was advanced to a depth of 12 feet bgs. Soils in B-1 and B-3 consisted of varying depths of topsoil and sandy clay over gravelly sand; groundwater in borings B-1 and B-3 was encountered at depths of 7 feet and 10 feet bgs, respectively. Upon completion of groundwater sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

Soil samples were collected from all three borings from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis. The soil and groundwater samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD. A second set of soil and groundwater samples were also submitted to MPI Research for laboratory analysis of PFCs, for laboratory comparison purposes.

Sampling Results – Luverne Fire Foam Training Area

Laboratory analysis of soil samples detected only one PFC compound in only one soil sample: 0.481 nanograms per gram (ng/g) PFOS were detected in the soil sample collected from B-2 from a depth of 0-4 feet bgs. Ng/g is equivalent to parts-per-billion. No other PFC compounds were detected in any of the Luverne soil samples. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report for soil and groundwater samples, with the chain-of-custody record, is included in **Appendix R**.

Laboratory analysis of groundwater samples detected PFC compound concentrations all three groundwater samples collected from the Luverne fire foam training area, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*.**

Groundwater Sample PFC Detections – Luverne Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-1	18.1 ng/L PFOS
B-2	2.73 ng/L PFOA
	25.1 ng/L PFHxS
	18.4 ng/L PFOS

Groundwater Sample PFC Detections – Luverne Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-3	3.99 ng/L PFPeA
	11.3 ng/L PFHxA
	3.39 ng/L PFOA
	28.8 ng/L PFHxS
	20.1 ng/L PFOS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Luverne Fire Foam Training Area

Based on information provided by the current and former Luverne Fire Department Fire Chiefs, Class B foam was used in training on one occasion, in 2005, at the municipal tree/brush dump. Municipal well 23 is located on the northeast corner of the tree/brush dump, approximately 325 feet northeast of the spot where the burn pan was situated during the 2005 foam training exercise.

The only PFC compound detected in any of the soil samples collected at the municipal tree/brush dump was 0.481 ng/g PFOS detected in the 0-4 foot sample collected from B-2. The MPCA has defined soil Tier 1 Residential Soil Reference Value (SRV) for PFOS of 2100 ng/g, a Tier 2 Recreational SRV of 2600 ng/g, and a Tier 2 Industrial SRV of 14000 ng/g for PFOS. The detected PFOS concentration in the Luverne B-2, 0-4 foot sample did not meet or exceed any of the MPCA SRVs.

PFC compounds were detected in all three groundwater samples collected at the Luverne site. The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values.

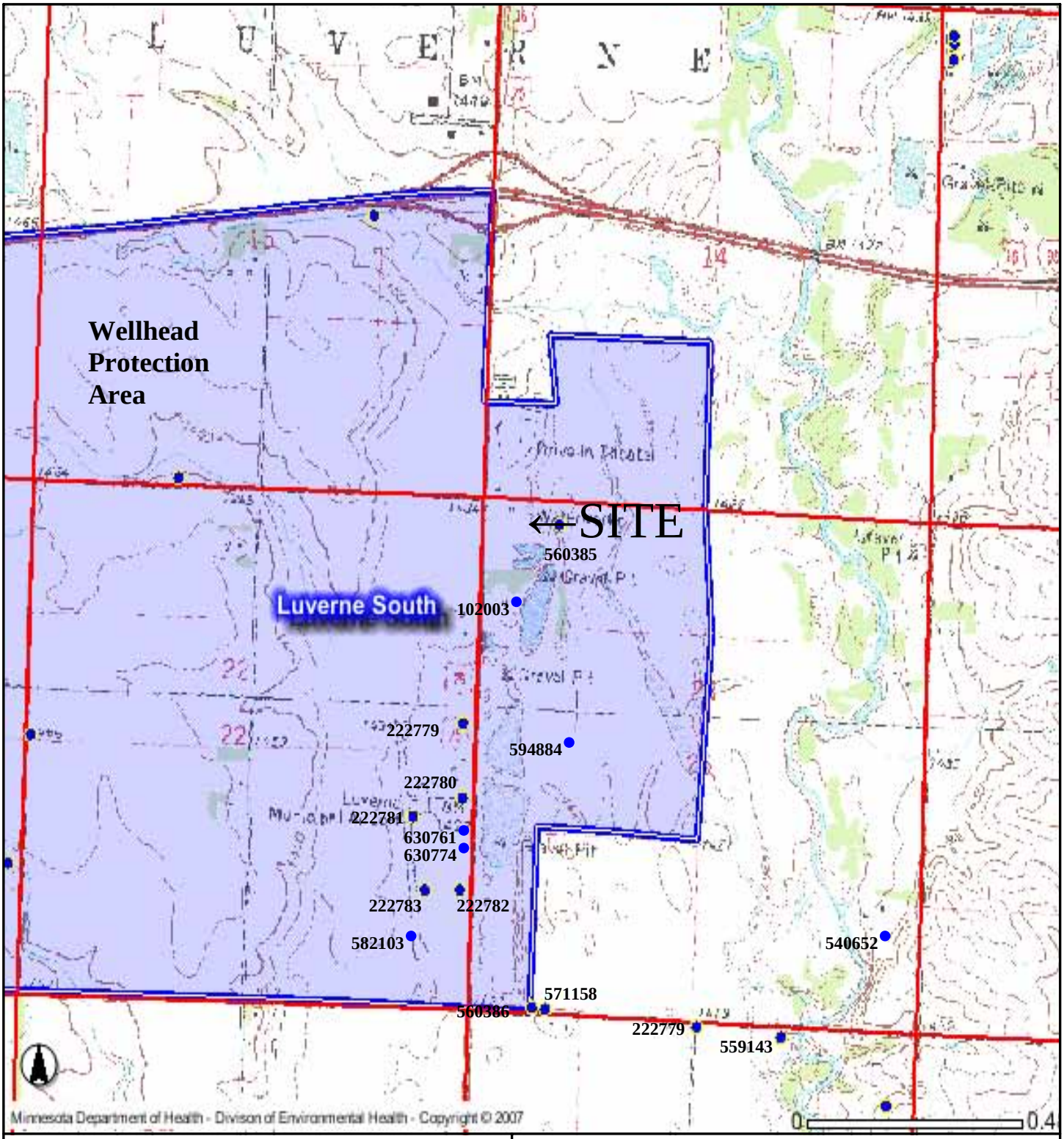
The detected PFC concentrations in the Luverne groundwater samples did not meet or exceed the HRLs for PFOS or PFOA nor the HBVs for PFBA or PFBS.

The following observations were noted in analyzing PFC laboratory data:

- The perfluorosulfonates (PFHxS, and PFOS) were detected at higher concentrations in groundwater than the perfluorocarboxylic acids. This trend is reflected in **Graph A, *Luverne***

Groundwater Samples, PFC Concentrations. The highest concentrations were of PFHxS, a six-chain fluorinated carbon compound.

- The lack of PFCs in the soil samples (except PFOS in the B-2 soil sample), and the presence of PFCs in the groundwater samples may be indicative of another source of PFCs in the groundwater.



LEGEND:

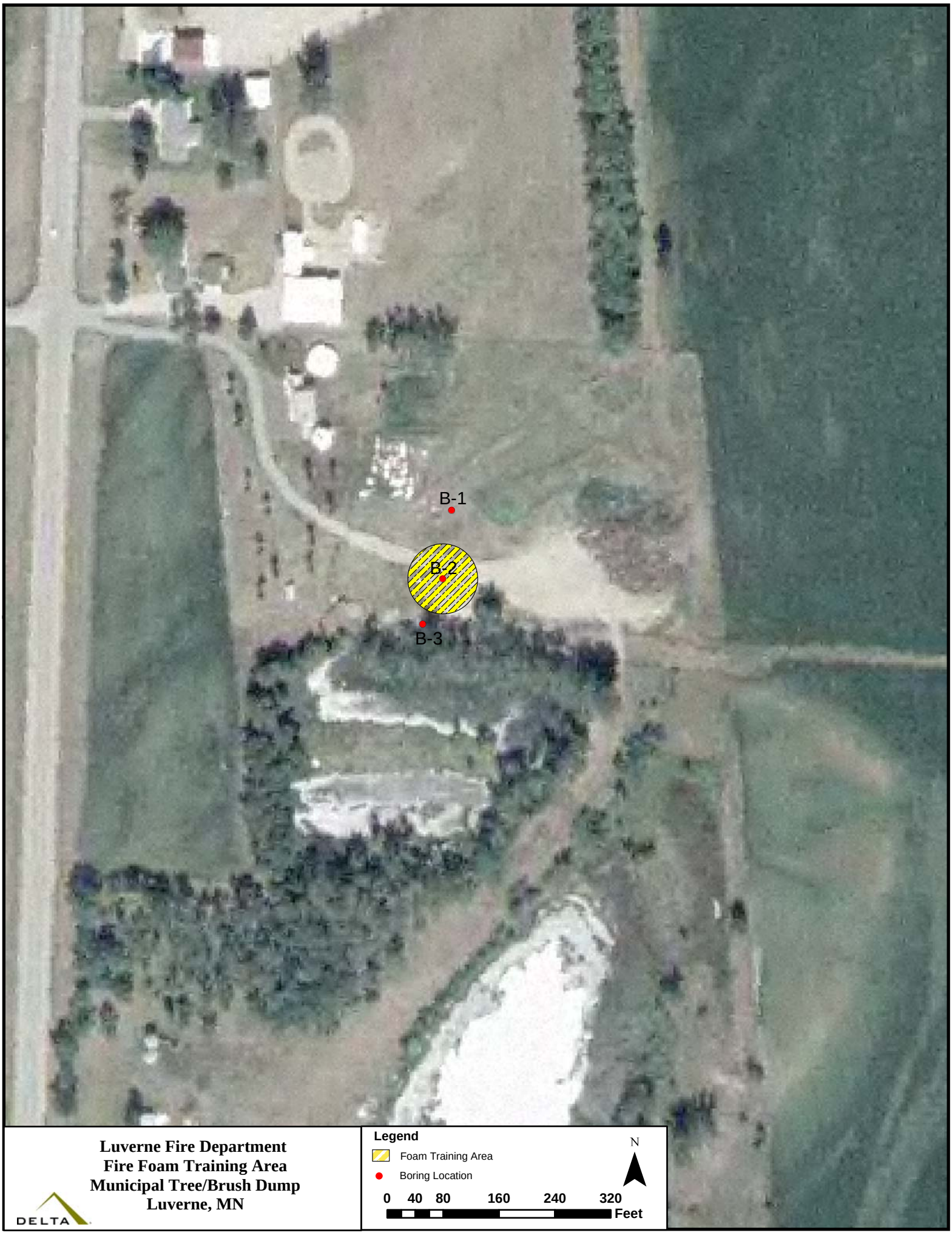
- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
LUVERNE MUNICIPAL TREE/BRUSH DUMP
LUVERNE, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		Luverne-1

DELTA



Luverne Fire Department
Fire Foam Training Area
Municipal Tree/Brush Dump
Luverne, MN

DELTA

Legend

Foam Training Area

Boring Location

N

0 40 80 160 240 320

Feet

Tree/Brush Dump, Luverne, MN

Luverne Fire Department Fire Foam Training Area
May 21, 2009

Photograph 1
Location of soil boring B-1, view facing east toward the tree/brush pile. B-1 was placed between the spot where the burn pan was situated and a nearby municipal well.

Photograph 2
Location of soil boring B-2, view facing northeast toward the tree/brush pile. B-2 was placed at the (approximate) spot where the burn pan was situated during the 2005 fire foam training event.

Photograph 3
Soil boring B-3 was located between B-2 and the south-adjoining pond, view facing east.

Photograph 4
Boring B-2 is in the foreground and B-3 is near the tree line. View facing south.

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **West Central Environmental Consultants**
Site Location: **Luverne, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Cheryl Sorensen**	Method of Drilling: **Direct Push Probe**
Weather: **60 degrees. Cloudy**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/22/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **7'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass and black/dark brown topsoil, moist. Top 5 ft hand augered.	PT		NA
		(1.00, 4.00) GRAVEL AND SAND: Light brown gravelly sand fine to very coarse, rounded to well rounded gravel, moist.	SW	Composite Sample from 0' - 4'.	
5		(4.00, 8.00) GRAVEL AND SAND: Same as above, wet at 7'.	SW	Composite Sample from 4' - 8'.	
⧖				Water Sample from 3' - 8'.	

Comments: E.O.B. at 8'.

Boring Location: 43 37.812' N / 96 12.652' W

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **12'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **West Central Environmental Consultants**
Site Location: **Luverne, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Cheryl Sorensen**	Method of Drilling: **Direct Push Probe**
Weather: **60 degrees. Cloudy**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/22/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **9'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 3.00) TOPSOIL: Gravel and dark brown/black topsoil, moist. Top 5 ft hand augered.	PT	Composite Sample from 0' - 4'.	NA
		(3.00, 4.00) SANDY CLAY: Light brown sandy clay, soft, plastic, moist.	CL		
5		(4.00, 8.00) GRAVEL AND SAND: Light brown gravelly sand, rounded fine to medium gravel, very fine to very coarse sand, moist.	SW	Composite Sample from 4' - 8'.	
⧖		(8.00, 12.00) GRAVEL AND SAND: As above. Wet at 9'. Dark brown at 11.75'.	SW		
10				Water Sample from 7' - 12'.	

Comments: E.O.B. at 12'.

Boring Location: 43 37.796' N / 96 12.654' W

DELTA

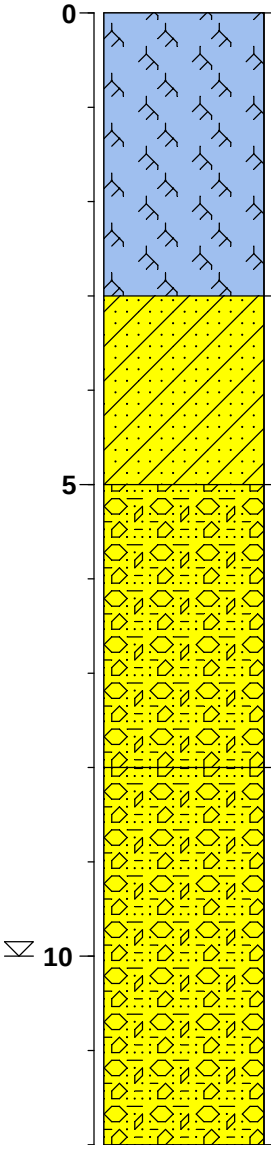
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-3**

TOTAL DEPTH: **12'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **West Central Environmental Consultants**
Site Location: **Luverne, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Cheryl Sorensen**	Method of Drilling: **Direct Push Probe**
Weather: **60 degrees. Cloudy**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/22/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **10'**	Field Screening Instrument: **None**

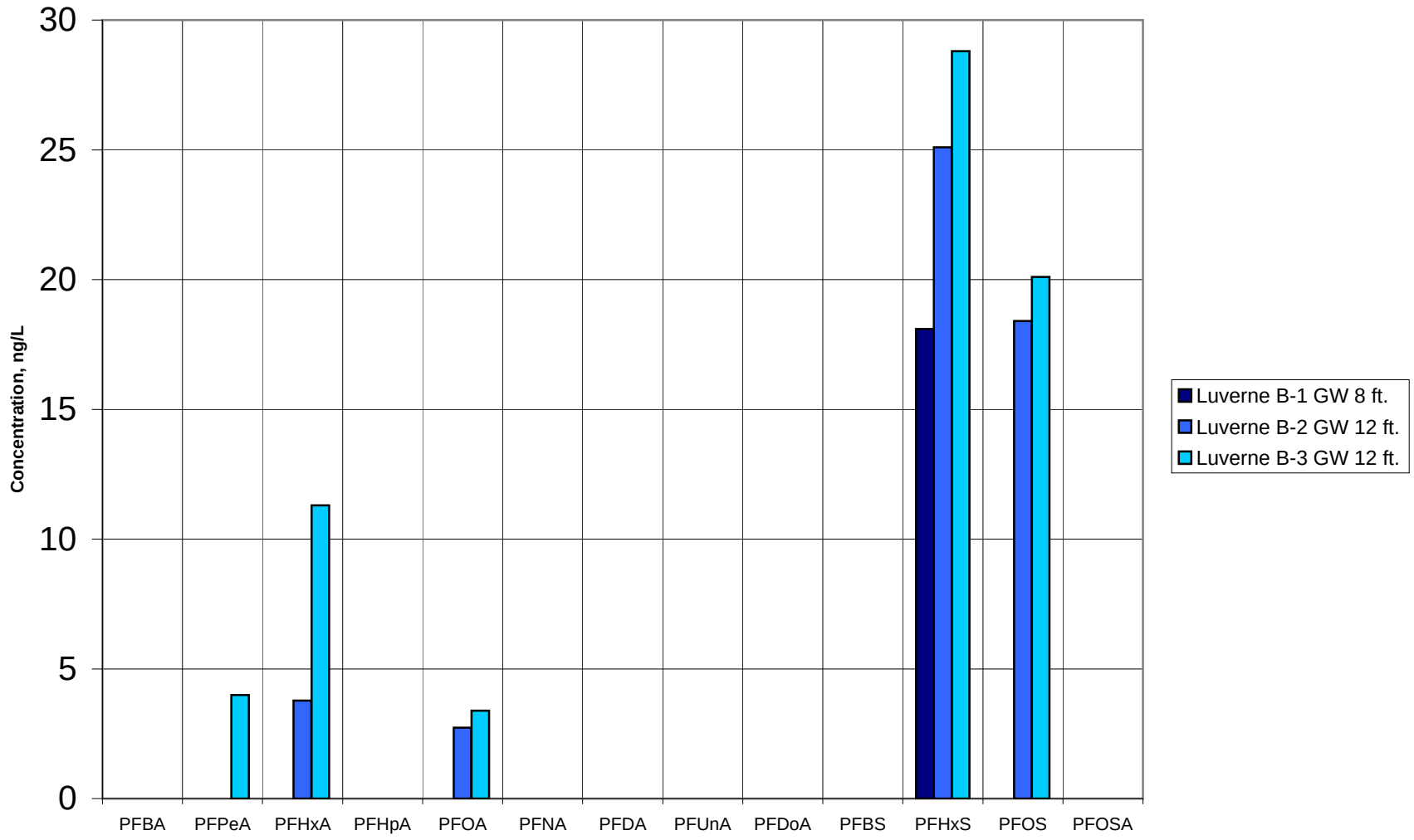


DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 3.00) TOPSOIL: Grass, dark brown/black topsoil, roots, moist. Top 5 ft hand augered.	PT	Composite Sample from 0' - 4'.	NA
		(3.00, 5.00) CLAYEY SAND: Light brown/light gray clayey sand and silt, moist.	SC		
5		(5.00, 8.00) GRAVEL AND SAND: Light brown gravelly sand, rounded to well rounded sand and gravel, moist.	SW	Composite Sample from 4' - 8'.	
		(8.00, 12.00) GRAVEL AND SAND: As above. Wet at 10'.	SW		
⧖ 10				Water Sample from 7' - 12'.	

Comments: E.O.B. at 12'.

Boring Location: 43 37.785' N / 96 12.660' W

GRAPH A
Luverne Groundwater Samples
PFC Concentrations



APPENDIX E

Rochester Fire Foam Training Area Discussion and Supporting Documents

Background and Access – Rochester Fire Foam Training Area

The Rochester Fire Department Deputy Fire Chief submitted a completed firefighting foam use questionnaire to Delta in April 2008, indicating the department's use of 3M-brand AFFF for annual training. A copy of the questionnaire was included in Appendix L of Delta's June 2009 Report. Follow-up conversations with the Rochester Deputy Fire Chief revealed that the training location address listed on the questionnaire was where Class A foam is used in training; the department trained in the past with Class B AFFF at the Olmsted County Fairgrounds in Rochester, in a parking lot located adjacent northeast of the fairground grandstand. The location of the fire foam training area is shown on **Figure 1, *Fire Foam Training Area Location, Rochester***, included in **Appendix E**. The Rochester Fire Department last trained with Class B foam about seven or eight years ago. Five gallons or less of foam concentrate was used per annual training event. The fire foam training area is relatively flat, with no obvious surface runoff direction. Photographs of the training area are included in **Appendix E**.

The fairground property is owned by Olmsted County. An access agreement signed by the Olmsted County Administrator and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area, was included in Appendix L of Delta's June 2009 Report.

As presented in Delta's April 2009 report, the inferred groundwater flow direction in the area of the fire foam training area is to the north-northwest.

Sample Collection – Rochester Fire Foam Training Area

On May 28, 2009, two soil borings were advanced within the fire foam training area at the Olmsted County Fairgrounds. Soil boring locations are shown on the figure ***Rochester Fire Department Fire Foam Training Area*** included in **Appendix E**. Soil borings were advanced by West Central Environmental Consultants using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, boring depths, and the GPS locations of the borings are included in **Appendix E**.

Borings B-1 and B-2 were advanced to depths of 15 feet and 14.75 feet below grade surface (bgs), respectively. Soils encountered in both borings consisted of fill over a two-foot layer of black silt, underlain by sand with minor gravel to the bottom of the borings, where sandstone bedrock was encountered. Wet sand was encountered in B-1 from 14.5 to 15 feet bgs, however, an insufficient volume of water was recoverable for sampling. Groundwater was not encountered in B-2. Both borings were sealed in accordance with applicable State requirements.

Soils samples were collected from both borings from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Rochester Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in soil samples collected from the former Rochester fire foam training areas as listed in the table below. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil Sample PFC Detections – Rochester Fire Department former Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-1	0-4 feet	0.207 ng/g PFBA
		0.361 ng/g PFHxS
		0.559 ng/g PFOS
B-2	0-4 feet	0.142 ng/g PFBA
		0.173 ng/g PFHxA
		1.7 ng/g PFHxS
		1.12 ng/g PFOS

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Discussion and Conclusion – Rochester Fire Foam Training Area

Based on information provided by the Rochester Fire Department Deputy Fire Chief, historical training with 3M-brand Class B foam at the Olmsted County fairgrounds ceased in approximately 2001 or 2002. Five gallons or less of foam concentrate were used per annual training event. Several PFC compounds were detected in the shallow soil samples collected from both borings advanced through the former foam training area, but no PFCs were detected in the deep (4 to 8 foot) soil samples.

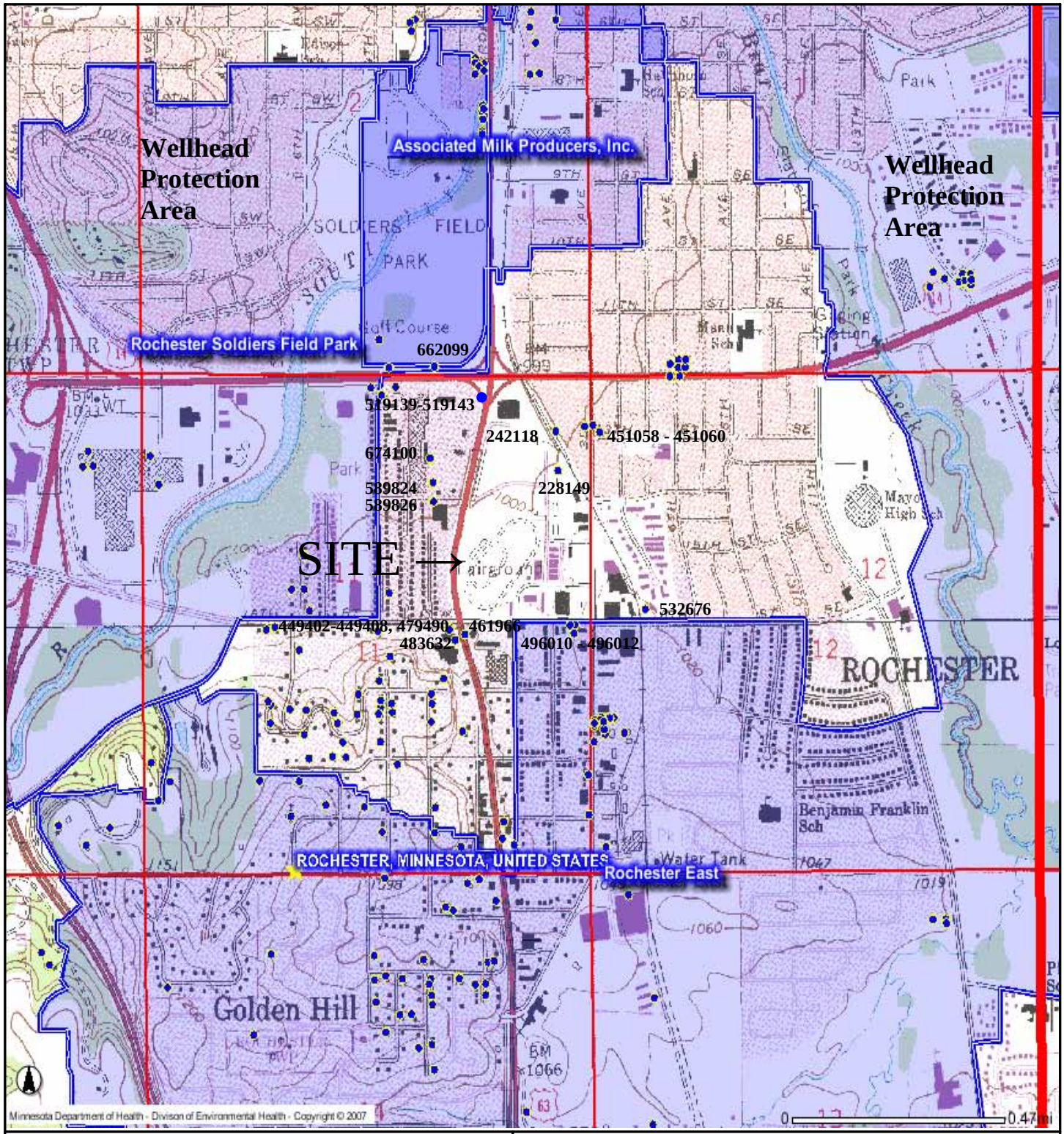
The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

No SRVs have been defined for PFHxS or PHFxA. None of the detected PFOS or PFBA concentrations in the Rochester soil samples met or exceeded any of the MPCA SRVs.

The following observations were noted in analyzing PFC soil laboratory data:

- While all detected PFC concentrations in the shallow soil samples were relatively low, the perfluorosulfonates (PFHxS, and PFOS) were detected at higher concentrations than the perfluorocarboxylic acids (PFBA and PFHxA). This trend is shown in **Graph A, *Rochester Soil Samples, Soil Depth vs. PFC Concentration*** included in **Appendix E**.
- The lack of PFCs in the deeper soils may be due to either the PFCs migrating more readily out of the soil column at depth, or the lack of PFC migration from shallow soils to deeper soils.



LEGEND:

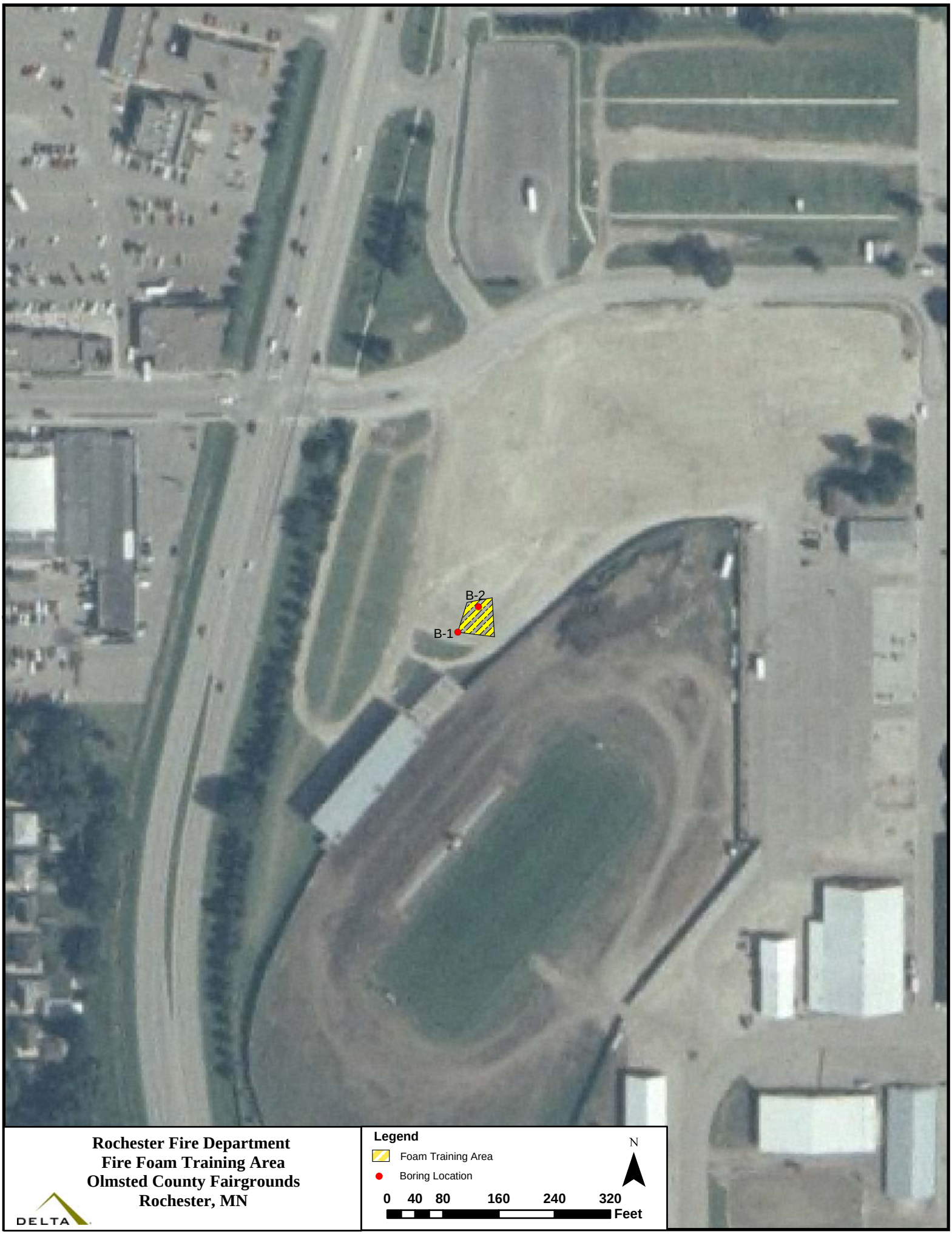
- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
OLMSTED COUNTY FAIRGROUND
ROCHESTER, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		Rochester-1

DELTA



Rochester Fire Department
Fire Foam Training Area
Olmsted County Fairgrounds
Rochester, MN

DELTA

Legend

Foam Training Area

Boring Location

N

0 40 80 160 240 320

Feet

Olmsted County Fairground Parking Lot, Rochester, MN

Rochester Fire Department Fire Foam Training Area
April 29 and May 28, 2009

Photograph 1
Fire foam was sprayed on the gravel parking lot located northeast of the Fairgrounds grandstand. View facing south.

Photograph 2
Soil borings B-1 in the background and B-2 in the foreground.

DELTA

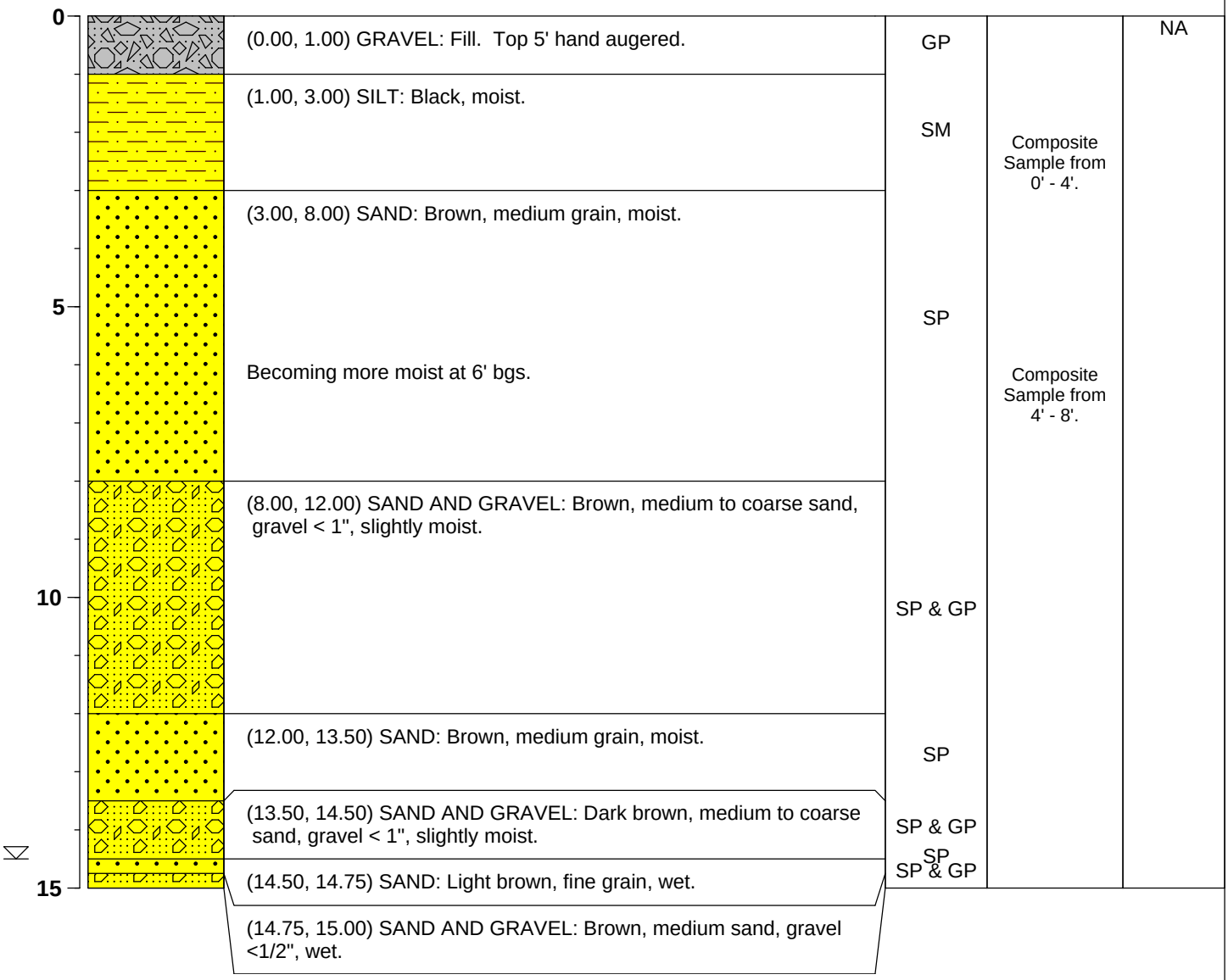
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **15'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **West Central Environmental Consultants**
Site Location: **Rochester, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL03**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/28/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **14.5'**	Field Screening Instrument: **None**



DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) GRAVEL: Fill. Top 5' hand augered.	GP		NA
		(1.00, 3.00) SILT: Black, moist.	SM	Composite Sample from 0' - 4'.	
5		(3.00, 8.00) SAND: Brown, medium grain, moist. Becoming more moist at 6' bgs.	SP	Composite Sample from 4' - 8'.	
10		(8.00, 12.00) SAND AND GRAVEL: Brown, medium to coarse sand, gravel < 1", slightly moist.	SP & GP		
		(12.00, 13.50) SAND: Brown, medium grain, moist.	SP		
		(13.50, 14.50) SAND AND GRAVEL: Dark brown, medium to coarse sand, gravel < 1", slightly moist.	SP & GP		
⧖			SP		
15		(14.50, 14.75) SAND: Light brown, fine grain, wet.	SP & GP		
		(14.75, 15.00) SAND AND GRAVEL: Brown, medium sand, gravel <1/2", wet.			

Comments: E.O.B. at 15' due to refusal. Insufficient water volume for sampling.

Boring Location: 44 00.159' N / 92 27.799' W

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **14.75'**

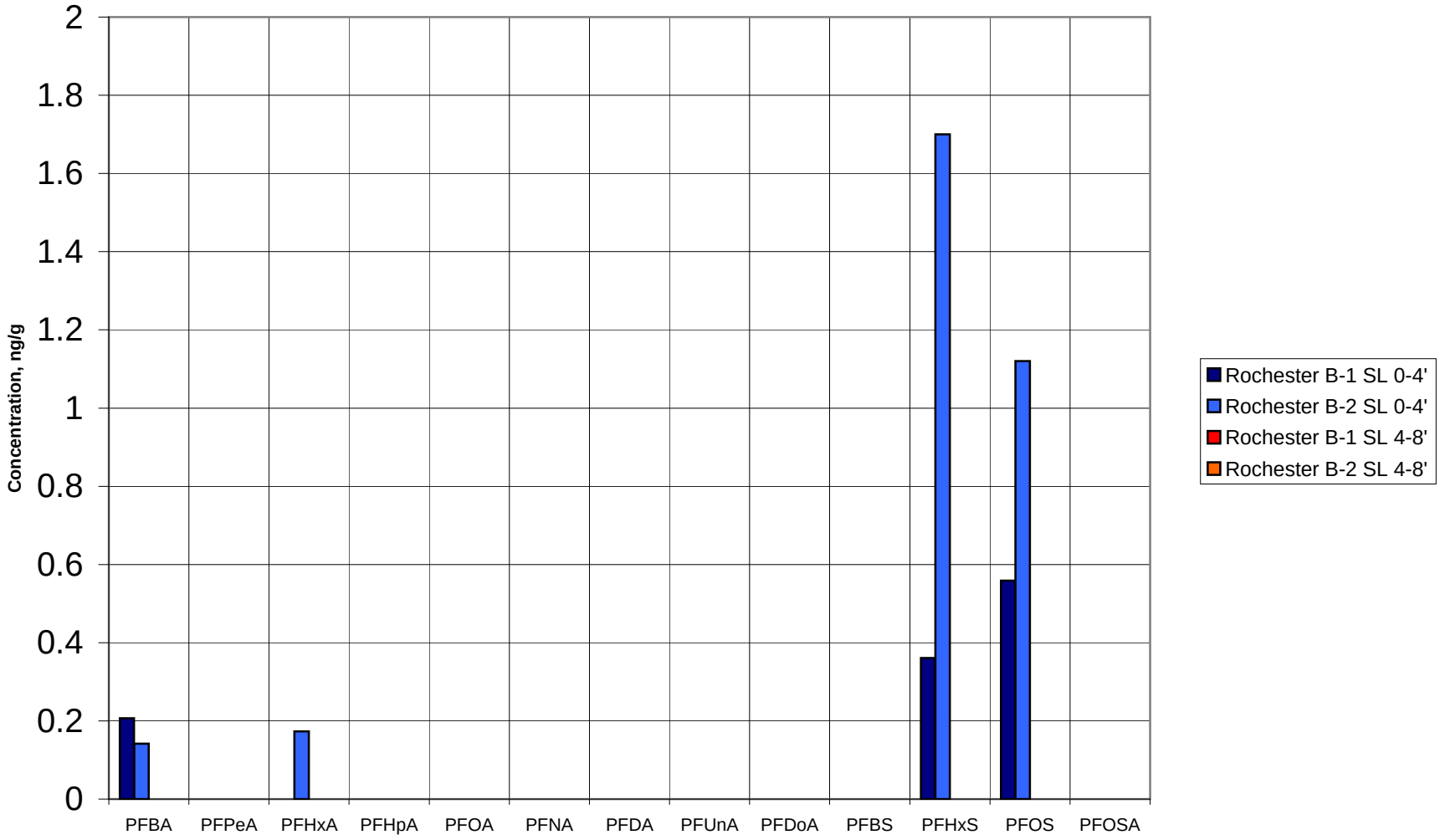
PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **West Central Environmental Consultants**
Site Location: **Rochester, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL03**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **5' samplers with liners**
Date Completed: **5/28/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **Dry**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) GRAVEL: Fill. Top 5ft hand augered.	GP		NA
		(1.00, 3.00) SILT: Black, moist.	SM	Composite Sample from 0' - 4'.	
		(3.00, 14.75) SAND: Brown, medium grain, moist.			
5				Composite Sample from 4' - 8'.	
10			SP		
		@ 13.75' light brown, fine grain, dry.			
		@ 14.75' bedrock/sandstone, dry.			

Comments: E.O.B. at 14.75' due to refusal.

Boring Location: 44 00.165' N / 92 27.792' W

GRAPH A
Rochester Soil Samples
Soil Depth vs. PFC Concentrations



APPENDIX F

Bemidji Fire Foam Training Area Discussion and Supporting Documents

Background and Access – Bemidji Fire Foam Training Area

In May 2008 the Bemidji Fire Chief returned a completed firefighting foam use questionnaire indicating the Bemidji Fire Department's use of approximately five gallons of 3M-brand Class B AFFF in annual training exercises. A copy of the questionnaire was included in Appendix A of Delta's June 2009 Report. The foam training exercises take place at the Bemidji Regional Airport, in a grassy area in front (northeast) of the Bemidji Airport fire department building. Spent foam is collected into the airport's glycol recovery system via several storm sewer grates present in the training area. The storm grates are connected to two 10,000-gallon capacity concrete tanks that are situated beneath the grates. However, it appears that spent foam may also break down at the surface and be absorbed into the soil. The location of the foam training area at the Bemidji Regional Airport is shown on **Figure 1, *Fire Foam Training Area Location, Bemidji***, included in **Appendix F**. Photos of the fire foam training area are also included in **Appendix F**.

An access agreement was signed by the Executive Director of the Bemidji Regional Airport Authority and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area. A copy of the access agreement was included in Appendix A of Delta's June 2009 Report.

Sample Collection – Bemidji Fire Foam Training Area

Prior to sampling at the Bemidji Regional Airport, an air space permit was obtained from the Federal Aviation Administration (FAA) in accordance with Federal Aviation Regulations (FAR) Part 77.13. A copy of the permit "Final Determination" is included in **Appendix F**.

On November 5, 2009, two soil borings were advanced within the fire foam training area at the Bemidji Regional Airport. Soil boring locations are shown on the figure ***Bemidji Fire Department Fire Foam Training Area*** included in **Appendix F**. Soil borings were advanced by Glacier Inc. using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto soil boring logs. Soil boring logs detailing soil descriptions, boring depths, and the GPS locations of the borings are included in **Appendix F**.

Borings B-1 and B-2 were advanced to a depth of 20 feet below grade surface (bgs). Soils encountered in both borings consisted of brown, medium- to large-grained sand. Groundwater was encountered in both borings at an approximate depth of 14.5 to 14.75 feet bgs. No staining, or foul or unusual odors were noted in the soils. Temporary wells with five-foot screens were set to the bottom of the borings for the collection of groundwater samples. Upon completion of groundwater sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

Soil samples were collected from both borings from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis. The soil and groundwater samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Bemidji Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in soil samples collected at the Bemidji fire foam training area as listed in the table below. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil Sample PFC Detections – Bemidji Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-1	0-4 feet	0.216 ng/g PFHxA
		0.118 ng/g PFOA
		3.12 ng/g PFHxS
		55.7 ng/g PFOS
		0.112 ng/g PFOSA
B-1	4-8 feet	0.498 ng/g PFOA
		0.267 ng/g PFBS
		3.98 ng/g PFHxS
		56 ng/g PFOS
B-2	0-4 feet	0.184 ng/g PFBA
		0.322 ng/g PFPeA
		1.44 ng/g PFHxA
		0.143 ng/g PFHpA
		1.31 ng/g PFOA
		0.099 ng/g PFNA
		13.9 ng/g PFHxS
		1200 ng/g PFOS
		18.5 ng/g PFOSA
B-2	4-8 feet	0.411 ng/g PFHxA
		0.917 ng/g PFHpA
		19.6 ng/g PFOA
		0.957 ng/g PFBS

Soil Sample PFC Detections – Bemidji Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
		147 ng/g PFHxS
		606 ng/g PFOS

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Laboratory analysis of groundwater samples detected PFC compound concentrations in both groundwater samples collected from the Bemidji fire foam training area, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*.**

Groundwater Sample PFC Detections – Bemidji Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-1	4.14 ng/L PFBA
	3.85 ng/L PFPeA
	14.5 ng/L PFHxA
	3.75 ng/L PFHpA
	49 ng/L PFOA
	19.1 ng/L PFBS
	227 ng/L PFHxS
	483 ng/L PFOS
B-2	21.1 ng/L PFBA
	55.5 ng/L PFPeA
	340 ng/L PFHxA
	33.8 ng/L PFHpA
	200 ng/L PFOA
	129 ng/L PFBS
	1490 ng/L PFHxS
	789 ng/L PFOS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Bemidji Fire Foam Training Area

Based on information provided by the Bemidji Fire Chief, 3M-brand Class B AFFF is used in annual fire foam training exercises at the Bemidji Regional Airport. Approximately five gallons of foam are used per training event.

Several PFC compounds were detected in the shallow (0-4 feet) and deep (4-8 feet) soil samples collected from B-1 and B-2, which were advanced through the firefighting foam training area. The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFOA	2100 ng/g	2500 ng/g	13000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

None of the detected PFC concentrations in the Bemidji soil samples met or exceeded any of the MPCA SRVs.

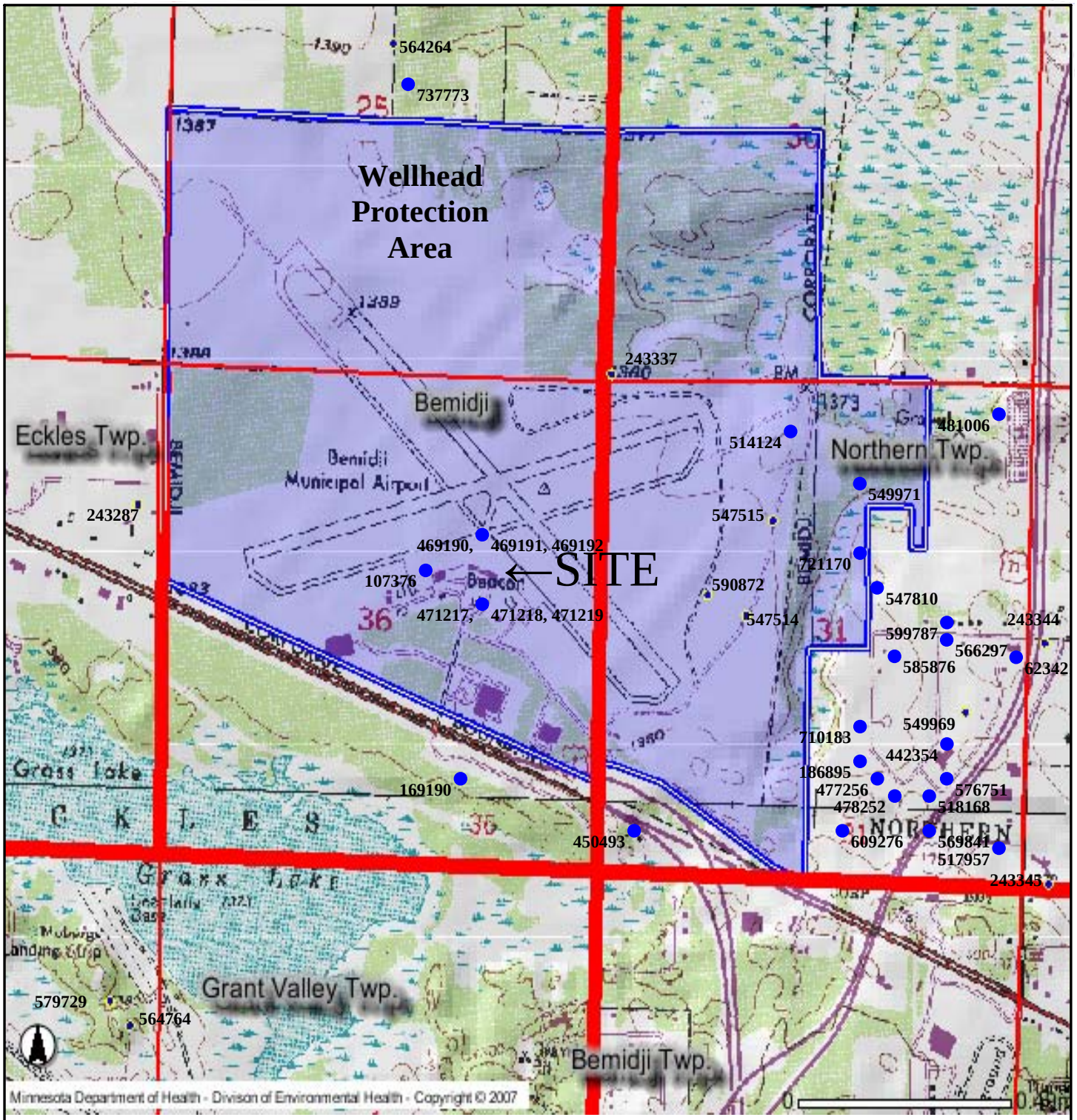
Several PFC compounds were detected in the groundwater samples collected from Bemidji B-1 and B-2, however, they were not necessarily the same compounds that were detected in the corresponding soil samples. The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values.

The PFOS concentrations detected in both the B-1 and B-2 groundwater samples exceeded the HRL for PFOS. Other detected PFC concentrations in the Bemidji groundwater samples did not meet or exceed the HRL for PFOA nor the HBVs for PFBA or PFBS.

The following observations were noted in analyzing PFC laboratory data and sample depths:

- Perfluorosulfonates (PFHxS and PFOS) were detected at significantly higher concentrations than the perfluorocarboxylic acids in both soil and groundwater samples. This trend is reflected in **Graph A, *Bemidji Soil Samples, Soil Depth vs. PFC Concentrations***, and **Graph B, *Bemidji Groundwater Samples, PFC Concentrations***.

- The individual PFC compounds detected in the soil samples did not necessarily correspond to the PFC compounds detected in the corresponding groundwater sample.
- No trends were apparent in comparing soil sample depths and PFC concentrations.



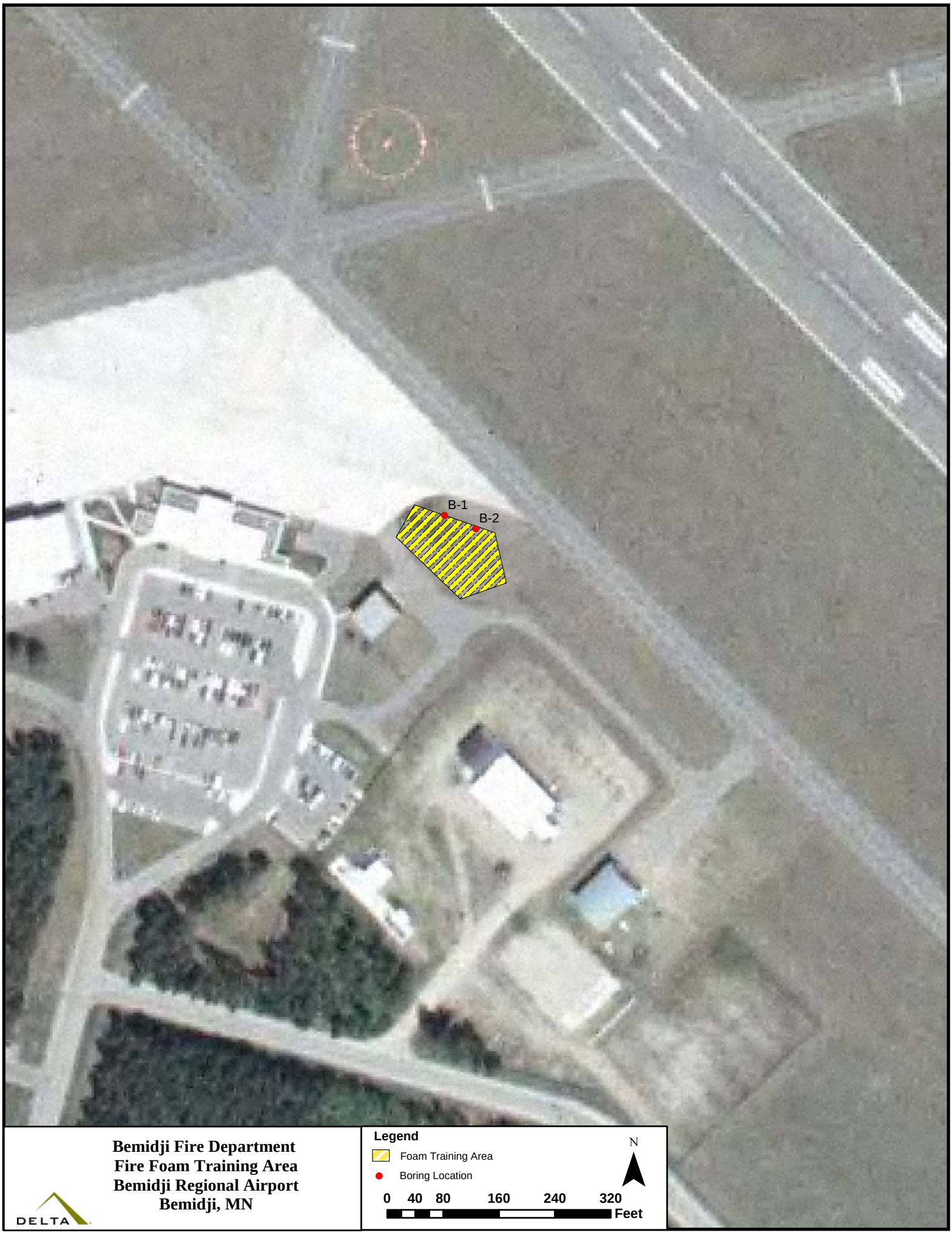
LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
BEMIDJI REGIONAL AIRPORT
BEMIDJI, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY	
19382DEL	NR	DD	
DATE	REVIEWED BY	FILE NAME	
5/12/09		Bemidji-1	DELTA



Bemidji Fire Department
Fire Foam Training Area
Bemidji Regional Airport
Bemidji, MN

DELTA

Legend

Foam Training Area

Boring Location

N

0 40 80 160 240 320

Feet

U.S. Department
of Transportation

**Federal Aviation
Administration**

Airports District Office
Minneapolis, MN 55450-2706

September 24, 2009

Delta Consultants
Attn: Nancy Rodning
5910 Rice Creek Pkwy
Suite 100
Shoreview, MN 55126

RE: *(See attached Table 1 for referenced case(s))*
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2009-AGL-1655-NRA		BEMIDJI, MN	47-30-23.74N	94-55-56.07W	15	1395
2009-AGL-1656-NRA		BEMIDJI, MN	47-30-23.61N	94-55-56.10W	15	1395

Description: Conduct soil boring operations.

We do not object with conditions to the construction described in this proposal provided:

You comply with the requirements set forth in FAA Advisory Circular 150/5370-2E, "Operational Safety on Airports During Construction."

At least seventy two (72) hours prior to preconstruction meeting and/or construction start, the contractor shall notify the local Tech Ops SSC Manager (contact information can be obtained from the MOCC at 800-322-8879).

The contractor should request to have a Tech Ops representative attend this meeting for the purpose of identifying all FAA facilities, their associated critical areas, their associated cables (power & control) and schedule shutdown of these facilities, if necessary. The local FAA Technical Operations (Tech Ops) office shall be coordinated with, invited to all meetings pertaining to the above proposal and any/all concerns must be addressed/resolved prior to construction start.

The contractor shall be responsible for locating utility lines and hand digging to locate FAA cabling and shall provide adequate provisions to protect all FAA cables exposed during the proposed work.

The sponsor/contractor shall be responsible for notifying the Tech Ops District Office representative at the project preconstruction meeting should cable relocation be necessary. Any damage to FAA cables, access roads, or to FAA facilities during the construction will require the contractor to replace the damaged cables, access

road, or FAA facilities to the Tech Ops District Office's requirements, and at the contractors' expense. If any FAA cables are damaged, the sponsor shall replace the cables in their entirety. The splicing of cables is not an acceptable form of repair.

Construction material and equipment (including cranes) shall not be placed or parked where they may interfere with the line-of-sight from any ATCT to the movement areas on the airfield or where they may interfere with the operation of navigational aids.

The airport manager shall ensure that adequate construction oversight is maintained throughout all phases of the project.

Airport management shall take action to ensure all vehicle/equipment operators who will have movement area access are properly trained by airport personnel relative to FAR Part 139 compliance. Airport management shall ensure that these vehicle operators have been trained/briefed on ground vehicle/equipment operations and airport familiarization, with particular emphasis on runway incursion prevention. Penalties shall be outlined for anyone involved in a vehicle deviation/runway incursion.

The airport manager must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies.

Airport management shall issue and maintain appropriate NOTAMs regarding the presence of personnel, equipment or open excavation in the runway or taxiway safety area during construction. Each runway or taxiway that does not meet the requirements of 14 CFR Part 139.309 shall have a NOTAM issued describing the irregularity.

Airport management must ensure that all equipment is appropriately marked and lighted and lowered to its minimum height when not in use. All equipment and stored material must also be clear of all runway object free areas and, if practicable, stored in a staging area when not in use.

A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

If you have any questions concerning this determination contact Dan Millenacker, (612) 713-4359, daniel.j.millenacker@faa.gov.

Dan Millenacker
ADO
cc:
Mike Karvakko, Karvakko Engineering
Harold Van Leeuwen, BJI

Bemidji Regional Airport, Bemidji, MN
Bemidji Fire Department Fire Foam Training Area
November 5, 2009

Photograph 1
View of the grassy training area where firefighting foam is discharged is located in front (northeast) of the airport fire station, view facing northeast. The airport's glycol collection system, including two underground storage tanks (USTs), is located in this area.

Photograph 2
Boring B-1 was advanced within the fire foam training area, 19 feet north of the glycol USTs.

Photograph 3
Boring B-2 was advanced within the fire foam training area, 24 feet east of the glycol USTs.

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **20 feet below surface**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier**
Site Location: **Bemidji, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL05**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather:	Soil Sampling Method: **5' samplers with liners**
Date Completed: **11/5/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **14.75 feet below surface**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	NA ppm
0		(0.00, 0.50) TOPSOIL			NA
		(0.50, 20.00) SAND: brown, medium grained, moist.		Composite Sample from 0' - 4'.	
5			SP	Composite Sample from 4' - 8'.	
10		@10' light brown, medium to coarse grained, moist.			
⧖ 15		@14.75' wet.	SW	Water Sample from 15' - 20'.	
20					

Comments: E.O.B. at 20'.

Boring Location: 47 30.400' N / 94 55.947' W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **20 feet below surface**

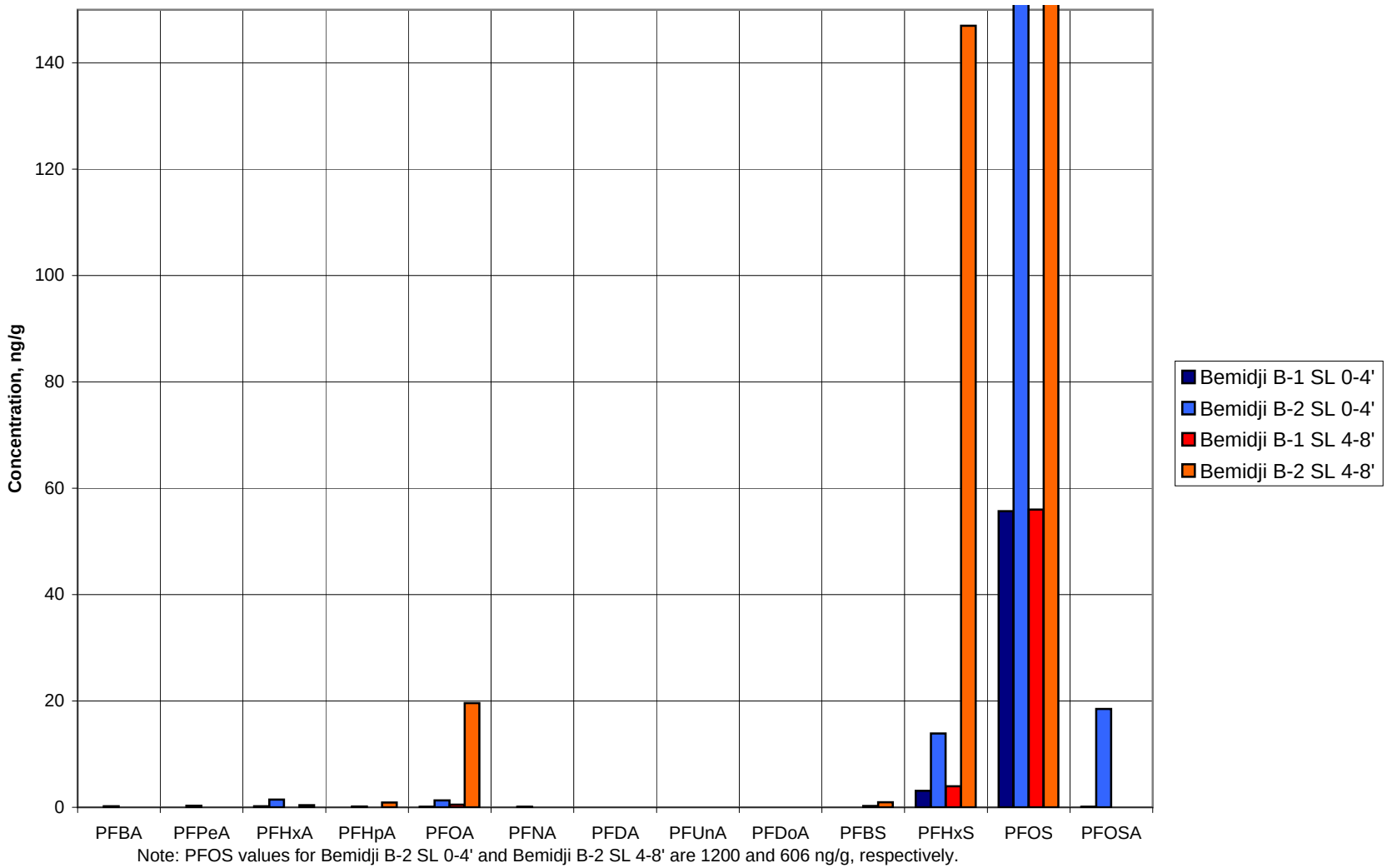
PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Glacier**
Site Location: **Bemidji, MN**	Drill Crew Chief: **Chris Niesen**
Job No.: **19382DEL05**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather:	Soil Sampling Method: **5' samplers with liners**
Date Completed: **11/5/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **14.5 feet below surface**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	NA ppm
0		(0.00, 0.50) TOPSOIL			NA
		(0.50, 20.00) SAND: brown, medium grained, moist.		Composite Sample from 0' - 4'.	
5			SP	Composite Sample from 4' - 8'.	
10		@10' light brown, medium to coarse grained, moist.			
⧖		@14.5' wet.			
15			SW	Water Sample from 15' - 20'.	
20					

Comments: E.O.B. at 20'.

