Request for Appendix II Groundwater Monitoring Modification

Prepared for

Iredell County Subtitle D Lined MSWLF, Phases 1 & 2

Statesville, North Carolina

January 2014

Permit Number: 49-03

MESCO Project Number: G14046.0

Submittal Date: January 15, 2014

P.O. Box 97
Garner, NC 27529
License No. C-0281

Municipal Services Garner, NC
Engineering Company, P.A. Boone, NC

Municipal Engineering Services Company, P.A.
Garner and Boone, North Carolina

TABLE OF CONTENTS

SECTION

Introduction ..... Page 1
Background ..... Page 1
Request for Appendix II Groundwater Monitoring Modifications ..... Page 2
Lithology of the Aquifer and Unsaturated Zone ..... Page 3
Hydraulic Conductivity of the Aquifer and Unsaturated Zone ..... Page 3
Groundwater Flow Rates ..... Page 3
Minimum Distance of Travel ..... Page 4
Resource Value of The Aquifer ..... Page 4
Nature, Fate, and Transport of any Detected Constituents ..... Page 4
Summary ..... Page 5
Closing ..... Page 6

FIGURES

Topographic Map with Site Location ..... Figure 1
Potentiometric Map of Uppermost Aquifer w/ VOCs Detected Above 2L Standards ..... Figure 2
Water Quality Monitoring Locations Superimposed Aerial Photograph ..... Figure 3
Time-Series Graphs of VOCs Currently in Excess of 2L Standards ..... Figure 4

TABLES

Summary of Detections Above SWSL and 2L Standard (Appendix II Exclusive) ..... Table 1
Detections Above MDL (Appendix II Exclusive) ..... Table 2
Detections that Attain or are Above SWSL,GWP,2L or 2B (Appendix I) ..... Table 3
Hydrogeologic Properties at Monitoring Well Locations ..... Table 4
Appendix II Monitoring Modification Summary ..... Table 5

APPENDICIES

USDA Custom Soil Resources Report ..... Appendix A

License No. C-0281

CIVIL/SANITARY/ENVIRONMENTAL ENGINEERS
SOLID WASTE MANAGEMENT

Municipal Services Engineering Company, P.A.

SITE PLANNING/SUBDIVISIONS
SUBSURFACE UTILITY ENGINEERING (SUE)

January 15, 2014

Mr. Ervin Lane
Solid Waste Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
217 West Jones Street
Raleigh, NC 27603

Re: ***Request for Appendix II Groundwater Monitoring Modification***
Iredell County Subtitle D Lined MSWLF, Phases 1 & 2
Permit No. 49-03
MESCO Project No. G14046.0

Dear Mr. Lane:

Introduction

On behalf of Iredell County, Municipal Engineering Services Company, P.A. (MESCO) is providing this request for modification of the Appendix II monitoring program associated with the Subtitle D Lined MSWLF, Phases 1 & 2. Appendix II monitoring as part of assessment monitoring was initiated at a subset of twelve monitoring wells in July 2009 in response to detections of low concentrations of volatile organic compounds (VOCs) detected in groundwater samples collected from a few monitoring wells located down/cross gradient and within the landfill's relevant point of compliance. As indicated in all of the S*emi-Annual Water Quality Monitoring Reports* low level VOCs persist within wells located within the compliance boundary. There are no downgradient groundwater receptors between the landfill and the Fourth Creek tributary discharge feature which remains unimpacted.

Rule 15A NCAC 13B .1634(b) and (c) allow NCDENR to specify an appropriate subset of wells to be sampled and analyzed for the RCRA Subtitle D Appendix II parameter list and allows NCDENR to also specify an appropriate alternate frequency for repeated sampling and analysis of the long list of parameters specified in the Appendix II list. This report presents a technical justification in support of a request for a subset of specific wells to continue Appendix II on a reduced frequency.

Background

The Iredell County Subtitle D Lined Phases 1 & 2 MSWLF is located on the south side of Fourth Creek at 354 Twin Oaks Road in Statesville, North Carolina. The site location topographic map is depicted in the attached **Figure 1**. Contiguous lined Phases 1 & 2 operated from 1993 to 2002. The waste footprint encompasses approximately 29 acres which is covered with vegetative intermediate soil. Since 2002 a separate Subtitle D Lined MSWLF Phases 3 & 4 has operated on a separate tract beyond an unnamed perennial tributary of Fourth Creek discharge feature which is monitored separately and not the subject of this report. Iredell County performed routine water quality monitoring on at least a semi-annual basis from 1993 through July 2013.

VOCs were first detected above the 2L Standard in MW-13B in 2002, MW-15D and P2-10S in 2006, MW-11 and MW-14A in 2007 and MW-14B in 2009. Contamination identified after 2006 may have previously been there but not detected until SWS mandated a reduction in reportable laboratory detection limits. In response to the VOC 2L exceedances a subset of twelve wells were chosen to initiate monitoring for the parameters listed in 40 CFR 258 Appendix II during a meeting between MESCO and Mr. Ervin Lane of the SWS on July 14, 2009.

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Appendix II monitoring consists of targeting an extensive list of 219 analytes comprised of pesticides, herbicides, PCBs, semi-volatile organic compounds, cyanide, sulfide, an expanded list of VOCs and an expanded list of metals. Appendix II list includes the complete list of 63 Appendix I constituents which is comprised of the most common VOCs and metals.

Appendix II monitoring has been performed on samples collected from monitoring wells MW-4A, MW-4B, MW-7, MW-11, MW-12, MW-13A, MW-13B, MW-14A, MW-14B, MW-15D and hydraulically upgradient background wells MW-1A and MW-1C. Full Appendix II monitoring was performed on the designated subset of viable wells five times (July 2009, January 2010, January 2011, January 2012, and January 2013) over the past four years. Appendix I monitoring plus any Appendix II detections during the preceding event were targeted during the subsequent semi-annual event.

Appendix II exclusive detections (defined in this report as not also listed in Appendix I) that have been attributed to landfill activities have not been detected above an established 2L Standard as presented in **Table 1** and **Table 2**. MESCO's observations gained over 35 years of monitoring several landfills around NC are that detections of Appendix II exclusive constituents are extremely rare. An extensive analytical database which is believed to be completely comprehensive encompassing 21 years has been developed for this site and reviewed in support of this report.

The only wells most recently identified as impacted by Phase 1 & 2 are MW-11, MW-13B, MW-14B, MW-15D and P2-10S; which are all located in close proximity (within 132 feet) of the edge of liner. The portion of the plume which has persisted the longest and at the highest levels has been consistently near MW-13B. The impact in this area has been delineated horizontally and vertically. MW-13A, adjacent but 15 feet deeper than MW-13B, remains clean and MW-13BR, located 144 feet downgradient and screened at the similar elevation as MW-13B, also has remained clean since installed in 2006.

Landfill gas (containing VOCs) rather than a leachate release is suspected to be the transport mechanism of the identified VOCs identified in the groundwater. LFG may impart VOCs into groundwater through interwell migration (the vadose zone near the liner edge) or intrawell (migration directly into the water through the head-space of the impacted wells). An active LFG extraction system used to generate power through several vertical wells in waste plumbed under vacuum to generators has been in operation within Phases 1 & 2 since around 2007. The active LFG extraction system may potentially mitigate potential groundwater impacts in the future.

Considering the advancing age of the waste unit, lack of historical Appendix II detections, observed reduction of contaminants and potential for additional remedial effect via active LFG extraction it is reasonable to suspect that high levels of Appendix II exclusive contaminants will not emerge in the future.

Request for Appendix II Groundwater Monitoring Modifications

As described in recent *Semi-Annual Water Quality Monitoring Reports*, the only constituents detected in excess of the 2L Standard attributed to landfill activities have been Appendix I VOCs within samples collected from MW-4A, MW-4B, MW-11, MW-13B, MW-14A, MW-14B, P2-10S and MW-15D (**Table 3**). The horizontal extent of the identified low level Appendix I VOCs is believed to be defined within the relevant compliance boundary and there is an adequate monitoring network in place between the landfill and the local discharge features. Groundwater within the identified impacted area consistently flows generally northeasterly toward Fourth Creek tributary.

We recommend a modification of the Appendix II monitoring program. We request that all constituents listed in 40CFR Appendix II be targeted at ten wells (MW-4A, MW-4B, MW-11, MW-13A, MW-13B, MW-14A, MW-14B, MW-15, MW-15D and background well MW-37) on a three year basis with the next event to be in January 2016. These wells were chosen since they are located within or in close proximity to the area suspected to be impacted. The background wells (MW-1A, MW-1B, MW-1C) that currently serves Phases 1 & 2 will be replaced by MW-37 in conjunction with the opening of Phase 5 which is planned before 2016. MW-37 will become the new upgradient background well for Phases 1 & 2 as MW-1A, MW-1B and MW-1C will be located downgradient of Phase 5. Routine detection monitoring (field parameters and Appendix I testing) will continue on a semi-annual basis (January and July) at all existing monitoring wells and surface water points listed in the SWS approved *Ground and Surface Water Sampling and Analysis Plan* (*SAP*) revised November 1997. Additionally semi-annual monitoring for Appendix I parameters will continue at MW-13BR and P2-10 which have been installed since initiation of the *SAP*. The proposed modifications are presented on **Table 5** and on a color-coded drawing with embedded table on **Figures 2** & **3**.

This request for an alternative Appendix II monitoring locations and frequency is based on the criteria listed in 15A NCAC 13B .1634(c) which are:

1. Lithology of the aquifer and unsaturated zone;
2. Hydraulic conductivity of the aquifer and unsaturated zone;
3. Ground-water flow rates;
4. Minimum distance of travel;
5. Resource value of the aquifer; and
6. Nature, fate, and transport of any detected constituents.

Lithology of the Aquifer and Unsaturated Zone

The lithology of the aquifer and unsaturated zone is described in detail in the SWS approved *Design Hydrogeologic Study Phase 2* drafted by MESCO dated November 1997 [1]. In general MESCO reported from on-site subsurface investigations and published research that the landfill is underlain by varying depths of sand-silt mixture transitioning to saprolite then variably thick zone(s) of partially weathered rock (PWR) which overlies fractured crystalline bedrock. The regolith material downgradient of the landfill in the observed impacted area in the alluvial valley is sandy silt to silt probably deposited by the Fourth Creek tributary. The regolith material on the hills is clay loam and saprolitic gneiss produced by in-place weathering of the rock.

Groundwater currently monitored around the landfill occurs in unconsolidated alluvium, saprolite, partially weathered rock (PWR) and fractured bedrock. The rock beneath the facility is fractured crystalline mica schist, amphibolites, and medium to coarse-grained hornblende to biotite gneiss. The depth to first groundwater (uppermost aquifer) varies depending upon topographic position, ranging from 7 feet below ground surface (bgs) at MW-3B on the banks of Fourth Creek to about 44 feet bgs at MW-15D located at the north edge of the landfill. Surficial groundwater flow in the impacted area is primarily to the northeast towards Fourth Creek tributary. Groundwater exhibits flow dynamics that are primarily controlled by the topographical high and local drainage features. Fourth Creek tributary, bordering the north end of the site, serves as the primary zone of discharge for the groundwater at the site, thus controlling the dynamics of the groundwater flow. Fourth Creek tributary, flowing through Iredell County owned Twin Oaks Golf Course, is approximately 30 feet across and maintains a consistently high flux of water flow throughout the year.

Hydraulic Conductivity of the Aquifer and Unsaturated Zone

Unsaturated subsurface soil conditions and results of hydraulic conductivity testing of monitoring wells was conducted and presented within the *Design Hydrogeologic Study Phase 2* drafted by MESCO dated November 1997. Hydraulic conductivity of the existing wells screened in the uppermost aquifer has been calculated through field slug tests previously performed on each well then calculated via Bouwer & Rice Method by MESCO. Hydraulic conductivity of the existing wells screened in the uppermost aquifer is low averaging 1.56E-04 cm/sec or 0.4 foot per day as presented in **Table 4**.

Previous drilling indicates the soil around the downgradient outside edge of the liner is predominantly silty clay underlain by saprolite. USDA soil survey published in 2012 indicates soil around the edge of the landfill consists primarily of Lloyd Clay Loam, 6 to 10 percent slopes moderately eroded (LcC2) which has a hydraulic conductivity (Ksat) of between 1.14 ft/day and 3.96 ft/day with an average of 2.55 ft/day as shown in **Appendix A**.

Groundwater Flow Rates

Based on measured hydraulic conductivity, measured hydraulic gradient, and assumed effective porosity, groundwater flow velocities are calculated via modified Darcy's equation and the results are presented to the SWS semi-annually. These calculated velocities are consistent between events. As presented in **Table 4** the calculated average velocity of existing wells screened in the regolith (soil, saprolite, PWR) ranged from 1 to 150 feet/year with an average of 48 feet/year during the most recent event performed in July 2013. The direction of surficial groundwater flow appears to be consistently in a general northerly direction as presented in **Figure 2** and **Table 4**.

[1] Municipal Engineering Services Company, P.A, June 1997 and November 1997. *Design Hydrogeologic Study Phase 2,* Iredell County Landfill – Permit *#49-03.*

Minimum Distance of Travel

The minimum horizontal distance of groundwater travel from the upgradient edge of waste to the monitoring wells along flow paths extrapolated from surficial groundwater contours during the latest July 2013 event are presented on **Table 4**. The minimum distance ranged from 0 feet in the upgradient wells to 1,522 feet at MW-3B. Based on site-wide calculated average flow rate of 48 feet per year, groundwater travel time from upgradient waste edge to MW-3B would take approximately 32 years. There are no potential groundwater receptors located between the landfill and the Fourth Creek tributary discharge feature.

Resource Value of the Aquifer

Potable water supply well(s) are not located between the landfill and local discharge features. Latest laboratory results indicate that contaminants were not detected in concentrations above EPA established primary drinking water standards or maximum contaminant levels (MCL). Iredell County has ensured that a sufficient buffer of Iredell County-owned land is downgradient of the landfill to allow natural attenuation processes the needed space to degrade any potential contamination in the groundwater. Iredell County controls the property between the landfill and Fourth Creek tributary, which is the major groundwater discharge point for groundwater traveling beneath the landfill. Private (residential) water wells have been identified within a 2,000-foot radius of the landfill during receptor surveys performed in support of all previous studies. Municipal (treated) water is available to residences surrounding the landfill from the City of Statesville. Public water supply lines run along Twin Oaks Road and serve the landfill facility. The Twin Oaks Golf Course club house, which is located approximately 300 feet beyond the discharge feature and owned by Iredell County, is served by a transient non-community well (Well #1). Per the North Carolina Division of Environmental Health, Public Water Supply (PWS) Section latest Source Water Assessment Program (SWAP)[1] report the area Well #1 is considered to have a moderate contamination susceptibility rating. Supply Well #1 is periodically monitored per PWS regulations. No domestic or public water supply wells or surface water supply intakes have been known or suspected of being impacted by landfill activities. Siting water supply well(s) between the landfill and the discharge feature is prohibited due to 500 foot setback distances enacted by Rule by 15A NCAC 02C .0107 (a)(j). The potential for exposure to known impacted groundwater at this site is considered minimal.

Nature, Fate, and Transport of any Detected Constituents

Water quality has improved over time and the only wells impacted at the facility as of the lastest event are MW-11 (sandpack 8 feet to 23 feet), MW-13B (sandpack 24 feet to 39 feet), MW-4B (sandpack 26 feet to 37 feet), MW-14B (sandpack 43.5 feet to 58.5feet), MW-15D (sandpack 43.5 feet to 59.12 feet) and P2-10S (sandpack 20 feet to 36 feet). The impacted wells are located between 52 and 118 linear feet from waste. Three shallow wells (MW-4A, MW-14A and MW-15) have been dry in recent years but each have a deeper nested well adjacent to it which is consistently viable. The extrapolated area of impact encompasses an area less than five acres as shown on **Figure 2**. The relatively low level contaminants most recently detected above 2L Standards consist primarily of a mixture of chlorinated hydrocarbons and benzene. The most recent lab results indicate 2L exceedances consist of:

2L Exceedance Summary July 2013 (VOCs)

Well	Benzene	PCE	TCE	DCM	VCM	EDC	Cumulative Total
2L Standard	1	0.7	3.0	4.6	0.03	0.38	-
MW-11	1.2				4.3		5.50
MW-13B	3.5	1.5	4.1		3.8	2.2	15.10
MW-14B	2.0	1.2		5.0	4.2		12.40
MW-15D		0.81 “j”			1.1		1.91
P2-10S		3.7	4.6				8.30
Total	6.7	7.2	8.7	5.0	13.4	2.2	43.21

“j” <SWSL therefore estimated concentration. Concentrations shown in (uq/L)

[1] http://swap.ncwater.org/swap_app/pdfreports/0149550_3_1_2010_85_11.PDF

A summary of all detections that attain or exceed SWSL, GWP, 2L or 2B Standards during the past five events are presented on **Table 3**. A site map depicting the spatial distribution of VOC concentrations exceeding 2L Standards during this sampling event is shown on **Figure 2.** Concentrations of all parameters detected in excess of the 2L Standard remain within their own respective historically identified range with historical time series graphs depicted in **Figure 4**. None of the recently identified contaminants are above EPA established primary drinking water Standards. The nature and extent of these impacts has been demonstrated in more detail in the previous *Semi-Annual Water Quality Monitoring Reports.*

Natural attenuation processes are effectively mitigating the small impacted area. Once VOCs have entered the groundwater, the migration pathway is predominantly in the shallow groundwater flowing north-northwesterly towards Fourth Creek. As detailed in previous reports the observed groundwater contamination is successfully attenuating. Natural processes, such as dilution, adsorption, and chemical reaction with subsurface materials will reduce VOC concentrations along the flow path. In addition, due to relatively low permeability and restrictive (upward) vertical components of groundwater flow, relatively slow travel times, and the nature of the contaminants, only limited migration (i.e, dispersion) is anticipated. The maximum horizontal fate of groundwater contamination originating from the landfill would be Fourth Creek tributary which remains within Iredell County property for over a mile downstream. Fourth Creek tributary conveys a large volume of water that would effectively dilute any contaminants to levels below surface water 2B Standards which are typically higher than groundwater 2L Standards. Fourth Creek tributary has always tested clean and will continue to be monitored semiannually for Appendix I analytes at SW-2 as previously approved by the SWS and shown on **Figures 2** & **3**.

Summary

A substantial amount of groundwater analytical data has been collected at this site and hydrogeologic characteristics are known. Testing indicates low concentrations of a few Appendix I VOCs occurring in the groundwater within 111 feet of the landfill which encompasses an area less than five acres within the compliance boundary. Groundwater monitoring will continue on a semiannual basis at all wells surrounding the landfill. Appendix II exclusive constituents attributed to landfill activities has not been detected above 2L Standards. Assessment monitoring specifies analysis of Appendix II (includes Appendix I) parameters annually. NCAC 13B .1634(b) allow for NCDENR to approve an alternative subset of wells and frequency for Appendix II monitoring.

