Corrective Action Evaluation Report

Prepared for

Alexander County Landfill
Taylorsville, North Carolina
Permit No. 02-01

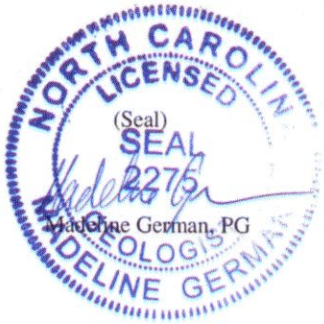
Prepared by

Municipal Engineering Services Company, P.A.
P.O. BOX 97
Garner, North Carolina

MESCO Project Number: G11047.0

Prepared on

March 22, 2011



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

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Division of Waste Management - Solid Waste

Environmental Monitoring Reporting Form

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Instructions:

- **Prepare one form for each individually monitored unit.**
- **Please type or print legibly.**
- Attach a notification table with values that attain or exceed NC 2L groundwater standards or NC 2B surface water standards. The notification must include a preliminary analysis of the cause and significance of each value. (e.g. naturally occurring, off-site source, pre-existing condition, etc.).
- Attach a notification table of any groundwater or surface water values that equal or exceed the reporting limits.
- Attach a notification table of any methane gas values that attain or exceed explosive gas levels. This includes any structures on or nearby the facility (NCAC 13B .1629 (4)(a)(i).
- Send the original signed and sealed form, any tables, and Electronic Data Deliverable to: Compliance Unit, NCDENR-DWM, Solid Waste Section, 1646 Mail Service Center, Raleigh, NC 27699-1646.

Solid Waste Monitoring Data Submittal Information

Name of entity submitting data (laboratory, consultant, facility owner):

Municipal Engineering Services Co., PA

Contact for questions about data formatting. Include data preparer's name, telephone number and E-mail address:

Name: Madeline German, PG Phone: (919)772-5393

E-mail: mgerman@mesco.com

Facility name:	Facility Address:	Facility Permit #	NC Landfill Rule: (.0500 or .1600)	Actual sampling dates (e.g., October 20-24, 2006)
Alexander County Active C&D upon Closed Unlined MSWLF	2500 Paynes Dairy Road Taylorsville, NC 28681	02-01	.1600	June 2009, December 2009, July 2010, December 2010

Environmental Status: (Check all that apply)

☐ Initial/Background Monitoring ☒ Detection Monitoring ☒ Assessment Monitoring ☒ Corrective Action

Type of data submitted: (Check all that apply)

☒ Groundwater monitoring data from monitoring wells
☐ Groundwater monitoring data from private water supply wells
☐ Leachate monitoring data
☒ Surface water monitoring data
☐ Methane gas monitoring data
☒ Corrective action data (specify) Biochlor
☐ Other(specify)

Notification attached?

☐ No. No groundwater or surface water standards were exceeded.
☒ Yes, a notification of values exceeding a groundwater or surface water standard is attached. It includes a list of groundwater and surface water monitoring points, dates, analytical values, NC 2L groundwater standard, NC 2B surface water standard or NC Solid Waste GWPS and preliminary analysis of the cause and significance of any concentration.
☐ Yes, a notification of values exceeding an explosive methane gas limit is attached. It includes the methane monitoring points, dates, sample values and explosive methane gas limits.

Certification

To the best of my knowledge, the information reported and statements made on this data submittal and attachments are true and correct. Furthermore, I have attached complete notification of any sampling values meeting or exceeding groundwater standards or explosive gas levels, and a preliminary analysis of the cause and significance of concentrations exceeding groundwater standards. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of a fine and imprisonment.

Madeline German, PG	Geologist	(919) 772-5393
Facility Representative Name (Print)	Title	(Area Code) Telephone Number

Madeline German

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DN: cn=Madeline German, o=MESCO, ou, email=mgerman@mesco.com, c=US
Date: 2011.03.21 15:34:52 -04'00'

3/22/2011

Signature Date

Affix NC Licensed/ Professional Geologist Seal

NORTH CAROLINA LICENSED SEAL 2275 GEOLOGIST MADELINE GERMAN 3/22/2011

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Facility Representative Address

C-0281

NC PE Firm License Number (if applicable effective May 1, 2009)

Revised 6/2009

TABLE OF CONTENTS

1 INTRODUCTION 3

1.1 Site Background 3

1.1.1 Site History 3
1.1.2 Sampling History 3
1.2 Aquifer Characteristics 4

1.3 Contaminant Distribution 5

1.4 Description of Site Conceptual Model 6

1.5 Regulatory Status 8

2 CORRECTIVE ACTION SUMMARY 9

2.1 Aquifer Conditions 9

2.1.1 Physical Changes 9
2.1.2 Chemical Changes 10
2.2 Plume Characteristics 11

2.2.1 Physical Changes 11
2.2.2 Chemical Changes 11

3 CORRECTIVE ACTION PLAN UPDATES 12

3.1 Modifications to Selected Remedy 12

3.1.1 MW-24 Area (Monitored Natural Attenuation w/ Phytoremediation) 12
3.1.2 MW-26 Area (Monitored Natural Attenuation w/ Substrate Injection) 14
3.1.3 MW-16 Area (Monitored Natural Attenuation w/ Substrate Injection) 17
3.1.4 MW-1B Area (Active Methane Extraction) 19
3.2 Contingency Plan 20

4 CONCLUSION 21

4.1 Evaluation of Effectiveness 21

4.2 Report Submittals 22

4.3 Completeness of Corrective Action 22

REFERENCES 23

TABLES

Table 1 ..... Well Construction Details

Table 2 ..... Historical Groundwater Elevation Data

Table 3 ..... Summary of Slug Test Results

Table 4 ..... Flow Rate Calculations

Table 5 ..... Summary of Historical Organic Results
Table 6 ..... MNA Parameter Summary
Table 7 ..... Reductive Dechlorination Assessment
Table 8 ..... Natural Attenuation Properties
Table 9 ..... Tree Evaluations Summary
Table 10 ..... Timeline/Schedule of Corrective Action

PLATES

Plate 1 ..... Topographic Map with Landfill Location
Plate 2 ..... Site Map with Sampling Locations
Plate 3 ..... Single-Day Potentiometric Surface Map
Plate 4 ..... Remediation Area Map
Plate 5 ..... December Detections above the 2L Standard
Plate 6A ..... Phytoremediation Photos
Plate 6B ..... Phytoremediation Photos
Plate 7A ..... 1,4-Dichlorobenzene Map
Plate 7B ..... Benzene Map
Plate 7C ..... 1,1-Dichloroethane Map
Plate 7D ..... cis 1,2-Dichloroethene Map
Plate 7E ..... Tetrachloroethene Map
Plate 7F ..... Trichloroethene Map
Plate 7G ..... Vinyl Chloride Map

APPENDIX

Appendix A ..... Well Information
Appendix B ..... Sampling and Analysis Plan
Appendix C ..... EOS Supplemental Information
Appendix D ..... New Property Deed
Appendix E ..... Biochlor & Transducer Data

1 INTRODUCTION

1.1 Site Background

1.1.1 Site History

The Alexander County Construction and Demolition (C&D) landfill is located at 2500 Payne Dairy Road, Taylorsville, Alexander County, North Carolina. The C&D landfill is operated in the area covered under the transition plan. Prior to operating as a C&D landfill, the site operated as a Municipal Solid Waste (MSW) unlined sanitary landfill that consisted of two units. The first, western unit was closed prior to October 9, 1991 with a 24 inch final soil cover. The second, eastern unit was closed by mid-1999, with a cohesive cap of 18 inches of soil with permeability of 1 x 10^{-5} cm/sec, and 18 inches of erosive layer.[11] The C&D landfill was constructed and operates on top of the western MSW unit. A topographic map showing the facility location is included as **Plate 1**.

Alexander County retained Municipal Engineering Services Company, P.A. (MESCO) to develop a *Corrective Action Plan* (CAP) for the closed C&D constructed over an existing unlined MSW. The CAP proposed to develop and implement a site-specific remediation plan to address groundwater contamination possibly associated with the C&D/MSW landfill. A CAP was prepared in accordance with Rules 15A NCAC 13B.1636 & .1637 and was submitted to the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Waste Management, Solid Waste Section (SWS) on September 19, 2008. A *Corrective Action Plan-Revision 1* was submitted to the SWS on February 6, 2009 and approved on February 19, 2009. On August 10, 2010, MESCO personnel requested the SWS approve an amendment to the CAP based on reduced contaminant concentrations and changing geochemical conditions since the original remedy selection. The corresponding *Corrective Action Plan – Addendum* was submitted December 20, 2010. On August 24, 2010, MESCO personnel submitted an Injection Permit Application to the Division of Water Quality, Aquifer Protection Section, Underground Injection Control (UIC) Program to inject edible oil substrate (EOS®) and bacteria (BAC 9®) into the subsurface. The requested Injection Permit was issued on November 26, 2010.

1.1.2 Sampling History

Generally, groundwater quality monitoring has been performed since initiated in 1990. Four monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed in September 1990. Initial sampling of these monitoring wells occurred on April 30, 1990, additional sampling occurred on July 18, 1991. The *Alexander County Transition Plan* provides sample results for these events.

The Ground and Surface Water Monitoring System (SAP) was prepared in February 1994 and submitted as part of the Transition Plan.[11] Included in this SAP, monitoring wells MW-1A, MW-5, MW-6, MW-7 and MW-8 were installed in September 1994. Monitoring well MW-4R was also installed at this time to replace monitoring well MW-4. Appendix I sampling was initiated in October 1994 with background sampling occurring on October 1, 1994, January 31, 1994, February 15, 1995, and March 7, 1995. Appendix II sampling was performed on monitoring wells MW-1, MW-1A, MW-2, MW-3, MW-4R, MW-5, MW-6, MW-7, and MW-8 on December 3, 1997. Background Appendix II sampling was performed on March 23, 1998, April 30, 1998, and June 4, 1998.

Appendix I with select constituents from Appendix II sampling was performed on November 18, 1998, and May 13, 1999. Appendix I sampling including sampling for mercury was performed on December 6, 1999. Additional monitoring wells MW-9, MW-10, MW-11, MW-12S, MW-13, MW-14, and MW-15 were installed in October 2000.

In May 2003 monitoring well MW-1B was installed as the new background well due to MW-1A being dry. Monitoring well MW-12D and MW-17 were installed in June 2003. Monitoring well MW-11D was attempted. No deep water-bearing fractures were identified. The boring was abandoned. Appendix I sampling resumed on a semi-annual basis. Monitoring wells MW-16, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, and MW-27 were installed in December 2007 to delineate the contamination extent. Monitoring wells MW-31 and MW-32 were installed in August 2010. MW-30 was attempted. No water bearing fractures were identified. The boring was abandoned. Analysis for mercury has occurred consistently. Appendix II sampling was conducted December 8, 2010.

A summary of existing monitoring wells is included as **Table 1**. Well construction records are provided in **Table 1**.

1.2 Aquifer Characteristics

The site lies within the Piedmont physiographic province that is characterized by gently rolling hills with moderately sloped valleys. Multiple drainage features control surface water flow off the site. The northern and western portions of the site have three drainage features, the primary being a tributary of Little River. Little River drains into the Catawba River located southwest of the facility. The southern portion of the site has five drainage features that empty into the Catawba River.

The aquifer consists of three layers, the uppermost unconsolidated regolith, the partially weathered rock transition, and the upper 15 feet of highly fractured rock. Groundwater typically occurs 20-40 feet below

ground surface; however, shallow groundwater is found in draws and near drainage features. Groundwater is found primarily in the highly weathered rock and saprolite in and near the drainage areas. The general groundwater trend follows the topography flowing south. On the western side groundwater flows more southwesterly; and on the northern end it flows west.

A summary of slug test results is provided as **Table 3**. Other hydrologic properties and flow rate data is shown on **Table 4**. Hydraulic conductivity values ranged from a high of 1.33×10^{-2} cm/sec in MW-24, to a low of 1.60×10^{-6} cm/sec in MW-7, and an average of 1.08×10^{-3} cm/sec. Hydraulic conductivity of the saprolite, consisting of silty sand, has an average value of 1.25×10^{-3} cm/sec. Hydraulic conductivity of gneiss has an average value of 8.02×10^{-5} cm/sec. A potentiometric map created based on data from the December 2010 semi-annual sampling event is provided as **Plate 3**.

Municipal water is available to the surrounding area. A receptor survey was performed as part of the Transition Plan. No potable water supply wells were identified within 2000 feet of the facility. An updated receptor survey was performed in December 2007. The updated receptor survey confirmed that there are no potable water supply wells within 2000 feet of the facility. The facility water supply well was abandoned in accordance with the CAP on August 17, 2010.

1.3 Contaminant Distribution

The Assessment of Corrective Measures (ACM) identified mercury, 1,1-dichloroethane, 1,2-dichloropropane, benzene, cis-1,2-dichloroethene, methylene chloride, p-dichlorobenzene, tetrachloroethene, trichloroethylene and xylenes as constituents of concern. Contamination primarily consists of several finger plumes near the drainage areas. These areas were identified as MW-24 area, MW-26 area, MW-16 area and MW-1 area.

The most recent water quality sampling results (December 2010) show benzene concentrations at levels above the North Carolina Groundwater Standards (2L Standard) in monitoring wells MW-1, MW-1B, MW-2, MW-3, MW-4R, MW-5, MW-7, MW-9, MW-10, MW-11, MW-12, MW-14, MW-15, MW-16 and MW-26. Vinyl chloride was detected above the 2L Standard in MW-2, MW-3, MW-9 and MW-11. Tetrachloroethene was detected above the 2L Standard in MW-12 and MW-16. 1,4-Dichloroethene was detected above the 2L Standard in MW11 and MW-12. Mercury was the only Appendix II exclusive parameter (defined as parameters not also listed on the Appendix I list) detected in quantifiable concentrations in MW-1B and MW-15.

Historic water quality sampling results for Organic Compounds (VOCs) are shown in **Table 5**. **Plate 5** illustrates the December 2010 VOC detections above the 2L Standard.

1.4 Description of Site Conceptual Model

Site conceptual and analytical models were created for the ACM developed with Visual MODFLOW with MT3D[96] and presented as cross sections.

Physical Process

Estimated hydraulic properties for each lithology were obtained by slug tests and soil results.

Hydraulic properties

	Hydraulic Conductivity cm/sec	Total Porosity	Effective Porosity
Layer 1: silty sand/saprolite	1.25×10^{-3}	48.5	28.1
Layer 2: partially weathered rock	4.90×10^{-4}	20	10
Layer 3: highly fractured rock	8.05×10^{-5}	20	10

Total run off is estimated to be 17.2 inches per year where overland runoff accounts for 6.9 inches and base flow accounts for 10.3 inches. Evapotranspiration is estimated at 31.0 inches per year. Aquifer "storativity S, [was] developed primarily for the analysis of well hydraulics in confined aquifers."[4] [page 61] Change in aquifer storage in an unconfined aquifer system results in an increase/decrease in water level.[5] Change in aquifer storage is considered negligible due to the unconfined nature of the system and the assumption that the system is under steady state conditions. [4][page 205] Values of the water budget were derived in Hydrogeology and Simulation of Ground-Water Flow in the Thick Regolith-Fractured Crystalline Rock Aquifer System of Indian Creek Basin, North Carolina.[1] Based on these estimations groundwater recharge is estimated at 10.3 inches per year. Recharge area is limited due to landfill activities, structures, and roads and was applied to areas that have limited impact.

The primary mechanism of physical plume movement is through advection. Advective flow with applied sorption (retardation) typically slows plume migration. The retardation coefficient (R) used to calculate the expected migration rates for the constituents can be calculated from the following equation:

$$R = 1 + \frac{\rho_d}{n} K_d$$

where

R is the retardation coefficient

ρ_d is the dry bulk density of the soil (g/cm^3)
n is the porosity (unitless)
K_d is the distribution coefficient (mL/g)

The dry bulk density utilized in the *ACM* Report was taken from published literature at a value of 1.44 g/cm^3. The distribution coefficient (K_d) can be estimated as the constituent-specific soil–water partitioning coefficient (K_{oc}) times the fraction of organic carbon in the soil.[4] Based on boring logs and field observations there is little evidence to suggest any significant soil organic carbon. A conservative value for soil organic carbon was estimated to be 1%. "Soils vary in the amount of soil organic carbon they contain, ranging from less than 1 percent in many sandy soils to greater than 20 percent in soils found in wetlands and bogs."[10]

Coefficients of Retardation	
Constituent	**R**
1,1-Dichloroethane	1.03
1,2-Dichloropropane	1.04
Benzene	1.07
cis-1,2-Dichloroethene	-
Methylene chloride	1.02
p-Dichlorobenzene	1.43
Tetrachloroethene	1.22
Trichloroethene	1.11
Xylenes	1.36

The above table suggests that there is limited retardation. Contamination has the potential to travel at or near the seepage velocities identified in the *ACM*.

Chemical/Biochemical Process

Chemical degradation processes, primarily that of half-life decay, are typically expressed based on surface water measurements. The identified contamination consists of constituents dissolved in groundwater. 1,1-Dichloroethane, 1,2-dichloropropane, benzene, *cis*-1,2-dichloroethene, methylene chloride, and tetrachloroethene undergo volatilization from soil when released near the surface and volatilization when released to surface waters. *p*-Dichlorobenzene, trichloroethene, and xylenes have an environmental fate of rapid volatilization when released from surface water and low to moderate adsorption when released into soils.[1] Half-life reactions in groundwater vary greatly. A summary of published half-life reactions in groundwater is included below.

Half-Life in Groundwater[9]		
Constituent	**Half-Life (high)**	**Half-Life (low)**
1,1-Dichloroethane	22 weeks	32 days
1,2-Dichloropropane	7.1 years	334 days
Benzene	24 months	10 days
cis-1,2-Dichloroethene	95 months	8 weeks
Methylene Chloride	8 weeks	14 days
p-Dichlorobenzene	12 months	8 weeks
Tetrachloroethene	2 years	12 months
Trichloroethene	4.5 years	10.7 months
Xylenes	12 months	2 weeks

Biotransformation of most chlorinated solvents, including halogenated aliphatic hydrocarbons, occurs through reductive dechlorination.[3] The reductive dechlorination process utilizes the chlorinated solvents as the electron acceptor. Through reductive dechlorination, carbon is utilized as the electron donor for microbial growth, with the aromatic hydrocarbons acting as the potential carbon source.

1.5 Regulatory Status

The Alexander County Landfill operates as a C&D Landfill over a MSW Landfill under permit No. 02-01. Alexander County has been under a Corrective Action Plan for two years. Water quality monitoring is performed semi-annually.

2 CORRECTIVE ACTION SUMMARY

2.1 Aquifer Conditions

The groundwater contaminant source is the former MSW landfill cell. The contamination mechanism is landfill gas or precipitation that has percolated through the landfill waste, allowing VOCs to partition from solid/liquid phases into a dissolved phase, and subsequently migrated downwards to mix with groundwater. The ACM identified mercury, 1,1-dichloroethane, 1,2-dichloropropane, benzene, cis-1,2-dichloroethene, methylene chloride, p-dichlorobenzene, tetrachloroethene, trichloroethylene and xylenes as constituents of concern. Contamination primarily consists of several finger plumes near the drainage areas.

2.1.1 Physical Changes

Alexander County has continued operation at the C&D landfill. The drainage area between MW-12, MW-12D and MW-7 was cleared, graded slightly, and planted with approximately 200 hybrid poplar trees. Currently the trees are dormant for the winter but MESCO anticipates little replanting to be required in the spring. Photographs of the area are included as **Plate 6A and Plate 6B**.

An allotment of the neighboring property to the East owned by Crescent Land Resources and Tony Correll, was purchased by Alexander County, extending their property boundary. The additional 15.7 acres allows Alexander County to own their monitoring wells and extend their compliance boundary to 250 feet from waste. Further plume delineation in this area is planned for spring 2011 with the installation of MW-33 and MW-34. The new property deed is included in **Appendix D**. Proposed construction details are included on **Table 1**.

Monitoring wells MW-31 and MW-32 were installed August 16, 2010 to determine plume extent. MW-31 is located south of MW-26 and MW-32 is located south of MW-10. MW-30 was proposed southwest of the transfer station; however, after two attempts, due to lack of fractures, no well was able to be installed. Well locations are shown on **Plate 2**.

In the MW-26 area four additional wells (IW-1, P-1, P-2 and P-3) were installed on February 14, 2011. The injection well, IW-1, was installed approximately fifty feet north of MW-26. Piezometer P-1, P-2 and P-3 were installed as temporary wells, used for observing local aquifer conditions around the injection well and desired area of influence. These wells are not intended to be used for traditional semi-annual water quality monitoring.

Three gas wells were installed as test points for active methane extraction. MEW-1 was installed August 17, 2010 to establish the presence of gas in this area. MEW-2 and MEW-3 were installed October 20, 2010, in preparation of the pilot test. The pilot test for methane extraction is scheduled for spring 2011.

2.1.2 Chemical Changes

The ACM and CAP listed contamination of concern as 1,1-dichloroethane, 1,2-dichloropropane, benzene, cis-1,2-dichloroethylene, methylene chloride (dichloromethane), p-dichlorobenzene (1,4-dichlorobenzene), tetrachloroethene, trichloroethene, xylenes and mercury. Since the ACM submittal in April 2008 and subsequent groundwater standard adjustments, Alexander County has generally seen a reduction in the quantity of 2L Standard exceedences. Total VOC concentrations in each area of concern (AOC) have shown a decrease in contamination levels, indicating natural degradation is occurring. Total VOCs in the MW-1 AOC decreased from 58.72 ug/l, at the time of the ACM, to 41.4 ug/l, from the most recent sampling event in December 2010. Total VOCs in the MW-16 AOC decreased from 76.65 ug/l to 66.4 ug/l; the MW-26 AOC saw a reduction in total VOCs from 157.26 ug/l to 132 ug/l and the MW-24 AOC saw a reduction from 101.75 ug/l to 77.3 ug/l. Additionally, the most recent water quality sampling results indicate detection of only five VOCs: benzene, vinyl chloride, 1,4-dichlorobenzene, tetrachloroethene, and 1,2-dichloropropane. Mercury, an Appendix II metal, is inconsistently detected.

Based on water quality laboratory results several trends can be observed. Metals continue to be present across the facility in groundwater, surface water and NURE soil samples. They are still considered to be naturally occurring. In 2010 sampling events mercury was detected above the laboratory established Method Detection Limit (MDL) in monitoring wells MW-1, MW-1B, MW-6, MW-15, MW-16 and MW-17; however, only two samples were recorded above the 2L standard. A general reduction in the number of contaminant of concern detections as well as an overall reduction in detections above the 2L Standard has been observed. Methylene chloride and xylenes have observed a reduction in detection concentration as well as number of well locations. Concentrations and detections of 1,2-dichloropropane, tetrachloroethene and trichloroethene remain consistent. Vinyl chloride has been more readily observed since the state limit reduction; however, the presence of vinyl chloride generally indicates the final stages of reductive dechlorination. Benzene detections have increased in concentration and in number of well locations. 1,4-Dichlorobenzene and cis-1,2 dichloroethene have increased in concentration. Overall total VOCs in groundwater have reduced. More details are included in the sections for each plume area.

2.2 Plume Characteristics

2.2.1 Physical Changes

Since the ACM submittal in April 2008 the horizontal extent of VOC migration in the MW-26 and MW-16 AOC, has been delineated through the installation of additional monitoring wells MW-31 and MW-32. Gas system wells MEW-1, MEW-2 and MEW-3 were installed along the northern edge of waste, near the scale house, to reduce landfill gas migration in the hydraulically up-gradient, direction of monitoring wells MW-1, MW-1A and MW-1B. Hybrid popular trees were planted in the MW-7 and MW-12/12D area to influence the plume extent for the MW-24 AOC.

2.2.2 Chemical Changes

As remediation has progressed, different AOCs have different target constituents for reduction. The aromatic hydrocarbons (benzene and 1,4-dichlorobenzene) are the target constituents to clean up in the MW-26 AOC. Benzene, 1,4-dichlorobenzene and tetrachloroethene are the constituents to be reduced in the MW-24 AOC. In the MW-16 AOC, the target constituents are benzene and terachloroethene. Sample results from proposed wells MW-33 and MW-34 will indicate the extent of these or other contaminants. Benzene is the primary contaminant of concern in the MW-1 AOC.

3 CORRECTIVE ACTION PLAN UPDATES

A number of factors influenced selection of remediation alternatives.

- Groundwater contamination exists in both the surficial (unconfined) and upper bedrock aquifers.
- Groundwater contamination exists at relatively low levels (ppb range).
- Groundwater contamination is below risk exposure levels.
- Groundwater contamination has migrated past the compliance boundary in some locations.
- Groundwater contamination is likely being controlled and influenced by landfill gas at some locations.

Remediation of relatively low-level contamination in the 100 ppb or less range can be difficult, expensive and may not be achievable. A multi-phase remedial approach is, therefore, necessary to address contamination across the site.

3.1 Modifications to Selected Remedy

3.1.1 MW-24 Area (Monitored Natural Attenuation w/ Phytoremediation)

Groundwater contaminants exist in the unconfined, shallow aquifer. Natural attenuation mechanisms are actively controlling groundwater contaminant movement in this area. Phytoremediation procedures were implemented to accelerate the natural evapotranspiration process and allow for hydraulic containment (plume control). On May 25, 2010 two hundred hybrid poplar cuttings were planted in the drainage between MW-7 and MW-12/12D. Protective fencing has been installed. Transducers were set to record daily water levels in MW-7 and MW-12. Daily precipitation levels are recovered from the State Climate Office website. Additionally, select trees are being measured to monitor growth. **Table 9** provides tree evaluation information. **Appendix E** contains transducer data and precipitation information from the State Climate Office.

The CAP indicated approximately 1,000-2,000 trees/acre would be planted in Alexander County on approximately 4 acres of property; however, additional information has indicated a planting area of that magnitude with that density is unnecessary. Given the revised planting area no more than 1,000 trees will be required for this AOC over the course of time. Additionally, the CAP proposed planting hybrid willow trees; but the planting area, county location and climate required a heartier tree that could better withstand the harsh winters and rocky soils present in Alexander County. **Plate 4** illustrates the phytoremediation area.

If 2L violations are consistently detected in MW-24 and or MW-25 and it is determined contamination has migrated beyond these wells, two additional monitoring wells, MW-28 and MW-29 are proposed for installation. Both wells will be constructed of 2”-I.D. Sch. 40 PVC casing with a 0.010”-slotted screen interval. Based upon the boring log for MW-24 the estimated depth for the two new wells is approximately 35-40 ft. bgs, with a 15-foot screened interval. The proposed well locations are depicted on **Plate 4**.

Groundwater sampling will be performed semi-annually on monitoring wells MW-6, MW-12, MW-12D, MW-13, MW-24 and MW-25. MW-7 will no longer be sampled as part of traditional semi-annual sampling due to its proximity to the waste boundary. Additional monitoring locations are present that can provide more relevant information regarding contamination migration and compliance boundary protection. MW-7 will not be abandoned, but remain for supplemental purposes and remediation/water level collection. Baseline sampling for the MNA performance parameters list provided by the Solid Waste Section was performed for two years (four consecutive semi-annual sampling events) on wells designated in the CAP Sampling and Analysis Plan. Based on the updated information regarding contaminant type and location select MNA sampling is proposed for MW-12 and MW-12D in this AOC. MW-6, MW-13, MW-24 and MW-25 have not had recent VOC detections and have been historically clean wells; therefore, they will no longer be included in the MNA sampling for this CAP. MW-12 and MW-12D will be sampled annually for the following parameters from the list of MNA sampling parameters provided by the SWS.

- Alkalinity
- Sulfate
- Sulfide
- TOC
- COD
- Iron
- Chloride
- Nitrate
- Temperature
- ORP
- DO
- pH
- Specific Conductance
- Turbidity

Hydrogen is an indicator of a redox environment; however, hydrogen can be unstable in nature and is expensive to monitor. Measurement of ORP can substitute for hydrogen analysis.