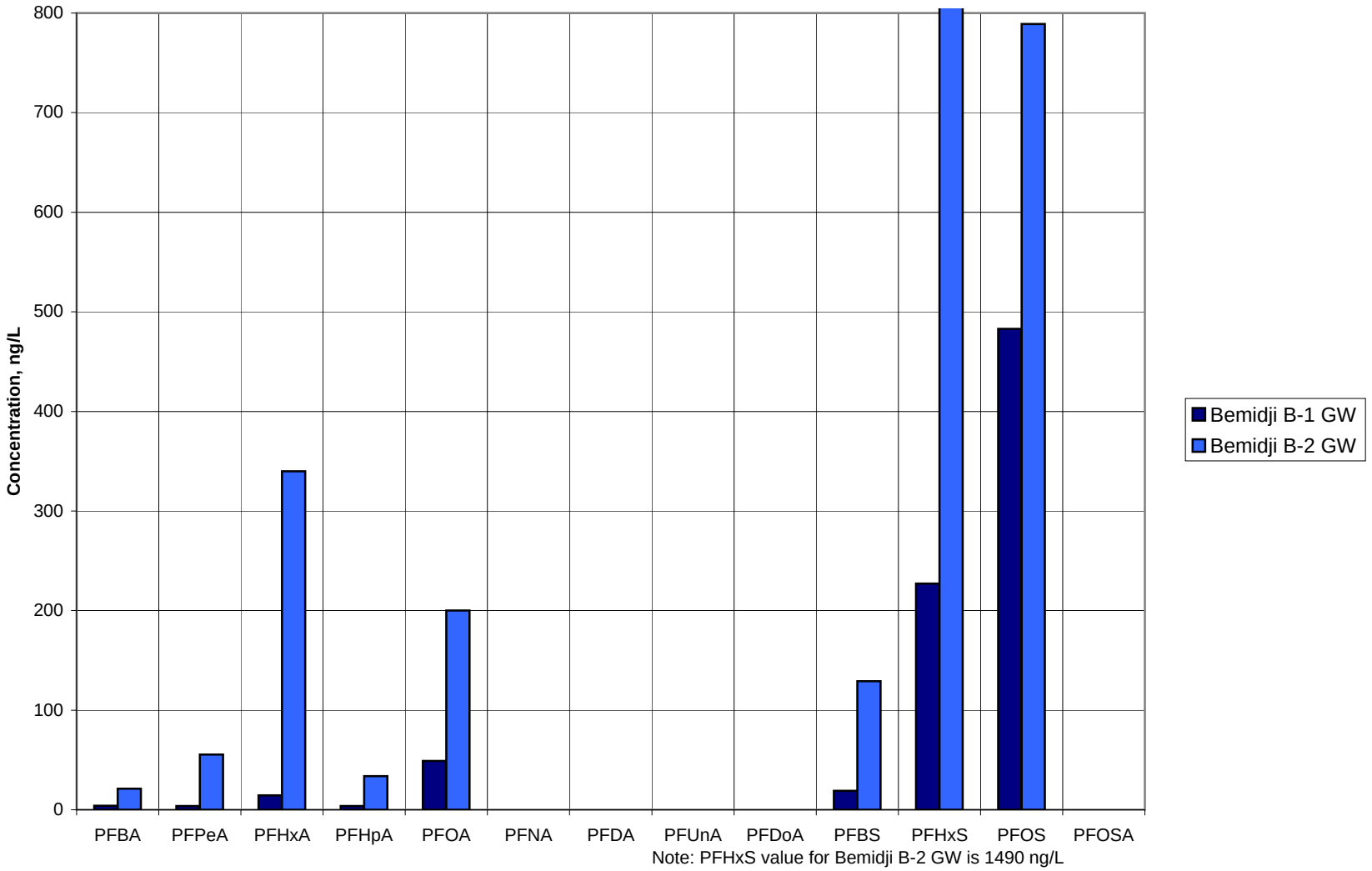
Boring Location: 47 30.400' N / 94 55.947' W

GRAPH A
Bemidji Soil Samples
Soil Depth vs. PFC Concentrations



Note: PFOS values for Bemidji B-2 SL 0-4' and Bemidji B-2 SL 4-8' are 1200 and 606 ng/g, respectively.

GRAPH B
Bemidji Groundwater Samples
PFC Concentrations



Note: PFHxS value for Bemidji B-2 GW is 1490 ng/L

APPENDIX G

Goodview Fire Foam Training Area Discussion and Supporting Documents

Background and Access – Goodview Fire Foam Training Area

The Goodview Fire Department Fire Chief completed a firefighting foam use questionnaire via a telephone interview in September 2008, indicating the department's historical use of Ansul-brand AFFF in training exercises at the Goodview fire station. A copy of the questionnaire was included in Appendix F of Delta's June 2009 Report. The Goodview fire station is located at 4140 W. 5th Street in Goodview, as shown on **Figure 1, *Fire Foam Training Area Location, Goodview***, which is included in **Appendix G**. The Fire Chief indicated that the department no longer uses Class B foam in training, and that they switched to F-500 foam in March 2008. The Goodview Fire Chief related that the department trained with Class B AFFF approximately six times in twenty years at the fire station, and that the last foam training event was approximately four to five years ago.

Class B foam was sprayed during training on the concrete apron in front (northeast) of the fire station toward the street. Spent foam was allowed to dissipate over time, with some drainage to a storm sewer drain located on the southwest side of West 5th Street, approximately 60 feet to the southeast of the fire station. A storm sewer map provided by the City of Goodview shows the storm drain outflow point for this sewer line at the north end of 39th Avenue in Goodview, into backwaters of the Missisippi River. The fire department foam training area and the location of the storm sewer outflow pipe are shown on the figure ***Goodview Fire Department Fire Foam Training Area*** included in **Appendix G**.

An access agreement was signed by the Goodview City Administrator and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area. A copy of the access agreement was included in Appendix F of Delta's June 2009 Report.

Sample Collection – Goodview Fire Foam Training Area/Storm Sewer Discharge Point

The fire foam training area in front of the Goodview Fire Station utilized by the Goodview Fire Department is concrete-paved, and the pavement was observed to be in good condition. With no direct path for spent foam to reach soils at or around the fire station, no sampling was done at the fire station. Runoff from the training area is directed along concrete gutter to a storm sewer which discharges into the backwaters of the Mississippi River.

On October 19, 2009, Delta collected a sediment sample (Sed-1) and a surface water sample (SW-1) from an area of pooled water just below the storm sewer outflow point for the sewer line that extends along 5th Street in front of the fire station. The pooled water directly below the storm sewer pipe was more than four feet deep. Sed-1 and SW-1 were collected approximately eight feet north of the end of the storm

sewer pipe outflow, at the edge of the pooled water. Photographs of the storm sewer outlet and the sample location are included in **Appendix G**.

Sediment and surface water samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Goodview Storm Sewer Discharge Point

Laboratory analysis detected only one PFC compound above the laboratory detection limits in the sediment sample collected in Goodview: 0.332 nanograms per gram (ng/g) PFOS. Ng/g is is equivalent to parts-per-billion. No other PFC compounds were detected in the Goodview sediment sample. All soil and sediment sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Laboratory analysis of the surface water sample collected in Goodview detected PFC compound concentrations, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*.**

Surface Water Sample PFC Detections – Goodview Storm Sewer Discharge	
Sample ID	**Compound Concentration**
SW-1	4.78 ng/L PFHxA
	4.49 ng/L PFOA
	2.56 ng/L PFNA
	2.82 ng/L PFDA
	8.19 ng/L PFOS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Goodview Fire Foam Training Area and Storm Sewer Sampling

Based on information provided by the Goodview Fire Chief, Ansul-brand Class B AFFF was historically used in fire training exercises in front of the Goodview Fire Station approximately six times in the last twenty years. Five gallons of AFFF were used per training event, and the last training event was in 2004 or 2005. A potential route for spent foam to the environment was via a storm sewer grate near the fire station. The storm sewer discharges to the backwaters of the Mississippi River at a point approximately

¼-mile northeast of the fire station. Only PFOS was detected in a sediment sample collected at the storm sewer discharge area, while several PFC compounds were detected in a surface water sample collected from that area.

The MPCA does not define sediment quality standards. Sediment quality targets, adopted for use in the St. Louis River Area of Concern, can be used throughout the State as benchmark values for making comparisons. However, there are no sediment quality targets for any of the PFC compounds.

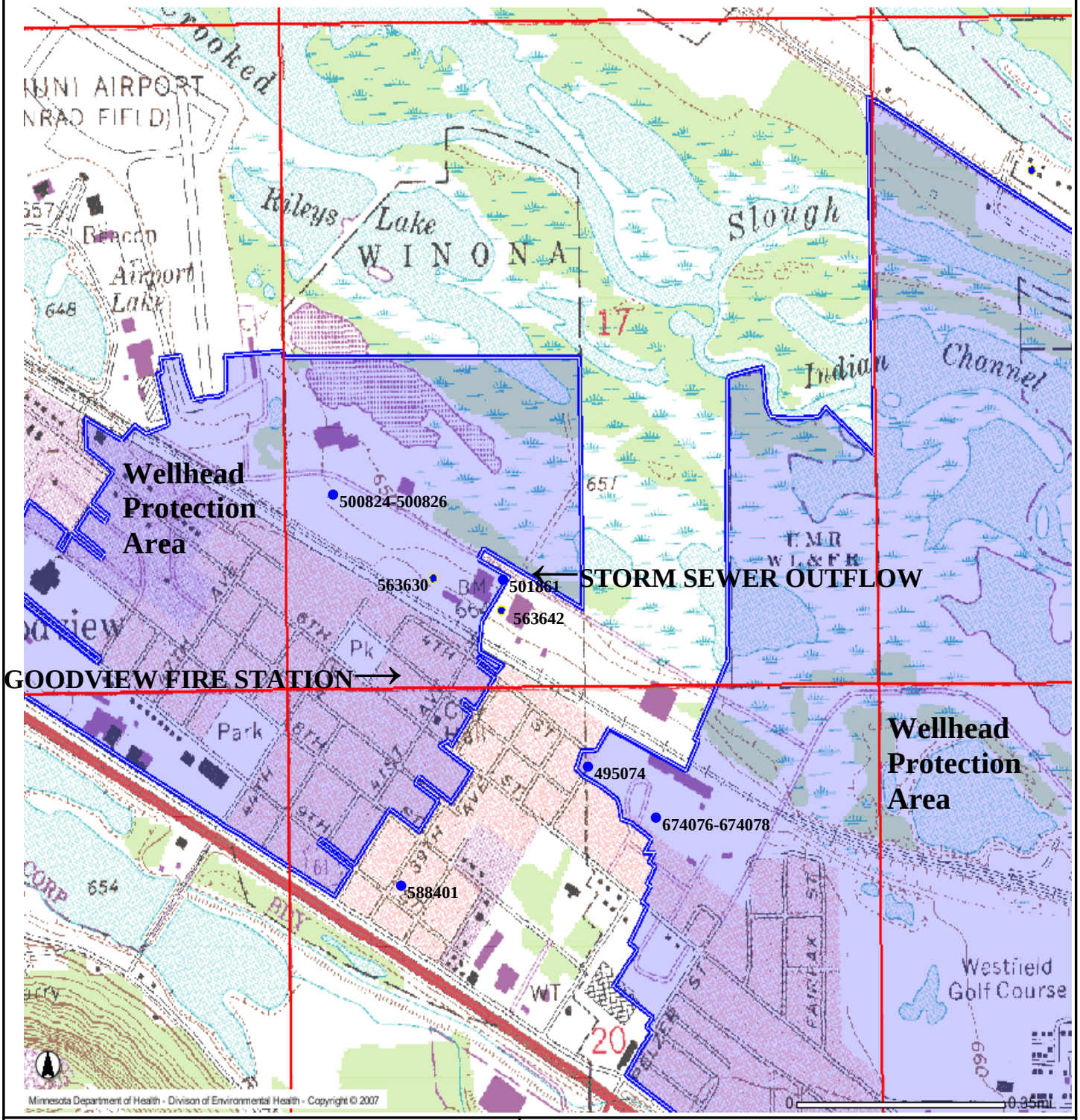
The MPCA has defined Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for PFOS for soils, as follows:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g

The PFOS concentration of 0.332 ng/g detected in the Goodview Sed-1 sample is below the MPCA SRVs. While the SRVs are not necessarily applicable to river sediment samples, they are presented here for comparison purposes only.

Surface water quality criteria are developed by the MPCA for specific surface water bodies only. The MPCA has not developed general surface water quality criteria or site-specific ambient surface water quality criteria for the portion of the Mississippi River where surface water samples were collected.

While PFCs were detected in the sediment and surface water samples collected at the end of the storm sewer discharge point, the concentrations cannot definitively be linked to the use of Class B firefighting foam at the Goodview Fire Station due to other potential unidentified sources of PFCs in the storm sewer runoff and in the ambient environment.



LEGEND:

- Well Locations

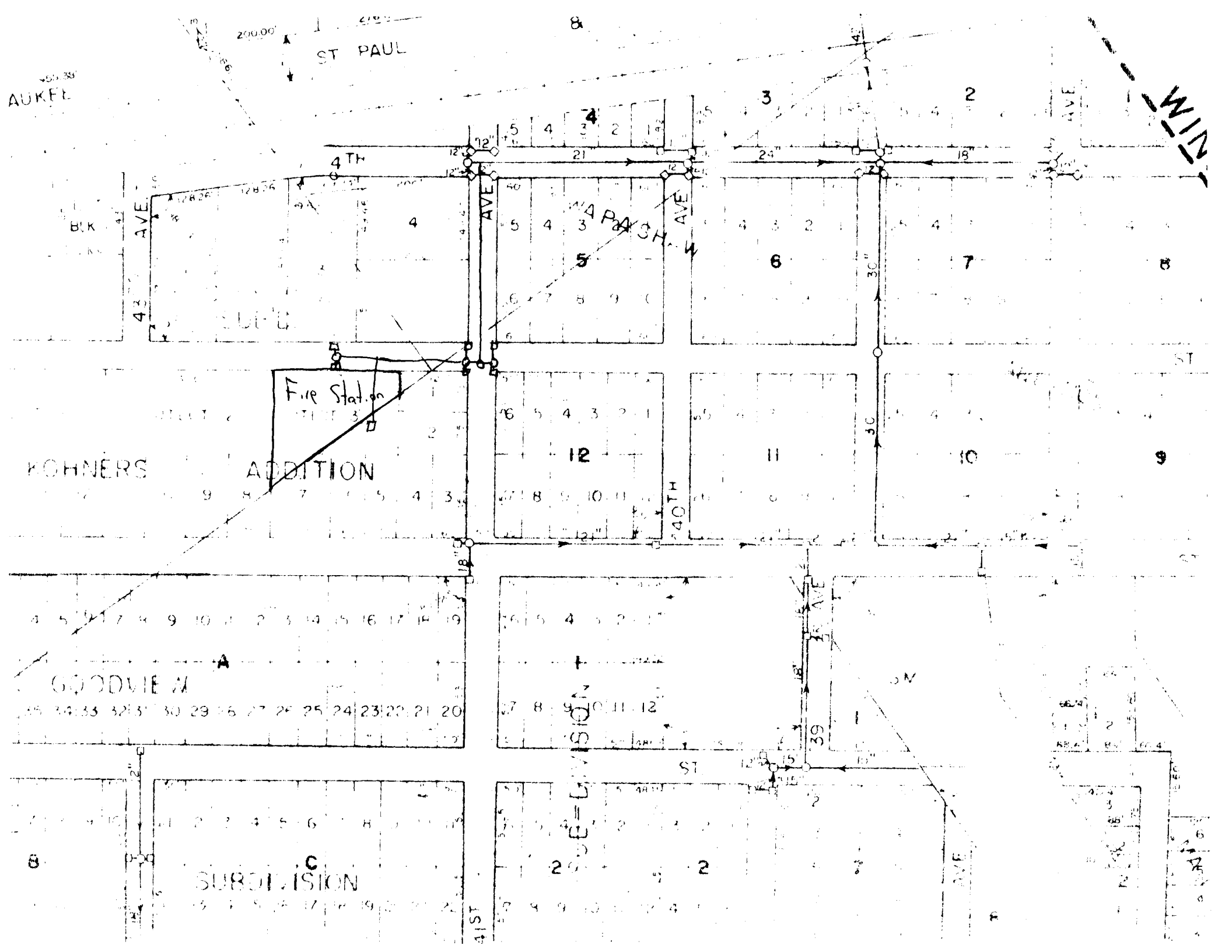
North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
GOODVIEW FIRE STATION
GOODVIEW, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
12/30/09		Goodview-2

DELTA


SW-1/Sed-1
Goodview Fire Department
Fire Foam Training Area
Goodview Fire Station
Goodview, MN
DELTA
Legend
Foam Training Area
Sample Location
Storm Sewer Outflow
N
0 70 140 280 420 560
Feet


ST PAUL
AUKEE
4TH
AVE
Fire Station
KOHNERS ADDITION
GOODWIN
SUBDIVISION
ST
WIN

Goodview Fire Station

Fire Foam Training Area
April 7 and October 19, 2009

Photograph 1

Fire foam is sprayed onto the concrete apron in front of the fire station. Drainage is to 5th Street West at left. Photo view facing southeast.

Photograph 2

Spent foam and water drain to a storm sewer grate in 5th Street West, approximately 60 feet to the southeast of the fire station.

Photograph 3
Storm sewer outflow pipe and sediment and surface water sample locations. The storm sewer is at the north end of 39th Avenue, north of Theuer Boulevard, to backwaters of the Mississippi River.

APPENDIX H

Marathon Refinery Fire Foam Training Area Discussion and Supporting Documents

Background and Access – Marathon Refinery Fire Foam Training Area

The Fire Chief at the Marathon Refinery in St. Paul Park returned a completed firefighting foam use questionnaire to Delta in May 2008, indicating the use of Thunderstorm Class B AR-AFFF in fire foam training by the fire department at the refinery. The questionnaire indicated that 50 to 100 gallons of AR-AFFF is used per semi-annual fire training event, with up to 250 gallons of foam concentrate used annually for training. A copy of the questionnaire was included in Appendix N of Delta's June 2009 Report. The fire foam training is conducted on a concrete pad at the fire training grounds near the southwest corner of the refinery. The concrete pad is slightly raised above grade with 2- to 4-inch high concrete curbing around the perimeter. The pad is surrounded by ten to twenty feet of river rock pebbles. Pooled or collected liquids on the training pad drain to an on-site storm sewer system, which is routed to an on-site wastewater treatment plant (WWTP). The fire training area was built in 1995; prior to 1995 training was conducted off-site. The location of the training area is shown on the figure ***Fire Foam Training Area Location, Marathon Refinery***, which is included in **Appendix H**. Photographs of the fire training area are included in **Appendix H**.

During follow-up interviews, the Marathon Fire Chief confirmed the departments' current use of Ansul-brand Thunderstorm AR-AFFF since 2000, and stated that the department historically used AR-AFFF manufactured by 3M for training from 1995 through approximately 2000.

As reported in Delta's April 2009 Report, the Marathon Fire Chief recalled two fires in the past where large amounts of Ansul Thunderstorm AR-AFFF were used. Approximately 6,500 gallons of foam were used on a fire at Tank 120 in July 2004, and approximately 2,000 gallons of foam were used in December 2007 on a fire at Tank 82. Tank 120, along with eight other tanks, is surrounded by an earthen berm. The Marathon Fire Chief indicated that the spent foam was contained within the bermed area and allowed to break down; water from within the bermed area was pumped out. Under the oversight of the MPCA, the soil from within the bermed area was excavated due to petroleum impacts; confirmation soil samples were collected from the excavated area and results reported to the MPCA. Tank 120 is located approximately 1,300 feet northeast of the fire training area.

According to the Marathon Environmental Coordinator, WWTP influent and effluent samples were collected by the MPCA and analyzed for PFCs in 2007. The MPCA provided a table summary of sampling analytical results, a copy of which was included in Delta's June 2009 Report. Low levels of several PFC compounds were detected in samples in both influent and effluent samples.

There are several groundwater monitoring and recovery wells in the area of the fire training pad. A map illustrating well locations provided by the Marathon Environmental Coordinator was included in Delta's June 2009 Report.

Groundwater studies associated with former 3M dumpsites and PFC contaminants have been conducted by the MDH in southern Washington County, including St. Paul Park. The Marathon Refinery is in an area where PFBA has been detected in the regional groundwater aquifer at concentrations of 1.0 ppb or greater.

An access agreement was signed by the Minnesota Refining Division Manager of Marathon Petroleum Company LLC and the MPCA, allowing access for sampling of existing groundwater monitoring wells at the Marathon Refinery. A copy of the access agreement with an accompanying scope of work was included in Appendix N of Delta's June 2009 Report.

As presented in Delta's April 2009 report, the inferred groundwater flow direction at the Marathon Refinery is to the west. The groundwater flow direction was confirmed by the Marathon Refinery Environmental Coordinator during the site reconnaissance conducted in March 2009.

Sample Collection – Marathon Refinery Fire Foam Training Area

Based on review of well logs and well location maps provided by Marathon, groundwater samples were collected from the existing site wells listed below, unless noted otherwise. The wells were chosen based on their locations relative to the fire training area and the location of the July 2004 fire. The well locations are shown on the figure ***Fire Foam Training Area, Marathon Refinery***, which is included in **Appendix H**.

- MW-156, located adjacent east (upgradient) of the fire training area.
- MW-173, located near the southwest corner of the fire training area. Light non-aqueous phase liquid (LNAPL) was found in MW-W173, therefore, a groundwater sample was not collected.
- EBH-1, located in the fire training area. LNAPL was found in EBH-1, therefore, a groundwater sample was not collected.
- SP-11, a sand point well located approximately 300 feet west (downgradient) of the fire training area.
- MW-172, located approximately 400 feet west of the training area.
- MW-101, located approximately 280 feet south-southwest of Tank 120.
- MW-912, located upgradient of the fire training area and Tank 120, near the east refinery property boundary. The sample collected from this well was intended to serve as a "background" sample.

The depths to water were measured at each well prior to sampling. As noted above, wells with LNAPL were not sampled. Groundwater samples were collected using disposable bailers as described in **Appendix Q, *Sampling Methodologies,*** and submitted to MPI Research for analysis of PFCs. A duplicate groundwater sample was collected from MW-156.

Sampling Results – Marathon Refinery Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in groundwater samples collected at the Marathon Refinery as listed in the table below. All groundwater sample analytical results, including non-detect results, are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Groundwater Sample PFC Detections – Marathon Refinery Fire Foam Training Area		
Sample Location	**Detected Compound Concentration**	**Calculated Compound Concentration, Less the Background Concentration at MW-912**
MW-156	220 ng/L PFBA	(242) ng/L PFBA
	1730 ng/L PFPeA	1432 ng/L PFPeA
	527 ng/L PFHxA	475.5 ng/L PFHxA
	200 ng/L PFHpA	178.2 ng/L PFHpA
	73.1 ng/L PFOA	55.6 ng/L PFOA
	26.9 ng/L PFNA	(26.9) ng/L PFNA
	2.58 ng/L PFUnA	(2.58) ng/L PFUnA
	462 ng/L PFBS	425 ng/L PFBS
	10500 ng/L PFHxS	8920 ng/L PFHxS
	14900 ng/L PFOS	14169 ng/L PFOS
MW-156 Duplicate	221 ng/L PFBA	(241) ng/L PFBA
	1660 ng/L PFPeA	1362 ng/L PFPeA
	534 ng/L PFHxA	482.5 ng/L PFHxA
	184 ng/L PFHpA	162.2 ng/L PFHpA
	81.4 ng/L PFOA	63.9 ng/L PFOA

Groundwater Sample PFC Detections – Marathon Refinery Fire Foam Training Area		
Sample Location	**Detected Compound Concentration**	**Calculated Compound Concentration, Less the Background Concentration at MW-912**
	23.7 ng/L PFNA	(23.7) ng/L PFNA
	2.93 ng/L PFUnA	(2.93) ng/L PFUnA
	502 ng/L PFBS	465 ng/L PFBS
	8930 ng/L PFHxS	7350 ng/L PFHxS
	11700 ng/L PFOS	10969 ng/L PFOS
	2.62 ng/L PFOSA	2.62 ng/L PFOSA
SP-11	182 ng/L PFBA	(280) ng/L PFBA
	458 ng/L PFPeA	160 ng/L PFPeA
	171 ng/L PFHxA	119.5 ng/L PFHxA
	52.2 ng/L PFHpA	30.4 ng/L PFHpA
	35.6 ng/L PFOA	18.1 ng/L PFOA
	20.7 ng/L PFNA	(20.7) ng/L PFNA
	369 ng/L PFBS	332 ng/L PFBS
	4910 ng/L PFHxS	3330 ng/L PFHxS
	5770 ng/L PFOS	5039 ng/L PFOS
MW-172	59.8 ng/L PFBA	(402.2) ng/L PFBA
	245 ng/L PFPeA	(53) ng/L PFPeA
	154 ng/L PFHxA	102.5 ng/L PFHxA
	25.1 ng/L PFHpA	3.3 ng/L PFHpA
	15.5 ng/L PFOA	(2) ng/L PFOA
	11.4 ng/L PFNA	(11.4) ng/L PFNA
	49 ng/L PFBS	12 ng/L PFBS
	1220 ng/L PFHxS	(360) ng/L PFHxS
	1330 ng/L PFOS	599 ng/L PFOS

Groundwater Sample PFC Detections – Marathon Refinery Fire Foam Training Area		
Sample Location	**Detected Compound Concentration**	**Calculated Compound Concentration, Less the Background Concentration at MW-912**
MW-101	183 ng/L PFBA	(279) ng/L PFBA
	403 ng/L PFPeA	105 ng/L PFPeA
	150 ng/L PFHxA	98.5 ng/L PFHxA
	12.4 ng/L PFHpA	(9.4) ng/L PFHpA
	36.7 ng/L PFOA	19.2 ng/L PFOA
	479 ng/L PFBS	442 ng/L PFBS
	3710 ng/L PFHxS	2130 ng/L PFHxS
	93.2 ng/L PFOS	(637.8) ng/L PFOS
MW-912	462 ng/L PFBA	
	298 ng/L PFPeA	
	51.5 ng/L PFHxA	
	21.8 ng/L PFHpA	
	17.5 ng/L PFOA	
	37 ng/L PFBS	
	1580 ng/L PFHxS	
	731 ng/L PFOS	

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

( ) Negative results for calculated compound concentrations less background concentration are presented in parentheses.

The groundwater sample collected from MW-912 was intended to serve as a “background” groundwater concentration indicator. The calculated concentrations included in the table above were derived by subtracting the compound concentration detected in the MW-912 sample from the detected compound concentration for that sample. For compounds where the concentration detected at MW-912 was greater, the calculated compound concentration is shown as a (negative) number.

Discussion and Conclusion – Marathon Refinery Fire Foam Training Area

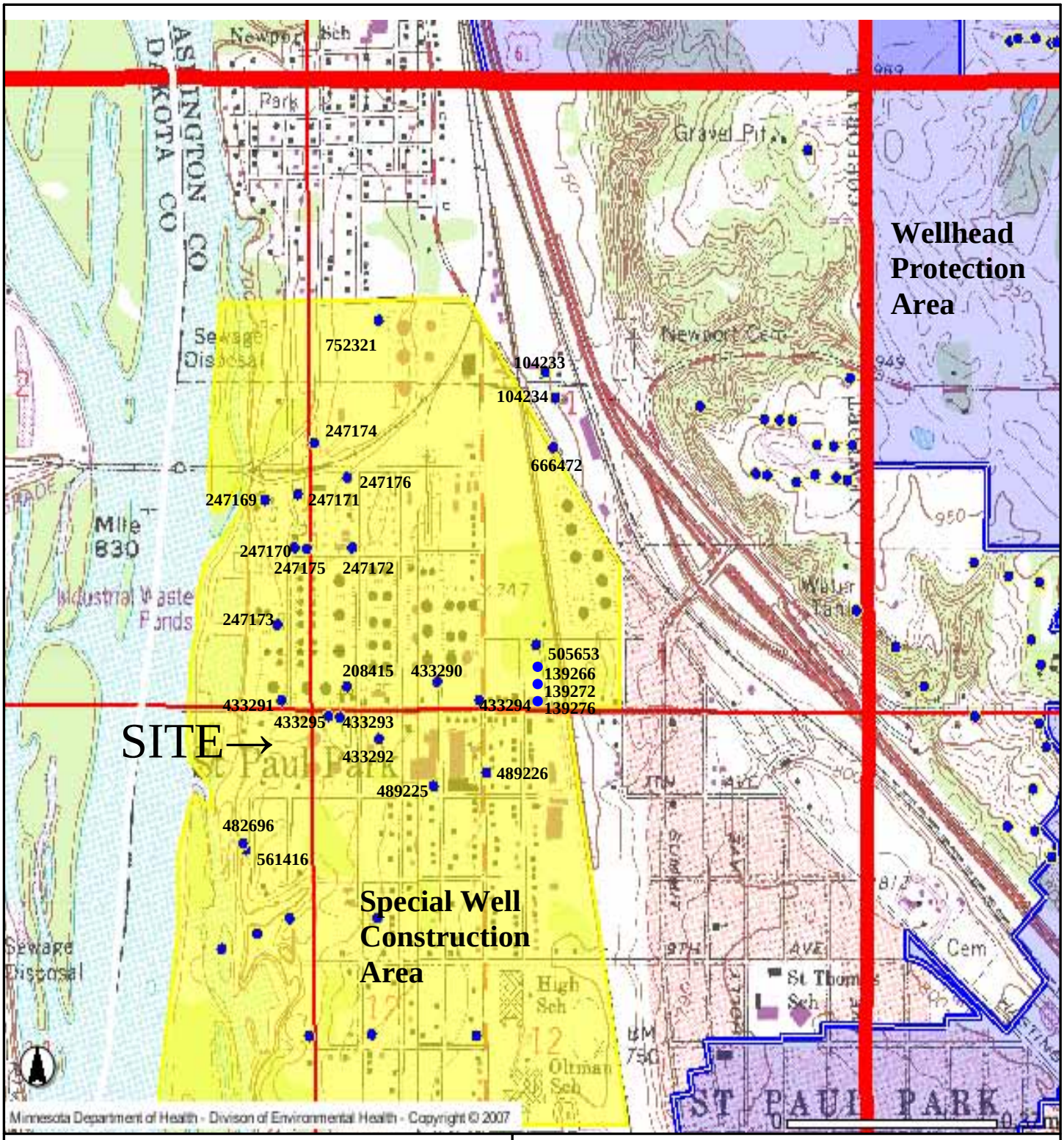
The Marathon Refinery Fire Department has trained with Class B AR-AFFF at their fire training area since 1995. The fire department switched from 3M-brand AR-AFFF to Ansul-brand AR-AFFF for training purposes in approximately 2000. Approximately 50 to 100 gallons of AR-AFFF is used per semi-annual training event, with up to 250 gallons of foam concentrate used annually for training. In July 2004, approximately 6,500 gallons of Ansul-brand foam were used on a fire at Tank 120 which is located approximately 1,300 feet northeast of the fire training area. Existing groundwater monitoring wells were selected for sampling based on their proximity to the fire training area and Tank 120.

The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values. The PFOS concentrations detected in groundwater samples collected from MW-156, SP-11, MW-172, and MW-912 exceeded the PFOS HRL. The calculated concentrations less the background PFOS concentration at MW-912 for groundwater samples collected from MW-156, SP-11, and MW-172 still exceed the PFOS HRL. No detected concentrations of PFOA, PFBA or PFBS exceeded the HRL or HBVs.

The following observations were noted in analyzing PFC laboratory data and sample depths:

- Perfluorosulfonates (PFHxS and PFOS) were detected at significantly higher concentrations than the perfluorocarboxylic acids. This trend is reflected in **Graph A, *Marathon Oil Refinery Groundwater Samples, PFC Concentrations***. Graph A reflects laboratory detected concentrations and has not been corrected for background concentrations.
- The “background” groundwater sample collected at MW-912 had a higher concentration of PFBA than the other groundwater samples collected at the Marathon Refinery. However, concentrations of PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, and PFOS were lower in the MW-912 groundwater sample than other downgradient groundwater samples, which may indicate an on-site source of PFCs in the groundwater.
- While PFNA, PFUnA, and PFOSA were not detected in the “background” groundwater sample collected at MW-912, they were detected in other groundwater samples collected at the Marathon Refinery. The presence of PFNA, PFUnA and PFOSA in groundwater samples collected downgradient of MW-912 may be indicative of an on-site source of these PFC compounds in the groundwater.

- The highest PFC concentrations, except for PFBA, were detected in the MW-156 or MW-156 duplicate groundwater samples. MW-156 is located adjacent east of the fire training area.



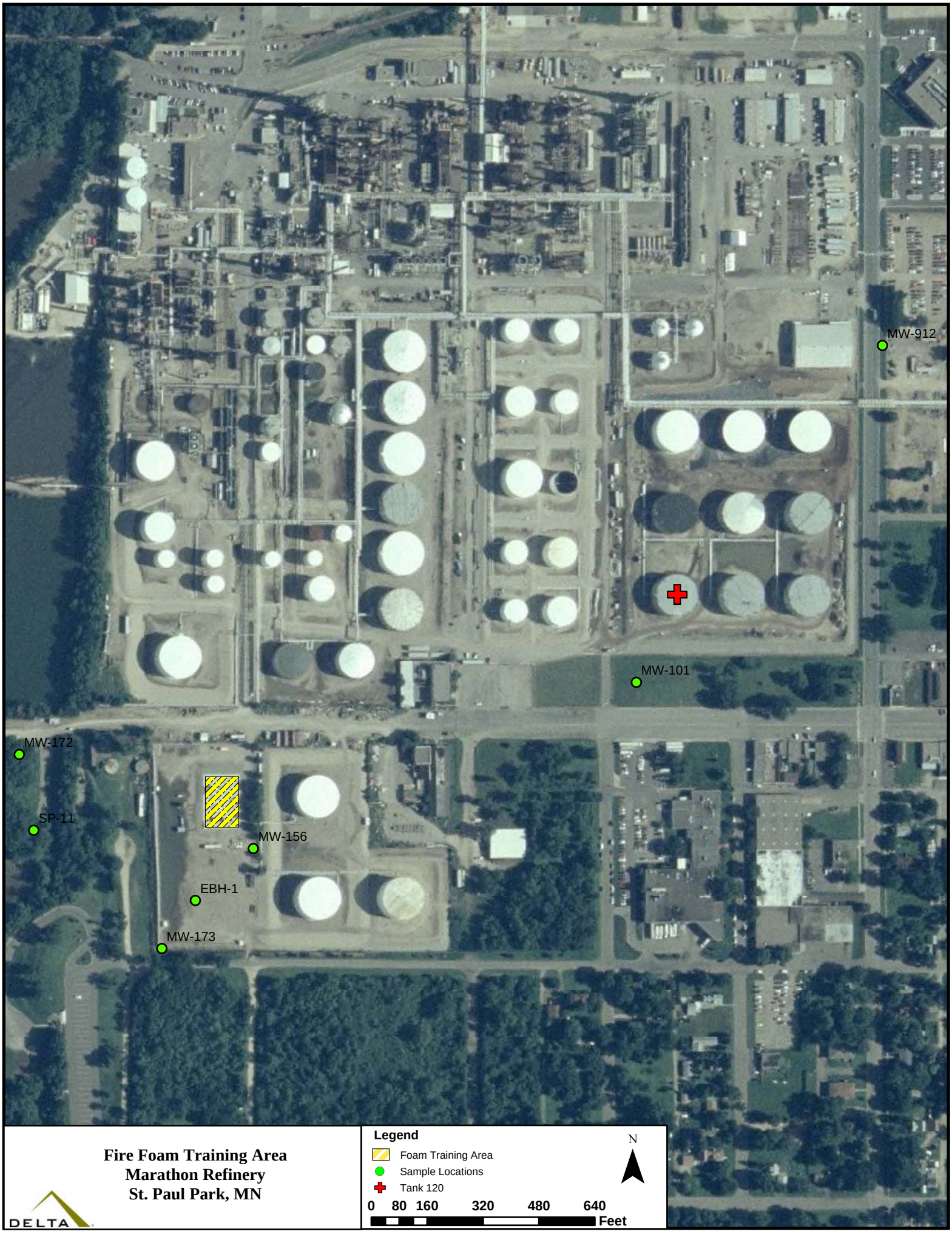
LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
MARATHON REFINERY
ST. PAUL PARK, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY	
19382DEL	NR	DD	
DATE	REVIEWED BY	FILE NAME	
6/8/09		StPaulPark–1	DELTA



Fire Foam Training Area
Marathon Refinery
St. Paul Park, MN

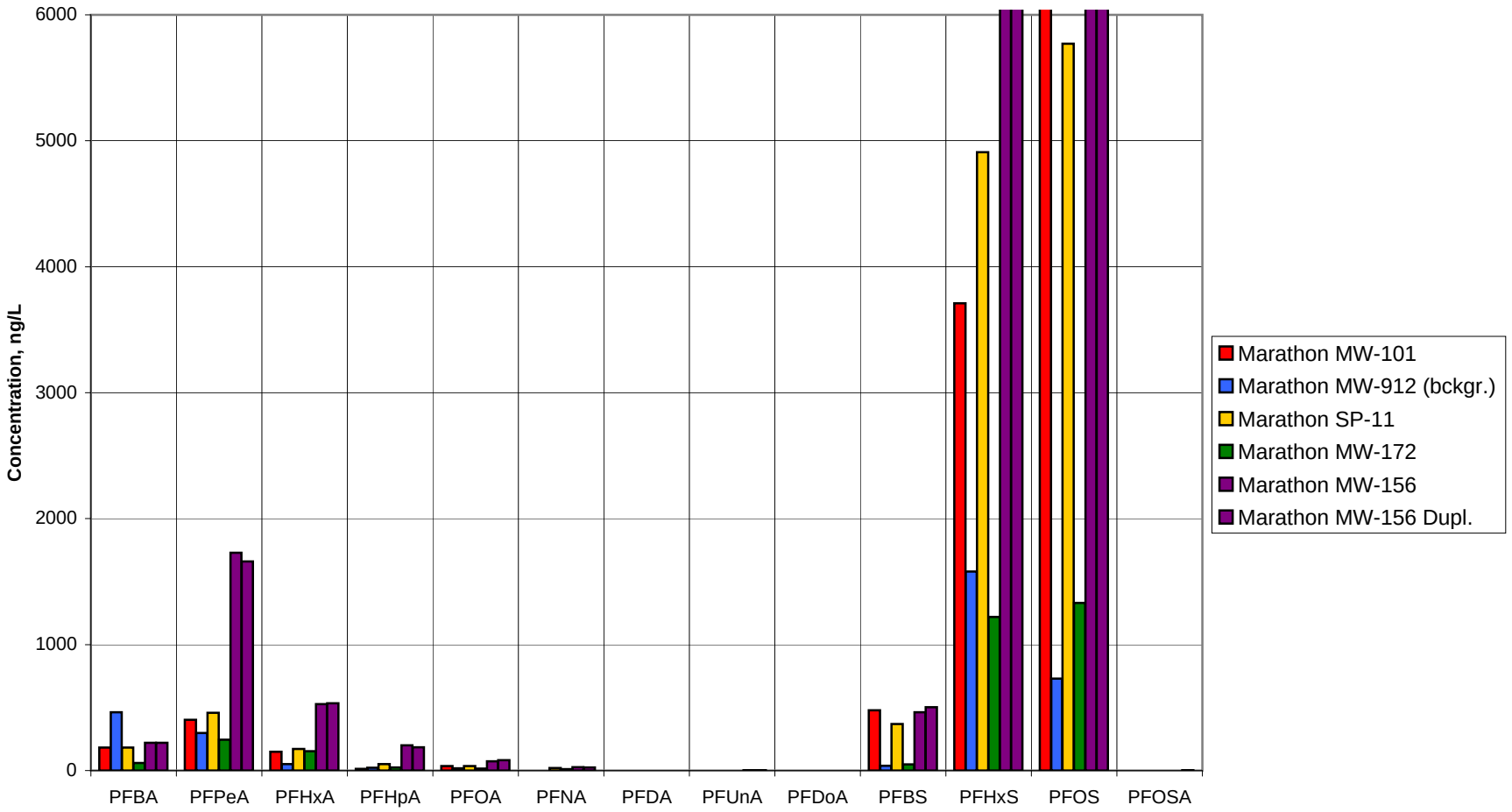
DELTA

Marathon Refinery, St. Paul Park
Fire Foam Training Area
March 17, 2009

Photograph 1
Fire training area concrete pad and structures, view from the northwest corner facing southeast.

Photograph 2
View of the training area from the southeast corner facing west.

GRAPH A
Marathon Oil Refinery Groundwater Samples
PFC Concentrations



Note: PFHxS and PFOS concentrations for MW-156 and MW-156 Dup, and the PFOS concentration for MW-101, exceed 6,000 ng/L. Graphed concentrations are actual values detected in the laboratory; values were not adjusted to reflect background concentrations.

APPENDIX I

Richfield Fire Foam Training Area Discussion and Supporting Documents

Background – Richfield Fire Foam Training Area

The Richfield Fire Chief completed a firefighting foam use questionnaire via a telephone interview in September 2008, indicating the department's occasional historical use of 3M-brand AFFF in training exercises conducted behind the Richfield Ice Arena. A copy of the questionnaire was included in Appendix K of Delta's June 2009 Report. The Fire Chief indicated that it has been approximately ten years since the Richfield Fire Department trained with Class B foam; they now use training foam in training exercises. The Fire Chief and other department members he consulted recalled that foam had been discharged in training exercises at two locations behind (north of) the Richfield Ice Arena. The main area where the Fire Chief recalled most foam training occurred is situated directly north of the ice arena building; a second area where foam training occurred fewer times is located on a slight hill to the northwest of the ice arena building. Both areas are grass-covered. The Richfield Ice Arena is located at 636 East 66th Street in Richfield, as shown on **Figure 1, *Fire Foam Training Area Location, Richfield***, included in **Appendix I**. Both former firefighting foam training areas are shown on the ***Fire Training Area, Richfield Ice Arena*** figure included in **Appendix I**.

The department did not utilize a burn pan or live fire in training, they sprayed the foam directly on the ground. Spent foam was allowed to dissipate on the ground over time. The surface grade would result in stormwater runoff from both training areas down a driveway to the east, toward Legion Lake. It appeared that water runoff would settle into a low area at the east end of the driveway before reaching the lake.

An access agreement was signed by the Richfield City Manager and the MPCA, allowing access for a site reconnaissance and sampling at the fire foam training area. A copy of the access agreement was included in Appendix K of Delta's June 2009 Report.

As presented in Delta's April 2009 report, the inferred groundwater flow direction in the area of the Richfield fire foam training area is generally to the east.

Water Well Survey – Richfield Fire Foam Training Area

A water well survey was conducted for the area adjacent to or within one-quarter mile to the east, south and southeast of the former Richfield fire foam training area, in reference to the easterly or potential southeasterly groundwater flow direction. A figure showing the well survey area is included in **Appendix I**. The well survey included a search of the County Well Index (CWI) maintained by the Minnesota Department of Health (MDH), walking survey to record addresses and to identify any visible private wells. Questionnaires were mailed to all 118 addresses identified during the walking survey regarding water supply wells on the property. An example of the questionnaire and accompanying cover letter are

included in **Appendix I**. A table including survey addresses and responses, where received, is also included in **Appendix I**. Copies of the completed, returned surveys are included in **Appendix I**.

Of the 118 water well questionnaires mailed, 8 were returned by the U.S. Postal Service as undeliverable, 42 were completed by the property owner or tenant and returned to Delta, and the remainder were not returned. The questionnaire indicated that a lack of response to the survey would be interpreted as no water well at the property.

The survey identified numerous water supply wells and groundwater monitoring wells in the survey area, all of which were either sealed or abandoned. No active wells were identified. The water well at the American Legion located adjacent west of the former firefighting foam training area at 6501 Portland Avenue south was reportedly sealed in the early 1990s.

Delta had originally proposed to sample private wells identified during the survey for PFCs, however, the well survey did not identify any active or open, accessible wells in the survey area. Three municipal water wells located within the survey area have been sampled for PFCs by the Minnesota Department of Health.

Sample Collection – Richfield Fire Foam Training Area

As presented in the June 2009 Report, three soil borings (B-1, B-2 and B-3) were advanced within or downslope of the Richfield fire training areas in May 2009. Soil boring locations are shown on the ***Fire Training Area, Richfield Ice Arena*** figure. Information, data and documentation for these three borings were presented in the June 2009 Report. Laboratory analysis of groundwater samples collected from B-1, B-2 and B-3 identified PFOA concentrations in two of the groundwater samples in exceedance of the PFOA HRL: 1,330 ng/L PFOA was detected in the groundwater sample collected from B-2, and 458 ng/L PFOA was detected in the B-3 groundwater sample. The PFOA concentration detected in the B-1 groundwater sample was below the HRL. Due to the high PFC concentrations detected in these groundwater samples, a groundwater sample was collected upgradient of the fire foam training areas, and a surface water sample was collected from Legion Lake for analysis of PFCs.

On August 27, 2009, a surface water sample was collected from the southwest portion of Legion Lake, due east of the fire foam training area. The surface water sample was collected as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD for analysis of PFCs.

On October 8, 2009, one soil boring (B-4) was advanced upgradient of the fire foam training area, in an area which is part of Veteran's Memorial Park. The soil boring location is shown on the figure ***Fire Training Area, Richfield Ice Arena*** included in **Appendix I**. The soil boring was advanced by Thein Well Company using push probe drilling technology, under the oversight of Delta personnel. Soil samples were collected continuously and logged onto a soil boring log. The soil boring log detailing soil descriptions, boring depth, and the GPS location of the boring is included in **Appendix I**.

Boring B-4 was advanced to a depth of 30 feet below grade surface (bgs). Soils encountered consisted of the following: brown sandy clay from the surface to 8 feet bgs grading to black sandy clay at a depth of 8 feet bgs, with a petroleum odor noted in the 8 to 12 foot soil sample. Soils graded to gray, medium-grained sand from 16 to 20 feet bgs, underlain by black silty- to clayey-sand to a depth of 25.5 feet bgs. From 25.5 feet to 30 feet bgs was fine- to medium-grained sand. Groundwater encountered at a depth of 27.5 feet bgs. A composite soil sample was collected from a depth of 0 to 8 feet bgs. A groundwater sample was collected directly from the boring. Upon completion of sampling the boring was grouted and sealed in accordance with applicable State requirements.

Soil and groundwater samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Richfield Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in the surface water, soil, and groundwater samples collected in association with the Richfield fire foam training area as listed in the tables below. All soil and groundwater sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil Sample PFC Detections – Richfield Fire Department Fire Foam Training Area		
Soil Boring	**Sample Depth**	**Compound Concentration**
B-4	0-8 feet	0.129 ng/g PFOA
		0.236 ng/g PFHxS
		4.52 ng/g PFOS

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Laboratory analysis of groundwater samples detected PFC compound concentrations in the Legion Lake surface water sample and the groundwater sample collected from B-4, as listed in the table below. All groundwater and surface water analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*,** of this report.

Water Sample PFC Detections – Richfield Fire Department Fire Foam Training Area	
Sampling Location	**Compound Concentration**
SW-1	4.02 ng/L PFBA
	5.69 ng/L PFOA
	3.63 ng/l PFNA
	3.92 ng/l PFDA
	13.2 ng/L PFOS
B-4	228 ng/L PFBA
	10.3 ng/L PFPeA
	10.3 ng/L PFHxA
	5.43 ng/L PFHpA
	38.7 ng/L PFOA
	71.4 ng/L PFHxS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Soil Discussion and Conclusion – Richfield Fire Foam Training Area

Based on information provided by the Richfield Fire Chief, the last fire foam training at the Richfield fire foam training area occurred approximately ten years ago, and 3M-brand AFFF was used. PFC compounds were detected in all of the soil and groundwater samples collected previously from borings B-1, B-2, and B-3 advanced within and downgradient of the fire foam training area, and in the samples collected upgradient of the fire foam training area in B-4. PFCs were also detected in the Legion Lake surface water sample.

The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFOA	2100 ng/g	2500 ng/g	13000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

None of the PFC compounds detected in the Richfield B-4 soil sample met or exceeded the SRVs.

Soil laboratory results for soil samples collected previously and as part of the current scope of work are summarized in the table below. PFC compounds which had no laboratory detections (PFUnA and PFDoA) are not included in the table below. The PFC concentrations detected in the B-4 soil sample were less than concentrations detected in the borings advanced through the fire foam training area (B-1 and B-2) by one order of magnitude or more, and fewer PFC compounds were detected at B-4. The source for PFCs in the soil at B-4, and of the petroleum odor noted in the 8-12 foot soil sample at B-4, is unknown, especially based on the current use of the area as a park. Since firefighting foam was not discharged in the area of B-4, firefighting foam is not suspected as a source of the PFCs detected in the B-4 soil sample.

Current and Previous Soil Sample PFC Detections
Richfield Fire Department Fire Foam Training Area

Sample ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFBS	PFHxS	PFOS	PFOSA
B-1, 0-4 ft.	ND	0.226	0.191	0.433	1.36	1.44	0.095	ND	1.26	104	0.21
B-1, 4-8 ft.	0.322	1.43	0.905	0.592	1.11	1.89	ND	ND	1.44	102	ND
B-2, 0-4 ft.	0.464	1.33	1.07	0.85	2.32	5.03	0.306	ND	13	401	0.47
B-2, 4-8 ft.	1.04	4.52	4.7	3.28	5.02	4.83	ND	ND	32.2	666	ND
B-3, 0-4 ft.	ND	ND	0.314	0.309	1.49	ND	ND	ND	21.9	56.4	ND
B-3, 4-8 ft.	0.173	0.439	1.02	0.283	0.336	ND	ND	0.57	2.35	9.33	ND
B-4, 0-8 ft.	ND	ND	ND	ND	0.129	ND	ND	ND	0.236	4.52	ND

Laboratory results in ng/g. Non-detect laboratory results are noted as ND.

Groundwater and Surface Water Discussion and Conclusion – Richfield Fire Foam Training Area

The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values. The detected PFC concentrations in the B-4 groundwater sample, and the Legion Lake surface water sample, do not meet or exceed the HRLs for PFOS or PFOA nor the HBVs for PFBA or PFBS.

The MPCA has developed site-specific ambient surface water quality criteria for PFOA and PFOS for the surface waters of the Mississippi River and Lake Calhoun only. No general surface water criteria or criteria specific to Legion Lake have been developed.

Groundwater laboratory results for groundwater samples collected previously and as part of the current scope of work are summarized in the table below. PFC compounds which had no laboratory detections (PFUnA, PFDoA, PFOS and PFOSA) are not included in the table below.

Current and Previous Groundwater Sample PFC Detections
Richfield Fire Department Fire Foam Training Area

Sample ID	PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFBS	PFHxS
B-1 GW	1070	3470	3500	819	50.3	737	76.2
B-2 GW	1240	4890	4170	1920	1330	ND	ND
B-3 GW	201	331	888	217	458	293	689
B-4 GW	228	10.3	10.3	5.43	38.7	ND	71.4

Laboratory results in ng/L. Non-detect laboratory results are noted as ND.

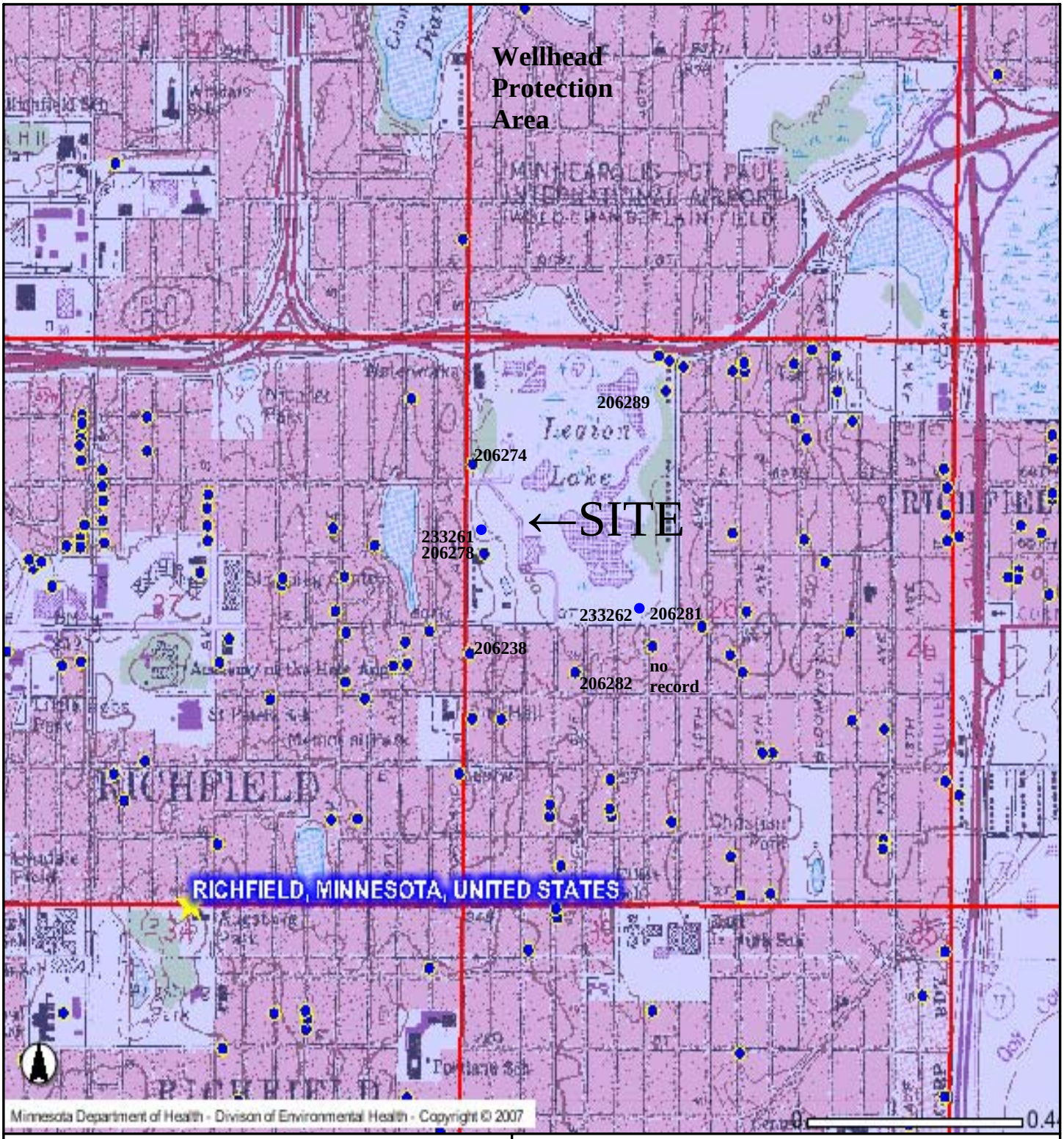
The concentrations of shorter-chain perfluorocarboxylic acids (PFBA, PFPeA, PFHxA and PFHpA) detected in the B-4 groundwater sample were an order of magnitude less than those detected in the B-1 and B-2 groundwater samples collected from the fire foam training area. Concentrations of PFOA and PFHxS were only slightly lower in the B-4 groundwater sample than the B-1 groundwater sample.

The source for PFCs in the groundwater B-4 is unknown, especially based on the current use of the area as a park. PFHxS and PFOS were detected in the soil sample collected from a depth of 0 to 8 feet bgs, indicating a source of PFCs in the immediate area of B-4. Since firefighting foam was not discharged in the area of B-4, and since B-4 was located in an assumed upgradient groundwater flow direction from the fire foam training area, firefighting foam is not suspected as a source of the PFCs detected in the B-4 soil or groundwater sample.

The groundwater sample collected from B-4 was intended to serve as a “background” groundwater concentration indicator. The calculated PFC concentrations for groundwater samples collected from B-1, B-2 and B-3, included in the table below, were calculated by subtracting the compound concentration detected in the B-4 sample from the detected compound concentration for that sample. For compounds where the concentration detected at B-4 was greater, the calculated compound concentration is shown as a (negative) number.

Calculated Groundwater PFC Concentrations, Less the Background B-4 GW Concentrations Richfield Fire Department Fire Foam Training Area							
Sample ID	**PFBA**	**PFPeA**	**PFHxA**	**PFHpA**	**PFOA**	**PFBS**	**PFHxS**
B-1 GW	842	3459.7	3489.7	813.57	11.6	737	4.8
B-2 GW	1012	4879.7	4159.7	1914.57	1291.3	ND	ND
B-3 GW	(27)	320.7	877.7	211.57	419.3	293	617.6

The calculated PFOA concentration for groundwater samples collected from B-2 and B-3 (less the background concentration at B-4) are still above the PFOA HRL of 300 ng/L.