Based on the substantial amount of historical data indicating lack of Appendix II exclusive detections, improving water quality and in accordance with the conditions described above we propose a modification to the monitoring plan summarized in **Table 5** and as follows.

-Appendix I monitoring and quantification of field parameters will continue semiannually at 19 wells (MW-2, MW-3A, MW-3B, MW-4A, MW-4B, MW-6A, MW-6B, MW-7, MW-8, MW-11, MW-12, MW-13A, MW-13B, MW-13BR, MW-14A, MW-14B, MW-15, MW-15D, P2-10S).

-Appendix I monitoring and quantification of field parameters will continue semiannually at three current background wells (MW-1A, MW-B, MW-1C). After Phase 5 opens (MW-1A, MW-1B, MW-1C) will continue to be sampled but purpose will be to monitor downgradient of Phase 5. MW-37 will become the new upgradient background well and be tested semi-annually once Phase 5 commences operations.

-Appendix II monitoring at ten existing wells (MW-4A, MW-4B, MW-11, MW-13A, MW-13B, MW-14A, MW-14B, MW-15, MW-15D) and background well (MW-37) on an alternate frequency of once every three years beginning with the winter 2016 event.

-Appendix I monitoring and quantification of field parameters will continue semiannually at all surface water points associated with all phases of the facility (SW-1, SW-2, SW-3, SW-4, SW-5).

-Leachate (LAGOON) will continue to be monitored semi-annually for the leachate specific list of constituents.

Based on the criteria listed in .1634(c) and the conditions cited below the Appendix II groundwater monitoring modification is justified and hereby requested.

1. Lithology of the aquifer and unsaturated zone consists of predominantly saprolitic soils underlain by PWR and metamorphic bedrock which is increasingly competent with depth.
2. Hydraulic conductivity of the aquifer and unsaturated zone which indicates saturated hydraulic conductivity averages 0.4 feet per day and unsaturated zone is comprised of predominantly dense sand-silt-saprolite with a published Ksat average of 2.55 ft/day.
3. Groundwater flow rates are relatively slow with a site wide calculated average of approximately 49 feet per year.
4. Minimum distance of groundwater travel which indicates the from the upgradient extent of waste (EOW) to the downgradient wells along flow paths varied from 565 feet to 1,522 feet.
5. Resource value of the aquifer in closest proximity to the impacted area is limited and critical receptors (drinking water wells) are not currently nor allowed per 2C Rules to be located between the landfill and the Fourth Creek tributary discharge feature.
6. Nature, fate, and transport of any detected constituents which indicates constituents detected in excess of 2L Standards attributed to landfill activities recently consist of only compounds listed in 40 CFR 258 Appendix I. Constituents listed in 40 CFR 258 Appendix II that are not also listed in Appendix I have never been detected above applicable Standards and attributed to anthropogenic sources. The impacted area is identified within the compliance boundary and Iredell County owns both sides of the Fourth Creek tributary discharge feature which effectively serves as a barrier to off-site groundwater contamination. Natural attenuation processes and LFG extraction are effectively decreasing contaminant levels.

Closing

Water quality monitoring reports will continue to be submitted to the NCDENR on a semi-annual basis. If, in the future, one or more constituent(s) are detected above SWSL and 2L Standards which are attributed to anthropogenic sources in any other well(s) other than these wells (MW-37, MW-4A, MW-4B, MW-11, MW-13A, MW-13B, MW-14A, MW-14B, MW-15, MW-15D, P2-10S) Appendix II monitoring will be performed at that particular well(s) during the next scheduled semi-annual event. If Appendix II exclusive constituents are not detected in excess of 2L Standards at the particular well(s), Appendix II monitoring will revert back to the established facility-wide three year cycle. If Appendix II exclusive parameters are detected above SWSL and 2L Standards (current as of event date(s)) which are attributed to landfill activities a specific plan will be formulated to investigate the detection(s) with the objective of protecting public health and the environment. In the future as water quality and or regulations change further modifications to the assessment monitoring program may be warranted. In the future as water quality and or regulations change further modifications to the assessment monitoring program may be warranted. Any unforeseen deviations will be explained in the associated water quality report, but any significant modifications will not be made without NCDENR approval.

If you have any questions or need any additional information regarding this request, please contact us at (919) 772-5393 or by email at jpfohl@mesco.com or wsullivan@mesco.com.

Sincerely,
MUNICIPAL ENGINEERING SERVICES CO., P.A.

Jonathan Pfohl
Environmental Specialist

Enclosures

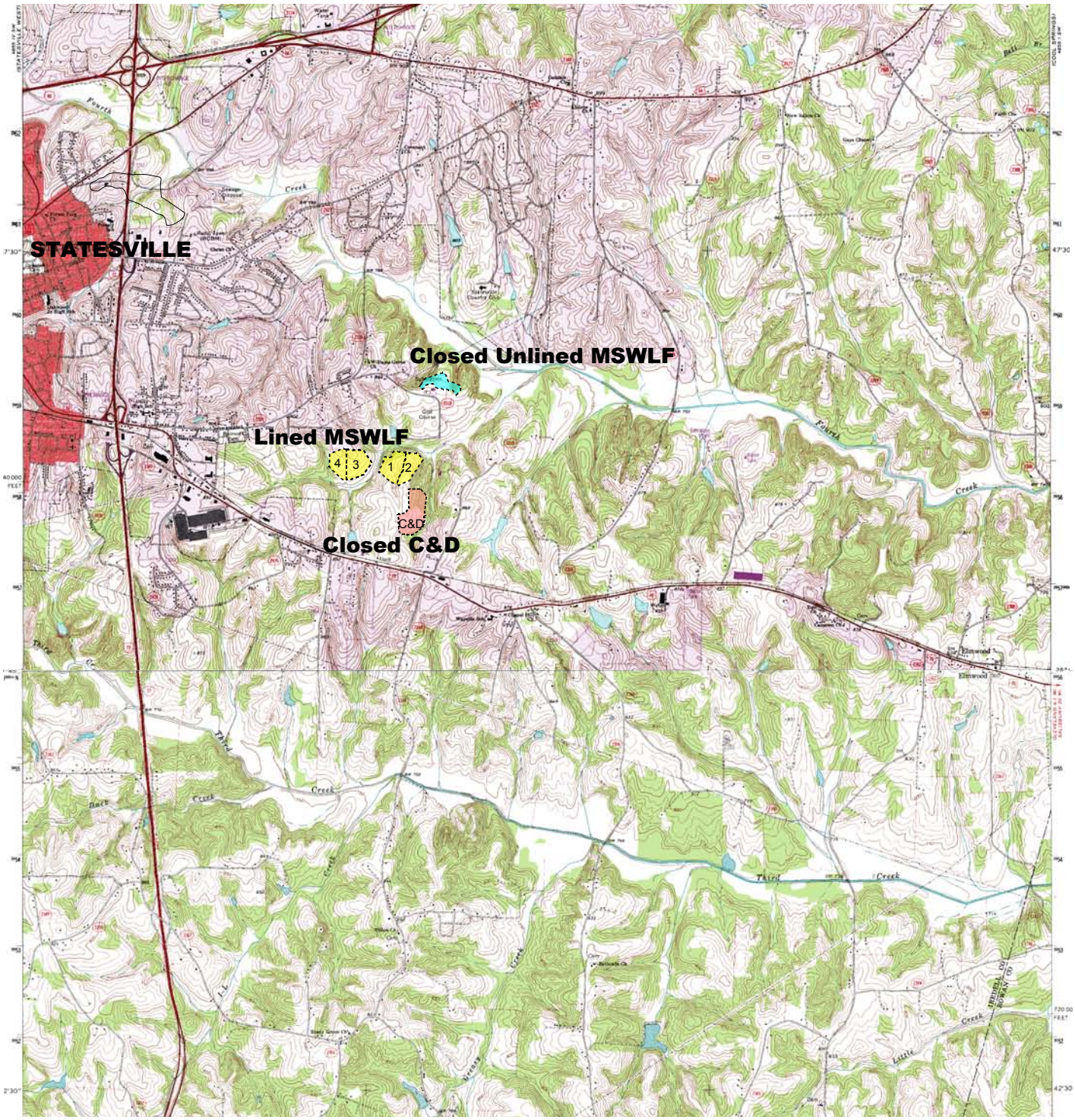
cc: Mr. David Lambert
Iredell County

Figures

Topographic Map with Site Location

Iredell County Landfill

N



354 Twin Oaks Rd
Statesville, NC 28625
Lat:35-46-17.8012
Long:-80-49-22.2973
Northing:740719.35
Easting:1459306.76

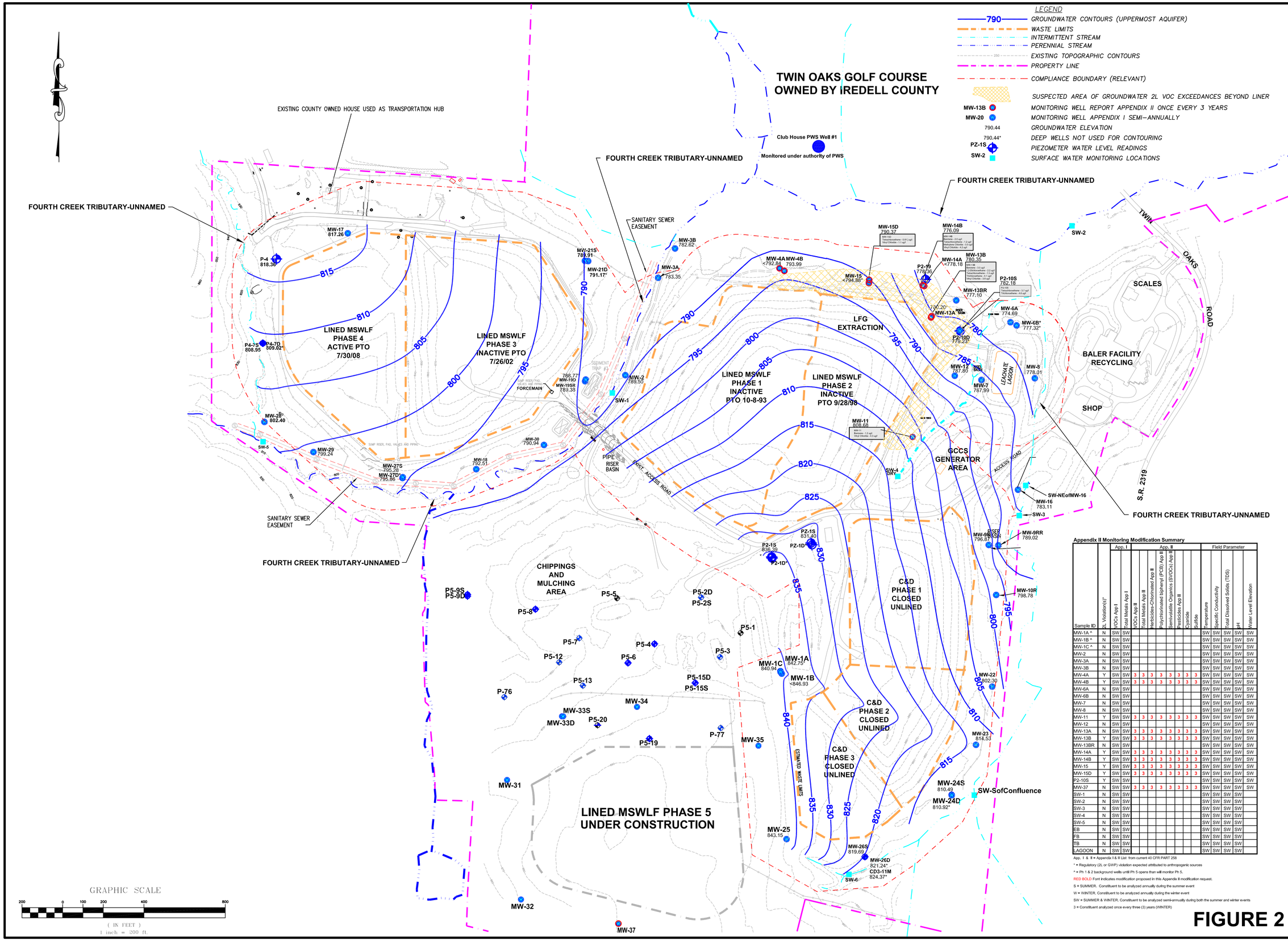
STATESVILLE EAST QUADRANGLE

ROAD CLASSIFICATION

Primary highway, hard surface
Light-duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U. S. Route
State Route

2.5 0 2.5 MILES

Figure 1



Appendix II Monitoring Modification Summary

	App. I		App. II								Field Parameter				
Sample ID	2L Violation(s)*	VOCs App I	Total Metals App I	VOCs App III	Total Metals App III	Herbicides-Chlorinated App III	Polychlorinated biphenyl (PCB) App III	Semivolatile Organics (SVOCs) App III	Pesticides App II	Cyanide	Sulfide	Temperature	Specific Conductivity	Total Dissolved Solids (TDS)	pH	Water Level Elevation
MW-1A ^	N	SW	SW									SW	SW	SW	SW	SW
MW-1B ^	N	SW	SW									SW	SW	SW	SW	SW
MW-1C ^	N	SW	SW									SW	SW	SW	SW	SW
MW-2	N	SW	SW									SW	SW	SW	SW	SW
MW-3A	N	SW	SW									SW	SW	SW	SW	SW
MW-3B	N	SW	SW									SW	SW	SW	SW	SW
MW-4A	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-4B	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-6A	N	SW	SW									SW	SW	SW	SW	SW
MW-6B	N	SW	SW									SW	SW	SW	SW	SW
MW-7	N	SW	SW									SW	SW	SW	SW	SW
MW-8	N	SW	SW									SW	SW	SW	SW	SW
MW-11	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-12	N	SW	SW									SW	SW	SW	SW	SW
MW-13A	N	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-13B	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-13BR	N	SW	SW									SW	SW	SW	SW	SW
MW-14A	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-14B	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-15	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-15D	Y	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
P2-10S	Y	SW	SW									SW	SW	SW	SW	SW
MW-37	N	SW	SW	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
SW-1	N	SW	SW									SW	SW	SW	SW	
SW-2	N	SW	SW									SW	SW	SW	SW	
SW-3	N	SW	SW									SW	SW	SW	SW	
SW-4	N	SW	SW									SW	SW	SW	SW	
SW-5	N	SW	SW									SW	SW	SW	SW	
EB	N	SW	SW									SW	SW	SW	SW	
FB	N	SW	SW									SW	SW	SW	SW	
TB	N	SW	SW									SW	SW	SW	SW	
LAGOON	N	SW	SW									SW	SW	SW	SW	

App. I & II = Appendix I & II List from current 40 CFR PART 258

* = Regulatory (2L or GWP) violation expected attributed to anthropogenic sources

^ = Ph 1 & 2 background wells until Ph 5 opens than will monitor Ph 5.

RED BOLD Font indicates modification proposed in this Appendix II modification request.

S = SUMMER. Constituent to be analyzed annually during the summer event

W = WINTER. Constituent to be analyzed annually during the winter event

SW = SUMMER & WINTER. Constituent to be analyzed semi-annually during both the summer and winter events

3 = Constituent analyzed once every three (3) years (WINTER)

FIGURE 2

Municipal Engineering Services Company, P.A.
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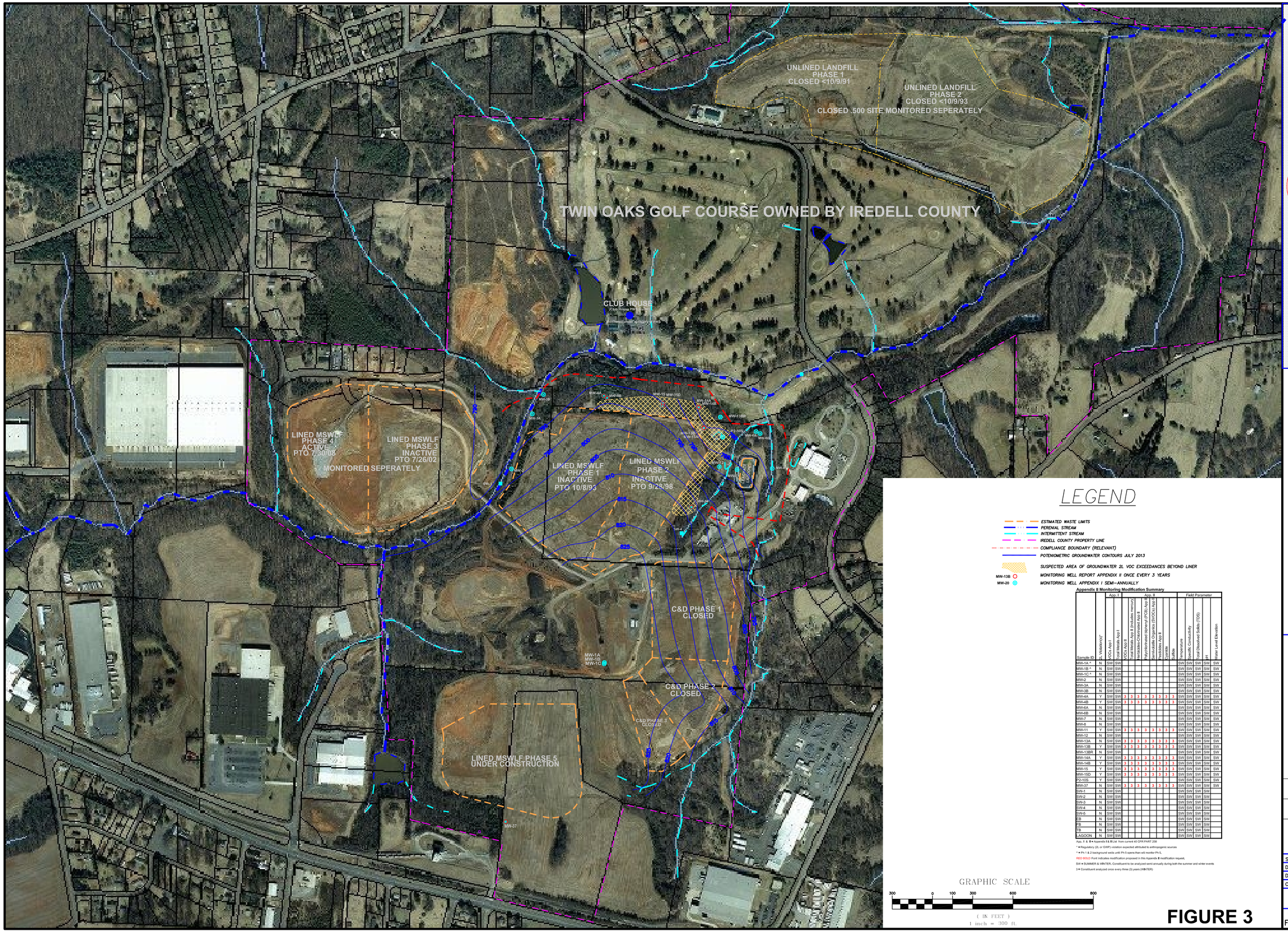
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