Volatile Fatty Acids can provide insight into the types of microbial activities occurring in the subsurface sometimes serving as electron donors. As these are expensive to monitor and a baseline has been established, it is MESCO’s belief it is no longer cost effective to continue sampling for these parameters.

Methane levels recorded above the background indicate methanogenic conditions, representing the final stages of dechlorination. Methane is commonly associated with landfill gas, which is not considered a primary contaminant source for this AOC. Additionally, new SWS guidance requires the landfill to be monitored for methane levels quarterly, providing coverage and data for this parameter.

Ethane and ethene also provide evidence of dechlorination's final stages. They are not cost effective to monitor in addition to multiple parameters providing similar information.

BOD is used to determine the amount of dissolved oxygen needed to break down organic material in the aquifer; however, it is not a precise quantitative test. The MW-24 area is highly anaerobic, with multiple analyses providing comparable data. BOD is a challenge to obtain, due to the short hold times, and the results are easier to obtain from other analyses.

Stream quality monitoring in the adjacent unnamed tributary of the Little River will be achieved through surface water sampling at sampling point SW-4R (**Plate 2**). Surface water locations will be sampled for Appendix I parameters. Soil sampling may be conducted, as deemed necessary, to monitor potential salt accumulation in the root zone.

Sampling details are included in the Water Quality Sampling and Analysis Plan presented in **Appendix B** of this report. Phytoremediation, MNA monitoring results, information on tree growth and health, shall be included as a separate section within the semi-annual monitoring reports.

3.1.2 MW-26 Area (Monitored Natural Attenuation w/ Substrate Injection)

Groundwater contaminants exist within the upper bedrock aquifer at the compliance boundary, requiring a remedial technology to supplement MNA.

In the CAP MESCO proposed supplementing natural attenuation by stimulating the *in-situ* bacteria through introduction of additional bacteria into the subsurface and later through introduction of a biological enhancement substrate (BES). For this AOC, MESCO proposed using BAC-9™, which according to its manufacturer (EOS Remediation, Raleigh, NC), consists of "…an enriched bioaugmentation culture capable of degrading chlorinated solvents …via halorespiration." BAC-9™ was injected into the subsurface using vendor-supplied Summa® canisters on February 17, 2011. The UIC Program has issued Injection Permit WI0300160 for this project.

A MESCO representative conducted the Bac-9 injection in Alexander County; Josh Mitchell, Solid Waste Director for Alexander County and Timothy Parker of IES-Solutions were present and assisted with the injection procedure. Access to the injection well was provided by cleared roads across the site. Water for this event was obtained from an offsite potable water source.

Set-up involved connecting the Bac-9 canister to a tank of Argon gas utilizing reinforced tubing. Around 10:45 AM, approximately 19 gallons of 1.05x concentrated Bac-9 were injected into IW-1 at pressure of approximately12 psi according to the procedure dictated by the manufacturer.

The injection event proceeded smoothly and without incident.

In the *Corrective Action Plan – Addendum* MESCO proposed to use a BES to feed the bacteria and stimulate biotic growth, once the BAC-9™ is established. The BES would be injected to accelerate the reduction of the benzene compound within the groundwater at MW-26, to help enforce the relative compliance boundary. Multiple injection events may be necessary over the course of corrective action. Before any additional applications at least two sampling events, including collection of select MNA performance parameters in MW-26, would be conducted to monitor the groundwater chemistry. In the CAP MESCO proposed to use edible oil substrate (EOS®), to reduce the chlorinated solvents. Recent sampling results indicate aphanitic hydrocarbons, primarily benzene, are currently the prominent COCs for this AOC; therefore, an injection of EOS may not aid in reducing these compounds. MESCO will monitor the progress of the Bac-9 through semi-annual sampling as well as quarterly sampling instituted by UIC. Given the slow rate of groundwater flow in this area, results from three semi-annual sampling events will be analyzed prior to additional injections. Upon receipt and analysis, MESCO will inform the SWS of its intentions to continue with the EOS injection, inject a different substrate based on the current contaminants present, or forego the injection because it is no longer necessary. In the event a new substrate will be injected, MESCO will contact the UIC to re-issue or modify the injection permit. Updates on progress and current sample results will be included in the MNA section of the semi-annual sampling reports.

Groundwater sampling will be performed semi-annually on MW-11, MW-26, MW-27 and MW-31. Due to its proximity immediately adjacent to the waste boundary, MW-3 will no longer be included with traditional semi-annual sampling events. Additional wells have been installed that provide coverage for this AOC. Baseline sampling for the MNA performance parameters provided by the SWS was conducted over four sampling events (two years). Select MNA parameters will be incorporated for monitoring wells MW-11 and MW-26 for this AOC. MW-27 and MW-31 have not had recent VOC detections and have

been historically clean wells; therefore, they will not be included in the MNA sampling for this CAP. MW-11 and MW-26 will be sampled annually for the following parameters from the list of MNA sampling parameters provided by the SWS.

- Alkalinity
- Sulfate
- Sulfide
- TOC
- COD
- Iron
- Chloride
- Nitrate
- Temperature
- ORP
- DO
- pH
- Specific Conductance
- Turbidity

Hydrogen is an indicator of a redox environment; however, hydrogen can be unstable in nature and is expensive to monitor. Measurement of ORP can substitute for hydrogen analysis.

Volatile Fatty Acids can provide insight into the types of microbial activities occurring in the subsurface sometimes serving as electron donors. As these are expensive to monitor, and a baseline has been established it is MESCO's belief it is no longer cost effective to continue sampling for these parameters.

Methane levels recorded above the background indicate methanogenic conditions, representing the final stages of dechlorination. Methane is commonly associated with landfill gas, which is not considered a primary contaminant source for this AOC. Additionally, new SWS guidance requires landfill to be monitored for methane levels quarterly, providing coverage and data for this parameter.

Ethane and ethene also provide evidence of dechlorination's final stages. They are not cost effective to monitor in addition to multiple parameters providing similar information.

BOD is used to determine the amount of dissolved oxygen needed to break down organic material in the aquifer; however, it is not a precise quantitative test. The MW-26 area is highly anaerobic, with multiple analyses providing comparable data. BOD is a challenge to obtain, due to the short hold times, and the results are easier to obtain from other analysis.

Sampling details are included in the Water Quality Sampling and Analysis Plan presented in **Appendix B** of this report. MNA sampling and monitoring results shall be included as a separate section within the semi-annual monitoring reports.

3.1.3 MW-16 Area (Monitored Natural Attenuation w/ Substrate Injection)

Alexander County acquired 15.7 acres of land from Tony Correll and Crescent Land Resources. The additional property allows Alexander County to extend the compliance boundary to 250 feet from the edge of waste and provides additional buffer for the protection of human health. Two additional monitoring wells MW-33 and MW-34 are planned for installation in spring 2011 to delineate the contamination extent for this AOC; locations have been updated since the approved CAP to account for the additional property and the 250 foot compliance boundary. Proposed wells will be constructed of 2”-I.D. Sch. 40 PVC casing with a 0.010”-slotted screen interval. Based upon existing boring logs and the proximity to the local drainage feature, the estimated depth for the new wells is approximately 20 ft. bgs, with 10-foot screened intervals. Well parameters differ slightly from the approved CAP due to the new proposed locations depicted in **Plate 4**.

If it is determined the contamination has not reached the new compliance boundary corrective action will no longer be required for this area. The wells will continue to be monitored semi-annually. MNA will continue in this area until lab results from the new monitoring wells are analyzed and submitted to the SWS establishing the plume extent within the 250-foot compliance boundary.

If laboratory results determine contamination is past the 250-foot compliance, MNA monitoring will continue as specified in the updated SAP. The *Corrective Action Plan – Addendum* proposed if chlorinated hydrocarbons still make up the majority of COCs in the plume, EOS may be injected into the shallow, unconfined aquifer using truck or rig-mounted direct-push technology. Injection points will be spaced at approximate 10-ft intervals in a line transverse to groundwater flow, and located at the upgradient end of the plume near the waste limit. The injection point line will extend for a distance of 100 ft. north and south from MW-5, along the east side of the roadway between MW-5 and the waste limit, for a total distance of 200 lineal feet (20 injection points total). The injection depth at this location will be approximately 30-40 ft. bgs. This EOS application is intended to create a reactive barrier that will breakdown COCs near the source area before they can be transported further downgradient. The existing plume will then be subject to natural biodegradation processes, as it will be cut off from the contaminant source. Multiple injection events may be needed at roughly 18-month intervals in order to effectively implement this form of corrective action. Monitoring wells MW-5 and MW-16 may also be used for EOS injection; however, these wells will be more effectively utilized as performance wells.

Dependent on the plume extent the injection location may be moved closer to the compliance boundary. EOS remains the proposed substrate for this AOC. The injection specifics including locations and well numbers will be based on sampling results from proposed wells MW-33 and MW-34, determined at a

later date. The SWS will be appraised of the remediation situation and possible CAP adjustments, as details are known.

Groundwater sampling will be performed semi-annually on monitoring wells MW-5, MW-10, MW-16 and MW-32, as well as proposed wells MW-33 and MW-34 once installed. Baseline sampling for the MNA performance parameters list provided by the SWS was performed for two years (four consecutive, semi-annual sampling events). Based on updated sampling information regarding contaminant type and location, select MNA is proposed for MW-5 and MW-16 in this AOC. If laboratory results indicate contamination is present in newly installed monitoring wells MW-33 and MW-34, they will be sampled for the SWS list of MNA performance parameters once a year for two years, or annually, to establish a baseline. MW-5 and MW-16 will be sampled annually for the following parameters from the list of MNA sampling parameters provided by the SWS.

- Alkalinity
- Sulfate
- Sulfide
- TOC
- COD
- Iron
- Chloride
- Nitrate
- Temperature
- ORP
- DO
- pH
- Specific Conductance
- Turbidity

In the event contamination has not reached the 250 foot compliance boundary no MNA sampling will be necessary for this AOC. Additionally, if injection is instituted it must be noted that due to the persistence of EOS in the subsurface after initial injection, groundwater in the injection wells may not be of adequate quality to sample.

Surface water monitoring will include sampling existing downstream surfacewater sampling point SW-5, located along the unnamed tributary of the Catawba River. Additional surface water sampling location, SW-6, will be implemented upstream from MW-5 and MW-16, during the next scheduled semi-annual sampling event, to monitor the newly acquired property. Proposed sampling locations are provided on **Plate 4**.

Sampling details are included in the Water Quality Sampling and Analysis Plan presented in **Appendix B** of this report. MNA sampling and monitoring results shall be included as a separate section in the semi-annual monitoring reports.

3.1.4 MW-1B Area (Active Methane Extraction)

Contamination has reached the current property line. Landfill gas is believed to be affecting migration of the contaminant plume in this area. Alexander County is in the process of purchasing the adjacent property in order to provide additional buffer at this location. Based on *ACM* observations, the most efficient and cost effective method of remediation is to install an active methane gas system.

Groundwater samples from MW-1 and MW-1B were sent to GEL Laboratories for tritium and low-level tritium analysis in September 2010. The tritium analysis was inconclusive however the low-level tritium results indicate 7.73 TU in MW-1 and 7.10 TU in MW-1B. These levels correspond with naturally occurring levels on Earth's surface. The absence of tritium indicates that leachate is not the cause of contamination in wells MW-1 and MW-1B, and landfill gas is a more probable cause. Additional landfill gas indicators also presented in the CAP include the up-gradient nature of the contamination, as well as low chloride levels.

The CAP proposed installing ten active methane wells along the periphery and outside of the current waste limits; ordered sequentially starting near MW-16 inside the current property line and following the edge of waste counterclockwise through MW-5, crossing the access road then running parallel to the waste limit and the scale house. The last well will be installed adjacent to the maintenance buildings. In October 2010, three methane wells were installed along the northern waste boundary, in the vicinity of the scale house. To date they have not been connected to an active system and are currently functioning as passive vents. Alexander County is soliciting carbon credit providers and landfill gas to energy developers as well as researching options for selling the methane before full implementation of the active methane system.

A pilot test is scheduled in 2011 for a possible active blower system. The pilot test will use the three methane wells (MEW-1, MEW-2 and MEW-3) already installed to determine if this method can reduce contamination levels. The pilot test is scheduled to last one month. Additional methane wells and a permanent blower system may be installed with the success of the pilot test.

If the pilot test does not provide adequate results and plans from various carbon credit providers or landfill gas developers are unable to be implemented, Alexander County may utilize a flare system. Once the system becomes active, installed wells would be fitted with an individual release valve to ensure optimum gas pressure. Methane will travel from the wells through pipes to the flares. Care will be taken to not exceed the EPA Clean Air Act standards in addition to complying with gas control standards set in the 15A NCAC 13B rules.

Active methane system monitoring will be implemented quarterly in conjunction with the existing methane probe monitoring, already in effect. Groundwater sampling for Appendix I VOCs and metals will continue to be conducted semi-annually on MW-1, MW-1B and MW-19. MW-18 will serve as the background well. Additionally, groundwater samples may be analyzed for dissolved methane to aid in determining the influence of landfill gas on plume migration.

3.2 Contingency Plan

At this juncture the contingency plan presented in the CAP does not need to be implemented. Alexander County owns extensive property providing for protection of human health. Surficial drainage features provide natural barriers to contamination migration off Alexander County's property. Additionally, the current methods and MNA have shown a reduction in total VOC concentrations.

4 CONCLUSION

4.1 Evaluation of Effectiveness

Certain changes in the physical and chemical characteristics of the contaminant plumes should occur as remediation progresses. Contaminant concentrations are expected to decrease over the period of remediation, thus resulting in a decrease in the physical extent of the plume.

Plume Area MW-24

The contaminant plume is delineated by MW-24 and MW-25. MW-7 and MW-12 are not expected to observe immediate changes in groundwater chemistry. Large contaminant concentration decreases may not be observed until 3-5 years after initiation of corrective action.

Plume Area MW-26

Installation of MW-31 delineated the extent of the contaminant plume. Follow up sampling for the NCDENR Underground Injection Control Section (UIC) will occur quarterly beginning in June 2011 with the scheduled semi-annual sampling event. Bac-9 travels at the rate of groundwater, which is relatively slow in this AOC. Changes in contaminant concentration should be observable in MW-26 starting approximately one year after the initial injection.

Plume Area MW-16

With the additional property, (as per 15A NCAC 13B .1631(a)(2)(A) the new compliance boundary would be established no more than 250 feet from the waste limit, and be at least 50 feet within the facility property boundary) the extension of the 250 foot compliance boundary and the installation of MW-33 and MW-34, the MW-16 AOC will delineate the contaminant plume. Evaluation of effectiveness will be determined through semi-annual sampling events monitoring the plume extent.

Plume Area MW-1B

Evaluation of effectiveness for the plume area associated with MW-1B will be determined through semi-annual sampling events to monitor potential decreases in contaminant levels. Data collected during the pilot test well help quantify possible reductions and timelines for active methane system implementation. Landfill gas reduction should be observed shortly after pilot test implementation. Contaminant reduction in groundwater will be observed approximately a year after full-time implementation of the active system.

4.2 Report Submittals

Brief updates regarding the status of the remediation efforts will be submitted within the semi-annual groundwater sampling report. The purpose of these updates is to keep the SWS current on the progress of remediation and aware of situations that may require amendments to the current CAP. Text, tables, pictures, etc. may be used to illustrate the existing site conditions.

Injection reports will be submitted in accordance with the injection permits issued for the site by the UIC Program. These reports typically consist of an *Injection Event Record* report detailing the actual event, and subsequent monitoring reports submitted at quarterly intervals.

4.3 Completeness of Corrective Action

Reduction of low-level contamination in Alexander County may be achieved through natural attenuation, injection, active methane extraction, and phytoremediation. Institutional controls limit access to the site. The source area has been capped to limit infiltration. The on-site, non-potable water supply well located near the scale house was abandoned to eliminate a potential contaminant migration pathway.

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TABLES

Table 1: Well Construction Details

Monitoring Well	Date Installed	Ground Elevation	Top-of-Casing Elevation	Northing	Easting	Well Diameter	Boring Diameter	Screen Interval (BGS)	TOR	Status
MW-1	09/14/1990	1077.98	1080.68	767134.0364	1363442.6050	2	6	25-40	31.00	Monitoring Well
MW-1A	09/30/1994	1083.28	1085.32	767200.3163	1363503.3553	2	-	32.5-47.5	41.00	Monitoring Well
MW-1B	05/21/2003	1079.56	1082.56	767195.2993	1363465.9606	2	6	46-61	-	Monitoring Well
MW-2	09/06/1990	1002.28	1004.48	766674.3685	1362089.6189	2	10	15-30	-	Monitoring Well
MW-3	09/19/1990	1024.23	1024.73	766250.3839	1362679.0876	2	6	13-33	23.10	Monitoring Well
MW-4R	09/30/1994	1008.54	1012.64	766301.7951	1363401.6259	2	-	5.5-20.5	18.00	Monitoring Well
MW-5	09/16/1994	1049.01	1051.26	766547.9303	1363808.9110	2	-	33.8-48.8	42.00	Monitoring Well
MW-6	09/29/1994	1008.29	1010.79	766433.2733	1361867.3868	2	-	26-41	24.00	Monitoring Well
MW-7	09/29/1994	1005.84	1009.24	766240.2892	1362135.0386	2	-	38-53	36.50	Monitoring Well
MW-8	09/29/1994	1019.01	1022.01	767017.6867	1362679.5452	2	-	12.5-27.5	14.00	Abandoned
MW-9	10/24/2000	993.76	996.27	766114.0184	1363340.8075	2	6	16.5-31.5	7.00	Monitoring Well
MW-10	10/25/2000	1037.83	1040.80	766278.6433	1363705.7044	2	6.5	76-91	36.00	Monitoring Well
MW-11	10/24/2000	1008.98	1011.96	766061.8888	1362636.9409	2	6.5	41-56	36.00	Monitoring Well
MW-12	10/23/2000	1004.46	1007.35	766005.5659	1362030.9237	2	6	51.5-66.5	66.00	Monitoring Well
MW-12D	06/09/2000	1006.03	1008.46	766005.1529	1362038.5108	2	3.88	90-100	-	Monitoring Well
MW-13	10/25/2000	1001.63	1004.56	766375.4660	1361820.1834	2	6.5	45.5-60.5	30.00	Monitoring Well
MW-14	10/26/2000	994.06	997.44	766663.1022	1362045.4545	2	6	25.0-40.5	37.50	Monitoring Well
MW-15	10/25/2000	1020.81	1023.44	766979.9418	1362543.9150	2	6	19-35	26.00	Monitoring Well
MW-16	12/20/2007	1034.94	1037.56	766458.4917	1363828.4046	2	7.75	25.25-40.25	-	Monitoring Well
MW-17	06/10/2003	988.36	991.16	767043.7701	1362461.2129	2	6	7.3-22.3	-	Monitoring Well
MW-18	12/19/2007	1081.52	1084.33	767212.2504	1363776.4901	2	6	41.7-56.7	20.50	Background Well
MW-19	12/20/2007	1068.67	1071.48	767200.6858	1363194.7175	2	6	48.92-63.92	43.00	Monitoring Well
MW-20	12/20/2007	1044.19	1046.92	767200.0703	1362748.8204	2	6	48.55-63.55	38.00	Monitoring Well
MW-21	12/19/2007	987.08	990.00	767046.2058	1362368.8492	2	6	26.05-41.05	-	Monitoring Well
MW-22	12/19/2007	956.21	958.97	766871.4240	1362092.4590	2	6	8.12-18.12	-	Monitoring Well
MW-23	12/19/2007	947.83	950.48	766686.4251	1361922.3394	2	6	6.54-21.54	21.54	Monitoring Well
MW-24	12/20/2007	971.29	974.04	765972.4283	1361780.7942	2	6	20.35-35.35	35.35	Monitoring Well
MW-25	12/19/2007	979.93	981.93	765849.7417	1361936.5943	2	6	29.48-44.48	22.80	Monitoring Well
MW-26	12/20/2007	988.08	990.69	765876.1807	1362646.1678	2	6	34.8-49.8	31.85	Monitoring Well
MW-27	12/20/2007	989.19	992.19	765934.3152	1362968.1353	2	6	34.82-49.82	23.70	Monitoring Well
*MW-28**	*TBD*	*~972*	-	*766218.15*	*1361636.24*	*2*	*6*	*25-40*	*40.00*	*Proposed Well*
*MW-29**	*TBD*	*~962*	-	*765882.93*	*1361711.49*	*2*	*6*	*25-40*	*40.00*	*Proposed Well*
MW-30	8/16/2010	1008.96	-	765878.2370	1362265.7566	-	-	-	26.00	Dry-abandoned in place
MW-30A	8/16/2010	1009.70	-	765891.1945	1362244.2411	-	-	-	28.00	Dry-abandoned in place
MW-31	8/16/2010	983.05	985.42	765663.1100	1362597.1100	2	6	17.56-32.56	-	Monitoring Well
MW-32	8/16/2010	1022.57	1025.26	766085.7021	1363691.4792	2	6	27.70-42.70	24.50	Monitoring Well
*MW-33**	*TBD*	*~1033*	-	*766326.70*	*1363793.79*	*2*	*6*	*35-50*	*50.00*	*Proposed Well*
*MW-34**	*TBD*	*~1025*	-	*766422.12*	*1363885.82*	*2*	*6*	*35-50*	*50.00*	*Proposed Well*

NOTE:

1. Ground, datum and TOR elevation are in units of feet, well and boring diameter are in units of inches.
2. TOR = Top of rock below ground surface (bgs)

* Proposed monitoring wells: elevations, locations & depths are estimated and subject to change.

Table 2: Historic Groundwater Elevation Data

Name	01/31/1995	02/15/1995	03/08/1995	12/06/1995	05/06/1996	11/11/1996	06/24/1997	12/03/1997	03/23/1998	04/30/1998	06/04/1998
MW-1	1047.54	1047.89	1048.09	1045.20	1045.84	1044.96	1046.93	1044.93	1047.68	1047.09	1046.94
MW-1A	1039.92	1039.19	1040.47	1037.47	1038.47	1037.53	1042.22	1038.97	1041.36	1042.38	1042.76
MW-1B	-	-	-	-	-	-	-	-	-	-	-
MW-2	984.48	981.98	985.88	982.05	983.48	-	-	-	-	-	-
MW-3	1000.23	999.13	1000.08	999.05	999.33	998.97	999.38	999.10	988.11	999.37	999.44
MW-4R	1000.64	1001.44	1001.39	996.41	997.16	996.48	997.95	996.85	998.24	998.24	997.74
MW-5	1014.14	1013.73	1015.16	1011.38	1012.76	1011.10	1012.90	1011.83	1025.82	1014.49	1013.54
MW-6	986.29	984.02	989.74	980.97	982.44	979.79	981.97	977.87	987.31	986.26	982.91
MW-7	971.54	967.86	973.74	969.86	973.24	969.34	974.72	969.32	974.68	974.94	974.89
MW-8	1011.96	1011.91	1014.21	1008.52	1010.14	1009.56	1012.42	1009.16	1012.56	1011.56	1010.54
MW-9	-	-	-	-	-	-	-	-	-	-	-
MW-10	-	-	-	-	-	-	-	-	-	-	-
MW-11	-	-	-	-	-	-	-	-	-	-	-
MW-12	-	-	-	-	-	-	-	-	-	-	-
MW-12D	-	-	-	-	-	-	-	-	-	-	-
MW-13	-	-	-	-	-	-	-	-	-	-	-
MW-14	-	-	-	-	-	-	-	-	-	-	-
MW-15	-	-	-	-	-	-	-	-	-	-	-
MW-17	-	-	-	-	-	-	-	-	-	-	-

Table 2: Historic Groundwater Elevation Data

Name	11/18/1998	05/13/1999	12/06/1999	05/17/2000	12/11/2000	06/11/2001	12/27/2001	06/12/2002	01/02/2003	06/24/2003	12/11/2003
MW-1	1044.77	1044.98	1044.51	1044.82	1044.36	1044.66	1044.58	1044.73	1044.97	1047.76	1044.77
MW-1A	1037.78	-	-	-	1036.72	1036.30	1036.26	1036.14	1036.79	1042.56	1038.90
MW-1B	-	-	-	-	-	-	-	-	-	1046.21	1040.92
MW-2	-	-	977.04	-	-	-	-	-	-	-	-
MW-3	999.08	999.31	998.62	999.10	998.50	998.12	998.18	998.77	999.21	999.45	999.11
MW-4R	996.24	996.45	995.71	995.95	995.37	995.48	995.32	995.37	996.50	997.82	996.59
MW-5	1010.76	1011.36	1008.92	1010.91	1007.84	1008.53	1007.50	1008.10	1011.16	1014.07	1010.19
MW-6	975.71	983.04	975.47	980.85	973.63	975.74	973.83	976.93	982.55	987.07	976.69
MW-7	968.46	969.54	967.92	968.97	967.92	967.98	967.86	967.90	968.40	977.75	968.29
MW-8	1006.75	1009.37	1007.56	1009.30	1005.47	1007.66	1007.73	1007.16	1011.16	1012.26	1012.06
MW-9	-	-	-	-	982.86	983.04	983.48	982.96	984.94	984.71	984.26
MW-10	-	-	-	-	1001.75	1001.90	1001.30	1001.57	1002.78	1004.80	1003.05
MW-11	-	-	-	-	968.75	969.66	969.78	969.39	976.35	958.76	970.34
MW-12	-	-	-	-	951.83	952.72	951.62	952.85	957.04	966.65	954.07
MW-12D	-	-	-	-	-	-	-	-	-	963.97	958.06
MW-13	-	-	-	-	958.33	958.41	957.51	960.03	964.43	975.00	963.61
MW-14	-	-	-	-	956.03	956.94	956.23	957.47	959.44	961.32	957.99
MW-15	-	-	-	-	996.60	997.74	997.38	997.83	1001.52	1002.37	999.19
MW-17	-	-	-	-	-	-	-	-	-	979.50	977.96

Table 2: Historic Groundwater Elevation Data

Name	06/15/2004	12/29/2004	06/22/2005	01/12/2006	07/06/2006	12/14/2006	06/27/2007	12/19/2007	6/20/2008	12/20/2008	6/20/2009
MW-1	1044.65	1044.69	1044.62	1044.60	1044.25	1044.62	1044.47	1044.13	1044.34	1044.46	1044.66
MW-1A	1036.72	-	-	-	-	-	-	-	-	-	-
MW-1B	1038.18	1038.16	1038.67	1038.00	1037.14	1037.52	1037.75	1036.10	1035.58	1035.55	1038.05
MW-2	-	-	-	-	-	979.17	977.28	975.12	977.83	978.03	984.43
MW-3	999.13	999.31	999.23	999.29	999.10	999.31	999.24	998.82	999.16	1009.54	999.28
MW-4R	996.25	996.77	996.39	996.96	996.77	996.19	995.93	995.56	995.63	997.82	997.47
MW-5	1009.61	1011.18	1009.85	1010.43	1009.02	1009.69	1009.14	1007.51	1007.90	1007.91	1011.12
MW-6	979.11	983.49	979.72	984.52	979.52	983.07	977.36	975.63	979.98	978.84	985.34
MW-7	967.83	968.52	969.83	968.01	967.77	967.94	967.42	976.18	967.20	965.44	971.03
MW-8	1008.40	1011.21	1010.54	1013.56	1013.63	1009.86	1007.57	-	-	-	-
MW-9	984.03	984.92	983.86	985.68	985.57	984.32	983.42	983.54	983.17	985.46	985.09
MW-10	1002.86	1003.33	1003.25	1003.21	1002.89	1002.99	1003.00	1002.03	1002.42	1002.37	1003.98
MW-11	969.97	973.56	970.52	973.57	971.14	971.46	969.55	969.05	969.26	971.11	974.34
MW-12	954.60	955.95	957.26	954.29	953.70	954.67	954.81	951.15	953.63	951.85	958.17
MW-12D	952.82	952.78	949.27	948.26	947.66	948.10	947.29	943.50	-	943.95	650.51
MW-13	966.55	970.00	967.41	968.67	965.14	968.76	965.10	958.99	958.56	961.95	971.75
MW-14	958.05	960.16	958.25	960.08	955.93	958.32	957.89	956.58	958.23	958.43	960.45
MW-15	998.61	1000.90	999.22	1001.79	1000.78	999.56	995.44	994.91	998.27	1000.51	1001.26
MW-16	-	-	-	-	-	-	-	-	1006.08	1005.66	1007.94
MW-17	974.55	976.48	975.91	978.55	979.39	975.49	981.03	973.31	971.21	973.71	976.27
MW-18	-	-	-	-	-	-	-	-	1029.63	1029.13	1031.85
MW-19	-	-	-	-	-	-	-	-	1018.09	1018.08	1019.20
MW-20	-	-	-	-	-	-	-	-	1006.52	1005.99	1007.51
MW-21	-	-	-	-	-	-	-	-	957.59	957.86	953.65
MW-22	-	-	-	-	-	-	-	-	943.52	943.47	944.20
MW-23	-	-	-	-	-	-	-	-	932.49	932.74	934.27
MW-24	-	-	-	-	-	-	-	-	941.92	940.94	944.98
MW-25	-	-	-	-	-	-	-	-	949.95	949.00	957.03
MW-26	-	-	-	-	-	-	-	-	960.61	962.45	971.39
MW-27	-	-	-	-	-	-	-	-	969.98	971.84	977.14
MW-31	-	-	-	-	-	-	-	-	-	-	-
MW-32	-	-	-	-	-	-	-	-	-	-	-