LEGEND:

- Well Locations

North

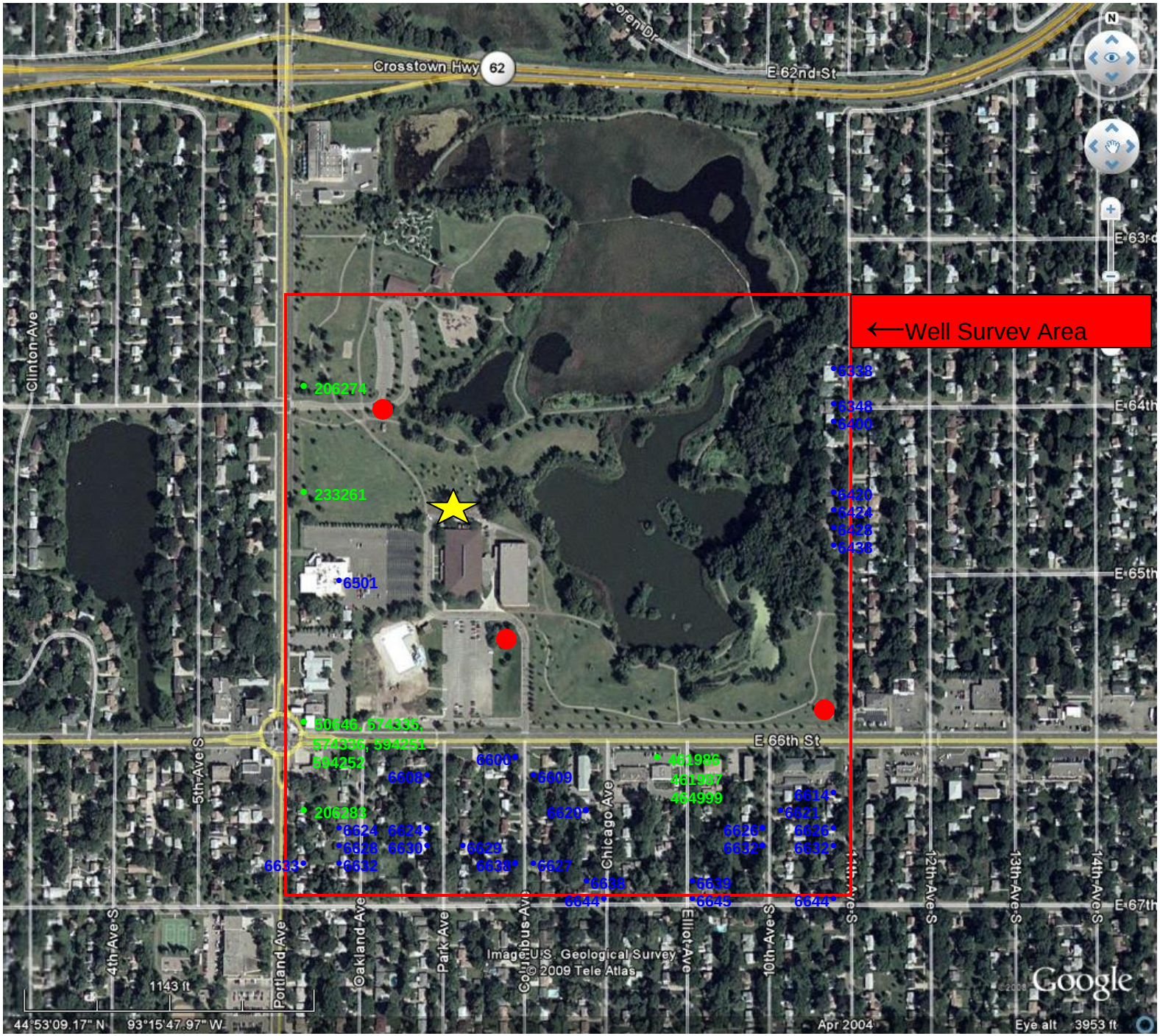
FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
RICHFIELD ICE ARENA
RICHFIELD, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		Richfield-1

DELTA

Fire Training Area
Richfield Ice Arena
Richfield, MN

DELTA



Former Fire Foam Training Area

Municipal Well

Wells Identified by CWI Only, with Unique Well ID

Private Well Identified in Survey, with Address

WATER WELL SURVEY AREA

Former Richfield Firefighting Foam Training Area

August 25, 2009

Property Owner or Tenant
xxxx 10th Avenue S.
Richfield, MN 55423

Subject: Water Well Survey Questionnaire

Dear Property Owner or Tenant:

The Minnesota Pollution Control Agency (MPCA) has requested that Delta Consultants (Delta) complete a survey of potential water wells for an investigation being conducted at the former Richfield Fire Training Area (Site), Richfield, Minnesota. The Site is located behind the Richfield Ice Arena. Enclosed please find a Well Survey Questionnaire for you to complete. The purpose of the survey is to identify the presence of possible groundwater exposure pathways (if any) for contaminants of concern that may have been released at the Site. The information provided by you will be utilized to evaluate possible human exposure risk at your property, due to your property's proximity to the Site. Based on this information, the MPCA and Delta may determine that it is necessary to collect a water sample on your property. There will be no cost to the property owner for this investigation.

Please send your completed questionnaire to Delta in the self-addressed, stamped envelope provided by September 9, 2009. If Delta does not receive your response by this date, Delta will assume the property does not have a water well. If you have any questions, or need help completing this form, please contact me at (651) 697-5152.

Thank you in advance for your time.

Sincerely,

DELTA CONSULTANTS

Nancy Rodning
Project Manager

Enclosures: Receptor Survey Questionnaire
Self-addressed, stamped envelope

a member of: Inogen Environmental Alliance

5910 Rice Creek Parkway Suite 100 St. Paul, MN 55126 USA
Phone: +1 651.639.9449 / USA Toll Free: 800.477.7411
Fax: +1 651.639.9473 www.deltaenv.com

Receptor Survey Questionnaire

PROPERTY ADDRESS: **xxxx 10th Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651-697-5152.

WATER WELL SURVEY
Former Richfield Firefighting Foam Training Area
Richfield, Minnesota

Survey Response Returned?	Address	Public Water Supply?	Well Installed	Well Status			Well Depth	Unique Well ID	Location / Comments
				Active	Abandoned	Sealed			
No	6334 11th Ave S								
Yes	6338 11th Ave S[1]	Yes	1957		Yes		unknown		In basement at back of house. Piping disconnected.
No	6344 11th Ave S								
Yes	6348 11th Ave S	Yes	1957		1960?		unknown		Under back step.
Yes	6400 11th Ave S	Yes	Yes			Yes	unknown		Well location unknown.
No	6404 11th Ave S								
No	6410 11th Ave S								
No	6414 11th Ave S								
Yes	6420 11th Ave S	Yes	1958			Yes	unknown		Sealed by previous owner. Had a certificate.
Yes	6424 11th Ave S	Yes	1956?			1986?	unknown		By east wall of house attached to furnace room.
Yes	6428 11th Ave S	Yes	1957			Yes	unknown		No well since they've lived there (15-16 years).
Yes	6438 11th Ave S	Yes	1959			1988	unknown		Basement.
Yes	6614 11th Ave S	Yes	1954?		Yes		unknown		Basement, east side of house. Well not active.
No	6620 11th Ave S								
Yes	6626 11th Ave S	Yes	~1950			1996	40 feet		South side of house.
Yes	6632 11th Ave S		Yes			Yes	unknown		
No	6638 11th Ave S								
Yes	6644 11th Ave S	Yes	~1950?		Yes	Yes	unknown		Not sure if abandoned or sealed. Located on the north side of the house.
Ret[2]	601 66th St E								Gas station and car wash.
No	701 66th St E								
Ret[2]	811 66th St E								
Yes	817 66th St E	Yes	1990			Yes	21 - 23 feet	461986, 461987, 464999	Abandoned monitoring wells.
Yes	901 66th St E	Yes	unknown						
No	1001 66th St E								
No	1015 66th St E								
No	6600 Chicago Ave S								
Yes	6620 Chicago Ave S	Yes	Yes			unknown	unknown		Northwest side behind home, in backyard.
No	6626 Chicago Ave S								
No	6632 Chicago Ave S								
Yes	6638 Chicago Ave S	Yes	1960		Yes		50 feet	206282	Basement.
Yes	6644 Chicago Ave S	Yes	Yes			Yes	unknown		Under side stoop.
No	6611 Chicago Ave S								

WATER WELL SURVEY
Former Richfield Firefighting Foam Training Area
Richfield, Minnesota

Survey Response Returned?	Address	Public Water Supply?	Well Installed	Well Status			Well Depth	Unique Well ID	Location / Comments
				Active	Abandoned	Sealed			
Yes	6621 Chicago Ave S	Yes	No						
No	6627 Chicago Ave S								
No	6633 Chicago Ave S								
No	6639 Chicago Ave S								
No	6645 Chicago Ave S								
Yes	6600 Columbus Ave S	Yes	~1949			>1995	unknown		Below the side door steps.
No	6610 Columbus Ave S								
No	6616 Columbus Ave S								
No	6624 Columbus Ave S								
No	6632 Columbus Ave S								
Yes	6638 Columbus Ave S	Yes	1950			>2005	unknown		In the laundry room on the north side of the home, to the right of the side steps.
No	6644 Columbus Ave S								
No	6601 Columbus Ave S								
Yes	6609 Columbus Ave S	Yes	Yes		Yes	unknown	unknown		In pump room at north end of east side of house.
No	6615 Columbus Ave S								
No	6621 Columbus Ave S								
Yes	6627 Columbus Ave S	Yes	Yes			Yes	unknown		Basement.
No	6633 Columbus Ave S								
Yes	6639 Columbus Ave S	Yes	unknown						
No	6645 Columbus Ave S								
No	6614 Elliot Ave S								
No	6620 Elliot Ave S								
Yes	6626 Elliot Ave S	Yes	unknown						
No	6632 Elliot Ave S								
No	6638 Elliot Ave S								
Yes	6644 Elliot Ave S	Yes	unknown						
Yes	6615 Elliot Ave S	Yes	unknown			Yes	unknown		Basement.
No	6621 Elliot Ave S								
No	6627 Elliot Ave S								
No	6633 Elliot Ave S								
Yes	6639 Elliot Ave S[1]	Yes	Yes		Yes		unknown		Directly behind house, not used in 30 years. No power to well pump, if present.
Yes	6645 Elliot Ave S	Yes	1946?			2007?	unknown		Under front steps.
Ret[2]	6600 Oakland Ave S								
No	6612 Oakland Ave S								
No	6620 Oakland Ave S								
Yes	6624 Oakland Ave S	Yes	1948-1949?			1991	40 - 44 feet		South side of basement foundation wall.

WATER WELL SURVEY
Former Richfield Firefighting Foam Training Area
Richfield, Minnesota

Survey Response Returned?	Address	Public Water Supply?	Well Installed	Well Status			Well Depth	Unique Well ID	Location / Comments
				Active	Abandoned	Sealed			
Yes	6628 Oakland Ave S[1]	Yes	1962		Yes		unknown		Basement, south side.
Yes	6632 Oakland Ave S	Yes	Yes			>1986	unknown		Under back door step.
No	6640 Oakland Ave S								
No	6644 Oakland Ave S								
No	6601 Oakland Ave S								
No	6609 Oakland Ave S								
No	6615 Oakland Ave S								
No	6619 Oakland Ave S								
No	6625 Oakland Ave S								
No	6631 Oakland Ave S								
No	6639 Oakland Ave S								
No	6643 Oakland Ave S								
No	6600 Park Ave S								
Yes	6608 Park Ave S	Yes	1949			>10 yrs ago	unknown		South side of house in the basement.
Yes	6618 Park Ave S	Yes	No						
Yes	6624 Park Ave S	Yes	Yes			Yes			Well sealed prior to 2000.
Yes	6630 Park Ave S	Yes	Yes			Yes	< 8 ft*		*The space visible in the basement.
No	6636 Park Ave S								
Yes	6644 Park Ave S	Yes	No						
No	6611 Park Ave S								
No	6617 Park Ave S								
No	6621 Park Ave S								
Yes	6629 Park Ave S	Yes	Yes			Yes	unknown		North side of house.
No	6637 Park Ave S								
No	6645 Park Ave S								
Ret[2]	6545 Portland Ave S		1996 - 1997	unknown			41 - 44 feet	560646, 574335, 574336, 594251, 594252	Monitoring wells, Amoco Corp. Station no longer present.
No	6527 Portland Ave S								
No	6505 Portland Ave S								
Yes	6501 Portland Ave S	Yes	Yes			early 1990's	168 feet	206278	South side of American Legion building.
Ret[2]	6613 Portland Ave S								
Ret[2]	6617 Portland Ave S								
Ret[2]	6621 Portland Ave S		1960				50 feet	206283	Vacant lot at 6621 Portland Av S observed during walking survey.
Ret[2]	6625 Portland Ave S								
No	6629 Portland Ave S								
Yes	6633 Portland Ave S[1]	Yes	Yes		Yes		unknown		Basement/laundry room. Pipe filled with concrete.

WATER WELL SURVEY
Former Richfield Firefighting Foam Training Area
Richfield, Minnesota

Survey Response Returned?	Address	Public Water Supply?	Well Installed	Well Status			Well Depth	Unique Well ID	Location / Comments
				Active	Abandoned	Sealed			
No	6637 Portland Ave S								
No	6645 Portland Ave S								
NA	6339 Portland Ave S		1960	unknown			49 feet	206274	Commercial well, owner Okerman & Huntstead.
NA	East of Portland Ave, between 64th and 66th			unknown			406 feet	233261	Test well, City of Richfield.
NA	813 66th Street E		1990			Yes	18 feet	465274	Abandoned monitoring well.

Notes:
Water well surveys mailed out on or about August 25, 2009.
Unique well ID numbers obtained from County Well Index (CWI) available on the Minnesota Department of Health website.
NA: not applicable, survey not mailed. Information obtained from CWI.
(1) Property owner or tenant contacted for further information regarding well.
(2) Mailed survey returned as undeliverable.

DELTA

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6620 10th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2. There is an exposed open pipe beside grate - not sure what it is beside I moved in in 1999

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Steve Dzikowski

Telephone Number 612 203 0358 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6621 10th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___✓___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? ___✓___

1d. If the well was abandoned, what year was the well sealed? ___?___

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? basement

_____

not active

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name BARBARA FEARS

Telephone Number 612-866-6740 DAY or (EVENING) (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Barbara Fears

Telephone Number 612 8666740 DAY or (EVENING) (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6626 10th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? Unknown

1d. If the well was abandoned, what year was the well sealed? prior to 1985

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) Not active

1f. Where on the property is (was) the well located? unsure

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Bridget Caeleigh

Telephone Number 612 869 4480 DAY or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6632 10th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___✓___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? probably around 1950

1d. If the well was abandoned, what year was the well sealed? around 2000

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? Under the side door step on well room

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Clarence Rangelhoff

Telephone Number 612-869-7185 (DAY) or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6338 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ____✓____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ____✓____)

1c. In what year was the well installed (if known)? 1957

1d. If the well was abandoned, what year was the well sealed? it isn't sealed

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? Back of house

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No NA

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name John Ashmead

Telephone Number 612-861-2992 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6348 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___✓___ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? 1957

1d. If the well was abandoned, what year was the well sealed? Not sure about 1960

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? under back stair

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Joseph Anderson

Telephone Number 612 866 9108 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6400 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___X___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? Not known

1d. If the well was abandoned, what year was the well sealed? "

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? Unknown

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Carol Prophet

Telephone Number 612-869-6951 DAY or (EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6420 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ✓ SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ✓)

1c. In what year was the well installed (if known)? house built in 1958

1d. If the well was abandoned, what year was the well sealed? ? Previous owner had it capped + sealed. Had certificate.

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

1f. Where on the property is (was) the well located? basement access - back patio

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Carole Rinder

Telephone Number 612 861-3435 DAY or (EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6424 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___✓___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ✓)

1c. In what year was the well installed (if known)? 1956 (?) Year house was built

1d. If the well was abandoned, what year was the well sealed? prior to 1992 (maybe 1986)

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) N/A

1f. Where on the property is (was) the well located? by east wall of house attached to furnace room

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No** N/A

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name DAVID C DEITER

Telephone Number 612-869-7459 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6428 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? 1957

1d. If the well was abandoned, what year was the well sealed? unknown greater than 15yrs

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No

Name Cari & John Junkers

Telephone Number 612-861-5339 DAY or (EVENING) (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Cari & John Junkers

Telephone Number 612-861-5339 DAY or (EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6438 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___X___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? ___± 1959___

1d. If the well was abandoned, what year was the well sealed? ___approx 1988___

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? ___Basement___

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes No

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Ollie Hoffman

Telephone Number 612-861-1142 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6614 11th Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___X___ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___X___)

1c. In what year was the well installed (if known)? 1954?

1d. If the well was abandoned, what year was the well sealed? UNKNOWN

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) NOT ACTIVE

1f. Where on the property is (was) the well located? BASEMENT, EAST SIDE OF HOUSE

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No

Name TINA AUSTIN

Telephone Number 612-798-3632 DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name TINA AUSTIN

Telephone Number 612-798-3632 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6626 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? 40 FEET (if depth is unknown check here ____)

1c. In what year was the well installed (if known)? about 1950

1d. If the well was abandoned, what year was the well sealed? 1996

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) N/A

1f. Where on the property is (was) the well located? South side of House

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No** N/A

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Marguerite F Lacey

Telephone Number 612-866-8927 DAY or (EVENING) 6 to 8 PM (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6632 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___X___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___X___)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6644 11th Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___?___ABANDONED ___X___SEALED ?

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? House built in 1950 - same time would be my guesss

1d. If the well was abandoned, what year was the well sealed? ?

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

North side of house

_____

1g. If there is currently a water supply well on the property, would you order to obtain a water sample from either an indoor or outside spigot (abandoned well) or unknown/ unsure.

Yes **No**

Name N/A

Telephone Number_____DAY and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Andy Gray

Telephone Number 612-866-2553 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 817 66th St E, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Patricia Reiman

Telephone Number 612 8699101 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **901 66th St E, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6620 Chicago Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ✓ SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ✓)

1c. In what year was the well installed (if known)? unknown

1d. If the well was abandoned, what year was the well sealed? unknown

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) N/A

1f. Where on the property is (was) the well located? North west side behind home (backyard)

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6621 Chicago Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** (**No**) **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (**Yes**) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Pho Sany Soovannarath

Telephone Number 612.861.8575 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6638 Chicago Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___X___ABANDONED _____SEALED

1b. How deep is (was) the well? 6?' FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____?

1d. If the well was abandoned, what year was the well sealed? _____?

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? basement

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) **No**

Name Linda St Clair

Telephone Number 612-251-6813 DAY or EVENING (please circle one and ~~state best~~ time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Same as above

Telephone Number_____ DAY or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6644 Chicago Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? ____?____

1d. If the well was abandoned, what year was the well sealed?____?____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)____N/A_____

1f. Where on the property is (was) the well located?__UNDER SIDE STOOP__

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes No

Name~~RON WILSON~~ N/A

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name RON WILSON

Telephone Number 612-243-1315 DAY or (PM) EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6600 Columbus Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __✓__)

1c. In what year was the well installed (if known)? about 1949 or so - Not sure that was when the house was moved to this location -

1d. If the well was abandoned, what year was the well sealed? before we bought the house in 2005

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) (Not active)

1f. Where on the property is (was) the well located? below the sidewalk slope (there was a well cover under the sidewalk step)

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes (No) (sealed)

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Sandy Clay / Glen Clay

Telephone Number 612 [illegible] (DAY) or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6609 Columbus Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___/___ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___?___)

1c. In what year was the well installed (if known)? ___?___

1d. If the well was abandoned, what year was the well sealed? ___?___

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? IN pump Room @ NORTH END of EAST Side of House

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No

Name Robert FURANO Please Leave Message if NO ANSWER!

Telephone Number 612 869 0239 DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Robert FURANO

Telephone Number 612 869 0239 DAY or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6627 Columbus Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED X SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ✓)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? Basement

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) (No)

Name Greg

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Greg Hamel

Telephone Number 612-798-3699 after 6:00 pm DAY or (EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6638 Columbus Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? 1950

1d. If the well was abandoned, what year was the well sealed? not sure, for sure before 2005

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.) not active

1f. Where on the property is (was) the well located? in the laundry room on the north side of the home, to the right of the side steps

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** (No)

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Jordana Allard

Telephone Number 612-866-8760 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6639 Columbus Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Marilee Dunsmore

Telephone Number 952-925-8550 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6615 Elliot Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___✓___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___✓___)

1c. In what year was the well installed (if known)? unknown

1d. If the well was abandoned, what year was the well sealed? unknown

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____
basement

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No** it is sealed so I don't believe you can obtain sample.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Lisa & Travis Gorske

Telephone Number 612-345-6862 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6626 Elliot Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Pam Samuelson

Telephone Number (612) 866-4849 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6639 Elliot Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___)

1c. In what year was the well installed (if known)? No Clue

1d. If the well was abandoned, what year was the well sealed? MN sealed

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? directly behind house

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name ROBT & DIANE PEMBERTON

Telephone Number 612 869 9363 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6644 Elliot Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name JAMES Ryan

Telephone Number 612-866-6987 DAY or EVENING (please circle one and state best time to reach you)

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If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6645 Elliot Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), (*abandoned* (not in use)), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED X SEALED

1b. How deep is (was) the well? 5 FEET (if depth is unknown check here X)

1c. In what year was the well installed (if known)? approx. 1946

1d. If the well was abandoned, what year was the well sealed? 2007 ?

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

1f. Where on the property is (was) the well located? under front steps

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No** I don't believe there is a water supply

Name_____

Telephone Number_____ DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Mary N. Fuller

Telephone Number 612-869-0319 (DAY) or EVENING (please circle one and state best time to reach you) 10AM

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6624 Oakland Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___X___SEALED

1b. How deep is (was) the well? 40-44 FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? 1948-49 estimate

1d. If the well was abandoned, what year was the well sealed? 9-24-1991 I purchased the home 1/1992

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? South Side of basement foundation wall

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Kimberly V South

Telephone Number 612-861-5528 DAY or EVENING (please circle one and ~~state~~ best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6628 Oakland Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___X___ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___X___)

1c. In what year was the well installed (if known)? 1962

1d. If the well was abandoned, what year was the well sealed? WASN'T EVER SEALED

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? BASEMENT - SOUTH SIDE

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name JOAN FORMANEK

Telephone Number 612 869 6139 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6632 Oakland Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED ___X___SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ___X___)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed? Prior to 1986

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? under back door step

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No

Name Don Beyl

Telephone Number 952 653 1466 (DAY) or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name ABOVE

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6608 Park Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? 1949

1d. If the well was abandoned, what year was the well sealed? at least 10 years ago

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? South side of house in the basement

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6618 Park Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? **Yes** (**No**) **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (**Yes**) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Jessica Popehn

Telephone Number 612-861-9995 (DAY or EVENING (please circle one ~~and state best~~ time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6624 Park Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed? before 2000

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____ DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Michelle + Dan Mathias

Telephone Number (612-861-2327 (DAY or EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6629 Park Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **(Yes)** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here __X__)

1c. In what year was the well installed (if known)? ____?____

1d. If the well was abandoned, what year was the well sealed?____?____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_North side of the house_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **(Yes)** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Julie Traft

Telephone Number 612-237-6098 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6630 Park Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** **No** **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed? _____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? **Yes** **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6644 Park Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? **Yes** (No) **Unknown**

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED _____SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here _____)

1c. In what year was the well installed (if known)? _____

1d. If the well was abandoned, what year was the well sealed?_____

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located?_____

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes **No**

Name_____

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) **No**

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name DAVE SCHMIDT

Telephone Number 612-861-7208 DAY or (EVENING) (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: **6501 Portland Ave S, Richfield, MN 55423**

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE _____ABANDONED __X__SEALED

1b. How deep is (was) the well? _____FEET (if depth is unknown check here ✓)

1c. In what year was the well installed (if known)? ?

1d. If the well was abandoned, what year was the well sealed? EARLY 90S

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

1f. Where on the property is (was) the well located? SOUTH SIDE OF BUILDING

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

Yes (No)

Name JON SMITH MAINT MGR

Telephone Number 612 866 3647 (DAY or EVENING (please circle one and state best time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name SAME AS ABOVE

Telephone Number_____DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

Receptor Survey Questionnaire

PROPERTY ADDRESS: 6633 Portland Ave S, Richfield, MN 55423

1. Is there, or has there ever been, a water well on the property? (Yes) No Unknown

If you answered **No or Unknown**, proceed to Question 2.

1a. If you answered **Yes**, is the well *active* (in use), *abandoned* (not in use), or *sealed* (decommissioned following Minnesota Department of Health [MDH] Well Code guidelines).

_____ACTIVE ___X___ABANDONED _____SEALED

1b. How deep is (was) the well? ___?___FEET (if depth is unknown check here ___X___)

1c. In what year was the well installed (if known)? ___?___

1d. If the well was abandoned, what year was the well sealed?___?___

3e. If the well is active, for what purpose is it used? Example: (drinking water, lawn sprinkler, cooling, etc.)_____

_____

1f. Where on the property is (was) the well located? Basement / Laundry room

_____

_____

1g. If there is currently a water supply well on the property, would you grant access to the property in order to obtain a water sample from either an indoor or outside spigot (at no cost to property owner)?

(Yes) No

Name Leo Murphy

Telephone Number 612-598-1680 (DAY) or (EVENING) (please circle one and state ~~best~~ time to reach you)

2. Is public water supply currently utilized by the property? (Yes) No

3. May we contact you for further information if necessary? If so, please provide your name and telephone number.

Name Leo Murphy

Telephone Number 612-598-1680 DAY or EVENING (please circle one and state best time to reach you)

Please complete this form and mail it back to Delta in the enclosed self-addressed stamped envelope. Delta thanks you in advance for taking the time to complete this form.

If you have any questions, or need help completing this form, please feel free to contact Nancy Rodning at (651)697-5152.

DELTA

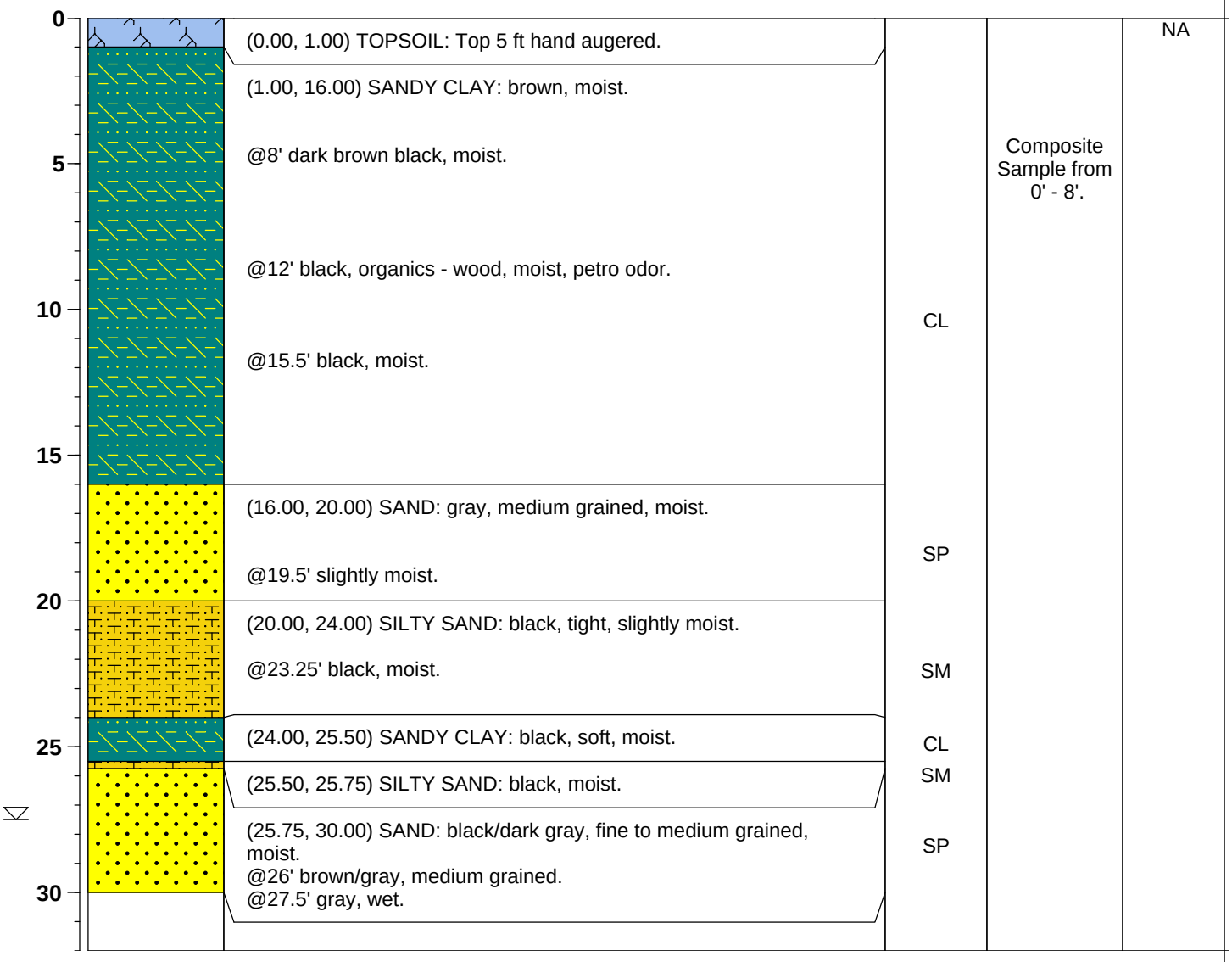
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-4**

TOTAL DEPTH: **30 feet below surface**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **Richfield, MN**	Drill Crew Chief:
Job No.: **19382DEL06**	Rig Type: **Truck-Mounted Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather:	Soil Sampling Method: **4' samplers with liners**
Date Completed: **10/8/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **27.5 feet below surface**	Field Screening Instrument: **None**



DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	NA ppm
		(0.00, 1.00) TOPSOIL: Top 5 ft hand augered.			NA
		(1.00, 16.00) SANDY CLAY: brown, moist.			
		@8' dark brown black, moist.		Composite Sample from 0' - 8'.	
		@12' black, organics - wood, moist, petro odor.	CL		
		@15.5' black, moist.			
		(16.00, 20.00) SAND: gray, medium grained, moist.	SP		
		@19.5' slightly moist.			
		(20.00, 24.00) SILTY SAND: black, tight, slightly moist.	SM		
		@23.25' black, moist.			
		(24.00, 25.50) SANDY CLAY: black, soft, moist.	CL		
		(25.50, 25.75) SILTY SAND: black, moist.	SM		
		(25.75, 30.00) SAND: black/dark gray, fine to medium grained, moist. @26' brown/gray, medium grained. @27.5' gray, wet.	SP		

Comments: E.O.B. at 30'.

Boring Location: 44 53.184' N / 93 16.033' W

APPENDIX J

Burnsville ABLE Fire Training Center Discussion and Supporting Documents

Background and Access – Burnsville Fire Foam Training Area

The Burnsville Fire Department Assistant Fire Chief returned a completed firefighting foam use questionnaire to Delta in May 2008, indicating the department's use of Ansul-brand AFFF and AR-AFFF in training exercises conducted at the ABLE Fire Training Center in Burnsville. A copy of the completed questionnaire was included in Appendix C of Delta's June 2009 Report. The ABLE Fire Training Center is jointly owned by the cities of Apple Valley, Burnsville, Lakeville and Eagan. The ABLE Fire Training Center is located at the southeast corner of the intersection of Cliff Road and River Ridge Boulevard in Burnsville; the location of the training center is shown on **Figure 1, *Fire Foam Training Area Location, Burnsville ABLE Fire Training Center,*** included in **Appendix J**. The Burnsville Fire Department has trained with Class B foam approximately three times since the fire training center was built in 1989, and the last Class B foam training event was in 2004. Five to ten gallons of foam concentrate are used per event. No burn pans or live fire are utilized in the training exercises, foam is just discharged into a wooded area where spent foam is allowed to break down and dissipate. The training area is shown on the figure ***Fire Foam Training Area, ABLE Fire Training Center,*** included in **Appendix J**. Surface drainage from the foam training area is down a hill toward the north. Photographs of the area where Class B foam was discharged are included in **Appendix J**.

A copy of an access agreement signed by the Burnsville Assistant Fire Chief and the MPCA, allowing access for a site reconnaissance and sampling at the ABLE Fire Training Center, was included in Appendix C of Delta's June 2009 Report.

As presented in Delta's April 2009 report, the inferred groundwater flow direction in the area of the Burnsville Fire Station area is to the north-northwest, toward the Minnesota River.

Other Users of the ABLE Fire Training Center

The fire departments of the other cities that jointly own the ABLE Fire Training Center were contacted by Delta to confirm their departments' use of firefighting foam at the ABLE Fire Training Center. The Apple Valley Fire Department Deputy Fire Chief confirmed that, while they conduct some training at the ABLE Center, the Apple Valley Fire Department has not trained with foam there. The Lakeville Fire Department Fire Chief reported that the Lakeville Fire Department does not regularly train at the ABLE Center, nor have they trained with Class B foam there. The Eagan Fire Department Fire Chief indicated that only Class A foam, and not Class B foam, is utilized for training by the Eagan Fire Department.

Sample Collection – Burnsville Fire Foam Training Area

As presented in the June 2009 Report, two soil borings (B-1 and B-2) were advanced within the fire foam training area on April 24, 2009. Soil boring locations are shown on the figure ***Fire Foam Training Area, ABLE Fire Training Center,*** included in **Appendix J**. Information, data and documentation for the two borings was presented in the June 2009 Report. Laboratory analysis of soil samples collected from depths of 0-4 feet below grade surface (bgs) and 4-8 feet bgs from B-1 and B-2 identified PFCs in all four soil samples. Drill refusal was experienced in both borings prior to reaching the water table, thus, groundwater samples were not collected from B-1 or B-2.

On August 27, 2009, soil boring B-3 was advanced adjacent to the location of B-1 for the purpose of collecting a groundwater sample. Boring B-3 was advanced by Stevens Drilling & Environmental using hollow stem auger drilling technology, under the oversight of Delta personnel. While soil samples were not collected from B-3, soils brought up by the augers were observed and recorded on a soil boring log. The soil boring log is included in **Appendix J**. Soils encountered in B-3 were consistently fine- to medium-grained sand. Boring B-3 was advanced to a depth of 50 feet before groundwater was encountered; the water table rose to a depth of 44.5 feet bgs in the auger. A groundwater sample was collected using a disposable, non-Teflon® bailer. Upon completion of sampling the boring was grouted and sealed in accordance with applicable State requirements.

The groundwater sample was collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Groundwater Sampling Results – Burnsville Fire Foam Training Area

Laboratory analysis detected PFC compound concentrations in the B-3 groundwater sample collected from the Burnsville Fire Department's fire foam training area as listed in the table below. All groundwater sample results, including non-detect results, are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*,** of this report.

Groundwater Sample PFC Detections – Burnsville Fire Department Fire Foam Training Area	
Sampling Location	**Compound Concentration**
B-3	146 ng/L PFBA
	422 ng/L PFPeA
	281 ng/L PFHxA
	447 ng/L PFHpA

Groundwater Sample PFC Detections – Burnsville Fire Department Fire Foam Training Area	
Sampling Location	**Compound Concentration**
	1260 ng/L PFOA
	81.7 ng/L PFNA
	17.8 ng/L PFDA
	12.8 ng/L PFBS
	279 ng/L PHFxS
	522 ng/L PFOS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Burnsville Fire Foam Training Area

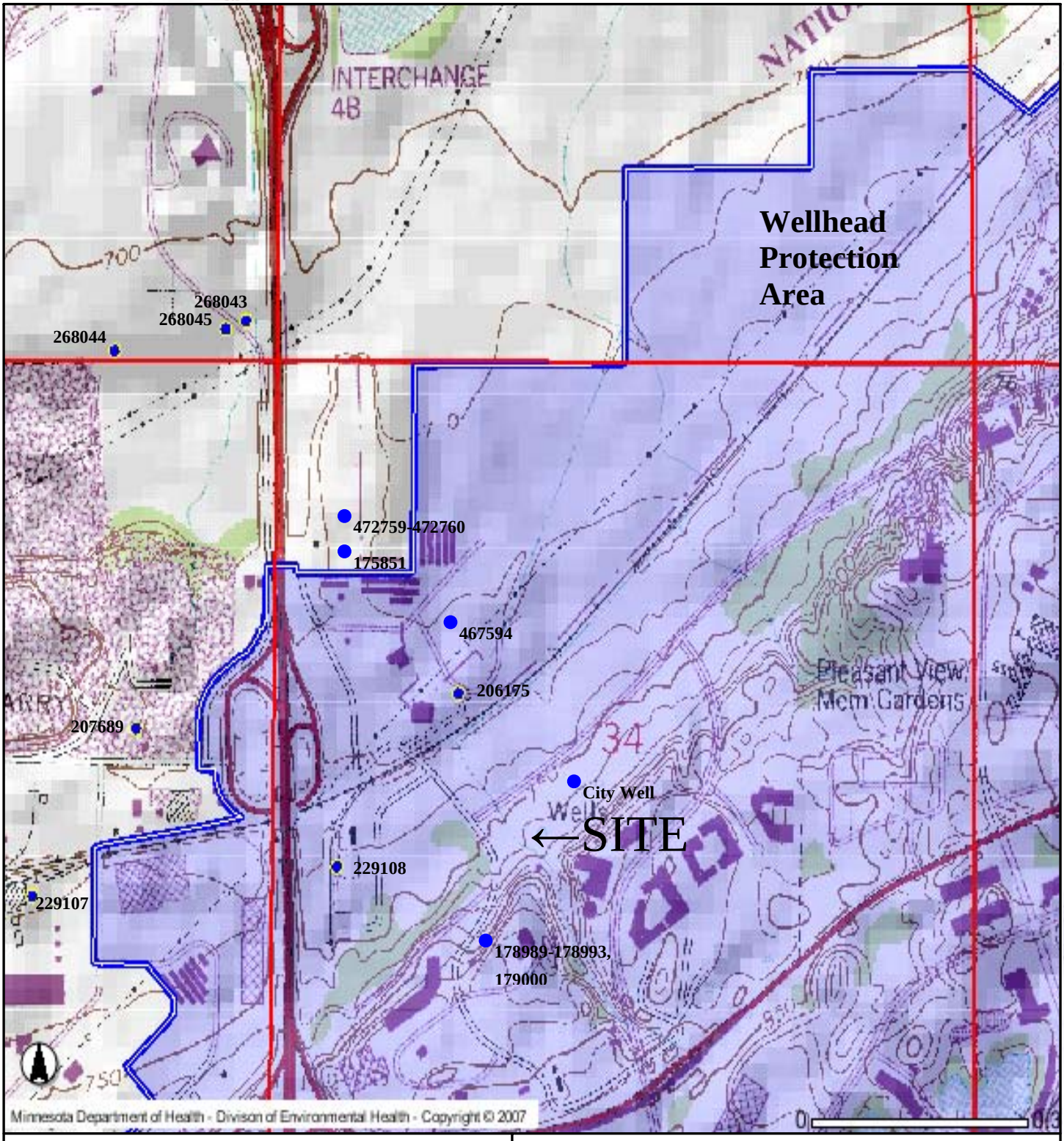
Based on information provided by the Burnsville Fire Department Assistant Fire Chief and the Training Officer, approximately 15 to 30 gallons of Ansul-brand AR-AFFF was discharged by the Burnsville Fire Department at the fire foam training area from 1989 through 2004. According to information provided by other municipal fire departments with joint ownership of the ABLE Fire Training Center, the other fire departments have not trained with Class B AFFF at the training center.

The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values. The detected PFOA and PFOS concentrations in the B-3 groundwater sample exceeded the HRLs. The PFBA and PFBS concentrations in the B-3 groundwater sample were below the HBVs.

In analyzing PFC compound concentrations in soil and groundwater samples collected at the Burnsville fire foam training area, Delta makes the following observations:

- Relatively higher concentrations of PFOA and PFOS were detected in both the soil and the groundwater samples. This trend is reflected in **Graph A, *Burnsville Soil and Groundwater Samples, PFC Concentrations***.
- While PFBS was detected in the groundwater sample, PFBS was not detected in the soil samples.

- PFDoA and PFUnA were detected in the shallow soil sample collected from B-1, however, these compounds were not detected in the deeper B-1 soil sample nor in the B-3 groundwater sample.



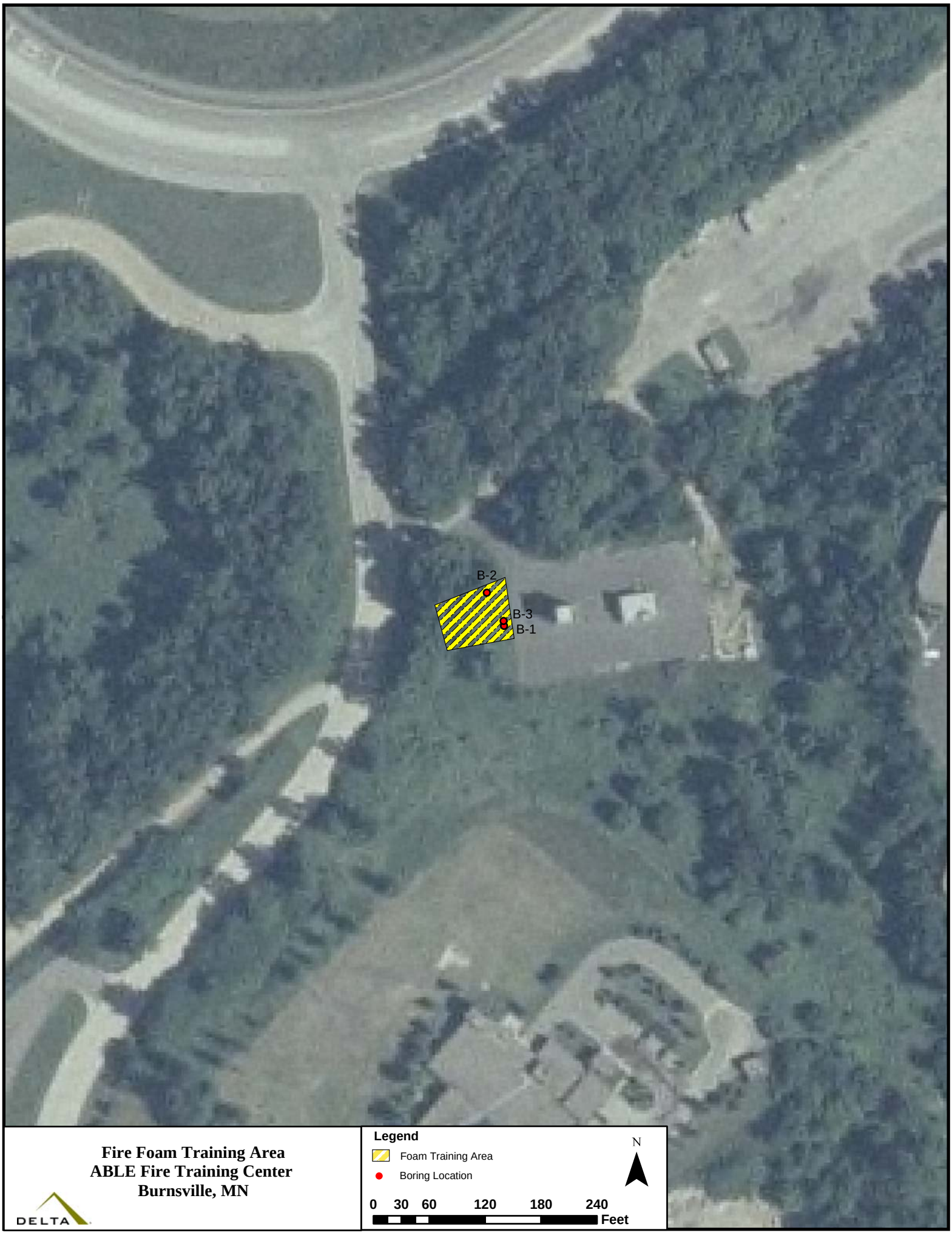
LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
BURNSVILLE ABLE FIRE TRAINING CENTER
BURNSVILLE, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY	
19382DEL	NR	DD	
DATE	REVIEWED BY	FILE NAME	
5/12/09		Burnsville-1	DELTA



Fire Foam Training Area
ABLE Fire Training Center
Burnsville, MN

DELTA

ABLE Fire Training Center, Burnsville
Fire Foam Training Area
March 31 and April 24, 2009

Photograph 1
Fire foam is sprayed from the edge of the asphalt into the wooded area. View facing northwest. Stakes mark soil boring locations B-1, B-3 and B-2.

Photograph 2
View of the fire foam training area (at left) facing north. Runoff from the fire foam training area would drain downhill to the north.

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-3**

TOTAL DEPTH: **50 feet below surface**

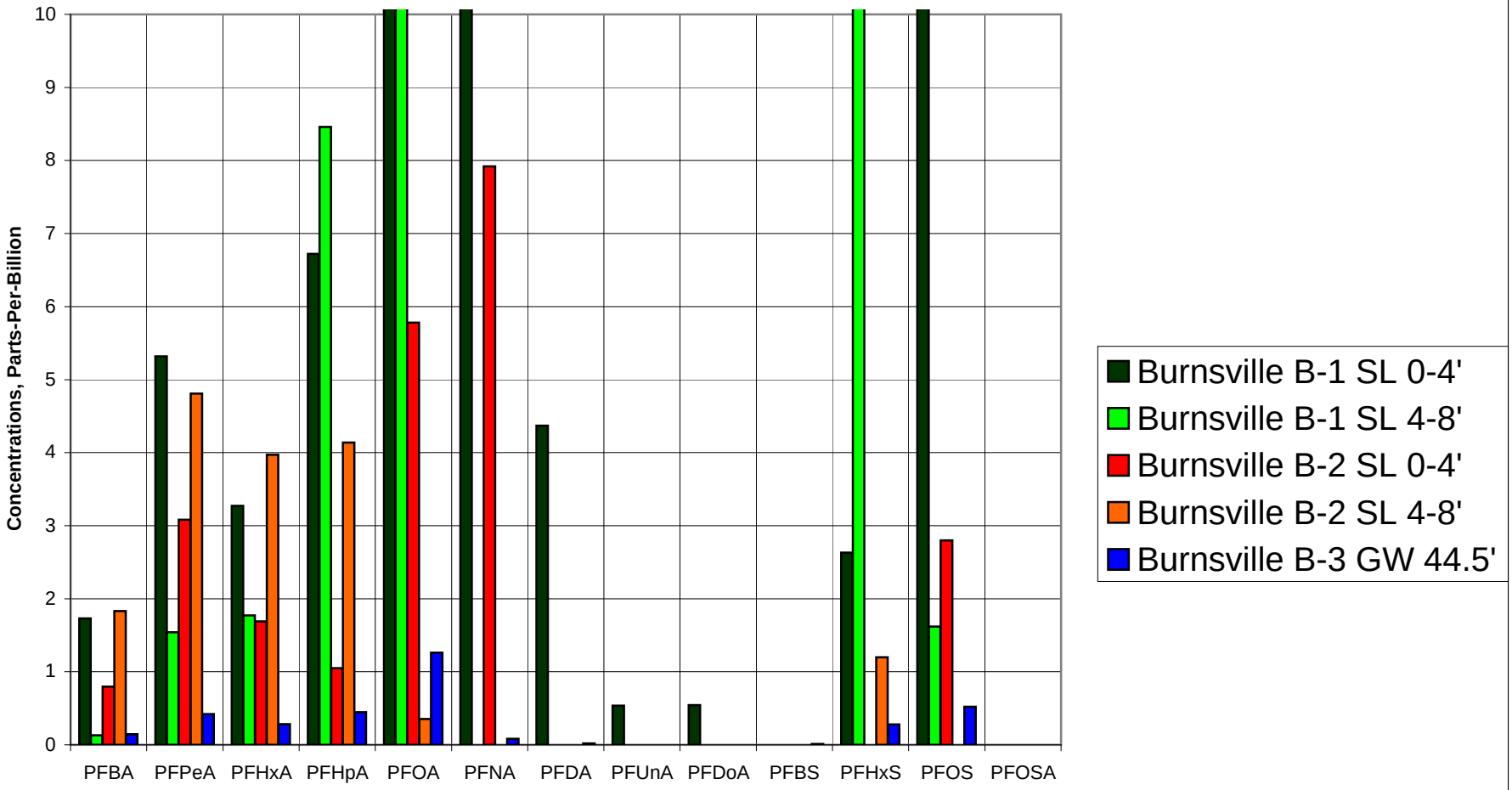
PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Stevens Drilling**
Site Location: **Burnsville, MN**	Drill Crew Chief: **Randy Johnson**
Job No.: **19382DEL05**	Rig Type:
Logged By: **Nancy Rodning**	Method of Drilling: **Hollow Stem Auger**
Weather:	Soil Sampling Method: **NA**
Date Completed: **8/27/09**	Surface Elevation (feet): **NA**
▽ Water Level During Drilling: **44.5 feet below surface**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	NA ppm
0		(0.00, 50.00) SAND: fine grained. Soil descriptions based on drill cuttings - no soil samples collected.	SP	NA	NA
5					
10					
15					
20					
25					
30					
35					
40					
▽ 45					
50					

Comments: E.O.B. at 50'.

Boring Location: 44 46.859 N / 93 16.913 W

GRAPH A
Burnsville Soil and Groundwater Samples
PFC Concentrations



Note: PFOA, PFNA and PFOS concentrations for B-1, 0-4', and PFOA and PFHxS concentrations for B-1, 4-8', are greater than 10 ppb.

APPENDIX K

Crystal Airport Foam Discharge Discussion and Supporting Documents

Background and Access – Crystal Airport Firefighting Foam Discharges

As discussed in the Brooklyn Center site discussion in Appendix B of Delta's June 2009 Report, the Brooklyn Center Fire Chief indicated that the Brooklyn Center Fire Department responded to a hangar fire at the Crystal Airport in 2006. While the Brooklyn Center Fire Department did not utilize Class B foam at the fire, the Fire Chief had no knowledge as to foam used by other responding departments. According to the Metropolitan Airports Commission, the responding fire department at Crystal Airport is the West Metro Fire District. According to the firefighting foam questionnaire returned by the West Metro Fire District in April 2008, they use Ansul-brand AR-AFFF for fire response and typically use training foam for fire training exercises.

Delta interviewed the West Metro Fire District Fire Chief in August 2009 regarding the 2006 hangar fire. The Fire Chief indicated that the West Metro District Fire Department responded to the hangar fire with Class A foam only; no Class B foam was used. The Fire Chief related that Fire Aide 2000 firefighting foam was used in response to a plane crash at the Crystal Airport in June 2009. Manufacturer information on Fire Aide 2000 indicates that the foam contains no PFOS or PFOA, and that the foam can be used on Class A or Class B fires. The West Metro District Fire Chief recalled that their department responded to three other aircraft crashes at the Crystal Airport, in November 2004, April 2002 and March 2001, but did not know the type of quantity of firefighting foam used at those crashes.

The Brooklyn Park Fire Department also responded to the 2006 hangar fire at Crystal Airport. According to the Deputy Fire Chief with the Brooklyn Park Fire Department, his department would have used Class A foam if any foam was used, since the fire was mainly structural.

The Crystal Airport is located east of the intersection of County Road 81 and 58th Avenue North in Crystal, Minnesota, as shown on **Figure 1, *Site Location Map, Crystal Airport***, which is included in **Appendix K**.

Site Reconnaissance – Crystal Airport

Site reconnaissance of the Crystal Airport was conducted on October 13, 2009. Delta representative Nancy Rodning and MPCA Project Manager Nile Fellows were accompanied by the Metropolitan Airports Commission (MAC) Manager of Reliever Airports (including Crystal Airport) and the MAC Environmental Administrator. The locations of the June 2009 plane crash and the 2006 hangar fire were pointed out by MAC personnel, as were the general storm water runoff paths from various parts of the airport. Generally, storm water runoff flows through various pathways to Shingle Creek, which is located along the east-northeast boundary of the airport. Shingle Creek flows to the southeast, to Twin Lakes. The figure ***PFC***

Sampling Locations, Crystal Airport showing the layout of the airport is included in **Appendix K**. Photographs of pertinent features observed during the site reconnaissance, including proposed sampling locations, are included on a photo log in **Appendix K**.

Since the exact locations of other past plane crashes at the airport and the details regarding foam use at these plane crashes referenced by the West Metro Fire District Fire Chief are unknown, it was decided to sample within two stormwater flow paths that drain the main runway areas of the airport. Delta recorded GPS locations of the June 2009 plane crash and the proposed boring locations using a hand-held GPS unit with an accuracy of approximately 15 feet.

An access agreement between MAC and the MPCA was executed on December 29, 2009, allowing for soil and groundwater sampling within two stormwater drainage paths, sediment and surface water sampling at two locations in Shingle Creek, and surface soil sampling at the location of the June 2009 plane crash. A copy of this access agreement is included in **Appendix K**.

Sample Collection – Crystal Airport

On January 20, 2010, two soil borings were advanced at Crystal Airport within two separate stormwater drainage paths located east of the airport runways. Soil boring locations are shown on the ***PFC Sampling Locations, Crystal Airport*** figure. Soil borings were advanced by Thein Well Company using push probe drilling technology, under the oversight of Delta personnel and accompanied by MAC personnel. Soil boring logs detailing soil descriptions, groundwater depths, boring depths, and the GPS locations of the borings are included in **Appendix K**.

Borings B-1 and B-2 were advanced to a depth of 8 feet below grade surface (bgs). Groundwater was encountered at depths of 5.5 feet to 6 feet bgs. Soils encountered in both borings consisted of brown medium- to large-grained sand. No staining, or foul or unusual odors were noted in the soils. Soil samples were collected from B-1 and B-2 from depths of 0 to 4 feet bgs and from 4 to 8 feet bgs for laboratory analysis of PFCs. Temporary wells with five-foot screens were set to the bottom of the borings for the collection of groundwater samples. Upon completion of groundwater sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

A surface soil sample (SS-1) was collected from the location of the June 2009 plane crash. A hammer and chisel were used to dig a hole below the frost line, approximately 2 feet bgs. A soil sample was collected using a clean, stainless steel spoon.

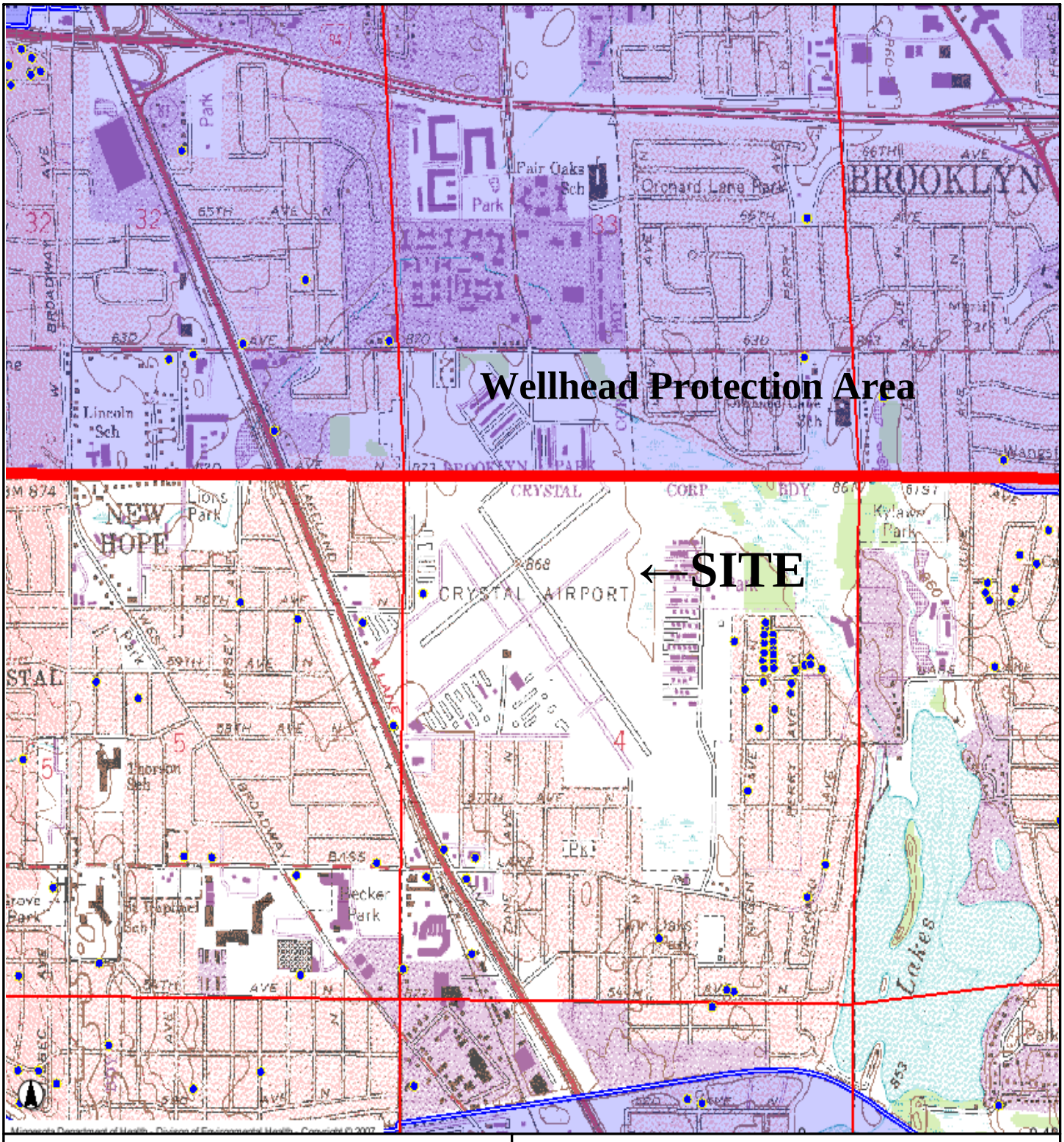
Sediment samples SED-1 and SED-2 were collected from Shingle Creek at locations upgradient and downgradient of main airport activities, respectively. Sample locations are shown on ***PFC Sampling Locations, Crystal Airport*** figure, and photos of the sediment sample locations are included on the photo log in **Appendix K**. A hole was opened in the ice on the creek at the location of SED-1 using a hammer and chisel. The creek sediments were bare of snow cover beneath a foot bridge at the location of SED-2. Sediment samples were collected from the creek bottom using a clean, stainless steel spoon.

The proposed work included the collection of surface water samples from Shingle Creek at the same locations as the sediment samples, however, there was no water below the ice in the creek bed.

The soil, groundwater and sediment samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Crystal Airport

Analytical results were not available from Axys Analytical Services LTD at the time of this report. Analytical results will be presented in a forthcoming report.



LEGEND:

- Well Locations

North

FIGURE 1
SITE LOCATION MAP
CRYSTAL AIRPORT
CRYSTAL, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
12/30/09		Crystal-1

DELTA


Sed-1
B-2
Sed-2
B-1
SS-1
PFC Sampling Locations
Crystal Airport
Crystal, MN
Legend
Boring Location
Sample Location
N
0 180 360 720 1,080 1,440
Feet
DELTA

Photograph 1
Location of June 2009 plane crash in foreground, view facing southwest toward the airport tower.

Photograph 2
Stormwater culverts near the northeast end of taxiway A and the location of boring B-1, view facing south.

Photograph 3
Stormwater culvert near the east end of taxiway C and location of boring B-2, view facing westerly.

Photograph 4
Sediment sample Sed-1 was collected from Shingle Creek near the northeast corner of the Crystal Airport property.

Photograph 5
Sediment sample Sed-2 was collected from beneath a foot bridge over Shingle Creek, at a location near the east corner of the Crystal Airport property.

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Minnesota Pollution Control Agency

ACCESS AGREEMENT BETWEEN THE MINNESOTA POLLUTION CONTROL AGENCY AND THE METROPOLITAN AIRPORTS COMMISSION

The Minnesota Pollution Control Agency (MPCA) is investigating the use of Class B firefighting foams in the State. A site reconnaissance and investigation will be conducted at the following site owned and operated by the Metropolitan Airports Commission (MAC) where historic use (by entities other than MAC) of Class B foams has occurred:

Crystal Airport
Crystal, Minnesota

MAC hereby consents and authorizes the MPCA, its employees, agents and contractors (collectively, hereafter the "MPCA"), to enter the Crystal Airport to conduct soil, groundwater, sediment and surface water sampling at the specific locations depicted in Attachment A and as specified in the attached Scope of Work. The sampling is being conducted in response to the use of Class B firefighting foams that may or may not contain perflurocarbons (PFCs). The MPCA is authorized to take these actions under Minn. Stat. § 115C.03, subd. 7 (2002).

The MPCA will notify MAC at least 48 hours in advance and must be escorted throughout the time of being on the property. Work will be conducted during regular business hours (8:00 a.m. to 5:00 p.m.) unless the MPCA receives permission to and arrangements are made to conduct work during different hours. The MPCA will conduct its activities so as to minimize interference with the use of the property. If any portion of the property must be disturbed as a result of the MPCA's activities, the MPCA will restore the property as close to its original condition as is reasonably possible under the circumstances. MAC agrees to take reasonable precautions to ensure that the equipment of the MPCA and its contractors on the property is not damaged, and that the work being conducted by the MPCA, its employees, agents and contractors is not disrupted. MAC reserves the right to have MAC personnel or its representatives present during sampling activities.

The MPCA will obtain all necessary permits for installation of soil borings for the purpose of soil and groundwater sampling. Upon completion of sampling, the MPCA will seal the borings in accordance with state law. Results of all testing conducted on the property will be provided to MAC. All waste material generated during the soil and groundwater sampling activities shall be promptly and properly disposed off-site by the MPCA, and the removal and proper disposal thereof shall be the responsibility of the MPCA.

The MPCA shall be liable for injury to or damage to property, or personal injury or death, caused by an act or omission of any employee of the state in the performance of the work described above, under the circumstances where the state, if a private person, would be liable to the claimant, in accordance with Minn. Stat. § 3.736. The parties acknowledge that MPCA might use private contractors to perform certain work hereunder. The MPCA shall cause its contractor who carries out the work to provide the Property Owner with a certificate of insurance showing commercial general liability insurance coverage of not less than $1M per occurrence and $2M aggregate. The certificate of insurance shall indicate or be accompanied by an endorsement which indicates that MAC has been named as an additional insured under the contractor's commercial general liability coverage, using ISO Form CG 20 26 11 85 or equivalent. Nothing in this Agreement limits the liability of any MPCA contractor for its acts or omissions in carrying out any work authorized under this Agreement on the Property.