SUBTITLE D LINED MSWLF PHASES 1-4
CLOSED C&D PHASES 1-3
IREDELL COUNTY
NORTH CAROLINA

POTENTIOMETRIC MAP OF UPPERMOST AQUIFER w/ VOCs DETECTED ABOVE 2L STANDARDS

DATE	BY	REV.	DESCRIPTION

SCALE: 1" = 200'
DATE: 1/5/14
DRWN. BY: J. PFOHL
CHKD. BY:
PROJECT NUMBER G14046.0
DRAWING NO. FIGURE 2
SHEET NO. 1 OF 1



Appendix II Monitoring Modification Summary

	App. I		App. II							Field Parameter				
Sample ID	2L Violations(1)*	SVOCs App I	Total Metals App I	VOCs App II	Total Metals App II (includes mercury)	Pesticides–Chlorinated App II	Polychlorinated biphenyl (PCB) App	Semivolatile Organics (SVOCs) App	Herbicides App II	Cyanides App II	Sulfide	Sulfate	Temperature	Specific Conductivity	Total Dissolved Solids (TDS)	pH	Water Level Elevation
MW-1A ^	N	SW	SW										SW	SW	SW	SW	SW
MW-1B ^	N	SW	SW										SW	SW	SW	SW	SW
MW-1C ^	N	SW	SW										SW	SW	SW	SW	SW
MW-2	N	SW	SW										SW	SW	SW	SW	SW
MW-3A	N	SW	SW										SW	SW	SW	SW	SW
MW-3B	N	SW	SW										SW	SW	SW	SW	SW
MW-4A	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-4B	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-6A	N	SW	SW										SW	SW	SW	SW	SW
MW-6B	N	SW	SW										SW	SW	SW	SW	SW
MW-7	N	SW	SW										SW	SW	SW	SW	SW
MW-8	N	SW	SW										SW	SW	SW	SW	SW
MW-11	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-12	N	SW	SW										SW	SW	SW	SW	SW
MW-13A	N	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-13B	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-13BR	N	SW	SW										SW	SW	SW	SW	SW
MW-14A	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-14B	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-15	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
MW-15D	Y	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
P2-10S	Y	SW	SW										SW	SW	SW	SW	SW
MW-37	N	SW	SW	3	3	3	3	3	3	3	3	3	SW	SW	SW	SW	SW
SW-1	N	SW	SW										SW	SW	SW	SW	
SW-2	N	SW	SW										SW	SW	SW	SW	
SW-3	N	SW	SW										SW	SW	SW	SW	
SW-4	N	SW	SW										SW	SW	SW	SW	
SW-6	N	SW	SW										SW	SW	SW	SW	
EB	N	SW	SW										SW	SW	SW	SW	
FB	N	SW	SW										SW	SW	SW	SW	
TB	N	SW	SW										SW	SW	SW	SW	
LAGOON	N	SW	SW										SW	SW	SW	SW	

App. I & II = Appendix I & II List from current 40 CFR PART 258

* = Regulatory (2L or GWP) violation expected attributed to anthropogenic sources

^ = Ph 1 & 2 background wells until Ph 5 opens than will monitor Ph 5.

RED BOLD Font indicates modification proposed in this Appendix II modification request.

SW = SUMMER & WINTER. Constituent to be analyzed semi-annually during both the summer and winter events

3 = Constituent analyzed once every three (3) years (WINTER)

FIGURE 3

Municipal Services Engineering Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772–5393
P.O. BOX 349 BOONE, N.C. 28607 (828) 262–1767
LICENSE NUMBER: C–0281

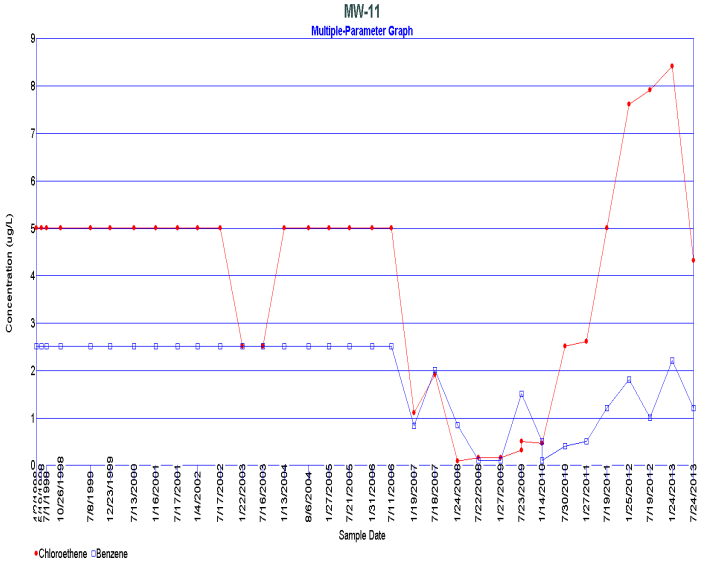
SUBTITLE D LINED MSWLF PHASES 1-6
CLOSED C&D PHASES 1-3
IREDELL COUNTY
NORTH CAROLINA

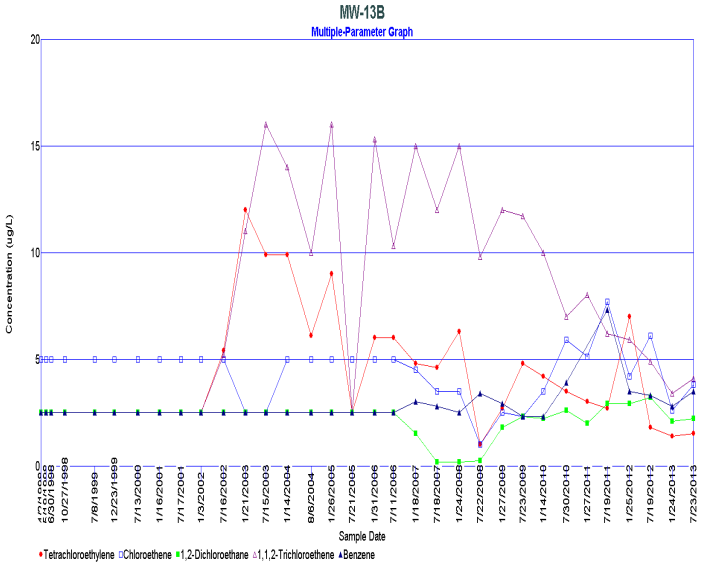
DATE	BY	REV.	DESCRIPTION
5/30/13	JAP		CHANGED MP–10 FROM NOT MONITORED TO MONITORED

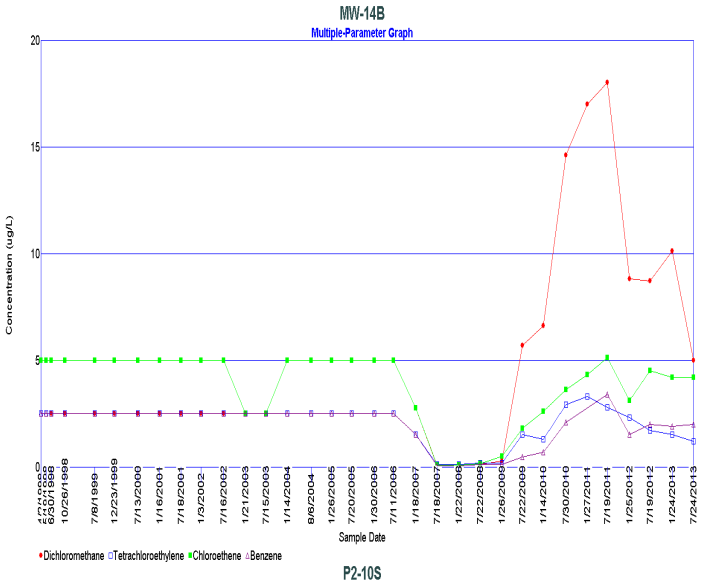
WATER QUALITY MONITORING LOCATIONS
SUPERIMPOSED AERIAL PHOTOGRAPH

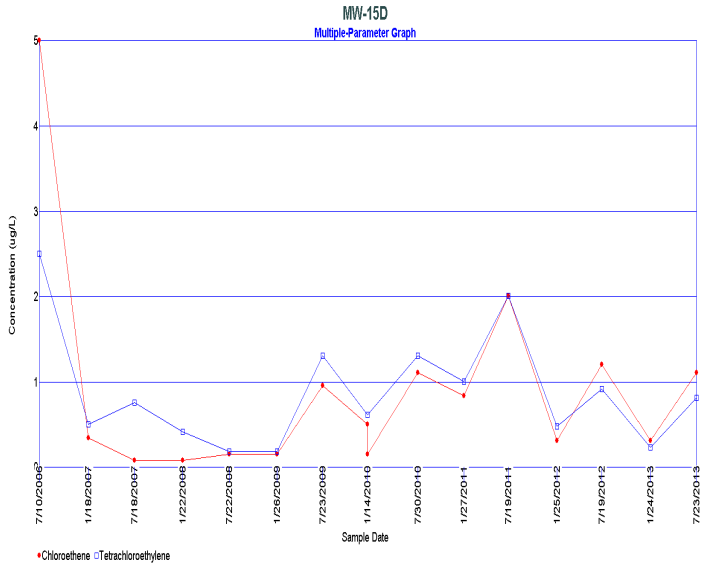
SCALE:	SEE SCALEBAR
DATE:	1/5/14
DRWN. BY:	J. PFOHL
CHKD. BY:	
PROJECT NUMBER	G14046.0
DRAWING NO.	FIGURE 3
SHEET NO.	1 OF 1

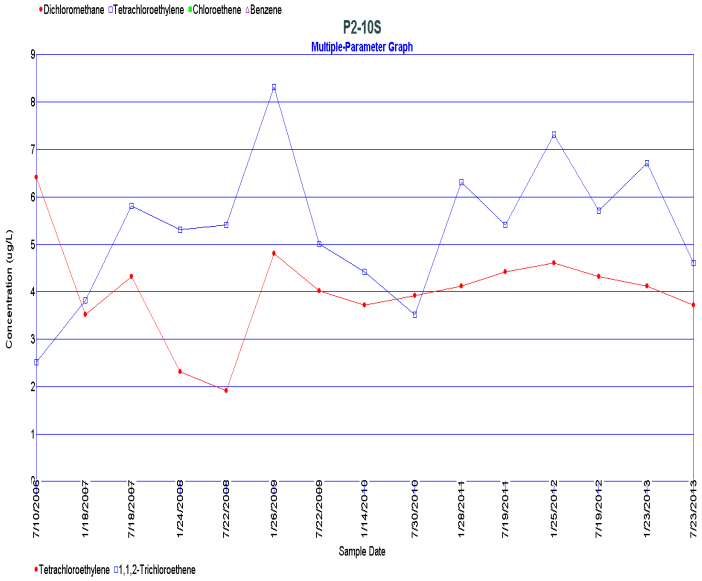
Figure 4
Time-Series Graphs of VOCs Currently in Excess of 2L Standards
July 22-24, 2013











ND Represented by ½ Detection Limit

Tables

Table 1
Summary of Detections in Water Samples Above MDL (Appendix II Exclusive)
July 22, 2009 through July 23, 2013

		Metal		Cyanide	Pesticides							SVOCs					PCBs	Herbicides	VOCs	Sulfide
Sample ID	Date	Tin, total	Mercury, total	Cyanide, total	Dieldrin	2,4-D	Endosulfan I	4,4'-DDE	4,4'-DDT	delta-BHC	Other 15 pesticides	Di-n-octylphthalate	3-Methylcholanthrene	7,12-Dimethylbenz(a)anthracene	Bis(2-ethylhexyl) phthalate	Other 107 SVOCs	All 5 PCBs	All 8 Herbicides	All 17 VOCs	Sulfide
MW-1A	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	Jan 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	July 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	Jan 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	July 2012	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1A	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1A	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1C	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	Jan 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	**0.25**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	July 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	Jan 2012	10.9 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	July 2012	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-1C	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-1C	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4A	July 2009		ND	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4A (V)	Sept 2009	NS	NS	24	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-4A	Jan 2010	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	July 2010	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	Jan 2011	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	July 2011	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	Jan 2012	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	July 2012	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	Jan 2013	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4A	July 2013	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-4B	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	Jan 2010	3.13 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	July 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	Jan 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.9 j	5.7 j	ND	ND	ND	ND	ND	ND
MW-4B	July 2012	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4B	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-7	July 2009	3.9 j	0.097 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	Jan 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.8 j	ND	ND	ND	ND	ND
MW-7	July 2011	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND
MW-7	Jan 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	July 2012	ND	ND	ND	ND	ND	NS	ND	ND	NS	NS	NS	ND	ND	NS	NS	NS	NS	NS	NS
MW-7	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-11	July 2009	2.3 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	Jan 2010	3.39 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	Jan 2011	2.38 j	ND	ND	ND	0.47 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	July 2011	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-11	Jan 2012	ND	ND	ND	**0.36**	1.7 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11 (V)	Feb 2012	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-11	July 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	Jan 2013	ND	ND	ND	ND	0.68 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-11	July 2013	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	July 2009	ND	0.093	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	Jan 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	Jan 2011	2.1 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	July 2011	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	Jan 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	July 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-13A	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	Jan 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	July 2011	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-13A	Jan 2012	ND	ND	5.4 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	July 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13A	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-13B	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	Jan 2010	3.18 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	July 2011	NS	ND	ND	NS	NS	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-13B	Jan 2012	ND	0.1 j	5.1 j	ND	ND	0.08 j	0.062 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	July 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	Jan 2013	ND	0.14 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13B	July 2013	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14A	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14A	Jan 2010	ND	ND	ND	ND	ND	1.5 j	ND	ND	ND	ND	1.5 j	ND	ND	ND	ND	ND	ND	ND	ND
MW-14A	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14A	Jan 2011	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-14A	July 2011	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
MW-14A	Jan 2012	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-14A	July 2012	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
MW-14A	Jan 2013	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-14A	July 2013	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D	NS D
MW-14B	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	Jan 2010	1.98 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	Jan 2011	2.85 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	July 2011	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14B	Jan 2012	ND	ND	ND	ND	ND	ND	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	July 2012	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14B	Jan 2013	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-14B	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-15D	July 2009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	Jan 2010	2.71 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	July 2010	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	Jan 2011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	July 2011	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-15D	Jan 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	July 2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	Jan 2013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-15D	July 2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS = Not Sampled
ND = Not Detected above MDL
D = Dry (Reason NS)
j = "j-qualified" The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data
(V) = Verification Event (In addition to semi-annual event)
BOLD = Concentration > 2L Standard

Table 2
Detections in Water Samples Above MDL (Appendix II Exclusive)
July 22, 2009 through July 23, 2013

Well ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	GWP [5]	Exceedance Amount	Preliminary Cause [7]
MW-1C	**delta-BHC**	**1/26/11**	**0.25**	**ug/L**	**0.014**	**0.05**	**0.019**		**0.231**	**B**
MW-1C	Tin, total	1/25/12	10.9 j	ug/L	5	100	NE	NE		
MW-4A	Cyanide, total	7/22/09	75	ug/L	5	10	70		5	
MW-4A	Cyanide, total	9/9/09	24	ug/L	5	10	70			
MW-4B	Tin, total	1/13/10	3.34 j	ug/L	1.50	100	NE	NE		
MW-4B	Tin, total	1/13/10	3.13 j	ug/L	1.50	100	NE	NE		
MW-4B	3-Methylcholanthrene	1/25/12	5.9 j	ug/L	2.6	10	NE	NE		
MW-4B	7,12-Dimethylbenz(a)anthracene	1/25/12	5.7 j	ug/L	4.9	10	NE	NE		
MW-7	Mercury, total	7/22/09	0.097 j	ug/L	0.070	0.2	1.1			
MW-7	Tin, total	7/22/09	3.9 j	ug/L	1.8	100	NE	NE		
MW-7	Bis(2-ethylhexyl)phthalate	1/27/11	5.8 j	ug/L	1.7	15				
MW-11	Tin, total	7/23/09	2.3j	ug/L	1.8	5		NE		
MW-11	Tin, total	1/14/10	3.39 j	ug/L	1.50	100	NE	NE		
MW-11	2,4-D	1/27/11	0.47 j	ug/L	0.15	2	70			
MW-11	Tin, total	1/27/11	2.38 j	ug/L	2.1	100	NE	NE		
MW-11	2,4-D	1/25/12	1.7 j	ug/L	0.22	2	70			
MW-11	**Dieldrin**	**1/25/12**	**0.36**	**ug/L**	**0.05**	**0.075**	**0.0022**		**0.358**	**A**
MW-11	Dieldrin	2/18/12	ND<0.045	ug/L	0.045	0.075	0.0022			
MW-11	2,4-D	1/24/13	0.68 j	ug/L	0.16	2	70			
MW-12	Mercury, total	7/22/09	0.093 j	ug/L	0.070	0.2	1.1			
MW-12	Tin, total	1/27/11	2.1 j	ug/L	2.1	100	NE	NE		
MW-13A	Cyanide, total	1/25/12	5.4 j	ug/L	5	10	70			
MW-13B	Tin, total	1/14/10	3.18 j	ug/L	1.50	100	NE	NE		
MW-13B	4,4'-DDE	1/25/12	0.062 j	ug/L	0.05	0.1	NE	NE		
MW-13B	Cyanide, total	1/25/12	5.1 j	ug/L	5	10	70			
MW-13B	Endosulfan I	1/25/12	0.08 j	ug/L	0.05	0.1	NE	NE		
MW-13B	Mercury, total	1/25/12	0.1 j	ug/L	0.1	0.2	1.1			
MW-13B	Mercury, total	1/24/13	0.14 j	ug/L	0.10	0.2	1.05			
MW-13B	Mercury, total	7/23/13	0.5 j	ug/L	0.1	0.2	1.0			
MW-14A	Di-n-octylphthalate	1/14/10	1.5 j	ug/L	1.4	10	140			
MW-14B	Tin, total	1/14/10	1.98 j	ug/L	1.50	100	NE	NE		
MW-14B	Tin, total	1/27/11	2.85 j	ug/L	2.1	100	NE	NE		
MW-14B	4,4'-DDT	1/25/12	0.1	ug/L	0.05	0.1	0.1			
MW-15D	Tin, total	1/14/10	2.71 j	ug/L	1.50	100	NE	NE		

1 Table contains only App II exclusive constituent detections. Targeted alternating full App II and Appendix I plus detects. If not listed <MDL.

[2] MDL = Method Detection Limit

[3] SWSL = Solid Waste Section Reporting Limit

[4] 2L = North Carolina 15A NCAC 2L Groundwater Quality Standard

[5] GWP = Groundwater Protection Standard

[7] Preliminary Cause = Refers to a preliminary analysis of the cause and/or source of a detection over the respective 2L/2B Standard.
A definitive source of the detection was not determined as part of this report.

j =The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.

B = Background. Not attributed to landfill activities as MW-1C is a designated background well located hydraulically upgradient of landfill.