Table 2: Historic Groundwater Elevation Data

Name	12/20/2009	07/20/2010	12/08/2010		Observed High	Observed Low	Difference	Average
MW-1	1044.47	1044.50	1044.37		1048.09	1044.13	3.96	1045.30
MW-1A	-	-	-		1042.76	1036.14	6.62	1038.95
MW-1B	1037.98	1039.54	1038.36		1046.21	1035.55	10.66	1038.36
MW-2	984.47	979.33	978.89		985.88	975.12	10.76	980.63
MW-3	999.73	999.05	999.06		1009.54	988.11	21.43	999.14
MW-4R	997.65	996.76	996.47		1001.44	995.32	6.12	997.00
MW-5	1011.18	1009.95	1009.14		1025.82	1007.50	18.32	1011.11
MW-6	986.33	978.54	979.48		989.74	973.63	16.11	980.89
MW-7	967.29	968.30	967.29		977.75	965.44	12.31	969.87
MW-8	-	-			1014.21	1005.47	8.74	1010.13
MW-9	986.02	983.73	984.84		986.02	982.86	3.16	984.28
MW-10	1003.65	1003.48	1002.91		1004.80	1001.30	3.50	1002.83
MW-11	974.91	970.35	970.76		976.35	958.76	17.59	970.60
MW-12	955.72	957.77	953.36		966.65	951.15	15.50	954.94
MW-12D	949.08	951.22	945.64		963.97	650.51	313.46	930.14
MW-13	969.66	963.83	961.16		975.00	957.51	17.49	964.52
MW-14	962.45	958.38	958.31		962.45	955.93	6.52	958.43
MW-15	1002.13	998.93	999.02		1002.37	994.91	7.46	999.24
MW-16	1007.75	1007.16	1006.33		1007.94	1005.66	2.28	1006.82
MW-17	978.36	975.16	974.81		981.03	971.21	9.82	976.36
MW-18	1031.59	1034.35	1031.58		1034.35	1029.13	5.22	1031.36
MW-19	1019.70	1021.53	1019.68		1021.53	1018.08	3.45	1019.38
MW-20	1007.21	1007.94	1006.87		1007.94	1005.99	1.95	1007.01
MW-21	964.15	963.20	961.77		964.15	953.65	10.50	959.70
MW-22	944.96	944.14	943.92		944.96	943.47	1.49	944.04
MW-23	935.43	933.08	933.44		935.43	932.49	2.94	933.58
MW-24	944.04	945.01	942.84		945.01	940.94	4.07	943.29
MW-25	955.04	956.50	950.63		957.03	949.00	8.03	953.03
MW-26	971.44	962.81	963.53		971.44	960.61	10.83	965.37
MW-27	979.67	970.81	973.41		979.67	969.98	9.69	973.81
MW-31	-	-	962.92		962.92	962.92	0.00	962.92
MW-32	-	-	993.34		993.34	993.34	0.00	993.34

Table 3: Summary of Slug Test Results

Well	Screen Interval (BGS)	Initial DTW (BTOP)	Initial Head Change	K (cm/sec)	Lithology
MW-1A	32.5-47.5	46.5	31.5	5.60E-05	Gneiss
MW-2	15-30	22.8	3.2	3.70E-06	Silty Sand
MW-3	13-33	25.5	25.5	3.90E-06	PWR/Gneiss
MW-4R	5.5-20.5	14.8	4.8	4.90E-04	Silty Clay/Gneiss
MW-5	33.8-48.8	39.9	39.9	6.40E-05	Saprolite
MW-6	26-41	33.2	33.2	2.40E-05	Gneiss
MW-7	38-53	40.6	40.6	1.60E-06	Gneiss
MW-8	12.5-27.5	14.2	14.2	1.30E-05	Gneiss
MW-16	25.25-40.25	31.97	3.82	8.72E-04	Silty Sand
MW-18	41.7-56.7	55.00	2.48	1.19E-04	Gneiss
MW-19	48.92-63.92	56.48	1.56	1.92E-06	Gneiss
MW-20	48.55-63.55	40.80	5.72	5.49E-05	Gneiss
MW-21	26.05-41.05	30.51	3.98	3.77E-03	Silty Sand
MW-22	8.12-18.12	15.31	4.16	6.04E-04	Silty Sand
MW-23	6.54-21.51	17.60	4.97	9.83E-04	Silty Sand
MW-24	20.35-35.35	33.71	1.39	1.33E-02	PWR
MW-25	29.48-44.48	33.05	5.13	5.41E-05	Gneiss
MW-26	34.8-49.8	29.91	9.02	1.16E-04	Gneiss
MW-27	34.82-49.82	20.38	4.97	2.83E-05	Gneiss

Summary Statistics			
Mean	1.08E-03	Maximum	1.33E-02
Median	5.60E-05	Minimum	1.60E-06
Sandard Deviation	3.08E-03	Count	19

Silty Sand			
Mean	1.25E-03	Maximum	3.77E-03
Median	8.72E-04	Minimum	3.70E-06

Gneiss			
Mean	8.02E-05	Maximum	4.90E-04
Median	4.12E-05	Minimum	1.60E-06

Table 4: Flow Rate Calculations

Well	h_1 (ft)	h_2 (ft)	dh (ft)	dl (ft)	i	K (cm/sec)	n_e (%)	v (ft/yr)	Lithology
MW-1	1045.47	1040.00	5.47	24.86	0.2199	5.60E-05	10%	127.43	Gneiss
MW-1A	1041.15	1040.00	1.15	65.05	0.0177	5.60E-05	10%	10.28	Gneiss
MW-1B	-	-	-	-	-		5%	-	Gneiss
MW-2	980.72	960.00	20.72	23.96	0.8648	3.70E-06	28.1%	11.78	Silty Sand
MW-3	998.77	990.00	8.77	57.87	0.1515	3.90E-06	10%	6.11	Gneiss
MW-4R	997.01	990.00	7.01	117.08	0.0598	4.90E-04	10%	303.34	Gneiss
MW-5	1011.42	1010.00	1.42	38.98	0.0364	6.40E-05	28.1%	8.59	Saprolite
MW-6	980.78	960.00	20.78	27.13	0.7661	2.40E-05	10%	190.23	Gneiss
MW-7	970.29	960.00	10.29	162.33	0.0634	1.60E-06	10%	1.05	Gneiss
MW-8	1010.13	1000.00	10.13	75.93	0.1334	1.30E-05	10%	17.95	Gneiss
MW-9	984.11	990.00	5.89	70.75	0.0833	8.02E-05	10%	69.13	PWR
MW-10	1002.71	1000.00	2.71	40.88	0.0664	8.02E-05	10%	55.09	Rock
MW-11	970.12	980.00	9.88	59.98	0.1647	8.02E-05	10%	136.64	Rock
MW-12	954.88	950.00	4.88	107.78	0.0453	4.90E-04	10%	229.58	PWR/Gneiss
MW-12D	951.17	950.00	1.17	114.37	0.0102	8.02E-05	10%	8.50	Gniess
MW-13	964.53	960.00	4.53	14.01	0.3233	8.02E-05	10%	268.26	Gneiss
MW-14	958.05	950.00	8.05	42.08	0.1912	8.02E-05	10%	158.65	Gneiss
MW-15	998.92	990.00	8.92	39.73	0.2246	8.02E-05	10%	186.36	Gneiss
MW-16	1005.58	1010.00	4.42	49.01	0.0902	8.72E-04	17%	478.63	Silty Sand
MW-17	977.22	970.00	7.22	26.16	0.2759	8.02E-05	10%	228.92	Gneiss
MW-18	1029.33	1040.00	10.67	362.02	0.0295	1.19E-04	10%	36.29	Gneiss
MW-19	1015.00	1020.00	5.00	54.38	0.0919	1.92E-06	10%	1.83	Gneiss
MW-20	1005.91	1010.00	4.09	181.49	0.0225	5.49E-05	10%	12.80	Gneiss
MW-21	959.49	970.00	10.51	39.20	0.2681	3.77E-03	28.1%	3721.72	Silty Sand
MW-22	943.66	950.00	6.34	27.55	0.2301	6.04E-04	28.1%	511.79	Silty Sand
MW-23	932.88	940.00	7.12	19.23	0.3703	9.83E-04	28.1%	1340.11	Silty Sand
MW-24	940.34	950.00	9.66	120.66	0.0801	1.33E-02	10%	11016.84	PWR
MW-25	948.88	950.00	1.12	49.48	0.0226	5.41E-05	10%	12.67	Gneiss
MW-26	960.78	960.00	0.78	17.85	0.0437	1.16E-04	10%	52.45	Gneiss
MW-27	971.81	970.00	1.81	26.03	0.0695	2.83E-05	10%	20.36	Gneiss

NOTES:

1. Parameters *dh* and *dl* denote the difference in the hydraulic head and the horizontal distance, respectively, between two measurement points. A line is constructed from a piezometer to a perpendicular of the potentiometric contour. The hydraulic head is the absolute value of the difference in the groundwater elevation at the piezometer, h_1, and the elevation of the corresponding potentiometric contour, h_2. The horizontal distance, *dl,* is the length of the line.

2. Parameter *i* denotes the hydraulic gradient associated with the line, defined by the equation:

$$i = \frac{dh}{dl}$$

3. Parameter n_e denotes the effective porosity.

4. *K* denotes the hydraulic conductivity determined from field slug tests; or the average, per lithology, if a slug test was not preformed.

5. Parameter *v* denotes the average linear velocity. The average linear velocity, denoted by *v*, is defined by the equation:

$$v = -\frac{K}{n_e}\frac{dh}{dl}$$

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**19**	**ug/l**	**6**	**5**	**13**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**17**	**ug/l**	**6**	**5**	**11**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**17**	**ug/l**	**6**	**5**	**11**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**15**	**ug/l**	**6**	**5**	**9**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/06/1995**	**13**	**ug/l**	**6**	**5**	**7**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**05/07/1996**	**16**	**ug/l**	**6**	**5**	**10**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**15**	**ug/l**	**6**	**5**	**9**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**06/24/1997**	**22**	**ug/l**	**6**	**5**	**16**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/03/1997**	**19**	**ug/l**	**6**	**5**	**13**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**06/04/1998**	**19**	**ug/l**	**6**	**5**	**13**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**11/18/1998**	**15.1**	**ug/l**	**6**	**5**	**9.1**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**05/13/1999**	**20**	**ug/l**	**6**	**5**	**14**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**18**	**ug/l**	**6**	**5**	**12**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**05/17/2000**	**17**	**ug/l**	**6**	**5**	**11**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/12/2000**	**17**	**ug/l**	**6**	**5**	**11**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**15**	**ug/l**	**6**	**5**	**9**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**13**	**ug/l**	**6**	**5**	**7**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**06/13/2002**	**17**	**ug/l**	**6**	**5**	**11**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**01/03/2003**	**8**	**ug/l**	**6**	**5**	**2**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**06/24/2003**	**8.3**	**ug/l**	**6**	**5**	**2.3**
MW-1	**75-34-3**	**1,1-Dichloroethane**	**12/11/2003**	**6.2**	**ug/l**	**6**	**5**	**0.2**
MW-1	75-34-3	1,1-Dichloroethane	06/16/2004	5.4	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	12/15/2006	2.1	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	06/28/2007	2.2	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	12/27/2007	2.5	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	12/30/2008	1.5	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	06/25/2009	1.8	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	12/16/2009	1.3	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	07/08/2010	0.94	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	07/08/2010	0.94	ug/l	6	5	
MW-1	75-34-3	1,1-Dichloroethane	12/09/2010	0.84	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	06/27/2007	0.09	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	12/27/2007	0.91	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	06/24/2009	0.68	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	12/15/2009	0.57	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	07/07/2010	0.5	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	07/07/2010	0.5	ug/l	6	5	
MW-10	75-34-3	1,1-Dichloroethane	12/09/2010	0.47	ug/l	6	5	
MW-11	**75-34-3**	**1,1-Dichloroethane**	**12/11/2000**	**11**	**ug/l**	**6**	**5**	**5**
MW-11	**75-34-3**	**1,1-Dichloroethane**	**06/12/2001**	**10**	**ug/l**	**6**	**5**	**4**
MW-11	**75-34-3**	**1,1-Dichloroethane**	**12/27/2001**	**9.8**	**ug/l**	**6**	**5**	**3.8**
MW-11	**75-34-3**	**1,1-Dichloroethane**	**06/13/2002**	**7**	**ug/l**	**6**	**5**	**1**
MW-11	75-34-3	1,1-Dichloroethane	12/14/2006	1.1	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	06/27/2007	1.4	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	12/27/2007	2.9	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	06/30/2009	1.7	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	12/17/2009	1.2	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	07/14/2010	1.7	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	07/14/2010	1.7	ug/l	6	5	
MW-11	75-34-3	1,1-Dichloroethane	12/17/2010	1.1	ug/l	6	5	
MW-12	**75-34-3**	**1,1-Dichloroethane**	**12/11/2000**	**17**	**ug/l**	**6**	**5**	**11**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-12	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**17**	**ug/l**	**6**	**5**	**11**
MW-12	**75-34-3**	**1,1-Dichloroethane**	**12/27/2001**	**17**	**ug/l**	**6**	**5**	**11**
MW-12	**75-34-3**	**1,1-Dichloroethane**	**06/12/2002**	**11**	**ug/l**	**6**	**5**	**5**
MW-12	**75-34-3**	**1,1-Dichloroethane**	**01/02/2003**	**7.5**	**ug/l**	**6**	**5**	**1.5**
MW-12	**75-34-3**	**1,1-Dichloroethane**	**06/24/2003**	**8.7**	**ug/l**	**6**	**5**	**2.7**
MW-12	75-34-3	1,1-Dichloroethane	12/11/2003	5.4	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	01/12/2006	5.9	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	12/14/2006	3.7	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	06/28/2007	2.9	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	12/28/2007	5	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	12/17/2008	3.7	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	07/01/2009	3.8	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	12/17/2009	3.1	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	07/13/2010	1.7	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	07/13/2010	1.7	ug/l	6	5	
MW-12	75-34-3	1,1-Dichloroethane	12/16/2010	2.2	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	06/28/2007	0.09	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	12/28/2007	0.89	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	12/17/2008	0.79	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	07/01/2009	1.1	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	12/17/2009	0.74	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	07/13/2010	0.41	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	07/13/2010	0.41	ug/l	6	5	
MW-12D	75-34-3	1,1-Dichloroethane	12/16/2010	0.40	ug/l	6	5	
MW-13	75-34-3	1,1-Dichloroethane	06/28/2007	0.09	ug/l	6	5	
MW-13	75-34-3	1,1-Dichloroethane	12/19/2007	0.56	ug/l	6	5	
MW-14	**75-34-3**	**1,1-Dichloroethane**	**12/12/2000**	**9.4**	**ug/l**	**6**	**5**	**3.4**
MW-14	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**9.5**	**ug/l**	**6**	**5**	**3.5**
MW-14	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**9**	**ug/l**	**6**	**5**	**3**
MW-14	**75-34-3**	**1,1-Dichloroethane**	**06/13/2002**	**11**	**ug/l**	**6**	**5**	**5**
MW-14	75-34-3	1,1-Dichloroethane	12/15/2006	1.4	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	06/28/2007	1.3	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	12/28/2007	2.2	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	06/24/2009	1.3	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	12/15/2009	0.58	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	07/08/2010	0.6	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	07/08/2010	0.6	ug/l	6	5	
MW-14	75-34-3	1,1-Dichloroethane	12/09/2010	0.85	ug/l	6	5	
MW-15	**75-34-3**	**1,1-Dichloroethane**	**12/11/2000**	**27**	**ug/l**	**6**	**5**	**21**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**06/12/2001**	**41**	**ug/l**	**6**	**5**	**35**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**17**	**ug/l**	**6**	**5**	**11**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**06/12/2002**	**28**	**ug/l**	**6**	**5**	**22**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**01/03/2003**	**24**	**ug/l**	**6**	**5**	**18**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**06/25/2003**	**53**	**ug/l**	**6**	**5**	**47**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**12/12/2003**	**13**	**ug/l**	**6**	**5**	**7**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**06/15/2004**	**9.2**	**ug/l**	**6**	**5**	**3.2**
MW-15	**75-34-3**	**1,1-Dichloroethane**	**12/30/2004**	**26**	**ug/l**	**6**	**5**	**20**
MW-15	75-34-3	1,1-Dichloroethane	06/23/2005	6	ug/l	6	5	
MW-15	**75-34-3**	**1,1-Dichloroethane**	**01/12/2006**	**9.1**	**ug/l**	**6**	**5**	**3.1**
MW-15	75-34-3	1,1-Dichloroethane	07/07/2006	5.8	ug/l	6	5	
MW-15	75-34-3	1,1-Dichloroethane	12/15/2006	4.6	ug/l	6	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-15	75-34-3	1,1-Dichloroethane	06/28/2007	4.2	ug/l	6	5	
MW-15	75-34-3	1,1-Dichloroethane	12/19/2007	3.7	ug/l	6	5	
MW-15	**75-34-3**	**1,1-Dichloroethane**	**06/25/2009**	**7.1**	**ug/l**	**6**	**5**	**1.1**
MW-15	75-34-3	1,1-Dichloroethane	12/15/2009	3.3	ug/l	6	5	
MW-15	75-34-3	1,1-Dichloroethane	07/08/2010	3.8	ug/l	6	5	
MW-15	75-34-3	1,1-Dichloroethane	07/08/2010	3.8	ug/l	6	5	
MW-15	75-34-3	1,1-Dichloroethane	12/09/2010	1.6	ug/l	6	5	
MW-16	**75-34-3**	**1,1-Dichloroethane**	**01/08/2008**	**21**	**ug/l**	**6**	**5**	**15**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**12/30/2008**	**14**	**ug/l**	**6**	**5**	**8**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**07/01/2009**	**11.5**	**ug/l**	**6**	**5**	**5.5**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**12/17/2009**	**12.2**	**ug/l**	**6**	**5**	**6.2**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**07/14/2010**	**11.9**	**ug/l**	**6**	**5**	**5.9**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**07/14/2010**	**11.9**	**ug/l**	**6**	**5**	**5.9**
MW-16	**75-34-3**	**1,1-Dichloroethane**	**12/17/2010**	**11**	**ug/l**	**6**	**5**	**5**
MW-17	**75-34-3**	**1,1-Dichloroethane**	**06/25/2003**	**17**	**ug/l**	**6**	**5**	**11**
MW-17	**75-34-3**	**1,1-Dichloroethane**	**12/12/2003**	**12**	**ug/l**	**6**	**5**	**6**
MW-17	**75-34-3**	**1,1-Dichloroethane**	**06/15/2004**	**9.1**	**ug/l**	**6**	**5**	**3.1**
MW-17	**75-34-3**	**1,1-Dichloroethane**	**12/30/2004**	**6.3**	**ug/l**	**6**	**5**	**0.3**
MW-17	**75-34-3**	**1,1-Dichloroethane**	**06/23/2005**	**7**	**ug/l**	**6**	**5**	**1**
MW-17	75-34-3	1,1-Dichloroethane	12/15/2006	3.2	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	06/28/2007	3	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	12/27/2007	3.3	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	12/30/2008	1.7	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	06/25/2009	2.8	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	12/15/2009	1.3	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	07/07/2010	1.6	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	07/07/2010	1.6	ug/l	6	5	
MW-17	75-34-3	1,1-Dichloroethane	12/09/2010	1.2	ug/l	6	5	
MW-1A	75-34-3	1,1-Dichloroethane	12/03/1997	2	ug/l	6	5	
MW-1A	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**6.5**	**ug/l**	**6**	**5**	**0.5**
MW-1A	**75-34-3**	**1,1-Dichloroethane**	**06/25/2003**	**6.2**	**ug/l**	**6**	**5**	**0.2**
MW-1B	75-34-3	1,1-Dichloroethane	12/15/2006	1.6	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	06/28/2007	1.8	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	12/28/2007	2.8	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	12/30/2008	1.5	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	06/24/2009	1.4	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	12/15/2009	1.4	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	07/07/2010	1.1	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	07/07/2010	1.1	ug/l	6	5	
MW-1B	75-34-3	1,1-Dichloroethane	12/09/2010	0.97	ug/l	6	5	
MW-2	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**33**	**ug/l**	**6**	**5**	**27**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**26**	**ug/l**	**6**	**5**	**20**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**26**	**ug/l**	**6**	**5**	**20**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**26**	**ug/l**	**6**	**5**	**20**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**12/06/1995**	**19**	**ug/l**	**6**	**5**	**13**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**11**	**ug/l**	**6**	**5**	**5**
MW-2	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**12**	**ug/l**	**6**	**5**	**6**
MW-2	75-34-3	1,1-Dichloroethane	12/15/2006	2	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	06/28/2007	1.9	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	12/28/2007	1.5	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	06/24/2009	1.2	ug/l	6	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-2	75-34-3	1,1-Dichloroethane	12/16/2009	0.86	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	07/08/2010	1.1	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	07/08/2010	1.1	ug/l	6	5	
MW-2	75-34-3	1,1-Dichloroethane	12/09/2010	0.87	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	01/08/2008	0.94	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	12/30/2008	0.59	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	06/25/2009	0.96	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	12/15/2009	0.48	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	07/07/2010	0.35	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	07/07/2010	0.35	ug/l	6	5	
MW-20	75-34-3	1,1-Dichloroethane	12/09/2010	0.41	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	01/09/2008	2.4	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	12/30/2008	2.5	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	06/25/2009	0.75	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	12/15/2009	0.73	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	07/07/2010	0.46	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	07/07/2010	0.46	ug/l	6	5	
MW-21	75-34-3	1,1-Dichloroethane	12/08/2010	1.0	ug/l	6	5	
MW-23	75-34-3	1,1-Dichloroethane	01/07/2008	1.2	ug/l	6	5	
MW-23	75-34-3	1,1-Dichloroethane	12/30/2008	0.68	ug/l	6	5	
MW-24	75-34-3	1,1-Dichloroethane	01/08/2008	1.1	ug/l	6	5	
MW-24	75-34-3	1,1-Dichloroethane	12/17/2008	0.95	ug/l	6	5	
MW-24	75-34-3	1,1-Dichloroethane	12/16/2009	0.53	ug/l	6	5	
MW-24	75-34-3	1,1-Dichloroethane	07/12/2010	0.32	ug/l	6	5	
MW-24	75-34-3	1,1-Dichloroethane	07/12/2010	0.32	ug/l	6	5	
MW-25	75-34-3	1,1-Dichloroethane	01/08/2008	3.4	ug/l	6	5	
MW-25	75-34-3	1,1-Dichloroethane	12/17/2008	2.3	ug/l	6	5	
MW-25	75-34-3	1,1-Dichloroethane	12/16/2010	0.67	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	01/09/2008	1.7	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	12/17/2008	1.2	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	06/30/2009	2.2	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	12/17/2009	0.89	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	07/14/2010	0.89	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	07/14/2010	0.89	ug/l	6	5	
MW-26	75-34-3	1,1-Dichloroethane	12/17/2010	0.65	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	01/09/2008	0.99	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	06/30/2009	1.1	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	12/17/2009	0.59	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	07/13/2010	0.65	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	07/13/2010	0.65	ug/l	6	5	
MW-27	75-34-3	1,1-Dichloroethane	12/16/2010	0.78	ug/l	6	5	
MW-3	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**22**	**ug/l**	**6**	**5**	**16**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**13**	**ug/l**	**6**	**5**	**7**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**18**	**ug/l**	**6**	**5**	**12**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**13**	**ug/l**	**6**	**5**	**7**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**12/07/1995**	**9**	**ug/l**	**6**	**5**	**3**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**9**	**ug/l**	**6**	**5**	**3**
MW-3	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**8.8**	**ug/l**	**6**	**5**	**2.8**
MW-3	75-34-3	1,1-Dichloroethane	06/24/1997	5.2	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	12/03/1997	6	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	06/27/2007	0.09	ug/l	6	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	75-34-3	1,1-Dichloroethane	12/28/2007	1.1	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	07/01/2009	1	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	12/18/2009	0.7	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	07/14/2010	0.87	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	07/14/2010	0.87	ug/l	6	5	
MW-3	75-34-3	1,1-Dichloroethane	12/17/2010	1.6	ug/l	6	5	
MW-31	75-34-3	1,1-Dichloroethane	12/08/2010	0.66	ug/l	6	5	
MW-4	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**14**	**ug/l**	**6**	**5**	**8**
MW-4	**75-34-3**	**1,1-Dichloroethane**	**12/03/1997**	**16**	**ug/l**	**6**	**5**	**10**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**14**	**ug/l**	**6**	**5**	**8**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**17**	**ug/l**	**6**	**5**	**11**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**17**	**ug/l**	**6**	**5**	**11**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**14**	**ug/l**	**6**	**5**	**8**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/06/1995**	**11**	**ug/l**	**6**	**5**	**5**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**13**	**ug/l**	**6**	**5**	**7**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**16**	**ug/l**	**6**	**5**	**10**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/24/1997**	**13**	**ug/l**	**6**	**5**	**7**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/04/1998**	**10**	**ug/l**	**6**	**5**	**4**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**11/18/1998**	**10.1**	**ug/l**	**6**	**5**	**4.1**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**05/13/1999**	**15**	**ug/l**	**6**	**5**	**9**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**18**	**ug/l**	**6**	**5**	**12**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**05/17/2000**	**12**	**ug/l**	**6**	**5**	**6**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/11/2000**	**15**	**ug/l**	**6**	**5**	**9**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**13**	**ug/l**	**6**	**5**	**7**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**16**	**ug/l**	**6**	**5**	**10**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/13/2002**	**7.4**	**ug/l**	**6**	**5**	**1.4**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/25/2003**	**7**	**ug/l**	**6**	**5**	**1**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/12/2003**	**7.4**	**ug/l**	**6**	**5**	**1.4**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/15/2004**	**7.4**	**ug/l**	**6**	**5**	**1.4**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/29/2004**	**7.5**	**ug/l**	**6**	**5**	**1.5**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/22/2005**	**7**	**ug/l**	**6**	**5**	**1**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**01/12/2006**	**14.6**	**ug/l**	**6**	**5**	**8.6**
MW-4R	75-34-3	1,1-Dichloroethane	07/07/2006	6	ug/l	6	5	
MW-4R	75-34-3	1,1-Dichloroethane	12/14/2006	4.3	ug/l	6	5	
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**06/27/2007**	**6.2**	**ug/l**	**6**	**5**	**0.2**
MW-4R	**75-34-3**	**1,1-Dichloroethane**	**12/27/2007**	**7.6**	**ug/l**	**6**	**5**	**1.6**
MW-4R	75-34-3	1,1-Dichloroethane	06/24/2009	5.6	ug/l	6	5	
MW-4R	75-34-3	1,1-Dichloroethane	12/16/2009	1.2	ug/l	6	5	
MW-4R	75-34-3	1,1-Dichloroethane	07/08/2010	3.9	ug/l	6	5	
MW-4R	75-34-3	1,1-Dichloroethane	07/08/2010	3.9	ug/l	6	5	
MW-4R	75-34-3	1,1-Dichloroethane	12/09/2010	4.1	ug/l	6	5	
MW-5	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**11**	**ug/l**	**6**	**5**	**5**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**12**	**ug/l**	**6**	**5**	**6**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**8**	**ug/l**	**6**	**5**	**2**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**7**	**ug/l**	**6**	**5**	**1**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**12/07/1995**	**14**	**ug/l**	**6**	**5**	**8**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**16**	**ug/l**	**6**	**5**	**10**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**16**	**ug/l**	**6**	**5**	**10**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**06/24/1997**	**15**	**ug/l**	**6**	**5**	**9**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**12/03/1997**	**19**	**ug/l**	**6**	**5**	**13**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**06/04/1998**	**22**	**ug/l**	**6**	**5**	**16**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-5	**75-34-3**	**1,1-Dichloroethane**	**11/18/1998**	**11.2**	**ug/l**	**6**	**5**	**5.2**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**05/13/1999**	**15**	**ug/l**	**6**	**5**	**9**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**13**	**ug/l**	**6**	**5**	**7**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**05/17/2000**	**10**	**ug/l**	**6**	**5**	**4**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**12/11/2000**	**11**	**ug/l**	**6**	**5**	**5**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**12**	**ug/l**	**6**	**5**	**6**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**12/27/2001**	**6.2**	**ug/l**	**6**	**5**	**0.2**
MW-5	75-34-3	1,1-Dichloroethane	06/13/2002	5.9	ug/l	6	5	
MW-5	**75-34-3**	**1,1-Dichloroethane**	**01/02/2003**	**6.1**	**ug/l**	**6**	**5**	**0.1**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**06/24/2003**	**6.4**	**ug/l**	**6**	**5**	**0.4**
MW-5	**75-34-3**	**1,1-Dichloroethane**	**01/12/2006**	**7.5**	**ug/l**	**6**	**5**	**1.5**
MW-5	75-34-3	1,1-Dichloroethane	12/14/2006	2.9	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	06/27/2007	3.6	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	12/19/2007	5.7	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	07/01/2009	5.1	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	12/17/2009	3.5	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	07/13/2010	3.1	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	07/13/2010	3.1	ug/l	6	5	
MW-5	75-34-3	1,1-Dichloroethane	12/16/2010	4.0	ug/l	6	5	
MW-7	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**16**	**ug/l**	**6**	**5**	**10**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**26**	**ug/l**	**6**	**5**	**20**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**29**	**ug/l**	**6**	**5**	**23**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**25**	**ug/l**	**6**	**5**	**19**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/06/1995**	**25**	**ug/l**	**6**	**5**	**19**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**26**	**ug/l**	**6**	**5**	**20**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**16**	**ug/l**	**6**	**5**	**10**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/24/1997**	**19**	**ug/l**	**6**	**5**	**13**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/03/1997**	**17**	**ug/l**	**6**	**5**	**11**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/04/1998**	**14**	**ug/l**	**6**	**5**	**8**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**11/18/1998**	**8.8**	**ug/l**	**6**	**5**	**2.8**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**05/13/1999**	**13**	**ug/l**	**6**	**5**	**7**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**17**	**ug/l**	**6**	**5**	**11**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**05/17/2000**	**15**	**ug/l**	**6**	**5**	**9**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/12/2000**	**15**	**ug/l**	**6**	**5**	**9**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/13/2001**	**15**	**ug/l**	**6**	**5**	**9**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/28/2001**	**15**	**ug/l**	**6**	**5**	**9**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/12/2002**	**10**	**ug/l**	**6**	**5**	**4**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**01/02/2003**	**8.7**	**ug/l**	**6**	**5**	**2.7**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/25/2003**	**14**	**ug/l**	**6**	**5**	**8**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/11/2003**	**8.2**	**ug/l**	**6**	**5**	**2.2**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**06/16/2004**	**6.2**	**ug/l**	**6**	**5**	**0.2**
MW-7	**75-34-3**	**1,1-Dichloroethane**	**12/30/2004**	**6.3**	**ug/l**	**6**	**5**	**0.3**
MW-7	75-34-3	1,1-Dichloroethane	06/23/2005	5	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	01/12/2006	5.9	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	12/14/2006	3.7	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	06/27/2007	2.7	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	12/27/2007	4.9	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	07/01/2009	3.4	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	12/18/2009	3	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	07/13/2010	2.4	ug/l	6	5	
MW-7	75-34-3	1,1-Dichloroethane	07/13/2010	2.4	ug/l	6	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-7	75-34-3	1,1-Dichloroethane	12/16/2010	2.6	ug/l	6	5	
MW-8	**75-34-3**	**1,1-Dichloroethane**	**10/01/1994**	**10**	**ug/l**	**6**	**5**	**4**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**01/31/1995**	**8**	**ug/l**	**6**	**5**	**2**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**02/15/1995**	**11**	**ug/l**	**6**	**5**	**5**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**03/07/1995**	**11**	**ug/l**	**6**	**5**	**5**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**12/06/1995**	**8**	**ug/l**	**6**	**5**	**2**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**05/06/1996**	**12**	**ug/l**	**6**	**5**	**6**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**11/11/1996**	**9**	**ug/l**	**6**	**5**	**3**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**06/24/1997**	**11**	**ug/l**	**6**	**5**	**5**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**12/03/1997**	**14**	**ug/l**	**6**	**5**	**8**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**06/04/1998**	**12**	**ug/l**	**6**	**5**	**6**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**11/18/1998**	**7.7**	**ug/l**	**6**	**5**	**1.7**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**05/13/1999**	**9.3**	**ug/l**	**6**	**5**	**3.3**
MW-8	**75-34-3**	**1,1-Dichloroethane**	**12/06/1999**	**8.1**	**ug/l**	**6**	**5**	**2.1**
MW-8	75-34-3	1,1-Dichloroethane	06/28/2007	0.09	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/11/2000	5.2	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	01/12/2006	6	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/14/2006	1.3	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	06/27/2007	1.2	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/19/2007	2.4	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/17/2008	1.7	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	06/24/2009	1.6	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/15/2009	1.1	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	07/07/2010	0.85	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	07/07/2010	0.85	ug/l	6	5	
MW-9	75-34-3	1,1-Dichloroethane	12/09/2010	1.4	ug/l	6	5	
SW-3	75-34-3	1,1-Dichloroethane	12/17/2008	0.87	ug/l	6	5	
SW-3	75-34-3	1,1-Dichloroethane	06/24/2009	1.6	ug/l	6	5	
SW-3	75-34-3	1,1-Dichloroethane	12/08/2010	0.58	ug/l	6	5	
SW-5	75-34-3	1,1-Dichloroethane	12/08/2010	0.60	ug/l	6	5	
MW-11	95-50-1	1,2-Dichlorobenzene	06/27/2007	0.47	ug/l	20	5	
MW-11	95-50-1	1,2-Dichlorobenzene	06/30/2009	0.47	ug/l	20	5	
MW-11	95-50-1	1,2-Dichlorobenzene	12/17/2009	0.51	ug/l	20	5	
MW-11	95-50-1	1,2-Dichlorobenzene	07/14/2010	0.62	ug/l	20	5	
MW-11	95-50-1	1,2-Dichlorobenzene	07/14/2010	0.62	ug/l	20	5	
MW-11	95-50-1	1,2-Dichlorobenzene	12/17/2010	0.62	ug/l	20	5	
MW-3	95-50-1	1,2-Dichlorobenzene	06/27/2007	0.17	ug/l	20	5	
MW-3	95-50-1	1,2-Dichlorobenzene	12/28/2007	0.85	ug/l	20	5	
MW-3	95-50-1	1,2-Dichlorobenzene	07/01/2009	0.69	ug/l	20	5	
MW-3	95-50-1	1,2-Dichlorobenzene	12/18/2009	0.6	ug/l	20	5	
MW-3	95-50-1	1,2-Dichlorobenzene	12/17/2010	0.49	ug/l	20	5	
MW-11	107-06-2	1,2-Dichloroethane	12/17/2009	0.32	ug/l	0.4	1	
MW-12	107-06-2	1,2-Dichloroethane	07/01/2009	0.32	ug/l	0.4	1	
MW-12	107-06-2	1,2-Dichloroethane	12/17/2009	0.37	ug/l	0.4	1	
MW-15	107-06-2	1,2-Dichloroethane	06/25/2009	0.18	ug/l	0.4	1	
MW-16	107-06-2	1,2-Dichloroethane	07/01/2009	0.15	ug/l	0.4	1	
MW-16	107-06-2	1,2-Dichloroethane	07/14/2010	0.21	ug/l	0.4	1	
MW-16	107-06-2	1,2-Dichloroethane	07/14/2010	0.21	ug/l	0.4	1	
MW-26	107-06-2	1,2-Dichloroethane	06/30/2009	0.18	ug/l	0.4	1	
MW-3	**107-06-2**	**1,2-Dichloroethane**	**07/01/2009**	**0.47**	**ug/l**	**0.4**	**1**	**0.07**
MW-3	107-06-2	1,2-Dichloroethane	12/18/2009	0.37	ug/l	0.4	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-7	107-06-2	1,2-Dichloroethane	12/18/2009	0.24	ug/l	0.4	1	
MW-16	**78-87-5**	**1,2-Dichloropropane**	**01/08/2008**	**1**	**ug/l**	**0.6**	**1**	**0.4**
MW-16	**78-87-5**	**1,2-Dichloropropane**	**12/30/2008**	**0.83**	**ug/l**	**0.6**	**1**	**0.23**
MW-16	78-87-5	1,2-Dichloropropane	07/01/2009	0.58	ug/l	0.6	1	
MW-16	**78-87-5**	**1,2-Dichloropropane**	**12/17/2009**	**0.86**	**ug/l**	**0.6**	**1**	**0.26**
MW-16	**78-87-5**	**1,2-Dichloropropane**	**07/14/2010**	**31.1**	**ug/l**	**0.6**	**1**	**30.5**
MW-16	**78-87-5**	**1,2-Dichloropropane**	**07/14/2010**	**1.1**	**ug/l**	**0.6**	**1**	**0.5**
MW-16	**78-87-5**	**1,2-Dichloropropane**	**12/17/2010**	**0.98**	**ug/l**	**0.6**	**1**	**0.38**
MW-3	**78-87-5**	**1,2-Dichloropropane**	**10/01/1994**	**11**	**ug/l**	**0.6**	**1**	**10.4**
MW-3	**78-87-5**	**1,2-Dichloropropane**	**01/31/1995**	**6**	**ug/l**	**0.6**	**1**	**5.4**
MW-3	**78-87-5**	**1,2-Dichloropropane**	**02/15/1995**	**9**	**ug/l**	**0.6**	**1**	**8.4**
MW-3	**78-87-5**	**1,2-Dichloropropane**	**03/07/1995**	**7**	**ug/l**	**0.6**	**1**	**6.4**
MW-3	**78-87-5**	**1,2-Dichloropropane**	**12/03/1997**	**2**	**ug/l**	**0.6**	**1**	**1.4**
MW-3	78-87-5	1,2-Dichloropropane	12/18/2009	0.34	ug/l	0.6	1	
MW-5	78-87-5	1,2-Dichloropropane	12/17/2009	0.3	ug/l	0.6	1	
MW-11	120-82-1	1,2,4-Trichlorobenzene	12/17/2010	0.87	ug/l	70	10	
MW-12	120-82-1	1,2,4-Trichlorobenzene	12/16/2010	1.4	ug/l	70	10	
MW-3	120-82-1	1,2,4-Trichlorobenzene	12/17/2010	0.45	ug/l	70	10	
MW-9	120-82-1	1,2,4-Trichlorobenzene	12/09/2010	0.43	ug/l	70	10	
MW-3	120-82-1	1,2,4-Trimethylbenzene	12/03/1997	5	ug/l	70	10	
MW-3	120-82-1	1,2,4-Trimethylbenzene	05/13/1999	5.8	ug/l	70	10	
MW-3	108-67-8	1,3,5-Trimethylbenzene	12/03/1997	2	ug/l	400	NE	
MW-1	106-46-7	1,4-Dichlorobenzene	12/15/2006	1.3	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	06/28/2007	2	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	12/27/2007	3.8	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	12/30/2008	3.2	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	06/25/2009	3.4	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	12/16/2009	3.3	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	07/08/2010	3.5	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	07/08/2010	3.5	ug/l	6	1	
MW-1	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.3	ug/l	6	1	
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**06/12/2001**	**6.9**	**ug/l**	**6**	**1**	**0.9**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/27/2001**	**7.8**	**ug/l**	**6**	**1**	**1.8**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**06/24/2003**	**7.7**	**ug/l**	**6**	**1**	**1.7**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/11/2003**	**8.3**	**ug/l**	**6**	**1**	**2.3**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**06/15/2004**	**9**	**ug/l**	**6**	**1**	**3**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/29/2004**	**8.4**	**ug/l**	**6**	**1**	**2.4**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**06/22/2005**	**11**	**ug/l**	**6**	**1**	**5**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**07/07/2006**	**11.6**	**ug/l**	**6**	**1**	**5.6**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/14/2006**	**7.5**	**ug/l**	**6**	**1**	**1.5**
MW-11	106-46-7	1,4-Dichlorobenzene	12/27/2007	5.9	ug/l	6	1	
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**06/30/2009**	**8.5**	**ug/l**	**6**	**1**	**2.5**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/17/2009**	**8.6**	**ug/l**	**6**	**1**	**2.6**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**07/14/2010**	**9.4**	**ug/l**	**6**	**1**	**3.4**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**07/14/2010**	**9.4**	**ug/l**	**6**	**1**	**3.4**
MW-11	**106-46-7**	**1,4-Dichlorobenzene**	**12/17/2010**	**10**	**ug/l**	**6**	**1**	**4**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/11/2000**	**6.3**	**ug/l**	**6**	**1**	**0.3**
MW-12	106-46-7	1,4-Dichlorobenzene	06/13/2001	5.6	ug/l	6	1	
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/27/2001**	**6.4**	**ug/l**	**6**	**1**	**0.4**
MW-12	106-46-7	1,4-Dichlorobenzene	06/12/2002	5.6	ug/l	6	1	
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**06/24/2003**	**6.8**	**ug/l**	**6**	**1**	**0.8**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-12	106-46-7	1,4-Dichlorobenzene	12/11/2003	5.7	ug/l	6	1	
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**06/15/2004**	**6.4**	**ug/l**	**6**	**1**	**0.4**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/30/2004**	**6.2**	**ug/l**	**6**	**1**	**0.2**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**06/23/2005**	**8**	**ug/l**	**6**	**1**	**2**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**01/12/2006**	**8.1**	**ug/l**	**6**	**1**	**2.1**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**07/07/2006**	**10.9**	**ug/l**	**6**	**1**	**4.9**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/14/2006**	**6.9**	**ug/l**	**6**	**1**	**0.9**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**06/28/2007**	**7.5**	**ug/l**	**6**	**1**	**1.5**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/28/2007**	**7.4**	**ug/l**	**6**	**1**	**1.4**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/17/2008**	**6.9**	**ug/l**	**6**	**1**	**0.9**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**07/01/2009**	**6.9**	**ug/l**	**6**	**1**	**0.9**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/17/2009**	**7.8**	**ug/l**	**6**	**1**	**1.8**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**07/13/2010**	**6.1**	**ug/l**	**6**	**1**	**0.1**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**07/13/2010**	**6.1**	**ug/l**	**6**	**1**	**0.1**
MW-12	**106-46-7**	**1,4-Dichlorobenzene**	**12/16/2010**	**9.2**	**ug/l**	**6**	**1**	**3.2**
MW-13	106-46-7	1,4-Dichlorobenzene	06/28/2007	0.15	ug/l	6	1	
MW-14	**106-46-7**	**1,4-Dichlorobenzene**	**06/13/2002**	**7.5**	**ug/l**	**6**	**1**	**1.5**
MW-14	106-46-7	1,4-Dichlorobenzene	12/11/2003	5.5	ug/l	6	1	
MW-14	**106-46-7**	**1,4-Dichlorobenzene**	**07/07/2006**	**6.4**	**ug/l**	**6**	**1**	**0.4**
MW-14	106-46-7	1,4-Dichlorobenzene	12/15/2006	4	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	06/28/2007	3.9	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	12/28/2007	4.6	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	06/24/2009	2.5	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	12/15/2009	1.9	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	07/08/2010	2.7	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	07/08/2010	2.7	ug/l	6	1	
MW-14	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.0	ug/l	6	1	
MW-15	106-46-7	1,4-Dichlorobenzene	06/28/2007	0.48	ug/l	6	1	
MW-15	106-46-7	1,4-Dichlorobenzene	06/25/2009	0.46	ug/l	6	1	
MW-15	106-46-7	1,4-Dichlorobenzene	07/08/2010	0.63	ug/l	6	1	
MW-15	106-46-7	1,4-Dichlorobenzene	07/08/2010	0.63	ug/l	6	1	
MW-15	106-46-7	1,4-Dichlorobenzene	12/09/2010	0.55	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	01/08/2008	1.8	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	12/30/2008	1.8	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	07/01/2009	2.1	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	12/17/2009	1.9	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	07/14/2010	2.5	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	07/14/2010	2.5	ug/l	6	1	
MW-16	106-46-7	1,4-Dichlorobenzene	12/17/2010	2.4	ug/l	6	1	
MW-17	106-46-7	1,4-Dichlorobenzene	06/28/2007	0.32	ug/l	6	1	
MW-17	106-46-7	1,4-Dichlorobenzene	12/27/2007	0.5	ug/l	6	1	
MW-17	106-46-7	1,4-Dichlorobenzene	06/25/2009	0.39	ug/l	6	1	
MW-17	106-46-7	1,4-Dichlorobenzene	07/07/2010	0.35	ug/l	6	1	
MW-17	106-46-7	1,4-Dichlorobenzene	07/07/2010	0.35	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	12/15/2006	1.9	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	12/28/2007	2.4	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	12/30/2008	1.8	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	06/24/2009	2.9	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	12/15/2009	3.6	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	07/07/2010	3.1	ug/l	6	1	
MW-1B	106-46-7	1,4-Dichlorobenzene	07/07/2010	3.1	ug/l	6	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1B	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.0	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	12/06/1999	5.1	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	12/15/2006	5	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	06/28/2007	5.2	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	12/28/2007	4.4	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	06/24/2009	4.2	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	12/16/2009	3.1	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	07/08/2010	4.2	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	07/08/2010	4.2	ug/l	6	1	
MW-2	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.0	ug/l	6	1	
MW-23	106-46-7	1,4-Dichlorobenzene	01/07/2008	1.1	ug/l	6	1	
MW-23	106-46-7	1,4-Dichlorobenzene	12/30/2008	0.65	ug/l	6	1	
MW-23	106-46-7	1,4-Dichlorobenzene	06/25/2009	0.35	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	01/08/2008	2.7	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	12/17/2008	2.6	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	06/30/2009	0.93	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	12/16/2009	1.6	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	07/12/2010	1.6	ug/l	6	1	
MW-24	106-46-7	1,4-Dichlorobenzene	07/12/2010	1.6	ug/l	6	1	
MW-25	106-46-7	1,4-Dichlorobenzene	12/17/2008	1.1	ug/l	6	1	
MW-26	106-46-7	1,4-Dichlorobenzene	01/09/2008	3.1	ug/l	6	1	
MW-26	106-46-7	1,4-Dichlorobenzene	12/17/2008	3.1	ug/l	6	1	
MW-26	106-46-7	1,4-Dichlorobenzene	06/30/2009	0.58	ug/l	6	1	
MW-26	**106-46-7**	**1,4-Dichlorobenzene**	**07/14/2010**	**6.5**	**ug/l**	**6**	**1**	**0.5**
MW-26	**106-46-7**	**1,4-Dichlorobenzene**	**07/14/2010**	**6.5**	**ug/l**	**6**	**1**	**0.5**
MW-26	106-46-7	1,4-Dichlorobenzene	12/17/2010	4.4	ug/l	6	1	
MW-3	106-46-7	1,4-Dichlorobenzene	12/07/1995	6	ug/l	6	1	
MW-3	106-46-7	1,4-Dichlorobenzene	11/11/1996	5.2	ug/l	6	1	
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/03/1997**	**8**	**ug/l**	**6**	**1**	**2**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**06/04/1998**	**7.6**	**ug/l**	**6**	**1**	**1.6**
MW-3	106-46-7	1,4-Dichlorobenzene	11/18/1998	4.6	ug/l	6	1	
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**05/13/1999**	**7.4**	**ug/l**	**6**	**1**	**1.4**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/06/1999**	**7.7**	**ug/l**	**6**	**1**	**1.7**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**05/17/2000**	**7.6**	**ug/l**	**6**	**1**	**1.6**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/11/2000**	**7.4**	**ug/l**	**6**	**1**	**1.4**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**06/12/2001**	**6.6**	**ug/l**	**6**	**1**	**0.6**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/27/2001**	**7.5**	**ug/l**	**6**	**1**	**1.5**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**06/13/2002**	**8.4**	**ug/l**	**6**	**1**	**2.4**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**06/24/2003**	**9.5**	**ug/l**	**6**	**1**	**3.5**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/11/2003**	**7.5**	**ug/l**	**6**	**1**	**1.5**
MW-3	106-46-7	1,4-Dichlorobenzene	06/15/2004	5.6	ug/l	6	1	
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/29/2004**	**8.9**	**ug/l**	**6**	**1**	**2.9**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**06/22/2005**	**11**	**ug/l**	**6**	**1**	**5**
MW-3	106-46-7	1,4-Dichlorobenzene	12/14/2006	3.8	ug/l	6	1	
MW-3	106-46-7	1,4-Dichlorobenzene	06/27/2007	5.8	ug/l	6	1	
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/28/2007**	**9.8**	**ug/l**	**6**	**1**	**3.8**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**07/01/2009**	**9.5**	**ug/l**	**6**	**1**	**3.5**
MW-3	**106-46-7**	**1,4-Dichlorobenzene**	**12/18/2009**	**7**	**ug/l**	**6**	**1**	**1**
MW-3	106-46-7	1,4-Dichlorobenzene	07/14/2010	3.3	ug/l	6	1	
MW-3	106-46-7	1,4-Dichlorobenzene	07/14/2010	3.3	ug/l	6	1	
MW-3	106-46-7	1,4-Dichlorobenzene	12/17/2010	5.1	ug/l	6	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-31	106-46-7	1,4-Dichlorobenzene	12/08/2010	0.95	ug/l	6	1	
MW-4	106-46-7	1,4-Dichlorobenzene	12/03/1997	3	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	12/14/2006	3.3	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	06/27/2007	3.6	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	12/27/2007	3.6	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	06/24/2009	5.1	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	12/16/2009	2.2	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	07/08/2010	4.1	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	07/08/2010	4.1	ug/l	6	1	
MW-4R	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.5	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	12/14/2006	1.2	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	06/27/2007	0.15	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	07/01/2009	1.8	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	12/17/2009	2.2	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	07/13/2010	2.1	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	07/13/2010	2.1	ug/l	6	1	
MW-5	106-46-7	1,4-Dichlorobenzene	12/16/2010	1.9	ug/l	6	1	
MW-6	106-46-7	1,4-Dichlorobenzene	12/19/2007	0.88	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	12/14/2006	3	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	06/27/2007	1.3	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	12/27/2007	2.1	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	07/01/2009	0.97	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	12/18/2009	0.94	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	07/13/2010	0.75	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	07/13/2010	0.75	ug/l	6	1	
MW-7	106-46-7	1,4-Dichlorobenzene	12/16/2010	1.3	ug/l	6	1	
MW-8	106-46-7	1,4-Dichlorobenzene	06/28/2007	0.15	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	06/27/2007	0.15	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	12/19/2007	0.42	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	06/24/2009	0.51	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	12/15/2009	0.34	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	07/07/2010	0.4	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	07/07/2010	0.4	ug/l	6	1	
MW-9	106-46-7	1,4-Dichlorobenzene	12/09/2010	4.1	ug/l	6	1	
SW-3	106-46-7	1,4-Dichlorobenzene	12/17/2008	0.88	ug/l	6	1	
SW-3	106-46-7	1,4-Dichlorobenzene	06/24/2009	2.1	ug/l	6	1	
SW-3	106-46-7	1,4-Dichlorobenzene	12/08/2010	0.44	ug/l	6	1	
SW-5	106-46-7	1,4-Dichlorobenzene	12/08/2010	0.48	ug/l	6	1	
MW-12D	78-93-3	2-Butanone	12/17/2009	1.9	ug/l	4000	100	
MW-17	78-93-3	2-Butanone	12/09/2010	22	ug/l	4000	100	
MW-5	78-93-3	2-Butanone	06/27/2007	0.56	ug/l	4000	100	
MW-1	591-78-6	2-Hexanone	06/25/2009	24.9	ug/l	NE	50	
MW-13	591-78-6	2-Hexanone	06/30/2009	5.2	ug/l	NE	50	
MW-18	591-78-6	2-Hexanone	06/25/2009	2.2	ug/l	NE	50	
MW-19	591-78-6	2-Hexanone	06/25/2009	13.9	ug/l	NE	50	
MW-20	591-78-6	2-Hexanone	06/25/2009	1.4	ug/l	NE	50	
MW-25	591-78-6	2-Hexanone	06/30/2009	1.2	ug/l	NE	50	
MW-26	591-78-6	2-Hexanone	06/30/2009	5.6	ug/l	NE	50	
MW-27	591-78-6	2-Hexanone	06/30/2009	3.6	ug/l	NE	50	
MW-3	105-67-9	2,4-Dimethylphenol	12/17/2010	1.7	ug/l	100	10	
MW-3	93-72-1	2,4,5-TP (Silvex)	06/13/2002	11	ug/l	50	NE	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
EB	67-64-1	Acetone	12/30/2008	14	ug/l	6000	100	
EB	67-64-1	Acetone	06/30/2009	7.8	ug/l	6000	100	
FB	67-64-1	Acetone	12/30/2008	15	ug/l	6000	100	
FB	67-64-1	Acetone	06/30/2009	9	ug/l	6000	100	
MW-1	67-64-1	Acetone	06/28/2007	0.9	ug/l	6000	100	
MW-10	67-64-1	Acetone	06/27/2007	0.9	ug/l	6000	100	
MW-10	67-64-1	Acetone	07/07/2010	2.2	ug/l	6000	100	
MW-10	67-64-1	Acetone	07/07/2010	2.2	ug/l	6000	100	
MW-10	67-64-1	Acetone	12/09/2010	5.1	ug/l	6000	100	
MW-12	67-64-1	Acetone	12/17/2008	5.9	ug/l	6000	100	
MW-12	67-64-1	Acetone	12/16/2010	4.9	ug/l	6000	100	
MW-12D	67-64-1	Acetone	06/28/2007	0.9	ug/l	6000	100	
MW-12D	67-64-1	Acetone	12/17/2008	5.4	ug/l	6000	100	
MW-12D	67-64-1	Acetone	07/13/2010	6.9	ug/l	6000	100	
MW-12D	67-64-1	Acetone	07/13/2010	6.9	ug/l	6000	100	
MW-14	67-64-1	Acetone	12/09/2010	4.4	ug/l	6000	100	
MW-15	67-64-1	Acetone	12/19/2007	5.1	ug/l	6000	100	
MW-15	67-64-1	Acetone	06/25/2009	4.8	ug/l	6000	100	
MW-16	67-64-1	Acetone	07/01/2009	3.4	ug/l	6000	100	
MW-17	67-64-1	Acetone	06/28/2007	3.5	ug/l	6000	100	
MW-17	67-64-1	Acetone	07/07/2010	2.5	ug/l	6000	100	
MW-17	67-64-1	Acetone	07/07/2010	2.5	ug/l	6000	100	
MW-17	67-64-1	Acetone	12/09/2010	5.7	ug/l	6000	100	
MW-18	67-64-1	Acetone	01/07/2008	5.3	ug/l	6000	100	
MW-19	67-64-1	Acetone	07/07/2010	2.4	ug/l	6000	100	
MW-19	67-64-1	Acetone	07/07/2010	2.4	ug/l	6000	100	
MW-1A	67-64-1	Acetone	06/25/2003	270	ug/l	6000	100	
MW-1A	67-64-1	Acetone	12/11/2003	200	ug/l	6000	100	
MW-2	67-64-1	Acetone	06/28/2007	0.9	ug/l	6000	100	
MW-2	67-64-1	Acetone	12/28/2007	47	ug/l	6000	100	
MW-2	67-64-1	Acetone	06/24/2009	3.4	ug/l	6000	100	
MW-2	67-64-1	Acetone	12/09/2010	11	ug/l	6000	100	
MW-20	67-64-1	Acetone	01/08/2008	3.6	ug/l	6000	100	
MW-22	67-64-1	Acetone	06/25/2009	7	ug/l	6000	100	
MW-23	67-64-1	Acetone	01/07/2008	5.7	ug/l	6000	100	
MW-25	67-64-1	Acetone	01/08/2008	9.2	ug/l	6000	100	
MW-27	67-64-1	Acetone	01/09/2008	8.5	ug/l	6000	100	
MW-3	67-64-1	Acetone	06/27/2007	0.9	ug/l	6000	100	
MW-3	67-64-1	Acetone	12/18/2009	3.8	ug/l	6000	100	
MW-4R	67-64-1	Acetone	06/27/2007	0.9	ug/l	6000	100	
MW-4R	67-64-1	Acetone	06/24/2009	3.3	ug/l	6000	100	
MW-5	67-64-1	Acetone	06/27/2007	0.9	ug/l	6000	100	
MW-6	67-64-1	Acetone	07/12/2010	2.6	ug/l	6000	100	
MW-6	67-64-1	Acetone	07/12/2010	2.6	ug/l	6000	100	
MW-7	67-64-1	Acetone	06/27/2007	8.3	ug/l	6000	100	
MW-7	67-64-1	Acetone	12/27/2007	6.4	ug/l	6000	100	
MW-7	67-64-1	Acetone	07/01/2009	10	ug/l	6000	100	
MW-7	67-64-1	Acetone	12/16/2010	6.0	ug/l	6000	100	
MW-8	67-64-1	Acetone	06/28/2007	0.9	ug/l	6000	100	
MW-1	**71-43-2**	**Benzene**	**11/18/1998**	**3**	**ug/l**	**1**	**1**	**2**
MW-1	**71-43-2**	**Benzene**	**05/13/1999**	**5.7**	**ug/l**	**1**	**1**	**4.7**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1	71-43-2	Benzene	12/06/1999	5.7	ug/l	1	1	4.7
MW-1	71-43-2	Benzene	06/13/2001	5.9	ug/l	1	1	4.9
MW-1	71-43-2	Benzene	06/13/2002	7.2	ug/l	1	1	6.2
MW-1	71-43-2	Benzene	12/30/2004	5.7	ug/l	1	1	4.7
MW-1	71-43-2	Benzene	06/23/2005	5	ug/l	1	1	4
MW-1	71-43-2	Benzene	01/13/2006	6	ug/l	1	1	5
MW-1	71-43-2	Benzene	12/15/2006	4.2	ug/l	1	1	3.2
MW-1	71-43-2	Benzene	06/28/2007	5	ug/l	1	1	4
MW-1	71-43-2	Benzene	12/27/2007	5.6	ug/l	1	1	4.6
MW-1	71-43-2	Benzene	12/30/2008	4.5	ug/l	1	1	3.5
MW-1	71-43-2	Benzene	06/25/2009	5	ug/l	1	1	4
MW-1	71-43-2	Benzene	12/16/2009	5.5	ug/l	1	1	4.5
MW-1	71-43-2	Benzene	07/08/2010	7.1	ug/l	1	1	6.1
MW-1	71-43-2	Benzene	07/08/2010	7.1	ug/l	1	1	6.1
MW-1	71-43-2	Benzene	12/09/2010	6.3	ug/l	1	1	5.3
MW-10	71-43-2	Benzene	06/27/2007	2.1	ug/l	1	1	1.1
MW-10	71-43-2	Benzene	06/24/2009	0.9	ug/l	1	1	
MW-10	71-43-2	Benzene	12/15/2009	1.2	ug/l	1	1	0.2
MW-10	71-43-2	Benzene	07/07/2010	1.1	ug/l	1	1	0.1
MW-10	71-43-2	Benzene	07/07/2010	1.1	ug/l	1	1	0.1
MW-10	71-43-2	Benzene	12/09/2010	1.2	ug/l	1	1	0.2
MW-11	71-43-2	Benzene	12/11/2000	5.2	ug/l	1	1	4.2
MW-11	71-43-2	Benzene	06/12/2001	7.8	ug/l	1	1	6.8
MW-11	71-43-2	Benzene	12/27/2001	6.9	ug/l	1	1	5.9
MW-11	71-43-2	Benzene	06/13/2002	7.7	ug/l	1	1	6.7
MW-11	71-43-2	Benzene	01/03/2003	6.4	ug/l	1	1	5.4
MW-11	71-43-2	Benzene	06/24/2003	6.3	ug/l	1	1	5.3
MW-11	71-43-2	Benzene	12/11/2003	6.4	ug/l	1	1	5.4
MW-11	71-43-2	Benzene	06/15/2004	5.3	ug/l	1	1	4.3
MW-11	71-43-2	Benzene	12/29/2004	5.6	ug/l	1	1	4.6
MW-11	71-43-2	Benzene	06/22/2005	6	ug/l	1	1	5
MW-11	71-43-2	Benzene	07/07/2006	5.1	ug/l	1	1	4.1
MW-11	71-43-2	Benzene	12/14/2006	4.6	ug/l	1	1	3.6
MW-11	71-43-2	Benzene	06/27/2007	6	ug/l	1	1	5
MW-11	71-43-2	Benzene	12/27/2007	4.2	ug/l	1	1	3.2
MW-11	71-43-2	Benzene	06/30/2009	5	ug/l	1	1	4
MW-11	71-43-2	Benzene	12/17/2009	4.5	ug/l	1	1	3.5
MW-11	71-43-2	Benzene	07/14/2010	5.9	ug/l	1	1	4.9
MW-11	71-43-2	Benzene	07/14/2010	5.9	ug/l	1	1	4.9
MW-11	71-43-2	Benzene	12/17/2010	4.2	ug/l	1	1	3.2
MW-12	71-43-2	Benzene	12/11/2000	7	ug/l	1	1	6
MW-12	71-43-2	Benzene	06/13/2001	8.2	ug/l	1	1	7.2
MW-12	71-43-2	Benzene	12/27/2001	7.6	ug/l	1	1	6.6
MW-12	71-43-2	Benzene	06/12/2002	5.6	ug/l	1	1	4.6
MW-12	71-43-2	Benzene	06/24/2003	6.5	ug/l	1	1	5.5
MW-12	71-43-2	Benzene	06/15/2004	5	ug/l	1	1	4
MW-12	71-43-2	Benzene	12/30/2004	5.8	ug/l	1	1	4.8
MW-12	71-43-2	Benzene	06/23/2005	6	ug/l	1	1	5
MW-12	71-43-2	Benzene	01/12/2006	7.1	ug/l	1	1	6.1
MW-12	71-43-2	Benzene	07/07/2006	8.1	ug/l	1	1	7.1
MW-12	71-43-2	Benzene	12/14/2006	6.3	ug/l	1	1	5.3