MAC's consent to this access does not constitute an admission of liability of any kind by the MAC regarding the use of firefighting foam or the presence of PFCs. This Access Agreement shall automatically terminate after the sampling detailed in the Scope of Work is completed and at the time the borings and monitoring wells have been sealed in accordance with state law.

MINNESOTA POLLUTION CONTROL AGENCY

Douglas W. Wetzstein
Signature

Douglas W. Wetzstein, Supervisor
Title

12/29/09
Date

Metropolitan Airports Commission

Signature

DENNIS PROBST, DEPUTY EXECUTIVE DIRECTOR
Title

28 DECEMBER 2009
Date

ATTACHMENT A

Legend

- ¤ Soil Boring
- § Surface Sample
- © Creek Sediment and Water Samples

SCOPE OF WORK: **Sampling of Soil, Groundwater, Sediments and Surface Water**

SITE: **Crystsal Airport**
Crystal, Minnesota

Delta Consultants (Delta), as a contractor for the Minnesota Pollution Control Agency (MPCA), will conduct the Scope of Work detailed below at the above-referenced site (the Site). The work is being conducted as part of the MPCA's *PFCs in Firefighting Foam* project.

1. Advance two soil borings (locations B-1 and B-2 on Attachment A) using push probe technology to the depth of groundwater for the purpose of collecting soil and groundwater samples. Two composite soil samples will be collected from each boring from two intervals: from the surface to 4 feet below grade surface (bgs), and from 4 to 8 feet bgs. A groundwater sample will be collected from each boring assuming that groundwater will be encountered. Based on area well logs, the depth to groundwater is expected to be 12 to 15 feet below grade.
2. Collect one surface soil sample (locations SS-1 on Attachment A) from the surface to 1 foot bgs via hand-sampling. This is the location of a recent airplane crash where a fire was extinguished.
3. Collect sediment and surface water samples (locations C-1 and C-2 on Attachment A) via hand-sampling. Sediment samples will be collected no deeper than 1 foot bgs.
4. Excess soil generated during drilling activities will be containerized and stored on-site for later disposal off-site.
5. It is Delta's understanding that MAC may request "split samples" for submittal to their own laboratory. Delta will split soil, groundwater, sediment and surface water samples as directed by MAC.
6. All samples will be submitted to a State-contracted laboratory for analysis of PFCs only. The following PFC compounds will be included on the list of analytes:
    - Perfluorobutanoic acid (PFBA)
    - Perfluorobutane Sulfonate (PFBS)
    - Perfluoropentanoic acid (PFPeA)
    - Perfluorohexanoic acid (PFHxA)
    - Perfluoroheptanoic acid (PFHpA)
    - Perfluorohexane Sulfonate (PFHxS)
    - Perfluorooctanoic acid (PFOA)
    - Perfluorooctane Sulfonate (PFOS)
    - Perfluorooctane Sulfonamide (PFOSA)
    - Perfluorononanoic acid (PFNA)
    - Perfluorodecanoic acid (PFDA)
    - Perfluoroundecanoic acid (PFUDA)
    - Perfluorododecanoic acid (PFDoDA)
6. A copy of the laboratory chain-of-custody will be provided to MAC after sample collection. A copy of the laboratory analytical report will be provided to MAC upon receipt.

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **Crystal Airport, MN**	Drill Crew Chief: **Brian**
Job No.: **19382DEL06**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **1/20/2010**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **5.5'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 0.50) TOPSOIL: Grass - snow covered.			NA
		(0.50, 8.00) SAND: brown, medium grained, moist.	SW		
5 ⧖		at 5.5' brown, medium to large grained, wet.		Water Sample Collected 3' - 8'	
		at 8' brown and light brown, medium to coarse grained, wet.			

Comments: E.O.B. at 8'.

Boring Location: 45 03.895' N / 93 20.935 W

DELTA

5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **8'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **Crystal Airport, MN**	Drill Crew Chief: **Brian**
Job No.: **19382DEL06**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **1/20/2010**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **6'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 0.50) TOPSOIL: Grass - snow covered.			NA
		(0.50, 8.00) SAND: brown, medium grained, moist.	SW		
5		at 6' brown, medium to large grained, wet.		Water Sample Collected 3' - 8'	
		at 8' brown, medium grained, wet.			

Comments: E.O.B. at 8'.

Boring Location: 45 03.962' N / 93 21.053 W

APPENDIX L

MSP Former Fire Training Areas Discussion and Supporting Documents

Background – MSP Airport Historical Fire Foam Training Areas

The Manager of Environmental Affairs for the Metropolitan Airports Commission (MAC) returned a completed firefighting foam use questionnaire to Delta in May 2008, indicating the use of Class B AFFF in quarterly fire foam training by the fire department at the Minneapolis-St. Paul International (MSP) Airport. A copy of the questionnaire was included in Appendix O of Delta's June 2009 Report. The questionnaire indicated that Ansul-brand AFFF is used in fire foam training exercises at the deicing pads and a remote ramp at the Humphrey terminal and that the spent foam is collected and discarded off-site by a licensed contractor. Follow-up conversations with MAC revealed that on-site foam training exercises were recently discontinued; any fire foam training is now conducted at the Emergency Response Training Center in Duluth, Minnesota.

MAC personnel also indicated that the MSP fire department historically trained at the airport with 3M-brand foam at two on-site locations. The locations of the past fire foam training areas utilized by the MSP Airport fire department are shown on **Figure 1, *Fire Foam Training Area Location, MSP Airport***, included in **Appendix L**. From 1983 through 2001, fire foam training with 3M-brand AFFF was conducted in live fire exercises at a burn pit located east of Cargo Road near the present location of the glycol management facility. The foam and water mixture would drain to a holding pond located directly west of the training area. Foam training prior to 1983 took place at an area located northeast of the current FedEx facility. The MSP Fire Chief was uncertain as to what type of structure, if any, may have been present at this location for training purposes. Both the pre- and post-1983 former fire foam training areas were re-worked and excavated to some extent during construction associated with the addition of a new airport runway in 2001. Photographs of the pre-1983 and post-1983 former fire foam training areas are included in **Appendix L**.

Other reliever airports within MAC's oversight do not have airport-dedicated fire departments, including the St. Paul Downtown Airport, the Airlake Airport in Lakeville, the Anoka County Airport in Blaine, the Flying Cloud Airport in Eden Prairie, and the Crystal and Lake Elmo Airports. The reliever airports receive fire protection from the surrounding community fire departments.

As presented in Delta's April 2009 report, the groundwater flow direction at the MSP Airport was inferred to be to the southeast. The groundwater flow direction was confirmed by MAC personnel.

Sample Collection – MSP Airport Historical Fire Foam Training Areas

As presented in Delta's June 2009 Report, four soil borings were advanced at MSP Airport, two within each of the two historical fire foam training areas, on May 29, 2009. Borings B-1 and B-2 were advanced through the post-1983 training area, and borings B-3 and B-4 were advanced through the pre-1983 training area. Soil boring locations are shown on the ***MSP Airport Former Fire Foam Training Areas*** figure. Groundwater was encountered at depths ranging from 21 to 23.5 feet below grade surface (bgs). Since both former fire training areas were excavated to some extent as part of a runway construction project in 2001, soils within the former training areas were not sampled. Soil boring logs detailing groundwater depths, boring depths, and the GPS locations for these four borings are included in **Appendix L**. The laboratory analytical results were not available at the time of the June 2009 Report and are therefore presented in this report.

As discussed in the following section, significant concentrations of PFOA were detected in the groundwater samples collected from borings B-1 through B-4. In response to these detections, Delta conducted additional groundwater and surface water sampling upgradient and downgradient of the two historical fire foam training areas.

A second access agreement between MAC and the MPCA was executed on December 29, 2009, allowing for additional sampling upgradient and downgradient of the historical fire foam training areas. A copy of this access agreement is included in **Appendix L**.

On January 19, 2010, borings B-5, B-6 and B-7 were advanced upgradient of borings B-1 through B-4 for the purpose of collecting groundwater samples. Sample locations are shown on the ***MSP Airport Former Fire Foam Training Areas*** figure. Soil borings were advanced by Thein Well Company using push probe drilling technology, under the oversight of Delta personnel. Soil samples were not collected from these borings. Groundwater was encountered at an approximate depth of 25 feet bgs. Soil boring logs detailing groundwater depths, boring depths, and the GPS locations of B-5 through B-7 are included in **Appendix L**. Groundwater samples were collected through plastic tubing inserted into the probe rods. Upon completion of groundwater sampling at each boring, the boring was grouted and sealed in accordance with applicable State requirements.

On January 19, 2010, groundwater samples were collected for PFC analysis from three existing groundwater monitoring wells situated downgradient or potentially downgradient of the former firefighting foam training areas: CWN-14A, CWN-15A and Signature MW-2. The well locations are shown on the ***MSP Airport Former Fire Foam Training Areas*** figure. The depths to groundwater were measured at

each well, and the wells checked for the presence of light non-aqueous phase liquid (LNAPL) prior to sampling. LNAPL was not detected in any of the wells, but a petroleum odor was noted in the groundwater collected from Signature MW-2. Depths to groundwater ranged from 35.9 to 36.6 feet bgs.

Groundwater samples were collected from borings B-5, B-6, and B-7, and from existing wells CWN-14A, CWN-15A and Signature MW-2 for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

On January 19, 2010, a surface water sample (SW-1) and a sediment sample (Sed-1) were collected by hand from MSP Pond 1, at the location shown on the figure ***MSP Airport Former Fire Foam Training Areas***. A manual ice auger was used to cut a hole in the ice in order to facilitate sample collection. Sediment and surface water samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – MSP Airport Historical Fire Foam Training Areas

Laboratory analysis of groundwater samples collected in May 2009 from the historical MSP fire foam training areas detected PFC compound concentrations, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs***. Laboratory results for groundwater samples collected in January 2010 were not available at the time of this report.

Groundwater Sample PFC Detections – MSP Historical Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-1	279 ng/L PFBA
	909 ng/L PFPeA
	1640 ng/L PFHxA
	317 ng/L PFHpA
	988 ng/L PFOA
	42 ng/L PFNA
	332 ng/L PFBS
	3090 ng/L PFHxS

Groundwater Sample PFC Detections – MSP Historical Fire Foam Training Area	
Soil Boring	**Compound Concentration**
B-2	190 ng/L PFBA
	507 ng/L PFPeA
	817 ng/L PFHxA
	198 ng/L PFHpA
	958 ng/L PFOA
	286 ng/L PFBS
	2920 ng/L PFHxS
B-3	151 ng/L PFBA
	148 ng/L PFPeA
	477 ng/L PFHxA
	12000 ng/L PFOA
	21200 ng/L PFHxS
	281 ng/L PFOS
B-4*	3140 ng/L PFHxA
	5830 ng/L PFHpA
	286000 ng/L PFOA
	145000 ng/L PFHxS

ng/L = nanograms per liter, which is equivalent to parts per trillion (ppt).

*Due to high concentrations of detected PFC compound concentrations, the laboratory detection limits for other undetected PFC compounds were elevated.

Analytical results for groundwater, sediment and surface water samples collected in January 2010 were not available from Axys Analytical Services LTD at the time of this report. Analytical results will be presented in a forthcoming report.

Discussion and Conclusion – MSP Airport Historical Fire Foam Training Areas

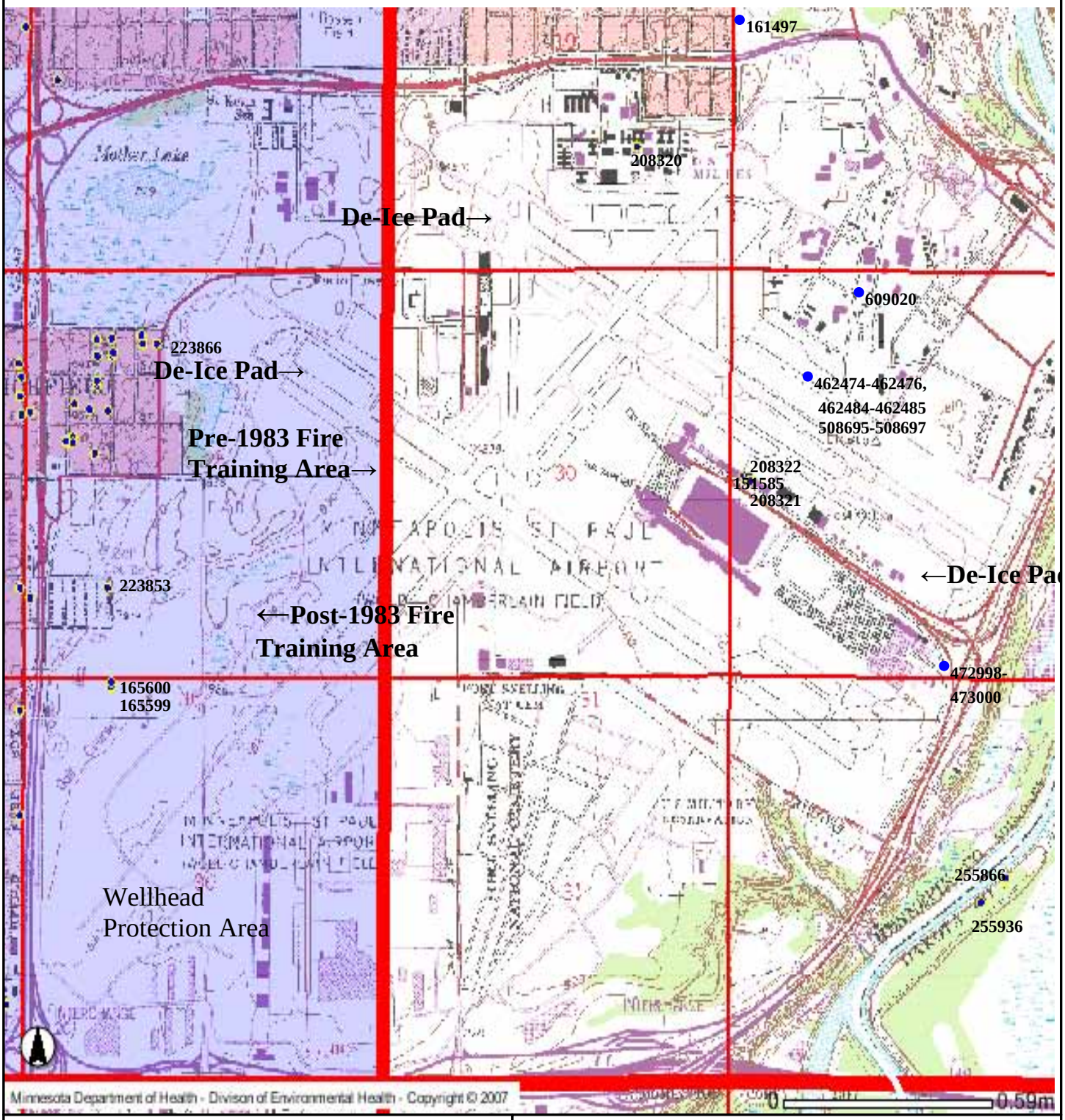
Historically the MSP fire department trained with 3M-brand foam at two on-site locations: from 1983 through 2001, fire foam training was conducted in live fire exercises at a burn pit located east of Cargo Road, near the present location of the glycol management facility; and, foam training prior to 1983 took place at an area located northeast of the current FedEx facility. Both the pre- and post-1983 former fire foam training areas were re-worked and excavated to some extent during construction associated with the addition of a new airport runway in 2001. In May 2009 borings B-1 and B-2 were advanced through

the post-1983 training area, and borings B-3 and B-4 were advanced through the pre-1983 training area. Laboratory analysis detected PFCs in groundwater samples collected from all four borings.

The Minnesota Department of Health has defined drinking water values only for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values.

The PFOA concentrations detected in the groundwater samples collected from borings B-1 through B-4 in May 2009 exceeded the HRL for PFOA. The PFOS concentration detected in the B-3 groundwater sample was below HRL. While PFOS was not detected in the groundwater sample collected from B-4, the laboratory detection limit for PFOS was greater than the HRL for PFOS. Detected levels of PFBA and PFBS did not meet or exceed the HBV.

Receipt and review of laboratory results for samples collected in January 2010 is expected to allow for discussion of upgradient, downgradient, and background concentrations of PFCs in the groundwater at MSP Airport.



LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
MSP AIRPORT
MINNEAPOLIS–ST. PAUL, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
5/12/09		MSP–1

DELTA

MSP Airport Former Fire Foam Training Areas
Minneapolis - St. Paul Airport
Minneapolis, MN

DELTA

Legend
Foam Training Area
Boring Location
Sample Location

N

0 337.5 675 1,350 2,025 2,700
Feet

Photograph 1
The Post-1983 former fire foam training area is located east of Cargo Road, near the current glycol management facility, which is visible at right. Soil borings B-1 and B-2 were advanced here in May 2009. View facing east.

Photograph 2
Soil boring B-2 was advanced near the southeast corner of the post-1983 former fire foam training area. Soil boring B-1 was advanced closer to the fence. Cargo Road is visible in the background. View facing northwest.

Photograph 3
The Pre-1983 fire foam training area is located northeast of the current FedEx facility. Soil borings B-3 and B-4 were advanced in this area in May 2009. Photo view facing southwest.

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-1**

TOTAL DEPTH: **25'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/29/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **21'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 25.00) NO RECOVERY: Blind drill/push to water at 25' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20 ⧖		Set screen at 21' - 25' bgs.			
				Water Sample from 21' to 25'	
25					

Comments: E.O.B. at 25'.

Boring Location: 44 52.717' N / 93 14.125' W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-2**

TOTAL DEPTH: **25'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/29/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **21'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 25.00) NO RECOVERY: Blind drill/push to water at 25' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20 ⧖		Set screen at 21' - 25' bgs.			
				Water Sample from 21' to 25'	
25					

Comments: E.O.B. at 25'.

Boring Location: 44 52.715' N / 93 14.111 W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-3**

TOTAL DEPTH: **25'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/29/09**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling: **23.5'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 25.00) NO RECOVERY: Blind drill/push to water at 25' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20		Set screen at 21' - 25' bgs.			
⧖				Water Sample from 21' to 25'	
25					

Comments: E.O.B. at 25'.

Boring Location: 44 53.023' N / 93 13.878 W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-4**

TOTAL DEPTH: **27'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **NA**
Job No.: **19382DEL04**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **5/29/09**	Surface Elevation (feet): **NA**
▽ Water Level During Drilling: **23.5'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 27.00) NO RECOVERY: Blind drill/push to water at 27' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20					
▽		Set screen at 23' - 27' bgs.		Water Sample from 23' to 27'	
25					

Comments: E.O.B. at 27'.

Boring Location: 44 53.011' N / 93 13.879 W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-5**

TOTAL DEPTH: **28'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **Brian**
Job No.: **19382DEL06**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **1/19/2010**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling:**25'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 28.00) NO RECOVERY: Blind drill/push to water at 28' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20					
⧖ 25				Water Sample at 25'	

Comments: E.O.B. at 28'.

Boring Location: 44 52.815' N / 93 14.243 W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-6**

TOTAL DEPTH: **28'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **Brian**
Job No.: **19382DEL06**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **1/19/2010**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling:**25'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 28.00) NO RECOVERY: Blind drill/push to water at 28' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20					
⧖ 25				Water Sample at 25'	

Comments: E.O.B. at 28'.

Boring Location: 44 53.114' N / 93 14.079 W

DELTA
5910 Rice Creek Parkway, Suite 100
St. Paul, Minnesota 55126

ENVIRONMENTAL BORING LOG

BORING ID: **B-7**

TOTAL DEPTH: **28'**

PROJECT INFORMATION	DRILLING INFORMATION
Project: **PFC's in Fire Fighting Foam**	Drilling Co.: **Thein Well**
Site Location: **MSP Airport, MN**	Drill Crew Chief: **Brian**
Job No.: **19382DEL06**	Rig Type: **Geoprobe**
Logged By: **Curt McKay**	Method of Drilling: **Direct Push Probe**
Weather: **NA**	Soil Sampling Method: **4' samplers with liners**
Date Completed: **1/19/2010**	Surface Elevation (feet): **NA**
⧖ Water Level During Drilling:**25'**	Field Screening Instrument: **None**

DEPTH	LITHOLOGY	DESCRIPTION	USCS	LAB SAMP.	PID ppm
0		(0.00, 1.00) TOPSOIL: Grass.	PT		NA
		(1.00, 28.00) NO RECOVERY: Blind drill/push to water at 28' bgs.			
		No Soil Sampling.			
5					
10			NA		
15					
20					
⧖ 25				Water Sample at 25'	

Comments: E.O.B. at 28'.

Boring Location: 44 53.270' N / 93 14.695 W

Minnesota Pollution Control Agency

ACCESS AGREEMENT BETWEEN THE MINNESOTA POLLUTION CONTROL AGENCY AND THE METROPOLITAN AIRPORTS COMMISSION

The Minnesota Pollution Control Agency (MPCA) is investigating firefighting training sites where Class B foams have been or are being utilized. The site reconnaissance and investigation will be conducted at the following site owned and operated by the Metropolitan Airports Commission (MAC) where firefighting training with Class B foams occurred:

Minneapolis-St. Paul International Airport
Minneapolis, Minnesota

MAC hereby consents and authorizes the MPCA, its employees, agents and contractors (collectively, hereafter the "MPCA"), to enter the MSP Airport to conduct sediment, surface water and groundwater sampling at the specific locations depicted in Attachment A and as described in Attachment B. The sampling is being conducted in response to the historical use of Class B firefighting foams that may or may not contain perflurocarbons (PFCs). The MPCA is authorized to take these actions under Minn. Stat. § 115C.03, subd. 7 (2002).

The MPCA will notify MAC at least 48 hours in advance and must be escorted throughout the time of being on the property. Work will be conducted during regular business hours (8:00 a.m. to 5:00 p.m.) unless the MPCA receives permission to and arrangements are made to conduct work during different hours. The MPCA will conduct its activities so as to minimize interference with the use of the property. If any portion of the property must be disturbed as a result of the MPCA's activities, the MPCA will restore the property as close to its original condition as is reasonably possible under the circumstances. MAC agrees to take reasonable precautions to ensure that the equipment of the MPCA and its contractors on the property is not damaged, and that the work being conducted by the MPCA, its employees, agents and contractors is not disrupted. MAC reserves the right to have MAC personnel or its representatives present during sampling activities.

The MPCA will obtain all necessary permits for installation of soil borings and temporary monitoring wells, if such wells are installed. Upon completion of sampling, the MPCA will seal the borings and monitoring wells in accordance with state law. Results of all testing conducted on the property will be provided to MAC. All waste material generated during sampling activities shall be promptly and properly disposed off-site by the MPCA, and the removal and proper disposal thereof shall be the responsibility of the MPCA.

The MPCA shall be liable for injury to or damage to property, or personal injury or death, caused by an act or omission of any employee of the state in the performance of the work described above, under the circumstances where the state, if a private person, would be liable to the claimant, in accordance with Minn. Stat. § 3.736. The parties acknowledge that MPCA might use private contractors to perform certain work hereunder. The MPCA shall cause its contractor who carries out the work to provide the Property Owner with a certificate of insurance showing commercial general liability insurance coverage of not less than $1M per occurrence and $2M aggregate. The certificate of insurance shall indicate or be accompanied by an endorsement which indicates that MAC has been named as an additional insured under the contractor's commercial general liability coverage, using ISO Form CG 20 26 11 85 or equivalent. Nothing in this Agreement limits the liability of any MPCA contractor for its acts or omissions in carrying out any work authorized under this Agreement on the Property.

MAC's consent to this access does not constitute an admission of liability of any kind by the MAC regarding the use of firefighting foam or the presence of PFCs. This Access Agreement shall automatically terminate after the sampling detailed in Attachment B is completed and at the time the borings and monitoring wells have been sealed in accordance with state law.

MINNESOTA POLLUTION CONTROL AGENCY

Signature

Douglas W. Wetzstein, Supervisor
Title

12/29/09
Date

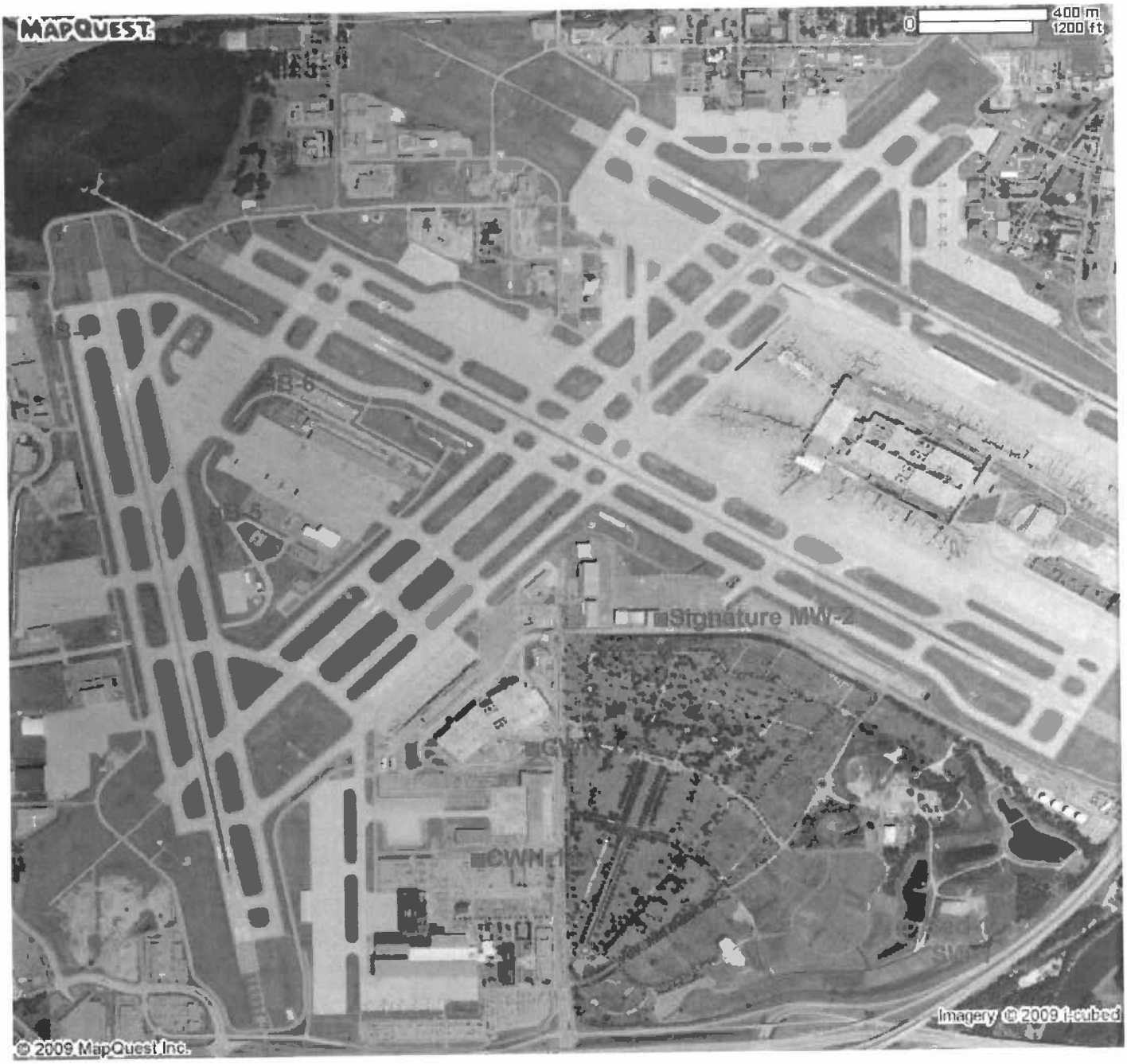
Metropolitan Airports Commission

Signature

DENNIS PROBST, DEPUTY EXECUTIVE DIRECTOR
Title

28 DECEMBER 2009
Date

ATTACHMENT A



Φ Sediment and Surface Water samples, Pond 1

◙ Existing wells

¤ Boring locations

ATTACHMENT B

SCOPE OF WORK: **Sampling of Groundwater, Sediment and Surface Water**

SITE: **MSP Airport**
Minneapolis, Minnesota

Delta Consultants (Delta), as a contractor for the Minnesota Pollution Control Agency (MPCA), will conduct the Scope of Work detailed below at the above-referenced site (the Site). The work is being conducted as part of the MPCA's *PFCs in Firefighting Foam* project.

1. Advance three soil borings (locations B-5, B-6 and B-7 on Attachment A) using push probe technology to the depth of groundwater for the purpose of collecting groundwater samples. Based on past sampling in the area, the depth to groundwater is expected to be approximately 30 feet below grade. Collect a groundwater sample from each boring. Soil samples will not be collected.
2. Collect groundwater samples from the following existing monitoring wells: CWN-14A, CWN-15A and Signature MW-2. Samples will be collected using dedicated, disposable bailers.
3. Collect one sediment sample and one surface water sample (locations Sed-1 and SW-1 on Attachment A) via hand-sampling from Pond 1. The sediment sample will be collected from shore and no deeper than 1 foot bgs.
4. It is Delta's understanding that MAC may request "split samples" for submittal to their own laboratory. Delta will split groundwater, sediment and surface water samples as directed by MAC.
5. All samples will be submitted to a State-contracted laboratory for analysis of PFCs only. The following PFC compounds will be included on the list of analytes:
    - Perfluorobutanoic acid (PFBA)
    - Perfluorobutane Sulfonate (PFBS)
    - Perfluoropentanoic acid (PFPeA)
    - Perfluorohexanoic acid (PFHxA)
    - Perfluoroheptanoic acid (PFHpA)
    - Perfluorohexane Sulfonate (PFHxS)
    - Perfluorooctanoic acid (PFOA)
    - Perfluorooctane Sulfonate (PFOS)
    - Perfluorooctane Sulfonamide (PFOSA)
    - Perfluorononanoic acid (PFNA)
    - Perfluorodecanoic acid (PFDA)
    - Perfluoroundecanoic acid (PFUDA)
    - Perfluorododecanoic acid (PFDoDA)
6. A copy of the laboratory chain-of-custody will be provided to MAC after sample collection. A copy of the laboratory analytical report will be provided to MAC upon receipt.

APPENDIX M

Flint Hills Pine Bend Refinery Foam Training Area Discussion and Supporting Documents

Background and Access – FHR Pine Bend Refinery Fire Foam Training Area

The Deputy Fire Chief at the Flint Hills Resources (FHR) Pine Bend Refinery returned a completed firefighting foam use questionnaire to Delta in June 2008, indicating the use of Class B AR-AFFF in fire foam training by the fire department at the refinery. The questionnaire indicated that five to ten gallons of Ansul-brand Thunderstorm AR-AFFF are used during each of the 20 to 25 fire foam training exercises performed annually from April through November per year, with up to 300 gallons of foam concentrate used annually for training. A copy of the questionnaire was included in Appendix M of Delta's June 2009 Report. In a follow-up conversation with the FHR Deputy Fire Chief, he stated that 3M-brand AR-AFFF was historically used in training, but the fire department switched to Thunderstorm foam in 2005. The fire training area is located near the southwest corner of the refinery, as shown on **Figure 1, *Fire Foam Training Area Location, Flint Hills Pine Bend Refinery***, included in **Appendix M**.

The fire training area was constructed in approximately 1995 with asphalt pavement, and was later re-paved with concrete. Training with foam was not conducted on-site prior to construction of the training pad. Run-off from the concrete training pad drains to a high-density polyethylene (HDPE)-lined retention pond. The pond is pumped out as needed and the contents are trucked and disposed through an on-site waste water treatment plant (WWTP). According to FHR personnel, any spent foam used on a live fire at the refinery would go to the on-site storm sewer system, which is routed through the WWTP. Photographs of the fire training area are included in **Appendix M**. During a site reconnaissance in March 2009, Delta recorded GPS locations of the corners of the fire training area using a hand-held GPS unit with an accuracy of approximately 15 feet. The training area is shown on the figure ***PFC Sampling Locations, Flint Hills Pine Bend Refinery***, included in **Appendix M**.

According to FHR personnel, WWTP influent and effluent samples were collected by the MPCA in 2007 and 2008 and analyzed for PFCs. Data from these sampling events was included in Appendix M of Delta's June 2009 Report. Low levels of several PFC compounds were detected in samples collected both years in both influent and effluent samples.

As presented in Delta's April 2009 Report, FHR personnel related that land adjacent to the west and north of the fire training area was being used for 'land-farming' of soil impacted with RCRA-regulated waste. Soils beneath the HDPE-lined retention pond were tested for benzene associated with the RCRA waste a few years ago; no benzene was detected in the soil samples, indicating that the HDPE-lined retention pond was not leaking at that time.

As reported in Delta's April 2009 Report, FHR personnel collected groundwater samples on February 16, 2009, from three existing on-site monitoring wells located in the area of the fire training area for PFC analyses. Monitoring well MW-1 is located approximately 500 feet west (upgradient) of the fire training area and is completed to a depth of 50 feet below grade surface (bgs); MW-3 is located approximately 400 feet northeast (downgradient) of the fire training area and is 90 feet deep; and, MW-111 is located approximately 1,700 feet east of the fire training area and is 85 feet deep. The depth to groundwater is approximately 50 feet, with a flow direction to the east-northeast. As presented in Appendix M of Delta's June 2009 Report, the groundwater sample collected from MW-3 exhibited the highest concentrations of PFCs as compared to the other two wells. Low levels of PFOS, PFBA and PFHxS were detected in the upgradient groundwater sample collected from MW-1.

An access agreement between FHR and the MPCA was executed on January 14, 2010, allowing access for re-sampling of groundwater monitoring wells MW-1, MW-3 and MW-111. A copy of the executed agreement is included in **Appendix M**.

As presented in Delta's April 2009 report, the inferred groundwater flow direction at the Flint Hills refinery is to the east-northeast

Sample Collection – FHR Pine Bend Refinery Fire Foam Training Area

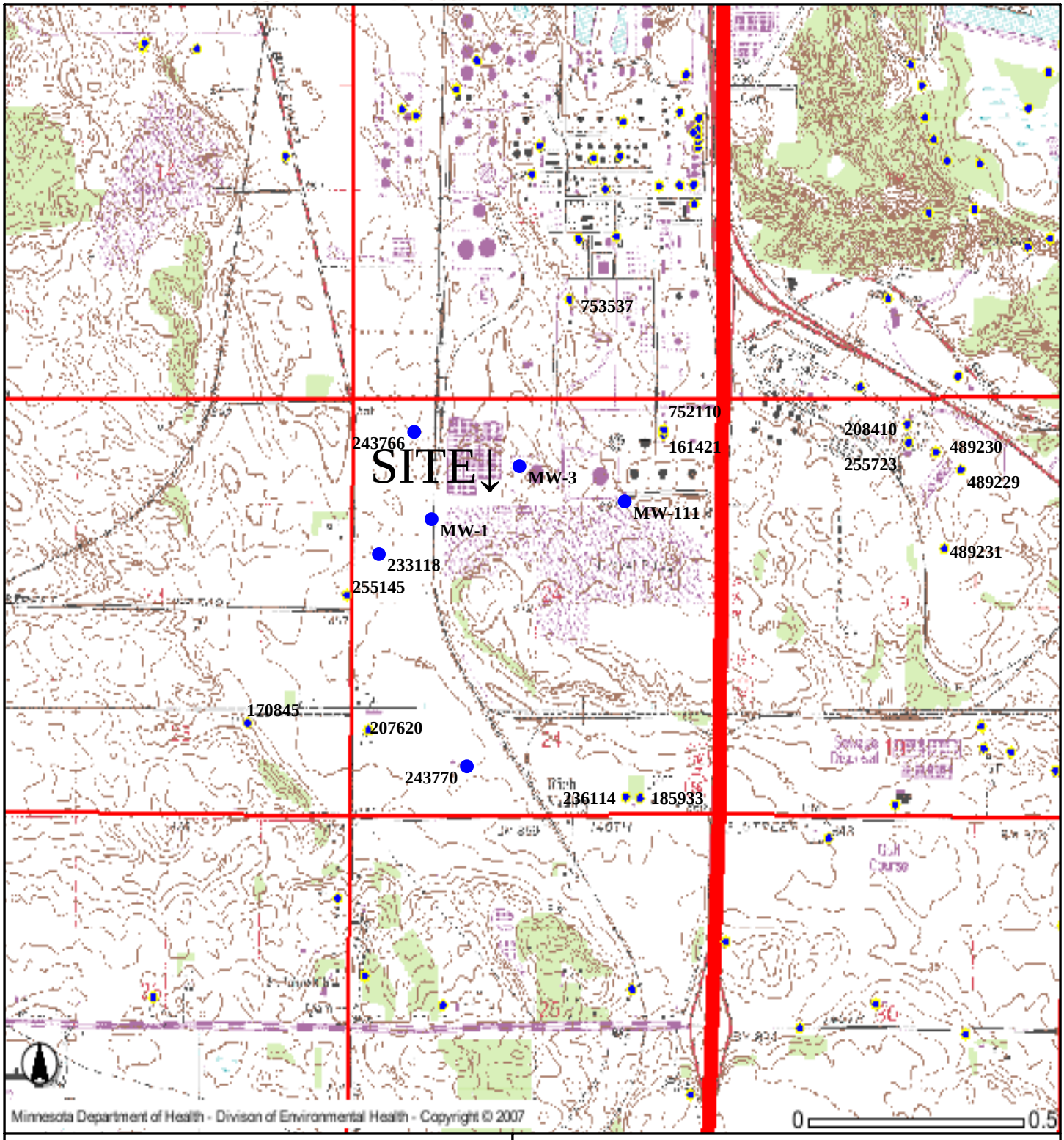
On January 21, 2010, Delta collected groundwater samples from the same existing monitoring wells sampled by FHR in February 2009, that is, MW-1, MW-3 and MW-111. The well locations are shown on the figure ***PFC Sampling Locations, Flint Hills Pine Bend Refinery***, included in **Appendix M**. The depths to water were measured at each well, and each well was checked for the presence of light non-aqueous phase liquid (LNAPL) prior to sampling. The depths to water ranged from 49.7 feet at MW-1 to 81.8 feet at MW-111. LNAPL was not detected in any of the sampled wells.

One well volume of groundwater was purged from each well prior to sampling. Wells MW-1 and MW-111 were purged using dedicated, disposable bailers. A submersible whale pump was used to purge groundwater from the monitoring well MW-3 due to a greater well volume of water.

Groundwater samples were collected using disposable, dedicated bailers described in **Appendix Q, *Sampling Methodologies***, and submitted to Axys Analytical Services LTD for analysis of PFCs.

Sampling Results – FHR Pine Bend Refinery Fire Foam Training Area

Analytical results were not available from Axys Analytical Services LTD at the time of this report. Analytical results will be presented in a forthcoming report



LEGEND:

- Well Locations

North

FIGURE 1
FIRE FOAM TRAINING AREA LOCATION
FLINT HILLS PINE BEND REFINERY
ROSEMOUNT, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
6/8/09		Rosemount-1

DELTA

PFC Foam Sampling Locations
Flint Hills Pine Bend Refinery
Rosemount, MN

DELTA

Flint Hills Pine Bend Refinery
Fire Foam Training Area
March 11, 2009 and January ??

Photograph 1
Concrete-paved training area and HDP-lined retention pond, view from the northwest corner facing east.

Photograph 2
View of the training area and pond from the northwest corner facing southwest.

Minnesota Pollution Control Agency

ACCESS AGREEMENT BETWEEN THE MINNESOTA POLLUTION CONTROL AGENCY AND FLINT HILLS RESOURCES LP

The Minnesota Pollution Control Agency (MPCA) is investigating firefighting training sites where Class B foams have been or are being utilized. Given the detection of perflourocarbons (PFCs) in groundwater previously, additional groundwater sampling will be conducted at the following site (the Property) owned and operated by Flint Hills Resources LP (the Property Owner) where firefighting training with Class B foams occurs:

Pine Bend Refinery
12555 Clark Road
Rosemount, Minnesota

The Property Owner hereby consents and authorizes the MPCA; its employees, agents and contractors (collectively, hereinafter "MPCA") to enter this property for the purpose of collecting groundwater samples from select existing monitoring wells specified in the attached Scope of Work, in response to the use of Class B firefighting foams that may or may not contain PFCs and the detections of PFCs in the groundwater at the Property. The MPCA is authorized to take these actions under Minn. Stat. §§ 115B.17, subd. 4 and 115.04 subd. 3.

The MPCA will notify the Property Owner at least 48 hours in advance and must be escorted throughout the time on the property. Work will be conducted during regular business hours (8:00 a.m. to 5:00 p.m.) unless the MPCA receives permission to and arrangements are made to conduct sampling during different hours. The MPCA will conduct its activities so as to minimize interference with the use of the Property. If any portion of the property must be disturbed as a result of the MPCA's activities, the MPCA will restore the property as close to its original condition as is reasonably possible under the circumstances. The Property Owner will take reasonable precautions regarding its own conduct and the conduct of its employees, agents and contractors on the property to avoid damage to the equipment of the MPCA and its contractors, and to avoid disrupting the work being conducted by the MPCA, its employees, agents and contractors.

A Scope of Work to collect groundwater samples from select existing wells for analysis of PFCs is attached. All work will be performed as outlined in the attached Scope of Work. A copy of laboratory reports for all groundwater samples collected at the property will be provided to the Property Owner. The Property Owner reserves the right to split-samples with the MPCA at the time of sampling.

The MPCA shall be liable for injury to or damage to property, or personal injury or death, caused by an act or omission of any employee of the state in the performance of the work described above, under the circumstances where the state, if a private person, would be liable to the claimant, in accordance with Minn. Stat. § 3.736. The MPCA shall cause its contractor(s) who carries out the work to provide the Property Owner with certificates of insurance showing commercial general liability insurance coverage of not less than $1M per occurrence and $2M aggregate. The certificate of insurance shall indicate or be accompanied by an endorsement which indicates that the Property Owner has been named as an additional insured under the contractor's commercial general liability coverage, using ISO Form CG 20 26 11 85 or equivalent. Nothing in this Agreement limits the liability of any MPCA contractor for its acts or omissions in carrying out any work authorized under this Agreement on the Property.

The Property Owner's consent to this access does not constitute an admission of liability of any kind by the Property Owner regarding the use of firefighting foam or the presence of PFCs. This Access Agreement shall automatically terminate after the sampling portion of the Scope of Work is completed by the MPCA.

Nothing in this Agreement shall be construed to limit or diminish the right of the MPCA to take any action authorized by MERLA or other law with respect to any release or threatened release of a hazardous substance or pollutant or contaminant.

MINNESOTA POLLUTION CONTROL AGENCY

Signature

Supervisor, Superfund Unit 1
Title

1/14/10
Date

Flint Hills Resources LP

Signature AED

V.P. + Mfg Mgr.
Title

1/13/10
Date

SCOPE OF WORK: **Sampling of Existing Wells**

SITE: **Flint Hills Resources' Pine Bend Refinery**
12555 Clark Road
Rosemount, Minnesota

Delta Consultants (Delta), as a contractor for the Minnesota Pollution Control Agency (MPCA), will conduct the Scope of Work detailed below at the above-referenced site (the Site). The work is being conducted as part of the MPCA's *PFCs in Firefighting Foam* project.

Flint Hills Resources provided Delta with monitoring well locations and groundwater PFC sampling results for groundwater samples collected from three wells: MW-1, MW-3 and MW-111. PFC compounds were detected at varying concentrations in groundwater samples collected from these three wells.

1. Based on information provided by Flint Hills Resources, groundwater samples will be collected from the existing on-site monitoring wells MW-1, MW-3 and MW-111. These wells were chosen for their proximity to the firefighting training area and for previous PFC detections.
2. The depths to water will be measured prior to each well sampling. Each well will be checked for LNAPL with a free-phase product indicator prior to sampling. Wells containing LNAPL will not be sampled.
3. Groundwater samples will be manually collected using dedicated, disposable bailers. One well volume will be purged prior to sampling. Groundwater samples will be placed directly into laboratory-supplied jars and handled under standard chain-of-custody controls. Delta will work with Flint Hills Resources to containerize and discharge any purge water generated during sampling activities.
4. It is Delta's understanding that Flint Hills Resources may request "split samples" for submittal to their own laboratory. Delta will provided Flint Hills Resources with groundwater from the same bailer, and will fill sampling jars if requested, as directed by Flint Hills Resources personnel.
5. Groundwater samples will be submitted to a State-contracted laboratory for analysis of PFCs only. The following PFC compounds will be included on the list of analytes:
    - Perfluorobutanoic acid (PFBA)
    - Perfluorobutane Sulfonate (PFBS)
    - Perfluoropentanoic acid (PFPeA)
    - Perfluorohexanoic acid (PFHxA)
    - Perfluoroheptanoic acid (PFHpA)
    - Perfluorohexane Sulfonate (PFHxS)
    - Perfluorooctanoic acid (PFOA)
    - Perfluorooctane Sulfonate (PFOS)
    - Perfluorooctane Sulfonamide (PFOSA)
    - Perfluorononanoic acid (PFNA)
    - Perfluorodecanoic acid (PFDA)
    - Perfluoroundecanoic acid (PFUDA)
    - Perfluorododecanoic acid (PFDoDA)
6. While at the Pine Bend Refinery, Delta will follow all rules, safety-related and otherwise, as set forth by Flint Hills Resources. Delta will also conduct all site work in conformance with their own site-specific health and safety plan.
7. A copy of the laboratory analytical report will be provided to Flint Hills Resources upon receipt.

APPENDIX N

Lake Superior College ERTC Foam Training Area Discussion and Supporting Documents

Background and Access – Lake Superior College ERTC

The Lake Superior College Emergency Response Training Center (ERTC) was built in 1994. The ERTC includes a firefighter training area where firefighters can practice extinguishing aircraft fires. The ERTC is located in Duluth at 11501 Highway 23, as shown in on **Figure 1, *Site Location Map, Lake Superior College ERTC***, which is included in **Appendix N**.

The ERTC Program Supervisor completed a firefighting foam use questionnaire in May 2008, indicating the possible historic use of 3M-brand AFFF and/or AR-AFFF at the ERTC. A copy of the completed questionnaire is included in **Appendix N**. In a follow-up conversation in August 2009, the Program Supervisor indicated that 3M-brand Class B foam may have been used in training exercises from approximately 1994 through 1996, prior to his tenure. Training foam has been used for training exercises at the ERTC since that time.

The firefighter training area includes a 600-foot diameter circular area with a 125-foot diameter concrete burn pit in the center, which is surrounded by a gravel surface vehicle operation area with storage around the outer-most portion of the circular area. A mock airplane sits in the center of the concrete burn pit. Numerous LP-gas lines with jets around and inside the mock airplane can repeatedly be fired to create a burning aircraft for training exercises. Water and spent foam discharged within the 125-foot diameter burn area around the mock airplane is collected into the concrete pit and routed to an on-site wastewater treatment plant specifically designed to treat wastewater and foam from this area, and from there it is routed to the municipal sanitary sewer system. The surrounding gravel vehicle operation area has several layers: 4” of Class V gravel over 8” of crushed rock over 36” of non-frost susceptile granular material over Type 1 fabric. A 6-inch perforated PVC pipe in a trench lined with crushed rock lies below these layers, carrying any overspray of infiltrated spent water/foam away from the area. This pipe also carries excess groundwater away from the training area. The pipe extends to a wooded area northeast of the training area to a small ravine. Large rip-rap rock covers the short hillside from beneath the pipe outlet to a creek at the bottom of the ravine, a distance of approximately three feet. According to the Program Supervisor at the ERTC, water flows from this drain pipe year-around. Based on photographs taken during past training exercises, some firefighting foam overspray ends up on the gravel vehicle operation area around the burn pit. Surface water runoff from the training area may also flow to a wetland located on the southeast side of the training area. The layout of the training area is shown in the figure ***Lake Superior College ERTC*** included in **Appendix N**. Photographs of the training area, 6-inch pipe outlet, and wetland are included in **Appendix N.**

An access agreement was signed by the Vice President of Finances and Administration of Lake Superior College and the MPCA, allowing access for sampling at the ERTC. A copy of the access agreement is included in **Appendix N**.

Sample Collection – Lake Superior College ERTC

To address the possibility for PFC-containing spent foam/wastewater from potential historical use of Class B foam in training to reach the drainage area or the wetland, Delta conducted sampling of soil, sediment and surface water at the discharge point of the 6-inch pipe and at the west edge of the wetland.

On November 25, 2009, Delta collected a surface soil sample (SS-1) near the end of the 6-inch pipe outlet in the ravine located northeast of the fire training area. Due to rip-rap rock at the ground surface, SS-1 was located approximately two feet downhill from the pipe outlet. A sediment sample (Sed-1) was collected from the edge of the creek nearest to the pipe outlet. Sample locations are shown on the photo log and the figure ***Lake Superior College ERTC*** included in **Appendix N**. A sediment sample (Sed-2) and a surface water sample (SW-1) were collected from the west edge of the wetland which is situated to the southeast of the fire training area.

Sediment, soil and surface water samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to Axys Analytical Services LTD.

Sampling Results – Lake Superior College ERTC

Laboratory analysis detected PFC compound concentrations in soil and sediment samples collected at the Lake Superior College ERTC as listed in the table below. All soil sample analytical results, including non-detect results, are summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report with the chain-of-custody record is included in **Appendix R**.

Soil and Sediment Sample PFC Detections – Lake Superior College ERTC	
Sample ID	**Compound Concentration**
SS-1	0.205 ng/g PFPeA
	0.794 ng/g PFHxA
	0.139 ng/g PFHpA
	0.495 ng/g PFOA
	3.49 ng/g PFHxS

Soil and Sediment Sample PFC Detections – Lake Superior College ERTC	
Sample ID	**Compound Concentration**
	83.5 ng/g PFOS
	4.54 ng/g PFOSA
Sed-1	0.225 ng/g PFOA
	1.2 ng/g PFHxS
	57.5 ng/g PFOS
	6.52 ng/g PFOSA
Sed-2	0.218 ng/g PFBA
	0.536 ng/g PFPeA
	1.72 ng/g PFHxA
	0.268 ng/g PFHpA
	1.26 ng/g PFOA
	0.184 ng/g PFNA
	0.101 ng/g PFDA
	0.174 ng/g PFUnA
	1.47 ng/g PFBS
	3.49 ng/g PFHxS
	83.5 ng/g PFOS
	4.54 ng/g PFOSA

Laboratory results in nanograms per gram (ng/g), which is equivalent to parts per billion (ppb).

Laboratory analysis of the surface water sample collected from the wetland adjacent to the ERTC fire training area detected PFC compound concentrations, as listed in the table below. All groundwater analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*.**

Surface Water Sample PFC Detections – Lake Superior College ERTC	
Sample ID	**Compound Concentration**
SW-1	257 ng/L PFBA

Surface Water Sample PFC Detections – Lake Superior College ERTC	
Sample ID	**Compound Concentration**
	537 ng/L PFPeA
	1790 ng/L PFHxA
	348 ng/L PFHpA
	991 ng/L PFOA
	31.8 ng/L PFNA
	3.45 ng/L PFDA
	1870 ng/L PFBS
	9390 ng/L PFHxS
	11300 ng/L PFOS
	360 ng/L PFOSA

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – Lake Superior College ERTC

Class B AFFF may have been used in firefighting training exercises at the Lake Superior College ERTC from approximately 1994 to 1996. Although spent foam and water discharged within the 125-foot diameter burn pit would be collected and routed through an on-site WWTP and ultimately to a municipal sewer, foam overspray outside of the burn pit could potentially reach an adjoining wetland or could infiltrate to an underground drainage pipe that discharges to a nearby small, on-site creek.

The MPCA has defined soil Tier 1 Residential Soil Reference Values (SRVs), Tier 2 Recreational SRVs, and Tier 2 Industrial SRVs for only the following PFC compounds:

	Tier 1 Residential SRV	*Tier 2 Recreational SRV*	*Tier 2 Industrial SRV*
PFOS	2100 ng/g	2600 ng/g	14000 ng/g
PFOA	2100 ng/g	2500 ng/g	13000 ng/g
PFBA	77000 ng/g	94000 ng/g	500000 ng/g

None of the detected PFC concentrations in the soil or sediment samples collected at the Lake Superior College ERTC met or exceeded any of the MPCA SRVs.

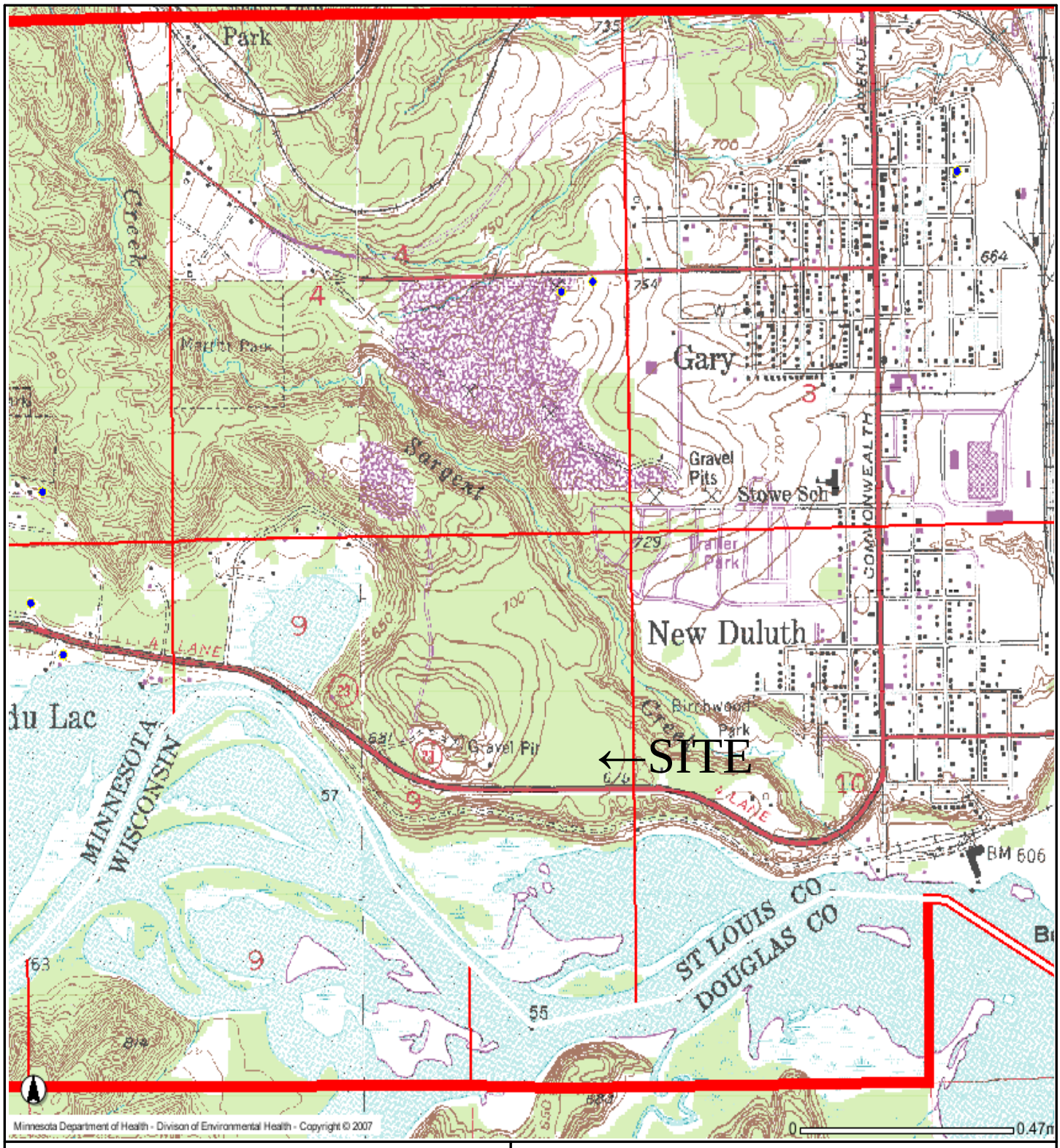
The MPCA does not define sediment quality standards. Sediment quality targets, adopted for use in the St. Louis River Area of Concern, can be used throughout the State as benchmark values for making comparisons. However, there are no sediment quality targets for any of the PFC compounds.

The MPCA has developed site-specific ambient surface water quality criteria for PFOA and PFOS for the surface waters of the Mississippi River and Lake Calhoun only. No general surface water criteria or criteria specific to the Lake Superior College ERTC wetland have been developed.

The Minnesota Department of Health has defined drinking water values for PFOS, PFOA, PFBA and PFBS. The Health Risk Limit (HRL) for both PFOS and PFOA in drinking water is 300 ng/L. The chronic exposure Health Based Value (HBV) for both PFBA and PFBS is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. A Risk Assessment Advice (RAA) for PFHxS does not specify numerical values. While the HRLs and HBVs may not be applicable to surface waters and/or wetlands, they are discussed here for comparison purposes only. The surface water sample collected from the wetland at the Lake Superior College ERTC had concentrations of PFOS and PFOA that exceeded the HRLs. The detected PFBA and PFBS concentrations in the SW-1 surface water sample do not meet or exceed the HBVs for PFBA or PFBS.

The following observations were noted in analyzing PFC laboratory data for samples collected at the Lake Superior College ERTC:

- The perfluorosulfonates (PFBS, PFHxS, and PFOS) were detected at higher concentrations in the surface water, soil and sediment samples than the perfluorocarboxylic acids. This trend is reflected in **Graph A**.
- The PFC compound concentrations detected in the Sed-2 sediment sample collected from the wetland were markedly higher than the PFC concentrations in the SS-1 or Sed-1 samples. The concentrations of perfluorosulfonates in the Sed-2 sample were one order of magnitude higher as compared to the SS-1 and Sed-1 samples.



LEGEND:

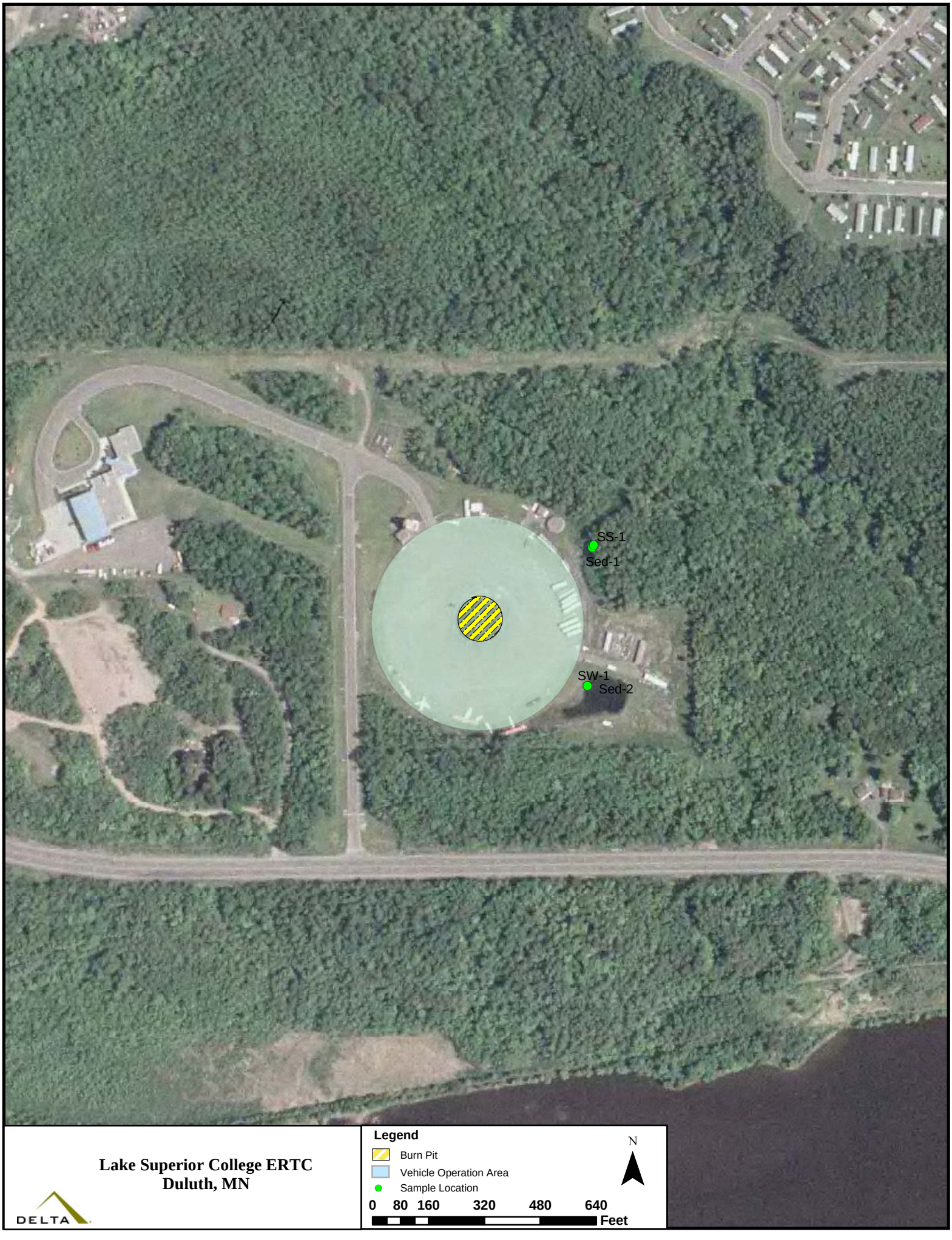
- Well Locations

North

FIGURE 1
SITE LOCATION MAP
LAKE SUPERIOR COLLEGE ERTC
DULUTH, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
12/30/09		Duluth-1

DELTA


SS-1
Sed-1
SW-1
Sed-2
Legend
Burn Pit
Vehicle Operation Area
Sample Location
N
0 80 160 320 480 640
Feet
Lake Superior College ERTC
Duluth, MN
DELTA

DELTA

QUESTIONNAIRE
Firefighting Foam Use in Fire Training

1. Does or has the school's firefighting training program include(d) practice with Class A or Class B foams, either now or in the past?