A = Artifact Contamination as evidenced by absence in subsequent verification samples.

NE = Not Established

BOLD = Concentration > 2L Standard

Table 3
Detections in Water Samples above SWSL, GWP, 2L or 2B (Appendix I)
July 22, 2009 through July 22, 2013

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-1C	Arsenic, total	1/12/10	12.1	ug/L	3.90	10	50				
MW-1C	Barium, total	7/22/09	113	ug/L	0.20	100	2000				
MW-1C	Barium, total	1/12/10	789	ug/L	0.250	100	2000				
MW-1C	Barium, total	7/29/10	901	ug/L	0.2	100	700			201	
MW-1C	Barium, total	7/19/11	453	ug/L	1.00	100	700				
MW-1C	Barium, total	1/26/11	457	ug/L	1	100	700				
MW-1C	**Barium, Total**	**1/25/12**	**702**	**ug/L**	**5**	**100**	**700**			**2**	**B & N**
MW-1C	Barium, total	7/19/12	511	ug/L	5	100	700				
MW-1C	Barium, total	1/24/13	398	ug/L	5	100	700				
MW-1C	Barium, total	7/22/13	139	ug/L	5	100	700				
MW-1C	Beryllium, total	1/12/10	6.83	ug/L	0.0860	1			4	2.83	B
MW-1C	Beryllium, total	7/29/10	3.6	ug/L	0.1	1			2	1.6	
MW-1C	Beryllium Total	1/26/11	1.31	ug/L	0.1	1			4		
MW-1C	Beryllium, Total	1/25/12	4.7	ug/L	1	1			4		
MW-1C	Beryllium, total	7/19/12	3.6	ug/L	1	1			4		
MW-1C	Beryllium, total	1/24/13	2	ug/L	1	1					
MW-1C	Cadmium, Total	1/25/12	1.6	ug/L	1	1	1.75				
MW-1C	**Chromium, total**	**1/12/10**	**40.4**	**ug/L**	**1.70**	**10**	**10**			**30.4**	**B**
MW-1C	**Chromium Total**	**7/19/11**	**18.8**	**ug/L**	**1.00**	**10**	**10**			**8.8**	**B & N**
MW-1C	**Chromium Total**	**1/26/11**	**20.2**	**ug/L**	**1**	**10**	**10**			**10.2**	**B & N**
MW-1C	**Chromium, Total**	**1/25/12**	**23.8**	**ug/L**	**5**	**10**	**10**			**13.8**	**B & N**
MW-1C	**Chromium, total**	**7/19/12**	**15**	**ug/L**	**5**	**10**	**10**			**5**	**N**
MW-1C	Cobalt, total	1/12/10	40.7	ug/L	0.410	10			70		
MW-1C	Cobalt, total	7/29/10	20.1	ug/L	0.6	10			70	10.1	
MW-1C	Cobalt Total	7/19/11	18.7	ug/L	1.10	10	NE		70		
MW-1C	Cobalt Total	1/26/11	25.1	ug/L	1.1	10			70		
MW-1C	Cobalt, total	7/19/12	21.4	ug/L	5	10			70		
MW-1C	Cobalt, total	1/24/13	42	ug/L	5	10	NE		70		
MW-1C	Copper, total	1/12/10	95.9	ug/L	1.90	10	1000				
MW-1C	Copper, total	7/29/10	21.8	ug/L	0.3	10	1000				
MW-1C	Copper Total	7/19/11	50.3	ug/L	1.60	10	1000				
MW-1C	Copper Total	1/26/11	54.1	ug/L	1.6	10	1000				
MW-1C	Copper, Total	1/25/12	88.4	ug/L	5	10	1000				
MW-1C	Copper, total	7/19/12	64.5	ug/L	5	10	1000				
MW-1C	Copper, total	1/24/13	38.2	ug/L	5	10	1000				
MW-1C	**Lead, total**	**1/12/10**	**28.5**	**ug/L**	**1.10**	**10**	**15**			**13.5**	**B**
MW-1C	Lead Total	1/26/11	10.3	ug/L	1.9	10	15				
MW-1C	Lead, Total	1/25/12	11	ug/L	5	10	15				
MW-1C	Vanadium, total	7/22/09	14.4[j]	ug/L	0.20	25			3.5	10.9	
MW-1C	Vanadium, total	1/12/10	226	ug/L	0.400	25			3.5	222.5	
MW-1C	Vanadium, total	7/29/10	57	ug/L	0.2	25			3.5	53.5	
MW-1C	Vanadium, total	7/19/11	101	ug/L	1.40	25	NE		3.5	97.5	
MW-1C	Vanadium, total	1/26/11	123	ug/L	1.4	25			3.5	119.5	
MW-1C	Vanadium, Total	1/25/12	166	ug/L	5	25			3.5	162.5	
MW-1C	Vanadium, total	7/19/12	124	ug/L	5	25			3.5	120.5	
MW-1C	Vanadium, total	1/24/13	68.2	ug/L	5	25	NE		3.5	64.7	
MW-1C	Vanadium, total	7/22/13	5.7 j	ug/L	5	25			3.5	2.2	

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-1C	Zinc, total	7/22/09	17.6	ug/L	0.40	10	1050				
MW-1C	Zinc, total	1/12/10	288	ug/L	1.60	10	1050				
MW-1C	Zinc, total	7/29/10	55.5	ug/L	0.4	10	1050				
MW-1C	Zinc Total	7/19/11	145	ug/L	3.80	10	1050				
MW-1C	Zinc Total	1/26/11	128	ug/L	3.8	10	1050				
MW-1C	Zinc, Total	1/25/12	221	ug/L	10	10	1050				
MW-1C	Zinc, total	7/19/12	164	ug/L	10	10	1050				
MW-1C	Zinc, total	1/24/13	112	ug/L	10	10	1050				
MW-1C	Zinc, total	7/22/13	16.3	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-1A	Barium, total	1/12/10	119	ug/L	0.250	100	2000				
MW-1A	Barium, total	7/29/10	336	ug/L	0.2	100	700				
MW-1A	Barium, total	1/26/11	296	ug/L	1	100	700				
MW-1A	Barium, total	7/19/12	126	ug/L	5	100	700				
MW-1A	Barium, total	7/22/13	141	ug/L	5	100	700				
MW-1A	Beryllium, total	7/29/10	2.2	ug/L	0.1	1			2	0.2	
MW-1A	**Cadmium, total**	**1/12/10**	**1.92**	**ug/L**	**0.130**	**1**	**1.75**			**0.17**	**B**
MW-1A	**Cadmium, total**	**7/29/10**	**3.5**	**ug/L**	**0.5**	**1**	**1.75**			**1.75**	**N**
MW-1A	**Cadmium Total**	**7/19/11**	**1.93**	**ug/L**	**0.360**	**1**	**1.75**			**0.18**	**B & N**
MW-1A	**Cadmium Total**	**1/26/11**	**1.9**	**ug/L**	**0.36**	**1**	**1.75**			**0.15**	**B & N**
MW-1A	Cadmium, Total	1/25/12	1.1	ug/L	1	1	1.75				
MW-1A	**Cadmium, total**	**7/19/12**	**3.9**	**ug/L**	**1**	**1**	**1.75**			**2.15**	**N**
MW-1A	**Cadmium, total**	**7/22/13**	**3.9**	**ug/L**	**1**	**1**	**2**			**1.9**	**B & N**
MW-1A	**Chromium, total**	**7/29/10**	**26.2**	**ug/L**	**0.4**	**10**	**10**			**16.2**	**N**
MW-1A	**Chromium Total**	**1/26/11**	**12.2**	**ug/L**	**1**	**10**	**10**			**2.2**	**B & N**
MW-1A	Cobalt, total	7/29/10	53.3	ug/L	0.6	10			70	43.3	
MW-1A	Cobalt Total	1/26/11	24.1	ug/L	1.1	10			70		
MW-1A	Cobalt, total	7/19/12	10.2	ug/L	5	10			70		
MW-1A	Copper, total	7/22/09	15.5	ug/L	0.30	10	1000				
MW-1A	Copper, total	1/12/10	19	ug/L	1.90	10	1000				
MW-1A	Copper, total	7/29/10	59.5	ug/L	0.3	10	1000				
MW-1A	Copper Total	7/19/11	13.8	ug/L	1.60	10	1000				
MW-1A	Copper Total	1/26/11	43.8	ug/L	1.6	10	1000				
MW-1A	Copper, total	7/19/12	12.9	ug/L	5	10	1000				
MW-1A	Copper, total	7/22/13	12.1	ug/L	5	10	1000				
MW-1A	Lead, total	7/29/10	13.6	ug/L	4	10	15				
MW-1A	Vanadium, total	7/22/09	22.1[j]	ug/L	0.20	25			3.5	18.6	
MW-1A	Vanadium, total	1/12/10	23.9[j]	ug/L	0.400	25			3.5	20.4	B
MW-1A	Vanadium, total	7/29/10	95.9	ug/L	0.2	25			3.5	92.4	
MW-1A	Vanadium, total	7/19/11	18.3 j	ug/L	1.40	25	NE		3.5	14.8	
MW-1A	Vanadium, total	1/26/11	62.6	ug/L	1.4	25			3.5	59.1	
MW-1A	Vanadium, Total	1/25/12	8.1 j	ug/L	5	25			3.5	4.6	
MW-1A	Vanadium, total	7/19/12	27.7	ug/L	5	25			3.5	24.2	
MW-1A	Vanadium, total	7/22/13	20 j	ug/L	5	25			3.5	16.5	
MW-1A	Zinc, total	7/22/09	19.3	ug/L	0.40	10	1050				
MW-1A	Zinc, total	1/12/10	29.5	ug/L	1.60	10	1050				
MW-1A	Zinc, total	7/29/10	109	ug/L	0.4	10	1050				
MW-1A	Zinc Total	7/19/11	26.4	ug/L	3.80	10	1050				
MW-1A	Zinc Total	1/26/11	84	ug/L	3.8	10	1050				
MW-1A	Zinc, Total	1/25/12	14.1	ug/L	10	10	1050				
MW-1A	Zinc, total	7/19/12	30.1	ug/L	10	10	1050				
MW-1A	Zinc, total	7/22/13	34.7	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-2	Antimony	7/21/09	3.3[j]	ug/L	2.6	6			1.4	1.9	
MW-2	Cadmium, dissolved	1/23/13	0.94 j	ug/L	0.5	1	1.75				
MW-2	**Cadmium, total**	**1/23/13**	**3.1**	**ug/L**	**1**	**1**	**1.75**			**1.35**	**N**
MW-2	Vanadium, total	7/21/09	18.7[j]	ug/L	0.20	25			3.5	15.2	
MW-2	Vanadium, total	1/13/10	3.56[j]	ug/L	0.400	25			3.5	0.06	
MW-2	Vanadium, total	7/29/10	8.3j	ug/L	0.2	25			3.5	4.8	
MW-2	Vanadium, total	1/28/11	11.1 j	ug/L	1.4	25			3.5	7.6	
MW-2	Vanadium, dissolved	1/23/13	ND	ug/L	0.2	25	NE				
MW-2	Vanadium, Total	1/25/12	9.1 j	ug/L	5	25			3.5	5.6	
MW-2	Vanadium, total	1/23/13	8.1 j	ug/L	5	25	NE		3.5	4.6	
MW-2	Zinc, total	7/21/09	15.8	ug/L	0.40	10	1050				
MW-2	Zinc, total	1/13/10	20.3	ug/L	1.60	10	1050				
MW-2	Zinc, total	7/29/10	22.4	ug/L	0.4	10	1050				
MW-2	Zinc, dissolved	1/23/13	16.7	ug/L	0.4	10	1050				
MW-2	Zinc, Total	1/25/12	11.1	ug/L	10	10	1050				
MW-2	Zinc, total	1/23/13	14.1	ug/L	10	10	1050				
MW-3A	Cadmium, total	7/23/13	1.3	ug/L	1	1	2				
MW-3A	Vanadium, total	7/21/09	9.9[j]	ug/L	0.20	25			3.5	6.4	
MW-3A	Vanadium, total	7/29/10	7.4j	ug/L	0.2	25			3.5	3.9	
MW-3A	Vanadium, total	7/18/11	12.9 j	ug/L	1.40	25	NE		3.5	9.4	
MW-3A	Vanadium, total	7/18/12	5.4j	ug/L	5	25			3.5	1.9	
MW-3A	Zinc, total	7/21/09	14.3	ug/L	0.40	10	1050				
MW-3B	**Arsenic, total**	**1/26/12**	**10.4**	**ug/L**	**5**	**10**	**10**			**0.4**	**N**
MW-3B	**Arsenic Total**	**7/18/11**	**10.6**	**ug/L**	**2.80**	**10**	**10**			**0.6**	**N**
MW-3B	**Arsenic, total**	**1/23/13**	**14.2**	**ug/L**	**5**	**10**	**10**			**4.2**	**N**
MW-3B	Arsenic, dissolved	1/23/13	ND	ug/L	2.7	10	10				
MW-3B	Cobalt, total	1/23/13	40.4	ug/L	5	10	NE		70		
MW-3B	Cobalt, dissolved	1/23/13	1.9 j	ug/L	0.6	10	NE		70		
MW-3B	Thallium	7/21/09	3.4[j]	ug/L	3.0	5.5			0.28	3.12	
MW-3B	Vanadium, total	7/21/09	3.6[j]	ug/L	0.20	25			3.5	0.1	
MW-3B	Vanadium, total	7/18/11	3.23 j	ug/L	1.40	25	NE		3.5		
MW-3B	Vanadium, total	1/28/11	4.39 j	ug/L	1.4	25			3.5	0.89	
MW-3B	Vanadium, dissolved	1/23/13	ND	ug/L	0.2	25	NE				
MW-3B	Vanadium, Total	1/26/12	6.8 j	ug/L	5	25			3.5	3.3	
MW-3B	Vanadium, total	1/23/13	14.6 j	ug/L	5	25	NE		3.5	11.1	
MW-3B	Zinc Total	7/18/11	11.9	ug/L	3.80	10	1050				
MW-3B	Zinc, total	7/18/12	46.2	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-4A	Arsenic, total	7/22/09	13.8	ug/L	2.7	10	50				
MW-4A	Barium, total	7/29/10	114	ug/L	0.2	100	700				
MW-4A	**Benzene**	**7/29/10**	**1.2**	**ug/L**	**0.25**	**1**	**1**			**0.2**	**L &/or LFG**
MW-4A	Cadmium, total	7/22/09	1.7	ug/L	0.50	1	1.75				
MW-4A	Cobalt, total	7/29/10	16.7	ug/L	0.6	10			70	6.7	
MW-4A	**Nickel, total**	**7/22/09**	**284**	**ug/L**	**1.7**	**50**	**100**			**184**	**Anomaly**
MW-4A	**Nickel, total**	**7/29/10**	**153**	**ug/L**	**1.7**	**50**	**100**			**53**	**N**
MW-4A	**Tetrachloroethene**	**7/22/09**	**0.7[j]**	**ug/L**	**0.46**	**1**	**0.7**			**0**	**L &/or LFG**
MW-4A	**Tetrachloroethene**	**7/29/10**	**0.85j**	**ug/L**	**0.46**	**1**	**0.7**			**0.15**	**L &/or LFG**
MW-4A	**Vinyl chloride**	**7/22/09**	**1.1**	**ug/L**	**0.62**	**1**	**0.015**			**1.085**	**L &/or LFG**
MW-4A	**Vinyl chloride**	**7/29/10**	**1.6**	**ug/L**	**0.62**	**1**	**0.03**			**1.57**	**L &/or LFG**