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-12	**71-43-2**	**Benzene**	**06/28/2007**	**7.2**	**ug/l**	**1**	**1**	**6.2**
MW-12	**71-43-2**	**Benzene**	**12/28/2007**	**7.1**	**ug/l**	**1**	**1**	**6.1**
MW-12	**71-43-2**	**Benzene**	**12/17/2008**	**6.2**	**ug/l**	**1**	**1**	**5.2**
MW-12	**71-43-2**	**Benzene**	**07/01/2009**	**6**	**ug/l**	**1**	**1**	**5**
MW-12	**71-43-2**	**Benzene**	**12/17/2009**	**6.7**	**ug/l**	**1**	**1**	**5.7**
MW-12	**71-43-2**	**Benzene**	**07/13/2010**	**5.6**	**ug/l**	**1**	**1**	**4.6**
MW-12	**71-43-2**	**Benzene**	**07/13/2010**	**5.6**	**ug/l**	**1**	**1**	**4.6**
MW-12	**71-43-2**	**Benzene**	**12/16/2010**	**6.1**	**ug/l**	**1**	**1**	**5.1**
MW-12D	71-43-2	Benzene	06/28/2007	0.12	ug/l	1	1	
MW-12D	71-43-2	Benzene	12/28/2007	0.52	ug/l	1	1	
MW-12D	71-43-2	Benzene	12/17/2008	0.47	ug/l	1	1	
MW-12D	71-43-2	Benzene	07/01/2009	0.65	ug/l	1	1	
MW-12D	71-43-2	Benzene	12/17/2009	0.44	ug/l	1	1	
MW-12D	71-43-2	Benzene	12/16/2010	0.45	ug/l	1	1	
MW-13	71-43-2	Benzene	06/28/2007	0.12	ug/l	1	1	
MW-13	71-43-2	Benzene	12/19/2007	0.47	ug/l	1	1	
MW-13	71-43-2	Benzene	06/30/2009	0.27	ug/l	1	1	
MW-14	**71-43-2**	**Benzene**	**12/15/2006**	**1.9**	**ug/l**	**1**	**1**	**0.9**
MW-14	**71-43-2**	**Benzene**	**06/28/2007**	**2**	**ug/l**	**1**	**1**	**1**
MW-14	**71-43-2**	**Benzene**	**12/28/2007**	**1.2**	**ug/l**	**1**	**1**	**0.2**
MW-14	71-43-2	Benzene	06/24/2009	1	ug/l	1	1	
MW-14	71-43-2	Benzene	12/15/2009	0.7	ug/l	1	1	
MW-14	71-43-2	Benzene	07/08/2010	0.95	ug/l	1	1	
MW-14	71-43-2	Benzene	07/08/2010	0.95	ug/l	1	1	
MW-14	**71-43-2**	**Benzene**	**12/09/2010**	**1.4**	**ug/l**	**1**	**1**	**0.4**
MW-15	**71-43-2**	**Benzene**	**06/12/2001**	**5.3**	**ug/l**	**1**	**1**	**4.3**
MW-15	**71-43-2**	**Benzene**	**12/15/2006**	**2.2**	**ug/l**	**1**	**1**	**1.2**
MW-15	**71-43-2**	**Benzene**	**06/28/2007**	**2.6**	**ug/l**	**1**	**1**	**1.6**
MW-15	**71-43-2**	**Benzene**	**06/25/2009**	**2.5**	**ug/l**	**1**	**1**	**1.5**
MW-15	**71-43-2**	**Benzene**	**12/15/2009**	**2.4**	**ug/l**	**1**	**1**	**1.4**
MW-15	**71-43-2**	**Benzene**	**07/08/2010**	**3.4**	**ug/l**	**1**	**1**	**2.4**
MW-15	**71-43-2**	**Benzene**	**07/08/2010**	**3.4**	**ug/l**	**1**	**1**	**2.4**
MW-15	**71-43-2**	**Benzene**	**12/09/2010**	**1.7**	**ug/l**	**1**	**1**	**0.7**
MW-16	**71-43-2**	**Benzene**	**01/08/2008**	**3.3**	**ug/l**	**1**	**1**	**2.3**
MW-16	**71-43-2**	**Benzene**	**12/30/2008**	**3.1**	**ug/l**	**1**	**1**	**2.1**
MW-16	**71-43-2**	**Benzene**	**07/01/2009**	**4.9**	**ug/l**	**1**	**1**	**3.9**
MW-16	**71-43-2**	**Benzene**	**12/17/2009**	**3.7**	**ug/l**	**1**	**1**	**2.7**
MW-16	**71-43-2**	**Benzene**	**07/14/2010**	**3.7**	**ug/l**	**1**	**1**	**2.7**
MW-16	**71-43-2**	**Benzene**	**07/14/2010**	**3.7**	**ug/l**	**1**	**1**	**2.7**
MW-16	**71-43-2**	**Benzene**	**12/17/2010**	**2.9**	**ug/l**	**1**	**1**	**1.9**
MW-17	**71-43-2**	**Benzene**	**12/15/2006**	**1.1**	**ug/l**	**1**	**1**	**0.1**
MW-17	**71-43-2**	**Benzene**	**06/28/2007**	**1.4**	**ug/l**	**1**	**1**	**0.4**
MW-17	**71-43-2**	**Benzene**	**12/27/2007**	**1.1**	**ug/l**	**1**	**1**	**0.1**
MW-17	71-43-2	Benzene	12/30/2008	0.81	ug/l	1	1	
MW-17	71-43-2	Benzene	06/25/2009	0.94	ug/l	1	1	
MW-17	71-43-2	Benzene	12/15/2009	0.54	ug/l	1	1	
MW-17	**71-43-2**	**Benzene**	**07/07/2010**	**1.2**	**ug/l**	**1**	**1**	**0.2**
MW-17	**71-43-2**	**Benzene**	**07/07/2010**	**1.2**	**ug/l**	**1**	**1**	**0.2**
MW-17	71-43-2	Benzene	12/09/2010	0.90	ug/l	1	1	
MW-1B	**71-43-2**	**Benzene**	**12/15/2006**	**1.3**	**ug/l**	**1**	**1**	**0.3**
MW-1B	**71-43-2**	**Benzene**	**06/28/2007**	**1.7**	**ug/l**	**1**	**1**	**0.7**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1B	**71-43-2**	**Benzene**	**12/30/2008**	**1.4**	**ug/l**	**1**	**1**	**0.4**
MW-1B	**71-43-2**	**Benzene**	**06/24/2009**	**2.4**	**ug/l**	**1**	**1**	**1.4**
MW-1B	**71-43-2**	**Benzene**	**12/15/2009**	**3.6**	**ug/l**	**1**	**1**	**2.6**
MW-1B	**71-43-2**	**Benzene**	**07/07/2010**	**3.4**	**ug/l**	**1**	**1**	**2.4**
MW-1B	**71-43-2**	**Benzene**	**07/07/2010**	**3.4**	**ug/l**	**1**	**1**	**2.4**
MW-1B	**71-43-2**	**Benzene**	**12/09/2010**	**3.6**	**ug/l**	**1**	**1**	**2.6**
MW-2	**71-43-2**	**Benzene**	**02/15/1995**	**5**	**ug/l**	**1**	**1**	**4**
MW-2	**71-43-2**	**Benzene**	**03/07/1995**	**5**	**ug/l**	**1**	**1**	**4**
MW-2	**71-43-2**	**Benzene**	**12/06/1995**	**5**	**ug/l**	**1**	**1**	**4**
MW-2	**71-43-2**	**Benzene**	**12/15/2006**	**3**	**ug/l**	**1**	**1**	**2**
MW-2	**71-43-2**	**Benzene**	**06/28/2007**	**2.8**	**ug/l**	**1**	**1**	**1.8**
MW-2	**71-43-2**	**Benzene**	**12/28/2007**	**1.8**	**ug/l**	**1**	**1**	**0.8**
MW-2	**71-43-2**	**Benzene**	**06/24/2009**	**2.5**	**ug/l**	**1**	**1**	**1.5**
MW-2	**71-43-2**	**Benzene**	**12/16/2009**	**2.2**	**ug/l**	**1**	**1**	**1.2**
MW-2	**71-43-2**	**Benzene**	**07/08/2010**	**3**	**ug/l**	**1**	**1**	**2**
MW-2	**71-43-2**	**Benzene**	**07/08/2010**	**3**	**ug/l**	**1**	**1**	**2**
MW-2	**71-43-2**	**Benzene**	**12/09/2010**	**2.7**	**ug/l**	**1**	**1**	**1.7**
MW-21	71-43-2	Benzene	01/09/2008	0.49	ug/l	1	1	
MW-21	71-43-2	Benzene	12/30/2008	1	ug/l	1	1	
MW-21	71-43-2	Benzene	12/08/2010	0.44	ug/l	1	1	
MW-24	**71-43-2**	**Benzene**	**01/08/2008**	**1.6**	**ug/l**	**1**	**1**	**0.6**
MW-24	**71-43-2**	**Benzene**	**12/17/2008**	**1.2**	**ug/l**	**1**	**1**	**0.2**
MW-24	71-43-2	Benzene	12/16/2009	0.6	ug/l	1	1	
MW-24	71-43-2	Benzene	07/12/2010	0.66	ug/l	1	1	
MW-24	71-43-2	Benzene	07/12/2010	0.66	ug/l	1	1	
MW-24	71-43-2	Benzene	12/16/2010	0.95	ug/l	1	1	
MW-25	71-43-2	Benzene	12/17/2008	0.87	ug/l	1	1	
MW-26	**71-43-2**	**Benzene**	**01/09/2008**	**1.9**	**ug/l**	**1**	**1**	**0.9**
MW-26	**71-43-2**	**Benzene**	**12/17/2008**	**1.7**	**ug/l**	**1**	**1**	**0.7**
MW-26	**71-43-2**	**Benzene**	**06/30/2009**	**1.4**	**ug/l**	**1**	**1**	**0.4**
MW-26	**71-43-2**	**Benzene**	**12/17/2009**	**1.4**	**ug/l**	**1**	**1**	**0.4**
MW-26	**71-43-2**	**Benzene**	**07/14/2010**	**3.2**	**ug/l**	**1**	**1**	**2.2**
MW-26	**71-43-2**	**Benzene**	**07/14/2010**	**3.2**	**ug/l**	**1**	**1**	**2.2**
MW-26	**71-43-2**	**Benzene**	**12/17/2010**	**1.6**	**ug/l**	**1**	**1**	**0.6**
MW-3	**71-43-2**	**Benzene**	**10/01/1994**	**9**	**ug/l**	**1**	**1**	**8**
MW-3	**71-43-2**	**Benzene**	**01/31/1995**	**8**	**ug/l**	**1**	**1**	**7**
MW-3	**71-43-2**	**Benzene**	**02/15/1995**	**9**	**ug/l**	**1**	**1**	**8**
MW-3	**71-43-2**	**Benzene**	**03/07/1995**	**6**	**ug/l**	**1**	**1**	**5**
MW-3	**71-43-2**	**Benzene**	**05/06/1996**	**9**	**ug/l**	**1**	**1**	**8**
MW-3	**71-43-2**	**Benzene**	**11/11/1996**	**11**	**ug/l**	**1**	**1**	**10**
MW-3	**71-43-2**	**Benzene**	**06/24/1997**	**8.3**	**ug/l**	**1**	**1**	**7.3**
MW-3	**71-43-2**	**Benzene**	**12/03/1997**	**10**	**ug/l**	**1**	**1**	**9**
MW-3	**71-43-2**	**Benzene**	**06/04/1998**	**8.8**	**ug/l**	**1**	**1**	**7.8**
MW-3	**71-43-2**	**Benzene**	**11/18/1998**	**5.7**	**ug/l**	**1**	**1**	**4.7**
MW-3	**71-43-2**	**Benzene**	**05/13/1999**	**7.9**	**ug/l**	**1**	**1**	**6.9**
MW-3	**71-43-2**	**Benzene**	**12/06/1999**	**11**	**ug/l**	**1**	**1**	**10**
MW-3	**71-43-2**	**Benzene**	**05/17/2000**	**9.5**	**ug/l**	**1**	**1**	**8.5**
MW-3	**71-43-2**	**Benzene**	**12/11/2000**	**10**	**ug/l**	**1**	**1**	**9**
MW-3	**71-43-2**	**Benzene**	**06/12/2001**	**13**	**ug/l**	**1**	**1**	**12**
MW-3	**71-43-2**	**Benzene**	**12/27/2001**	**11**	**ug/l**	**1**	**1**	**10**
MW-3	**71-43-2**	**Benzene**	**06/13/2002**	**10**	**ug/l**	**1**	**1**	**9**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	71-43-2	Benzene	01/03/2003	7.5	ug/l	1	1	6.5
MW-3	71-43-2	Benzene	06/24/2003	11	ug/l	1	1	10
MW-3	71-43-2	Benzene	12/11/2003	7.9	ug/l	1	1	6.9
MW-3	71-43-2	Benzene	06/15/2004	6.9	ug/l	1	1	5.9
MW-3	71-43-2	Benzene	12/29/2004	8.5	ug/l	1	1	7.5
MW-3	71-43-2	Benzene	06/22/2005	7	ug/l	1	1	6
MW-3	71-43-2	Benzene	12/14/2006	4.8	ug/l	1	1	3.8
MW-3	71-43-2	Benzene	06/27/2007	8	ug/l	1	1	7
MW-3	71-43-2	Benzene	12/28/2007	8	ug/l	1	1	7
MW-3	71-43-2	Benzene	07/01/2009	8.1	ug/l	1	1	7.1
MW-3	71-43-2	Benzene	12/18/2009	7.2	ug/l	1	1	6.2
MW-3	71-43-2	Benzene	07/14/2010	6	ug/l	1	1	5
MW-3	71-43-2	Benzene	07/14/2010	6	ug/l	1	1	5
MW-3	71-43-2	Benzene	12/17/2010	6.1	ug/l	1	1	5.1
MW-4	71-43-2	Benzene	12/03/1997	4	ug/l	1	1	3
MW-4R	71-43-2	Benzene	11/18/1998	2.3	ug/l	1	1	1.3
MW-4R	71-43-2	Benzene	06/13/2001	5.6	ug/l	1	1	4.6
MW-4R	71-43-2	Benzene	06/25/2003	5.1	ug/l	1	1	4.1
MW-4R	71-43-2	Benzene	12/14/2006	2.4	ug/l	1	1	1.4
MW-4R	71-43-2	Benzene	06/27/2007	2.8	ug/l	1	1	1.8
MW-4R	71-43-2	Benzene	06/24/2009	3	ug/l	1	1	2
MW-4R	71-43-2	Benzene	12/16/2009	1.7	ug/l	1	1	0.7
MW-4R	71-43-2	Benzene	07/08/2010	2.5	ug/l	1	1	1.5
MW-4R	71-43-2	Benzene	07/08/2010	2.5	ug/l	1	1	1.5
MW-4R	71-43-2	Benzene	12/09/2010	2.3	ug/l	1	1	1.3
MW-5	71-43-2	Benzene	12/03/1997	4	ug/l	1	1	3
MW-5	71-43-2	Benzene	06/04/1998	5.6	ug/l	1	1	4.6
MW-5	71-43-2	Benzene	11/18/1998	2.5	ug/l	1	1	1.5
MW-5	71-43-2	Benzene	06/13/2001	6.1	ug/l	1	1	5.1
MW-5	71-43-2	Benzene	12/14/2006	2.8	ug/l	1	1	1.8
MW-5	71-43-2	Benzene	06/27/2007	3.2	ug/l	1	1	2.2
MW-5	71-43-2	Benzene	12/19/2007	3.2	ug/l	1	1	2.2
MW-5	71-43-2	Benzene	07/01/2009	3.8	ug/l	1	1	2.8
MW-5	71-43-2	Benzene	12/17/2009	4.1	ug/l	1	1	3.1
MW-5	71-43-2	Benzene	07/13/2010	3.6	ug/l	1	1	2.6
MW-5	71-43-2	Benzene	07/13/2010	3.6	ug/l	1	1	2.6
MW-5	71-43-2	Benzene	12/16/2010	3.1	ug/l	1	1	2.1
MW-6	71-43-2	Benzene	12/19/2007	1.1	ug/l	1	1	0.1
MW-7	71-43-2	Benzene	12/03/1997	2	ug/l	1	1	1
MW-7	71-43-2	Benzene	06/13/2001	6	ug/l	1	1	5
MW-7	71-43-2	Benzene	12/28/2001	5.6	ug/l	1	1	4.6
MW-7	71-43-2	Benzene	06/25/2003	6.7	ug/l	1	1	5.7
MW-7	71-43-2	Benzene	01/12/2006	5.1	ug/l	1	1	4.1
MW-7	71-43-2	Benzene	12/14/2006	2.6	ug/l	1	1	1.6
MW-7	71-43-2	Benzene	06/27/2007	3.2	ug/l	1	1	2.2
MW-7	71-43-2	Benzene	12/27/2007	4.7	ug/l	1	1	3.7
MW-7	71-43-2	Benzene	07/01/2009	3.3	ug/l	1	1	2.3
MW-7	71-43-2	Benzene	12/18/2009	4.1	ug/l	1	1	3.1
MW-7	71-43-2	Benzene	07/13/2010	4.2	ug/l	1	1	3.2
MW-7	71-43-2	Benzene	07/13/2010	4.2	ug/l	1	1	3.2
MW-7	71-43-2	Benzene	12/16/2010	4.6	ug/l	1	1	3.6