   _X_ Yes - **Please proceed to Question 2**

   _____ No - **Please sign the back of this form and return to Delta Consultants**

2. How often does the school train with Class A or Class B foam?

   _____ Weekly _____ Monthly _____ Quarterly

   _____ Semi-Annually _X_ Annually _____ Bi-Annually

   _____ Other (please specify): _____

3. How much foam is used per training event?

   _X_ Less than 5 gallons _____ 5 gallons _____ 5 to 10 gallons

   _____ More than 10 gallons (please specify): _____

4. Where does the spent foam go?

   _____ Storm Sewer _____ Sanitary Sewer _____ On-Site Septic _____ Ground

   _____ Containment system for off-site disposal

   _X_ Other (please describe): ON-SITE TREATMENT FACILITY

5. Where does/did the training take place? Please include address, intersection or other specific location information for current and past training areas.

   11501 Hwy 23 DULUTH MN 55808

   WE USE LESS THAN 5 GALLONS OF CLASS A FOAM CONCENTRATE ON AN ANNUAL BASIS

   OUR CLASS B "FOAM" IS A SIMULATION PRODUCT — NOT ACTUAL FOAM CONCENTRATE (TRAINOL)

6. Do other fire departments utilize your facility for their training with foam?

   _X_ Yes — THE FD's USE OUR SIMUFOAM

   _____ No

   -- **If yes,** do the other fire departments bring their own foam? _____ Yes _X_ No

   -- **If yes,** approximately how much foam is discharged annually by other departments at your facility?

   _____ Less than 5 gallons _____ 5-25 gallons _____ 25 to 50 gallons

   _____ More than 50 gallons (please specify): _____

DELTA

QUESTIONNAIRE
Firefighting Foam Use in Fire Training

7. What type(s) and brand(s) of foam are currently or were historically used for training by the school? Please check all that apply.

Type of Foam	Brand of Foam	Amount Used Annually	Current Use or Historic Use?
Class B Aqueous Film-Forming Foam (AFFF)	3M	?	HISTORIC
Class B Alcohol-Resistant (AR)-AFFF	3M	?	HISTORIC
Class B Protein	3M	?	HISTORIC
Class B Fluoroprotein (FP)			
Class B Film-Forming Fluoroprotein (FFFP)			
Class B AR-FFFP			
Class A-B Hi Expansion Foam			
Class A	SILVEX	less than 5 gal	CURRENT
Training Foam	SIMUL FOAM / KIDDE GROUP TRAINOL		CURRENT
Other			

Thank you for your time and cooperation. Please contact Nancy Rodning at Delta Consultants (651-697-5152) or nrodning@deltaenv.com, or Jim Stockinger at the Minnesota Pollution Control Agency (651-297-8666) or jim.stockinger@state.mn.us if you have any questions regarding this questionnaire.

Please return this form by May 9, 2008, to Nancy Rodning, Delta Consultants: nrodning@deltaenv.com

Questionnaire completed by:

DAVID SARAZIN ACADEMIC SUPERVISOR
Name and Title

LAKE SUPERIOR COLLEGE ERTC
School Name

218 733-1077 05/01/08
Phone Number Date

d.isarazin@lsc.edu
E-Mail Address

Lake Superior College ERTC, Duluth, MN
Firefighting Training Area
October 2 and November 25, 2009

Photograph 1
The fire training area at the ERTC, view facing southeast. A 125-foot diameter, concrete-lined burn pit is situated beneath the mock airplane to catch water and spent foam from training exercises.

Photograph 2
Close-up of the gravel-covered surface of the burn pit. Concrete curbing outlines the burn pit.

Photograph 3
Surface soil sample SS-1and sediment sample Sed-1 were collected between the discharge from the drainage pipe which runs below the fire training area and the small creek at left. Photo view facing southeast.

Photograph 4
Sediment sample Sed-2 and surface water sample SW-1 were collected at the west edge of the wetland, which is located southeast of the fire training area. View facing east.

Minnesota Pollution Control Agency

ACCESS AGREEMENT BETWEEN THE MINNESOTA POLLUTION CONTROL AGENCY AND LAKE SUPERIOR COLLEGE

The Minnesota Pollution Control Agency (MPCA) is investigating firefighting training sites where Class B foams may have been or are being utilized. The investigation will be conducted at the following firefighting training site owned by the Lake Superior College (Property Owner):

Lake Superior College Emergency Response Training Center (the Property)
11501 Highway 23
Duluth, Minnesota

The Property Owner hereby consents and authorizes the MPCA, its employees, agents and contractors (collectively, hereafter the "MPCA"), to enter the Property to conduct soil, sediment and surface water sampling for perflourocarbons (PFCs) as specified in the attached Scope of Work. The sampling is being conducted in response to the potential historical use of Class B firefighting foams that may or may not contain PFCs. The MPCA is authorized to take these actions under Minn. Stat. § 115C.03, subd. 7 (2002).

The MPCA will notify the Property Owner at least 48 hours before entering the property. Work will be conducted during regular business hours (8:00 a.m. to 5:00 p.m.) unless the MPCA receives permission to and arrangements are made to conduct work during different hours. The MPCA will conduct its activities so as to minimize interference with the use of the property. If any portion of the Property must be disturbed as a result of the MPCA's activities, the MPCA will restore the disturbed Property as close to its original condition as is reasonably possible under the circumstances. The Property Owner will take reasonable precautions to ensure that the equipment of the MPCA and its contractors on the property is not damaged, and that the work being conducted by the MPCA, its employees, agents and contractors is not disrupted.

The Property Owner reserves the right to have Lake Superior College personnel or its representatives present during sampling activities. Results of all testing conducted on the Property will be provided to the Property Owner.

The MPCA shall be liable for injury to or loss of property, or personal injury or death, caused by an act or omission of any employee of the state in the performance of the work described above, under the circumstances where the state, if a private person, would be liable to the claimant, in accordance with Minn. Stat. § 3.736.

MINNESOTA POLLUTION CONTROL AGENCY

Signature

Supervisor / Superfund Unit 1
Title

11/23/09
Date

Lake Superior College

Signature MARK WATSON

Vice President - Finance/Administration
Title

11/18/09
Date

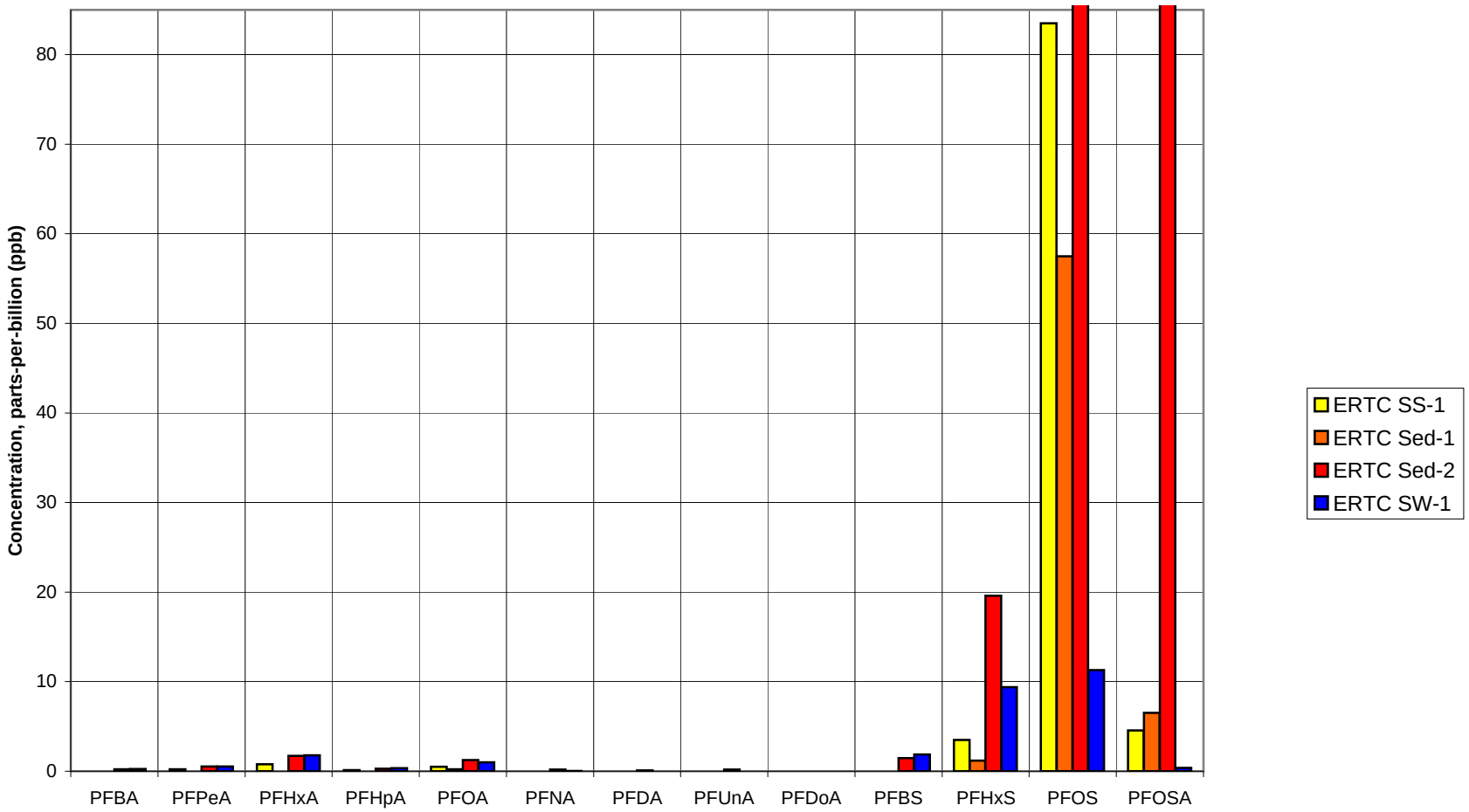
SCOPE OF WORK: **Sampling of Soil, Sediments and Surface Water**

SITE: **Lake Superior College Emergency Response Training Center**
11501 Highway 23
Duluth, Minnesota

Delta Consultants (Delta), as a contractor for the Minnesota Pollution Control Agency (MPCA), will conduct the Scope of Work detailed below at the above-referenced site (the Site). The work is being conducted as part of the MPCA's *PFCs in Firefighting Foam* project.

1. Collect two soil samples from the ravine beneath the 6-inch drain pipe that extends from beneath the vehicle operation area around the fire training area burn pit to the northeast toward the ravine. One soil sample will be collected directly below the pipe outflow approximately 6 inches below the surface, presuming water runoff may erode soils at that point. The other soil sample will be collected downhill from the pipe outflow. Soil samples will be collected by hand.
2. Collect a sediment sample and a surface water sample from the wetland located adjacent southeast of the fire training area. The sediment sample will be collected no deeper than 1 foot from a readily accessible location near the western edge of the wetland. Samples will be collected by hand.
3. Collect latitude and longitude coordinates of all sample locations with a hand-held GPS unit. This data will be incorporated into a project GIS layer.
4. Lake Superior College may request "split samples" for submittal to their own laboratory. Delta will split soil, sediment and/or surface water samples as directed by Lake Superior College.
5. Submit all samples will be submitted to a State-contracted laboratory for analysis of PFCs only. The following PFC compounds will be included on the list of analytes:
    - Perfluorobutanoic acid (PFBA)
    - Perfluorobutane Sulfonate (PFBS)
    - Perfluoropentanoic acid (PFPeA)
    - Perfluorohexanoic acid (PFHxA)
    - Perfluoroheptanoic acid (PFHpA)
    - Perfluorohexane Sulfonate (PFHxS)
    - Perfluorooctanoic acid (PFOA)
    - Perfluorooctane Sulfonate (PFOS)
    - Perfluorooctane Sulfonamide (PFOSA)
    - Perfluorononanoic acid (PFNA)
    - Perfluorodecanoic acid (PFDA)
    - Perfluoroundecanoic acid (PFUDA)
    - Perfluorododecanoic acid (PFDoDA)
6. A copy of the laboratory chain-of-custody will be provided to Lake Superior College after sample collection if requested. A copy of the laboratory analytical report will be provided to Lake Superior College upon receipt.

GRAPH A
Lake Superior College ERTC Soil and Sediment Samples
PFC Concentrations



Note: The PFOS and PFOSA concentrations in the ERTC Sed-2 sample were 538 ppb and 181 ppb, respectively.

APPENDIX O

River Grove Marina Foam Discharge Discussion and Supporting Documents

Background and Access – River Grove Marina Foam Discharge Site

A boat fire occurred at the River Grove Marina on September 26, 2009. The River Grove Marina is located on backwaters of the west bank of the Mississippi River, at 3985 102nd Street East in Inver Grove Heights, as shown in on **Figure 1, *Site Location Map, River Grove Marina***, which is included in **Appendix O**. Four boats situated in the southeastern-most slips and the adjacent docks burned. According to the Inver Grove Heights Fire Chief, the Inver Grove Heights Fire Department used fifteen gallons of Ansul Thunderstorm AR-AFFF to help extinguish the fire. The Inver Grove Heights Fire Chief stated that some of the spent foam and other debris drifted to shore at the location of the marina boat ramp. The layout of the marina is shown in the figure ***Sampling Locations, River Grove Marina*** included in **Appendix O**. Photographs of the area of the fire and sampling locations at the marina are also included in **Appendix O.**

An access agreement was signed by the President of River Grove Harbor Inc., allowing access for sampling at the River Grove Marina. A copy of the access agreement is included in **Appendix O**.

Sample Collection – River Grove Marina Foam Discharge Site

Sampling of surface water and sediments from the Mississippi River in the area of the fire and foam discharge was conducted to determine if PFCs related to the foam discharge remain in the immediate environment.

On November 18, 2009, Delta was accompanied by the President of River Grove Harbor to observe the area of the fire at the River Grove Marina. The area of the fire was marked by charred wooden docks. Two sediment samples (Sed-1 and Sed-2) were collected from the river bed directly blow the location of the fire, and one surface water sample (SW-2) was collected from the same location as Sed-1. A second surface water sample (SW-1) was collected approximately 85 feet upriver from SW-2. A third sediment sample (Sed-3) was collected just off-shore near the boat ramp, where foam and debris reportedly collected. Sample locations are shown on the figure ***Sampling Locations, River Grove Marina***.

Sediment and surface water samples were collected for laboratory analysis of PFCs as described in **Appendix Q, *Sampling Methodologies*** and submitted to MPI Research.

Sampling Results – River Grove Marina Foam Discharge Site

Laboratory analysis of sediment samples collected from the Mississippi River at the River Grove Marina did not detect any PFC compounds above the laboratory quantitation limits. All sediment sample analytical results, including non-detect results and laboratory quantitation or detection limits, are

summarized in **Table 1, *Soil and Sediment Analytical Results, PFCs and TOC***, of this report. A copy of the laboratory report for sediment and surface water, with the chain-of-custody record, is included in **Appendix R**.

Laboratory analysis of surface water samples collected from the Mississippi River at the River Grove Marina detected PFC compound concentrations in both the upgradient surface water sample (SW-1) and the downgradient surface water sample (SW-2), as listed in the table below. All surface water analytical results are summarized in **Table 2, *Groundwater and Surface Water Analytical Results, PFCs*. *Results, PFCs*.**

Surface Water Sample PFC Detections – River Grove Marina Foam Discharge Site	
Sample Location	**Compound Concentration**
SW-1	3.54 ng/L PFBA
	2.79 ng/L PFOA
	4.00 ng/L PFBS
SW-2	4.23 ng/L PFBA
	3.43 ng/L PFBS

Laboratory results in nanograms per liter (ng/L), which is equivalent to parts per trillion (ppt).

Discussion and Conclusion – River Grove Marina Foam Discharge Site

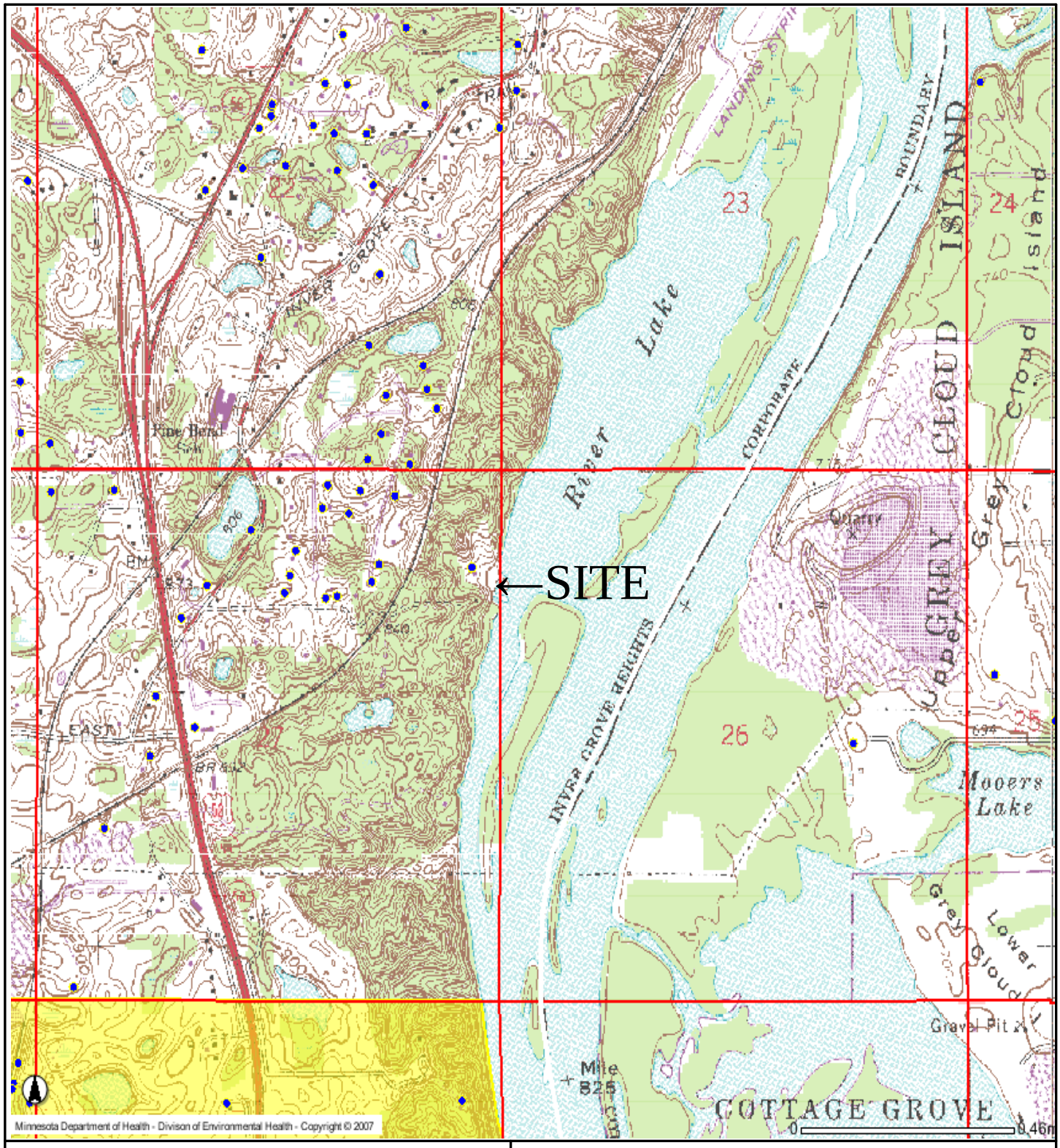
Based on information provided by the owner/operator of the River Grove Marina and the Inver Grove Heights Fire Chief, fifteen gallons of Ansul-brand Class B AFFF was discharged at a boat and dock fire at the River Grove Marina on September 26, 2009. The River Grove Marina is situated on the west bank of backwaters of the Mississippi River. The majority of the spent foam apparently dissipated in the river, while some washed up on shore near the boat landing.

No PFCs were detected in the three sediment samples collected from the river at the marina.

Surface water quality criteria are developed by the MPCA for specific surface water bodies only. The MPCA has not developed general surface water quality criteria or site-specific ambient surface water quality criteria for the portion of the Mississippi River where surface water samples were collected.

While PFCs were detected in the surface water samples collected at the River Grove Marina, the concentrations cannot definitively be linked to the use of Class B firefighting foam at the marina. PFC

sampling conducted by the MPCA prior to the fire at the River Grove Marina fire, unrelated to the PFC/Firefighting Foam project, has been conducted at various locations in the Mississippi River. This sampling by the MPCA has identified PFCs in sediments and surface water up-river of the River Grove Marina. Information regarding other sampling in the Mississippi River is published by the MPCA.



LEGEND:

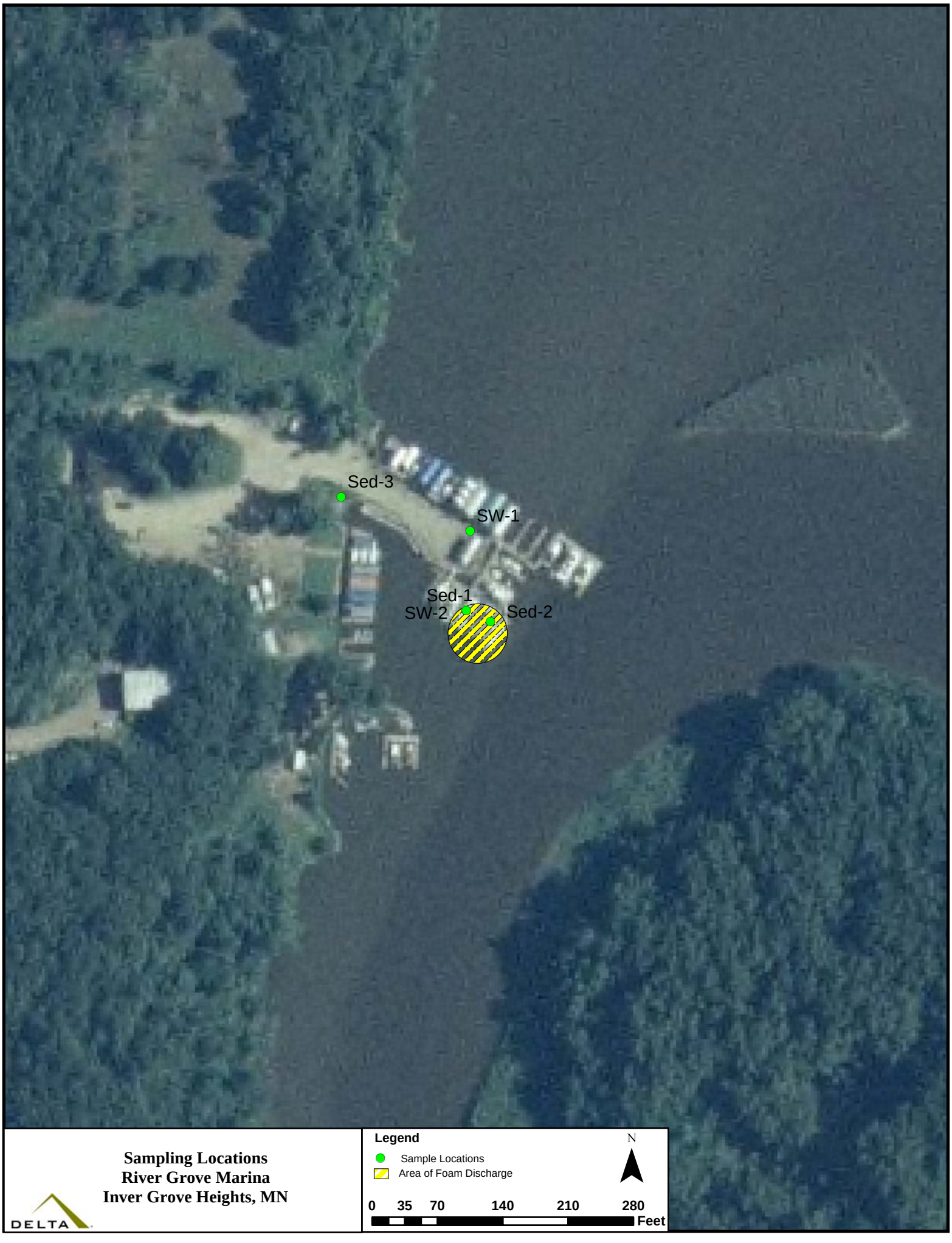
- Well Locations

North

FIGURE 1
SITE LOCATION MAP
RIVER GROVE MARINA
INVER GROVE HEIGHTS, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY
19382DEL	NR	DD
DATE	REVIEWED BY	FILE NAME
12/31/09		IGH-1

DELTA



Sampling Locations
River Grove Marina
Inver Grove Heights, MN

River Grove Marina, Inver Grove Heights, MN
Site of September 26, 2009 Fire
November 18, 2009

Photograph 1
View of the marina and boat ramp from shore, view facing east. Sediment sample Sed-3 was collected at the shallow area near the left (north) end of the boat ramp.

Photograph 2
Four boats and adjoining docks at upper right of the photo burned in the fire of September 26, 2009.

Photograph 3
River sediment sample Sed-1 and surface water sample SW-2 were collected on the east side nearest dock in the photo. Sediment sample Sed-2 was collected from the inside of the furthest dock. View facing east.

Minnesota Pollution Control Agency

ACCESS AGREEMENT BETWEEN
THE MINNESOTA POLLUTION CONTROL AGENCY
AND RIVER GROVE HARBOR INC.

The Minnesota Pollution Control Agency (MPCA) is investigating sites where Class B firefighting foams have been or are being discharged. The site reconnaissance and investigation will be conducted at the following site owned and operated by River Grove Harbor Inc., where Class B firefighting foam was recently released during a fire response:

River Grove Marina
102nd Street East
Inver Grove Heights, Minnesota

The Property Owner hereby consents and authorizes the MPCA, its employees, agents and contractors, to enter this property to conduct soil, sediment and water sampling as specified in the attached Scope of Work. The sampling is being conducted in response to the use of Class B firefighting foam that may or may not contain perflurocarbons (PFCs). The MPCA is authorized to take these actions under Minn. Stat. § 115C.03, subd. 7 (2002).

The MPCA will notify the Property Owner at least 48 hours before entering the property. Work will be conducted during regular business hours (8:00 a.m. to 5:00 p.m.) unless the MPCA receives permission to and arrangements are made to conduct work during different hours. The MPCA will conduct its activities so as to minimize interference with the use of the property. If any portion of the property must be disturbed as a result of the MPCA's activities, the MPCA will restore the property as close to its original condition as is reasonably possible under the circumstances. The Property Owner will take reasonable precautions to ensure that the equipment of the MPCA and its contractors on the property is not damaged, and that the work being conducted by the MPCA, its employees, agents and contractors is not disrupted.

All waste material generated during sampling activities shall be promptly and properly disposed off-site by the MPCA, and the removal and proper disposal thereof shall be the responsibility of the MPCA. Results of all testing conducted on the property will be provided to the Property Owner if requested.

The MPCA shall be liable for injury to or loss of property, or personal injury or death, caused by an act or omission of any employee of the state in the performance of the work described above, under the circumstances where the state, if a private person, would be liable to the claimant, in accordance with Minn. Stat. § 3.736.

MINNESOTA POLLUTION CONTROL AGENCY

Kathryn J Sather
Signature

Remediation Division Director
Title

11/4/09
Date

RIVER GROVE HARBOR INC.

Robert R Hackett
Signature

President
Title

10/24/2009
Date

SCOPE OF WORK: **Sampling of Soil, Sediments and Water**

SITE: **River Grove Marina**
Inver Grove Heights, Minnesota

Delta Consultants (Delta), as a contractor for the Minnesota Pollution Control Agency (MPCA), will conduct the Scope of Work detailed below at the above-referenced site (the Site). The work is being conducted as part of the MPCA's *PFCs in Firefighting Foam* project. The Work is expected to be completed in four hours or less.

1. Collect one surface soil sample from the launch area near the shore where debris from the fire collected.
2. Collect two sediment and two surface water samples from the river via hand-sampling in the area where firefighting foam was discharged in response to the boat fire.
3. All samples will be submitted to a State-contracted laboratory for analysis of PFCs only. The following PFC compounds will be included on the list of analytes:
   - Perfluorobutanoic acid (PFBA)
   - Perfluorobutane Sulfonate (PFBS)
   - Perfluoropentanoic acid (PFPeA)
   - Perfluorohexanoic acid (PFHxA)
   - Perfluoroheptanoic acid (PFHpA)
   - Perfluorohexane Sulfonate (PFHxS)
   - Perfluorooctanoic acid (PFOA)
   - Perfluorooctane Sulfonate (PFOS)
   - Perfluorooctane Sulfonamide (PFOSA)
   - Perfluorononanoic acid (PFNA)
   - Perfluorodecanoic acid (PFDA)
   - Perfluoroundecanoic acid (PFUDA)
   - Perfluorododecanoic acid (PFDoDA)
4. Collect latitude/longitude coordinates of all sample locations using a hand-held GPS unit.
5. A copy of the laboratory analytical report will be provided to River Grove Harbor Inc. upon receipt.

APPENDIX P

Kandiyohi County Landfill Foam Discharge Discussion and Supporting Documents

Background and Access – Kandiyohi County Landfill Fire Site

A fire occurred at the construction and demolition (C&D) portion of the Kandiyohi Landfill over several days starting on October 22, 2009. According to news reports, fire departments from New London, Spicer, Willmar, Sunburg, Pennock, and Belgrade responded to the fire. In November 2009 the Willmar Fire Department Fire Chief was contacted regarding the fire response at the landfill. The Fire Chief indicated that, while mostly Class A foam was used to fight the fire, 3M- and Ansul-brands of Class B foam were also used. The Kandiyohi County Director of Environmental Services confirmed that 545 gallons of Class B foam concentrate were used on the landfill fire.

The Kandiyohi County Landfill is located approximately three miles west-southwest of the City of New London, southwest of the corner of the intersection of 165th Avenue NW and Highway 71. The landfill location is shown on **Figure 1, *Site Location Map, Kandiyohi County Landfill***, included in **Appendix P**. The layout of the landfill and the location of the C&D portion of the landfill is shown on the figure ***Kandiyohi Landfill Firefighting Foam Discharge Site,*** also included in **Appendix P**.

Site Reconnaissance – Kandiyohi County Landfill

Site reconnaissance of the C&D portion of the Kandiyohi Landfill was conducted on December 2, 2009. Delta representative Nancy Rodning and MPCA Project Manager Nile Fellows were accompanied by the Kandiyohi County Director of Environmental Services (ES). The ES Director indicated that smoke was spotted at the C&D portion of the landfill, prompting fire department personnel to search for the source of the fire by spot digging, that is, digging into the debris pile at several locations until flame erupted. During the fire response, all of the affected C&D debris was dug up, spread out and saturated with water and firefighting foam to ensure that the flames were out. At the time of the site reconnaissance, much of the debris remained dug up and spread out, however, the portion of the C&D landfill that was dug out to the bottom of the debris (to the soil surface) was refilled with debris. The ES Director expected to re-place the debris into its original location in the coming weeks. Based on the site reconnaissance, Class B foam was not discharged directly to the ground surface but to the C&D debris. Photographs of the C&D portion of the Kandiyohi Landfill where the fire occurred are included in **Appendix P**.

Several groundwater monitoring wells are situated around the landfill as part of the State landfill monitoring program. Maps of the Kandiyohi County Landfill well monitoring network were provided by the MPCA. The maps included water table elevations and groundwater flow paths. Copies of the maps are included in **Appendix P**. In the area of the C&D portion of the landfill the groundwater flow direction ranges from southerly to southwesterly. Groundwater monitoring well DMW-3 is located south of the C&D landfill, and DMW-1A is located north of the C&D landfill in an upgradient groundwater flow direction. While DMW-3 is

situated roughly downgradient of the C&D area, a more ideal downgradient location would be to the southwest of the landfill, as two of three groundwater flow diagrams for the landfill show a south-southwesterly flow path in the area of the C&D landfill.

A work plan was prepared to collect groundwater samples for PFC analysis from existing wells DMW-3 and DMW-1A and from a new monitoring well that was to be installed to the southwest of the C&D area. The MPCA provided well logs and water table elevation data for DMW-3 and DMW-1A, copies of which are included in **Appendix P**.

Kandiyohi County granted permission the MPCA to install a new monitoring well near the southwest corner of the C&D portion of the landfill and to sample select existing wells and the new well for PFCs. Since the MPCA already had access to the landfill through the State Landfill Program, an access agreement specific to the PFC-related work was not executed.

Sample Collection – Kandiyohi County Landfill

On January 12, 2010, Delta personnel and Thein Well Company mobilized to the Kandiyohi County Landfill to install a new groundwater monitoring well designated as DMW-4, near the southwest corner of the C&D portion of the landfill. However, due to deep snow cover the area was inaccessible for the drill rig. Attempts to clear a road to the proposed well location were unsuccessful. Therefore, the proposed new monitoring well was not installed.

Groundwater samples were collected via hand-bailing from existing wells DMW-3 and DMW-1A on January 12, 2010. An equipment blank water sample was also collected. See **Appendix Q, *Methodologies***, for groundwater and equipment blank sampling methodologies. The depths to groundwater were measured at 55.0 feet in DMW-3 and 26.8 feet in DMW-1A prior to sampling. Light non-aqueous phase liquid (LNAPL) was not detected in either well. Groundwater samples were submitted to Axys Analytical Services LTD for analysis of PFCs.

Sampling Results – Kandiyohi County Landfill

Laboratory analysis of groundwater samples collected at the Kandiyohi Landfill detected only one PFC compound, and only in the groundwater sample collected downgradient of the C&D area: 6.1 nanograms per liter (ng/L) PFBA was detected in the DMW-3 groundwater sample. No other PFC compounds were detected in the DMW-3 sample, and no PFC compounds were detected in the DMW-1 sample or the equipment blank sample.

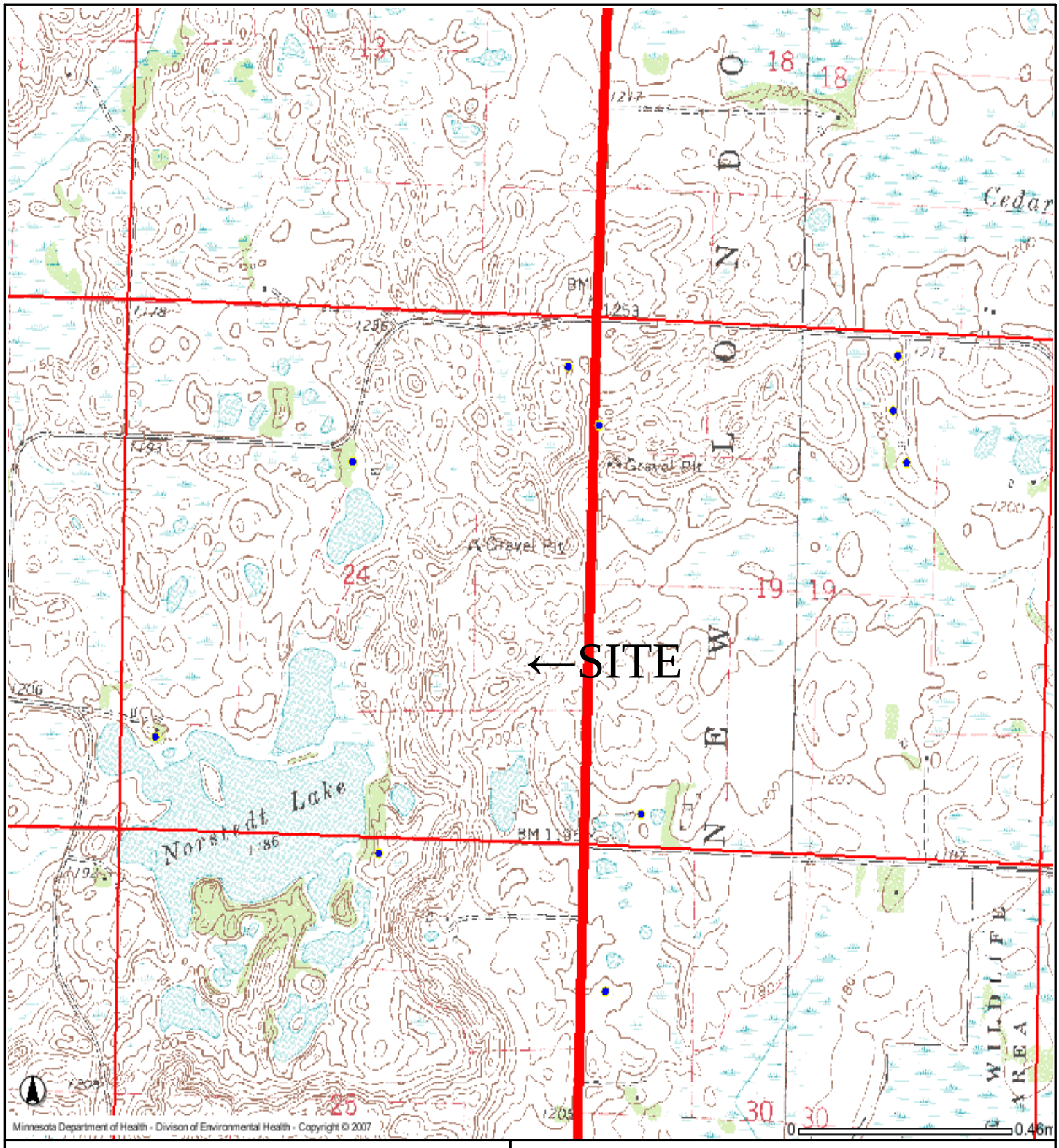
Discussion and Conclusion – Kandiyohi County Landfill

Based on information provided by the Willmar Fire Chief and the Kandiyohi County ES Director, 545 gallons of Ansul and 3M brands of Class B foam concentrate were used on the landfill fire at the end of October 2009. Based on data collected from an existing monitoring well network at the landfill, the groundwater flow direction in the C&D portion of the landfill ranges from southerly to southwesterly. An attempt to install a monitoring well to the southwest of the C&D landfill area in January 2010 was unsuccessful due to deep snow at the landfill.

Laboratory analysis of a groundwater sample collected on January 12, 2010, roughly downgradient of the landfill fire from DMW-3, detected only 6.1 ng/L PFBA. No PFCs were detected in the upgradient groundwater sample collected from DMW-1.

The Minnesota Department of Health has defined drinking water values for select PFC compounds, including PFBA. The chronic exposure Health Based Value (HBV) for PFBA is 7000 ng/L. The HBVs are developed by the MDH as interim guidance until a HRL can be established. The PFBA concentration detected in the groundwater sample collected from DMW-3 was well below the HBV.

PFCs from the discharge of firefighting foam at the landfill may or may not have moved through the soils and reached the water table at the time of groundwater sampling, which is at an approximate depth of 25 feet to 50 feet below the ground surfaces where the foam was sprayed. Additional future groundwater sampling of DMW-3, and at a location to the southwest of the C&D landfill, may provide useful data regarding the potential migration of PFCs through the environment at the landfill.



LEGEND:

- Well Locations

North

FIGURE 1
SITE LOCATION MAP
KANDIYOHI COUNTY LANDFILL
NEW LONDON, MINNESOTA

PROJECT NO.	PREPARED BY	DRAWN BY	
19382DEL	NR	DD	
DATE	REVIEWED BY	FILE NAME	
12/30/09		New London-1	DELTA

Kandiyohi Landfill
Firefighting Foam Discharge Site
New London, MN

DELTA

Kandiyohi County Landfill
Site of October 2009 Fire

Photograph 1

View of the construction and demolition (C&D) debris area at the Kandiyohi County Landfill during the site reconnaissance on December 2, 2009, view facing west, photo taken from the landfill entrance road. Much of the C&D debris was pushed up and spread around the landfill to ensure the fire had stopped smoldering.

Photograph 2

View from the area above the site of the fire, view facing east. C&D debris was spread in this area.

Table 3
Well Construction Summary
(April 2008)
Kandiyohi County Landfill

Well Type	Well No.	Location Decimal Degrees Latitude	Longitude	MN Unique Well No.	Elevation (ft MSL) Ground Surface	Top of Riser	Approx. Total Well Depth* (ft)	Depth to water (ft)	Screen Diameter/ Length (in/ft)	Screen Material	Riser Material	Unit Monitored	Gradient Position[2]	Construction Date
Compliance Boundary Wells	MW1A	-95.0116	45.281362	401691	1251.1	1253.5	78.8	58	(4 / 5)	PVC	PVC	MO	Variable3	Jan-85
	MW1B	-95.0116	45.281388	211118	1256	1255.1	135	64	(5 / 4)	--	Steel	LO	Variable3	Jul-71
	MW4	-95.0097	45.276221	401683	1214.2	1216.5	36.5	23	(2 / 7)	PVC	PVC	LT	Side	Jan-85
	MW6A	-95.0143	45.278904	401688	1249.71	1251	63.5	56	(4 / 5)	PVC	PVC	MO	Down	Jan-85
	MW6B	-95.0144	45.27897	401690	1248.11	1250.1	113.5	58	(4 / 5)	PVC	PVC	LO	Down	Jan-85
	MW7A	-95.01	45.281808	478136	1256.8	1260.1	76.3	65	(4 / 10)	SS	BS	MO	Up	Apr-91
	MW8	-95.0129	45.282263	482129	1240.0	1242.1	60.2	32	(4 / 10)	SS	BS and SS	UO/UT	Variable3	Jul-92
	MW9A	-95.0149	45.28125	498879	1240.7	1243.7	69.5	49	(4 / 10)	SS	BS and SS	MO	Down	Jul-92
	MW9B	-95.0149	45.281209	482128	1240.5	1242.6	122.1	51	(4 / 10)	SS	BS and SS	LO	Down	Jul-92
	MW10A	-95.0151	45.278758	482127	1233.7	1236.6	60	42	(4 / 10)	SS	BS and SS	MO	Down	Jul-92
	MW10B	-95.0151	45.278719	482126	1233.8	1236.9	92.4	42	(4 / 10)	SS	BS and SS	LO	Down	Jul-92
	MW11	-95.015	45.277327	482125	1219.7	1222.2	42.3	28	(4 / 10)	SS	BS and SS	MO	Down	Jul-92
	MW12	-95.015	45.274825	482124	1222.6	1225.3	48.7	35	(4 / 10)	SS	BS and SS	MO	Down	Jul-92
	MW14A	-95.0132	45.274868	529502	1210.8	1213.3	28.3	23	(2 / 10)	SS	SS	UO	Down	Jul-93
	MW14B	-95.0132	45.274845	532298	1209.9	1212.6	48.7	22	(2 / 5)	SS	SS	MO	Down	Jul-93
	DW1	-95.0145	45.276935	529501	1238	1239.9	55.8	48	(2 / 10)	SS	SS	MO	Down	Jun-93
Domestic Wells	Combs	Unknown	Unknown	471507	1200	--	55	40	(5 / 10)	Plastic	Plastic	LT sand seam	Side	Sep-90
	Daily	Unknown	Unknown	169854	1230	--	88	--	?/5	Black	SS	LT sand seam	Side	?/80
	Hillcrest	Unknown	Unknown	141779	1253	--	124	--	(5 / 8.5)	SS	Steel	LO	Up	Apr-78
	Jordon	Unknown	Unknown	None	--	--	84	--	(4 / 7)	Plastic	Plastic	LO or LT sand seam	Down	?/81

*From TOC

1. January 1993 elevation or depth after placing 1992 final cover and raising well casings.
2. Position of well relative to groundwater flow from beneath refuse-filled area.
3. Variable due to mounding and subsiding water-table elevation fluctuations.
4. October, 1993 County Survey
5. Kandiyohi County Survey, Nov. 22, 1994 (top of well casing north side with locking cap off)
6. Kandiyohi County Survey, Nov 1, 2002 (top of well with locking cap off after casing was raised 14.2 feet for road realignment project# CP T233-01)

UO = Upper Outwash; UT = Upper Till; MO = Middle Outwash; LO = Lower Outwash; LT = Lower Till
SS = Stainless steel; PVC = Polyvinyl chloride; BS = Black steel

Table 3
Well Construction Summary
(April 2008)
Kandiyohi County Landfill

Well Type	Well No.	Location Decimal Degrees Latitude	Longitude	MN Unique Well No.	Elevation (ft MSL) Ground Surface	Top of Riser	Approx. Total Well Depth* (ft)	Depth to water (ft)	Screen Diameter/ Length (in/ft)	Screen Material	Riser Material	Unit Monitored	Gradient Position[2]	Construction Date
Corrective Action Wells	MW7B	-95.01	45.281774	570409	1256.96	1259.9	152	69	(2 / 5)	SS	SS	LO	Up	Sep-95
	MW15	-95.0164	45.281819	529505	1238.8	1241.2	57.1	47	(2 / 10)	SS	SS	UO	Down	Jun-93
	MW16	-95.0161	45.280913	529506	1223.8	1226.1	42.4	31	(2 / 10)	SS	SS	UO	Down	Jun-93
	MW17	-95.0161	45.279688	529507	1242.7	1245.2	57.6	50	(2 / 10)	SS	SS	UO	Side	Jun-93
	MW18	-95.0184	45.280144	529503	1215.5	1217.7	30.3	22	(2 / 10)	SS	SS	UO	Up	Jun-93
	MW19	-95.0128	45.283305	529504	1228.3	1230.8	46.4	35	(2 / 10)	SS	SS	UO	Side	Jun-93
	MW20	-95.0151	45.282313	570408	1236.9	1239.5	51	45	(2 / 15)	SS	SS	MO	Down	Sep-95
	MW20B	-95.0151	45.282328	582447	1235.89	1237.6	78	46	(2 / 5)	SS	SS	LO	Down	Dec-96
	MW21	-95.0168	45.282693	582448	1258.19	1260	74	67	(2 / 15)	SS	SS	UO	Down	Dec-96
	MW21B	-95.0168	45.28278	751072	1256.6	1259.3	109.4	70	(2 / 5)	SS	SS	LO	Down	7-Mar
	MW22A	-95.0155	45.284076	750588	1220	1222.4	38.5	32	(2 / 5)	SS	SS	MO	Side	7-Apr
	MW22B	-95.0155	45.284097	750589	1220.1	1222.4	68.1	32	(2 / 5)	SS	SS	LO	Side	7-Apr
Piezometers	P1	-95.0145	45.281811	478135	1226.1	1228	44.2	33	(2 / 10)	PVC	PVC	MO	Down	Apr-91
	P22	-95.0155	45.284056	750587	1220.3	1222.8	20.2	17	(2 / 10)	SS	SS	UO	Side	7-Apr
Demolition Landfill wells	DMW1A	-95.012	45.274634	582446	1215.45	1217.2	36.4	26	(2 / 15)	SS	SS	UO	Side	Dec-96
	DMW1B	-95.0119	45.274637	582444	1216.11	1217.7	58	27	(2 / 5)	SS	SS	UO	Side	Dec-96
	DMW2	-95.0149	45.273785	582445	1225.25	1227.9	47.4	38	(2 / 15)	SS	SS	UO	Down	Dec-96
	DMW3	-95.0128	45.272147	730127	1242.2	1244.9	63.5	54	(2 / 10)	SS	Black Steel	UO	Down	5-Aug

*From TOC

1. January 1993 elevation or depth after placing 1992 final cover and raising well casings.
2. Position of well relative to groundwater flow from beneath refuse-filled area.
3. Variable due to mounding and subsiding water-table elevation fluctuations.
4. October, 1993 County Survey
5. Kandiyohi County Survey, Nov. 22, 1994 (top of well casing north side with locking cap off)
6. Kandiyohi County Survey, Nov 1, 2002 (top of well with locking cap off after casing was rased 14.2 feet for road realignment project# CP T233-01)

UO = Upper Outwash; UT = Upper Till; MO = Middle Outwash; LO = Lower Outwash; LT = Lower Till

SS = Stainless steel; PVC = Polyvinyl chloride; BS = Black steel

Table 8
October 2008 Groundwater Elevation and Head Potential Calculations
Kandiyohi County Landfill

Water Table Elevations Analysis:

Well No.	TOC elev.	10/14/08 Measured depth to water (ft.)	Approx. Depth to top of screen (ft.)	Water elev. in well	Top of sceen elev.	Vertical gradient (+down)	Calculated head potential elev. (ft.)	
MW-1A	1253.52	60.53	73.8	1192.99	1179.72	0.0573535	1193.75	
DMW-1A	1217.21	27.89	20.0	1189.32	1197.21	NA	1189.32	
DMW-2	1227.90	39.08	30.0	1188.82	1197.90	NA	1188.82	
DMW-3	1244.91	56.4	53.5	1188.51	1191.41	NA	1188.51	
MW-4	1216.53	23.98	29.5	1192.55	1187.03	NA	1192.55	
MW-6A	1251.00	58.82	58.5	1192.18	1192.50	0.0453386	1192.19	
MW-7A	1260.10	67.01	66.3	1193.09	1193.80	NA	1193.09	
MW-8	1242.10	48.71	50.2	1193.39	1191.90	0.0436681	1193.46	
MW-9A	1243.74	51.39	59.5	1192.35	1184.24	0.0436681	1192.70	
MW-10A	1236.60	44.24	50.0	1192.36	1186.60	0.0037406	1192.38	
MW-11	1222.21	29.95	32.3	1192.26	1189.91	0.0037406	1192.27	
MW-12	1225.29	36.35	38.7	1188.94	1186.59	-0.0099010	1188.92	
MW-14A	1213.30	24.23	18.3	1189.07	1195.00	NA	1189.07	
DW-1	1239.92	49.02	45.8	1190.90	1194.12	NA	1190.90	
P-1	1227.98	35.55	34.2	1192.43	1193.78	NA	1192.43	
MW-15	1241.20	49.23	47.1	1191.97	1194.10	NA	1191.97	
MW-16	1226.08	33.83	32.4	1192.25	1193.68	NA	1192.25	
MW-17	1245.22	52.39	47.6	1192.83	1197.62	NA	1192.83	
MW-18	1217.71	25.01	20.3	1192.70	1197.41	NA	1192.70	
MW-19	1230.83	37.49	36.4	1193.34	1194.43	NA	1193.34	
MW-20A	1239.51	47.94	36.0	1191.57	1203.51	NA	1191.57	
MW-21A	1259.97	69.34	57.0	1190.63	1202.97	NA	1190.63	
MW-22A	1222.35	33.14	36.3	1189.21	1186.05	NA	1189.21	
P-22	1222.80	18.17	12.3	1204.63	1210.50		1204.63	
* PB-1							1189.21	Correlated with MW-22A
* PB-2							1190.79	Correlated with MW-21A
* PB-3							1192.77	Correlated with MW-18

NA= Screen intersects water table, or not applicable

Aquifer Base Elevation Head Potential Elevations Analysis:

							Base Elev. used for head pot. calcs.	
MW-1B	1255.10	65.3	131.0	1189.80	1124.10	0.0573535	1188.42	1100	
DMW-1B	1217.71	28.21	50.0	1189.50	1167.71	-0.0083295	1189.56	1160	Transition Layer
MW-6B	1250.05	60.18	108.5	1189.87	1141.55	0.0453386	1189.80	1140	
MW-7B	1259.91	70.15	147.0	1189.76	1112.91	0.0411670	1189.23	1100	
MW-9B	1242.62	52.97	112.1	1189.65	1130.52	0.0436681	1188.32	1100	
MW-10B	1236.92	44.68	82.4	1192.24	1154.52	0.0037406	1192.15	1130	
MW-14B	1212.57	23.3	43.7	1189.27	1168.87	-0.0099010	1189.46	1150	
MW-20B	1237.59	47.68	73.0	1189.91	1164.59	0.0615271	1185.94	1100	
MW-21B	1259.25	70.07	104.4	1189.18	1154.85	0.0430778	1188.54	1140	
MW-22B	1222.41	33.2	63.1	1189.21	1159.31	0.0000000	1189.21	1100	

NA= Screen intersects water table, or not applicable

Aquifer Mid Elevation 1165 Head Potential Elevations Analysis:

							Middle Elev. used for head pot. calcs.	
MW-1B	1255.10	65.3	131.0	1189.80	1124.10	0.0573535	1192.15	1165	
DMW-1B	1217.71	28.21	50.0	1189.50	1167.71	-0.0083295	1189.56	1160	Transition layer
MW-6B	1250.05	60.18	108.5	1189.87	1141.55	0.0453386	1190.93	1165	
MW-7B	1259.91	70.15	147.0	1189.76	1112.91	0.0411670	1191.90	1165	
MW-9B	1242.62	52.97	112.1	1189.65	1130.52	0.0436681	1191.16	1165	
MW-10B	1236.92	44.68	82.4	1192.24	1154.52	0.0037406	1192.28	1165	
MW-14B	1212.57	23.3	43.7	1189.27	1168.87	-0.0099010	1189.31	1165	
MW-20B	1237.59	47.68	73.0	1189.91	1164.59	0.0615271	1189.94	1165	
MW-21B	1259.25	70.07	104.4	1189.18	1154.85	0.0405254	1189.59	1165	
MW-22B	1222.41	33.2	63.1	1189.21	1159.31	0.0000000	1189.21	1165	

SW-1	–
SW-2	1187.07
** SW-3	1188.64
SW-4	1196.63

* Measured July 22, 2008 and correlated with nearby wells MW-22, MW-21, MW-18, respectively. (2008 Plume Re-characterization and Borings Report, ECAD 2008)

** BM elevation revised to 1152.99 on 7/11/02 by Kandiyohi County Survey Crew from historical value of 1163.67 they had reported

Table 9
2008 Groundwater Head Potential Elevations
Kandiyohi County Sanitary Landfill

Well No.	Calculated head potential elev. (ft.) 4/14/2008	7/14/2008	7/22/2008	10/14/2008
Water Table Elevations				
MW-1A	1193.54	1194.36	1194.21	1193.75
DMW-1A	1189.21	1189.91	-	1189.32
DMW-2	1188.76	1189.45	-	1188.82
DMW-3	1188.60	1189.03	-	1188.51
MW-4	1192.35	1193.10	-	1192.55
MW-6A	1192.12	1192.61	-	1192.19
MW-7A	1192.89	1193.55	1193.58	1193.09
MW-8	1193.22	1193.66	1193.71	1193.46
MW-9A	1192.51	1192.96	1193.01	1192.70
MW-10A	1192.26	1192.77	-	1192.38
MW-11	1192.18	1192.64	-	1192.27
MW-12	1188.89	1189.54	-	1188.92
MW-14A	1189.02	1189.68	-	1189.07
DW-1	1190.72	1191.51	-	1190.90
P-1	1192.28	1192.71	1192.73	1192.43
MW-15	1191.90	1192.30	1192.33	1191.97
MW-16	1192.10	1192.61	1192.62	1192.25
MW-17	1192.72	1192.89	-	1192.83
MW-18	1192.71	1192.88	1192.90	1192.70
MW-19	1193.05	1193.50	1193.54	1193.34
MW-20A	1191.69	1192.11	1192.11	1191.57
MW-21A	1190.41	1190.86	1190.89	1190.63
MW-22A	1189.11	1189.75	1189.66	1189.21
P-22	1203.86	1205.47	1205.46	1204.63
PB-1*	1189.11	1189.75	1189.66	1189.21
PB-2*	1190.57	1191.02	1191.05	1190.79
PB-3*	1192.78	1192.95	1192.97	1192.77

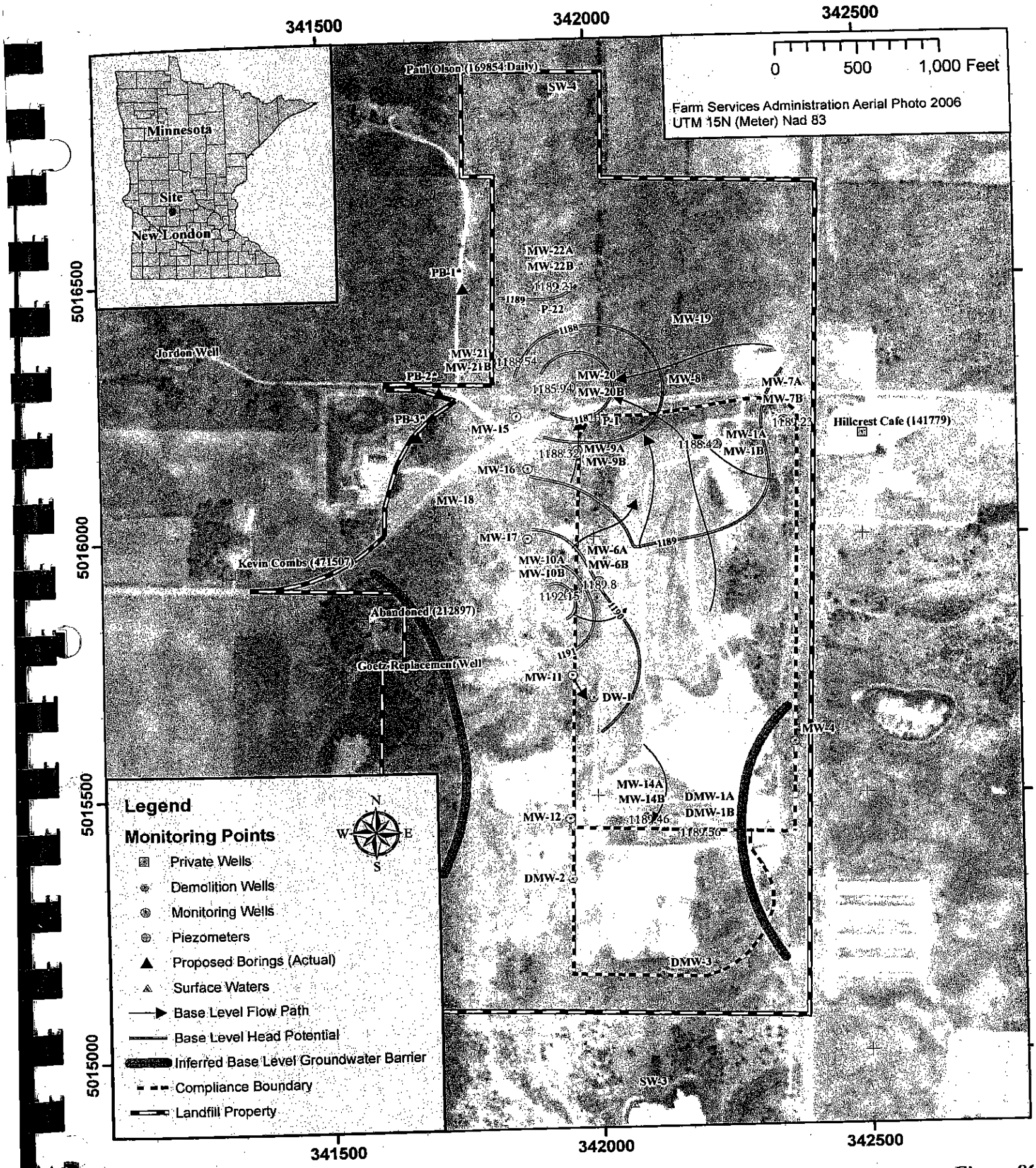
* Measured July 22, 2008 and correlated with nearby wells MW-22, MW-21, MW-18, respectively. (2008 Plume Re-characterization and Borings Report, ECAD 2008)

Table 9
2008 Groundwater Head Potential Elevations
Kandiyohi County Sanitary Landfill

Well No.	Calculated head potential elev. (ft.) 4/14/2008	7/14/2008	7/22/2008	10/14/2008
Aquifer Base Elevation Head Potential Elevations Analysis:				
MW-1B	1188.29	1187.59	1188.90	1188.42
DMW-1B	1189.51	1190.15	-	1189.56
MW-6B	1189.80	1190.39	-	1189.80
MW-7B	1189.13	1189.82	1189.71	1189.23
MW-9B	1188.29	1189.01	1188.88	1188.32
MW-10B	1192.18	1192.64	-	1192.15
MW-14B	1189.45	1189.99	-	1189.46
MW-20B	1184.45	1185.68	1185.38	1185.94
MW-21B	1188.51	1189.20	-	1188.54
MW-22B	1189.08	1189.69	1189.66	1189.21
Mid Aquifer Elevation 1165 Head Potential Elevations Analysis:				
MW-1B	1191.97	1192.30	1192.59	1192.15
DMW-1B	1189.51	1190.15	-	1189.56
MW-6B	1190.90	1191.45	-	1190.93
MW-7B	1191.74	1192.40	1192.39	1191.90
MW-9B	1191.03	1191.55	1191.54	1191.16
MW-10B	1192.22	1192.71	-	1192.28
MW-14B	1189.28	1189.87	-	1189.31
MW-20B	1189.58	1190.22	1190.13	1189.94
MW-21B	1189.47	1190.03	1189.99	1189.59
MW-22B	1189.10	1189.73	1189.66	1189.21
Surface Water Elevations				
SW-1	1151.29	-	-	-
SW-2	1187.79	-	-	1187.07
SW-3**	1189.09	-	-	1188.64
SW-4	-	1197.91	-	1196.63

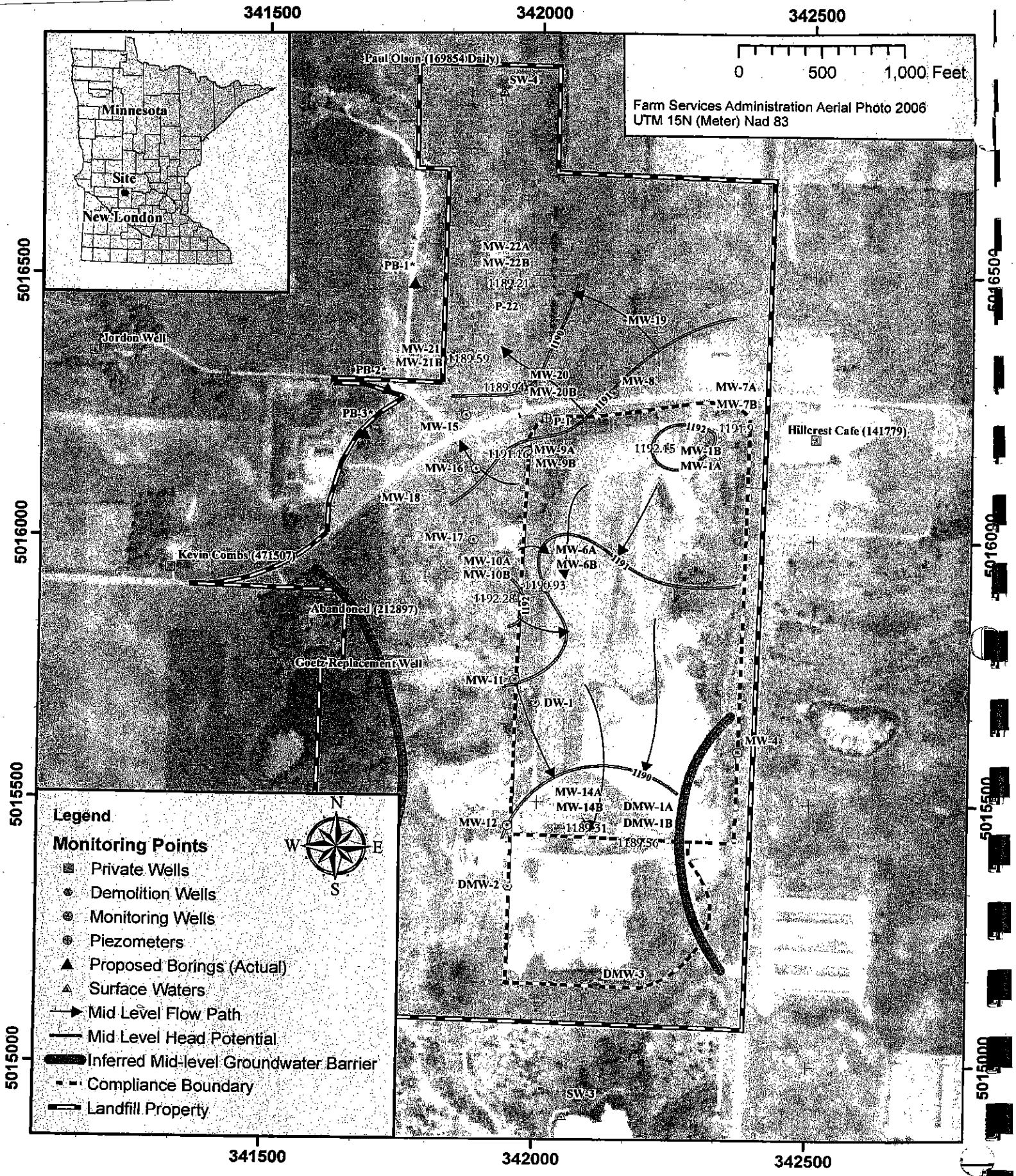
- not measured

** BM elevation revised to 1152.99 on 7/11/02 by Kandiyohi County Survey Crew from historical value of 1163.67 they had reported .