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-4B	**1,2-Dichloroethane**	**7/29/10**	**1.2**	**ug/L**	**0.12**	**1**	**0.38**			**0.82**	**L &/or LFG**
MW-4B	**1,2-Dichloroethane**	**7/19/11**	**1.6**	**ug/L**	**0.47**	**1**	**0.38**			**1.22**	**L &/or LFG**
MW-4B	**1,2-Dichloroethane**	**7/19/12**	**1.2**	**ug/L**	**0.12**	**1**	**0.38**			**0.82**	**L &/or LFG**
MW-4B	**1,2-Dichloroethane**	**1/24/13**	**0.67 j**	**ug/L**	**0.12**	**1**	**0.38**			**0.29**	**L &/or LFG**
MW-4B	1,4-Dichlorobenzene	1/13/10	1.1	ug/L	0.38	1	1.4				
MW-4B	1,4-Dichlorobenzene	7/29/10	3.6	ug/L	0.33	1	6				
MW-4B	1,4-Dichlorobenzene	7/19/11	1.8	ug/L	0.79	1	6				
MW-4B	1,4-Dichlorobenzene	1/25/12	2	ug/L	0.33	1	6				
MW-4B	1,4-Dichlorobenzene	7/19/12	3.2	ug/L	0.33	1	6				
MW-4B	1,4-Dichlorobenzene	1/24/13	1.3	ug/L	0.33	1	6				
MW-4B	1,4-Dichlorobenzene	7/23/13	2.4	ug/L	0.33	1	6				
MW-4B	1,4-Dichlorobenzene	1/27/11	1.2	ug/L	0.38	1	6				
MW-4B	Barium, total	1/13/10	222	ug/L	0.250	100	2000				
MW-4B	Barium, total	7/29/10	110	ug/L	0.2	100	700				
MW-4B	Barium, total	7/19/11	176	ug/L	1.00	100	700				
MW-4B	Barium, total	1/27/11	142	ug/L	1	100	700				
MW-4B	Barium, Total	1/25/12	147	ug/L	5	100	700				
MW-4B	Barium, total	7/19/12	132	ug/L	5	100	700				
MW-4B	Barium, total	1/24/13	164	ug/L	5	100	700				
MW-4B	Barium, total	7/23/13	155	ug/L	5	100	700				
MW-4B	**Benzene**	**1/13/10**	**1.8**	**ug/L**	**0.20**	**1**	**1**			**0.8**	**L &/ or LFG**
MW-4B	**Benzene**	**7/29/10**	**2.7**	**ug/L**	**0.25**	**1**	**1**			**1.7**	**L &/or LFG**
MW-4B	**Benzene**	**7/19/11**	**2.7**	**ug/L**	**0.68**	**1**	**1**			**1.7**	**L &/or LFG**
MW-4B	**Benzene**	**1/25/12**	**1.6**	**ug/L**	**0.25**	**1**	**1**			**0.6**	**L &/or LFG**
MW-4B	**Benzene**	**7/19/12**	**2.5**	**ug/L**	**0.25**	**1**	**1**			**1.5**	**L &/or LFG**
MW-4B	**Cadmium, total**	**7/22/09**	**3.2**	**ug/L**	**0.50**	**1**	**1.75**			**1.45**	**N**
MW-4B	Cadmium, total	7/23/13	1.6	ug/L	1	1	2				
MW-4B	Chloride	1/13/10	3700	ug/L	1200	NE	250000				
MW-4B	**Chromium, total**	**1/13/10**	**24.6**	**ug/L**	**1.70**	**10**	**10**			**14.6**	**N**
MW-4B	cis-1,2-Dichloroethene	7/29/10	6.7	ug/L	0.19	5	70				
MW-4B	cis-1,2-Dichloroethene	7/19/12	5.7	ug/L	0.19	5	70				
MW-4B	Cobalt, total	1/13/10	11.5	ug/L	0.410	10			70		
MW-4B	Copper, total	1/13/10	37.3	ug/L	1.90	10	1000				
MW-4B	Methylene chloride	1/13/10	2.3	ug/L	0.53	1	4.6				
MW-4B	**Tetrachloroethene**	**7/29/10**	**0.96j**	**ug/L**	**0.46**	**1**	**0.7**			**0.26**	**L &/or LFG**
MW-4B	Vanadium, total	1/13/10	42.2	ug/L	0.400	25			3.5	38.7	
MW-4B	Vanadium, total	7/19/11	9.7 j	ug/L	1.40	25	NE		3.5	6.2	
MW-4B	Vanadium, total	1/27/11	5.51 j	ug/L	1.4	25			3.5	2.01	
MW-4B	Vanadium, total	7/23/13	8.7 j	ug/L	5	25			3.5	5.2	
MW-4B	**Vinyl chloride**	**7/22/09**	**1.7**	**ug/L**	**0.62**	**1**	**0.015**			**1.685**	**L &/or LFG**
MW-4B	**Vinyl chloride**	**1/13/10**	**2**	**ug/L**	**0.30**	**1**	**0.03**			**1.97**	**L &/ or LFG**
MW-4B	**Vinyl chloride**	**7/29/10**	**2.1**	**ug/L**	**0.62**	**1**	**0.03**			**2.07**	**L &/or LFG**
MW-4B	**Vinyl chloride**	**7/19/11**	**2.1**	**ug/L**	**0.60**	**1**	**0.03**			**2.07**	**L &/or LFG**
MW-4B	**Vinyl chloride**	**7/19/12**	**1.8**	**ug/L**	**0.62**	**1**	**0.03**			**1.77**	**L &/or LFG**
MW-4B	**Vinyl chloride**	**1/27/11**	**0.73 j**	**ug/L**	**0.3**	**1**	**0.03**			**0.7**	**L &/or LFG**
MW-4B	Zinc, total	7/22/09	10.8	ug/L	0.40	10	1050				
MW-4B	Zinc, total	1/13/10	45.5	ug/L	1.60	10	1050				
MW-4B	Zinc Total	7/19/11	22.6	ug/L	3.80	10	1050				
MW-4B	Zinc Total	1/27/11	10.2	ug/L	3.8	10	1050				
MW-4B	Zinc, Total	1/25/12	12.2	ug/L	10	10	1050				
MW-4B	Zinc, total	1/24/13	11	ug/L	10	10	1050				
MW-4B	Zinc, total	7/23/13	23.9	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-6A	Barium, total	7/21/09	101	ug/L	0.20	100	2000				
MW-6A	Barium, total	7/18/11	101	ug/L	1.00	100	700				
MW-6A	Barium, total	1/28/11	101	ug/L	1	100	700				
MW-6A	Vanadium, total	7/21/09	11.2[j]	ug/L	0.20	25			3.5	7.7	
MW-6A	Vanadium, total	1/13/10	6.64[j]	ug/L	0.400	25			3.5	3.14	
MW-6A	Vanadium, total	7/18/12	6.6j	ug/L	5	25			3.5	3.1	
MW-6A	Zinc, total	7/21/09	18.5	ug/L	0.40	10	1050				
MW-6A	Zinc, total	1/13/10	12.6	ug/L	1.60	10	1050				
MW-6A	Zinc, total	7/29/10	19.6	ug/L	0.4	10	1050				
MW-6A	Zinc Total	7/18/11	10.9	ug/L	3.80	10	1050				
MW-6A	Zinc Total	1/28/11	14.2	ug/L	3.8	10	1050				
MW-6A	Zinc, Total	1/26/12	15.5	ug/L	10	10	1050				
MW-6A	Zinc, total	7/18/12	11.7	ug/L	10	10	1050				
MW-6A	Zinc, total	1/23/13	13.4	ug/L	10	10	1050				
MW-6A	Zinc, total	7/23/13	11.5	ug/L	10	10	1000				
MW-6B	Barium, total	7/23/13	147	ug/L	5	100	700				
MW-6B	Cadmium, Total	1/26/12	1	ug/L	1	1	1.75				
MW-6B	Vanadium, total	7/21/09	4.4[j]	ug/L	0.20	25			3.5	0.9	
MW-6B	Vanadium, total	1/13/10	4.44[j]	ug/L	0.400	25			3.5	0.94	
MW-6B	Vanadium, total	7/23/13	5.2 j	ug/L	5	25			3.5	1.7	
MW-6B	Zinc, total	7/23/13	13.7	ug/L	10	10	1000				
MW-7	Barium, total	1/13/10	148	ug/L	0.250	100	2000				
MW-7	Barium, total	7/19/11	109	ug/L	1.00	100	700				
MW-7	Barium, total	1/27/11	103	ug/L	1	100	700				
MW-7	**Cadmium, total**	**1/13/10**	**2.18**	**ug/L**	**0.130**	**1**	**1.75**			**0.43**	**N**
MW-7	Cadmium Total	7/19/11	1.24	ug/L	0.360	1	1.75				
MW-7	**Cadmium Total**	**1/27/11**	**4.09**	**ug/L**	**0.36**	**1**	**1.75**			**2.34**	**N**
MW-7	**Cadmium, total**	**7/18/12**	**3.8**	**ug/L**	**1**	**1**	**1.75**			**2.05**	**N**
MW-7	Cadmium, total	7/24/13	1.3	ug/L	1	1	2				
MW-7	Chloride	1/13/10	7500	ug/L	1200	NE	250000				
MW-7	**Chromium, total**	**1/13/10**	**12.5**	**ug/L**	**1.70**	**10**	**10**			**2.5**	**N**
MW-7	Copper, total	7/22/09	11.4	ug/L	0.30	10	1000				
MW-7	Copper, total	1/13/10	13.9	ug/L	1.90	10	1000				
MW-7	Lead, total	1/13/10	14.9	ug/L	1.10	10	15				
MW-7	Vanadium, total	7/22/09	4.6[j]	ug/L	0.20	25			3.5	1.1	
MW-7	Vanadium, total	1/13/10	32.4	ug/L	0.400	25			3.5	28.9	
MW-7	Vanadium, total	7/19/11	7.8 j	ug/L	1.40	25	NE		3.5	4.3	
MW-7	Vanadium, total	1/27/11	6.94 j	ug/L	1.4	25			3.5	3.44	
MW-7	Zinc, total	7/22/09	16.6	ug/L	0.40	10	1050				
MW-7	Zinc, total	1/13/10	57.6	ug/L	1.60	10	1050				
MW-7	Zinc Total	7/19/11	17.9	ug/L	3.80	10	1050				
MW-7	Zinc Total	1/27/11	13.8	ug/L	3.8	10	1050				
MW-7	Zinc, Total	1/25/12	13.6	ug/L	10	10	1050				
MW-7	Zinc, total	7/18/12	14.1	ug/L	10	10	1050				
MW-7	Zinc, total	1/24/13	10.3	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-8	Barium, total	7/21/09	113	ug/L	0.20	100	2000				
MW-8	Barium, total	1/13/10	273	ug/L	0.250	100	2000				
MW-8	Barium, total	7/18/11	125	ug/L	1.00	100	700				
MW-8	Barium, total	1/28/11	140	ug/L	1	100	700				
MW-8	Barium, total	7/18/12	126	ug/L	5	100	700				
MW-8	Barium, total	7/23/13	257	ug/L	5	100	700				
MW-8	Beryllium, total	1/13/10	1.27	ug/L	0.0860	1			4		
MW-8	Beryllium, total	7/23/13	1.7	ug/L	1	1			4		
MW-8	Cadmium, total	7/23/13	1.4	ug/L	1	1	2				
MW-8	Chromium, total	7/21/09	13.7	ug/L	0.40	10	50				
MW-8	**Chromium, total**	**1/13/10**	**40.5**	**ug/L**	**1.70**	**10**	**10**			**30.5**	**N**
MW-8	**Chromium, Total**	**1/26/12**	**11.9**	**ug/L**	**5**	**10**	**10**			**1.9**	**N**
MW-8	Copper, total	1/13/10	24.5	ug/L	1.90	10	1000				
MW-8	Vanadium, total	7/21/09	13.6[j]	ug/L	0.20	25			3.5	10.1	
MW-8	Vanadium, total	1/13/10	42.7	ug/L	0.400	25			3.5	39.2	
MW-8	Vanadium, total	7/18/11	7.01 j	ug/L	1.40	25	NE		3.5	3.51	
MW-8	Vanadium, total	1/28/11	8.87 j	ug/L	1.4	25			3.5	5.37	
MW-8	Vanadium, Total	1/26/12	16.1	ug/L	5	25			3.5	12.6	
MW-8	Vanadium, total	7/18/12	9.7j	ug/L	5	25			3.5	6.2	
MW-8	Vanadium, total	1/23/13	5.2 j	ug/L	5	25	NE		3.5	1.7	
MW-8	Vanadium, total	7/23/13	6.3 j	ug/L	5	25			3.5	2.8	
MW-8	Zinc, total	7/21/09	18.6	ug/L	0.40	10	1050				
MW-8	Zinc, total	1/13/10	53.4	ug/L	1.60	10	1050				
MW-8	Zinc Total	7/18/11	12.5	ug/L	3.80	10	1050				
MW-8	Zinc Total	1/28/11	15.2	ug/L	3.8	10	1050				
MW-8	Zinc, Total	1/26/12	15.4	ug/L	10	10	1050				
MW-8	Zinc, total	7/18/12	15.8	ug/L	10	10	1050				
MW-8	Zinc, total	1/23/13	10	ug/L	10	10	1050				
MW-8	Zinc, total	7/23/13	25.1	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-11	**1,2-Dichloroethane**	**7/23/09**	**2.1**	**ug/L**	**0.12**	**1**	**0.38**			**1.72**	**L &/or LFG**
MW-11	**1,2-Dichloroethane**	**1/24/13**	**0.87 j**	**ug/L**	**0.12**	**1**	**0.38**			**0.49**	**L &/or LFG**
MW-11	1,4-Dichlorobenzene	7/23/09	1.1	ug/L	0.33	1	1.4				
MW-11	Barium, total	7/23/09	153	ug/L	0.20	100	2000				
MW-11	Barium, total	1/14/10	174	ug/L	0.250	100	2000				
MW-11	Barium, total	7/30/10	159	ug/L	0.2	100	700				
MW-11	Barium, total	7/19/11	256	ug/L	1.00	100	700				
MW-11	Barium, total	1/27/11	160	ug/L	1	100	700				
MW-11	Barium, Total	1/25/12	401	ug/L	5	100	700				
MW-11	Barium, total	7/19/12	249	ug/L	5	100	700				
MW-11	Barium, total	1/24/13	216	ug/L	5	100	700				
MW-11	Barium, total	7/24/13	182	ug/L	5	100	700				
MW-11	**Benzene**	**7/23/09**	**1.5**	**ug/L**	**0.25**	**1**	**1**			**0.5**	**L &/or LFG**
MW-11	**Benzene**	**7/19/11**	**1.2**	**ug/L**	**0.68**	**1**	**1**			**0.2**	**L &/or LFG**
MW-11	**Benzene**	**1/25/12**	**1.8**	**ug/L**	**0.25**	**1**	**1**			**0.8**	**L &/or LFG**
MW-11	Benzene	7/19/12	1	ug/L	0.25	1	1				
MW-11	**Benzene**	**1/24/13**	**2.2**	**ug/L**	**0.25**	**1**	**1**			**1.2**	**L &/or LFG**
MW-11	**Benzene**	**7/24/13**	**1.2**	**ug/L**	**0.25**	**1**	**1**			**0.2**	**L &/or LFG**
MW-11	**Bromodichloromethane**	**1/14/10**	**0.65[j]**	**ug/L**	**0.37**	**1**	**0.56**			**0.09**	**L &/ or LFG**
MW-11	Chloride	1/14/10	25000	ug/L	1200	NE	250000				
MW-11	Chloroform	1/14/10	9	ug/L	0.20	5	70				
MW-11	cis-1,2-Dichloroethene	7/23/09	23.9	ug/L	0.19	5	70				
MW-11	**Methylene Chloride**	**7/23/09**	**11**	**ug/L**	**0.97**	**2**	**4.6**			**6.4**	**L &/or LFG**
MW-11	**Tetrachloroethene**	**7/23/09**	**2**	**ug/L**	**0.46**	**1**	**0.7**			**1.3**	**L &/or LFG**
MW-11	**Tetrachloroethene**	**1/14/10**	**0.91[j]**	**ug/L**	**0.36**	**1**	**0.7**			**0.21**	**L &/ or LFG**
MW-11	**Trichloroethene**	**7/23/09**	**4**	**ug/L**	**0.47**	**1**	**2.8**			**1.2**	**L &/or LFG**
MW-11	Vanadium, total	1/14/10	4.75[j]	ug/L	0.400	25			3.5	1.25	
MW-11	Vanadium, total	7/19/11	5.12 j	ug/L	1.40	25	NE		3.5	1.62	
MW-11	Vanadium, total	7/19/12	5.7j	ug/L	5	25			3.5	2.2	
MW-11	**Vinyl chloride**	**1/14/10**	**0.45[j]**	**ug/L**	**0.30**	**1**	**0.03**			**0.42**	**L &/ or LFG**
MW-11	**Vinyl chloride**	**7/30/10**	**2.5**	**ug/L**	**0.62**	**1**	**0.03**			**2.47**	**L &/or LFG**
MW-11	**Vinyl chloride**	**7/19/11**	**5**	**ug/L**	**0.60**	**1**	**0.03**			**4.97**	**L &/or LFG**
MW-11	**Vinyl chloride**	**1/25/12**	**7.6**	**ug/L**	**0.62**	**1**	**0.03**			**7.57**	**L &/or LFG**
MW-11	**Vinyl chloride**	**7/19/12**	**7.9**	**ug/L**	**0.62**	**1**	**0.03**			**7.87**	**L &/or LFG**
MW-11	**Vinyl chloride**	**1/24/13**	**8.4**	**ug/L**	**0.62**	**1**	**0.03**			**8.37**	**L &/or LFG**
MW-11	**Vinyl chloride**	**7/24/13**	**4.3**	**ug/L**	**0.62**	**1**	**0.03**			**4.27**	**L &/or LFG**
MW-11	**Vinyl chloride**	**1/27/11**	**2.6**	**ug/L**	**0.3**	**1**	**0.03**			**2.57**	**L &/or LFG**
MW-11	Zinc Total	7/19/11	13.4	ug/L	3.80	10	1050				
MW-11	Zinc, Total	1/25/12	11.6	ug/L	10	10	1050				
MW-11	Zinc, total	7/19/12	14.7	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-12	Barium, total	7/22/09	165	ug/L	0.20	100	2000				
MW-12	Barium, total	1/13/10	164	ug/L	0.250	100	2000				
MW-12	Barium, total	7/29/10	269	ug/L	0.2	100	700				
MW-12	Barium, total	7/19/11	110	ug/L	1.00	100	700				
MW-12	Barium, total	1/27/11	160	ug/L	1	100	700				
MW-12	Barium, total	1/24/13	204	ug/L	5	100	700				
MW-12	Barium, total	7/24/13	380	ug/L	5	100	700				
MW-12	Beryllium, total	7/24/13	2.6	ug/L	1	1			4		
MW-12	Cadmium, total	7/24/13	1	ug/L	1	1	2				
MW-12	Chloride	1/13/10	6500	ug/L	1200	NE	250000				
MW-12	**Chromium, total**	**7/29/10**	**21.5**	**ug/L**	**0.4**	**10**	**10**			**11.5**	**N**
MW-12	Cobalt, total	7/29/10	14.4	ug/L	0.6	10			70	4.4	
MW-12	Cobalt, total	7/24/13	21.5	ug/L	5	10			70		
MW-12	Copper, total	7/29/10	11.3	ug/L	0.3	10	1000				
MW-12	Vanadium, total	7/29/10	29.6	ug/L	0.2	25			3.5	26.1	
MW-12	Vanadium, total	7/19/11	11.4 j	ug/L	1.40	25	NE		3.5	7.9	
MW-12	Vanadium, total	1/27/11	3.85 j	ug/L	1.4	25			3.5	0.35	
MW-12	Vanadium, Total	1/25/12	9.7 j	ug/L	5	25			3.5	6.2	
MW-12	Zinc, total	7/22/09	39.4	ug/L	0.40	10	1050				
MW-12	Zinc, total	1/13/10	11	ug/L	1.60	10	1050				
MW-12	Zinc, total	7/29/10	38.9	ug/L	0.4	10	1050				
MW-12	Zinc Total	7/19/11	17	ug/L	3.80	10	1050				
MW-12	Zinc Total	1/27/11	10.3	ug/L	3.8	10	1050				
MW-12	Zinc, Total	1/25/12	17.2	ug/L	10	10	1050				
MW-12	Zinc, total	1/24/13	17	ug/L	10	10	1050				
MW-12	Zinc, total	7/24/13	51	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-13A	Barium, total	7/22/09	125	ug/L	0.20	100	2000				
MW-13A	Barium, total	1/13/10	136	ug/L	0.250	100	2000				
MW-13A	Barium, total	7/30/10	121	ug/L	0.2	100	700				
MW-13A	Barium, total	7/19/11	228	ug/L	1.00	100	700				
MW-13A	Barium, total	7/23/13	130	ug/L	5	100	700				
MW-13A	Chromium, total	7/22/09	22.1	ug/L	0.40	10	50				
MW-13A	**Chromium, total**	**1/13/10**	**20.5**	**ug/L**	**1.70**	**10**	**10**			**10.5**	**N**
MW-13A	**Chromium, total**	**7/30/10**	**18**	**ug/L**	**0.4**	**10**	**10**			**8**	**N**
MW-13A	**Chromium Total**	**7/19/11**	**31.2**	**ug/L**	**1.00**	**10**	**10**			**21.2**	**N**
MW-13A	**Chromium, total**	**7/19/12**	**16.8**	**ug/L**	**5**	**10**	**10**			**6.8**	**N**
MW-13A	**Chromium, total**	**7/23/13**	**12.9**	**ug/L**	**5**	**10**	**10**			**2.9**	**N**
MW-13A	Methylene chloride	1/27/11	1	ug/L	0.53	1	4.6				
MW-13A	Thallium Total	7/19/11	0.306 j	ug/L	0.110	5.5	NE		0.28	0.026	
MW-13A	Trichloroethene	1/27/11	1.2	ug/L	0.38	1	3				
MW-13A	Vanadium, total	7/22/09	24.2[j]	ug/L	0.20	25			3.5	20.7	
MW-13A	Vanadium, total	1/13/10	21.4[j]	ug/L	0.400	25			3.5	17.9	
MW-13A	Vanadium, total	7/30/10	21.1j	ug/L	0.2	25			3.5	17.6	
MW-13A	Vanadium, total	7/19/11	32.7	ug/L	1.40	25	NE		3.5	29.2	
MW-13A	Vanadium, total	7/19/12	19.6j	ug/L	5	25			3.5	16.1	
MW-13A	Vanadium, total	7/23/13	11 j	ug/L	5	25			3.5	7.5	
MW-13A	**Vinyl chloride**	**1/27/11**	**0.44 j**	**ug/L**	**0.3**	**1**	**0.03**			**0.41**	**L &/or LFG**
MW-13A	Zinc, total	7/22/09	31.7	ug/L	0.40	10	1050				
MW-13A	Zinc, total	1/13/10	33.4	ug/L	1.60	10	1050				
MW-13A	Zinc, total	7/30/10	27.4	ug/L	0.4	10	1050				
MW-13A	Zinc Total	7/19/11	53.6	ug/L	3.80	10	1050				
MW-13A	Zinc, Total	1/25/12	13.3	ug/L	10	10	1050				
MW-13A	Zinc, total	7/19/12	27.8	ug/L	10	10	1050				
MW-13A	Zinc, total	7/23/13	18.4	ug/L	10	10	1000				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-13B	1,1-Dichloroethane	7/23/09	8	ug/L	0.32	5	70				
MW-13B	**1,2-Dichloroethane**	**7/23/09**	**2.3**	**ug/L**	**0.12**	**1**	**0.38**			**1.92**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**1/14/10**	**2.2**	**ug/L**	**0.65**	**1**	**0.38**			**1.82**	**L &/ or LFG**
MW-13B	**1,2-Dichloroethane**	**7/30/10**	**2.6**	**ug/L**	**0.12**	**1**	**0.38**			**2.22**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**7/19/11**	**3.7**	**ug/L**	**0.47**	**1**	**0.38**			**3.32**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**1/25/12**	**2.9**	**ug/L**	**0.12**	**1**	**0.38**			**2.52**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**7/19/12**	**3.2**	**ug/L**	**0.12**	**1**	**0.38**			**2.82**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**1/24/13**	**2.1**	**ug/L**	**0.12**	**1**	**0.38**			**1.72**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**7/23/13**	**2.2**	**ug/L**	**0.12**	**1**	**0.38**			**1.82**	**L &/or LFG**
MW-13B	**1,2-Dichloroethane**	**1/27/11**	**2**	**ug/L**	**0.65**	**1**	**0.38**			**1.62**	**L &/or LFG**
MW-13B	1,4-Dichlorobenzene	7/23/13	1.1	ug/L	0.33	1	6				
MW-13B	Barium, total	7/23/09	325	ug/L	0.20	100	2000				
MW-13B	Barium, total	1/14/10	345	ug/L	0.250	100	2000				
MW-13B	Barium, total	7/30/10	394	ug/L	0.2	100	700				
MW-13B	Barium, total	7/19/11	445	ug/L	1.00	100	700				
MW-13B	Barium, total	1/27/11	401	ug/L	1	100	700				
MW-13B	Barium, Total	1/25/12	402	ug/L	5	100	700				
MW-13B	Barium, total	7/19/12	136	ug/L	5	100	700				
MW-13B	Barium, total	1/24/13	323	ug/L	5	100	700				
MW-13B	Barium, total	7/23/13	329	ug/L	5	100	700				
MW-13B	**Benzene**	**7/23/09**	**2.3**	**ug/L**	**0.25**	**1**	**1**			**1.3**	**L &/or LFG**
MW-13B	**Benzene**	**1/14/10**	**2.3**	**ug/L**	**0.20**	**1**	**1**			**1.3**	**L &/ or LFG**
MW-13B	**Benzene**	**7/30/10**	**3.9**	**ug/L**	**0.25**	**1**	**1**			**2.9**	**L &/or LFG**
MW-13B	**Benzene**	**7/19/11**	**7.3**	**ug/L**	**0.68**	**1**	**1**			**6.3**	**L &/or LFG**
MW-13B	**Benzene**	**1/25/12**	**3.5**	**ug/L**	**0.25**	**1**	**1**			**2.5**	**L &/or LFG**
MW-13B	**Benzene**	**7/19/12**	**3.3**	**ug/L**	**0.25**	**1**	**1**			**2.3**	**L &/or LFG**
MW-13B	**Benzene**	**1/24/13**	**2.8**	**ug/L**	**0.25**	**1**	**1**			**1.8**	**L &/or LFG**
MW-13B	**Benzene**	**7/23/13**	**3.5**	**ug/L**	**0.25**	**1**	**1**			**2.5**	**L &/or LFG**
MW-13B	**Benzene**	**1/27/11**	**4.2**	**ug/L**	**0.2**	**1**	**1**			**3.2**	**L &/or LFG**
MW-13B	Beryllium, total	7/23/09	1.2	ug/L	0.10	1			4		
MW-13B	Beryllium, total	1/14/10	1.01	ug/L	0.0860	1			4		
MW-13B	Beryllium, total	7/30/10	1.3	ug/L	0.1	1			2		
MW-13B	Beryllium Total	7/19/11	1.6	ug/L	0.100	1	NE		4		
MW-13B	Beryllium Total	1/27/11	1.31	ug/L	0.1	1			4		
MW-13B	Beryllium, total	1/24/13	1.5	ug/L	1	1					
MW-13B	Beryllium, total	7/23/13	1.5	ug/L	1	1			4		
MW-13B	Chloride	1/14/10	4000	ug/L	1200	NE	250000				
MW-13B	cis-1,2-Dichloroethene	7/23/09	54	ug/L	0.19	5	70				
MW-13B	cis-1,2-Dichloroethene	1/14/10	50	ug/L	0.36	5	70				
MW-13B	cis-1,2-Dichloroethene	7/30/10	39.9	ug/L	0.19	5	70				
MW-13B	cis-1,2-Dichloroethene	7/19/11	49	ug/L	0.72	5	70				
MW-13B	cis-1,2-Dichloroethene	1/25/12	34.2	ug/L	0.19	5	70				
MW-13B	cis-1,2-Dichloroethene	7/19/12	36.7	ug/L	0.19	5	70				
MW-13B	cis-1,2-Dichloroethene	1/24/13	23.5	ug/L	0.19	5	70				
MW-13B	cis-1,2-Dichloroethene	1/27/11	37	ug/L	0.36	5	70				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-13B	**Methylene Chloride**	**7/23/09**	**60.6**	**ug/L**	**0.97**	**2**	**4.6**			**56**	**L &/or LFG**
MW-13B	**Methylene chloride**	**1/14/10**	**35**	**ug/L**	**0.53**	**1**	**4.6**			**30.4**	**L &/ or LFG**
MW-13B	**Methylene Chloride**	**7/30/10**	**12.1**	**ug/L**	**0.97**	**1**	**4.6**			**7.5**	**L &/or LFG**
MW-13B	**Methylene chloride**	**7/19/11**	**13**	**ug/L**	**0.14**	**1**	**4.6**			**8.4**	**L &/or LFG**
MW-13B	**Methylene Chloride**	**1/25/12**	**7**	**ug/L**	**0.97**	**1**	**4.6**			**2.4**	**L &/or LFG**
MW-13B	**Methylene Chloride**	**7/19/12**	**10.9**	**ug/L**	**0.97**	**1**	**4.6**			**6.3**	**L &/or LFG**
MW-13B	**Methylene Chloride**	**1/24/13**	**7.2**	**ug/L**	**0.97**	**1**	**4.6**			**2.6**	**L &/or LFG**
MW-13B	Methylene Chloride	7/23/13	2.4	ug/L	0.97	1	4.6				
MW-13B	**Methylene chloride**	**1/27/11**	**16**	**ug/L**	**0.53**	**1**	**4.6**			**11.4**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**7/23/09**	**4.8**	**ug/L**	**0.46**	**1**	**0.7**			**4.1**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**1/14/10**	**4.2**	**ug/L**	**0.36**	**1**	**0.7**			**3.5**	**L &/ or LFG**
MW-13B	**Tetrachloroethene**	**7/30/10**	**3.5**	**ug/L**	**0.46**	**1**	**0.7**			**2.8**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**7/19/11**	**2.7**	**ug/L**	**0.73**	**1**	**0.7**			**2**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**1/25/12**	**2**	**ug/L**	**0.46**	**1**	**0.7**			**1.3**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**7/19/12**	**1.8**	**ug/L**	**0.46**	**1**	**0.7**			**1.1**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**1/24/13**	**1.4**	**ug/L**	**0.46**	**1**	**0.7**			**0.7**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**7/23/13**	**1.5**	**ug/L**	**0.46**	**1**	**0.7**			**0.8**	**L &/or LFG**
MW-13B	**Tetrachloroethene**	**1/27/11**	**3**	**ug/L**	**0.36**	**1**	**0.7**			**2.3**	**L &/or LFG**
MW-13B	**Trichloroethene**	**7/23/09**	**11.7**	**ug/L**	**0.47**	**1**	**2.8**			**8.9**	**L &/or LFG**
MW-13B	**Trichloroethene**	**1/14/10**	**10**	**ug/L**	**0.38**	**1**	**2.8**			**7.2**	**L &/ or LFG**
MW-13B	**Trichloroethene**	**7/30/10**	**7**	**ug/L**	**0.47**	**1**	**3**			**4**	**L &/or LFG**
MW-13B	**Trichloroethene**	**7/19/11**	**6.2**	**ug/L**	**0.72**	**1**	**2.8**			**3.4**	**L &/or LFG**
MW-13B	**Trichloroethene**	**1/25/12**	**5.9**	**ug/L**	**0.47**	**1**	**3**			**2.9**	**L &/or LFG**
MW-13B	**Trichloroethene**	**7/19/12**	**4.9**	**ug/L**	**0.47**	**1**	**3**			**1.9**	**L &/or LFG**
MW-13B	**Trichloroethene**	**1/24/13**	**3.4**	**ug/L**	**0.47**	**1**	**3**			**0.4**	**L &/or LFG**
MW-13B	**Trichloroethene**	**7/23/13**	**4.1**	**ug/L**	**0.47**	**1**	**3**			**1.1**	**L &/or LFG**
MW-13B	**Trichloroethene**	**1/27/11**	**8**	**ug/L**	**0.38**	**1**	**3**			**5**	**L &/or LFG**
MW-13B	Vanadium, total	7/19/11	3.76 j	ug/L	1.40	25	NE		3.5	0.26	
MW-13B	Vanadium, total	1/24/13	6.5 j	ug/L	5	25	NE		3.5	3	
MW-13B	**Vinyl chloride**	**7/23/09**	**2.3**	**ug/L**	**0.62**	**1**	**0.015**			**2.285**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**1/14/10**	**3.5**	**ug/L**	**0.30**	**1**	**0.03**			**3.47**	**L &/ or LFG**
MW-13B	**Vinyl chloride**	**7/30/10**	**5.9**	**ug/L**	**0.62**	**1**	**0.03**			**5.87**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**7/19/11**	**7.7**	**ug/L**	**0.60**	**1**	**0.03**			**7.67**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**1/25/12**	**4.2**	**ug/L**	**0.62**	**1**	**0.03**			**4.17**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**7/19/12**	**6.1**	**ug/L**	**0.62**	**1**	**0.03**			**6.07**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**1/24/13**	**2.6**	**ug/L**	**0.62**	**1**	**0.03**			**2.57**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**7/23/13**	**3.8**	**ug/L**	**0.62**	**1**	**0.03**			**3.77**	**L &/or LFG**
MW-13B	**Vinyl chloride**	**1/27/11**	**5.1**	**ug/L**	**0.3**	**1**	**0.03**			**5.07**	**L &/or LFG**
MW-13B	Xylene (Total)	7/23/09	7.5	ug/L	0.66	5	530				
MW-13B	Xylene (Total)	1/25/12	5.1	ug/L	0.66	5	530				
MW-13B	Xylenes (Total)	1/14/10	11	ug/L	0.40	5	530				
MW-13B	Zinc Total	7/19/11	10.6	ug/L	3.80	10	1050				
MW-13B	Zinc, Total	1/25/12	13.6	ug/L	10	10	1050				
MW-13B	Zinc, total	1/24/13	17.3	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-13BR	Antimony	7/21/09	3.3[j]	ug/L	2.6	6			1.4	1.9	
MW-13BR	Barium, total	7/21/09	119	ug/L	0.20	100	2000				
MW-13BR	Barium, total	1/13/10	131	ug/L	0.250	100	2000				
MW-13BR	Chromium, total	7/21/09	25.8	ug/L	0.40	10	50				
MW-13BR	**Chromium, total**	**1/13/10**	**13.4**	**ug/L**	**1.70**	**10**	**10**			**3.4**	**N**
MW-13BR	cis-1,2-Dichloroethene	7/18/12	5	ug/L	0.19	5	70				
MW-13BR	Copper, total	7/21/09	14.8	ug/L	0.30	10	1000				
MW-13BR	Methylene chloride	1/13/10	1.2	ug/L	0.53	1	4.6				
MW-13BR	Thallium	7/21/09	5.3[j]	ug/L	3.0	5.5			0.28	5.02	
MW-13BR	Trichloroethene	7/18/12	1.2	ug/L	0.47	1	3				
MW-13BR	Vanadium, total	7/21/09	37	ug/L	0.20	25			3.5	33.5	
MW-13BR	Vanadium, total	1/13/10	12.3[j]	ug/L	0.400	25			3.5	8.8	
MW-13BR	Zinc, total	7/21/09	30.2	ug/L	0.40	10	1050				
MW-13BR	Zinc, total	1/13/10	12.7	ug/L	1.60	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-14A	Barium, total	7/23/09	156	ug/L	0.20	100	2000				
MW-14A	Barium, total	1/14/10	147	ug/L	0.250	100	2000				
MW-14A	Barium, total	7/30/10	469	ug/L	0.2	100	700				
MW-14A	Beryllium, total	7/30/10	3.4	ug/L	0.1	1			2	1.4	
MW-14A	Chloride	1/14/10	3300	ug/L	1200	NE	250000				
MW-14A	**Chromium, total**	**7/30/10**	**24.1**	**ug/L**	**0.4**	**10**	**10**			**14.1**	**N**
MW-14A	**Tetrachloroethene**	**7/23/09**	**1.8**	**ug/L**	**0.46**	**1**	**0.7**			**1.1**	**L &/or LFG**
MW-14A	**Tetrachloroethene**	**1/14/10**	**1.6**	**ug/L**	**0.36**	**1**	**0.7**			**0.9**	**L &/ or LFG**
MW-14A	**Tetrachloroethene**	**7/30/10**	**1.5**	**ug/L**	**0.46**	**1**	**0.7**			**0.8**	**L &/or LFG**
MW-14A	Vanadium, total	1/14/10	5.89[j]	ug/L	0.400	25			3.5	2.39	N
MW-14A	Vanadium, total	7/30/10	29.3	ug/L	0.2	25			3.5	25.8	
MW-14A	Zinc, total	1/14/10	12.5	ug/L	1.60	10	1050				
MW-14A	Zinc, total	7/30/10	33.9	ug/L	0.4	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-14B	**1,1-Dichloroethane**	**7/19/11**	**6**	**ug/L**	**0.080**	**5**	**6**			**0**	**L &/or LFG**
MW-14B	1,1-Dichloroethane	1/27/11	5.4	ug/L	0.33	5	70				
MW-14B	**1,2-Dichloroethane**	**7/30/10**	**0.43j**	**ug/L**	**0.12**	**1**	**0.38**			**0.05**	**L &/or LFG**
MW-14B	Barium, total	7/19/11	178	ug/L	1.00	100	700				
MW-14B	Barium, total	1/27/11	159	ug/L	1	100	700				
MW-14B	Barium, Total	1/25/12	163	ug/L	5	100	700				
MW-14B	Barium, total	7/19/12	139	ug/L	5	100	700				
MW-14B	Barium, total	1/24/13	141	ug/L	5	100	700				
MW-14B	Barium, total	7/24/13	116	ug/L	5	100	700				
MW-14B	**Benzene**	**7/30/10**	**2.1**	**ug/L**	**0.25**	**1**	**1**			**1.1**	**L &/or LFG**
MW-14B	**Benzene**	**7/19/11**	**3.4**	**ug/L**	**0.68**	**1**	**1**			**2.4**	**L &/or LFG**
MW-14B	**Benzene**	**1/25/12**	**1.5**	**ug/L**	**0.25**	**1**	**1**			**0.5**	**L &/or LFG**
MW-14B	**Benzene**	**7/19/12**	**2**	**ug/L**	**0.25**	**1**	**1**			**1**	**L &/or LFG**
MW-14B	**Benzene**	**1/24/13**	**1.9**	**ug/L**	**0.25**	**1**	**1**			**0.9**	**L &/or LFG**
MW-14B	**Benzene**	**7/24/13**	**2**	**ug/L**	**0.25**	**1**	**1**			**1**	**L &/or LFG**
MW-14B	**Benzene**	**1/27/11**	**2.2**	**ug/L**	**0.2**	**1**	**1**			**1.2**	**L &/or LFG**
MW-14B	Cadmium Total	7/19/11	1.35	ug/L	0.360	1	1.75				
MW-14B	Chloride	1/14/10	2900	ug/L	1200	NE	250000				
MW-14B	cis-1,2-Dichloroethene	1/14/10	6	ug/L	0.36	5	70				
MW-14B	cis-1,2-Dichloroethene	7/30/10	20.8	ug/L	0.19	5	70				
MW-14B	cis-1,2-Dichloroethene	7/19/11	30	ug/L	0.72	5	70				
MW-14B	cis-1,2-Dichloroethene	1/25/12	14	ug/L	0.19	5	70				
MW-14B	cis-1,2-Dichloroethene	7/19/12	14	ug/L	0.19	5	70				
MW-14B	cis-1,2-Dichloroethene	1/24/13	11.6	ug/L	0.19	5	70				
MW-14B	cis-1,2-Dichloroethene	1/27/11	24	ug/L	0.36	5	70				
MW-14B	**Methylene Chloride**	**7/22/09**	**5.7**	**ug/L**	**0.97**	**2**	**4.6**			**1.1**	**L &/or LFG**
MW-14B	**Methylene chloride**	**1/14/10**	**6.6**	**ug/L**	**0.53**	**1**	**4.6**			**2**	**L &/ or LFG**
MW-14B	**Methylene Chloride**	**7/30/10**	**14.6**	**ug/L**	**0.97**	**1**	**4.6**			**10**	**L &/or LFG**
MW-14B	**Methylene chloride**	**7/19/11**	**18**	**ug/L**	**0.14**	**1**	**4.6**			**13.4**	**L &/or LFG**
MW-14B	**Methylene Chloride**	**1/25/12**	**8.8**	**ug/L**	**0.97**	**1**	**4.6**			**4.2**	**L &/or LFG**
MW-14B	**Methylene Chloride**	**7/19/12**	**8.7**	**ug/L**	**0.97**	**1**	**4.6**			**4.1**	**L &/or LFG**
MW-14B	**Methylene Chloride**	**1/24/13**	**10.1**	**ug/L**	**0.97**	**1**	**4.6**			**5.5**	**L &/or LFG**
MW-14B	**Methylene Chloride**	**7/24/13**	**5**	**ug/L**	**0.97**	**1**	**4.6**			**0.4**	**L &/or LFG**
MW-14B	**Methylene chloride**	**1/27/11**	**17**	**ug/L**	**0.53**	**1**	**4.6**			**12.4**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**7/22/09**	**1.5**	**ug/L**	**0.46**	**1**	**0.7**			**0.8**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**1/14/10**	**1.3**	**ug/L**	**0.36**	**1**	**0.7**			**0.6**	**L &/ or LFG**
MW-14B	**Tetrachloroethene**	**7/30/10**	**2.9**	**ug/L**	**0.46**	**1**	**0.7**			**2.2**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**7/19/11**	**2.8**	**ug/L**	**0.73**	**1**	**0.7**			**2.1**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**1/25/12**	**2.3**	**ug/L**	**0.46**	**1**	**0.7**			**1.6**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**7/19/12**	**1.7**	**ug/L**	**0.46**	**1**	**0.7**			**1**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**1/24/13**	**1.5**	**ug/L**	**0.46**	**1**	**0.7**			**0.8**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**7/24/13**	**1.2**	**ug/L**	**0.46**	**1**	**0.7**			**0.5**	**L &/or LFG**
MW-14B	**Tetrachloroethene**	**1/27/11**	**3.3**	**ug/L**	**0.36**	**1**	**0.7**			**2.6**	**L &/or LFG**
MW-14B	Trichloroethene	7/22/09	2.2	ug/L	0.47	1	2.8				
MW-14B	Trichloroethene	1/14/10	2.6	ug/L	0.38	1	2.8				
MW-14B	**Trichloroethene**	**7/30/10**	**4.9**	**ug/L**	**0.47**	**1**	**3**			**1.9**	**L &/or LFG**
MW-14B	**Trichloroethene**	**7/19/11**	**4.9**	**ug/L**	**0.72**	**1**	**2.8**			**2.1**	**L &/or LFG**
MW-14B	**Trichloroethene**	**1/25/12**	**3.8**	**ug/L**	**0.47**	**1**	**3**			**0.8**	**L &/or LFG**
MW-14B	**Trichloroethene**	**7/19/12**	**3.1**	**ug/L**	**0.47**	**1**	**3**			**0.1**	**L &/or LFG**
MW-14B	Trichloroethene	1/24/13	2.7	ug/L	0.47	1	3				
MW-14B	Trichloroethene	7/24/13	2.3	ug/L	0.47	1	3				
MW-14B	**Trichloroethene**	**1/27/11**	**6.4**	**ug/L**	**0.38**	**1**	**3**			**3.4**	**L &/or LFG**