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-8	71-43-2	Benzene	06/28/2007	0.12	ug/l	1	1	
MW-9	**71-43-2**	**Benzene**	**12/09/2010**	**1.5**	**ug/l**	**1**	**1**	**0.5**
SW-3	**71-43-2**	**Benzene**	**06/24/2009**	**1.1**	**ug/l**	**1**	**1**	**0.1**
MW-11	319-84-6	BHC, alpha	06/13/2002	0.0547	ug/l	NE	0.05	
MW-11	319-84-6	BHC, alpha	01/03/2003	0.18	ug/l	NE	0.05	
MW-3	319-84-6	BHC, alpha	12/03/1997	0.12	ug/l	NE	0.05	
MW-4R	319-84-6	BHC, alpha	12/03/1997	0.1	ug/l	NE	0.05	
MW-4R	319-84-6	BHC, alpha	04/30/1998	0.066	ug/l	NE	0.05	
MW-4R	319-84-6	BHC, alpha	11/18/1998	0.39	ug/l	NE	0.05	
MW-7	319-84-6	BHC, alpha	11/18/1998	0.63	ug/l	NE	0.05	
MW-8	319-84-6	BHC, alpha	04/30/1998	0.073	ug/l	NE	0.05	
MW-8	319-84-6	BHC, alpha	11/18/1998	0.068	ug/l	NE	0.05	
MW-6	319-85-7	BHC, beta	12/03/1997	0.06	ug/l	NE	0.05	
MW-1	**59-89-9**	**BHC, gamma**	**11/18/1998**	**0.055**	**ug/l**	**0.03**	**0.05**	**0.025**
MW-4R	**59-89-9**	**BHC, gamma**	**11/18/1998**	**0.11**	**ug/l**	**0.03**	**0.05**	**0.08**
MW-8	**59-89-9**	**BHC, gamma**	**11/18/1998**	**0.063**	**ug/l**	**0.03**	**0.05**	**0.033**
MW-1	**117-81-7**	**Bis(2-ethylhexyl)phthalate**	**12/03/1997**	**13**	**ug/l**	**3**	**15**	**10**
MW-1	75-15-0	Carbon disulfide	06/24/1997	33	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	05/13/1999	7.5	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	05/17/2000	18	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	06/13/2001	18	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	12/11/2003	170	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	06/28/2007	0.12	ug/l	700	100	
MW-1	75-15-0	Carbon disulfide	12/27/2007	2	ug/l	700	100	
MW-10	75-15-0	Carbon disulfide	06/12/2001	71	ug/l	700	100	
MW-10	75-15-0	Carbon disulfide	06/24/2003	13	ug/l	700	100	
MW-11	75-15-0	Carbon disulfide	06/12/2001	15	ug/l	700	100	
MW-11	75-15-0	Carbon disulfide	06/24/2003	47	ug/l	700	100	
MW-12D	75-15-0	Carbon disulfide	06/24/2003	70	ug/l	700	100	
MW-12D	75-15-0	Carbon disulfide	06/28/2007	0.12	ug/l	700	100	
MW-12D	75-15-0	Carbon disulfide	12/28/2007	1.7	ug/l	700	100	
MW-13	75-15-0	Carbon disulfide	06/12/2001	15	ug/l	700	100	
MW-13	75-15-0	Carbon disulfide	06/24/2003	91	ug/l	700	100	
MW-13	75-15-0	Carbon disulfide	12/11/2003	130	ug/l	700	100	
MW-15	75-15-0	Carbon disulfide	06/12/2001	21	ug/l	700	100	
MW-16	75-15-0	Carbon disulfide	12/17/2010	0.59	ug/l	700	100	
MW-18	75-15-0	Carbon disulfide	01/07/2008	0.76	ug/l	700	100	
MW-1A	75-15-0	Carbon disulfide	06/25/2003	21	ug/l	700	100	
MW-1B	75-15-0	Carbon disulfide	06/28/2007	0.12	ug/l	700	100	
MW-1B	75-15-0	Carbon disulfide	12/28/2007	0.56	ug/l	700	100	
MW-1B	75-15-0	Carbon disulfide	12/30/2008	0.66	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	06/24/1997	6.6	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	11/18/1998	6.7	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	05/17/2000	22	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	12/11/2000	29	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	06/12/2001	26	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	01/03/2003	11	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	06/24/2003	31	ug/l	700	100	
MW-3	75-15-0	Carbon disulfide	06/27/2007	18	ug/l	700	100	
MW-4R	75-15-0	Carbon disulfide	06/24/1997	5.5	ug/l	700	100	
MW-4R	75-15-0	Carbon disulfide	05/13/1999	5.9	ug/l	700	100	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-4R	75-15-0	Carbon disulfide	05/17/2000	30	ug/l	700	100	
MW-4R	75-15-0	Carbon disulfide	06/13/2001	11	ug/l	700	100	
MW-4R	75-15-0	Carbon disulfide	12/28/2001	5.4	ug/l	700	100	
MW-4R	75-15-0	Carbon disulfide	06/25/2003	20	ug/l	700	100	
MW-5	75-15-0	Carbon disulfide	06/24/1997	36	ug/l	700	100	
MW-5	75-15-0	Carbon disulfide	05/17/2000	17	ug/l	700	100	
MW-5	75-15-0	Carbon disulfide	06/13/2001	54	ug/l	700	100	
MW-5	75-15-0	Carbon disulfide	06/27/2007	0.12	ug/l	700	100	
MW-6	75-15-0	Carbon disulfide	06/24/1997	61	ug/l	700	100	
MW-6	75-15-0	Carbon disulfide	12/03/1997	6	ug/l	700	100	
MW-6	75-15-0	Carbon disulfide	05/17/2000	18	ug/l	700	100	
MW-6	75-15-0	Carbon disulfide	06/12/2001	41	ug/l	700	100	
MW-6	75-15-0	Carbon disulfide	06/24/2003	11	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	06/24/1997	66	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	12/03/1997	3	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	05/13/1999	8	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	05/17/2000	5.4	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	12/12/2000	13	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	06/13/2001	16	ug/l	700	100	
MW-7	75-15-0	Carbon disulfide	06/25/2003	50	ug/l	700	100	
MW-8	75-15-0	Carbon disulfide	06/24/1997	19	ug/l	700	100	
MW-8	75-15-0	Carbon disulfide	06/04/1998	8	ug/l	700	100	
MW-8	75-15-0	Carbon disulfide	05/13/1999	6.2	ug/l	700	100	
MW-8	75-15-0	Carbon disulfide	06/12/2001	16	ug/l	700	100	
MW-1	SW301	Chloride	06/28/2007	2800	ug/l	250000	NE	
MW-11	SW301	Chloride	06/27/2007	7700	ug/l	250000	NE	
MW-11	SW301	Chloride	06/30/2009	12300	ug/l	250000	NE	
MW-11	SW301	Chloride	7/14/2010	19000	ug/l	250000	NE	
MW-11	SW301	Chloride	12/17/2010	19000	ug/l	250000	NE	
MW-12	SW301	Chloride	06/28/2007	4300	ug/l	250000	NE	
MW-12	SW301	Chloride	07/01/2009	6400	ug/l	250000	NE	
MW-12	SW301	Chloride	7/13/2010	5730	ug/l	250000	NE	
MW-12	SW301	Chloride	12/16/2010	6600	ug/l	250000	NE	
MW-12D	SW301	Chloride	06/28/2007	32000	ug/l	250000	NE	
MW-12D	**SW301**	**Chloride**	**07/01/2009**	**429000**	**ug/l**	**250000**	**NE**	**179000**
MW-12D	SW301	Chloride	7/13/2010	49500	ug/l	250000	NE	
MW-12D	SW301	Chloride	12/16/2010	50000	ug/l	250000	NE	
MW-13	SW301	Chloride	06/28/2007	2100	ug/l	250000	NE	
MW-13	SW301	Chloride	12/16/2010	3600	ug/l	250000	NE	
MW-16	SW301	Chloride	12/17/2010	3600	ug/l	250000	NE	
MW-18	SW301	Chloride	12/17/2010	2800	ug/l	250000	NE	
MW-1B	SW301	Chloride	06/28/2007	2000	ug/l	250000	NE	
MW-2	SW301	Chloride	06/28/2007	45000	ug/l	250000	NE	
MW-24	SW301	Chloride	06/30/2009	23300	ug/l	250000	NE	
MW-24	SW301	Chloride	7/12/2010	21600	ug/l	250000	NE	
MW-24	SW301	Chloride	12/16/2010	20000	ug/l	250000	NE	
MW-25	SW301	Chloride	12/16/2010	3500	ug/l	250000	NE	
MW-26	SW301	Chloride	06/30/2009	6900	ug/l	250000	NE	
MW-26	SW301	Chloride	7/14/2010	12500	ug/l	250000	NE	
MW-26	SW301	Chloride	12/17/2010	9200	ug/l	250000	NE	
MW-27	SW301	Chloride	06/30/2009	13800	ug/l	250000	NE	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-27	SW301	Chloride	7/13/2010	12800	ug/l	250000	NE	
MW-27	SW301	Chloride	12/16/2010	12000	ug/l	250000	NE	
MW-3	SW301	Chloride	06/27/2007	7700	ug/l	250000	NE	
MW-3	SW301	Chloride	07/01/2009	17600	ug/l	250000	NE	
MW-3	SW301	Chloride	7/14/2010	16700	ug/l	250000	NE	
MW-3	SW301	Chloride	12/17/2010	14000	ug/l	250000	NE	
MW-5	SW301	Chloride	12/16/2010	3400	ug/l	250000	NE	
MW-6	SW301	Chloride	06/28/2007	4000	ug/l	250000	NE	
MW-6	SW301	Chloride	06/30/2009	7300	ug/l	250000	NE	
MW-6	SW301	Chloride	7/12/2010	6790	ug/l	250000	NE	
MW-6	SW301	Chloride	12/16/2010	6200	ug/l	250000	NE	
MW-7	SW301	Chloride	06/27/2007	7700	ug/l	250000	NE	
MW-7	SW301	Chloride	07/01/2009	16600	ug/l	250000	NE	
MW-7	SW301	Chloride	7/13/2010	18200	ug/l	250000	NE	
MW-7	SW301	Chloride	12/16/2010	14000	ug/l	250000	NE	
MW-1	108-90-7	Chlorobenzene	06/25/2009	0.45	ug/l	50	3	
MW-1	108-90-7	Chlorobenzene	12/16/2009	0.52	ug/l	50	3	
MW-1	108-90-7	Chlorobenzene	07/08/2010	0.76	ug/l	50	3	
MW-1	108-90-7	Chlorobenzene	07/08/2010	0.76	ug/l	50	3	
MW-1	108-90-7	Chlorobenzene	12/09/2010	0.74	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	12/14/2006	2	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	12/27/2007	1.6	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	06/30/2009	2.2	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	12/17/2009	2	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	07/14/2010	2.3	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	07/14/2010	2.3	ug/l	50	3	
MW-11	108-90-7	Chlorobenzene	12/17/2010	2.5	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	12/14/2006	1.5	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	12/28/2007	1.7	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	12/17/2008	1.6	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	07/01/2009	1.6	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	12/17/2009	1.9	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	07/13/2010	1.6	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	07/13/2010	1.6	ug/l	50	3	
MW-12	108-90-7	Chlorobenzene	12/16/2010	2.4	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	12/15/2006	1.5	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	12/28/2007	1.7	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	06/24/2009	1.4	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	12/15/2009	1	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	07/08/2010	1	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	07/08/2010	1	ug/l	50	3	
MW-14	108-90-7	Chlorobenzene	12/09/2010	1.5	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	12/30/2008	0.41	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	07/01/2009	0.63	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	12/17/2009	0.54	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	07/14/2010	0.66	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	07/14/2010	0.66	ug/l	50	3	
MW-16	108-90-7	Chlorobenzene	12/17/2010	0.55	ug/l	50	3	
MW-1B	108-90-7	Chlorobenzene	06/24/2009	0.31	ug/l	50	3	
MW-1B	108-90-7	Chlorobenzene	12/15/2009	0.46	ug/l	50	3	
MW-1B	108-90-7	Chlorobenzene	07/07/2010	0.58	ug/l	50	3	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1B	108-90-7	Chlorobenzene	07/07/2010	0.58	ug/l	50	3	
MW-1B	108-90-7	Chlorobenzene	12/09/2010	0.59	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	12/15/2006	1.8	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	12/28/2007	1.5	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	06/24/2009	1.5	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	12/16/2009	1.1	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	07/08/2010	1.8	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	07/08/2010	1.8	ug/l	50	3	
MW-2	108-90-7	Chlorobenzene	12/09/2010	1.4	ug/l	50	3	
MW-24	108-90-7	Chlorobenzene	12/17/2008	0.53	ug/l	50	3	
MW-24	108-90-7	Chlorobenzene	12/16/2009	0.3	ug/l	50	3	
MW-24	108-90-7	Chlorobenzene	07/12/2010	0.31	ug/l	50	3	
MW-24	108-90-7	Chlorobenzene	07/12/2010	0.31	ug/l	50	3	
MW-24	108-90-7	Chlorobenzene	12/16/2010	0.62	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	01/09/2008	0.78	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	12/17/2008	0.73	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	06/30/2009	0.32	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	12/17/2009	0.6	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	07/14/2010	1.6	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	07/14/2010	1.6	ug/l	50	3	
MW-26	108-90-7	Chlorobenzene	12/17/2010	1.1	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	12/14/2006	1	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	07/01/2009	1	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	12/18/2009	0.92	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	07/14/2010	0.78	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	07/14/2010	0.78	ug/l	50	3	
MW-3	108-90-7	Chlorobenzene	12/17/2010	0.90	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	12/14/2006	1.2	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	12/27/2007	0.98	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	06/24/2009	1.8	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	12/16/2009	1.1	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	07/08/2010	1.3	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	07/08/2010	1.3	ug/l	50	3	
MW-4R	108-90-7	Chlorobenzene	12/09/2010	1.3	ug/l	50	3	
MW-5	108-90-7	Chlorobenzene	07/01/2009	0.66	ug/l	50	3	
MW-5	108-90-7	Chlorobenzene	12/17/2009	0.64	ug/l	50	3	
MW-5	108-90-7	Chlorobenzene	07/13/2010	0.75	ug/l	50	3	
MW-5	108-90-7	Chlorobenzene	07/13/2010	0.75	ug/l	50	3	
MW-5	108-90-7	Chlorobenzene	12/16/2010	0.66	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	12/14/2006	1.4	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	12/27/2007	0.84	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	07/01/2009	0.51	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	12/18/2009	0.56	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	07/13/2010	0.48	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	07/13/2010	0.48	ug/l	50	3	
MW-7	108-90-7	Chlorobenzene	12/16/2010	0.91	ug/l	50	3	
MW-9	108-90-7	Chlorobenzene	12/09/2010	1.4	ug/l	50	3	
SW-3	108-90-7	Chlorobenzene	06/24/2009	0.76	ug/l	50	3	
MW-1	75-00-3	Chloroethane	12/03/1997	2	ug/l	3000	10	
MW-1	75-00-3	Chloroethane	11/18/1998	5.7	ug/l	3000	10	
MW-11	75-00-3	Chloroethane	12/14/2006	1.3	ug/l	3000	10	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-11	75-00-3	Chloroethane	06/27/2007	2	ug/l	3000	10	
MW-11	75-00-3	Chloroethane	12/27/2007	2	ug/l	3000	10	
MW-11	75-00-3	Chloroethane	07/14/2010	1.7	ug/l	3000	10	
MW-11	75-00-3	Chloroethane	07/14/2010	1.7	ug/l	3000	10	
MW-11	75-00-3	Chloroethane	12/17/2010	1.0	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	06/13/2001	11	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	06/24/2003	15	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	12/14/2006	2	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	06/28/2007	2.8	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	12/17/2008	2.8	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	07/13/2010	1.9	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	07/13/2010	1.9	ug/l	3000	10	
MW-12	75-00-3	Chloroethane	12/16/2010	1.4	ug/l	3000	10	
MW-14	75-00-3	Chloroethane	12/15/2006	1.5	ug/l	3000	10	
MW-14	75-00-3	Chloroethane	06/28/2007	2.2	ug/l	3000	10	
MW-14	75-00-3	Chloroethane	12/28/2007	2	ug/l	3000	10	
MW-14	75-00-3	Chloroethane	12/15/2009	1.1	ug/l	3000	10	
MW-14	75-00-3	Chloroethane	12/09/2010	1.1	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	06/25/2003	13	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	12/19/2007	0.88	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	06/25/2009	2.2	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	12/15/2009	0.63	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	07/08/2010	1.8	ug/l	3000	10	
MW-15	75-00-3	Chloroethane	07/08/2010	1.8	ug/l	3000	10	
MW-16	75-00-3	Chloroethane	01/08/2008	1.6	ug/l	3000	10	
MW-16	75-00-3	Chloroethane	12/30/2008	0.87	ug/l	3000	10	
MW-16	75-00-3	Chloroethane	07/01/2009	0.9	ug/l	3000	10	
MW-16	75-00-3	Chloroethane	12/17/2010	0.55	ug/l	3000	10	
MW-17	75-00-3	Chloroethane	07/07/2010	0.79	ug/l	3000	10	
MW-17	75-00-3	Chloroethane	07/07/2010	0.79	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	10/01/1994	22	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	01/31/1995	20	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	02/15/1995	20	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	03/07/1995	22	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	12/06/1995	14	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	12/15/2006	1.9	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	07/08/2010	3	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	07/08/2010	3	ug/l	3000	10	
MW-2	75-00-3	Chloroethane	12/09/2010	1.9	ug/l	3000	10	
MW-24	75-00-3	Chloroethane	01/08/2008	0.88	ug/l	3000	10	
MW-24	75-00-3	Chloroethane	12/16/2010	0.41	ug/l	3000	10	
MW-25	75-00-3	Chloroethane	12/17/2008	0.76	ug/l	3000	10	
MW-26	75-00-3	Chloroethane	01/09/2008	0.94	ug/l	3000	10	
MW-26	75-00-3	Chloroethane	12/17/2008	0.94	ug/l	3000	10	
MW-26	75-00-3	Chloroethane	06/30/2009	0.82	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	10/01/1994	12	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	01/31/1995	10	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	02/15/1995	12	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	11/11/1996	10	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	12/03/1997	12	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	11/18/1998	9.7	ug/l	3000	10	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	75-00-3	Chloroethane	06/24/2003	10	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	07/14/2010	1.3	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	07/14/2010	1.3	ug/l	3000	10	
MW-3	75-00-3	Chloroethane	12/17/2010	0.86	ug/l	3000	10	
MW-4	75-00-3	Chloroethane	12/03/1997	7	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	05/06/1996	13	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	11/18/1998	7.6	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	12/14/2006	1.8	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	06/27/2007	3	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	12/27/2007	3.4	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	06/24/2009	2.9	ug/l	3000	10	
MW-4R	75-00-3	Chloroethane	12/09/2010	1.5	ug/l	3000	10	
MW-5	75-00-3	Chloroethane	12/03/1997	2	ug/l	3000	10	
MW-5	75-00-3	Chloroethane	12/16/2010	0.42	ug/l	3000	10	
MW-6	75-00-3	Chloroethane	12/03/1997	1	ug/l	3000	10	
MW-7	75-00-3	Chloroethane	01/31/1995	11	ug/l	3000	10	
MW-7	75-00-3	Chloroethane	02/15/1995	11	ug/l	3000	10	
MW-7	75-00-3	Chloroethane	12/06/1995	11	ug/l	3000	10	
MW-7	75-00-3	Chloroethane	12/03/1997	3	ug/l	3000	10	
MW-8	75-00-3	Chloroethane	12/03/1997	7	ug/l	3000	10	
MW-8	75-00-3	Chloroethane	06/25/2003	11	ug/l	3000	10	
MW-9	75-00-3	Chloroethane	12/17/2008	1	ug/l	3000	10	
MW-9	75-00-3	Chloroethane	07/07/2010	0.66	ug/l	3000	10	
MW-9	75-00-3	Chloroethane	07/07/2010	0.66	ug/l	3000	10	
MW-9	75-00-3	Chloroethane	12/09/2010	0.98	ug/l	3000	10	
SW-3	75-00-3	Chloroethane	12/17/2008	0.44	ug/l	3000	10	
SW-3	75-00-3	Chloroethane	06/24/2009	1.8	ug/l	3000	10	
MW-11	75-00-3	Chloroethene	06/27/2007	0.94	ug/l	3000	10	
MW-11	75-00-3	Chloroethene	12/27/2007	0.79	ug/l	3000	10	
MW-3	75-00-3	Chloroethene	12/03/1997	2	ug/l	3000	10	
MW-3	75-00-3	Chloroethene	06/27/2007	0.15	ug/l	3000	10	
EB	67-66-3	Chloroform	12/30/2008	0.43	ug/l	70	5	
EB	67-66-3	Chloroform	06/30/2009	0.7	ug/l	70	5	
FB	67-66-3	Chloroform	06/30/2009	0.76	ug/l	70	5	
MW-12D	67-66-3	Chloroform	06/24/2003	5.8	ug/l	70	5	
MW-1B	67-66-3	Chloroform	12/11/2003	8.4	ug/l	70	5	
FB	74-87-3	Chloromethane	06/30/2009	0.28	ug/l	3	1	
MW-22	74-87-3	Chloromethane	07/07/2010	0.19	ug/l	3	1	
MW-22	74-87-3	Chloromethane	07/07/2010	0.19	ug/l	3	1	
MW-6	74-87-3	Chloromethane	06/30/2009	0.17	ug/l	3	1	
MW-1	156-59-2	cis-1,2-Dichloroethene	11/18/1998	4.9	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	05/13/1999	8.3	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/06/1999	8.7	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	05/17/2000	7.8	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/12/2000	9.7	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/13/2001	9.5	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/28/2001	7.4	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/13/2002	12	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	01/03/2003	6.7	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/24/2003	14	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/11/2003	8.8	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1	156-59-2	cis-1,2-Dichloroethene	06/16/2004	7.8	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/30/2004	11	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/23/2005	10	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	01/13/2006	11.4	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	07/06/2006	8.1	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/15/2006	6.6	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/28/2007	10	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/27/2007	13	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/30/2008	8.8	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	06/25/2009	10.8	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/16/2009	9.1	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	07/08/2010	10.1	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	07/08/2010	10.1	ug/l	70	5	
MW-1	156-59-2	cis-1,2-Dichloroethene	12/09/2010	8.7	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	12/14/2006	1.2	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	06/27/2007	3.6	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	12/27/2007	3.8	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	06/24/2009	2.4	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	12/15/2009	3	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.9	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.9	ug/l	70	5	
MW-10	156-59-2	cis-1,2-Dichloroethene	12/09/2010	2.7	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/11/2000	28	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/12/2001	50	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/27/2001	51	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/13/2002	51	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	01/03/2003	42	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/24/2003	41	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/11/2003	42	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/15/2004	35	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/29/2004	38	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/22/2005	40	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	01/12/2006	25.4	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	07/07/2006	48.6	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/14/2006	26	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/27/2007	30	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/27/2007	42	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	06/30/2009	32.5	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/17/2009	32.3	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	07/14/2010	24.6	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	07/14/2010	24.6	ug/l	70	5	
MW-11	156-59-2	cis-1,2-Dichloroethene	12/17/2010	29	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/11/2000	10	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	06/13/2001	10	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/27/2001	12	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	06/12/2002	7.1	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	01/02/2003	5.5	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	06/24/2003	14	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/11/2003	11	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	06/15/2004	9.6	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/30/2004	12	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-12	156-59-2	cis-1,2-Dichloroethene	06/23/2005	9	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	01/12/2006	11.8	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	07/07/2006	10.2	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/14/2006	9.1	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	06/28/2007	11	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/28/2007	14	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/17/2008	12	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	07/01/2009	12.5	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/17/2009	13.6	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	07/13/2010	11.9	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	07/13/2010	11.9	ug/l	70	5	
MW-12	156-59-2	cis-1,2-Dichloroethene	12/16/2010	13	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	06/28/2007	0.14	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	12/28/2007	0.69	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	12/17/2008	0.9	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	07/01/2009	0.77	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	12/17/2009	0.68	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	07/13/2010	0.36	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	07/13/2010	0.36	ug/l	70	5	
MW-12D	156-59-2	cis-1,2-Dichloroethene	12/16/2010	0.62	ug/l	70	5	
MW-13	156-59-2	cis-1,2-Dichloroethene	06/28/2007	0.14	ug/l	70	5	
MW-13	156-59-2	cis-1,2-Dichloroethene	12/19/2007	0.71	ug/l	70	5	
MW-13	156-59-2	cis-1,2-Dichloroethene	06/30/2009	0.45	ug/l	70	5	
MW-13	156-59-2	cis-1,2-Dichloroethene	12/16/2009	0.41	ug/l	70	5	
MW-13	156-59-2	cis-1,2-Dichloroethene	12/16/2010	0.44	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/12/2000	11	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/13/2001	12	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/28/2001	12	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/13/2002	17	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	01/03/2003	6.3	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/11/2003	14	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/16/2004	11	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/29/2004	7.5	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/23/2005	9	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	01/12/2006	7.9	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	07/07/2006	13.5	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/15/2006	9.3	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/28/2007	14	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/28/2007	19	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	06/24/2009	12.3	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/15/2009	8.3	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	07/08/2010	10.9	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	07/08/2010	10.9	ug/l	70	5	
MW-14	156-59-2	cis-1,2-Dichloroethene	12/09/2010	15	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	12/15/2006	3.5	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	06/28/2007	6.6	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	12/19/2007	4.6	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	06/25/2009	5.2	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	12/15/2009	6.6	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	07/08/2010	8.5	ug/l	70	5	
MW-15	156-59-2	cis-1,2-Dichloroethene	07/08/2010	8.5	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-15	156-59-2	cis-1,2-Dichloroethene	12/09/2010	5.0	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	01/08/2008	16	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	12/30/2008	13	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	07/01/2009	17.2	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	12/17/2009	16.3	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	07/14/2010	18	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	07/14/2010	18	ug/l	70	5	
MW-16	156-59-2	cis-1,2-Dichloroethene	12/17/2010	17	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	12/15/2006	2.6	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	06/28/2007	2.4	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	12/27/2007	3	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	12/30/2008	2	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	06/25/2009	3.2	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	12/15/2009	1.7	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	07/07/2010	3	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	07/07/2010	3	ug/l	70	5	
MW-17	156-59-2	cis-1,2-Dichloroethene	12/09/2010	2.8	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/30/2004	5.3	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	01/13/2006	5.4	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/15/2006	3.3	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	06/28/2007	4.1	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/28/2007	6.6	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/30/2008	4.1	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	06/24/2009	6.6	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/15/2009	7.8	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	07/07/2010	5.9	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	07/07/2010	5.9	ug/l	70	5	
MW-1B	156-59-2	cis-1,2-Dichloroethene	12/09/2010	6.3	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	01/31/1995	5	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	02/15/1995	6	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	03/07/1995	6	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/06/1995	6	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	05/06/1996	5	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/06/1999	13	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/15/2006	13	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	06/28/2007	17	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/28/2007	18	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	06/24/2009	15.3	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/16/2009	13.3	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	07/08/2010	20.3	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	07/08/2010	20.3	ug/l	70	5	
MW-2	156-59-2	cis-1,2-Dichloroethene	12/09/2010	18	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	01/09/2008	1.6	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	12/30/2008	2.4	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	06/25/2009	0.36	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	12/15/2009	0.65	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	07/07/2010	0.29	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	07/07/2010	0.29	ug/l	70	5	
MW-21	156-59-2	cis-1,2-Dichloroethene	12/08/2010	1.4	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	01/07/2008	7.8	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	12/30/2008	4.6	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-23	156-59-2	cis-1,2-Dichloroethene	06/25/2009	1.7	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	12/15/2009	1.9	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.6	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.6	ug/l	70	5	
MW-23	156-59-2	cis-1,2-Dichloroethene	12/08/2010	0.81	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	01/08/2008	8.2	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	12/17/2008	6.4	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	06/30/2009	2.1	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	12/16/2009	4.1	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	07/12/2010	3.2	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	07/12/2010	3.2	ug/l	70	5	
MW-24	156-59-2	cis-1,2-Dichloroethene	12/16/2010	4.5	ug/l	70	5	
MW-25	156-59-2	cis-1,2-Dichloroethene	01/08/2008	1.2	ug/l	70	5	
MW-25	156-59-2	cis-1,2-Dichloroethene	12/17/2008	1.3	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	01/09/2008	32	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	12/17/2008	26	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	06/30/2009	28.3	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	12/17/2009	18.6	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	07/14/2010	29.8	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	07/14/2010	29.8	ug/l	70	5	
MW-26	156-59-2	cis-1,2-Dichloroethene	12/17/2010	23	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	01/09/2008	21	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	06/30/2009	19	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	12/17/2009	20.2	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	07/13/2010	24.6	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	07/13/2010	24.6	ug/l	70	5	
MW-27	156-59-2	cis-1,2-Dichloroethene	12/16/2010	28	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	10/01/1994	12	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	01/31/1995	7	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	02/15/1995	13	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	03/07/1995	10	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/07/1995	10	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	05/06/1996	13	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	11/11/1996	12	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/24/1997	14	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/03/1997	17	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/04/1998	17	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	11/18/1998	15.8	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	05/13/1999	20	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/06/1999	21	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	05/17/2000	20	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/11/2000	26	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/12/2001	25	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/27/2001	28	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/13/2002	24	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	01/03/2003	22	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/24/2003	30	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/11/2003	20	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/15/2004	16	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/29/2004	18	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/22/2005	12	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	156-59-2	cis-1,2-Dichloroethene	01/12/2006	10.6	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/14/2006	7.6	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	06/27/2007	8.3	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/28/2007	13	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	07/01/2009	11.6	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/18/2009	8.8	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	07/14/2010	9.3	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	07/14/2010	9.3	ug/l	70	5	
MW-3	156-59-2	cis-1,2-Dichloroethene	12/17/2010	8.3	ug/l	70	5	
MW-31	156-59-2	cis-1,2-Dichloroethene	12/08/2010	3.0	ug/l	70	5	
MW-4	156-59-2	cis-1,2-Dichloroethene	10/01/1994	8	ug/l	70	5	
MW-4	156-59-2	cis-1,2-Dichloroethene	12/03/1997	20	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	10/01/1994	10	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	01/31/1995	12	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	02/15/1995	12	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	03/07/1995	10	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/06/1995	7	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	05/06/1996	10	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	11/11/1996	16	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/24/1997	18	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/04/1998	18	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	05/13/1999	16	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/06/1999	16	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	05/17/2000	14	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/11/2000	15	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/13/2001	19	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/28/2001	24	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/13/2002	14	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	01/02/2003	22	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/25/2003	36	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/12/2003	17	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/15/2004	15	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/29/2004	20	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/22/2005	16	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	01/12/2006	14	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	07/07/2006	12.8	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/14/2006	11	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/27/2007	15	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/27/2007	18	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	06/24/2009	20.8	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/16/2009	10.1	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	07/08/2010	15.1	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	07/08/2010	15.1	ug/l	70	5	
MW-4R	156-59-2	cis-1,2-Dichloroethene	12/09/2010	15	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/03/1997	4	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/04/1998	8.3	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	05/13/1999	7.4	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/11/2000	7.2	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/13/2001	13	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/27/2001	7.2	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/13/2002	11	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-5	156-59-2	cis-1,2-Dichloroethene	01/02/2003	19	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/24/2003	17	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/12/2003	13	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/15/2004	11	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/29/2004	10	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/22/2005	9	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	07/07/2006	8.5	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/14/2006	6	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	06/27/2007	8.2	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/19/2007	10	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	07/01/2009	11.5	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/17/2009	11.3	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	07/13/2010	10.5	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	07/13/2010	10.5	ug/l	70	5	
MW-5	156-59-2	cis-1,2-Dichloroethene	12/16/2010	9.0	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	11/18/1998	6.5	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	12/06/1999	11	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	12/11/2000	7.6	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	06/12/2001	13	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	12/28/2001	8	ug/l	70	5	
MW-6	156-59-2	cis-1,2-Dichloroethene	12/19/2007	2.3	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/03/1997	3	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	11/18/1998	2.7	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	05/17/2000	5.7	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/12/2000	7	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/13/2001	7.5	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/28/2001	7.3	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/12/2002	5.1	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	01/02/2003	5.2	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/25/2003	10	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/11/2003	6.1	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/16/2004	6	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/30/2004	7.2	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/23/2005	7	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	01/12/2006	7.4	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	07/07/2006	8	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/14/2006	7.3	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	06/27/2007	4.9	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/27/2007	9.2	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	07/01/2009	5.2	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/18/2009	5.7	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	07/13/2010	5	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	07/13/2010	5	ug/l	70	5	
MW-7	156-59-2	cis-1,2-Dichloroethene	12/16/2010	7.0	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	12/03/1997	2	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	06/25/2003	9.1	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	06/15/2004	5.7	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	12/30/2004	6.1	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	12/15/2006	3.5	ug/l	70	5	
MW-8	156-59-2	cis-1,2-Dichloroethene	06/28/2007	2.1	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/11/2000	15	ug/l	70	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-9	156-59-2	cis-1,2-Dichloroethene	06/13/2001	11	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/27/2001	15	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/12/2002	8.2	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	01/02/2003	12	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/24/2003	16	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/12/2003	10	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/15/2004	12	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/29/2004	13	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/22/2005	8	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	01/12/2006	10.2	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	07/07/2006	12.3	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/14/2006	8.3	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/27/2007	10	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/19/2007	20	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/17/2008	16	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	06/24/2009	15.3	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/15/2009	12.6	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	07/07/2010	13.9	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	07/07/2010	13.9	ug/l	70	5	
MW-9	156-59-2	cis-1,2-Dichloroethene	12/09/2010	24	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	12/17/2008	3.7	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	06/24/2009	9.8	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	12/15/2009	1.3	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.6	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	07/07/2010	2.6	ug/l	70	5	
SW-3	156-59-2	cis-1,2-Dichloroethene	12/08/2010	1.2	ug/l	70	5	
SW-5	156-59-2	cis-1,2-Dichloroethene	12/08/2010	1.3	ug/l	70	5	
MW-12D	88-85-7	Dinoseb	12/16/2010	0.44	ug/l	NE	1	
MW-27	88-85-7	Dinoseb	12/16/2010	0.41	ug/l	NE	1	
MW-11	100-41-4	Ethylbenzene	06/30/2009	0.61	ug/l	600	1	
MW-11	100-41-4	Ethylbenzene	12/17/2009	0.51	ug/l	600	1	
MW-11	100-41-4	Ethylbenzene	07/14/2010	0.49	ug/l	600	1	
MW-11	100-41-4	Ethylbenzene	07/14/2010	0.49	ug/l	600	1	
MW-11	100-41-4	Ethylbenzene	12/17/2010	0.42	ug/l	600	1	
MW-16	100-41-4	Ethylbenzene	07/01/2009	0.34	ug/l	600	1	
MW-1B	100-41-4	Ethylbenzene	06/28/2007	0.17	ug/l	600	1	
MW-1B	100-41-4	Ethylbenzene	12/28/2007	0.96	ug/l	600	1	
MW-1B	100-41-4	Ethylbenzene	06/24/2009	0.44	ug/l	600	1	
MW-1B	100-41-4	Ethylbenzene	12/15/2009	0.38	ug/l	600	1	
MW-1B	100-41-4	Ethylbenzene	12/09/2010	0.52	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	12/03/1997	3	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	11/18/1998	2	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	12/14/2006	1.4	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	06/27/2007	2.3	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	12/28/2007	3.9	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	07/01/2009	3.1	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	12/18/2009	2.1	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	07/14/2010	1.5	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	07/14/2010	1.5	ug/l	600	1	
MW-3	100-41-4	Ethylbenzene	12/17/2010	1.8	ug/l	600	1	
MW-11	**107-06-2**	**Ethylene dichloride**	**12/14/2006**	**1.1**	**ug/l**	**0.4**	**1**	**0.7**