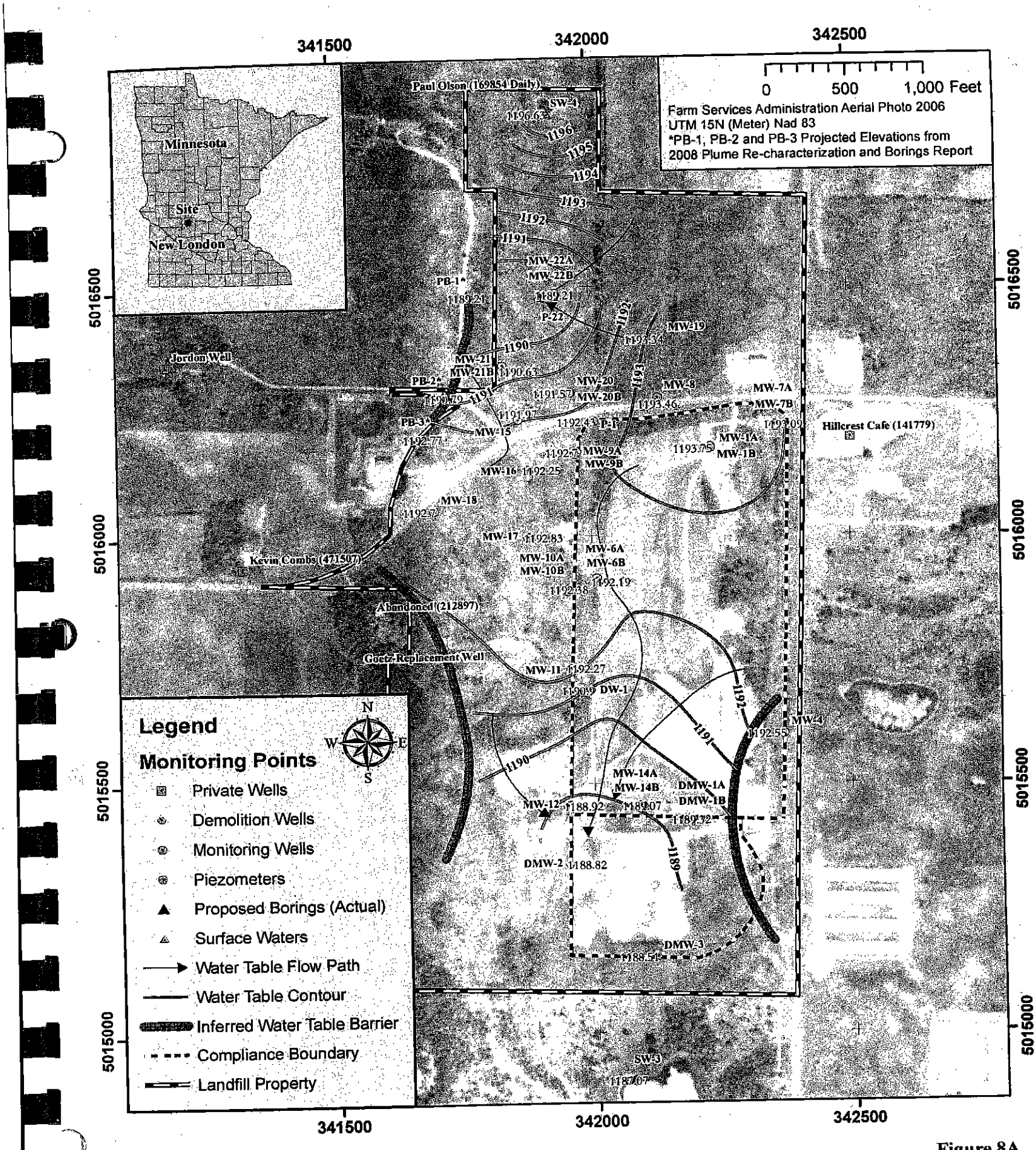
ECAD Engineering
Environmental Concepts & Design, Inc

Figure 8(
Basal Aquifer Head Potentials with Flow path
(October 2008
Kandiyohi County Landfi



ECAD Engineering — Environmental Concepts & Design, Inc.

Figure 8B
Mid Aquifer Head Potentials with Flow paths
(October 2008)
Kandiyohi County Landfill



ECAD Engineering
Environmental Concepts & Design, Inc.

Figure 8A
Water Table Contour Map with Flow paths
(October 2008)
Kandiyohi County Landfill

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 103I

MINNESOTA UNIQUE WELL NO. 582447

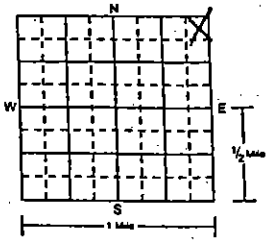
WELL LOCATION

County Name: KANDYOHI

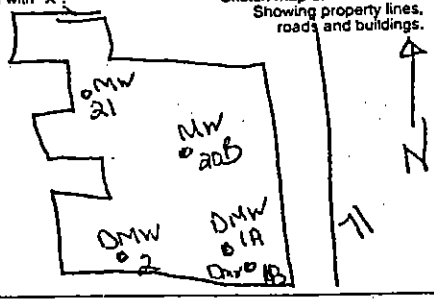
Township Name	Township No.	Range No.	Section No.	Fraction
	121N	35W	24	NE ¼ NE ¼ NE ¼

House Number, Street Name, City, and Zip Code of Well Location or Fire Number: 165th AVE NE KANDIYOHI CO LANDFILL

Show exact location of well in section grid with "X".



Sketch map of well location. Showing property lines, roads and buildings.



WELL DEPTH (completed): 78 ft. | Date Work Completed: 11-29-96

DRILLING METHOD
☐ Cable Tool ☐ Driven ☐ Dug
☒ Auger ☐ Rotary ☐ Jetted
☐ _____

DRILLING FLUID: NONE USED

USE
☐ Domestic ☒ Monitoring ☐ Heating/Cooling
☐ Irrigation ☐ Community PWS ☐ Industry/Commercial
☐ Test Well ☐ Noncommunity PWS ☐ Remedial
☐ Dewatering ☐ _____

CASING Drive Shoe? ☐ Yes ☒ No
☒ Steel ☐ Threaded ☐ Welded
☐ Plastic ☐ _____

CASING DIAMETER / WEIGHT

2	in. to 73 ft.	_____	lbs./ft.	8¾	in. to 78 ft.
_____	in. to _____ ft.	_____	lbs./ft.	_____	in. to _____ ft.
_____	in. to _____ ft.	_____	lbs./ft.	_____	in. to _____ ft.

HOLE DIAM.

SCREEN
Make: COOK
Type: STAINLESS STEEL Diam.: 2"
Slot/Gauze: .010 Length: 5'
Set between: 73 ft. and 78 ft. FITTINGS: _____

OPEN HOLE
from _____ ft. to _____ ft.

STATIC WATER LEVEL
50 ft. ☒ below ☐ above land surface Date measured 11-29-96

PUMPING LEVEL (below land surface)
N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION
☐ Pitless adapter manufacturer _____ Model _____
☒ Casing Protection 3-4x6 POSTS ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

GROUTING INFORMATION
Well grouted? ☒ Yes ☐ No
Grout Material: ☐ Neat cement ☐ Bentonite ☐ Concrete 2☐ High Solids Bentonite

from 0 to 4 ft.	3	☐ yds.	☒ bags
from 4 to 70 ft.	5	☐ yds.	☒ bags
from _____ to _____ ft.	_____	☐ yds.	☐ bags

NEAREST KNOWN SOURCE OF CONTAMINATION
_____ feet UNKNOWN direction _____ type
Well disinfected upon completion? ☐ Yes ☒ No

PUMP
☒ Not installed Date installed _____
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Pressure Tank Capacity _____
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

VARIANCE
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

THEIN WELL CO. 34050
Licensee Business Name *Lic. or Reg. No.*

Authorized Representative Signature 1-7-97 *Date*

NATHAN HERRBOLDT 1-7-97
Name of Driller *Date*

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
ROCKY GRAVELY	SAND BRN	MED	0	20
GRAVEL SAND	BRN	MED	20	30
CLAY GRAVEL SAND	BRN	MED	30	50
CLAY GRAVEL SAND	BRN	MED	50	60
WET SAND PEBBLES	BRN	COARSE	60	78

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW #20B

env. concepts

MINN. DEPT. OF HEALTH COPY 582447

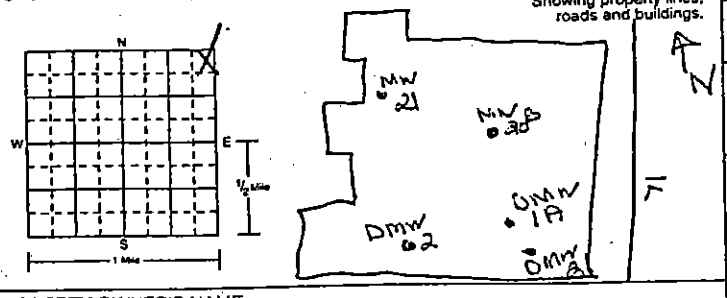
HE-01205-05 (Rev. 1/95)

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 1031

MINNESOTA UNIQUE WELL NO. 582445

WELL LOCATION
County Name: KANDIYOHI
Township Name | Township No.: 121N | Range No.: 35W | Section No.: 24 | Fraction: NE¼ NE¼ NE¼
House Number, Street Name, City, and Zip Code of Well Location or Fire Number: 165th AVE NE KANDIYOHI CO LANDFILL

Show exact location of well in section grid with "X". Sketch map of well location. Showing property lines, roads and buildings.



WELL DEPTH (completed): 45 ft. Date Work Completed: 11-29-96

DRILLING METHOD: ☐ Cable Tool ☒ Auger ☐ Driven ☐ Rotary ☐ Dug ☐ Jetted ☐ _____

DRILLING FLUID: NONE USED

USE: ☐ Domestic ☐ Irrigation ☐ Test Well ☒ Monitoring ☐ Community PWS ☐ Noncommunity PWS ☐ Dewatering ☐ Heating/Cooling ☐ Industry/Commercial ☐ Remedial ☐ _____

CASING: ☒ Steel ☐ Plastic Drive Shoe? ☐ Yes ☒ No ☒ Threaded ☐ Welded ☐ _____

HOLE DIAM.

CASING DIAMETER / WEIGHT:
2 in. to 30 ft. _____ lbs./ft.
_____ in. to _____ ft. _____ lbs./ft.
_____ in. to _____ ft. _____ lbs./ft.

HOLE DIAM.: 8¼ in. to 45 ft.; ____ in. to ____ ft.; ____ in. to ____ ft.

SCREEN: Make COOK; Type STAINLESS STEEL; Slot/Gauze .010; Set between 30 ft. and 45 ft.
OPEN HOLE: from _____ ft. to _____ ft.
Diam. 2"; Length 15'; FITTINGS: _____

STATIC WATER LEVEL: 35 ft. ☒ below ☐ above land surface Date measured 11-29-96

PUMPING LEVEL (below land surface): N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION
☐ Pitless adapter manufacturer _____ Model _____
☐ Casing Protection 3-4x6 posts ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

GROUTING INFORMATION
Well grouted? ☒ Yes ☐ No
Grout Material: ☒ Neat cement ☐ Bentonite ☐ Concrete ☒ High Solids Bentonite
from 0 to 4 ft. 1 ☐ yds. ☒ bags
from 4 to 28 ft. 6 ☐ yds. ☒ bags
from _____ to _____ ft. _____ ☐ yds. ☐ bags

NEAREST KNOWN SOURCE OF CONTAMINATION: _____ feet UNKNOWN direction _____ type
Well disinfected upon completion? ☐ Yes ☐ No

PUMP
☒ Not installed Date installed _____
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Pressure Tank Capacity _____
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

VARIANCE
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
SAND GRAVEL	BRN	MED	0	15
SAND GRAVEL	BRN	MED	15	30
GRAVEL SAND	BRN	MED-C	30	35
SAND GRAVEL WET	BRN	MED	35	45

Use a second sheet, if needed

PROPERTY OWNER'S NAME: KANDIYOHI COUNTY
Property owner's mailing address if different than well location address indicated above.
PO BOX 976
WILLMAR, MN 56201

WELL OWNER'S NAME: same as above
Well owner's mailing address if different than property owner's address indicated above.

REMARKS, ELEVATION, SOURCE OF DATA, etc.
DMW #2

env concepts

MINN. DEPT. OF HEALTH COPY 582445

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

THEIN WELL CO — Licensee Business Name — Lic. or Reg. No. 34050
Authorized Representative Signature — Date 1-7-97
NATHAN HERRBOLDT — Name of Driller — Date 1-7-97

HE-01205-05 (Rev. 1/95)

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes Chapter 1031

MINNESOTA UNIQUE WELL NO. 582446

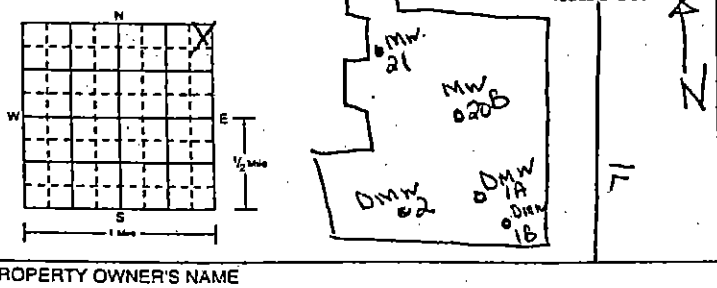
WELL LOCATION

County Name: KANDIYOHI

Township Name	Township No.	Range No.	Section No.	Fraction
	121N	35W	24	NE. NE NE

House Number, Street Name, City, and Zip Code of Well Location or Fire Number: 165th AVE NE KANDIYOHI CO LANDFILL

Show exact location of well in section grid with "X". Sketch map of well location. Showing property lines, roads and buildings.



PROPERTY OWNER'S NAME: KANDIYOHI COUNTY

Property owner's mailing address if different than well location address indicated above.

PO BOX 976
WILLMAR, MN 56201

WELL OWNER'S NAME: SAME AS ABOVE

Well owner's mailing address if different than property owner's address indicated above.

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
DIRT SAND	BLK	MED	0	4
SILTY SANDY CLAY	BRN	MED	4	8
SAND GRAVEL	BRN	MED-C	8	35

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

DMW #1A

env. concepts

MINN. DEPT OF HEALTH COPY 582446

WELL DEPTH (completed): 35 ft. Date Work Completed: 11-29-96

DRILLING METHOD: ☐ Cable Tool ☐ Driven ☐ Dug ☒ Auger ☐ Rotary ☐ Jetted ☐ _____

DRILLING FLUID: NONE USED

USE: ☐ Domestic ☐ Irrigation ☐ Test Well ☒ Monitoring ☐ Community PWS ☐ Noncommunity PWS ☐ Dewatering ☐ Heating/Cooling ☐ Industry/Commercial ☐ Remedial ☐ _____

CASING: ☒ Steel ☐ Plastic Drive Shoe? ☐ Yes ☒ No ☒ Threaded ☐ Welded ☐ _____

CASING DIAMETER	WEIGHT	HOLE DIAM.
2 in. to 20 ft.	_____ lbs./ft.	8¼ in. to 35 ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.
_____ in. to _____ ft.	_____ lbs./ft.	_____ in. to _____ ft.

SCREEN: Make COOK; Type STAINLESS STEEL; Slot/Gauze .010; Set between 20 ft. and 35 ft. FITTINGS: _____

OPEN HOLE: from _____ ft. to _____ ft.; Diam. 2"; Length 15'

STATIC WATER LEVEL: 25 ft. ☒ below ☐ above land surface Date measured 11-29-96

PUMPING LEVEL (below land surface): N/A ft. after _____ hrs. pumping _____ g.p.m.

WELL HEAD COMPLETION: ☐ Pitless adapter manufacturer _____ Model _____
☒ Casing Protection 3-4x6 POSTS ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

GROUTING INFORMATION: Well grouted? ☒ Yes ☐ No
Grout Material ☐ Neat cement ☐ Bentonite ☐ Concrete ☒ High Solids Bentonite
from 0 to 5 ft. 1 ☐ yds. ☒ bags
from 5 to 18 ft. 2 ☐ yds. ☒ bags
from _____ to _____ ft. _____ ☐ yds. ☐ bags

NEAREST KNOWN SOURCE OF CONTAMINATION: _____ feet UNKNOWN direction _____ type
Well disinfected upon completion? ☐ Yes ☒ No

PUMP: ☒ Not installed Date Installed _____
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Pressure Tank Capacity _____
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ _____

ABANDONED WELLS: Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

VARIANCE: Was a variance granted from the MDH for this well? ☐ Yes ☒ No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

THEIN WELL CO — 34050
Licensee Business Name — *Lic. or Reg. No.*

Authorized Representative Signature — 1-7-97 *Date*

MARTY WINTHER — 1-7-97
Name of Driller — *Date*

HE-01205-05 (Rev. 1/95)

Well Log: Lithology & Construction

Well Ident	Name
DMW2 #582445	Kandiyohi County Landfill

Drill. Method:	Drill. Dates:
HSA	11-29-96

X	Y	Ground Elev. (ft)	Meas. Pt. Elev. (ft)
3553.32	1897.34	1225.25	1227.90

All measurements are in feet. Hole and casing diameters in inches. Casing, screen are stainless steel.

Water Level (ft MSL)	Driller	Vertical	Horizontal
1190.88		75.0	40.0

Depth [feet]	Hole	Annulus	Casing	Screen	Lithology	Elev. [feet]
42	8	Sand Pack	2		GP Gravel w/sand, brown-pink, saturated 43	1184
44	45	45	45	45	SP Coarse sand, brown, saturated 45	1182
46						1180
48						1178
50						1176
52						1174
54						1172
56						1170
58						1168
60						1166
62						1164
64						1162
66						1160
68						1158
70						1156
72						1154
74						1152
76						1150
78						1148
						1146

Comments:

Developed by pumping, 50 gal removed

Environmental Concepts & Design, inc.

Well Log: Lithology & Construction

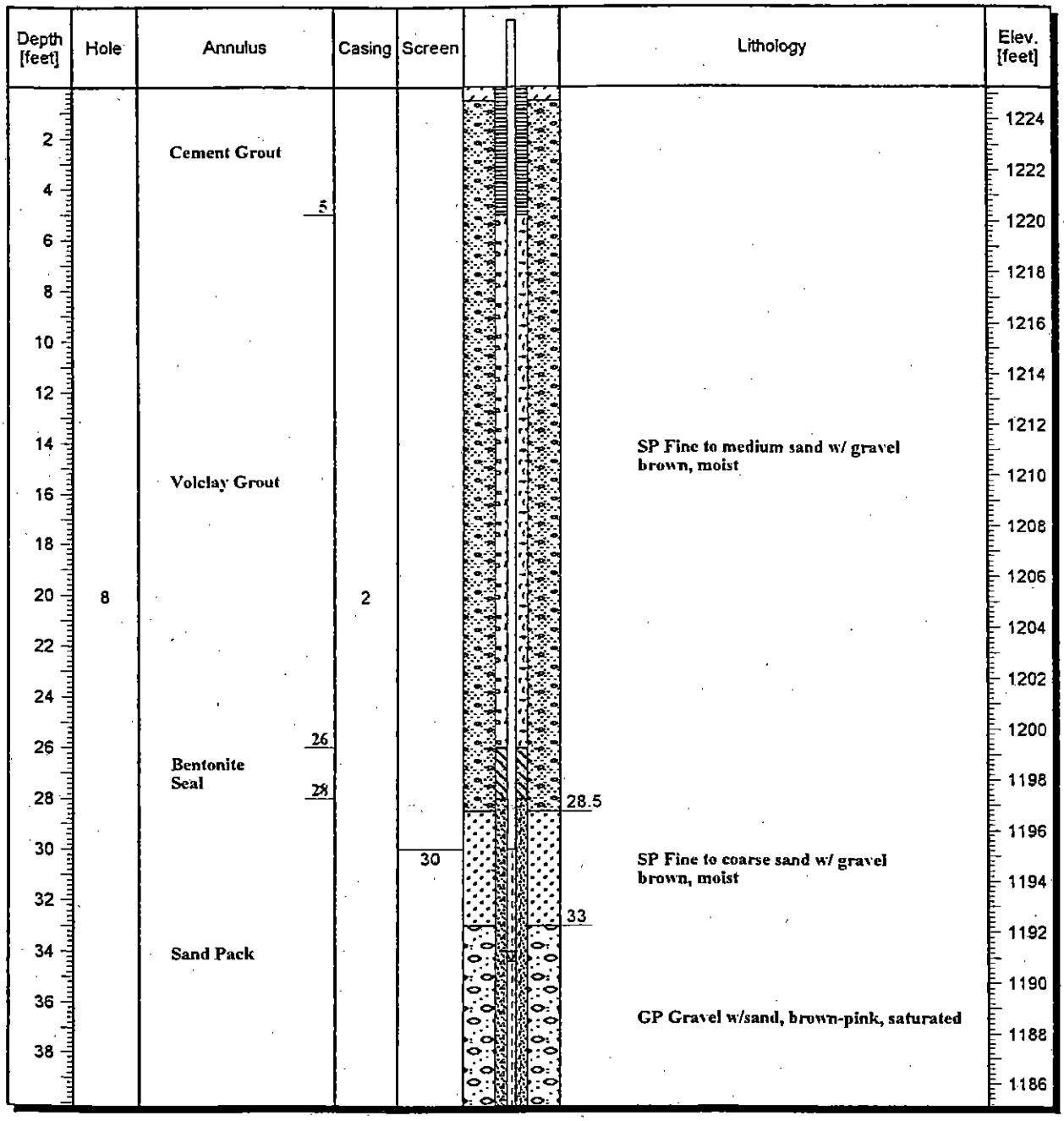
Well Ident	Name
D.MW2 #582445	Kandiyohi County Landfill

Drill. Method:	Drill. Dates:
HSA	11-29-96

X	Y	Ground Elev. (ft)	Meas. Pt. Elev. (ft)
3553.32	1897.34	1225.25	1227.90

All measurements are in feet. Hole and casing diameters in inches. Casing, screen are stainless steel.

Water Level (ft MSL)	Driller	Vertical	Horizontal
1190.88		75.0	40.0



Comments:

Developed by pumping, 50 gal removed

Environmental Concepts & Design, inc.

Well Log: Lithology & Construction

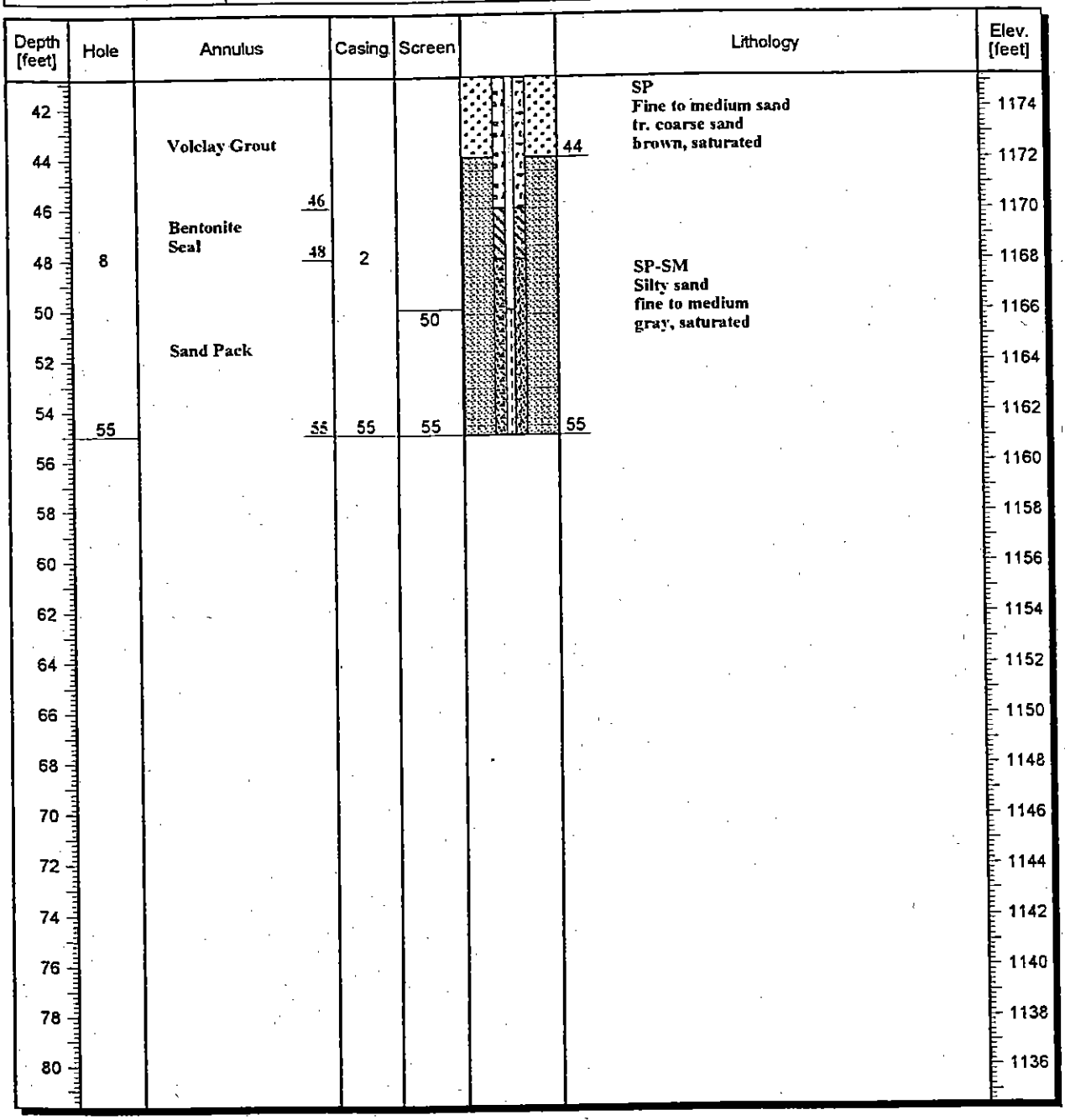
Well Ident	Name
DMW1B #582444	Kandiyohi County Landfill

Drill. Method:	Drill. Dates:
HSA	11-29-96

X	Y	Ground Elev. (ft)	Meas. Pt. Elev. (ft)
4329.32	2208.14	1216.11	1217.71

All measurements are in feet. Hole and casing diameters in inches. Casing, screen are stainless steel.

Water Level (ft MSL)	Driller	Vertical	Horizontal
1191.59	Thein Well Drilling	75.0	40.0



Comments:

Developed by pumping, 4 gal removed (dry)

Environmental Concepts & Design, inc.

Well Log: Lithology & Construction

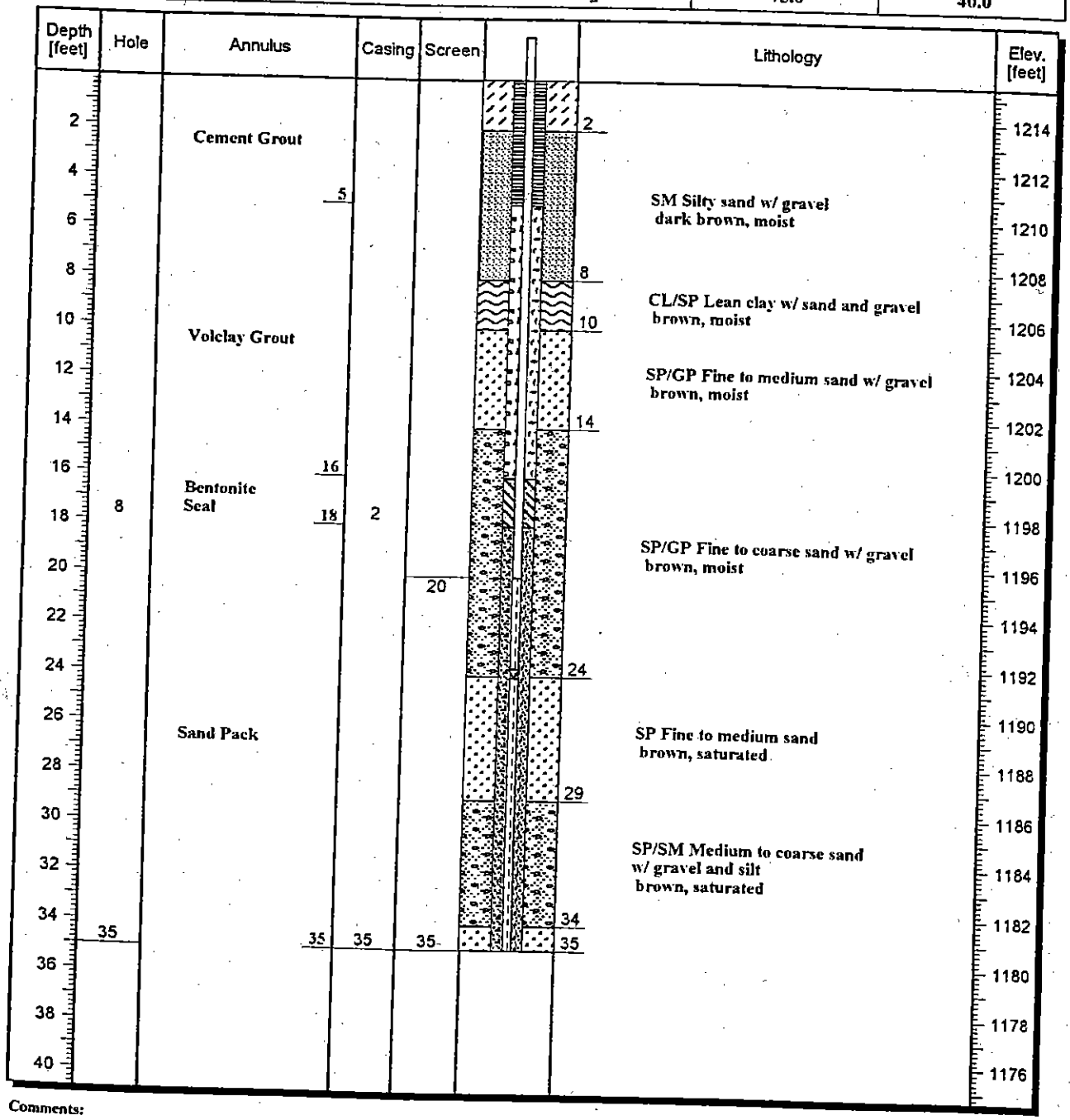
Well Ident	Name
DMW1A #582446	Kandiyohi County Landfill

Drill. Method:	Drill. Dates:
HSA	11-29-96

X	Y	Ground Elev. (ft)	Meas. Pt. Elev. (ft)
4318.59	2207.21	1215.45	1217.21

All measurements are in feet. Hole and casing diameters in inches. Casing, screen are stainless steel.

Water Level (ft MSL)	Driller	Vertical	Horizontal
1191.40	Thein Well Drilling	75.0	40.0



Comments:

Well developed by pumping, 20 gal removed

Environmental Concepts & Design, inc.

Well Log: Lithology & Construction

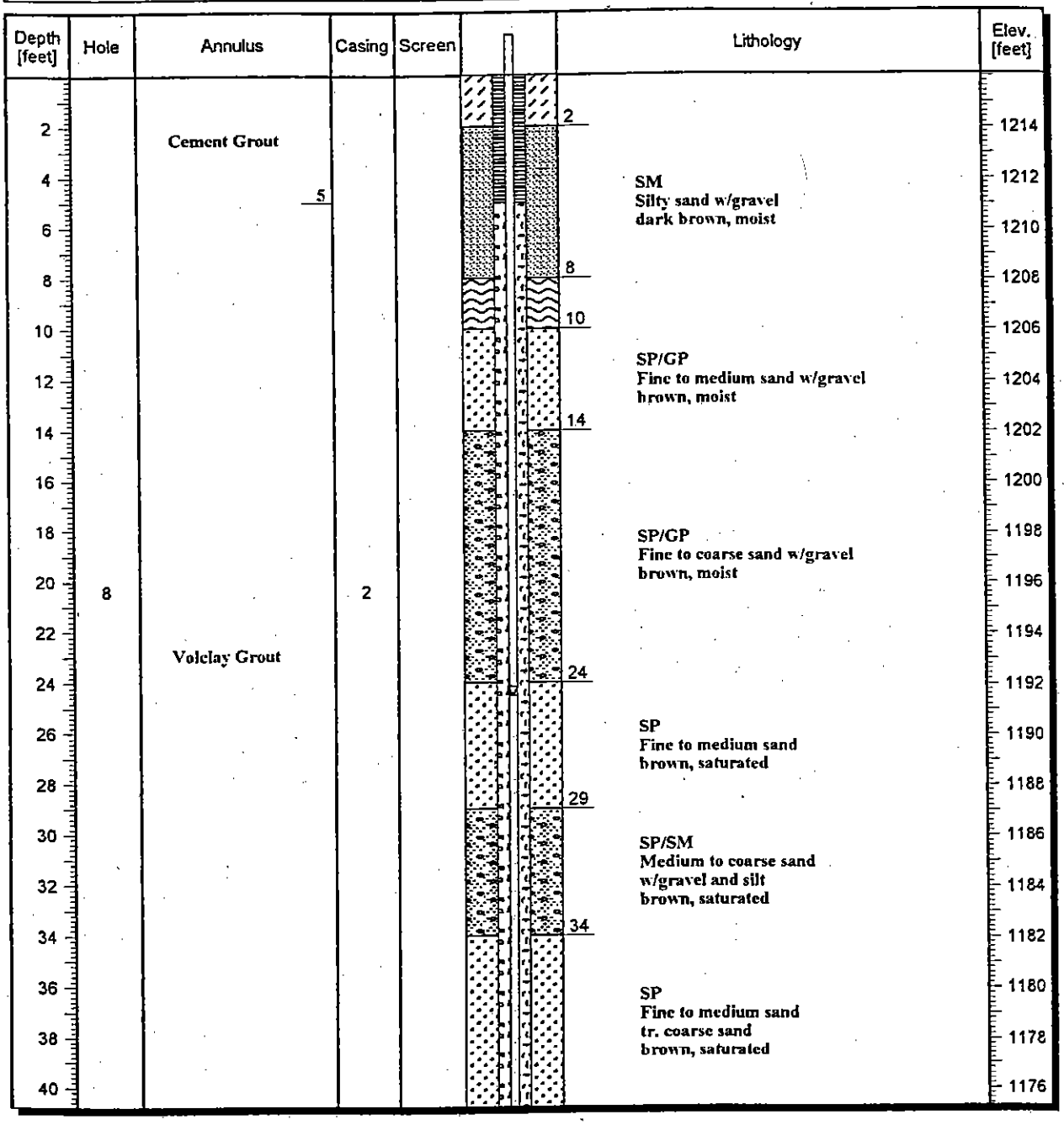
Well Ident	Name
DMW1B #582444	Kandiyohi County Landfill

Drill. Method:	Drill. Dates:
HSA	11-29-96

X	Y	Ground Elev. (ft)	Meas. Pt. Elev. (ft)
4329.32	2208.14	1216.11	1217.71

All measurements are in feet. Hole and casing diameters in inches. Casing, screen are stainless steel.

Water Level (ft MSL)	Driller	Vertical	Horizontal
1191.59	Thein Well Drilling	75.0	40.0



Comments:

Developed by pumping, 4 gal removed (dry)

Environmental Concepts & Design, inc.

APPENDIX Q

Drilling and Sampling Methodologies

SAMPLING METHODOLOGIES AT
FIREFIGHTING FOAM TRAINING AND DISCHARGE AREAS

Utility Clearance

Prior to all drilling, underground utilities were identified and marked via public utility meets and private utility locates.

In order to help ensure that potentially unlocated/unmarked buried utilities in the upper five feet of the soil profile are not encountered during drilling, the top five feet of the borings were cleared via hand augers equipped with a stainless steel bucket head. The auger was hand-turned to a depth of five feet below grade surface (bgs).

Special PFC Sampling Consideration

Since PFCs are also in numerous everyday items, the following special precautions were taken during all sampling activities: no use of Teflon®-containing materials (i.e. Teflon® tubing, bailers, tape, plumbing paste); no Tyvek® clothing was worn; clothes treated with stain- or rain-resistant coatings were avoided or had gone through several washings; no Post-It® Notes were handled or brought on site; no fast food wrappers, disposable cups or microwave popcorn were brought on site during sampling, and hands were washed after handing such items and prior to any sampling activities; and no use of chemical (blue) ice packs was allowed.

Nitrile gloves were worn during all sample collection activities.

Soil Sample Collection via Hand Auger

The top five feet of soil borings were cleared via hand augers equipped with a stainless steel bucket head. The auger was hand-turned to a depth of five bgs.

Soil collected in the bucket head from the surface to four feet bgs for laboratory analysis was composited in a large polyethylene, zip-lock bag. After mixing, soil was placed into the unpreserved, 250-milliliter (mL) HDPE sample jar provided by the laboratory for laboratory analysis. Disposable nitrile gloves were worn when handling the soil and were changed between each sample. Excess soil was disposed by thin-spreading on site.

Hand auger equipment and auxiliary sample compositing equipment was decontaminated before use and between each boring by washing in Alconox or Liquinox® detergent and rinsing with distilled water. Wash and rinse water was disposed by thin-spreading on site.

Soil Sample Collection from Borings

Soil borings were advanced via push probe method, with one exception: hollow stem auger drilling was utilized to advance one soil boring at the Burnsville fire foam training area. Soil samples were not collected from this one boring in Burnsville; soil characterization was based on auger soil cuttings.

Soil borings were advanced using a truck-mounted, hydraulically-powered push probe machine that utilizes static force and percussion to advance small (2- to 3-inch diameter) sampling tools into the subsurface for collecting soil core samples. Sampling depth was attained by driving a

probe with a tip to a specified sampling depth. Soil samples deeper than 5 feet bgs were collected continuously for this project, except at the MSP Airport where no soil samples were collected. The tile probe was withdrawn and a 4-foot or 5-foot long, 2- or 3-inch outer diameter stainless steel sampling spoon lined with an acetate liner was inserted into the bore hole. The stainless steel sampling spoon was driven four or five feet past the bottom of the boring for collection of a soil core sample. The sampling spoon was withdrawn, and the acetate liner removed from the steel sampling spoon. The acetate liner with soil sample intact was provided to an on-site Delta representative. Liners were opened by Delta personnel. Disposable nitrile gloves were worn when handling soils and acetate liners. Separate gloves were used for each discrete soil sample interval where soil samples were collected for laboratory analysis.

Tile probes and stainless steel sampling spoons were decontaminated between each discrete sample by washing in Alconox or Liquinox® detergent and rinsing with distilled water or clean tap water. On-site well water, if available, was not used for washing or rinsing purposes. Wash and rinse water was disposed by thin-spreading on site. Separate acetate liners are used for each discrete soil sample.

No Teflon® tubing or core liners were used in sample collection.

Soil Classification

Soil samples collected from borings were classified using the Unified Soil Classification system. Soil descriptions and depths were recorded on a soil boring log. Visual and olfactory evidence of (non-PFC) contamination were noted on the soil boring logs, as applicable.

Soil Sample Collection for Laboratory Analysis

Composite soil samples were collected for laboratory analysis of PFCs and TOC from two intervals, unless otherwise noted: from the surface to four feet below grade and from four feet to eight feet below grade. The soil sample collected from soil boring B-4 in Richfield for laboratory analysis was composited from the surface to eight feet below grade. Soil samples were placed directly by hand into laboratory-supplied 250 mL HDPE jars with no sample preservative. Soil jars were labeled and stored on regular ice (no chemical ice) in a cooler pending shipment to the laboratory.

A chain-of-custody record was kept for all laboratory samples. The chain-of-custody record included the project number, a sample ID number, the date and time of sample collection, sample type (ie. soil, water), the analyses required, the signature of the sampler, and other information as required by the laboratory.

Soil Headspace Analysis

Based on a literature search, no field instruments are currently available for field screening soils for PFCs. Correspondence with Dr. Jennifer Field of Oregon State University, who has conducted field research into analytical methodologies for PFCs in soil and groundwater at fire foam training sites, confirmed that she is not aware of any field detectors for PFCs in soil. Therefore, soils were not screened in the field for PFCs.

Groundwater Sample Collection Via Push Probe

The depth to groundwater in a soil boring was determined by observation of wet soil in the soil core samples, and by direct measure with a groundwater interface probe as necessary. Upon drilling into the water table, a groundwater sample was collected via one of two methods:

1) In loose soils or if the soil boring collapsed, or if an insufficient amount of groundwater is present in the borehole fore immediate sampling, an assembled screen point sampler with a 4- or 5-foot screen encased in a perforated stainless steel sleeve was driven into the boring such that approximately 6 inches to 1 foot of the screen was situated above the water table, and the remainder of the screen was below the water table. While the screen point sampler was being driven, O-ring connections placed at critical locations on the assembly kept the sampler sealed. When the desired sampling depth was reached, the sampler was pulled up approximately 2 feet, which disengages the expendable drive point and creates an open bore hole from which to sample. The inner screen core was then pushed out into the bore hole and water was allowed to enter the sampler. Groundwater samples were collected by inserting disposable, non-Teflon®, polyethylene tubing through the center of the drill rods and into the screen. Groundwater was either drawn via a sampling pump or hand-checked through tubing directly into laboratory-supplied sample jars with no preservative. Laboratory jars were labeled and stored on ice pending shipment to the laboratory.
2) If the borehole remained open without drill rods, disposable, non-Teflon®, polyethylene tubing was inserted directly into the borehole to the water table. Groundwater was either drawn via a sampling pump or hand-checked through tubing directly into laboratory-supplied sample jars with no preservative. Laboratory jars were labeled and stored on ice pending shipment to the laboratory.

Probe rods and stainless steel screen point samplers were decontaminated between each use using an Alconox or Liquinox® solution and water rinse. New polyethylene tubing was used for each groundwater sample. Teflon® tubing was not used for sampling.

Hollow Stem Auger Groundwater Sample Collection

Hollow stem auger drilling was utilized to advance one soil boring (B-3) at the Burnsville fire foam training area for the purpose of collecting a groundwater sample. This boring was advanced to a depth of 50 feet. The depth to water was 44.5 feet, as determined by direct measure with a groundwater interface probe. A disposable, plastic, (non-Teflon®) bailer and attached string was inserted into the drill casing for groundwater sample collection. The groundwater was placed into a laboratory-supplied sample jar. The sample jar was labeled and stored on ice pending shipment to the laboratory.

Soil Boring Closure

Soil borings were abandoned in accordance with Minnesota Department of Health regulations by filling the bore hole with bentonite or Portland cement, to approximately 2 inches from the surface grade. Then, cement, asphalt patch or soil completed the top 2 inches of the bore hole, as needed.

Groundwater Sample Collection at Existing Monitoring Wells

Prior to sample collection from an (existing) groundwater monitoring well, an electronic oil/water interface meter was introduced into the well to check for light non-aqueous phase liquid (LNAPL) at the top of the water table. A signal (beep) would be emitted from the meter if LNAPL was detected. If LNAPL was detected in the well, a groundwater sample was not collected for laboratory analysis.

Prior to sample collection from a groundwater monitoring well, the depth to water was measured using an electronic water level indicator. The water level indicator probe was lowered into the well until a beep was emitted, indicating that the probe had reached the water table surface. The depth to water was measured from the notched or north side of top of casing. All measurements were recorded to the nearest 0.01 foot; however, the manufacturer's reported accuracy for the instrument is 0.04 foot. The water level indicator probe and attached measuring tape that were introduced into the well were decontaminated between wells.

Prior to sample collection, one well volume of groundwater was purged from each well using a dedicated, disposal bailer, except at the FHR Pine Bend Refinery, where a submersible whale pump was used as described below. One well volume for a 2-inch well, for example, was calculated using to the following equation:

Well Volume, gallon = π x well radius (ft)^2 x height of water column (ft) x 7.48 gal./cu. ft.
= 3.14159 x 0.007 sq. ft. x height of water column (ft) x 7.48 gal/cu. ft.
= 0.2 x height of water column in feet

The capacity of each bailer is approximately 1 liter, which is equivalent to approximately 1/4-gallon.

A submersible whale pump was used to purge groundwater from the monitoring well MW-3 at FHR Pine Bend due to the significant well volume. The depth to groundwater at MW-3 was 76.3 feet, and well depth was 90.6 feet, and the well casing was 4-inches in diameter. Thus, one well volume of 9.5 gallons was removed using a pump in MW-3.

After well purging, a groundwater sample was retrieved using a dedicated, disposable, non-Teflon®) bailer tied to a string for retrieval. The water sample was placed directly into a laboratory-supplied 1-liter HDPE container with no preservative. Groundwater samples were kept in a cooler on ice until shipment to the laboratory. Appropriate chain-of-custody record was kept with the samples at all times. Nitrile gloves were worn during all sampling activities.

Surface Soil Sample Collection

Surface soil samples were collected by hand with or without the use of a clean garden trowel or stainless steel spoon. Surface soil samples were collected in the upper six inches of the soil profile, except for the surface soil sample collected at the Crystal Airport, where the surface soil sample was collected from a depth of two feet bgs due to frost in the ground. Soil samples were placed by hand directly into laboratory-supplied 250 mL HDPE containers with no preservative. Nitrile gloves were worn during soil sample collection. The sample jars were labeled and stored on ice pending shipment to the laboratory. Sampling tools, if used, were cleaned in a solution of distilled water and Liquinox® soap before and after use in sampling.

Surface Water Sample Collection

Surface water samples were collected by dipping the (non-preserved) 1-liter HDEP sample jar supplied by the laboratory at the surface of the water and allowing the jar to slowly fill. Intermediary containers were not used, except at the River Grove Marina, where a clean, plastic, long-handled scoop was used to collect water. The water sample was placed directly into a laboratory-supplied 1-liter HDPE container with no preservative. Nitrile gloves were worn during surface water sample collection. The long-handled scoop was cleaned in a solution of distilled water and Liquinox® soap before and after use in sampling.

A hand-powered ice auger was used at MSP Airport to open a hole in the ice on the stormwater pond to allow for surface water sampling.

Water samples were labeled and stored on ice pending shipment to the laboratory.

Sediment Sample Collection

Sediment samples were generally collected by hand near the edge of the water, without the use of intermediary containers, except as described. At the River Grove Marina a clean, plastic, long-handled scoop was used to collect sediments from the river bottom. At the MSP Airport stormwater pond, a 4-foot disposable, dedicated acetate liner tube used in push probe sampling was pushed into the pond bottom to retrieve a sediment sample. Nitrile gloves were worn during sediment sample collection. The long-handled scoop was cleaned in a solution of distilled water and Liquinox® soap before and after use in sampling.

A hand-powered ice auger was used at MSP Airport to open a hole in the ice on the stormwater pond to allow for sediment sampling. At the Crystal Airport, a hammer and chisel were used to create a hole in the ice to allow for sediment sampling.

Sediment samples were placed into 250 mL HDPE containers provided by the laboratory. The containers were unpreserved. The sample jars were labeled and stored on ice pending shipment to the laboratory.

Equipment Blank Sample Collection

An equipment blank sample was collected during groundwater sampling at the Kandiyohi County Landfill. Distilled water bottled by Humbolt Springs Water Company was introduced into a dedicated, disposable non-Teflon® bailer. The bailer was then emptied into a laboratory-supplied 1-liter HDPE container with no preservative. The sample was submitted for laboratory analysis as “Kandiyohi Equipment Blank.”

Sample Shipment

Samples for PFC analysis were securely packed in a cooler with ice and chain-of-custody records. The cooler was shipped Priority Overnight via FedEx to the laboratory.

If samples were being shipped to Axys Analytical Services, and sampling occurred on Thursday or Friday, samples were stored in a secure refrigerator at Delta over the weekend pending shipment to the laboratory on Monday. Samples were then shipped to Axys Analytical Services as indicated above, with required international shipping documents.

Soil samples for total organic carbon analysis were securely packed in a cooler with ice and chain-of-custody records. The cooler was picked up at Delta's office by Pace Analytical Services.

Decontamination Procedure

Field sampling equipment, including oil/water interface meters and water level indicators, were decontaminated by scrubbing the equipment in a mixture of distilled water with Alconox®powder soap or Liquinox® soap and rinsing with distilled water. The Material Safety Data Sheets for Alconox® and Liquinox® list no fluoro-surfactants as an ingredient.