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-14B	Trichlorofluoromethane	7/22/09	1.1	ug/L	0.20	1	2100				
MW-14B	Trichlorofluoromethane	7/30/10	1.1	ug/L	0.2	1	2100				
MW-14B	Vanadium, total	7/22/09	5.7[j]	ug/L	0.20	25			3.5	2.2	
MW-14B	Vanadium, total	1/14/10	4.75[j]	ug/L	0.400	25			3.5	1.25	
MW-14B	Vanadium, total	1/24/13	7.9 j	ug/L	5	25	NE		3.5	4.4	
MW-14B	**Vinyl chloride**	**7/22/09**	**1.8**	**ug/L**	**0.62**	**1**	**0.015**			**1.785**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**1/14/10**	**2.6**	**ug/L**	**0.30**	**1**	**0.03**			**2.57**	**L &/ or LFG**
MW-14B	**Vinyl chloride**	**7/30/10**	**3.6**	**ug/L**	**0.62**	**1**	**0.03**			**3.57**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**7/19/11**	**5.1**	**ug/L**	**0.60**	**1**	**0.03**			**5.07**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**1/25/12**	**3.1**	**ug/L**	**0.62**	**1**	**0.03**			**3.07**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**7/19/12**	**4.5**	**ug/L**	**0.62**	**1**	**0.03**			**4.47**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**1/24/13**	**4.2**	**ug/L**	**0.62**	**1**	**0.03**			**4.17**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**7/24/13**	**4.2**	**ug/L**	**0.62**	**1**	**0.03**			**4.17**	**L &/or LFG**
MW-14B	**Vinyl chloride**	**1/27/11**	**4.3**	**ug/L**	**0.3**	**1**	**0.03**			**4.27**	**L &/or LFG**
MW-14B	Zinc Total	7/19/11	10.1	ug/L	3.80	10	1050				
MW-14B	Zinc, Total	1/25/12	13.8	ug/L	10	10	1050				
MW-14B	Zinc, total	1/24/13	10.4	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
MW-15D	cis-1,2-Dichloroethene	7/19/11	5	ug/L	0.72	5	70				
MW-15D	Iodomethane	7/23/13	3	ug/L	0.32	10	NE	NE	NE		
MW-15D	**Methylene Chloride**	**7/23/09**	**4.7**	**ug/L**	**0.97**	**2**	**4.6**			**0.1**	**L &/or LFG**
MW-15D	Methylene chloride	1/14/10	1.2	ug/L	0.53	1	4.6				
MW-15D	Methylene Chloride	7/30/10	3.1	ug/L	0.97	1	4.6				
MW-15D	**Methylene chloride**	**7/19/11**	**6.9**	**ug/L**	**0.14**	**1**	**4.6**			**2.3**	**L &/or LFG**
MW-15D	Methylene Chloride	7/23/13	1.2	ug/L	0.97	1	4.6				
MW-15D	Methylene chloride	1/27/11	2.1	ug/L	0.53	1	4.6				
MW-15D	**Tetrachloroethene**	**7/23/09**	**1.3**	**ug/L**	**0.46**	**1**	**0.7**			**0.6**	**L &/or LFG**
MW-15D	**Tetrachloroethene**	**7/30/10**	**1.3**	**ug/L**	**0.46**	**1**	**0.7**			**0.6**	**L &/or LFG**
MW-15D	**Tetrachloroethene**	**1/27/11**	**1**	**ug/L**	**0.36**	**1**	**0.7**			**0.3**	**L &/or LFG**
MW-15D	**Tetrachloroethene**	**7/19/11**	**1.7**	**ug/L**	**0.73**	**1**	**0.7**			**1**	**L &/or LFG**
MW-15D	**Tetrachloroethene**	**7/19/12**	**0.91**	**ug/L**	**0.46**	**1**	**0.7**			**0.21**	**L &/or LFG**
MW-15D	**Tetrachloroethene**	**7/23/13**	**0.81 j**	**ug/L**	**0.46**	**1**	**0.7**			**0.11**	**L &/or LFG**
MW-15D	Trichloroethene	7/19/11	1	ug/L	0.72	1	2.8				
MW-15D	Vanadium, total	7/23/09	5.5[j]	ug/L	0.20	25			3.5	2	
MW-15D	Vanadium, total	1/14/10	3.7[j]	ug/L	0.400	25			3.5	0.2	
MW-15D	Vanadium, total	7/30/10	5.5j	ug/L	0.2	25			3.5	2	
MW-15D	Vanadium, total	7/19/11	3.83 j	ug/L	1.40	25	NE		3.5	0.33	
MW-15D	Vanadium, total	1/27/11	4.67 j	ug/L	1.4	25			3.5	1.17	
MW-15D	Vanadium, Total	1/25/12	9.6 j	ug/L	5	25			3.5	6.1	
MW-15D	Vanadium, total	1/24/13	5.4 j	ug/L	5	25	NE		3.5	1.9	
MW-15D	**Vinyl chloride**	**7/23/09**	**0.95[j]**	**ug/L**	**0.62**	**1**	**0.015**			**0.935**	**L &/or LFG**
MW-15D	**Vinyl chloride**	**7/30/10**	**1.1**	**ug/L**	**0.62**	**1**	**0.03**			**1.07**	**L &/or LFG**
MW-15D	**Vinyl chloride**	**1/27/11**	**0.83 j**	**ug/L**	**0.3**	**1**	**0.03**			**0.8**	**L &/or LFG**
MW-15D	**Vinyl chloride**	**7/19/11**	**2**	**ug/L**	**0.60**	**1**	**0.03**			**1.97**	**L &/or LFG**
MW-15D	**Vinyl chloride**	**7/19/12**	**1.2**	**ug/L**	**0.62**	**1**	**0.03**			**1.17**	**L &/or LFG**
MW-15D	**Vinyl chloride**	**7/23/13**	**1.1**	**ug/L**	**0.62**	**1**	**0.03**			**1.07**	**L &/or LFG**
MW-15D	Zinc, Total	1/25/12	12.7	ug/L	10	10	1050				