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	**76-44-8**	**Heptachlor**	**12/03/1997**	**0.1**	**ug/l**	**0.008**	**0.05**	**0.092**
MW-3	80-62-6	Methyl methacrylate	12/03/1997	35	ug/l	NE	30	
MW-3	1634-04-4	Methyl tert-butyl ether	12/03/1997	14	ug/l	20	NE	
MW-7	1634-04-4	Methyl tert-butyl ether	12/03/1997	2	ug/l	20	NE	
EB	75-09-2	Methylene Chloride	12/15/2009	1.5	ug/l	5	1	
MW-11	75-09-2	Methylene chloride	12/27/2007	0.7	ug/l	5	1	
MW-12	**75-09-2**	**Methylene chloride**	**12/11/2000**	**13**	**ug/l**	**5**	**1**	**8**
MW-12	**75-09-2**	**Methylene chloride**	**06/13/2001**	**10**	**ug/l**	**5**	**1**	**5**
MW-12	**75-09-2**	**Methylene chloride**	**12/27/2001**	**12**	**ug/l**	**5**	**1**	**7**
MW-12	**75-09-2**	**Methylene chloride**	**06/12/2002**	**7.4**	**ug/l**	**5**	**1**	**2.4**
MW-12	75-09-2	Methylene chloride	06/28/2007	1.8	ug/l	5	1	
MW-12	75-09-2	Methylene chloride	12/28/2007	1.8	ug/l	5	1	
MW-12	75-09-2	Methylene chloride	12/17/2008	1.2	ug/l	5	1	
MW-15	**75-09-2**	**Methylene chloride**	**06/25/2003**	**16**	**ug/l**	**5**	**1**	**11**
MW-15	**75-09-2**	**Methylene chloride**	**12/30/2004**	**13**	**ug/l**	**5**	**1**	**8**
MW-15	75-09-2	Methylene chloride	06/28/2007	1.8	ug/l	5	1	
MW-16	75-09-2	Methylene chloride	01/08/2008	4.1	ug/l	5	1	
MW-16	75-09-2	Methylene chloride	12/30/2008	2.8	ug/l	5	1	
MW-16	75-09-2	Methylene Chloride	07/01/2009	2	ug/l	5	1	
MW-16	75-09-2	Methylene Chloride	12/17/2009	2	ug/l	5	1	
MW-16	75-09-2	Methylene chloride	12/17/2010	2.2	ug/l	5	1	
MW-17	**75-09-2**	**Methylene chloride**	**06/25/2003**	**9.7**	**ug/l**	**5**	**1**	**4.7**
MW-17	75-09-2	Methylene chloride	06/28/2007	1.2	ug/l	5	1	
MW-17	75-09-2	Methylene chloride	12/27/2007	0.54	ug/l	5	1	
MW-1B	75-09-2	Methylene chloride	06/28/2007	0.088	ug/l	5	1	
MW-1B	75-09-2	Methylene chloride	12/28/2007	2.8	ug/l	5	1	
MW-1B	75-09-2	Methylene chloride	12/30/2008	1.2	ug/l	5	1	
MW-21	75-09-2	Methylene chloride	01/09/2008	0.7	ug/l	5	1	
MW-21	75-09-2	Methylene chloride	12/30/2008	1.1	ug/l	5	1	
MW-22	75-09-2	Methylene Chloride	06/25/2009	3.8	ug/l	5	1	
MW-3	**75-09-2**	**Methylene chloride**	**10/01/1994**	**24**	**ug/l**	**5**	**1**	**19**
MW-3	**75-09-2**	**Methylene chloride**	**02/15/1995**	**14**	**ug/l**	**5**	**1**	**9**
MW-7	**75-09-2**	**Methylene chloride**	**10/01/1994**	**24**	**ug/l**	**5**	**1**	**19**
MW-7	**75-09-2**	**Methylene chloride**	**01/31/1995**	**29**	**ug/l**	**5**	**1**	**24**
MW-7	**75-09-2**	**Methylene chloride**	**02/15/1995**	**26**	**ug/l**	**5**	**1**	**21**
MW-7	**75-09-2**	**Methylene chloride**	**03/07/1995**	**11**	**ug/l**	**5**	**1**	**6**
MW-7	**75-09-2**	**Methylene chloride**	**12/06/1995**	**20**	**ug/l**	**5**	**1**	**15**
TB	75-09-2	Methylene chloride	12/30/2008	0.78	ug/l	5	1	
MW-12	91-20-3	Naphthalene	12/16/2010	1.5	ug/l	6	10	
MW-14	91-20-3	Naphthalene	06/28/2007	3.5	ug/l	6	10	
MW-3	**91-20-3**	**Naphthalene**	**12/03/1997**	**7**	**ug/l**	**6**	**10**	**1**
MW-3	91-20-3	Naphthalene	04/30/1998	4.6	ug/l	6	10	
MW-3	91-20-3	Naphthalene	12/17/2010	4.4	ug/l	6	10	
MW-5	91-20-3	Naphthalene	03/23/1998	4.6	ug/l	6	10	
MW-13	14797-55-8	Nitrogen, Nitrate	7/12/2010	181	ug/l	10000	10000	
MW-16	14797-55-8	Nitrogen, Nitrate	7/14/2010	108	ug/l	10000	10000	
MW-16	14797-55-8	Nitrogen, Nitrate	12/17/2010	94	ug/l	10000	10000	
MW-18	14797-55-8	Nitrogen, Nitrate	7/8/2010	120	ug/l	10000	10000	
MW-18	14797-55-8	Nitrogen, Nitrate	12/17/2010	93	ug/l	10000	10000	
MW-24	14797-55-8	Nitrogen, Nitrate	7/12/2010	133	ug/l	10000	10000	
MW-25	14797-55-8	Nitrogen, Nitrate	7/12/2010	716	ug/l	10000	10000	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-25	14797-55-8	Nitrogen, Nitrate	12/16/2010	417	ug/l	10000	10000	
MW-27	14797-55-8	Nitrogen, Nitrate	7/13/2010	869	ug/l	10000	10000	
MW-27	14797-55-8	Nitrogen, Nitrate	12/16/2010	490	ug/l	10000	10000	
MW-6	14797-55-8	Nitrogen, Nitrate	7/12/2010	471	ug/l	10000	10000	
MW-6	14797-55-8	Nitrogen, Nitrate	12/16/2010	863	ug/l	10000	10000	
MW-11	14808-79-8	Sulfate	12/17/2010	3600	ug/l	250000	250000	
MW-12	14808-79-8	Sulfate	12/16/2010	3100	ug/l	250000	250000	
MW-12D	14808-79-8	Sulfate	12/16/2010	2100	ug/l	250000	250000	
MW-13	14808-79-8	Sulfate	06/30/2009	20300	ug/l	250000	250000	
MW-13	14808-79-8	Sulfate	7/12/2010	19700	ug/l	250000	250000	
MW-13	14808-79-8	Sulfate	12/16/2010	27000	ug/l	250000	250000	
MW-16	14808-79-8	Sulfate	12/17/2010	5700	ug/l	250000	250000	
MW-18	14808-79-8	Sulfate	06/25/2009	54900	ug/l	250000	250000	
MW-18	14808-79-8	Sulfate	7/8/2010	5550	ug/l	250000	250000	
MW-18	14808-79-8	Sulfate	12/17/2010	5500	ug/l	250000	250000	
MW-24	14808-79-8	Sulfate	7/12/2010	5570	ug/l	250000	250000	
MW-24	14808-79-8	Sulfate	12/16/2010	7100	ug/l	250000	250000	
MW-25	14808-79-8	Sulfate	12/16/2010	3300	ug/l	250000	250000	
MW-26	14808-79-8	Sulfate	12/17/2010	4700	ug/l	250000	250000	
MW-27	14808-79-8	Sulfate	06/30/2009	16200	ug/l	250000	250000	
MW-27	14808-79-8	Sulfate	7/13/2010	13300	ug/l	250000	250000	
MW-27	14808-79-8	Sulfate	12/16/2010	5900	ug/l	250000	250000	
MW-3	14808-79-8	Sulfate	12/17/2010	1900	ug/l	250000	250000	
MW-5	14808-79-8	Sulfate	12/16/2010	5200	ug/l	250000	250000	
MW-6	14808-79-8	Sulfate	12/16/2010	3300	ug/l	250000	250000	
MW-7	14808-79-8	Sulfate	12/16/2010	2600	ug/l	250000	250000	
MW-10	18496-25-8	Sulfide	12/09/2010	60	ug/l	NE	1000	
MW-5	18496-25-8	Sulfide	7/13/2010	102	ug/l	NE	1000	
MW-7	18496-25-8	Sulfide	12/16/2010	20	ug/l	NE	1000	
MW-1	127-18-4	Tetrachloroethene	06/28/2007	0.25	ug/l	0.7	1	
MW-11	**127-18-4**	**Tetrachloroethene**	**12/14/2006**	**1.1**	**ug/l**	**0.7**	**1**	**0.4**
MW-11	127-18-4	Tetrachloroethene	06/27/2007	0.58	ug/l	0.7	1	
MW-11	127-18-4	Tetrachloroethene	06/30/2009	0.49	ug/l	0.7	1	
MW-11	127-18-4	Tetrachloroethene	12/17/2009	0.52	ug/l	0.7	1	
MW-11	127-18-4	Tetrachloroethene	12/17/2010	0.40	ug/l	0.7	1	
MW-12	**127-18-4**	**Tetrachloroethene**	**12/14/2006**	**2**	**ug/l**	**0.7**	**1**	**1.3**
MW-12	**127-18-4**	**Tetrachloroethene**	**06/28/2007**	**1.3**	**ug/l**	**0.7**	**1**	**0.6**
MW-12	**127-18-4**	**Tetrachloroethene**	**12/28/2007**	**1**	**ug/l**	**0.7**	**1**	**0.3**
MW-12	**127-18-4**	**Tetrachloroethene**	**12/17/2008**	**1.1**	**ug/l**	**0.7**	**1**	**0.4**
MW-12	**127-18-4**	**Tetrachloroethene**	**07/01/2009**	**1.1**	**ug/l**	**0.7**	**1**	**0.4**
MW-12	**127-18-4**	**Tetrachloroethene**	**12/17/2009**	**1.2**	**ug/l**	**0.7**	**1**	**0.5**
MW-12	**127-18-4**	**Tetrachloroethene**	**07/13/2010**	**0.82**	**ug/l**	**0.7**	**1**	**0.12**
MW-12	**127-18-4**	**Tetrachloroethene**	**07/13/2010**	**0.82**	**ug/l**	**0.7**	**1**	**0.12**
MW-12	**127-18-4**	**Tetrachloroethene**	**12/16/2010**	**1.1**	**ug/l**	**0.7**	**1**	**0.4**
MW-16	**127-18-4**	**Tetrachloroethene**	**01/08/2008**	**2.5**	**ug/l**	**0.7**	**1**	**1.8**
MW-16	**127-18-4**	**Tetrachloroethene**	**12/30/2008**	**2.6**	**ug/l**	**0.7**	**1**	**1.9**
MW-16	**127-18-4**	**Tetrachloroethene**	**07/01/2009**	**2.1**	**ug/l**	**0.7**	**1**	**1.4**
MW-16	**127-18-4**	**Tetrachloroethene**	**12/17/2009**	**2.9**	**ug/l**	**0.7**	**1**	**2.2**
MW-16	**127-18-4**	**Tetrachloroethene**	**07/14/2010**	**2.8**	**ug/l**	**0.7**	**1**	**2.1**
MW-16	**127-18-4**	**Tetrachloroethene**	**12/17/2010**	**2.4**	**ug/l**	**0.7**	**1**	**1.7**
MW-17	127-18-4	Tetrachloroethene	06/28/2007	0.47	ug/l	0.7	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1B	127-18-4	Tetrachloroethene	06/28/2007	0.25	ug/l	0.7	1	
MW-1B	127-18-4	Tetrachloroethene	12/28/2007	0.42	ug/l	0.7	1	
MW-21	127-18-4	Tetrachloroethene	12/30/2008	0.52	ug/l	0.7	1	
MW-25	127-18-4	Tetrachloroethene	01/08/2008	0.49	ug/l	0.7	1	
MW-25	127-18-4	Tetrachloroethene	12/17/2008	0.6	ug/l	0.7	1	
MW-3	**127-18-4**	**Tetrachloroethene**	**12/03/1997**	**1**	**ug/l**	**0.7**	**1**	**0.3**
MW-3	127-18-4	Tetrachloroethene	06/27/2007	0.25	ug/l	0.7	1	
MW-3	127-18-4	Tetrachloroethene	12/28/2007	0.45	ug/l	0.7	1	
MW-5	**127-18-4**	**Tetrachloroethene**	**12/03/1997**	**1**	**ug/l**	**0.7**	**1**	**0.3**
MW-5	127-18-4	Tetrachloroethene	06/27/2007	0.25	ug/l	0.7	1	
MW-7	**127-18-4**	**Tetrachloroethene**	**12/14/2006**	**1.2**	**ug/l**	**0.7**	**1**	**0.5**
MW-7	127-18-4	Tetrachloroethene	06/27/2007	0.25	ug/l	0.7	1	
MW-1	108-88-3	Toluene	12/15/2006	2	ug/l	600	1	
MW-1	108-88-3	Toluene	06/28/2007	0.15	ug/l	600	1	
MW-11	108-88-3	Toluene	06/27/2007	0.34	ug/l	600	1	
MW-12	108-88-3	Toluene	06/28/2007	0.33	ug/l	600	1	
MW-12D	108-88-3	Toluene	06/28/2007	0.15	ug/l	600	1	
MW-15	108-88-3	Toluene	06/28/2007	0.73	ug/l	600	1	
MW-15	108-88-3	Toluene	06/25/2009	0.26	ug/l	600	1	
MW-17	108-88-3	Toluene	12/15/2006	2	ug/l	600	1	
MW-2	108-88-3	Toluene	06/28/2007	0.15	ug/l	600	1	
MW-3	108-88-3	Toluene	05/06/1996	8	ug/l	600	1	
MW-3	108-88-3	Toluene	06/24/1997	7.6	ug/l	600	1	
MW-3	108-88-3	Toluene	12/03/1997	2	ug/l	600	1	
MW-3	108-88-3	Toluene	06/24/2003	5.1	ug/l	600	1	
MW-3	108-88-3	Toluene	12/14/2006	1.5	ug/l	600	1	
MW-3	108-88-3	Toluene	06/27/2007	3.2	ug/l	600	1	
MW-3	108-88-3	Toluene	12/28/2007	2.1	ug/l	600	1	
MW-3	108-88-3	Toluene	07/01/2009	3	ug/l	600	1	
MW-3	108-88-3	Toluene	12/18/2009	3	ug/l	600	1	
MW-3	108-88-3	Toluene	07/14/2010	2.1	ug/l	600	1	
MW-3	108-88-3	Toluene	07/14/2010	2.1	ug/l	600	1	
MW-3	108-88-3	Toluene	12/17/2010	1.9	ug/l	600	1	
MW-5	108-88-3	Toluene	06/27/2007	0.15	ug/l	600	1	
MW-5	108-88-3	Toluene	07/01/2009	0.75	ug/l	600	1	
MW-5	108-88-3	Toluene	12/17/2009	0.5	ug/l	600	1	
MW-5	108-88-3	Toluene	07/13/2010	0.64	ug/l	600	1	
MW-5	108-88-3	Toluene	07/13/2010	0.64	ug/l	600	1	
MW-5	108-88-3	Toluene	12/16/2010	1.6	ug/l	600	1	
MW-8	108-88-3	Toluene	12/15/2006	6.5	ug/l	600	1	
MW-8	108-88-3	Toluene	06/28/2007	0.15	ug/l	600	1	
MW-1	79-01-6	Trichloroethene	06/28/2007	0.23	ug/l	3	1	
MW-1	79-01-6	Trichloroethene	12/27/2007	0.42	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	12/14/2006	1.2	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	06/27/2007	1.1	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	12/27/2007	0.55	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	06/30/2009	0.87	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	12/17/2009	0.72	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	07/14/2010	0.75	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	07/14/2010	0.75	ug/l	3	1	
MW-11	79-01-6	Trichloroethene	12/17/2010	0.45	ug/l	3	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-12	79-01-6	Trichloroethene	12/14/2006	2.4	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	06/28/2007	2.4	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	12/28/2007	2.2	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	12/17/2008	2.1	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	07/01/2009	1.9	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	12/17/2009	2.3	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	07/13/2010	2	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	07/13/2010	2	ug/l	3	1	
MW-12	79-01-6	Trichloroethene	12/16/2010	2.2	ug/l	3	1	
MW-14	79-01-6	Trichloroethene	06/28/2007	0.86	ug/l	3	1	
MW-14	79-01-6	Trichloroethene	12/28/2007	0.62	ug/l	3	1	
MW-14	79-01-6	Trichloroethene	07/08/2010	0.78	ug/l	3	1	
MW-14	79-01-6	Trichloroethene	07/08/2010	0.78	ug/l	3	1	
MW-14	79-01-6	Trichloroethene	12/09/2010	0.68	ug/l	3	1	
MW-15	79-01-6	Trichloroethene	06/28/2007	0.58	ug/l	3	1	
MW-15	79-01-6	Trichloroethene	06/25/2009	1	ug/l	3	1	
MW-15	79-01-6	Trichloroethene	12/15/2009	0.5	ug/l	3	1	
MW-15	79-01-6	Trichloroethene	07/08/2010	0.95	ug/l	3	1	
MW-15	79-01-6	Trichloroethene	07/08/2010	0.95	ug/l	3	1	
MW-16	**79-01-6**	**Trichloroethene**	**01/08/2008**	**3.7**	**ug/l**	**3**	**1**	**0.7**
MW-16	**79-01-6**	**Trichloroethene**	**12/30/2008**	**3.3**	**ug/l**	**3**	**1**	**0.3**
MW-16	79-01-6	Trichloroethene	07/01/2009	2.5	ug/l	3	1	
MW-16	**79-01-6**	**Trichloroethene**	**12/17/2009**	**3.5**	**ug/l**	**3**	**1**	**0.5**
MW-16	**79-01-6**	**Trichloroethene**	**07/14/2010**	**3.5**	**ug/l**	**3**	**1**	**0.5**
MW-16	**79-01-6**	**Trichloroethene**	**07/14/2010**	**3.5**	**ug/l**	**3**	**1**	**0.5**
MW-16	79-01-6	Trichloroethene	12/17/2010	3.0	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	06/28/2007	0.72	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	12/27/2007	0.49	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	12/30/2008	0.53	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	06/25/2009	0.56	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	07/07/2010	0.55	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	07/07/2010	0.55	ug/l	3	1	
MW-17	79-01-6	Trichloroethene	12/09/2010	0.53	ug/l	3	1	
MW-1B	79-01-6	Trichloroethene	06/28/2007	0.23	ug/l	3	1	
MW-1B	79-01-6	Trichloroethene	12/30/2008	0.43	ug/l	3	1	
MW-1B	79-01-6	Trichloroethene	12/15/2009	0.53	ug/l	3	1	
MW-2	**79-01-6**	**Trichloroethene**	**10/01/1994**	**5**	**ug/l**	**3**	**1**	**2**
MW-2	**79-01-6**	**Trichloroethene**	**01/31/1995**	**6**	**ug/l**	**3**	**1**	**3**
MW-2	**79-01-6**	**Trichloroethene**	**02/15/1995**	**6**	**ug/l**	**3**	**1**	**3**
MW-2	**79-01-6**	**Trichloroethene**	**03/07/1995**	**6**	**ug/l**	**3**	**1**	**3**
MW-2	**79-01-6**	**Trichloroethene**	**12/06/1995**	**6**	**ug/l**	**3**	**1**	**3**
MW-2	79-01-6	Trichloroethene	12/15/2006	1.9	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	06/28/2007	1.4	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	12/28/2007	0.47	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	06/24/2009	2	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	12/16/2009	1.4	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	07/08/2010	1.8	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	07/08/2010	1.8	ug/l	3	1	
MW-2	79-01-6	Trichloroethene	12/09/2010	1.4	ug/l	3	1	
MW-21	79-01-6	Trichloroethene	12/30/2008	0.85	ug/l	3	1	
MW-21	79-01-6	Trichloroethene	12/08/2010	0.42	ug/l	3	1	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-23	79-01-6	Trichloroethene	12/30/2008	0.42	ug/l	3	1	
MW-25	79-01-6	Trichloroethene	12/17/2008	0.52	ug/l	3	1	
MW-3	**79-01-6**	**Trichloroethene**	**02/15/1995**	**5**	**ug/l**	**3**	**1**	**2**
MW-3	**79-01-6**	**Trichloroethene**	**12/03/1997**	**4**	**ug/l**	**3**	**1**	**1**
MW-3	79-01-6	Trichloroethene	12/14/2006	1	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	06/27/2007	1.1	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	12/28/2007	2	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	07/01/2009	2.2	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	12/18/2009	1.6	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	07/14/2010	1	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	07/14/2010	1	ug/l	3	1	
MW-3	79-01-6	Trichloroethene	12/17/2010	1.2	ug/l	3	1	
MW-4	79-01-6	Trichloroethene	12/03/1997	3	ug/l	3	1	
MW-4R	79-01-6	Trichloroethene	06/27/2007	0.23	ug/l	3	1	
MW-5	**79-01-6**	**Trichloroethene**	**12/03/1997**	**4**	**ug/l**	**3**	**1**	**1**
MW-5	79-01-6	Trichloroethene	06/27/2007	0.23	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	12/19/2007	0.55	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	07/01/2009	0.54	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	12/17/2009	0.65	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	07/13/2010	0.67	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	07/13/2010	0.67	ug/l	3	1	
MW-5	79-01-6	Trichloroethene	12/16/2010	0.71	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	12/14/2006	1.2	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	06/27/2007	0.23	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	12/27/2007	0.84	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	07/01/2009	0.48	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	12/18/2009	0.9	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	07/13/2010	0.54	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	07/13/2010	0.54	ug/l	3	1	
MW-7	79-01-6	Trichloroethene	12/16/2010	0.82	ug/l	3	1	
MW-8	79-01-6	Trichloroethene	12/03/1997	1	ug/l	3	1	
MW-1	**75-01-4**	**Vinyl chloride**	**07/08/2010**	**0.66**	**ug/l**	**0.03**	**1**	**0.63**
MW-1	**75-01-4**	**Vinyl chloride**	**07/08/2010**	**0.66**	**ug/l**	**0.03**	**1**	**0.63**
MW-11	**75-01-4**	**Vinyl chloride**	**06/30/2009**	**0.94**	**ug/l**	**0.03**	**1**	**0.91**
MW-11	**75-01-4**	**Vinyl chloride**	**12/17/2009**	**0.85**	**ug/l**	**0.03**	**1**	**0.82**
MW-11	**75-01-4**	**Vinyl chloride**	**07/14/2010**	**0.91**	**ug/l**	**0.03**	**1**	**0.88**
MW-11	**75-01-4**	**Vinyl chloride**	**07/14/2010**	**0.91**	**ug/l**	**0.03**	**1**	**0.88**
MW-11	**75-01-4**	**Vinyl chloride**	**12/17/2010**	**0.48**	**ug/l**	**0.03**	**1**	**0.45**
MW-2	**75-01-4**	**Vinyl chloride**	**12/16/2009**	**0.77**	**ug/l**	**0.03**	**1**	**0.74**
MW-2	**75-01-4**	**Vinyl chloride**	**07/08/2010**	**1.4**	**ug/l**	**0.03**	**1**	**1.37**
MW-2	**75-01-4**	**Vinyl chloride**	**07/08/2010**	**1.4**	**ug/l**	**0.03**	**1**	**1.37**
MW-2	**75-01-4**	**Vinyl chloride**	**12/09/2010**	**1.1**	**ug/l**	**0.03**	**1**	**1.07**
MW-3	**75-01-4**	**Vinyl chloride**	**07/01/2009**	**1.3**	**ug/l**	**0.03**	**1**	**1.27**
MW-3	**75-01-4**	**Vinyl chloride**	**12/18/2009**	**0.83**	**ug/l**	**0.03**	**1**	**0.8**
MW-3	**75-01-4**	**Vinyl chloride**	**07/14/2010**	**1.1**	**ug/l**	**0.03**	**1**	**1.07**
MW-3	**75-01-4**	**Vinyl chloride**	**07/14/2010**	**1.1**	**ug/l**	**0.03**	**1**	**1.07**
MW-3	**75-01-4**	**Vinyl chloride**	**12/17/2010**	**0.64**	**ug/l**	**0.03**	**1**	**0.61**
MW-9	**75-01-4**	**Vinyl chloride**	**12/09/2010**	**0.53**	**ug/l**	**0.03**	**1**	**0.5**
SW-3	**75-01-4**	**Vinyl chloride**	**06/24/2009**	**1.4**	**ug/l**	**0.03**	**1**	**1.37**
MW-1	1330-20-7	Xylene	12/11/2003	5.1	ug/l	500	5	
MW-1	1330-20-7	Xylene	06/28/2007	1.1	ug/l	500	5	