APPENDIX R

Laboratory Reports

CLIENT ID	Kenyon B-1 SL 4-8'	Kenyon B-2 SL 4-8'	Claremont B-1 SL 0-4'	Lab Blank	Spiked Matrix
AXYS ID	L12689-2	L12689-4	L12689-5	WG29086-101	WG29086-102
WORKGROUP	WG29086	WG29086	WG29086	WG29086	WG29086
Sample Size	5.30 g (dry)	5.30 g (dry)	5.51 g (dry)	5.00 g	
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov
PFBA	< 0.0944	< 0.0943	< 0.0907	< 0.100	72.8
PFPeA	< 0.0944	< 0.0943	< 0.0907	< 0.100	72.9
PFHxA	< 0.0944	< 0.0943	< 0.0907	< 0.100	80.3
PFHpA	< 0.0944	< 0.0943	< 0.0907	< 0.100	79.3
PFOA	< 0.0944	< 0.0943	< 0.0907	< 0.100	79.2
PFNA	< 0.0944	< 0.0943	< 0.0907	< 0.100	80.1
PFDA	< 0.0944	< 0.0943	< 0.0907	< 0.100	86.5
PFUnA	< 0.0944	< 0.0943	< 0.0907	< 0.100	61.9
PFDoA	< 0.0944	< 0.0943	< 0.0907	< 0.100	75.9
PFBS	< 0.189	< 0.189	< 0.181	< 0.200	103
PFHxS	< 0.189	< 0.189	< 0.181	< 0.200	110
PFOS	< 0.189	< 0.189	0.308	< 0.200	84.9
PFOSA	< 0.0944	< 0.0943	< 0.0907	< 0.100	89.9
% Moisture	13.4	12.5	8.61		

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	=	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	=	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	Kenyon B-1 SL 0-4'	Claremont B-3 SL 4-8'	Kenyon B-2 SL 0-4'	Claremont B-1 SL 4-8'	Claremont B-2 SL 0-4'	Claremont B-2 SL 4-8'	Claremont B-3 SL 0-4'	Lab Blank	Spiked Matrix	Kenyon B-2 SL 0-4' (MS)	Kenyon B-2 SL 0-4' (MSD)	Kenyon B-2 SL 0-4' (MSD)	Kenyon B-2 SL 0-4' (MS)
AXYS ID	L12689-1	L12689-10	L12689-3 (A)	L12689-6	L12689-7	L12689-8	L12689-9	WG28839-101	WG28839-102	WG28839-104	WG28839-105	WG28839-105	WG28839-104
WORKGROUP	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839	WG28839
Sample Size	5.19 g (dry)	5.35 g (dry)	5.33 g (dry)	5.17 g (dry)	5.34 g (dry)	5.22 g (dry)	5.48 g (dry)	5.00 g		5.30 g (dry)	5.40 g (dry)	5.40 g (dry)	5.30 g (dry)
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	ng/g (dry weight basis)	ng/g (dry weight basis)	% Recov	% Recov
PFBA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	0.114	< 0.100	123	42.7	41.5	89.6	90.5
PFPeA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	0.167	< 0.100	94.4	35.5	41.2	89	75.2
PFHxA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	0.385	< 0.0958	0.427	< 0.100	98.3	38.8	38.2	82.6	82.4
PFHpA	0.111	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	0.232	< 0.100	95	44.8	43.9	94.9	95
PFOA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	0.154	< 0.0958	0.174	< 0.100	93	36.3	39	84.3	76.9
PFNA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	< 0.0912	< 0.100	87	38.6	36	77.8	81.9
PFDA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	< 0.0912	< 0.100	102	42.2	39.6	85.6	89.6
PFUnA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	< 0.0912	< 0.100	86.1	34.7	38	82.1	73.5
PFDoA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	< 0.0936	< 0.0958	< 0.0912	< 0.100	113	41.8	39.7	85.9	88.7
PFBS	< 0.193	< 0.187	< 0.187	< 0.193	0.491	< 0.192	2.39	< 0.200	107	84.7	91.3	98.6	89.8
PFHxS	< 0.193	0.561	< 0.187	0.224	1.65	< 0.192	5.25	< 0.200	115	87.1	93.1	101	92.4
PFOS	< 0.193	0.988	< 0.187	0.321	24.7	0.25	3.46	< 0.200	91.8	83	80.9	87.4	88.1
PFOSA	< 0.0963	< 0.0935	< 0.0937	< 0.0966	0.129	< 0.0958	< 0.0912	< 0.100	96.1	23.1	41.3	89.2	49
% Moisture	13.9	12.6	18.7	14.5	11	13.9	22.3			18.5	17.2		

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There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	Luverne B-1, SL 0-4 ft	Luverne B-1, SL 4-8 ft	Luverne B-2, SL 0-4 ft	Luverne B-2, SL 4-8 ft	Luverne B-3, SL 0-4 ft	Luverne B-3, SL 4-8 ft	Lab Blank	Spiked Matrix	Luverne B-3, SL 0-4 ft (MS)	Luverne B-3, SL 0-4 ft (MSD)	Luverne B-3, SL 0-4 ft (MSD)	Luverne B-3, SL 0-4 ft (MS)
AXYS ID	L12718-1	L12718-2	L12718-3	L12718-4	L12718-5 (A)	L12718-6	WG28923-101	WG28923-102	WG28923-103	WG28923-104	WG28923-104	WG28923-103
WORKGROUP	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923	WG28923
Sample Size	5.20 g (dry)	5.10 g (dry)	5.24 g (dry)	5.00 g (dry)	5.13 g (dry)	5.08 g (dry)	5.00 g		5.25 g (dry)	5.11 g (dry)	5.11 g (dry)	5.25 g (dry)
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	ng/g (dry weight basis)	ng/g (dry weight basis)	% Recov	% Recov
PFBA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	100	44.5	51.1	105	93.5
PFPeA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	104	49.7	47.5	97.2	104
PFHxA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	108	49.9	46	94	105
PFHpA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	106	55	53.4	109	116
PFOA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	111	48.4	50.8	104	102
PFNA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	112	52.8	53.2	109	111
PFDA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	119	50.1	53.8	110	105
PFUnA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	94.5	45.1	48.4	99	94.7
PFDoA	< 0.0962	< 0.0981	< 0.0954	< 0.100	< 0.0974	< 0.0984	< 0.100	107	40.9	42.3	86.6	85.8
PFBS	< 0.192	< 0.196	< 0.191	< 0.200	< 0.195	< 0.197	< 0.200	118	89.3	104	107	93.8
PFHxS	< 0.192	< 0.196	< 0.191	< 0.200	< 0.195	< 0.197	< 0.200	110	85.6	97.9	100	89.9
PFOS	< 0.481	< 0.490	0.481	< 0.500	< 0.487	< 0.492	< 0.500	95.9	95	98	100	99.8
PFOSA	< 0.241	< 0.245	< 0.239	< 0.250	< 0.244	< 0.246	< 0.250	111	47.3	49.7	102	99.3
% Moisture	10.7	5.76	18.3	11	15.2	13.7			12.6	15.4		

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CLIENT ID	Luverne B-1, GW 8ft	Luverne B-2, GW 12ft	Luverne B-3, GW 12ft	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L12719-1	L12719-2	L12719-3	WG28913-101	WG28913-102 (A)	WG28913-103 (DUP WG28913-102)
WORKGROUP	WG28913	WG28913	WG28913	WG28913	WG28913	WG28913
Sample Size	0.495 L	0.490 L	0.493 L	0.500 L		
UNITS	ng/L	ng/L	ng/L	ng/L	% Recov	% Recov
PFBA	< 2.53	< 2.55	< 2.53	< 2.50	98.5	101
PFPeA	< 2.53	< 2.55	3.99	< 2.50	105	92.7
PFHxA	< 2.53	3.78	11.3	< 2.50	104	94.1
PFHpA	< 2.53	< 2.55	< 2.53	< 2.50	109	96.7
PFOA	< 2.53	2.73	3.39	< 2.50	115	92
PFNA	< 2.53	< 2.55	< 2.53	< 2.50	99.6	86.1
PFDA	< 2.53	< 2.55	< 2.53	< 2.50	109	91.2
PFUnA	< 2.53	< 2.55	< 2.53	< 2.50	105	89.7
PFDoA	< 2.53	< 2.55	< 2.53	< 2.50	112	96.9
PFBS	< 5.05	< 5.10	< 5.07	< 5.00	102	88.6
PFHxS	18.1	22.8	21.4	< 5.00	95.9	88.5
PFOS	< 5.05	18.4	20.1	< 5.00	107	90.8
PFOSA	< 2.53	< 2.55	< 2.53	< 2.50	113	92.6

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CLIENT ID	Fridley B-1 SL 0-4	Fridley B-1 SL 4-8	Fridley Sediment 1	Fridley B-2 SL 0-4	Fridley B-2 SL 4-8	Rochester B-1 SL 0-4	Rochester B-1 SL 4-8	Rochester B-2 SL 0-4	Rochester B-2 SL 4-8	Lab Blank	Spiked Matrix	Fridley B-1 SL 0-4 (MS)	Fridley B-1 SL 0-4 (MSD)
AXYS ID	L12757-1 (A)	L12757-2	L12757-3	L12757-4	L12757-5	L12757-6	L12757-7	L12757-8	L12757-9	WG28992-101	WG28992-102	WG28992-105	WG28992-106
WORKGROUP	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992	WG28992
Sample Size	4.98 g (dry)	4.96 g (dry)	5.18 g (dry)	4.90 g (dry)	5.27 g (dry)	5.11 g (dry)	5.23 g (dry)	5.01 g (dry)	5.27 g (dry)	5.00 g		4.97 g (dry)	5.14 g (dry)
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	% Recov	% Recov
PFBA	0.242	< 0.101	< 0.0966	1.34	0.601	0.207	< 0.0957	0.142	< 0.0949	< 0.100	96.8	97.1	98.7
PFPeA	0.422	< 0.101	< 0.0966	1.67	1.13	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	95.9	99.8	101
PFHxA	0.413	< 0.101	< 0.0966	2.78	1.53	< 0.0979	< 0.0957	0.173	< 0.0949	< 0.100	100	105	102
PFHpA	0.27	< 0.101	< 0.0966	0.735	0.335	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	88.9	106	101
PFOA	0.291	< 0.101	< 0.0966	0.699	0.493	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	100	84.9	101
PFNA	0.144	< 0.101	< 0.0966	< 0.102	< 0.0950	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	93.7	106	106
PFDA	< 0.100	< 0.101	< 0.0966	< 0.102	< 0.0950	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	109	112	105
PFUnA	< 0.100	< 0.101	< 0.0966	< 0.102	< 0.0950	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	82.1	119	118
PFDoA	< 0.100	< 0.101	< 0.0966	< 0.102	< 0.0950	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	97.3	81.1	85.8
PFBS	< 0.201	< 0.201	< 0.193	3.01	1.32	< 0.196	< 0.191	< 0.200	< 0.190	< 0.200	125	105	94
PFHxS	1.25	< 0.201	< 0.193	23.4	14.2	0.361	< 0.191	1.7	< 0.190	< 0.200	117	101	106
PFOS	43	2.45	18.3	3.48	1.31	0.559	< 0.191	1.12	< 0.190	< 0.200	92.2	87.3	104
PFOSA	< 0.100	< 0.101	< 0.0966	< 0.102	< 0.0950	< 0.0979	< 0.0957	< 0.0999	< 0.0949	< 0.100	81.8	90.6	91.7
% Moisture	7.32	12.3	22.1	10.5	26.2	11.3	7.52	8.96	5.43			7.12	7.46

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

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CLIENT ID	Fridley B-1 GW	Fridley B-2 GW	MSP Airport B-1 GW	MSP Airport B-2 GW	MSP Airport B-3 GW	MSP Airport B-4 GW	Lab Blank	Spiked Matrix	(MS)	(MSD)	(MSD)	(MS)
AXYS ID	L12758-1	L12758-2	L12758-3	L12758-4	L12758-5	L12758-6	WG28995-101	WG28995-102	WG28995-103	WG28995-104	WG28995-104	WG28995-103
WORKGROUP	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995	WG28995
Sample Size	0.293 L	0.232 L	0.0303 L	0.0256 L	0.00929 L	0.00100 L	0.500 L		0.499 L	0.493 L	0.493 L	0.499 L
UNITS	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	% Recov	ng/L	ng/L	% Recov	% Recov
PFBA	37.6	88.3	279	190	151	< 1250	< 2.50	86.6	672	663	106	109
PFPeA	34	97.2	909	507	148	< 1250	< 2.50	94.1	516	603	102	85.9
PFHxA	27.1	166	1640	817	477	3140	< 2.50	91.6	544	612	108	96
PFHpA	23.2	59.5	317	198	< 135	5830	< 2.50	86.1	507	582	114	100
PFOA	32.7	86.8	988	958	12000	286000	< 2.50	105	512	536	105	101
PFNA	< 4.27	< 5.39	42	< 48.8	< 135	< 1250	< 2.50	103	511	564	111	102
PFDA	< 4.27	< 5.39	< 41.2	< 48.8	< 135	< 1250	< 2.50	96.5	498	490	96.6	99.3
PFUnA	< 4.27	< 5.39	< 41.2	< 48.8	< 135	< 1250	< 2.50	93.7	455	437	86.1	90.8
PFDoA	< 4.27	< 5.39	< 41.2	< 48.8	< 135	< 1250	< 2.50	99.3	550	532	105	110
PFBS	15.2	182	332	286	< 269	< 2500	< 5.00	101	1120	1040	103	112
PFHxS	98.9	1330	3090	2920	21200	145000	< 5.00	97.2	1090	1030	102	109
PFOS	21.9	35	< 82.5	< 97.6	281	< 2500	< 5.00	92.8	1060	1040	102	106
PFOSA	< 4.27	< 5.39	< 41.2	< 48.8	< 135	< 1250	< 2.50	89.2	511	493	97.4	102

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

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CLIENT ID	Richfield B-4 SL 0-8'	Goodview Sed-1	Lab Blank	Spiked Matrix	Richfield B-4 SL 0-8' (MS)	Richfield B-4 SL 0-8' (MS)	Richfield B-4 SL 0-8' (MSD)	Richfield B-4 SL 0-8' (MSD)
AXYS ID	L13736-1 (A)	L13786-1	WG30965-101	WG30965-102	WG30965-108	WG30965-108	WG30965-109	WG30965-109
WORKGROUP	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965
Sample Size	5.23 g (dry)	5.66 g (dry)	1.00 g		5.20 g (dry)	5.20 g (dry)	5.16 g (dry)	5.16 g (dry)
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	ng/g (dry weight basis)	% Recov	ng/g (dry weight basis)	% Recov
PFBA	< 0.0956	< 0.0883	< 0.500	94.7	47	97.8	39.9	82.4
PFPeA	< 0.0956	< 0.0883	< 0.500	88	44.4	92.3	45.2	93.2
PFHxA	< 0.0956	< 0.0883	< 0.500	94.9	45.3	94.1	42.9	88.5
PFHpA	< 0.0956	< 0.0883	< 0.500	87.3	43.2	89.8	46.8	96.6
PFOA	0.129	< 0.0883	< 0.500	85.3	39.5	81.9	41.5	85.4
PFNA	< 0.0956	< 0.0883	< 0.500	97.3	42.3	87.8	46.3	95.5
PFDA	< 0.0956	< 0.0883	< 0.500	109	43.2	89.7	41	84.5
PFUnA	< 0.0956	< 0.0883	< 0.500	90.8	40.4	84	39.7	81.9
PFDoA	< 0.0956	< 0.0883	< 0.500	103	42.2	87.8	40.9	84.4
PFBS	< 0.191	< 0.177	< 1.00	116	89.2	92.7	83.3	85.9
PFHxS	0.236	< 0.177	< 1.00	130	90.5	93.8	85	87.5
PFOS	4.52	0.332	< 1.00	98.7	87.1	85.8	87.4	85.5
PFOSA	< 0.0956	< 0.0883	< 0.500	93.9	41.5	86.4	40.2	82.9
% Moisture	13.2	20.3			14.2		14	

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CLIENT ID	Richfield B-4 GW 29'	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13737-1	WG30544-101	WG30544-102 (A)	WG30544-103 (DUP WG30544-102)
WORKGROUP	WG30544	WG30544	WG30544	WG30544
Sample Size	0.504 L	0.500 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA	228	< 2.50	116	125
PFPeA	10.3	< 2.50	104	108
PFHxA	10.3	< 2.50	103	105
PFHpA	5.43	< 2.50	98.9	101
PFOA	38.7	< 2.50	112	114
PFNA	< 2.48	< 2.50	111	106
PFDA	< 2.48	< 2.50	111	100
PFUnA	< 2.48	< 2.50	84.7	87.2
PFDoA	< 2.48	< 2.50	99.3	104
PFBS	< 4.96	< 5.00	111	104
PFHxS	71.4	< 5.00	115	102
PFOS	< 4.96	< 5.00	108	96.6
PFOSA	< 2.48	< 2.50	106	102

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

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There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: MW-101
Date Analyzed: 09/16/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	183	2.5
C5 Acid- Perfluoropentanoic Acid	403	2.5
C6 Acid- Perfluorohexanoic Acid	150	2.5
C7 Acid- Perfluoroheptanoic Acid	12.4 [1,2]	2.5
C8 Acid- Perfluorooctanoic Acid	36.7	2.5
C9 Acid- Perfluorononanoic Acid	NQ [4]	2.5
C10 Acid- Perfluorodecanoic Acid	ND [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	ND [3,7]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,8]	2.5
PFBS- Perfluorobutanesulfonate	479 [3]	2.5
PFHS- Perfluorohexanesulfonate	3710 [3,6]	2.5
PFOS- Perfluorooctanesulfonate	9230 [3,9]	2.5
FOSA- Perfluorooctane sulfonamide	NQ [2,3,5]	2.5

ND= Not Detected = Response is below the LOQ of 2.5 ng/L
NQ= Not Quantifiable = Response is between LOD and LOQ

[1] The initial Relative Percent Difference (RPD) between LCS/LCSD was outside the acceptable value of 20% on September 16th.
[2] The Reporting Limit Verification (RLV) was outside the acceptable value of 70-130% on September 17th results should be considered as estimated.
[3] The relative percent recovery for the internal standard was outside of the acceptable range of between 50% and 200%
[4] The Lab control spike (LCS) duplicate recovery (75%) was outside of the acceptable range of 80-120% all the results should be considered as estimated
[5] In the intial calibration from September 16th, the r^2 value was less than 0.9900 for this analyte and therefore out of the acceptable range. As the report stands, the results for this analyte in the associated samples should be considered as estimated.
[6] The intial system suitability test (SST) was outside the acceptable value of less than 20% relative standard deviation on September 16th.
[7] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 16th. Since the QC failure was bias high and the results were ND, the results were reportable
[8] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were ND, the results were reportable
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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: MW-912
Date Analyzed: 09/15/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	462	2.5
C5 Acid- Perfluoropentanoic Acid	298	2.5
C6 Acid- Perfluorohexanoic Acid	51.5	2.5
C7 Acid- Perfluoroheptanoic Acid	21.8 [1,2]	2.5
C8 Acid- Perfluorooctanoic Acid	17.5 [3]	2.5
C9 Acid- Perfluorononanoic Acid	NQ [4]	2.5
C10 Acid- Perfluorodecanoic Acid	ND [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	ND [3]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,8]	2.5
PFBS- Perfluorobutanesulfonate	37.0	2.5
PFHS- Perfluorohexanesulfonate	1580 [3,6]	2.5
PFOS- Perfluorooctanesulfonate	731 [3,9]	2.5
FOSA- Perfluorooctane sulfonamide	ND [2,5]	2.5

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[5] In the intial calibration from September 16th, the r^2 value was less than 0.9900 for this analyte and therefore out of the acceptable range. As the report stands, the results for this analyte in the associated samples should be considered as estimated.
[6] The intial system suitability test (SST) was outside the acceptable value of less than 20% relative standard deviation on September 16th.
[7] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 16th. Since the QC failure was bias high and the results were ND, the results were reportable
[8] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were ND, the results were reportable
[9] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure the results should be considered as estimated

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: SP-11
Date Analyzed: 09/15/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	182	2.5
C5 Acid- Perfluoropentanoic Acid	458	2.5
C6 Acid- Perfluorohexanoic Acid	171	2.5
C7 Acid- Perfluoroheptanoic Acid	52.2 [1,2,3]	2.5
C8 Acid- Perfluorooctanoic Acid	35.6	2.5
C9 Acid- Perfluorononanoic Acid	20.7 [3,4]	2.5
C10 Acid- Perfluorodecanoic Acid	NQ [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	ND [3,7]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,8]	2.5
PFBS- Perfluorobutanesulfonate	369 [3]	2.5
PFHS- Perfluorohexanesulfonate	4910 [3,6]	2.5
PFOS- Perfluorooctanesulfonate	5770 [3,9]	2.5
FOSA- Perfluorooctane sulfonamide	ND [2,3,5]	2.5

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[5] In the intial calibration from September 16th, the r^2 value was less than 0.9900 for this analyte and therefore out of the acceptable range. As the report stands, the results for this analyte in the associated samples should be considered as estimated.
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[7] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 16th. Since the QC failure was bias high and the results were ND, the results were reportable
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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: MW-172
Date Analyzed: 09/15/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	59.8	2.5
C5 Acid- Perfluoropentanoic Acid	245	2.5
C6 Acid- Perfluorohexanoic Acid	154	2.5
C7 Acid- Perfluoroheptanoic Acid	25.1 [1,2,3]	2.5
C8 Acid- Perfluorooctanoic Acid	15.5	2.5
C9 Acid- Perfluorononanoic Acid	11.4 [3,4]	2.5
C10 Acid- Perfluorodecanoic Acid	NQ [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	ND [3]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,8]	2.5
PFBS- Perfluorobutanesulfonate	49.0	2.5
PFHS- Perfluorohexanesulfonate	1220 [6]	2.5
PFOS- Perfluorooctanesulfonate	1330 [3,9]	2.5
FOSA- Perfluorooctane sulfonamide	ND [2,5]	2.5

ND= Not Detected = Response is below the LOQ of 2.5 ng/L
NQ= Not Quantifiable = Response is between LOD and LOQ

[1] The initial Relative Percent Difference (RPD) between LCS/LCSD was outside the acceptable value of 20% on September 16th.
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[3] The relative percent recovery for the internal standard was outside of the acceptable range of between 50% and 200%
[4] The Lab control spike (LCS) duplicate recovery (75%) was outside of the acceptable range of 80-120% all the results should be considered as estimated
[5] In the intial calibration from September 16th, the r^2 value was less than 0.9900 for this analyte and therefore out of the acceptable range. As the report stands, the results for this analyte in the associated samples should be considered as estimated.
[6] The intial system suitability test (SST) was outside the acceptable value of less than 20% relative standard deviation on September 16th.
[7] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 16th. Since the QC failure was bias high and the results were ND, the results were reportable
[8] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were ND, the results were reportable
[9] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure the results should be considered as estimated

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: MW-156
Date Analyzed: 09/15/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	220	2.5
C5 Acid- Perfluoropentanoic Acid	1730	2.5
C6 Acid- Perfluorohexanoic Acid	527	2.5
C7 Acid- Perfluoroheptanoic Acid	200 [1,2,3]	2.5
C8 Acid- Perfluorooctanoic Acid	73.1 [3]	2.5
C9 Acid- Perfluorononanoic Acid	26.9 [3,4,7]	2.5
C10 Acid- Perfluorodecanoic Acid	NQ [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	2.58 [7,8]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,9]	2.5
PFBS- Perfluorobutanesulfonate	462 [3]	2.5
PFHS- Perfluorohexanesulfonate	10500 [3,6]	2.5
PFOS- Perfluorooctanesulfonate	14900 [3,10]	2.5
FOSA- Perfluorooctane sulfonamide	NQ [2,3,5]	2.5

ND= Not Detected = Response is below the LOQ of 2.5 ng/L
NQ= Not Quantifiable = Response is between LOD and LOQ

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[2] The Reporting Limit Verification (RLV) was outside the acceptable value of 70-130% on September 17th results should be considered as estimated.
[3] The relative percent recovery for the internal standard was outside of the acceptable range of between 50% and 200%
[4] The Lab control spike (LCS) duplicate recovery (75%) was outside of the acceptable range of 80-120% all the results should be considered as estimated
[5] In the intial calibration from September 16th, the r^2 value was less than 0.9900 for this analyte and therefore out of the acceptable range. As the report stands, the results for this analyte in the associated samples should be considered as estimated.
[6] The intial system suitability test (SST) was outside the acceptable value of less than 20% relative standard deviation on September 16th.
[7] The initial Relative Percent Difference (RPD) between sample / sample dup was outside the acceptable value of 20% on September 16th.
[8] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were near the reporting limit the results were reportable
[9] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were ND, the results were reportable
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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: MW-156*
Date Analyzed: 09/15/2009

Analyte	Result (ng/L)	LOQ (ng/L)
C4 Acid- Perfluorobutyric Acid	221	2.5
C5 Acid- Perfluoropentanoic Acid	1660	2.5
C6 Acid- Perfluorohexanoic Acid	534	2.5
C7 Acid- Perfluoroheptanoic Acid	184 [1,2,5]	2.5
C8 Acid- Perfluorooctanoic Acid	81.4	2.5
C9 Acid- Perfluorononanoic Acid	23.7 [3,4,7]	2.5
C10 Acid- Perfluorodecanoic Acid	NQ [2,6]	2.5
C11 Acid- Perfluoroundecanoic Acid	2.93 [7,8]	2.5
C12 Acid- Perfluorododecanoic Acid	ND [2,6,9]	2.5
PFBS- Perfluorobutanesulfonate	502 [3]	2.5
PFHS- Perfluorohexanesulfonate	8930 [3,6]	2.5
PFOS- Perfluorooctanesulfonate	11700 [3,10]	2.5
FOSA- Perfluorooctane sulfonamide	2.62 [2,3,5]	2.5

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*Laboratory Duplicate

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[6] The intial system suitability test (SST) was outside the acceptable value of less than 20% relative standard deviation on September 16th.
[7] The initial Relative Percent Difference (RPD) between sample / sample dup was outside the acceptable value of 20% on September 16th.
[8] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were near the reporting limit the results were reportable
[9] The Continuing Calibration Verification standard (CCV) was outside the acceptable value of 70-130% on September 17th. Since the QC failure was bias high and the results were ND, the results were reportable
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Analytical Report

Recovery Summary of Fluorochemical Residues in Water Samples

Sample Description	C4 Acid				C5 Acid			C6 Acid			C7 Acid		
	Amount Spiked (ng/L)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)
Reagent Spike A-1 10 ng/L	10	ND	9.76	98	ND	9.46	95	ND	9.27	93	ND	9.92	99
Reagent Spike A-2 10 ng/L	10	ND	10.1	101	ND	10.2	102	ND	10.1	101	ND	9.69	97
MW-101 Laboratory Spike (L18876-1 10 ng/L Matrix Spike)	10	183	206	230^	403	454	510^	150	170	200^	12.4	49.1	367^

Sample Description	C8 Acid				C9 Acid			C10 Acid			C11 Acid		
	Amount Spiked (ng/L)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)
Reagent Spike A-1 10 ng/L	10	ND	10.7	107	ND	8.22	82	ND	9.32	93	ND	8.21	82
Reagent Spike A-2 10 ng/L	10	ND	10.3	103	ND	7.45	75*	ND	9.58	96	ND	9.37	94
MW-101 Laboratory Spike (L18876-1 10 ng/L Matrix Spike)	10	36.7	51.7	150^	NQ	9.36	94	ND	9.13	91	ND	9.95	100

Sample Description	C12 Acid				PFBS			PFHS			PFOS		
	Amount Spiked (ng/L)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)
Reagent Spike A-1 10 ng/L	10	ND	8.76	88	ND	10.4	104	ND	9.56	96	ND	8.05	81
Reagent Spike A-2 10 ng/L	10	ND	8.64	86	ND	10.5	105	ND	9.77	98	ND	8.39	84
MW-101 Laboratory Spike (L18876-1 10 ng/L Matrix Spike)	10	ND	8.38	84	479	449	0^	3710	3760	500^	9230	10500	12700^

Sample Description	FOSA			
	Amount Spiked (ng/L)	Amt Found in Sample (ng/L)	Amount Recovered (ng/L)	Recovery (%)
Reagent Spike A-1 10 ng/L	10	ND	9.72	97
Reagent Spike A-2 10 ng/L	10	ND	8.52	85
MW-101 Laboratory Spike (L18876-1 10 ng/L Matrix Spike)	10	NQ	29.0	290^

ND = Not detected = Response less than LOQ of 2.5 ng/L.

^ Sample residue exceeds the spiking level significantly; therefore, an accurate recovery value cannot be calculated.

* LCS is outside the 80-120% criteria

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Analytical Report

Recovery Summary of ^{13}C PFOA (m+4) in Water Samples

Client Sample ID	MPI Sample ID	Amount Spiked (ng/L)	Amount Recovered (ng/L)	Recovery (%)
NA	Reagent Blank	10	10.2	102
NA	Reagent Spike A	10	9.16	92
NA	Reagent Spike A DUP	10	9.70	97
MW-101	L18876-1 Spk B	10	10.8	108
MW-101	L18876-1	10	9.54	95
MW-912	L18876-2	10	10.8	108
SP-11	L18876-3	10	9.28	93
MW-172	L18876-4	10	10.1	101
MW-156	L18876-5	10	9.61	96
MW-156*	L18876-5 DUP	10	9.93	99

* Laboratory Duplicate

CLIENT ID	SW-1 (Legion Lake)	Burnsville B-3, GW 44.5 ft	Lab Blank	Spiked Matrix	(MS)	(MSD)	(MS)	(MSD)
AXYS ID	L13453-1	L13453-2	WG30035-101	WG30035-102	WG30035-103	WG30035-104	WG30035-104	WG30035-103
WORKGROUP	WG30035	WG30035	WG30035	WG30035	WG30035	WG30035	WG30035	WG30035
Sample Size	0.498 L	0.496 L	0.500 L		0.496 L	0.496 L	0.496 L	0.496 L
UNITS	ng/L	ng/L	ng/L	% Recov	ng/L	ng/L	% Recov	% Recov
PFBA	4.02	146	< 2.50	105	615	658	104	95.5
PFPeA	< 7.21	422	< 2.50	91.3	513	495	79.8	83.3
PFHxA	< 2.51	281	< 2.50	100	560	518	88.5	96.8
PFHpA	3.55	447	< 2.50	97.8	509	528	103	99.7
PFOA	5.69	1260	< 2.50	104	530	545	107	104
PFNA	3.63	81.7	< 2.50	108	521	506	100	103
PFDA	3.92	17.8	< 2.50	96.8	556	530	105	110
PFUnA	< 2.51	< 2.52	< 2.50	103	507	506	100	101
PFDoA	< 2.51	< 2.52	< 2.50	110	590	560	111	117
PFBS	< 5.02	12.8	< 5.00	109	891	978	97	88.4
PFHxS	< 5.02	279	< 5.00	113	1190	1020	101	118
PFOS	13.2	522	< 5.00	111	1110	1010	99.9	111
PFOSA	< 2.51	< 2.52	< 2.50	106	597	537	106	118

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CLIENT ID	Richfield B-4 SL 0-8'	Goodview Sed-1	Lab Blank	Spiked Matrix	Richfield B-4 SL 0-8' (MS)	Richfield B-4 SL 0-8' (MS)	Richfield B-4 SL 0-8' (MSD)	Richfield B-4 SL 0-8' (MSD)
AXYS ID	L13736-1 (A)	L13786-1	WG30965-101	WG30965-102	WG30965-108	WG30965-108	WG30965-109	WG30965-109
WORKGROUP	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965	WG30965
Sample Size	5.23 g (dry)	5.66 g (dry)	1.00 g		5.20 g (dry)	5.20 g (dry)	5.16 g (dry)	5.16 g (dry)
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	ng/g (dry weight basis)	% Recov	ng/g (dry weight basis)	% Recov
PFBA	< 0.0956	< 0.0883	< 0.500	94.7	47	97.8	39.9	82.4
PFPeA	< 0.0956	< 0.0883	< 0.500	88	44.4	92.3	45.2	93.2
PFHxA	< 0.0956	< 0.0883	< 0.500	94.9	45.3	94.1	42.9	88.5
PFHpA	< 0.0956	< 0.0883	< 0.500	87.3	43.2	89.8	46.8	96.6
PFOA	0.129	< 0.0883	< 0.500	85.3	39.5	81.9	41.5	85.4
PFNA	< 0.0956	< 0.0883	< 0.500	97.3	42.3	87.8	46.3	95.5
PFDA	< 0.0956	< 0.0883	< 0.500	109	43.2	89.7	41	84.5
PFUnA	< 0.0956	< 0.0883	< 0.500	90.8	40.4	84	39.7	81.9
PFDoA	< 0.0956	< 0.0883	< 0.500	103	42.2	87.8	40.9	84.4
PFBS	< 0.191	< 0.177	< 1.00	116	89.2	92.7	83.3	85.9
PFHxS	0.236	< 0.177	< 1.00	130	90.5	93.8	85	87.5
PFOS	4.52	0.332	< 1.00	98.7	87.1	85.8	87.4	85.5
PFOSA	< 0.0956	< 0.0883	< 0.500	93.9	41.5	86.4	40.2	82.9
% Moisture	13.2	20.3			14.2		14	

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CLIENT ID	Goodview SW-1	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13785-1	WG30640-101	WG30640-102 (A)	WG30640-103 (DUP WG30640-102)
WORKGROUP	WG30640	WG30640	WG30640	WG30640
Sample Size	0.494 L	0.500 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA	< 2.53	< 2.50	95.1	91
PFPeA	< 2.53	< 2.50	77.8	80.3
PFHxA	4.78	< 2.50	96.2	96.6
PFHpA	< 2.53	< 2.50	82.5	86.2
PFOA	4.49	< 2.50	97.6	99.4
PFNA	2.56	< 2.50	85.6	95.4
PFDA	2.82	< 2.50	86.8	89.5
PFUnA	< 2.53	< 2.50	86.3	92.3
PFDoA	< 2.53	< 2.50	98.3	104
PFBS	< 5.06	< 5.00	120	122
PFHxS	< 5.06	< 5.00	95.7	105
PFOS	8.19	< 5.00	105	113
PFOSA	< 2.53	< 2.50	100	99.6

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CLIENT ID	Bemidji B-1 SL 0-4'	Bemidji B-1 SL 4-8'	Bemidji B-2 SL 0-4'	Bemidji B-2 SL 4-8'	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13894-1	L13894-2	L13894-3	L13894-4	WG30845-101	WG30845-102 (A)	WG30845-103 (DUP WG30845-102)
WORKGROUP	WG30845	WG30845	WG30845	WG30845	WG30845	WG30845	WG30845
Sample Size	5.26 g (dry)	5.48 g (dry)	5.36 g (dry)	5.44 g (dry)	5.00 g		
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	% Recov
PFBA	< 0.0951	< 0.0913	0.184	< 0.276	< 0.100	89.7	90.2
PFPeA	< 0.0951	< 0.0913	0.322	< 0.276	< 0.100	86.7	86.4
PFHxA	0.216	< 0.0913	1.44	D 0.411	< 0.100	96.1	93.5
PFHpA	< 0.0951	< 0.0913	0.143	D 0.917	< 0.100	79.8	81.3
PFOA	0.118	0.498	1.31	D 19.6	< 0.100	94.4	95.6
PFNA	< 0.0951	< 0.0913	0.099	< 0.276	< 0.102	83.2	87.9
PFDA	< 0.0951	< 0.0913	< 0.0933	< 0.276	< 0.100	103	108
PFUnA	< 0.0951	< 0.0913	< 0.0933	< 0.276	< 0.100	79	80.4
PFDoA	< 0.0951	< 0.0913	< 0.0933	< 0.276	< 0.100	91.7	99
PFBS	< 0.190	0.267	< 1.87	D 0.957	< 0.200	133	128
PFHxS	3.12	3.98	D 13.9	D 147	< 0.200	130	129
PFOS	55.7	56	D 1200	D 606	< 0.200	88.6	77.7
PFOSA	0.112	< 0.0913	18.5	< 0.276	< 0.100	76.6	70.2
% Moisture	6.09	8.76	6.66	6.12			

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CLIENT ID	Bemidji B-1 GW 15'	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13895-1	WG30925-101	WG30925-102 (A)	WG30925-103 (DUP WG30925-102)
WORKGROUP	WG30925	WG30925	WG30925	WG30925
Sample Size	0.500 L	0.500 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA	4.14	< 2.50	98.7	102
PFPeA	3.85	< 2.50	79.4	88.2
PFHxA	14.5	< 2.50	91	90.4
PFHpA	3.75	< 2.50	77.8	88.5
PFOA	49	< 2.50	93.2	101
PFNA	< 2.50	< 2.50	77.2	97.4
PFDA	< 2.50	< 2.50	95.8	97.2
PFUnA	< 2.50	< 2.50	89.6	83.7
PFDoA	< 2.50	< 2.50	103	109
PFBS	19.1	< 5.00	107	97.8
PFHxS	227	< 5.00	97.1	100
PFOS	483	< 5.00	94.1	90.6
PFOSA	< 2.50	< 2.50	84.5	85.6

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	Bemidji B-2 GW 15'	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13895-2	WG31192-101	WG31192-102 (A)	WG31192-103 (DUP WG31192-102)
WORKGROUP	WG31192	WG31192	WG31192	WG31192
Sample Size	0.103 L	0.500 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA	21.1	< 2.50	97.4	98.1
PFPeA	55.5	< 2.50	105	97.7
PFHxA	340	< 2.50	105	103
PFHpA	33.8	< 2.50	96.5	101
PFOA	200	< 2.50	97.6	101
PFNA	< 12.2	< 2.50	111	71.1
PFDA	< 12.2	< 2.50	104	98
PFUnA	< 12.2	< 2.50	94.3	94.4
PFDoA	< 12.2	< 2.50	100	103
PFBS	129	< 5.00	110	115
PFHxS	1490	< 5.00	114	116
PFOS	789	< 5.00	121	120
PFOSA	< 12.2	< 2.50	110	119

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Analytical Report

Summary of Fluorochemical Residues in Soil Samples

Sample ID: River Grove Sed-1

Analyte	Result (Dry Weight) (ng/g)	LOQ (ng/g)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	ND	0.333	12/18/2009
C5 Acid- Perfluoropentanoic Acid	ND	0.333	12/18/2009
C6 Acid- Perfluorohexanoic Acid	ND	0.333	12/18/2009
C7 Acid- Perfluoroheptanoic Acid	ND	0.333	12/18/2009
C8 Acid- Perfluorooctanoic Acid	NQ	0.333	12/18/2009
C9 Acid- Perfluorononanoic Acid	ND	0.333	12/18/2009
C10 Acid- Perfluorodecanoic Acid	ND	0.333	12/18/2009
C11 Acid- Perfluoroundecanoic Acid	ND	0.333	12/18/2009
C12 Acid- Perfluorododecanoic Acid	ND	0.333	12/18/2009
PFBS- Perfluorobutanesulfonate	ND	0.667	12/18/2009
PFHS- Perfluorohexanesulfonate	ND	0.667	12/18/2009
PFOS- Perfluorooctanesulfonate	NQ	0.667	12/18/2009
FOSA- Perfluorooctane sulfonamide	ND	0.333	12/18/2009

ND= Not Detected = Response is below the LOD of 0.2 ng/g (wet weight)
NQ= Not Quantifiable = Response is between LOD and LOQ

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Analytical Report

Summary of Fluorochemical Residues in Soil Samples

Sample ID: River Grove Sed-1 DUP

Analyte	Result (Dry Weight) (ng/g)	LOQ (ng/g)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	ND	0.333	12/18/2009
C5 Acid- Perfluoropentanoic Acid	ND	0.333	12/18/2009
C6 Acid- Perfluorohexanoic Acid	ND	0.333	12/18/2009
C7 Acid- Perfluoroheptanoic Acid	ND	0.333	12/18/2009
C8 Acid- Perfluorooctanoic Acid	NQ	0.333	12/18/2009
C9 Acid- Perfluorononanoic Acid	ND	0.333	12/18/2009
C10 Acid- Perfluorodecanoic Acid	ND	0.333	12/18/2009
C11 Acid- Perfluoroundecanoic Acid	ND	0.333	12/18/2009
C12 Acid- Perfluorododecanoic Acid	ND	0.333	12/18/2009
PFBS- Perfluorobutanesulfonate	ND	0.667	12/18/2009
PFHS- Perfluorohexanesulfonate	ND	0.667	12/18/2009
PFOS- Perfluorooctanesulfonate	NQ	0.667	12/18/2009
FOSA- Perfluorooctane sulfonamide	ND	0.333	12/18/2009

ND= Not Detected = Response is below the LOD of 0.2 ng/g (wet weight)
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Analytical Report

Summary of Fluorochemical Residues in Soil Samples

Sample ID: River Grove Sed-2

Analyte	Result (Dry Weight) (ng/g)	LOQ (ng/g)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	ND	0.333	12/18/2009
C5 Acid- Perfluoropentanoic Acid	ND	0.333	12/18/2009
C6 Acid- Perfluorohexanoic Acid	ND	0.333	12/18/2009
C7 Acid- Perfluoroheptanoic Acid	ND	0.333	12/18/2009
C8 Acid- Perfluorooctanoic Acid	ND	0.333	12/18/2009
C9 Acid- Perfluorononanoic Acid	ND	0.333	12/18/2009
C10 Acid- Perfluorodecanoic Acid	ND	0.333	12/18/2009
C11 Acid- Perfluoroundecanoic Acid	ND	0.333	12/18/2009
C12 Acid- Perfluorododecanoic Acid	ND	0.333	12/18/2009
PFBS- Perfluorobutanesulfonate	ND	0.667	12/18/2009
PFHS- Perfluorohexanesulfonate	ND	0.667	12/18/2009
PFOS- Perfluorooctanesulfonate	ND	0.667	12/18/2009
FOSA- Perfluorooctane sulfonamide	ND	0.333	12/18/2009

ND= Not Detected = Response is below the LOD of 0.2 ng/g (wet weight)
NQ= Not Quantifiable = Response is between LOD and LOQ

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Analytical Report

Summary of Fluorochemical Residues in Soil Samples

Sample ID: River Grove Sed-3

Analyte	Result (Dry Weight) (ng/g)	LOQ (ng/g)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	ND	0.333	12/18/2009
C5 Acid- Perfluoropentanoic Acid	ND	0.333	12/18/2009
C6 Acid- Perfluorohexanoic Acid	ND	0.333	12/18/2009
C7 Acid- Perfluoroheptanoic Acid	ND	0.333	12/18/2009
C8 Acid- Perfluorooctanoic Acid	ND	0.333	12/18/2009
C9 Acid- Perfluorononanoic Acid	ND	0.333	12/18/2009
C10 Acid- Perfluorodecanoic Acid	ND	0.333	12/18/2009
C11 Acid- Perfluoroundecanoic Acid	ND	0.333	12/18/2009
C12 Acid- Perfluorododecanoic Acid	ND	0.333	12/18/2009
PFBS- Perfluorobutanesulfonate	ND	0.667	12/18/2009
PFHS- Perfluorohexanesulfonate	ND	0.667	12/18/2009
PFOS- Perfluorooctanesulfonate	ND	0.667	12/18/2009
FOSA- Perfluorooctane sulfonamide	ND	0.333	12/18/2009

ND= Not Detected = Response is below the LOD of 0.2 ng/g (wet weight)
NQ= Not Quantifiable = Response is between LOD and LOQ

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

ample ID: River Grove SW-1

Analyte	Result (ng/L)	LOQ (ng/L)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	3.54 [1]	2.5	12/19/2009
C5 Acid- Perfluoropentanoic Acid	ND	2.5	12/19/2009
C6 Acid- Perfluorohexanoic Acid	NQ	2.5	12/19/2009
C7 Acid- Perfluoroheptanoic Acid	ND	2.5	12/19/2009
C8 Acid- Perfluorooctanoic Acid	2.79	2.5	12/19/2009
C9 Acid- Perfluorononanoic Acid	ND	2.5	12/19/2009
C10 Acid- Perfluorodecanoic Acid	ND [2]	2.5	12/19/2009
C11 Acid- Perfluoroundecanoic Acid	ND [2,3]	2.5	12/19/2009
C12 Acid- Perfluorododecanoic Acid	ND [2]	2.5	12/19/2009
PFBS- Perfluorobutanesulfonate	4.00	2.5	12/19/2009
PFHS- Perfluorohexanesulfonate	ND	2.5	12/19/2009
PFOS- Perfluorooctanesulfonate	NQ [2]	2.5	12/19/2009
FOSA- Perfluorooctane sulfonamide	ND	2.5	12/19/2009

D= Not Detected = Response is below the LOQ of 2.5 ng/L
Q= Not Quantifiable = Response is between LOD and LOQ

The Laboratory Fortified Sample (LF) was outside the acceptable value of 70-130%
sults should be considered as estimated.
Laboratory Control Spikes (LCS) were outside the acceptable recoveries (80-120%) all results
ould be considered estimates.
Calibration verification standard (CCV) was outside the acceptable recoveries (70-130%) samples show
detection of analyte, so values may be reported without reanalysis.

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

Sample ID: River Grove SW-2

Analyte	Result (ng/L)	LOQ (ng/L)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	4.23 [1]	2.5	12/19/2009
C5 Acid- Perfluoropentanoic Acid	ND	2.5	12/19/2009
C6 Acid- Perfluorohexanoic Acid	NQ	2.5	12/19/2009
C7 Acid- Perfluoroheptanoic Acid	ND	2.5	12/19/2009
C8 Acid- Perfluorooctanoic Acid	NQ	2.5	12/19/2009
C9 Acid- Perfluorononanoic Acid	ND	2.5	12/19/2009
C10 Acid- Perfluorodecanoic Acid	ND [2]	2.5	12/19/2009
C11 Acid- Perfluoroundecanoic Acid	ND [2,3]	2.5	12/19/2009
C12 Acid- Perfluorododecanoic Acid	ND [2]	2.5	12/19/2009
PFBS- Perfluorobutanesulfonate	3.43	2.5	12/19/2009
PFHS- Perfluorohexanesulfonate	ND	2.5	12/19/2009
PFOS- Perfluorooctanesulfonate	NQ [2]	2.5	12/19/2009
FOSA- Perfluorooctane sulfonamide	ND	2.5	12/19/2009

ND= Not Detected = Response is below the LOQ of 2.5 ng/L
NQ= Not Quantifiable = Response is between LOD and LOQ

[1] The Laboratory Fortified Sample (LF) was outside the acceptable value of 70-130% results should be considered as estimated.
[2] Laboratory Control Spikes (LCS) were outside the acceptable recoveries (80-120%) all results should be considered estimates.
[3] Calibration verification standard (CCV) was outside the acceptable recoveries (70-130%) samples show no detection of analyte, so values may be reported without reanalysis.

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Analytical Report

Summary of Fluorochemical Residues in Water Samples

nple ID: River Grove SW-2 DUP

Analyte	Result (ng/L)	LOQ (ng/L)	Date Analyzed
C4 Acid- Perfluorobutyric Acid	4.10 [1]	2.5	12/19/2009
C5 Acid- Perfluoropentanoic Acid	ND	2.5	12/19/2009
C6 Acid- Perfluorohexanoic Acid	NQ	2.5	12/19/2009
C7 Acid- Perfluoroheptanoic Acid	ND	2.5	12/19/2009
C8 Acid- Perfluorooctanoic Acid	NQ	2.5	12/19/2009
C9 Acid- Perfluorononanoic Acid	ND	2.5	12/19/2009
C10 Acid- Perfluorodecanoic Acid	ND [2]	2.5	12/19/2009
C11 Acid- Perfluoroundecanoic Acid	ND [2,3]	2.5	12/19/2009
C12 Acid- Perfluorododecanoic Acid	ND [2]	2.5	12/19/2009
PFBS- Perfluorobutanesulfonate	3.28	2.5	12/19/2009
PFHS- Perfluorohexanesulfonate	ND	2.5	12/19/2009
PFOS- Perfluorooctanesulfonate	NQ [2]	2.5	12/19/2009
FOSA- Perfluorooctane sulfonamide	ND	2.5	12/19/2009

)= Not Detected = Response is below the LOQ of 2.5 ng/L
Q= Not Quantifiable = Response is between LOD and LOQ

The Laboratory Fortified Sample (LF) was outside the acceptable value of 70-130%
sults should be considered as estimated.
Laboratory Control Spikes (LCS) were outside the acceptable recoveries (80-120%) all results
hould be considered estimates.
Calibration verification standard (CCV) was outside the acceptable recoveries (70-130%) samples show
o detection of analyte, so values may be reported without reanalysis.

CLIENT ID	ERTC SS-1	ERTC Sed-1	ERTC Sed-2	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13985-1	L13985-2	L13985-3	WG31243-101	WG31243-102 (A)	WG31243-103 (DUP WG31243-102)
WORKGROUP	WG31243	WG31243	WG31243	WG31243	WG31243	WG31243
Sample Size	5.01 g (dry)	5.45 g (dry)	5.36 g (dry)	5.00 g		
UNITS	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g (dry weight basis)	ng/g	% Recov	% Recov
PFBA	< 0.0998	< 0.0917	0.218	< 0.100	98.2	95.4
PFPeA	0.205	< 0.0917	0.536	< 0.100	89.9	90.7
PFHxA	0.794	< 0.0917	1.72	< 0.100	96.3	98.1
PFHpA	0.139	< 0.0917	0.268	< 0.100	85.7	91.7
PFOA	0.495	0.225	1.26	< 0.100	102	94.9
PFNA	< 0.0998	< 0.0917	0.184	< 0.100	76.7	110
PFDA	< 0.0998	< 0.0917	0.101	< 0.100	104	107
PFUnA	< 0.0998	< 0.0917	0.174	< 0.100	76.6	82
PFDoA	< 0.0998	< 0.0917	< 0.0933	< 0.100	110	97
PFBS	< 0.200	< 0.183	1.47	< 0.200	136	168
PFHxS	3.49	1.2	19.6	< 0.200	127	155
PFOS	83.5	57.5	538	< 0.200	92.9	122
PFOSA	4.54	6.52	181	< 0.100	83.4	118
% Moisture	28.8	28.1	33.5			

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	=	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	=	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	ERTC SW-1	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13986-1	WG31143-101	WG31143-102 (A)	WG31143-103 (DUP WG31143-102)
WORKGROUP	WG31143	WG31143	WG31143	WG31143
Sample Size	0.498 L	0.500 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA	257	< 2.50	95.4	96.7
PFPeA	537	< 2.50	94.3	92.5
PFHxA	1790	< 2.50	97.7	99.9
PFHpA	348	< 2.50	94.6	92
PFOA	991	< 2.50	98.2	103
PFNA	31.8	< 2.50	99.8	91.8
PFDA	3.45	< 2.50	92	96.4
PFUnA	< 2.51	< 2.50	91.4	86.4
PFDoA	< 2.51	< 2.50	102	97.3
PFBS		< 5.00	105	113
PFHxS		< 5.00	110	110
PFOS		< 5.00	111	118
PFOSA		< 2.50	104	108

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	=	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	=	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	ERTC SW-1	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L13986-1	WG31304-101	WG31304-102 (A)	WG31304-103 (DUP WG31304-102)
WORKGROUP	WG31304	WG31304	WG31304	WG31304
Sample Size	0.0983 L	0.100 L		
UNITS	ng/L	ng/L	% Recov	% Recov
PFBA		< 12.5	92.4	93
PFPeA		< 12.5	89.8	87.8
PFHxA		< 12.5	98.2	96.9
PFHpA		< 12.5	96.5	87.2
PFOA		< 12.5	104	90.9
PFNA		< 12.5	101	94.1
PFDA		< 12.5	99.4	105
PFUnA		< 12.5	116	111
PFDoA		< 12.5	106	108
PFBS	1870	< 25.0	104	100
PFHxS	9390	< 25.0	107	101
PFOS	11300	< 25.0	77.7	82.1
PFOSA	360	< 12.5	87.7	92.1

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	=	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	=	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

CLIENT ID	Kandiyohi Equip Blank	Kandiyohi DMW-1A	Kandiyohi DMW-3	Lab Blank	Spiked Matrix	Spiked Matrix (Duplicate)
AXYS ID	L14126-1	L14126-2	L14126-3	WG31545-101	WG31545-102 (A)	WG31545-104 (DUP WG31545-102)
WORKGROUP	WG31545	WG31545	WG31545	WG31545	WG31545	WG31545
Sample Size	0.491 L	0.513 L	0.499 L	0.500 L		
UNITS	ng/L	ng/L	ng/L	ng/L	% Recov	% Recov
PFBA	< 2.55	< 2.43	6.1	< 2.50	84	80.1
PFPeA	< 2.55	< 2.43	< 2.51	< 2.50	78.5	80.1
PFHxA	< 2.55	< 2.43	< 2.51	< 2.50	87.5	86.7
PFHpA	< 2.55	< 2.43	< 2.51	< 2.50	83.4	73
PFOA	< 2.55	< 2.43	< 2.51	< 2.50	82.1	85
PFNA	< 2.55	< 2.43	< 2.51	< 2.50	93.6	87.7
PFDA	< 2.55	< 2.43	< 2.51	< 2.50	85.2	91.1
PFUnA	< 2.55	< 2.43	< 2.51	< 2.50	84.2	77.9
PFDoA	< 2.55	< 2.43	< 2.51	< 2.50	92.6	85.3
PFBS	< 5.09	< 4.87	< 5.01	< 5.00	82.9	68.9
PFHxS	< 5.09	< 4.87	< 5.01	< 5.00	85.1	70
PFOS	< 5.09	< 4.87	< 5.01	< 5.00	75.3	65.7
PFOSA	< 2.55	< 2.43	< 2.51	< 2.50	88.8	78.7

See below for definitions of possible flags and labels in the database (sheet tab 'GenericEDD')

R	=	peak detected but did not meet quantification criteria number following this flag represents the estimated maximum possible concentration
<	=	less than the detection limit number following this symbol represents the detection limit For homologue totals sums, please see the individual congener data for the detection limit.

There may be additional flags associated with these data; please see individual hard copy reports for a complete list of flags and definitions.

SF-00006-05(4/86)

DEPARTMENT : POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE : November 2, 2009

TO : Nile Fellows, Pollution Control Project Leader
Remediation Division

FROM : William Scruton, QA Coordinator
Environmental Analysis & Outcomes Division

PHONE : (651)757-2710

SUBJECT : Comments for an Aqueous Perfluorinated Organics Analysis Report [DPWG30552] (Report from AXYS ANALYTICAL SERVICES LTD. Dated October 15, 2009)

The above-referenced report was reviewed at the request of Nile Fellows (MPCA). Questions or comments can be directed to me at the above number or by email at Bill.Scruton@state.mn.us.

General Comments for Analysis Batch WG30035

1. WG30035 contained two aqueous samples. The samples were received at the laboratory on September 1st in good condition.

Specific Comments for Analysis Batch WG30035

1. Initial Calibration/Calibration Verification: In the Initial Calibration from September 15sh, all % recoveries met the QC acceptance criteria. The % recoveries in the Calibration Verification analyses from September 17th and 18th were acceptable. No data were qualified.

2. Labeled Surrogates: All labeled compound recoveries were between 50% and 150% except for the % recoveries of 13C4-PFOS (80) for the Lab Blank, the LCS, and the MSD (175%, 212%, and 176%, respectively). The samples were diluted and re-analyzed. The surrogate recoveries met method specifications and the native concentrations were not affected. The sample data were reported from the original analyses. No data were qualified.

3. Blanks: There were no target analytes detected above the detection limits in the lab blank associated with the Work Group. No data were qualified.

4. LCS: All target analyte recoveries were acceptable. No data were qualified.

5. MS/MSD: Another MPCA sample was chosen for QC purposes. All target analyte recoveries (and RPDs) met QC acceptance criteria. No data were qualified.

6. Sample Duplicates: There was no sample duplicate analyzed with the analytical batch. Precision QC evaluation was based on the performance between the MS and MSD. No data were qualified.

7. Based on the review of the batch QC results, the sample results for L13453-1 and L13452-2 are usable with the exceptions noted above.

SF-00006-05(4/86)

DEPARTMENT : POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE : January 4, 2010

TO : Nile Fellows, Pollution Control Project Leader
Remediation Division

FROM : William Scruton, QA Coordinator
Environmental Analysis & Outcomes Division

PHONE : (651)757-2710

SUBJECT : Comments for a Perfluorinated Organics Analysis Report of Solid Samples [DPWG31146] (Report from AXYS ANALYTICAL SERVICES LTD. Dated December 4, 2009)

The above-referenced report was reviewed at the request of Nile Fellows (MPCA). Questions or comments can be directed to me at the above number or by email at Bill.Scruton@state.mn.us.

General Comments for Analysis Batch WG30965

1. WG30965 contained two solid samples. The samples were received at the laboratory on October 13th and 21st in good condition.

2. There were some discrepancies between the COC and the information on the sample label or the type of sample container used to collect a sample. AXYS contacted the MPCA representative and logged the samples in following her instructions.

Specific Comments for Analysis Batch WG30965

1. Initial Calibration/Calibration Verification: In the Initial Calibration from November 21st, all % recoveries met the QC acceptance criteria. In the Calibration Verifications from November 21st, all % recoveries met QC acceptance criteria. No data were qualified.

2. Labeled Surrogates: All labeled compound recoveries were between 50% and 150% except for the % recovery of 13C2-PFDoA in sample Goodview Sed-1 (153%). **Since the QC failure for 13C2-PFDoA demonstrated a positive bias (which would have a negative impact on the result), the non-detect result for PFDoA in sample Goodview Sed-1 may contain a slight negative bias and should be considered as estimated.** No other data were qualified.

3. Blanks: There were no target analytes detected above the detection limits in the lab blank associated with the Work Group. No data were qualified.

4. LCS: All target analyte recoveries were acceptable. No data were qualified.

5. MS/MSD: Sample Richfield B-4 SL 0-8' was chosen for QC purposes. All % recoveries (and RPDs) met QC acceptance criteria. No data were qualified.

6. Sample Duplicates: There was no sample duplicate analyzed with the analytical batch. Precision QC evaluation was based on the performance between the MS and the MSD. No data were qualified.

7. Based on the review of the batch QC results, the sample results for L13736-1 and L13786-1 are usable with the exceptions noted above.

SF-00006-05(4/86)

DEPARTMENT : POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE : January 4, 2010

TO : Nile Fellows, Pollution Control Project Leader
Remediation Division

FROM : William Scruton, QA Coordinator
Environmental Analysis & Outcomes Division

PHONE : (651)757-2710

SUBJECT : Comments for a Perfluorinated Organics Analysis Report of Aqueous Samples [DPWG31204] (Report from AXYS ANALYTICAL SERVICES LTD. Dated December 10, 2009)

The above-referenced report was reviewed at the request of Nile Fellows (MPCA). Questions or comments can be directed to me at the above number or by email at Bill.Scruton@state.mn.us.

General Comments for Analysis Batch WG30640

1. WG30640 contained one aqueous sample. The sample was received at the laboratory on October 21st in good condition.

2. There were some discrepancies between the COC and the information on the sample label or the type of sample container used to collect a sample. AXYS contacted the MPCA representative and logged the samples in following her instructions.

Specific Comments for Analysis Batch WG30640

1. Initial Calibration/Calibration Verification: In the Initial Calibration from November 17th, all % recoveries met the QC acceptance criteria. In the Calibration Verifications from November 26th, all % recoveries met QC acceptance criteria except for the % recoveries of PFPeA, PFHxA, PFHpA, PFDoA, and PFOS in the beginning Calibration Verification standard (221%, 154%, 146%, 43.0%, and 138%, respectively). The standard did not include PFOSA. The expected concentrations were either 0.50-ng or 1.00-ng. These are between factors of twenty to eighty smaller than normal. **The laboratory is investigating this standard.** No data were qualified.

2. Labeled Surrogates: All labeled compound recoveries were between 50% and 150% except for the % recovery of 13C4-PFBA in sample Goodview SW-1 (24.5%). Since the QC failure for 13C4-PFBA demonstrated a negative bias (which would have a positive impact on the result) and PFBA was not detected in the sample, no data were qualified.

3. Blanks: There were no target analytes detected above the detection limits in the lab blank associated with the Work Group. No data were qualified.

4. LCS/LCSD: All target analyte recoveries (and RPDs) were acceptable. No data were qualified.

5. MS/MSD: There was no MS/MSD pair analyzed with the analytical batch. Accuracy and precision QC evaluation was based on the performance between the LCS and the LCSD. No data were qualified.

6. Sample Duplicates: There was no sample duplicate analyzed with the analytical batch. Precision QC evaluation was based on the performance between the LCS and the LCSD. No data were qualified.

7. Based on the review of the batch QC results, the sample results for L13785-1 are usable with the exceptions noted above.

SF-00006-05(4/86)

DEPARTMENT : POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE : January 14, 2010

TO : Nile Fellows, Pollution Control Project Leader
Remediation Division

FROM : William Scruton, QA Coordinator
Environmental Analysis & Outcomes Division

PHONE : (651)757-2710

SUBJECT : Comments for a Perfluorinated Organic Analysis Report of Solid Samples [DPWG31475] (Report from AXYS ANALYTICAL SERVICES LTD. Dated January 11, 2010)

The above-referenced report was reviewed at the request of Nile Fellows (MPCA). Questions or comments can be directed to me at the above number or by email at Bill.Scruton@state.mn.us.

General Comments for Analysis Batch WG30845

1. WG30845 contained four solid samples. The samples were received at the laboratory on November 12th in good condition.

2. There were some discrepancies between the COC and the information on the sample label or the type of sample container used to collect a sample. AXYS contacted the MPCA representative and logged the samples in following her instructions.

Specific Comments for Analysis Batch WG30845

1. Initial Calibration/Calibration Verification: In the Initial Calibration from December 1st, all % recoveries met the QC acceptance criteria except for the % recoveries of PFBA in CS1 (129%) and of PFDA in CS7 (72.2%). In the Calibration Verifications from December 2nd, 4th, and 8th, all % recoveries met QC acceptance criteria. Since the QC failures were minimal and the Calibration Verifications were acceptable, no data were qualified.

2. Labeled Surrogates: All labeled compound recoveries were between 50% and 150% except for the % recoveries of 13C2-PFDoA in samples Bemidji B-1 SL 4-8', the LCS, and the LCSD (47.1%, 45.3%, and 38.6%, respectively). Since the QC failures for 13C2-PFDoA demonstrated a negative bias (which would have a positive impact on the result) and PFDoA was not detected in the sample and the % recoveries of PFDoA in the LCS and LCSD were acceptable, no data were qualified.

3. Blanks: There were no target analytes detected above the detection limits in the lab blank associated with the Work Group. No data were qualified.

4. LCS/LCSD: All target analyte recoveries (and RPDs) were acceptable except for the % recovery of PFBS in the LCS (133%). **Since the QC failure demonstrated a positive bias, only the results for PFBS in samples Bemidji B-1 SL 4-8' and Bemidji B-2 SL 4-8' may contain a slight positive bias and should be considered as estimated.** No other data were qualified.

5. MS/MSD: There was no MS/MSD pair analyzed with the analytical batch. Accuracy and precision QC evaluation was based on the performance between the LCS and the LCSD. No data were qualified.

6. Sample Duplicates: There was no sample duplicate analyzed with the analytical batch. Precision QC evaluation was based on the performance between the LCS and the LCSD. No data were qualified.

7. Based on the review of the batch QC results, the sample results for L13894-1 through L13894-4 are usable with the exceptions noted above.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

June 02, 2009

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on May 18, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

carolynne.trout@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Minnesota Certification IDs

Wisconsin Certification #: 999407970
Washington Certification #: C754
Tennessee Certification #: 02818
Pennsylvania Certification #: 68-00563
Oregon Certification #: MN200001
North Dakota Certification #: R-036
North Carolina Certification #: 530
New York Certification #: 11647
New Jersey Certification #: MN-002
Montana Certification #: MT CERT0092
Minnesota Certification #: 027-053-137
Maine Certification #: 2007029
Louisiana Certification #: LA080009
Louisiana Certification #: 03086
Kansas Certification #: E-10167
Iowa Certification #: 368
Illinois Certification #: 200011
Florida/NELAP Certification #: E87605
California Certification #: 01155CA
Arizona Certification #: AZ-0014
Alaska Certification #: UST-078

Green Bay Certification IDs

Wisconsin DATCP Certification #: 105-444
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
South Carolina Certification #: 83006001
North Dakota Certification #: R-200
North Dakota Certification #: R-150
North Carolina Certification #: 503
North Carolina Certification #: 503
New York Certification #: 11887
New York Certification #: 11888
Minnesota Certification #: 055-999-334
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04169
Louisiana Certification #: 04168
Kentucky Certification #: 83
Kentucky Certification #: 82
Illinois Certification #: 200051
Illinois Certification #: 200050
Florida/NELAP Certification #: E87951
Florida/NELAP Certification #: E87948

Pace Analytical Services, Inc.
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SAMPLE SUMMARY

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Lab ID	Sample ID	Matrix	Date Collected	Date Received
1095252001	**KENYON B-1 SL 0-4'**	Solid	05/15/09 10:50	05/18/09 15:52
1095252002	**KENYON B-1 SL 4-8'**	Solid	05/15/09 11:10	05/18/09 15:52
1095252003	**KENYON B-2 SL 0-4'**	Solid	05/15/09 12:15	05/18/09 15:52
1095252004	**KENYON B-2 SL 4-8'**	Solid	05/15/09 12:30	05/18/09 15:52
1095252005	**CLAREMONT B-1 SL 0-4'**	Solid	05/15/09 14:30	05/18/09 15:52
1095252006	**CLAREMONT B-1 SL 4-8'**	Solid	05/15/09 14:45	05/18/09 15:52
1095252007	**CLAREMONT B-2 SL 0-4'**	Solid	05/15/09 15:10	05/18/09 15:52
1095252008	**CLAREMONT B-2 SL 4-8'**	Solid	05/15/09 15:20	05/18/09 15:52
1095252009	**CLAREMONT B-3 SL 0-4'**	Solid	05/15/09 15:55	05/18/09 15:52
1095252010	**CLAREMONT B-3 SL 4-8'**	Solid	05/15/09 16:05	05/18/09 15:52

Pace Analytical Services, Inc.
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SAMPLE ANALYTE COUNT

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
1095252001	**KENYON B-1 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
1095252002	**KENYON B-1 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
1095252003	**KENYON B-2 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
1095252004	**KENYON B-2 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
1095252005	**CLAREMONT B-1 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
1095252006	**CLAREMONT B-1 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
1095252007	**CLAREMONT B-2 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
1095252008	**CLAREMONT B-2 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
1095252009	**CLAREMONT B-3 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
1095252010	**CLAREMONT B-3 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G

Pace Analytical Services, Inc.
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PROJECT NARRATIVE

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: June 02, 2009

General Information:
10 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/3860

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1095252003

M0: Matrix spike recovery was outside laboratory control limits.