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
P2-10S	**Benzene**	**7/19/11**	**1.1**	**ug/L**	**0.68**	**1**	**1**			**0.1**	**L &/or LFG**
P2-10S	cis-1,2-Dichloroethene	7/19/11	7.1	ug/L	0.72	5	70				
P2-10S	cis-1,2-Dichloroethene	1/26/12	5.5	ug/L	0.19	5	70				
P2-10S	cis-1,2-Dichloroethene	7/19/12	6.4	ug/L	0.19	5	70				
P2-10S	cis-1,2-Dichloroethene	1/23/13	6.2	ug/L	0.19	5	70				
P2-10S	cis-1,2-Dichloroethene	1/28/11	5.2	ug/L	0.36	5	70				
P2-10S	Methylene Chloride	7/22/09	2.9	ug/L	0.97	2	4.6				
P2-10S	Methylene chloride	1/14/10	2.1	ug/L	0.53	1	4.6				
P2-10S	Methylene Chloride	7/30/10	1.1	ug/L	0.97	1	4.6				
P2-10S	**Methylene chloride**	**7/19/11**	**5.7**	**ug/L**	**0.14**	**1**	**4.6**			**1.1**	**L &/or LFG**
P2-10S	Methylene Chloride	1/26/12	3.4	ug/L	0.97	1	4.6				
P2-10S	**Methylene Chloride**	**7/19/12**	**4.8**	**ug/L**	**0.97**	**1**	**4.6**			**0.2**	**L &/or LFG**
P2-10S	**Methylene Chloride**	**1/23/13**	**8.1**	**ug/L**	**0.97**	**1**	**4.6**			**3.5**	**L &/or LFG**
P2-10S	Methylene Chloride	7/23/13	1.9	ug/L	0.97	1	4.6				
P2-10S	Methylene chloride	1/28/11	4.3	ug/L	0.53	1	4.6				
P2-10S	**Tetrachloroethene**	**7/22/09**	**4**	**ug/L**	**0.46**	**1**	**0.7**			**3.3**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**1/14/10**	**3.7**	**ug/L**	**0.36**	**1**	**0.7**			**3**	**L &/ or LFG**
P2-10S	**Tetrachloroethene**	**7/30/10**	**3.9**	**ug/L**	**0.46**	**1**	**0.7**			**3.2**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**1/28/11**	**4.1**	**ug/L**	**0.36**	**1**	**0.7**			**3.4**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**7/19/11**	**4.4**	**ug/L**	**0.73**	**1**	**0.7**			**3.7**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**1/26/12**	**4.6**	**ug/L**	**0.46**	**1**	**0.7**			**3.9**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**7/19/12**	**4.3**	**ug/L**	**0.46**	**1**	**0.7**			**3.6**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**1/23/13**	**4.1**	**ug/L**	**0.46**	**1**	**0.7**			**3.4**	**L &/or LFG**
P2-10S	**Tetrachloroethene**	**7/23/13**	**3.7**	**ug/L**	**0.46**	**1**	**0.7**			**3**	**L &/or LFG**
P2-10S	**Trichloroethene**	**7/22/09**	**5**	**ug/L**	**0.47**	**1**	**2.8**			**2.2**	**L &/or LFG**
P2-10S	**Trichloroethene**	**1/14/10**	**4.4**	**ug/L**	**0.38**	**1**	**2.8**			**1.6**	**L &/ or LFG**
P2-10S	**Trichloroethene**	**7/30/10**	**3.5**	**ug/L**	**0.47**	**1**	**3**			**0.5**	**L &/or LFG**
P2-10S	**Trichloroethene**	**1/28/11**	**6.3**	**ug/L**	**0.38**	**1**	**3**			**3.3**	**L &/or LFG**
P2-10S	**Trichloroethene**	**7/19/11**	**5.4**	**ug/L**	**0.72**	**1**	**3**			**2.4**	**L &/or LFG**
P2-10S	**Trichloroethene**	**1/26/12**	**7.3**	**ug/L**	**0.47**	**1**	**3**			**4.3**	**L &/or LFG**
P2-10S	**Trichloroethene**	**7/19/12**	**5.7**	**ug/L**	**0.47**	**1**	**3**			**2.7**	**L &/or LFG**
P2-10S	**Trichloroethene**	**1/23/13**	**6.7**	**ug/L**	**0.47**	**1**	**3**			**3.7**	**L &/or LFG**
P2-10S	**Trichloroethene**	**7/23/13**	**4.6**	**ug/L**	**0.47**	**1**	**3**			**1.6**	**L &/or LFG**
P2-10S	**Vinyl chloride**	**1/23/13**	**0.67 j**	**ug/L**	**0.62**	**1**	**0.03**			**0.64**	**L &/or LFG**

Sample ID	Parameter Name [1]	Sample Date	Result	Unit	MDL [2]	SWSL [3]	2L [4]	2B [5]	GWP [6]	Exceedance Amount	Preliminary Cause [7]
SW-1	Zinc, total	1/23/13	10.3	ug/L	10	10		50			
SW-2	Cadmium, total	7/21/09	1	ug/L	0.50	1		NE			
SW-2	**Silver**	**1/13/10**	**0.481[j]**	**ug/L**	**0.48**	**10**		**0.06**		**0.42**	**N**
SW-2	Zinc, total	1/22/13	12.9	ug/L	10	10		50			
SW-4	Zinc, total	1/14/10	32.3	ug/L	1.60	10		50			
SW-5	**Silver**	**1/13/10**	**0.6[j]**	**ug/L**	**0.48**	**10**		**0.06**		**0.54**	**B (Upstream)**
SW-5	Zinc, total	7/29/10	14.6	ug/L	0.4	10		50			
SW-5	Zinc Total	1/28/11	16.5	ug/L	3.8	10		50			
TB	**Methylene Chloride**	**7/28/10**	**7.7**	**ug/L**	**0.97**	**1**	**4.6**			**3.1**	**A**
TB	Methylene Chloride	1/25/13	1.4	ug/L	0.97	1	4.6				
EB	Zinc, total	7/28/10	162	ug/L	0.4	10	1050				
FB	Methylene Chloride	1/25/13	2.6	ug/L	0.97	1	4.6				

[1] Table contains Appendix I constituents detected above SWSL, GWP, 2L, or 2B

[2] MDL = Method Detection Limit

[3] SWSL = Solid Waste Section Reporting Limit

[4] 2L = North Carolina 15A NCAC 2L Groundwater Quality Standard

[5] 2B = North Carolina 15 NCAC 2B Surface Water Quality Standard for this Specific Stream Classification

[6] GWP = Groundwater Protection Standard

[7] Preliminary Cause = Refers to a preliminary analysis of the cause and/or source of a detection over the respective 2L/2B Standard. A definitive source of the detection was not determined as part of this report.

j =The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable

B = Background

N = Natural from erosion of natural deposits

L = Leachate

LFG = Landfill Gas

A = Artifact Contamination (detected in lab blank(s))

BOLD = Concentration > 2L, or 2B Standard

Table 4
Hydrogeologic Properties at Monitoring Well Locations
July 22-24, 2013

Monitoring Location	Hydraulic Conductivity (cm/second)	Hydraulic Conductivity (ft/day)	Effective Porosity (%)	Hydraulic Gradient (feet/feet)	Average Linear Velocity Rate (feet/year)	Flow Direction	Depth to Groundwater (feet btoc)	Minimum Distance From Upgradient EOW (ft)	Groundwater Potentiometric Elevation (feet amsl)	Screened Interval Lithology
MW-1A	2.00E-04	0.6	20	0.07	na	na	24.99	na	842.75	Silty Clayey Sand
MW-1C	na	0.0	20	0.03	na	N69E	25.31	0	840.94	Silty Clayey Sand
MW-2	5.00E-04	1.4	20	0.03	67	N54W	8.12	883	789.50	Silty Sand
MW-3A	2.00E-04	0.6	20	0.03	29	N38W	8.75	1422	783.35	Silty Sand
MW-3B	2.00E-04	0.6	20	0.03	26	N43W	7.99	1522	782.62	Silty Sand
MW-4A	7.00E-05	0.2	5	na	na	na	>29.74	na	<792.84	Sandy Clay/Rock
MW-4B	7.00E-05	0.2	20	0.02	8	N00W	31.42	1206	793.99	Weathered Rock
MW-6A	7.00E-05	0.2	15	0.04	19	N39E	18.31	1302	774.69	Clayey Silt
MW-6B	na	0.0	15	0.04	na	na	21.55	na	777.32	Sandy Clay
MW-7	2.00E-04	0.6	15	0.09	126	N29E	10.24	999	787.99	Sandy Clay
MW-8	1.00E-04	0.3	15	0.04	27	N73E	19.39	1229	778.01	Sandy Clay
MW-11	1.30E-05	0.0	21	0.09	6	N63E	12.78	565	808.68	Sand
MW-12	3.90E-06	0.0	20	0.06	1	N33E	17.84	918	787.80	Sandy Silt/Sitly Sand
MW-13A	4.90E-08	0.0	15	0.58	na	na	38.21	na	780.20	Sandy Silt
MW-13B	5.30E-06	0.0	21	0.02	1	N39E	37.75	1173	780.35	Silty Sand
MW-13BR	9.24E-04	2.6	21	0.03	150	N06E	34.21	1236	777.20	Silty Sand
MW-14A	1.20E-05	0.0	21	na	na	na	>40.89	na	<778.18	Silty Sand
MW-14B	1.20E-05	0.0	21	0.04	2	N70E	39.91	1338	778.63	Silty Sand
MW-15	3.10E-06	0.0	5	na	na	na	>44.45	na	<793.16	Silt/Sand/Schist
MW-15D	na	0.0	5	0.08	na	N41E	47.27	1219	790.37	Schist
P2-1S	1.42E-04	0.4	15	0.14	134	N03W	21.97	0	838.51	Clayey Silt
PZ-1S	na	0.0	15	0.04	na	N79E	42.02	0	831.40	Sandy Silt
P2-10S	2.38E-04	0.7	15	0.04	71	N26E	30.19	1106	782.18	Sandy Silt/Silty Sand
Minimum	4.90E-08	0.0	5	0.02	1	-	7.99	0	774.69	-
Average	1.56E-04	0.4	17	0.08	48	-	24.91	948	795.32	-
Maximum	9.24E-04	2.6	21	0.58	150	-	47.27	1522	842.75	-