- MSD (Lab ID: 160935)
  - Mean Total Organic Carbon

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
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(612)607-1700

ANALYTICAL RESULTS

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Sample: KENYON B-1 SL 0-4' **Lab ID: 1095252001** Collected: 05/15/09 10:50 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**29300**	mg/kg	5000	1		05/23/09 08:38	7440-44-0	
Total Organic Carbon	**23600**	mg/kg	4550	1		05/23/09 08:42	7440-44-0	
Mean Total Organic Carbon	**26300**	mg/kg	4760	1		05/23/09 08:42	7440-44-0	

Sample: KENYON B-1 SL 4-8' **Lab ID: 1095252002** Collected: 05/15/09 11:10 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**23700**	mg/kg	5260	1		05/23/09 08:49	7440-44-0	
Total Organic Carbon	**23500**	mg/kg	5880	1		05/23/09 08:53	7440-44-0	
Mean Total Organic Carbon	**23600**	mg/kg	5560	1		05/23/09 08:53	7440-44-0	

Sample: KENYON B-2 SL 0-4' **Lab ID: 1095252003** Collected: 05/15/09 12:15 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**9110**	mg/kg	5560	1		05/23/09 08:58	7440-44-0	
Total Organic Carbon	**17000**	mg/kg	4760	1		05/23/09 09:03	7440-44-0	
Mean Total Organic Carbon	**13300**	mg/kg	5130	1		05/23/09 09:03	7440-44-0	M0

Sample: KENYON B-2 SL 4-8' **Lab ID: 1095252004** Collected: 05/15/09 12:30 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**14200**	mg/kg	4550	1		05/23/09 09:36	7440-44-0	
Total Organic Carbon	**37500**	mg/kg	4760	1		05/23/09 09:44	7440-44-0	
Mean Total Organic Carbon	**25600**	mg/kg	4650	1		05/23/09 09:44	7440-44-0	

Sample: CLAREMONT B-1 SL 0-4' **Lab ID: 1095252005** Collected: 05/15/09 14:30 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**195000**	mg/kg	25000	1		05/23/09 10:07	7440-44-0	
Total Organic Carbon	**260000**	mg/kg	50000	1		05/23/09 10:14	7440-44-0	

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Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Sample: CLAREMONT B-1 SL 0-4' **Lab ID: 1095252005** Collected: 05/15/09 14:30 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Mean Total Organic Carbon	**217000**	mg/kg	33300	1		05/23/09 10:14	7440-44-0	

Sample: CLAREMONT B-1 SL 4-8' **Lab ID: 1095252006** Collected: 05/15/09 14:45 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**16900**	mg/kg	4350	1		05/23/09 10:19	7440-44-0	
Total Organic Carbon	**12500**	mg/kg	4760	1		05/23/09 10:25	7440-44-0	
Mean Total Organic Carbon	**14800**	mg/kg	4550	1		05/23/09 10:25	7440-44-0	

Sample: CLAREMONT B-2 SL 0-4' **Lab ID: 1095252007** Collected: 05/15/09 15:10 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**208000**	mg/kg	50000	1		05/23/09 10:58	7440-44-0	
Total Organic Carbon	**134000**	mg/kg	100000	1		05/23/09 11:02	7440-44-0	
Mean Total Organic Carbon	**184000**	mg/kg	66700	1		05/23/09 11:02	7440-44-0	

Sample: CLAREMONT B-2 SL 4-8' **Lab ID: 1095252008** Collected: 05/15/09 15:20 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**8650**	mg/kg	5260	1		05/23/09 11:07	7440-44-0	
Total Organic Carbon	**6420**	mg/kg	5000	1		05/23/09 11:17	7440-44-0	
Mean Total Organic Carbon	**7500**	mg/kg	5130	1		05/23/09 11:17	7440-44-0	

Sample: CLAREMONT B-3 SL 0-4' **Lab ID: 1095252009** Collected: 05/15/09 15:55 Received: 05/18/09 15:52 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**35400**	mg/kg	12500	1		05/23/09 11:27	7440-44-0	
Total Organic Carbon	**35100**	mg/kg	14300	1		05/23/09 11:30	7440-44-0	
Mean Total Organic Carbon	**35200**	mg/kg	13300	1		05/23/09 11:30	7440-44-0	

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ANALYTICAL RESULTS

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Sample: CLAREMONT B-3 SL 4-8' **Lab ID: 1095252010** Collected: 05/15/09 16:05 Received: 05/18/09 15:52 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**533**	mg/kg	253	1		05/23/09 11:55	7440-44-0	
Total Organic Carbon	**372**	mg/kg	253	1		05/23/09 11:59	7440-44-0	
Mean Total Organic Carbon	**453**	mg/kg	253	1		05/23/09 11:59	7440-44-0	

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QUALITY CONTROL DATA

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

QC Batch: WETA/3860 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 1095252001, 1095252002, 1095252003, 1095252004, 1095252005, 1095252006, 1095252007, 1095252008, 1095252009, 1095252010

METHOD BLANK: 160932 Matrix: Solid
Associated Lab Samples: 1095252001, 1095252002, 1095252003, 1095252004, 1095252005, 1095252006, 1095252007, 1095252008, 1095252009, 1095252010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	05/23/09 08:19	

LABORATORY CONTROL SAMPLE: 160933

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	1050	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 160934 160935

Parameter	Units	1095252003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	13300	11800	12100	29200	37900	135	203	50-150	26	30	M0

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QUALIFIERS

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

M0	Matrix spike recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 19382DEL04 KENYON/CLAREMONT
Pace Project No.: 1095252

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
1095252001	**KENYON B-1 SL 0-4'**	EPA 9060 Modified	WETA/3860		
1095252002	**KENYON B-1 SL 4-8'**	EPA 9060 Modified	WETA/3860		
1095252003	**KENYON B-2 SL 0-4'**	EPA 9060 Modified	WETA/3860		
1095252004	**KENYON B-2 SL 4-8'**	EPA 9060 Modified	WETA/3860		
1095252005	**CLAREMONT B-1 SL 0-4'**	EPA 9060 Modified	WETA/3860		
1095252006	**CLAREMONT B-1 SL 4-8'**	EPA 9060 Modified	WETA/3860		
1095252007	**CLAREMONT B-2 SL 0-4'**	EPA 9060 Modified	WETA/3860		
1095252008	**CLAREMONT B-2 SL 4-8'**	EPA 9060 Modified	WETA/3860		
1095252009	**CLAREMONT B-3 SL 0-4'**	EPA 9060 Modified	WETA/3860		
1095252010	**CLAREMONT B-3 SL 4-8'**	EPA 9060 Modified	WETA/3860		
1095252001	**KENYON B-1 SL 0-4'**	EPA 9060 Modified	WETA/3861		
1095252002	**KENYON B-1 SL 4-8'**	EPA 9060 Modified	WETA/3861		
1095252003	**KENYON B-2 SL 0-4'**	EPA 9060 Modified	WETA/3861		
1095252004	**KENYON B-2 SL 4-8'**	EPA 9060 Modified	WETA/3861		
1095252005	**CLAREMONT B-1 SL 0-4'**	EPA 9060 Modified	WETA/3861		
1095252006	**CLAREMONT B-1 SL 4-8'**	EPA 9060 Modified	WETA/3861		
1095252007	**CLAREMONT B-2 SL 0-4'**	EPA 9060 Modified	WETA/3861		
1095252008	**CLAREMONT B-2 SL 4-8'**	EPA 9060 Modified	WETA/3861		
1095252009	**CLAREMONT B-3 SL 0-4'**	EPA 9060 Modified	WETA/3861		
1095252010	**CLAREMONT B-3 SL 4-8'**	EPA 9060 Modified	WETA/3861		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1095252

Page: 1 of 1

1300866

Section A Required Client Information:

Company: Delta
Address: 5910 Rice Creek Pkwy
Shoreview, MN 55126
Email To: NRodning@deltaenv.com
Phone: 651 639 9449 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Nancy Rodning
Copy To:
Purchase Order No.:
Project Name: Kenyon/Claremont
Project Number: 19382 DEL04

Section C Invoice Information:

Attention: Nancy Rodning
Company Name:
Address: Same
Pace Quote Reference:
Pace Project Manager: C. Trout
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☒ OTHER

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Matrix Codes (MATRIX / CODE): Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	TCL	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Kenyon B-1 SL 0-4'	SL	G	5/15/09			1050		1	X								X	X		001
2	Kenyon B-1 SL 4-8'						1110		1	X								X	X		002
3	Kenyon B-2 SL 0-4'						1215		1	X								X	X		003
4	Kenyon B-2 SL 4-8'						1230		1	X								X	X		004
5	Kenyon B-2 SL 0-4' MS/MSD						1215		1	X								X	X		MS/MSD Sample
6	Claremont B-1 SL 0-4'						1430		1	X								X	X		005
7	Claremont B-1 SL 4-8'						1445		1	X								X	X		006
8	Claremont B-2 SL 0-4'						1510		1	X								X	X		007
9	Claremont B-2 SL 4-8'						1520		1	X								X	X		008
10	Claremont B-3 SL 0-4'						1555		1	X								X	X		009
11	Claremont B-3 SL 4-8'						1605		1	X								X	X		010
12																					011

Requested Analysis Filtered (Y/N)

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
MPCA pricing	[signature] /Delta	5/18/09	8:00	[signature]	5-18-09	1435				
	[signature]	5-18-09	1552	[signature] /Pace	5/18/09	1552	3.2	Y	Y	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Kyle VanSpreeuwen

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/18/09

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical

Sample Condition Upon Receipt

Client Name: Delta

Project # 1093252

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other _____

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☑ yes ☐ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ✓ No _____

Thermometer Used 80344042 179425 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3.2 Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: 5/18/09 SM

Temp should be above freezing to 6°C

Comments:

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☑No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: SL		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☑No ☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☑No ☐N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☑No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☑No ☐N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☑No ☐N/A	15.
Trip Blank Present:	☐Yes ☑No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☐N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: CMust Rev 5/18/09SM **Date:** 5/19/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Chain of Custody

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Workorder: 1095252 **Workorder Name:** 19382DEL04 KENYON/CLAREMONT **Owner Received Date:** 5/18/2009 **Results Requested By:** 6/1/2009

Report To:	Subcontract To:
Carolynne Trout Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

	Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved						Requested Analysis: DC 9060												LAB USE ONLY
001	1	KENYON B-1 SL 0-4'	5/15/2009 10:50	1095252001	Solid	1						X												1-4oz AGA
002	2	KENYON B-1 SL 4-8'	5/15/2009 11:10	1095252002	Solid	1						X												
003	3	KENYON B-2 SL 0-4'	5/15/2009 12:15	1095252003	Solid	2						X											2-4oz AGA	MS/MSD
004	4	KENYON B-2 SL 4-8'	5/15/2009 12:30	1095252004	Solid	1						X												
005	5	CLAREMONT B-1 SL 0-4'	5/15/2009 14:30	1095252005	Solid	1						X												
006	6	CLAREMONT B-1 SL 4-8'	5/15/2009 14:45	1095252006	Solid	1						X												
007	7	CLAREMONT B-2 SL 0-4'	5/15/2009 15:10	1095252007	Solid	1						X												
008	8	CLAREMONT B-2 SL 4-8'	5/15/2009 15:20	1095252008	Solid	1						X												
009	9	CLAREMONT B-3 SL 0-4'	5/15/2009 15:55	1095252009	Solid	1						X												
010	10	CLAREMONT B-3 SL 4-8'	5/15/2009 16:05	1095252010	Solid	1						X												

Transfers	Released By	Date/Time	Received By	Date/Time
1	C Trout/Pace	5/19/09 15:19	WA HTO	
2	WA HTO	5/20/09 910		5/20/09 910
3				

Comments: 0°C

4017539

Cooler Temperature on Receipt ____ °C	Custody Seal Y or N	Received on Ice Y or N	Samples Intact Y or N

Sample Condition Upon Receipt

Pace Analytical

Client Name: PACE - MN Project # 4017539

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other Walter

Tracking #:

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer Used 9B **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 0°C **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C **Comments:**

Date and Initials of person examining contents: 5/20/09 RE

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7. 6/11/09
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: **Date:** 5/20/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

June 08, 2009

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on May 26, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

carolynne.trout@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Minnesota Certification IDs

Wisconsin Certification #: 999407970
Washington Certification #: C754
Tennessee Certification #: 02818
Pennsylvania Certification #: 68-00563
Oregon Certification #: MN200001
North Dakota Certification #: R-036
North Carolina Certification #: 530
New York Certification #: 11647
New Jersey Certification #: MN-002
Montana Certification #: MT CERT0092
Minnesota Certification #: 027-053-137
Maine Certification #: 2007029
Louisiana Certification #: LA080009
Louisiana Certification #: 03086
Kansas Certification #: E-10167
Iowa Certification #: 368
Illinois Certification #: 200011
Florida/NELAP Certification #: E87605
California Certification #: 01155CA
Arizona Certification #: AZ-0014
Alaska Certification #: UST-078

Green Bay Certification IDs

Wisconsin DATCP Certification #: 105-444
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
South Carolina Certification #: 83006001
North Dakota Certification #: R-200
North Dakota Certification #: R-150
North Carolina Certification #: 503
North Carolina Certification #: 503
New York Certification #: 11887
New York Certification #: 11888
Minnesota Certification #: 055-999-334
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04169
Louisiana Certification #: 04168
Kentucky Certification #: 83
Kentucky Certification #: 82
Illinois Certification #: 200051
Illinois Certification #: 200050
Florida/NELAP Certification #: E87951
Florida/NELAP Certification #: E87948

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1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Lab ID	Sample ID	Matrix	Date Collected	Date Received
1095810001	**Luverne B-1,SL 0-4 ft**	Solid	05/22/09 09:25	05/26/09 16:56
1095810002	**Luverne B-1,SL 4-8 ft**	Solid	05/22/09 09:40	05/26/09 16:56
1095810003	**Luverne B-2,SL 0-4 ft**	Solid	05/22/09 10:25	05/26/09 16:56
1095810004	**Luverne B-2,SL 4-8 ft**	Solid	05/22/09 10:40	05/26/09 16:56
1095810005	**Luverne B-3,SL 0-4 ft**	Solid	05/22/09 11:20	05/26/09 16:56
1095810006	**Luverne B-3,SL 4-8 ft**	Solid	05/22/09 11:35	05/26/09 16:56

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SAMPLE ANALYTE COUNT

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
1095810001	**Luverne B-1,SL 0-4 ft**	EPA 9060 Modified	DJR	3	PASI-G
1095810002	**Luverne B-1,SL 4-8 ft**	EPA 9060 Modified	DJR	3	PASI-G
1095810003	**Luverne B-2,SL 0-4 ft**	EPA 9060 Modified	DJR	3	PASI-G
1095810004	**Luverne B-2,SL 4-8 ft**	EPA 9060 Modified	DJR	3	PASI-G
1095810005	**Luverne B-3,SL 0-4 ft**	EPA 9060 Modified	DJR	3	PASI-G
1095810006	**Luverne B-3,SL 4-8 ft**	EPA 9060 Modified	DJR	3	PASI-G

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PROJECT NARRATIVE

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: June 08, 2009

General Information:
6 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/3938

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1095810004,1096030004

M0: Matrix spike recovery was outside laboratory control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

R1: RPD value was outside control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Sample: Luverne B-1,SL 0-4 ft **Lab ID: 1095810001** Collected: 05/22/09 09:25 Received: 05/26/09 16:56 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**17900**	mg/kg	7690	1		06/03/09 12:56	7440-44-0	
Total Organic Carbon	**7520**	mg/kg	7140	1		06/03/09 13:06	7440-44-0	
Mean Total Organic Carbon	**12500**	mg/kg	7410	1		06/03/09 13:06	7440-44-0	

Sample: Luverne B-1,SL 4-8 ft **Lab ID: 1095810002** Collected: 05/22/09 09:40 Received: 05/26/09 16:56 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**15500**	mg/kg	5000	1		06/03/09 13:18	7440-44-0	
Total Organic Carbon	**11200**	mg/kg	5000	1		06/03/09 13:37	7440-44-0	
Mean Total Organic Carbon	**13300**	mg/kg	5000	1		06/03/09 13:37	7440-44-0	

Sample: Luverne B-2,SL 0-4 ft **Lab ID: 1095810003** Collected: 05/22/09 10:25 Received: 05/26/09 16:56 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**14200**	mg/kg	3570	1		06/03/09 13:45	7440-44-0	
Total Organic Carbon	**6710**	mg/kg	3330	1		06/03/09 13:58	7440-44-0	
Mean Total Organic Carbon	**10300**	mg/kg	3450	1		06/03/09 13:58	7440-44-0	

Sample: Luverne B-2,SL 4-8 ft **Lab ID: 1095810004** Collected: 05/22/09 10:40 Received: 05/26/09 16:56 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**15100**	mg/kg	4000	1		06/03/09 14:09	7440-44-0	
Total Organic Carbon	**13900**	mg/kg	3570	1		06/03/09 14:23	7440-44-0	
Mean Total Organic Carbon	**14400**	mg/kg	3770	1		06/03/09 14:23	7440-44-0	M0,R1

Sample: Luverne B-3,SL 0-4 ft **Lab ID: 1095810005** Collected: 05/22/09 11:20 Received: 05/26/09 16:56 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**6950**	mg/kg	1670	1		06/03/09 15:08	7440-44-0	
Total Organic Carbon	**8640**	mg/kg	1430	1		06/03/09 15:16	7440-44-0	

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ANALYTICAL RESULTS

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Sample: Luverne B-3,SL 0-4 ft **Lab ID: 1095810005** Collected: 05/22/09 11:20 Received: 05/26/09 16:56 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Mean Total Organic Carbon	**7860**	mg/kg	1540	1		06/03/09 15:16	7440-44-0	

Sample: Luverne B-3,SL 4-8 ft **Lab ID: 1095810006** Collected: 05/22/09 11:35 Received: 05/26/09 16:56 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**35100**	mg/kg	10000	1		06/03/09 15:39	7440-44-0	
Total Organic Carbon	**43800**	mg/kg	10000	1		06/03/09 15:44	7440-44-0	
Mean Total Organic Carbon	**39500**	mg/kg	10000	1		06/03/09 15:44	7440-44-0	

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QUALITY CONTROL DATA

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

QC Batch: WETA/3938 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 1095810001, 1095810002, 1095810003, 1095810004, 1095810005, 1095810006

METHOD BLANK: 164486 Matrix: Solid
Associated Lab Samples: 1095810001, 1095810002, 1095810003, 1095810004, 1095810005, 1095810006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	06/03/09 11:55	

LABORATORY CONTROL SAMPLE: 164487

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	1090	109	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164488 164489

Parameter	Units	1095810004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	14400	9760	10500	25400	36900	113	213	50-150	37	30	M0,R1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164490 164491

Parameter	Units	1096030004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	431	499	502	901	912	94	96	50-150	1	30	

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QUALIFIERS

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

M0	Matrix spike recovery was outside laboratory control limits.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 19382DEL04 Luverne
Pace Project No.: 1095810

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
1095810001	**Luverne B-1,SL 0-4 ft**	EPA 9060 Modified	WETA/3938		
1095810002	**Luverne B-1,SL 4-8 ft**	EPA 9060 Modified	WETA/3938		
1095810003	**Luverne B-2,SL 0-4 ft**	EPA 9060 Modified	WETA/3938		
1095810004	**Luverne B-2,SL 4-8 ft**	EPA 9060 Modified	WETA/3938		
1095810005	**Luverne B-3,SL 0-4 ft**	EPA 9060 Modified	WETA/3938		
1095810006	**Luverne B-3,SL 4-8 ft**	EPA 9060 Modified	WETA/3938		
1095810001	**Luverne B-1,SL 0-4 ft**	EPA 9060 Modified	WETA/3939		
1095810002	**Luverne B-1,SL 4-8 ft**	EPA 9060 Modified	WETA/3939		
1095810003	**Luverne B-2,SL 0-4 ft**	EPA 9060 Modified	WETA/3939		
1095810004	**Luverne B-2,SL 4-8 ft**	EPA 9060 Modified	WETA/3939		
1095810005	**Luverne B-3,SL 0-4 ft**	EPA 9060 Modified	WETA/3939		
1095810006	**Luverne B-3,SL 4-8 ft**	EPA 9060 Modified	WETA/3939		

1095810

1623

DELTA

YEAR 2009

Chain of Custody Record HAWKEYE

On-site Time:		Temp:	60 F
Off-site Time:		Temp:	
Sky Conditions:	Cloudy		
Meteorological Events:			
Wind Speed and Direction:			

Project Name Fire Foam Sampling - Luverne **Project #:** 19382DEL04

State of Lead Regulatory Agency Minnesota

Requested Due Date (mm/dd/yy) Standard TAT

COC TRACKING No.

Lab Name:	Pace Analytical Services	Report To:	Delta Consultants Attn: Nancy Rodning	Consultant	Delta Consultants
Lab Address:	1700 Elm Street Suite 200	Address:	5910 Rice Creek Parkway	Address:	5910 Rice Creek Parkway
	Minneapolis, MN 55414		Shoreview, MN 55126		Shoreview, MN 55126
Lab PM:	Carolynne Trout	Phone Number;	651-697-5152		
Telephone	(612) 607-6351	Email Address:	nrodning@deltaenv.com	Delta Project Mgr	Nancy Rodning
Fax		Invoice to:	Delta Consultants Attn: Nancy Rodning	Delta Tele/Fax:	651.697.5152
Lab PM Email	carolynne.trout@pacelabs.com	Address:	5910 Rice Creek Parkway		
	INVOICE INFORMATION		Shoreview, MN 55126		
		Phone Number;	651-697-5152		

Lab Bottle Order No:

Item No.	Sample ID	Time	Day/Mth	Matrix: Soil	Water	Air	Laboratory Tracking Number	Preservatives: No. of containers	Unpreserved	H2SO4	HNO3	HCl	Methanol	Other	Requested Analysis: TOC	Sample Point Lat/Long Comments
1	Luverne B-1, SL 0-4 ft	9:25	5.22.09	X				1	1						X	1095810001
2	Luverne B-1, SL 4-8 ft	9:40	5.22.09	X				1	1						X	002
3	Luverne B-2, SL 0-4 ft	10:25	5.22.09	X				1	1						X	003
4	Luverne B-2, SL 4-8 ft	10:40	5.22.09	X				1	1						X	004
5	Luverne B-3, SL 0-4 ft	11:20	5.22.09	X				1	1						X	005
6	Luverne B-3, SL 4-8 ft	11:35	5.22.09	X				1	1						X	006
7																
8																
9																

		Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name:	Cheryl Sorensen	Cheryl Sorensen/Delta	5/26/09	9:30		5-26-09	1530
Sampler's Company:	Delta Consultants	Shareen Davis	5-26-09	1656	PACE	5/26/09	1656
Shipment Date:	5/26/09						
Shipment Method:							
Shipment Tracking No:							

Special Instructions:

Custody seals in place (circle one) Y N | Temp Blank (circle one) Y N | Cooler Temperature on Receipt 2.2 F C (circle one) | Trip Blank? Y / N (circle one)

Pace Analytical

Sample Condition Upon Receipt

Client Name: Delta Project # 1095810

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ☒ No _____

Thermometer Used ~~80344042~~, 179425 Type of Ice: (Wet) Blue None ☐ Samples on Ice, cooling process has begun

Cooler Temperature 2-2°C Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: 5/26/09

Temp should be above freezing to 6°C

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☐No ☒N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☒No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Diane Anderson **Date:** 5/27/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

5/5-27-09

4017847

vmeu

Chain of Custody

Pace Analytical®
www.pacelabs.com

Workorder: 1095810 **Workorder Name:** 19382DEL04 Luverne **Owner Received Date:** 5/26/2009 **Results Requested By:** 6/8/2009

Report To	Subcontract To
Carolynne Trout Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: TOC 9060 single	LAB USE ONLY
1	Luverne B-1,SL 0-4 ft 001	5/22/2009 09:25	1095810001	Solid	1	X	1-4oz AGA
2	Luverne B-1,SL 4-8 ft 002	5/22/2009 09:40	1095810002	Solid	1	X	
3	Luverne B-2,SL 0-4 ft 003	5/22/2009 10:25	1095810003	Solid	1	X	
4	Luverne B-2,SL 4-8 ft 004	5/22/2009 10:40	1095810004	Solid	1	X	
5	Luverne B-3,SL 0-4 ft 005	5/22/2009 11:20	1095810005	Solid	1	X	
6	Luverne B-3,SL 4-8 ft 006	5/22/2009 11:35	1095810006	Solid	1	X	

Transfers	Released By	Date/Time	Received By	Date/Time
1	Deana Henderson WATTO	5/27/09	WATTO	
2	WATTO	5/28/09 0830	[illegible]	5/28/09 0830
3				

Comments: 1.5°C

4017847

Cooler Temperature on Receipt _____ °C | **Custody Seal** Y or N | **Received on Ice** Y or N | **Samples Intact** Y or N

Sample Condition Upon Receipt

Pace Analytical

Client Name: PACE - MN Project # 4017847

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other WATTCO

Tracking #:

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer Used 9B **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 1.5°C **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 5/28/09 AE

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3. No Time
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7. 6/8/09
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: **Date:** 5/28/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical Services, Inc.
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Minneapolis, MN 55414
(612)607-1700

June 08, 2009

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on May 27, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

carolynne.trout@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Minnesota Certification IDs

Wisconsin Certification #: 999407970
Washington Certification #: C754
Tennessee Certification #: 02818
Pennsylvania Certification #: 68-00563
Oregon Certification #: MN200001
North Dakota Certification #: R-036
North Carolina Certification #: 530
New York Certification #: 11647
New Jersey Certification #: MN-002
Montana Certification #: MT CERT0092
Minnesota Certification #: 027-053-137
Maine Certification #: 2007029
Louisiana Certification #: LA080009
Louisiana Certification #: 03086
Kansas Certification #: E-10167
Iowa Certification #: 368
Illinois Certification #: 200011
Florida/NELAP Certification #: E87605
California Certification #: 01155CA
Arizona Certification #: AZ-0014
Alaska Certification #: UST-078

Green Bay Certification IDs

Wisconsin DATCP Certification #: 105-444
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
South Carolina Certification #: 83006001
North Dakota Certification #: R-200
North Dakota Certification #: R-150
North Carolina Certification #: 503
North Carolina Certification #: 503
New York Certification #: 11887
New York Certification #: 11888
Minnesota Certification #: 055-999-334
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04169
Louisiana Certification #: 04168
Kentucky Certification #: 83
Kentucky Certification #: 82
Illinois Certification #: 200051
Illinois Certification #: 200050
Florida/NELAP Certification #: E87951
Florida/NELAP Certification #: E87948

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1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Lab ID	Sample ID	Matrix	Date Collected	Date Received
1095906001	**Fridley B-1 0-4**	Solid	05/27/09 09:45	05/27/09 17:00
1095906002	**Fridley B-1 4-8**	Solid	05/27/09 09:55	05/27/09 17:00
1095906003	**Fridley Sediment 1**	Solid	05/27/09 11:10	05/27/09 17:00
1095906004	**Fridley B-2 0-4**	Solid	05/27/09 11:30	05/27/09 17:00
1095906005	**Fridley B-2 4-8**	Solid	05/27/09 11:45	05/27/09 17:00

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SAMPLE ANALYTE COUNT

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
1095906001	**Fridley B-1 0-4**	EPA 9060 Modified	DJR	3	PASI-G
1095906002	**Fridley B-1 4-8**	EPA 9060 Modified	DJR	3	PASI-G
1095906003	**Fridley Sediment 1**	EPA 9060 Modified	DJR	3	PASI-G
1095906004	**Fridley B-2 0-4**	EPA 9060 Modified	DJR	3	PASI-G
1095906005	**Fridley B-2 4-8**	EPA 9060 Modified	DJR	3	PASI-G

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PROJECT NARRATIVE

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: June 08, 2009

General Information:
5 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/3938

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1095810004,1096030004

M0: Matrix spike recovery was outside laboratory control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

R1: RPD value was outside control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Sample: Fridley B-1 0-4 **Lab ID: 1095906001** Collected: 05/27/09 09:45 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**70700**	mg/kg	20000	1		06/03/09 15:52	7440-44-0	
Total Organic Carbon	**43300**	mg/kg	16700	1		06/03/09 15:57	7440-44-0	
Mean Total Organic Carbon	**55700**	mg/kg	18200	1		06/03/09 15:57	7440-44-0	

Sample: Fridley B-1 4-8 **Lab ID: 1095906002** Collected: 05/27/09 09:55 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**1920**	mg/kg	508	1		06/03/09 16:03	7440-44-0	
Total Organic Carbon	**1420**	mg/kg	503	1		06/03/09 16:10	7440-44-0	
Mean Total Organic Carbon	**1670**	mg/kg	505	1		06/03/09 16:10	7440-44-0	

Sample: Fridley Sediment 1 **Lab ID: 1095906003** Collected: 05/27/09 11:10 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**15300**	mg/kg	2130	1		06/03/09 16:24	7440-44-0	
Total Organic Carbon	**14200**	mg/kg	2220	1		06/03/09 16:38	7440-44-0	
Mean Total Organic Carbon	**14800**	mg/kg	2170	1		06/03/09 16:38	7440-44-0	

Sample: Fridley B-2 0-4 **Lab ID: 1095906004** Collected: 05/27/09 11:30 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**12100**	mg/kg	3570	1		06/03/09 16:45	7440-44-0	
Total Organic Carbon	**10900**	mg/kg	3230	1		06/03/09 16:50	7440-44-0	
Mean Total Organic Carbon	**11400**	mg/kg	3390	1		06/03/09 16:50	7440-44-0	

Sample: Fridley B-2 4-8 **Lab ID: 1095906005** Collected: 05/27/09 11:45 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**25400**	mg/kg	10000	1		06/03/09 16:56	7440-44-0	
Total Organic Carbon	**15100**	mg/kg	8330	1		06/03/09 17:01	7440-44-0	

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ANALYTICAL RESULTS

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Sample: Fridley B-2 4-8 **Lab ID: 1095906005** Collected: 05/27/09 11:45 Received: 05/27/09 17:00 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Mean Total Organic Carbon	**19800**	mg/kg	9090	1		06/03/09 17:01	7440-44-0	

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QUALITY CONTROL DATA

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

QC Batch: WETA/3938 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 1095906001, 1095906002, 1095906003, 1095906004, 1095906005

METHOD BLANK: 164486 Matrix: Solid
Associated Lab Samples: 1095906001, 1095906002, 1095906003, 1095906004, 1095906005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	06/03/09 11:55	

LABORATORY CONTROL SAMPLE: 164487

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	1090	109	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164488 164489

Parameter	Units	1095810004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	14400	9760	10500	25400	36900	113	213	50-150	37	30	M0,R1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164490 164491

Parameter	Units	1096030004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	431	499	502	901	912	94	96	50-150	1	30	

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QUALIFIERS

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

M0	Matrix spike recovery was outside laboratory control limits.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MPCA-Fridley 19382 DEL 04
Pace Project No.: 1095906

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
1095906001	**Fridley B-1 0-4**	EPA 9060 Modified	WETA/3938		
1095906002	**Fridley B-1 4-8**	EPA 9060 Modified	WETA/3938		
1095906003	**Fridley Sediment 1**	EPA 9060 Modified	WETA/3938		
1095906004	**Fridley B-2 0-4**	EPA 9060 Modified	WETA/3938		
1095906005	**Fridley B-2 4-8**	EPA 9060 Modified	WETA/3938		
1095906001	**Fridley B-1 0-4**	EPA 9060 Modified	WETA/3939		
1095906002	**Fridley B-1 4-8**	EPA 9060 Modified	WETA/3939		
1095906003	**Fridley Sediment 1**	EPA 9060 Modified	WETA/3939		
1095906004	**Fridley B-2 0-4**	EPA 9060 Modified	WETA/3939		
1095906005	**Fridley B-2 4-8**	EPA 9060 Modified	WETA/3939		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1095906

Page: 1 of 1

1304309

Section A Required Client Information:

Company: DELTA
Address: 5910 Rice Creek Pkwy
Shoreview, MN 55126
Email To:
Phone: 651-697-5152 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Nancy Rodning
Copy To:
Purchase Order No.:
Project Name: MPCA - Fridley
Project Number: 19382 DEL 04

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N: TOC	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Fridley B-1 0-4					5/27	9:45		1	1								X		001
2	Fridley B-1 4-8						9:55		1	1								X		002
3	Fridley Sediment 1						11:10		1	1								X		003
4	Fridley B-2 0-4						11:30		1	1								X		004
5	Fridley B-2 4-8						11:45		1	1								X		005
6																				
7																				
8																				
9																				
10																				
11																				
12																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Curt McKay / DELTA	5/27/09	13:00	Shannon Jones	5/27/09	1625				
	Shannon Jones	5/27/09	1700	Stan / PACE	5/27/09	1708	2.4	4	N	4

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: CURT MCKAY

SIGNATURE of SAMPLER: Curt McKay

DATE Signed (MM/DD/YY): 5/27/09

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Sample Condition Upon Receipt

Pace Analytical

Client Name: Delta Project # 10959606

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other ____

Tracking #: ____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other ____ Temp Blank: Yes ☑ No ____

Thermometer Used 80344042 179425 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 2.4 Biological Tissue is Frozen: Yes No Date and Initials of person examining contents: 5/27/09 BH

Temp should be above freezing to 6°C

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: SL		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☑No ☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☑No ☐N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☑No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☑No ☐N/A	
Pace Trip Blank Lot # (if purchased): ____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: ____ Date/Time: ____

Comments/ Resolution: ____

Project Manager Review: Diane Anderson **Date:** 5/28/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Chain of Custody

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Workorder: 1095906 **Workorder Name:** MPCA-Fridley 19382 DEL 04 **Owner Received Date:** 5/27/2009 **Results Requested By:** 6/9/2009

Report To	Subcontract To
Carolynne Trout Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: TDC 8260 SIMS	LAB USE ONLY
1	Fridley B-1 0-4 001	5/27/2009 09:45	1095906001	Solid	1	X	1-4 on ICE
2	Fridley B-1 4-8 002	5/27/2009 09:55	1095906002	Solid	1	X	
3	Fridley Sediment 1 003	5/27/2009 11:10	1095906003	Solid	1	X	
4	Fridley B-2 0-4 004	5/27/2009 11:30	1095906004	Solid	1	X	
5	Fridley B-2 4-8 005	5/27/2009 11:45	1095906005	Solid	1	X	

Transfers	Released By	Date/Time	Received By	Date/Time
1	Diana Anderson	5/28/09	Walter	
2	Walter	5/29/09 0850		5/29/09 0850
3				

Comments: 0.5°C

4017896

Cooler Temperature on Receipt ____ °C | **Custody Seal** Y or N | **Received on Ice** Y or N | **Samples Intact** Y or N

Sample Condition Upon Receipt

Pace Analytical

Client Name: PACE - MN Project # 4017896

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other Walco

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____

Thermometer Used 9b **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 0.0°C **Biological Tissue is Frozen:** Yes No

Date and Initials of person examining contents: 5/29/09 AE

Temp should be above freezing to 6°C

Comments:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7. 6/9/09
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 5-29-09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
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(612)607-1700

June 09, 2009

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on May 28, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

carolynne.trout@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Minnesota Certification IDs

Wisconsin Certification #: 999407970
Washington Certification #: C754
Tennessee Certification #: 02818
Pennsylvania Certification #: 68-00563
Oregon Certification #: MN200001
North Dakota Certification #: R-036
North Carolina Certification #: 530
New York Certification #: 11647
New Jersey Certification #: MN-002
Montana Certification #: MT CERT0092
Minnesota Certification #: 027-053-137
Maine Certification #: 2007029
Louisiana Certification #: LA080009
Louisiana Certification #: 03086
Kansas Certification #: E-10167
Iowa Certification #: 368
Illinois Certification #: 200011
Florida/NELAP Certification #: E87605
California Certification #: 01155CA
Arizona Certification #: AZ-0014
Alaska Certification #: UST-078

Green Bay Certification IDs

Wisconsin DATCP Certification #: 105-444
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
South Carolina Certification #: 83006001
North Dakota Certification #: R-200
North Dakota Certification #: R-150
North Carolina Certification #: 503
North Carolina Certification #: 503
New York Certification #: 11887
New York Certification #: 11888
Minnesota Certification #: 055-999-334
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04169
Louisiana Certification #: 04168
Kentucky Certification #: 83
Kentucky Certification #: 82
Illinois Certification #: 200051
Illinois Certification #: 200050
Florida/NELAP Certification #: E87951
Florida/NELAP Certification #: E87948

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Lab ID	Sample ID	Matrix	Date Collected	Date Received
1096030001	**ROCHESTER B-1 0-4**	Solid	05/28/09 09:30	05/28/09 17:20
1096030002	**ROCHESTER B-1 4-8**	Solid	05/28/09 09:40	05/28/09 17:20
1096030003	**ROCHESTER B-2 0-4**	Solid	05/28/09 10:30	05/28/09 17:20
1096030004	**ROCHESTER B-2 4-8**	Solid	05/28/09 10:40	05/28/09 17:20

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
1096030001	**ROCHESTER B-1 0-4**	EPA 9060 Modified	DJR	3	PASI-G
1096030002	**ROCHESTER B-1 4-8**	EPA 9060 Modified	DJR	3	PASI-G
1096030003	**ROCHESTER B-2 0-4**	EPA 9060 Modified	DJR	3	PASI-G
1096030004	**ROCHESTER B-2 4-8**	EPA 9060 Modified	DJR	3	PASI-G

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1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: June 09, 2009

General Information:
4 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/3938

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 1095810004,1096030004

M0: Matrix spike recovery was outside laboratory control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

R1: RPD value was outside control limits.

- MSD (Lab ID: 164489)
  - Mean Total Organic Carbon

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Sample: ROCHESTER B-1 0-4 **Lab ID: 1096030001** Collected: 05/28/09 09:30 Received: 05/28/09 17:20 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**4160**	mg/kg	1850	1		06/03/09 17:55	7440-44-0	
Total Organic Carbon	**4040**	mg/kg	1850	1		06/03/09 17:58	7440-44-0	
Mean Total Organic Carbon	**4100**	mg/kg	1850	1		06/03/09 17:58	7440-44-0	

Sample: ROCHESTER B-1 4-8 **Lab ID: 1096030002** Collected: 05/28/09 09:40 Received: 05/28/09 17:20 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**1650**	mg/kg	251	1		06/04/09 09:54	7440-44-0	
Total Organic Carbon	**1230**	mg/kg	253	1		06/04/09 10:02	7440-44-0	
Mean Total Organic Carbon	**1440**	mg/kg	252	1		06/04/09 10:02	7440-44-0	

Sample: ROCHESTER B-2 0-4 **Lab ID: 1096030003** Collected: 05/28/09 10:30 Received: 05/28/09 17:20 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**4960**	mg/kg	2040	1		06/04/09 10:10	7440-44-0	
Total Organic Carbon	**4590**	mg/kg	2080	1		06/04/09 10:16	7440-44-0	
Mean Total Organic Carbon	**4780**	mg/kg	2060	1		06/04/09 10:16	7440-44-0	

Sample: ROCHESTER B-2 4-8 **Lab ID: 1096030004** Collected: 05/28/09 10:40 Received: 05/28/09 17:20 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**450**	mg/kg	249	1		06/04/09 10:45	7440-44-0	
Total Organic Carbon	**411**	mg/kg	251	1		06/04/09 11:05	7440-44-0	
Mean Total Organic Carbon	**431**	mg/kg	250	1		06/04/09 11:05	7440-44-0	

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QUALITY CONTROL DATA

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

QC Batch: WETA/3938 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 1096030001, 1096030002, 1096030003, 1096030004

METHOD BLANK: 164486 Matrix: Solid
Associated Lab Samples: 1096030001, 1096030002, 1096030003, 1096030004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	06/03/09 11:55	

LABORATORY CONTROL SAMPLE: 164487

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	1090	109	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164488 164489

Parameter	Units	1095810004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	14400	9760	10500	25400	36900	113	213	50-150	37	30	M0,R1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 164490 164491

Parameter	Units	1096030004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	431	499	502	901	912	94	96	50-150	1	30	

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QUALIFIERS

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

WORKORDER QUALIFIERS

WO: 1096030

[1]	Samples were received outside of the recommended temperature range of 0-6 degrees Celsius. The samples were received from the field on ice, indicating the cool down process had begun.

ANALYTE QUALIFIERS

M0	Matrix spike recovery was outside laboratory control limits.
R1	RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 19382 DEL 04 MPCA-ROCHESTER
Pace Project No.: 1096030

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
1096030001	**ROCHESTER B-1 0-4**	EPA 9060 Modified	WETA/3938		
1096030002	**ROCHESTER B-1 4-8**	EPA 9060 Modified	WETA/3938		
1096030003	**ROCHESTER B-2 0-4**	EPA 9060 Modified	WETA/3938		
1096030004	**ROCHESTER B-2 4-8**	EPA 9060 Modified	WETA/3938		
1096030001	**ROCHESTER B-1 0-4**	EPA 9060 Modified	WETA/3939		
1096030002	**ROCHESTER B-1 4-8**	EPA 9060 Modified	WETA/3939		
1096030003	**ROCHESTER B-2 0-4**	EPA 9060 Modified	WETA/3939		
1096030004	**ROCHESTER B-2 4-8**	EPA 9060 Modified	WETA/3939		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1096030

Page: 1 of 1

1304312

Section A Required Client Information:

Company: DELTA
Address: 5910 Rice Creek Pkwy
Shoreview, MN 55126
Email To: nroding@deltaenv.com
Phone: 651 697 5152 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Nancy Roding
Copy To:
Purchase Order No.:
Project Name: MPCA - Rochester
Project Number: 19382 DEL 04

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Requested Analysis Filtered (Y/N) Y/N	Analysis Test: TOC	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Rochester B-1 0-4	SL	G			5/28	9:30		1	1								X	X		001
2	Rochester B-1 4-8	"	"			"	9:40		1	1								X	X		002
3	Rochester B-2 0-4	"	"			"	10:30		1	1								X	X		003
4	Rochester B-2 4-8	"	"			"	10:40		1	1								X	X		004
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Curt McKay / DELTA	5/28/09	12:00	[signature] PACE	5/28	1653				
	[signature] PACE	5/28	1720	[signature] PACE	5/28	1720	10.2	Y	N	Y

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Curt McKay

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 5/28/09

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Sample Condition Upon Receipt

Pace Analytical

Client Name: Delta

Project # 1096030

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other _____

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ✓ No _____

Thermometer Used ~~80344042~~ 179425 Type of Ice: (Wet) Blue None ☐ Samples on Ice, cooling process has begun

Cooler Temperature 10.2°c Biological Tissue is Frozen: Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: AS 5-28-09

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☑No ☐N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☑N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☑N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☑Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: Cool down phase

Project Manager Review: DLW 5/28/09 Diane Anders Date: 5/29/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

4017953

Chain of Custody

Pace Analytical®
www.pacelabs.com

Workorder: 1096030 **Workorder Name:** 19382 DEL 04 MPCA-ROCHESTER **Owner Received Date:** 5/28/2009 **Results Requested By:** 6/11/2009

Report To	Subcontract To
Carolynne Trout Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: TOC (MN 001)	LAB USE ONLY
1	ROCHESTER B-1 0-4 001	5/28/2009 09:30	1096030001	Solid	1	X	402 qg
2	ROCHESTER B-1 4-8 002	5/28/2009 09:40	1096030002	Solid	1	X	1
3	ROCHESTER B-2 0-4 003	5/28/2009 10:30	1096030003	Solid	1	X	1
4	ROCHESTER B-2 4-8 004	5/28/2009 10:40	1096030004	Solid	1	X	1
5							

Comments

Transfers	Released By	Date/Time	Received By	Date/Time
1	Diane Anderson	5/29/09		
2	Waldad	5/30/09 845	Pacelabs	5/30/09 845
3				

4017953

Cooler Temperature on Receipt 3 °C | Custody Seal Y or N | Received on Ice (Y) or N | Samples Intact (Y) or N

Sample Condition Upon Receipt

Pace Analytical

Client Name: Pace - MN Project # 4017953

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other Walter

Tracking #: _____

Optional
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____

Thermometer Used JB **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 3C **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 5/30/09 mel

Comments:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☐No ☒N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☒Yes ☐No ☐N/A	7. 6/11
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed: _____ Lot # of added preservative: _____
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 6/1/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

November 24, 2009

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: Bemidji
Pace Project No.: 10116667

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on November 10, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

This report contains data that were produced by a subcontracted laboratory certified for the fields of testing performed.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

carolynne.trout@pacelabs.com
Project Manager

Enclosures

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: Bemidji
Pace Project No.: 10116667

Green Bay Certification IDs
1241 Bellevue Street Green Bay, WI 54302
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
North Dakota Certification #: R-150
North Carolina Certification #: 503
California Certification #: 09268CA
New York Certification #: 11887
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04168
Kentucky Certification #: 82
Illinois Certification #: 200050
Florida/NELAP Certification #: E87948
New York Certification #: 11888

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(612)607-1700

SAMPLE SUMMARY

Project: Bemidji
Pace Project No.: 10116667

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10116667001	**BEMIDJI B-1 0-4'**	Solid	11/05/09 08:45	11/10/09 16:55
10116667002	**BEMIDJI B-1 4-8'**	Solid	11/05/09 09:00	11/10/09 16:55
10116667003	**BEMIDJI B-2 0-4'**	Solid	11/05/09 09:40	11/10/09 16:55
10116667004	**BEMIDJI B-2 4-8'**	Solid	11/05/09 09:55	11/10/09 16:55

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SAMPLE ANALYTE COUNT

Project: Bemidji
Pace Project No.: 10116667

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10116667001	**BEMIDJI B-1 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
10116667002	**BEMIDJI B-1 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
10116667003	**BEMIDJI B-2 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
10116667004	**BEMIDJI B-2 4-8'**	EPA 9060 Modified	DJR	3	PASI-G

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(612)607-1700

PROJECT NARRATIVE

Project: Bemidji
Pace Project No.: 10116667

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: November 24, 2009

General Information:
4 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: Bemidji
Pace Project No.: 10116667

Sample: BEMIDJI B-1 0-4' **Lab ID: 10116667001** Collected: 11/05/09 08:45 Received: 11/10/09 16:55 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**9640**	mg/kg	2080	1		11/17/09 12:59	7440-44-0	
Total Organic Carbon	**2900**	mg/kg	2040	1		11/17/09 13:04	7440-44-0	
Mean Total Organic Carbon	**6230**	mg/kg	2060	1		11/17/09 13:04	7440-44-0	S9

Sample: BEMIDJI B-1 4-8' **Lab ID: 10116667002** Collected: 11/05/09 09:00 Received: 11/10/09 16:55 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**518**	mg/kg	251	1		11/17/09 13:13	7440-44-0	
Total Organic Carbon	**552**	mg/kg	251	1		11/17/09 13:17	7440-44-0	
Mean Total Organic Carbon	**535**	mg/kg	251	1		11/17/09 13:17	7440-44-0	S9

Sample: BEMIDJI B-2 0-4' **Lab ID: 10116667003** Collected: 11/05/09 09:40 Received: 11/10/09 16:55 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**4070**	mg/kg	510	1		11/18/09 13:12	7440-44-0	
Total Organic Carbon	**3000**	mg/kg	515	1		11/18/09 13:17	7440-44-0	
Mean Total Organic Carbon	**3540**	mg/kg	513	1		11/18/09 13:17	7440-44-0	S9

Sample: BEMIDJI B-2 4-8' **Lab ID: 10116667004** Collected: 11/05/09 09:55 Received: 11/10/09 16:55 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**480**	mg/kg	253	1		11/18/09 13:25	7440-44-0	
Total Organic Carbon	**494**	mg/kg	251	1		11/18/09 13:31	7440-44-0	
Mean Total Organic Carbon	**487**	mg/kg	252	1		11/18/09 13:31	7440-44-0	S9

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QUALITY CONTROL DATA

Project: Bemidji
Pace Project No.: 10116667

QC Batch: WETA/5217 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 10116667001, 10116667002, 10116667003, 10116667004

METHOD BLANK: 234269 Matrix: Solid
Associated Lab Samples: 10116667001, 10116667002, 10116667003, 10116667004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	11/17/09 10:16	

LABORATORY CONTROL SAMPLE: 234270

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	980	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 234271 234272

Parameter	Units	252480001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	1060	503	501	1470	1590	81	105	50-150	8	30	

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QUALIFIERS

Project: Bemidji
Pace Project No.: 10116667

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

S9	The laboratory is not accredited for this parameter by the certifying body for this state.

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1134
10116667

Page: 1 of 1

1300435

Section A Required Client Information:

Company: MPCA DELTA CT 11/16
Address: 520 Lafayette Rd
St. Paul, MN 55155
Email To: mike.fellows@state.mn.us
Phone: 651.757.2352 Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To: SAME Nancy Rodning CT 11/16
Copy To:
Purchase Order No.: State Contract SFDE1006
Project Name:
Project Number:

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #: 22853

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes (MATRIX / CODE)

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N: TOC	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Bemidji B-1 0-4'	SL	G			11/6/09	8:45		1	X								X		0 01
2	Bemidji B-1 4-8'	"	"			"	9:00		1	X								X		0 02
3	Bemidji B-2 0-4'	"	"			"	9:40		1	X								X		0 03
4	Bemidji B-2 4-8'	"	"			"	9:55		1	X								X		0 04
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
Per Nancy Rodning, Report project to Delta not to MPCA. CT mck 11/16/09	Curt McKay / DELTA	11/10/09	11:00	Shannon Jarvis / Pace	11-10-09	1606				
	Shannon Jarvis / Pace	11-10-09	1655	Shannon Jarvis / Pace	11-10-09	1655	5.9°c	y	N	y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Curt McKay - DELTA
SIGNATURE of SAMPLER: Curt McKay
DATE Signed (MM/DD/YY): 11/10/09

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Sample Condition Upon Receipt

Pace Analytical

Client Name: MPCA/Delta **Project #** 1611666 7

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☒ Pace Other _____

Tracking #: _____

Optional: Proj. Due Date: Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no **Seals Intact:** ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____ **Temp Blank:** Yes ____ No X

Thermometer Used 80344042 or (179425) **Type of Ice:** (Wet) Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 5.9c see back **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C **Comments:**

Date and initials of person examining contents: DO 11-10-09

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☐Yes ☒No ☐N/A	12. Bemidji B-1 0-4' on COC Bemidji SL 0-4' on jar - otherwise jars have 'SL' in sample ID
-Includes date/time/ID/Analysis Matrix: SL		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☒N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☒No ☐N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☒No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: **Field Data Required?** Y / N

Person Contacted: Nic Fellows/MPCA Date/Time: 11/6/09

Comments/ Resolution: State offices closed - Called to check if Admin proj and if Invoice AISD goes to MPCA. left Voice message

11/9/09 Talk Curt McKay 651-697-5750
Per Nancy Radmer, 11/16/09 report this project to Delta. COC was filled out incorrectly. CMut 11/16/09

Project Manager Review: Diane Anderson **Date:** 11/6/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR.

Pace Analytical Services, Inc.
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Minneapolis, MN 55414
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February 02, 2010

Ms. Nancy Rodning
Delta Consultants
5910 Rice Creek Parkway
Suite 100
Saint Paul, MN 55126

RE: Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Dear Ms. Rodning:
Enclosed are the analytical results for sample(s) received by the laboratory on January 20, 2010. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carol Davy for
Carolynne Trout
carolynne.trout@pacelabs.com
Project Manager

Enclosures

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Green Bay Certification IDs
1241 Bellevue Street Green Bay, WI 54302
Wisconsin DATCP Certification #: 105-444
Wisconsin Certification #: 405132750
South Carolina Certification #: 83006001
North Dakota Certification #: R-150
North Carolina Certification #: 503
California Certification #: 09268CA
New York Certification #: 11887
Minnesota Certification #: 055-999-334
Louisiana Certification #: 04168
Kentucky Certification #: 82
Illinois Certification #: 200050
Florida/NELAP Certification #: E87948
New York Certification #: 11888

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SAMPLE SUMMARY

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10120842001	**Crystal B-2 SL 0-4'**	Solid	01/20/10 09:20	01/20/10 16:23
10120842002	**Crystal B-2 SL 4-8'**	Solid	01/20/10 09:30	01/20/10 16:23
10120842003	**Crystal B-1 SL 0-4'**	Solid	01/20/10 10:00	01/20/10 16:23
10120842004	**Crystal B-1 SL 4-8'**	Solid	01/20/10 10:10	01/20/10 16:23

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SAMPLE ANALYTE COUNT

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10120842001	**Crystal B-2 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
10120842002	**Crystal B-2 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G
10120842003	**Crystal B-1 SL 0-4'**	EPA 9060 Modified	DJR	3	PASI-G
10120842004	**Crystal B-1 SL 4-8'**	EPA 9060 Modified	DJR	3	PASI-G

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PROJECT NARRATIVE

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Method: **EPA 9060 Modified**
Description: Total Organic Carbon
Client: Delta Environmental
Date: February 02, 2010

General Information:
4 samples were analyzed for EPA 9060 Modified. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: WETA/5664

A matrix spike and matrix spike duplicate (MS/MSD) were performed on the following sample(s): 3022149001,4027705006

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 259621)
  - Mean Total Organic Carbon
- MSD (Lab ID: 259622)
  - Mean Total Organic Carbon

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Sample: Crystal B-2 SL 0-4' **Lab ID: 10120842001** Collected: 01/20/10 09:20 Received: 01/20/10 16:23 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**4340**	mg/kg	2000	1		01/29/10 14:39	7440-44-0	
Total Organic Carbon	**3340**	mg/kg	1960	1		01/29/10 14:42	7440-44-0	
Mean Total Organic Carbon	**3840**	mg/kg	1980	1		01/29/10 14:42	7440-44-0	

Sample: Crystal B-2 SL 4-8' **Lab ID: 10120842002** Collected: 01/20/10 09:30 Received: 01/20/10 16:23 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**590**	mg/kg	250	1		01/29/10 14:56	7440-44-0	
Total Organic Carbon	**548**	mg/kg	250	1		01/29/10 15:03	7440-44-0	
Mean Total Organic Carbon	**569**	mg/kg	250	1		01/29/10 15:03	7440-44-0	

Sample: Crystal B-1 SL 0-4' **Lab ID: 10120842003** Collected: 01/20/10 10:00 Received: 01/20/10 16:23 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**336**	mg/kg	251	1		01/29/10 15:08	7440-44-0	
Total Organic Carbon	**580**	mg/kg	251	1		01/29/10 15:13	7440-44-0	
Mean Total Organic Carbon	**458**	mg/kg	251	1		01/29/10 15:13	7440-44-0	

Sample: Crystal B-1 SL 4-8' **Lab ID: 10120842004** Collected: 01/20/10 10:10 Received: 01/20/10 16:23 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Total Organic Carbon	Analytical Method: EPA 9060 Modified							
Total Organic Carbon	**4670**	mg/kg	980	1		01/29/10 15:26	7440-44-0	
Total Organic Carbon	**6550**	mg/kg	971	1		01/29/10 15:33	7440-44-0	
Mean Total Organic Carbon	**5610**	mg/kg	976	1		01/29/10 15:33	7440-44-0	

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QUALITY CONTROL DATA

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

QC Batch: WETA/5664 Analysis Method: EPA 9060 Modified
QC Batch Method: EPA 9060 Modified Analysis Description: 9060 TOC Average
Associated Lab Samples: 10120842001, 10120842002, 10120842003, 10120842004

METHOD BLANK: 259619 Matrix: Solid
Associated Lab Samples: 10120842001, 10120842002, 10120842003, 10120842004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mean Total Organic Carbon	mg/kg	ND	250	01/29/10 12:50	

LABORATORY CONTROL SAMPLE: 259620

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mean Total Organic Carbon	mg/kg	1000	1110	111	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 259621 259622

Parameter	Units	4027705006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	29200	25000	23500	36700	34900	30	24	50-150	5	30	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 259623 259624

Parameter	Units	3022149001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mean Total Organic Carbon	mg/kg	97.3J	499	493	504	438	82	69	50-150	14	30	

Pace Analytical Services, Inc.
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QUALIFIERS

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

ANALYTE QUALIFIERS

M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

Pace Analytical Services, Inc.
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(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Crystal Airport 19382 DEL 06
Pace Project No.: 10120842

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10120842001	**Crystal B-2 SL 0-4'**	EPA 9060 Modified	WETA/5664		
10120842001	**Crystal B-2 SL 0-4'**	EPA 9060 Modified	WETA/5665		
10120842002	**Crystal B-2 SL 4-8'**	EPA 9060 Modified	WETA/5664		
10120842002	**Crystal B-2 SL 4-8'**	EPA 9060 Modified	WETA/5665		
10120842003	**Crystal B-1 SL 0-4'**	EPA 9060 Modified	WETA/5664		
10120842003	**Crystal B-1 SL 0-4'**	EPA 9060 Modified	WETA/5665		
10120842004	**Crystal B-1 SL 4-8'**	EPA 9060 Modified	WETA/5664		
10120842004	**Crystal B-1 SL 4-8'**	EPA 9060 Modified	WETA/5665		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1120847

Page: 1 of 1

1335203

Section A Required Client Information:

Company: ~~MPCA~~ Delta Consultants
Address: ~~Suite [illegible] Rd~~ 5910 Rice Creek Pkwy
St. Paul, MN ~~55155~~ 55126
Email To: ~~mike.fellows@stantec.com~~
Phone: ~~651-757-2352~~ Fax: 697-5152
Requested Due Date/TAT: STD

Section B Required Project Information:

Report To: ~~Mike Fellows~~ Nancy Rodning
Copy To:
Purchase Order No.: nrodning@deltaenv.com
Project Name: Crystal Airport
Project Number: 19382 DEL OC WO# SFDE1009

Section C Invoice Information:

Attention: Same
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager: Carolynne Trout
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes (MATRIX / CODE)

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Requested Analysis Filtered (Y/N) Y/N	Analysis Test: TOC	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	Crystal B-2 SL 0-4'	SL	G			1/20	9:20		1	X									X		001
2	Crystal B-2 SL 4-8'	"	"			"	9:30		1	X									X		002
3	Crystal B-1 SL 0-4'	"	"			"	10:00		1	X									X		003
4	Crystal B-1 SL 4-8'	"	"			"	10:16		1	X									X		004
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Curt McKay / DELTA	1/20/2010	13:30	Shannon Jarvis / Pace	1-20-10	1600				
	Shannon Jarvis Pace	1-20-10	1623	AA / Pace	1/20/10	1623	24	Y	N	Y

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Curt McKay

SIGNATURE of SAMPLER: Curt McKay

DATE Signed (MM/DD/YY): 1/20/2010

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Sample Condition Upon Receipt

Pace Analytical

Client Name: Delta **Project #** 10120847

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☑ Pace Other _____

Tracking #: _____

Optional
Proj Due Date:
Proj Name:

Custody Seal on Cooler/Box Present: ☑ yes ☐ no Seals Intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes ____ No ✓

Thermometer Used 80344042 or 179425 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 2.4 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 1/20/10 SL

Comments:

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☐No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: SL		
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☐No ☑N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☑N/A	Samp #
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☑No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 1/21/10

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DENR.

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

4027742

REV

Chain of Custody

Pace Analytical®
www.pacelabs.com

Workorder: 10120842 **Workorder Name:** Crystal Airport 19382 DEL 06 **Owner Received Date:** 1/20/2010 **Results Requested By:** 2/2/2010

Report To	Subcontract To
Carolynne Trout Pace Analytical Services, Inc. 1700 Elm Street, Suite 200 Minneapolis, MN 55414 Phone (612)607-1700 Fax (612)607-6444	Pace Analytical Green Bay 1241 Bellevue Street Suite 9 Green Bay, WI 54302 Phone (920)469-2436

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: TBC 9060	LAB USE ONLY
1	Crystal B-2 SL 0-4' 001	1/20/2010 09:20	10120842001	Solid	1	X	1-4oz A
2	Crystal B-2 SL 4-8' 002	1/20/2010 09:30	10120842002	Solid	1	X	↓
3	Crystal B-1 SL 0-4' 003	1/20/2010 10:00	10120842003	Solid	1	X	
4	Crystal B-1 SL 4-8' 004	1/20/2010 10:10	10120842004	Solid	1	X	
5							

Transfers	Released By	Date/Time	Received By	Date/Time
1	Client Pace MN	1/21/10 1600		
2	FEDEX	1/22/10 0835	[signature]	1/22/10 0835 3.0
3				

Comments: 4027742

Cooler Temperature on Receipt ____ °C | **Custody Seal** Y or N | **Received on Ice** Y or N | **Samples Intact** Y or N

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name: PACE - MN Project # 4027742

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☒ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None Other

Thermometer Used 9B

Cooler Temperature 3.0

Type of Ice: (Wet) Blue Dry None

Biological Tissue is Frozen: ☐ yes ☐ no

Temp Blank Present: ☒ yes ☐ no

☐ Samples on ice, cooling process has begun

Optional
Proj. Due Date:
Proj. Name:

Person examining contents:
Date: 1/22/10
Initials: AF

Temp should be above freezing to 6°C for all sample except Biota.
Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☐Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☐Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☐Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☐No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☐No ☐N/A	7.
Sufficient Volume:	☐Yes ☐No ☐N/A	8.
Correct Containers Used:	☐Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☐No ☐N/A	
Containers Intact:	☐Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☐N/A	11.
Sample Labels match COC:	☐Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: S		
All containers needing preservation have been checked.	☐Yes ☐No ☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☐N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☐N/A	15.
Trip Blank Present:	☐Yes ☐No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☐N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 1-22-10

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

APPENDIX S

GIS Map Layer of Fire Foam Training and Discharge Areas and Sample Locations (Electronic File)