NOTE: Hydrologic gradient calculated from groundwater elevations recorded on July 23-24, 2013
Values for hydraulic conductivity determined via slug test by MESCO
Wells screened in rock or deeper counterparts in cluster pairs not utilized for flow directions/gradients
na = not available
Groundwater average linear velocity rate calculated from modified Darcy's equation:

where $$Q = -\frac{K}{n_e} \cdot \frac{dh}{dl}$$

K = hydraulic conductivity
ne = effective porosity
dh = head difference
dl = horizontal distance

Table 5
Appendix II Monitoring Modification Summary

		App. I		App. II								Field Parameter					Leachate					
Sample ID	2L Violation(s)*	VOCs App I	Total Metals App I	VOCs App II	Total Metals App II (includes mercury)	Herbicides-Chlorinated App II	Polychlorinated biphenyl (PCB) App II	Semivolatile Organics (SVOCs) App II	Pesticides App II	Cyanide	Sulfide	Temperature	Specific Conductivity	Total Dissolved Solids (TDS)	pH	Water Level Elevation	Sulfate	pH	Phosphorus	BOD, 5 day	COD	Nitrate
MW-1A ^	N	SW	SW									SW	SW	SW	SW	SW						
MW-1B ^	N	SW	SW									SW	SW	SW	SW	SW						
MW-1C ^	N	SW	SW									SW	SW	SW	SW	SW						
MW-2	N	SW	SW									SW	SW	SW	SW	SW						
MW-3A	N	SW	SW									SW	SW	SW	SW	SW						
MW-3B	N	SW	SW									SW	SW	SW	SW	SW						
MW-4A	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-4B	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-6A	N	SW	SW									SW	SW	SW	SW	SW						
MW-6B	N	SW	SW									SW	SW	SW	SW	SW						
MW-7	N	SW	SW									SW	SW	SW	SW	SW						
MW-8	N	SW	SW									SW	SW	SW	SW	SW						
MW-11	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-12	N	SW	SW									SW	SW	SW	SW	SW						
MW-13A	N	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-13B	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-13BR	N	SW	SW									SW	SW	SW	SW	SW						
MW-14A	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-14B	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-15	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
MW-15D	Y	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
P2-10S	Y	SW	SW									SW	SW	SW	SW	SW						
MW-37	N	SW	SW	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	SW	SW	SW	SW	SW						
SW-1	N	SW	SW									SW	SW	SW	SW							
SW-2	N	SW	SW									SW	SW	SW	SW							
SW-3	N	SW	SW									SW	SW	SW	SW							
SW-4	N	SW	SW									SW	SW	SW	SW							
SW-5	N	SW	SW									SW	SW	SW	SW							
EB	N	SW	SW									SW	SW	SW	SW							
FB	N	SW	SW									SW	SW	SW	SW							
TB	N	SW	SW									SW	SW	SW	SW							
LAGOON	N	SW	SW									SW	SW	SW	SW		SW	SW	SW	SW	SW	SW

App. I & II = Appendix I & II List from current 40 CFR PART 258

* = Regulatory (2L or GWP) violation expected attributed to anthropogenic sources

^ = Ph 1 & 2 background wells until Ph 5 opens than will monitor Ph 5.

RED BOLD Font indicates modification proposed in this Appendix II modification request.

SW = SUMMER & WINTER. Constituent to be analyzed semi-annually during both the summer and winter events

3 = Constituent analyzed once every three (3) years (WINTER)

Appendix A
USDA Custom Soil Resources

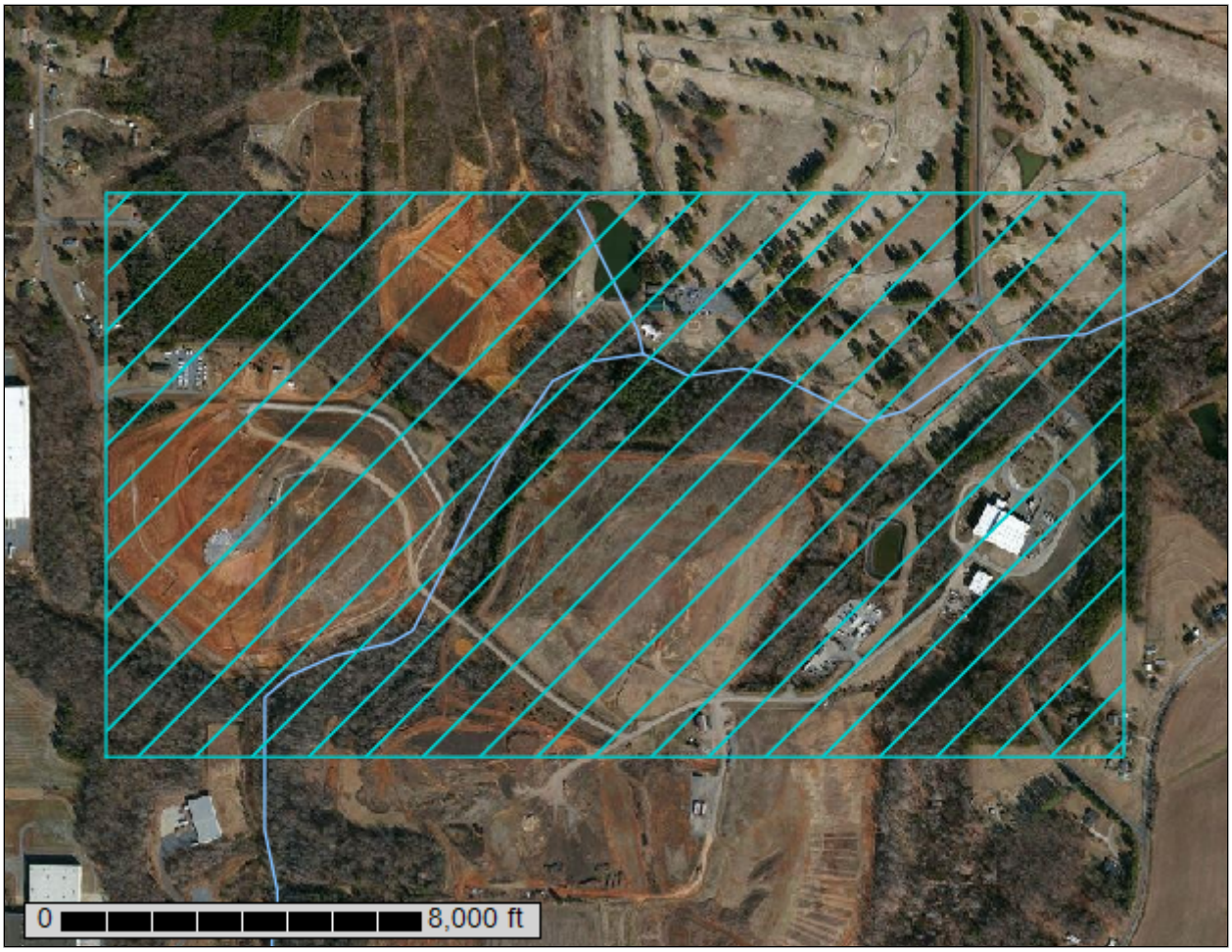
United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Iredell County, North Carolina

Iredell Landfill Wide Zoom



January 8, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....7
Soil Map.....8
Legend.....9
Map Unit Legend.....10
Map Unit Descriptions.....11
Iredell County, North Carolina.....13
ApB—Appling sandy loam, 2 to 6 percent slopes.....13
CeB2—Cecil sandy clay loam, 2 to 6 percent slopes, moderately eroded.....14
CeC2—Cecil sandy clay loam, 6 to 10 percent slopes, moderately eroded.....15
CgC—Cecil-Urban land complex, 2 to 10 percent slopes.....16
ChA—Chewacla loam, 0 to 2 percent slopes, frequently flooded.....17
LcC2—Lloyd clay loam, 6 to 10 percent slopes, moderately eroded.....18
MaE4—Madison-Udorthents complex, 15 to 25 percent slopes, gullied.....19
MdB—Masada fine sandy loam, 2 to 6 percent slopes.....21
PaE—Pacolet sandy loam, 15 to 25 percent slopes.....22
PaF—Pacolet sandy loam, 25 to 45 percent slopes.....23
PcB2—Pacolet sandy clay loam, 2 to 6 percent slopes, moderately eroded.....25
PcC2—Pacolet sandy clay loam, 6 to 10 percent slopes, moderately eroded.....26
PcD2—Pacolet sandy clay loam, 10 to 15 percent slopes, moderately eroded.....27
PcE2—Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded.....28
PrF—Poindexter-Rowan complex, 25 to 45 percent slopes.....30
UmF—Udorthents-Urban land complex, 0 to 45 percent slopes.....32
W—Water.....33
References.....34

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:7,840 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Iredell County, North Carolina
Survey Area Data: Version 18, Jul 6, 2012

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 11, 2011—Mar 2, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Iredell County, North Carolina (NC097)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
ApB	Appling sandy loam, 2 to 6 percent slopes	3.1	1.1%
CeB2	Cecil sandy clay loam, 2 to 6 percent slopes, moderately eroded	15.0	5.4%
CeC2	Cecil sandy clay loam, 6 to 10 percent slopes, moderately eroded	19.8	7.1%
CgC	Cecil-Urban land complex, 2 to 10 percent slopes	2.9	1.1%
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	29.7	10.7%
LcC2	Lloyd clay loam, 6 to 10 percent slopes, moderately eroded	5.3	1.9%
MaE4	Madison-Udorthents complex, 15 to 25 percent slopes, gullied	6.6	2.4%
MdB	Masada fine sandy loam, 2 to 6 percent slopes	2.4	0.9%
PaE	Pacolet sandy loam, 15 to 25 percent slopes	0.0	0.0%
PaF	Pacolet sandy loam, 25 to 45 percent slopes	10.4	3.8%
PcB2	Pacolet sandy clay loam, 2 to 6 percent slopes, moderately eroded	4.0	1.5%
PcC2	Pacolet sandy clay loam, 6 to 10 percent slopes, moderately eroded	18.8	6.8%
PcD2	Pacolet sandy clay loam, 10 to 15 percent slopes, moderately eroded	4.9	1.8%
PcE2	Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded	5.0	1.8%
PrF	Poindexter-Rowan complex, 25 to 45 percent slopes	5.6	2.0%
UmF	Udorthents-Urban land complex, 0 to 45 percent slopes	143.0	51.4%
W	Water	1.7	0.6%
Totals for Area of Interest		**278.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly

indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Iredell County, North Carolina

ApB—Appling sandy loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Appling and similar soils: 92 percent
Minor components: 4 percent

Description of Appling

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 6 inches: Sandy loam
6 to 18 inches: Sandy clay loam
18 to 36 inches: Clay
36 to 52 inches: Sandy clay loam
52 to 80 inches: Sandy loam

Minor Components

Vance

Percent of map unit: 3 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Helena

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Concave

CeB2—Cecil sandy clay loam, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Cecil, moderately eroded, and similar soils: 90 percent
Minor components: 1 percent

Description of Cecil, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 6 inches: Sandy clay loam
6 to 40 inches: Clay
40 to 48 inches: Clay loam

48 to 80 inches: Loam

Minor Components

Spartanburg, moderately eroded

Percent of map unit: 1 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

CeC2—Cecil sandy clay loam, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Cecil, moderately eroded, and similar soils: 90 percent
Minor components: 1 percent

Description of Cecil, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 6 inches: Sandy clay loam
6 to 40 inches: Clay
40 to 48 inches: Clay loam
48 to 80 inches: Sandy loam

Minor Components

Spartanburg, moderately eroded

Percent of map unit: 1 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

CgC—Cecil-Urban land complex, 2 to 10 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 55 to 66 degrees F
Frost-free period: 160 to 240 days

Map Unit Composition

Cecil and similar soils: 55 percent
Urban land: 30 percent
Minor components: 10 percent

Description of Cecil

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 6 inches: Sandy clay loam
6 to 40 inches: Clay
40 to 48 inches: Clay loam
48 to 80 inches: Sandy loam

Description of Urban Land

Setting

Parent material: Impervious layers over human transported material

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8

Minor Components

Udorthents, loamy

Percent of map unit: 10 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

ChA—Chewacla loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Chewacla, frequently flooded, and similar soils: 85 percent
Minor components: 8 percent

Description of Chewacla, Frequently Flooded

Setting

Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 11.5 inches)

Interpretive groups

Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Land capability (nonirrigated): 4w
Hydrologic Soil Group: B/D

Typical profile

0 to 4 inches: Loam
4 to 26 inches: Silty clay loam
26 to 38 inches: Loam
38 to 60 inches: Clay loam
60 to 80 inches: Loam

Minor Components

Wehadkee, undrained

Percent of map unit: 5 percent
Landform: Depressions on flood plains
Down-slope shape: Concave
Across-slope shape: Linear

Riverview

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

LcC2—Lloyd clay loam, 6 to 10 percent slopes, moderately eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Lloyd, moderately eroded, and similar soils: 90 percent
Minor components: 8 percent

Description of Lloyd, Moderately Eroded

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Clay loam
7 to 58 inches: Clay
58 to 73 inches: Clay loam
73 to 80 inches: Loam

Minor Components

Madison, moderately eroded

Percent of map unit: 8 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

MaE4—Madison-Udorthents complex, 15 to 25 percent slopes, gullied

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Madison, gullied, and similar soils: 50 percent
Udorthents, gullied, and similar soils: 40 percent
Minor components: 6 percent

Description of Madison, Gullied

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist and/or other micaceous metamorphic rock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B

Typical profile

0 to 6 inches: Sandy clay loam
6 to 26 inches: Clay
26 to 37 inches: Clay loam
37 to 80 inches: Sandy loam

Description of Udorthents, Gullied

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist and/or other micaceous metamorphic rock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.2 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: A

Typical profile
0 to 80 inches: Sandy loam

Minor Components

Gullied land
Percent of map unit: 6 percent

MdB—Masada fine sandy loam, 2 to 6 percent slopes

Map Unit Setting
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition
Masada and similar soils: 85 percent
Minor components: 10 percent

Description of Masada

Setting
Landform: Hillslopes on stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Old alluvium derived from igneous, metamorphic and sedimentary rock

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 9 inches: Fine sandy loam
9 to 45 inches: Clay
45 to 80 inches: Gravelly sandy clay loam

Minor Components

Cecil

Percent of map unit: 8 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Dorian

Percent of map unit: 2 percent
Landform: Flats on stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear

PaE—Pacolet sandy loam, 15 to 25 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Pacolet and similar soils: 85 percent
Minor components: 13 percent

Description of Pacolet

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 15 to 25 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Sandy loam
5 to 8 inches: Sandy loam
8 to 29 inches: Clay
29 to 38 inches: Sandy clay loam
38 to 80 inches: Sandy loam

Minor Components

Spartanburg

Percent of map unit: 8 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Bethlehem

Percent of map unit: 5 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

PaF—Pacolet sandy loam, 25 to 45 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Pacolet and similar soils: 85 percent
Minor components: 13 percent

Description of Pacolet

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Sandy loam
5 to 8 inches: Sandy loam
8 to 29 inches: Clay
29 to 38 inches: Sandy clay loam
38 to 80 inches: Sandy loam

Minor Components

Spartanburg

Percent of map unit: 8 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Bethlehem

Percent of map unit: 5 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

PcB2—Pacolet sandy clay loam, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Pacolet, moderately eroded, and similar soils: 90 percent
Minor components: 7 percent

Description of Pacolet, Moderately Eroded

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Sandy clay loam
7 to 28 inches: Clay
28 to 44 inches: Sandy clay loam
44 to 80 inches: Sandy loam

Minor Components

Madison, moderately eroded

Percent of map unit: 6 percent
Landform: Interfluves
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Spartanburg, moderately eroded
Percent of map unit: 1 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

PcC2—Pacolet sandy clay loam, 6 to 10 percent slopes, moderately eroded

Map Unit Setting
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition
Pacolet, moderately eroded, and similar soils: 90 percent
Minor components: 9 percent

Description of Pacolet, Moderately Eroded

Setting
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities
Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Sandy clay loam
7 to 28 inches: Clay
28 to 44 inches: Sandy clay loam
44 to 80 inches: Sandy loam

Minor Components

Madison, moderately eroded

Percent of map unit: 8 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Spartanburg, moderately eroded

Percent of map unit: 1 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

PcD2—Pacolet sandy clay loam, 10 to 15 percent slopes, moderately eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Pacolet, moderately eroded, and similar soils: 85 percent
Minor components: 8 percent

Description of Pacolet, Moderately Eroded

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile
0 to 7 inches: Sandy clay loam
7 to 28 inches: Clay
28 to 44 inches: Sandy clay loam
44 to 80 inches: Sandy loam

Minor Components

Madison, moderately eroded
Percent of map unit: 5 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Spartanburg, moderately eroded
Percent of map unit: 3 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

PcE2—Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded

Map Unit Setting
Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition
Pacolet, moderately eroded, and similar soils: 85 percent
Minor components: 13 percent

Description of Pacolet, Moderately Eroded

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss and/or schist

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 7 inches: Sandy clay loam
7 to 28 inches: Clay
28 to 44 inches: Sandy clay loam
44 to 80 inches: Sandy loam

Minor Components

Madison, moderately eroded

Percent of map unit: 10 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Spartanburg, moderately eroded

Percent of map unit: 3 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

PrF—Poindexter-Rowan complex, 25 to 45 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Poindexter and similar soils: 45 percent
Rowan and similar soils: 40 percent
Minor components: 15 percent

Description of Poindexter

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 80 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B

Typical profile

0 to 3 inches: Loam
3 to 7 inches: Loam
7 to 26 inches: Sandy clay loam
26 to 39 inches: Loam
39 to 43 inches: Weathered bedrock
43 to 80 inches: Unweathered bedrock

Description of Rowan

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Saprolite derived from diorite and/or gabbro and/or diabase and/or gneiss

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B

Typical profile

0 to 2 inches: Loam
2 to 9 inches: Loam
9 to 29 inches: Sandy clay loam
29 to 80 inches: Loam

Minor Components

Wilkes

Percent of map unit: 10 percent
Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Wynott

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

UmF—Udorthents-Urban land complex, 0 to 45 percent slopes

Map Unit Setting

Elevation: 200 to 1,790 feet
Mean annual precipitation: 37 to 60 inches
Mean annual air temperature: 55 to 66 degrees F
Frost-free period: 160 to 240 days

Map Unit Composition

Udorthents, loamy, and similar soils: 55 percent
Urban land: 45 percent

Description of Udorthents, Loamy

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy and clayey mine spoil or earthy fill derived from igneous, metamorphic and sedimentary rock

Properties and qualities

Slope: 0 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: C

Typical profile

0 to 80 inches: Sandy clay loam

Description of Urban Land

Setting

Landform: Hillslopes on ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Convex
Parent material: Impervious layers over human transported material

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8

W—Water

Map Unit Composition
Water: 100 percent

Description of Water

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8w

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://soils.usda.gov/

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://soils.usda.gov/

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.glti.nrcs.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.