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Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-1	1330-20-7	Xylene	12/30/2008	0.41	ug/l	500	5	
MW-1	1330-20-7	Xylene	06/25/2009	0.95	ug/l	500	5	
MW-1	1330-20-7	Xylene	12/16/2009	0.78	ug/l	500	5	
MW-11	1330-20-7	Xylene	12/11/2003	5.1	ug/l	500	5	
MW-11	1330-20-7	Xylene	06/27/2007	0.43	ug/l	500	5	
MW-12	1330-20-7	Xylene	12/11/2003	5.2	ug/l	500	5	
MW-14	1330-20-7	Xylene	12/11/2003	5.1	ug/l	500	5	
MW-16	1330-20-7	Xylene	01/08/2008	2.2	ug/l	500	5	
MW-16	1330-20-7	Xylene	12/30/2008	1.9	ug/l	500	5	
MW-16	1330-20-7	Xylene	07/01/2009	2.1	ug/l	500	5	
MW-16	1330-20-7	Xylene	12/17/2009	2	ug/l	500	5	
MW-16	1330-20-7	Xylene	07/14/2010	1.4	ug/l	500	5	
MW-16	1330-20-7	Xylene	07/14/2010	1.4	ug/l	500	5	
MW-16	1330-20-7	Xylene	12/17/2010	1.4	ug/l	500	5	
MW-1A	1330-20-7	Xylene	12/03/1997	3	ug/l	500	5	
MW-1A	1330-20-7	Xylene	11/18/1998	7.4	ug/l	500	5	
MW-1A	1330-20-7	Xylene	12/11/2003	5.6	ug/l	500	5	
MW-1A	1330-20-7	Xylene	06/16/2004	5.9	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/11/2003	5.5	ug/l	500	5	
MW-1B	1330-20-7	Xylene	06/16/2004	5.2	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/30/2004	5	ug/l	500	5	
MW-1B	1330-20-7	Xylene	07/06/2006	7.3	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/15/2006	5.5	ug/l	500	5	
MW-1B	1330-20-7	Xylene	06/28/2007	3.1	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/28/2007	8.8	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/30/2008	2.2	ug/l	500	5	
MW-1B	1330-20-7	Xylene	06/24/2009	3.4	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/15/2009	3.9	ug/l	500	5	
MW-1B	1330-20-7	Xylene	07/07/2010	3.1	ug/l	500	5	
MW-1B	1330-20-7	Xylene	07/07/2010	3.1	ug/l	500	5	
MW-1B	1330-20-7	Xylene	12/09/2010	4.5	ug/l	500	5	
MW-27	1330-20-7	Xylene	01/09/2008	0.97	ug/l	500	5	
MW-3	1330-20-7	Xylene	10/01/1994	34	ug/l	500	5	
MW-3	1330-20-7	Xylene	01/31/1995	20	ug/l	500	5	
MW-3	1330-20-7	Xylene	02/15/1995	24	ug/l	500	5	
MW-3	1330-20-7	Xylene	03/07/1995	22	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/07/1995	19	ug/l	500	5	
MW-3	1330-20-7	Xylene	05/06/1996	34	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/24/1997	23	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/03/1997	11	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/04/1998	23	ug/l	500	5	
MW-3	1330-20-7	Xylene	11/18/1998	12.8	ug/l	500	5	
MW-3	1330-20-7	Xylene	05/13/1999	11	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/24/2003	17	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/11/2003	10	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/15/2004	9.3	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/29/2004	13	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/22/2005	16	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/14/2006	8.8	ug/l	500	5	
MW-3	1330-20-7	Xylene	06/27/2007	12	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/28/2007	15	ug/l	500	5	

Table 5: Historical Organic Groundwater Results

Well ID	CAS	Parameter Name [1]	Sample Date	Result	Unit	NCGW2L [3]	SWSL	Exceedance
MW-3	1330-20-7	Xylene	07/01/2009	19.7	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/18/2009	12.5	ug/l	500	5	
MW-3	1330-20-7	Xylene	07/14/2010	8.2	ug/l	500	5	
MW-3	1330-20-7	Xylene	07/14/2010	8.2	ug/l	500	5	
MW-3	1330-20-7	Xylene	12/17/2010	12	ug/l	500	5	
MW-6	1330-20-7	Xylene	12/11/2003	5.2	ug/l	500	5	
MW-8	1330-20-7	Xylene	12/12/2003	5	ug/l	500	5	

NOTE:
[1] Table only contains detected constituents.
[2] PQL = Practical Quantitation Limit
[3] NCGW2L = North Carolina Ground Water 2L Standard

Table 6: MNA Parameter Summary

Parameters	Date	VFA – Acetic Acid (mg/l)	VFA – Butyric Acid (mg/l)	VFA – Lactic Acid (mg/l)	VFA – Propionic Acid (mg/l)	VFA – Pyruvic Acid (mg/l)	Hydrogen (nM)	Methane (ug/l)	Ethene (ug/l)	Ethane (ug/l)
MW-3	07/01/09	<1	<1	<25	<1	<10	11	10000	<5	<5
	12/18/09	0.072	<1	0.15	0.037	0.083	2.3	8400	0.49	0.048
	07/14/10	0.160	0.068	0.048	0.051	<0.150	3.9	5600	0.240	0.046
	12/17/10	0.110	<0.05	0.190	<0.050	<0.150	4.3	6600	1.1	0.64
MW-5	07/01/09	<1	<1	<25	<1	<10	1.4	4100	<5	<5
	12/17/09	0.086	<0.07	0.16	<0.7	<0.7	1.7	3800	<0.010	<0.010
	07/13/10	0.070	0.055	0.25	0.033	<0.010	<0.150	3100	<0.010	0.008
	12/16/10	<0.070	<0.050	0.22	<0.050	<0.150	1	7500	<0.010	<0.010
MW-6	06/30/09	<1	<1	14000	<1	<10	5.7	60.9	<5	<5
	12/16/09	0.025	<0.07		<0.07	<0.07	0.82	24	0.021	0.002
	07/12/10	0.018	<0.050	<0.100	0.038	<0.150	2.4	21	0.020	0.002
	12/16/10	0.076	<0.050	0.160	0.077	<0.150	0.760	23	0.300	0.016
MW-7	07/01/09	<1	<1	<25	<1	<10	1.9	7900	<5	<5
	12/18/09	0.079	<0.07	0.22	0.038	<0.07	1.3	7600	0.12	0.018
	07/13/10	0.054	0.081	<0.100	<0.050	<0.150	2.9	5100	0.27	0.022
	12/16/10	0.170	<0.050	0.550	<0.050	<0.150	0.710	4700	0.071	0.019
MW-11	06/30/09	<1	<1	<25	<1	<10	2	4260	<5	<5
	12/17/09	0.02	<0.07	0.099	<0.07	<0.07	1.5	4600	0.018	<0.010
	07/14/10	0.029	0.1	<0.100	<0.050	<0.150	4.9	4100	0.042	0.015
	12/17/10	0.080	<0.050	0.280	0.075	<0.150	1.4	3300	0.042	0.014
MW-12	07/01/09	<1	<1	<25	<1	<10	1.1	406	<5	<5
	12/17/09	0.028	0.05	0.13	<0.07	0.052	1.4	8600	<0.010	<0.010
	07/13/10	0.008	0.065	<0.100	<0.050	<0.150	3	5400	0.01	<0.010
	12/16/10	0.087	0.120	0.160	0.076	<0.150	1.3	2900	<0.010	<0.010
MW-12D	07/01/09	<1	<1	<25	<1	<10	1.9	2820	<5	<5
	12/17/09	0.03	<0.07	0.13	<0.07	0.079	2.9	1000	0.11	0.012
	07/13/10	1.4	0.130	0.41	0.13	<0.150	3.7	480	0.078	0.008
	12/16/10	0.100	<0.050	<0.100	<0.050	<0.150	<0.6	0.370	0.038	<0.010
MW-13	06/30/09	0.600	<1	<25	<1	<10	2	52.5	<5	<5
	12/16/09	<0.070	<0.07	0.26	<0.070	<0.07	0.83	14	0.021	0.002
	07/12/10	0.021	<0.050	0.11	<0.050	<0.150	2.6	22	0.022	0.002
	12/16/10	0.076	0.120	0.170	0.072	<0.150	0.880	22	0.300	0.160

Table 6: MNA Parameter Summary

Parameters	Date	VFA – Acetic Acid (mg/l)	VFA – Butyric Acid (mg/l)	VFA – Lactic Acid (mg/l)	VFA – Propionic Acid (mg/l)	VFA – Pyruvic Acid (mg/l)	Hydrogen (nM)	Methane (ug/l)	Ethene (ug/l)	Ethane (ug/l)
MW-16	07/01/09	<1	<1	<25	<1	<10	3.9	7490	<5	<5
	12/17/09	0.022	<0.07	0.13	<0.07	<0.07	2.7	5100	<0.010	<0.010
	07/14/10	0.031	0.08	<0.100	<0.050	<0.150	2.5	5100	<0.010	0.01
	12/17/10	0.084	0.110	0.140	0.079	<0.150	2.5	7400	<0.010	0.012
MW-18	07/01/09	<1	<1	<25	<1	<10	12 (2)	<5	<5	<5
	12/16/09	<0.070	<0.07	0.089	<0.07	<0.07	1.1	0.05	0.007	<0.010
	07/08/10	0.053	<0.05	0.400	0.089	<0.150	2.9	0.044	0.009	0.002
	12/17/10	<0.070	0.120	0.130	0.073	<0.150	1.1	<0.015	0.012	<0.010
MW-24	06/30/09	<1	<1	<25	<1	<10	1.8	<5	<5	<5
	12/16/09	0.023	<0.07	0.16	<0.07	<0.07	0.66	1.3	0.003	<0.010
	07/12/10	0.021	0.067	<0.100	0.03	<0.150	2.6	260	0.006	0.014
	12/16/10	0.089	0.110	0.150	0.079	<0.150	0.65	160	<0.010	<0.010
MW-25	06/30/09	<1	<1	<25	<1	<10	1.4	6.8	<5	<5
	12/16/09	0.021	<0.07	0.077	<0.07	<0.07	0.63	1.2	<0.010	<0.010
	07/12/10	<0.070	<0.050	<0.100	<0.050	<0.150	5.6	340	0.005	0.016
	12/16/10	<0.070	<0.050	0.140	0.230	<0.150	<0.600	130	<0.010	<0.010
MW-26	06/30/09	<1	<1	<25	<1	<10	1.6	240	<5	<5
	12/17/09	0.034	<0.07	0.22	<0.07	<0.07	1.6	2100	0.071	0.022
	07/14/10	0.032	0.077	<0.100	0.029	<0.150	4.4	480	0.460	0.100
	12/17/10	<0.070	0.100	0.190	0.074	<0.150	3.1	700	0.070	0.022
MW-27	06/30/09	<1	<1	<25	<1	<10	1.6	<5	<5	<5
	12/17/09	0.058	<0.07	0.11	<0.07	<0.07	1.4	1.1	0.16	0.019
	07/13/10	0.080	<0.050	0.093	<0.050	<0.150	6.1	2.7	0.21	0.086
	12/16/10	0.110	0.110	<0.100	0.230	<0.150	<0.600	0.390	0.046	<0.010

Notes:
VFA = Volatile Fatty Acids
Constituents Below Quantitation Limit are shown as < MDL value
>100 = CO_2 Concentration Exceeds Maximum capability of Method Used
NS = Not Sampled
*Alkalinity analysis for MW-7 and MW-12D uses a dilution factor of 2 (MDL = 16,000)
(1) Sulfide samples collected on 9/11/2009
(2) Hydrogen collected 9/14/2009

Table 6: MNA Parameter Summary

Parameters	Date	CO2-Dissolved (mg/l)	Alkalinity (ug/l)	Sulfate (ug/l)	Sulfide (ug/l)	Chloride (ug/l)	TOC (ug/l)	COD (ug/l)	BOD (ug/l)	Iron (ug/l)
MW-3	07/01/09	>100	131000	10000 (1)	10000	17600	18300	29300	6900	14100
	12/18/09	>100	262000	<5000	1000	18500	14900	25000	4000	42500
	07/14/10	>100	130000	<5000	<100	16700	47400	35000	12400	14400
	12/17/10	>100	130000	1900	<100	14000	5100	2000	<2000	17400
MW-5	07/01/09	>100	16600	<10000 (1)	<100	<5000	47500	36200	<2000	40800
	12/17/09	>100	133000	<5000	1000	5000	4990	25000	7600	35400
	07/13/10	>100	137000	<5000	102	<5000	6080	50000	9700	41500
	12/16/10	>100	150000	5200	<100	3400	770	3100	1110	43500
MW-6	06/30/09	>100	<5000	<10000	<100	7300	11900	30100	7200	703
	12/16/09	>100	16100	<5000	1000	15400	5170	25000	2000	168
	07/12/10	>100	6580	<5000	<100	6790	15900	<25000	<2000	32.6
	12/16/10	>100	9100	3300	<00	6200	6100	31000	<2000	309
MW-7	07/01/09	>100	214000	<10000 (1)	<100	16600	9000	<25000	3700	36300
	12/18/09	>100	255000	<5000	1000	15000	10600	25000	2900	26000
	07/13/10	>100	267000	<5000	<100	18200	7740	<25000	11200	29000
	12/16/10	>100	290000*	2600	20	14000	2100	18000	14100	36100
MW-11	06/30/09	>100	207000	<10000	<100	12300	21000	31600	<2000	36900
	12/17/09	>100	197000	<5000	1000	13900	6710	25000	4700	33700
	07/14/10	>100	223000	<5000	<100	19000	13200	26000	2020	32900
	12/17/10	>100	190000	3600	<100	19000	3500	33000	7140	39900
MW-12	07/01/09	>100	50900	<10000 (1)	<100	6400	13900	34800	<2000	810
	12/17/09	>100	62500	<5000	1000	6070	27600	25000	<2000	1680
	07/13/10	>100	56700	<5000	<100	5730	13500	<25000	15700	5930
	12/16/10	>100	57000	3100	<100	6600	2300	12000	15100	4680
MW-12D	07/01/09	90	350000	<10000 (1)	<100	429000	10400	<25000	11600	3140
	12/17/09	90	331000	<5000	1000	46900	3250	25000	<2000	860
	07/13/10	90	386000	<5000	<100	49500*	10500	<25000	4430	3040
	12/16/10	80	350000*	2100	<100	50000	4300	25000	<2000	2500
MW-13	06/30/09	>100	34400	20300	<100	<5000	1900	37700	12700	3470
	12/16/09	>100	35100	23300	1000	5000	21800	25000	2000	1600
	07/12/10	>100	53800	19700	<100	<5000	1850	<25000	<2000	1960
	12/16/10	>100	42000	27000	<100	3600	1800	20000	<2000	2020

Table 6: MNA Parameter Summary

Parameters	Date	CO2-Dissolved (mg/l)	Alkalinity (ug/l)	Sulfate (ug/l)	Sulfide (ug/l)	Chloride (ug/l)	TOC (ug/l)	COD (ug/l)	BOD (ug/l)	Iron (ug/l)
MW-16	07/01/09	>100	23.8	<10000 (1)	<100	<5000	9600	<25000	8800	889
	12/17/09	>100	5000	26500	1000	26500	3670	25000	<2000	6930
	07/14/10	>100	39800	<5000	<100	<5000	7780	<25000	<2000	331
	12/17/10	>100	41000	5700	<100	3600	720	5300	<2000	7040
MW-18	07/01/09	40	<5000	54900	<100	<5000	1600	<25000	6900	5460
	12/16/09	40	5000	8320	1000	5000	5500	25000	2000	1090
	07/08/10	40	<5000	5550	<100	<5000	8350	<25000	<2000	32100
	12/17/10	30	<8000	5500	<100	2800	<0.12	3100	5700	22600
MW-24	06/30/09	>100	311000	<10000	<100	23300	9800	<25000	<2000	576
	12/16/09	95	42200	5340	1000	22400	4120	25000	2000	108
	07/12/10	90	50400	5570	<100	21600	15500	<25000	<2000	2600
	12/16/10	90	54000	7100	<100	20000	4500	25000	<2000	3390
MW-25	06/30/09	95	18900	<10000	<00	<5000	4700	<25000	6500	777
	12/16/09	90	11000	<5000	1000	5000	3340	25000	2000	233
	07/12/10	90	15400	<5000	<100	<5000	25200	<25000	<2000	167
	12/16/10	90	47000	3300	<100	3500	690	3100	<2000	260
MW-26	06/30/09	>100	144000	<10000	<100	6900	12400	76000	<2000	11500
	12/17/09	>100	134000	<5000	1000	6800	12500	25000	<2000	23800
	07/14/10	>100	190000	<5000	<100	<12500	13400	57000	<2000	25200
	12/17/10	>100	150000	4700	<100	9200	2000	18000	<2000	23400
MW-27	06/30/09	70	144000	16200	<100	13800	6900	<25000	5900	3720
	12/17/09	80	242000	31600	1000	10400	3230	25000	5800	4160
	07/13/10	80	102000	13300	<100	<12800	14400	<25000	3000	25.8
	12/16/10	80	40000	5900	<100	12000	1800	5300	<2000	730

Table 6: MNA Parameter Summary

Parameters	Date	Nitrate (ug/l)	Temperature (Degrees C)	ORP (mV)	DO (mg/l)	pH (Std Units)	Specific Conductance (us/cm)	Turbidity (NTU)
MW-3	07/01/09	211	18.3	-2	0.3	5.9	570	5.81
	12/18/09	<100	13.9	-17	0.2	5.86	610	6.31
	07/14/10	<100	16.5	-15	0.2	5.91	310	9.86
	12/17/10	<25	15.3	-21	0.1	5.86	310	10.3
MW-5	07/01/09	110	17.3	-68	0.1	6.42	430	7.83
	12/17/09	<100	13.7	-51	0.1	6.89	400	9.81
	07/13/10	<100	16.3	-72	0.1	6.88	352	17.2
	12/16/10	<25	15.5	-55	0.3	6.74	452	13.7
MW-6	06/30/09	1060	19.7	205	3.4	5.25	80	13.1
	12/16/09	687	15.1	205	0.6	6.76	70	16.1
	07/12/10	471	17.4	193	0.7	6.79	403	23.7
	12/16/10	<25	10.3	181	0.7	6.83	411	28.9
MW-7	07/01/09	127	20	-80	0.3	6.55	590	6.91
	12/18/09	<100	16.6	-78	0.3	6.51	610	8.32
	07/13/10	<100	16.6	-103	0.3	7.19	583	11.4
	12/16/10	<25	9.8	-83	0.2	7.03	501	12.8
MW-11	06/30/09	2060	19.6	12	0.3	5.85	380	5.83
	12/17/09	<100	15.3	2	0.9	5.94	410	8.31
	07/14/10	<100	17.9	-3	0.9	6.7	290	8.31
	12/17/10	<25	16.1	10	0.5	5.97	434	9.91
MW-12	07/01/09	<100	16.4	74	0.2	5.43	170	6.61
	12/17/09	15.3	11.8	2	0.9	5.94	410	8.31
	07/13/10	<100	17.3	55	0.2	6.13	177	9.32
	12/16/10	<25	9.67	93	0.9	5.68	153	13.2
MW-12D	07/01/09	100	17.2	-126	0.1	7.31	790	6.62
	12/17/09	<100	15.1	-123	0.1	7.21	800	9.1
	07/13/10	<100	19.7	-107	0.2	7.11	791	11.3
	12/16/10	<25	11.9	-81	0.1	7.03	803	12.8
MW-13	06/30/09	115	18.4	-26	0.7	6.21	330	6.81
	12/16/09	10000	13.9	-31	0.8	6.81	360	8.89
	07/12/10	181	19.1	84	0.8	6.31	177	10.7
	12/16/10	<25	9.5	68	0.9	6.54	271	14.2

Table 6: MNA Parameter Summary

Parameters	Date	Nitrate (ug/l)	Temperature (Degrees C)	ORP (mV)	DO (mg/l)	pH (Std Units)	Specific Conductance (us/cm)	Turbidity (NTU)
MW-16	07/01/09	196.5	15.9	544	0.1	5.22	90	6.63
	12/17/09	<100	13	490	0.1	13	100	9.61
	07/14/10	108	15.8	536	0.1	5.93	91	9.35
	12/17/10	94	14.85	508	0.3	5.66	101	9.91
MW-18	07/01/09	<100	16.9	-99	3.9	6.13	90	8.32
	12/16/09	10000	11.9	-79	3.8	6.83	90	14.3
	07/08/10	120	18.5	-86	3.7	6.89	38	146
	12/17/10	93	12.1	-81	3.6	6.9	40	139
MW-24	06/30/09	171	19.1	514	4.1	5.36	170	9.1
	12/16/09	10000	15.2	486	3.9	5.76	170	9.1
	07/12/10	133	17.5	397	3.1	6.03	206	10.7
	12/16/10	<25	11.9	477	0.4	5.68	188	16.4
MW-25	06/30/09	548	14.6	215	0.9	5.6	210	7.31
	12/16/09	1310	10	169	1	6.28	190	8.93
	07/12/10	716	16.9	138	1.1	6.29	163	10.2
	12/16/10	<25	10.7	146	0.5	6.31	170	11.9
MW-26	06/30/09	<100	21	13	1.2	6.41	86	10.1
	12/17/09	<100	16.4	-32	0.9	6.06	440	11.3
	07/14/10	<100	16.6	21	1	6.49	336	13.3
	12/17/10	<25	15.1	25.8	0.4	6.08	307	16.2
MW-27	06/30/09	0.69	16.5	69	4.4	6.38	600	5.81
	12/17/09	<100	11.7	171	0.8	6.46	610	300
	07/13/10	869	16	62	0.7	6.81	586	11.3
	12/16/10	<25	8.6	305	2.8	6.18	221	14.8

Table 7: Reductive Dechlorination Assessment

Well	Tetrachloroethene (Perchloroethene – PCE)				Trichloroethene (TCE)				1,1-Dichloroethene (1,1-DCE)			
	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10
MW-3	BQL	BQL	BQL	BQL	2.20	1.60	1.00	1.20	BQL	BQL	BQL	1.60
MW-11	0.49	0.52	BQL	0.40	0.87	0.72	0.75	0.45	BQL	BQL	BQL	1.10
MW-26	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.65
MW-27	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.78
MW-5	BQL	BQL	BQL	BQL	0.54	0.65	0.67	0.71	BQL	BQL	BQL	4.00
MW-16	2.10	2.90	2.80	2.40	2.50	3.50	3.50	3.00	BQL	BQL	BQL	11.00
MW-6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-13	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-7	BQL	BQL	BQL	BQL	0.48	0.90	0.54	0.82	BQL	BQL	BQL	2.60
MW-12	1.10	1.20	BQL	1.10	1.90	2.30	2.00	2.20	BQL	BQL	BQL	2.20
MW-12D	BQL	BQL	0.82	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.40
MW-24	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-25	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.67
MW-18	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Notes:

1. The selected chlorinated solvents consist of the target parent compound and several target daughter compounds.
2. Analytes were analyzed per EPA Test Method 8260. Detections are presented in micrograms per liter (µg/L).
3. BQL = Below Quantitation Limit
4. Red Text identifies an increase in concentration when compared to the prior event.
5. Green Text identifies a decrease in concentratios when compared to the prior event.

Table 7: Reductive Dechlorination Assessment

Well	cis-1,2-Dichlorethene (cis-1,2-DCE)				Vinyl Chloride (VC)				Ethene				Ethane			
	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10
MW-3	11.60	8.80	9.30	8.30	1.30	0.83	1.10	0.64	BQL	0.49	0.240	1.10	BQL	0.048	0.046	0.64
MW-11	32.50	32.30	24.60	29.00	0.94	0.85	0.91	0.48	BQL	0.018	0.042	0.042	BQL	BQL	0.015	0.014
MW-26	28.30	18.60	29.80	23.00	BQL	BQL	BQL	BQL	BQL	0.071	0.460	0.070	BQL	0.022	0.100	0.022
MW-27	19.00	20.20	24.60	28.00	BQL	BQL	BQL	BQL	BQL	0.16	0.210	0.046	BQL	0.019	0.086	BQL
MW-5	11.50	11.30	10.50	9.00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.008	BQL
MW-16	17.20	16.30	18.00	17.00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.010	0.012
MW-6	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.021	0.020	0.30	BQL	0.002	0.002	0.016
MW-13	0.45	0.41	BQL	0.44	BQL	BQL	BQL	BQL	BQL	0.021	0.022	0.30	BQL	0.002	0.002	0.016
MW-7	5.20	5.70	5.00	7.00	BQL	BQL	BQL	BQL	BQL	0.12	0.270	0.071	BQL	0.018	0.022	0.019
MW-12	12.50	13.60	11.90	13.00	BQL	BQL	BQL	BQL	BQL	BQL	0.010	BQL	BQL	BQL	BQL	BQL
MW-12D	0.77	0.68	0.36	0.62	BQL	BQL	BQL	BQL	BQL	0.11	0.078	0.038	BQL	0.012	0.008	BQL
MW-24	2.10	4.10	3.20	4.50	BQL	BQL	BQL	BQL	BQL	0.003	0.006	BQL	BQL	BQL	0.014	BQL
MW-25	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.005	BQL	BQL	BQL	0.016	BQL
MW-18	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	0.007	0.009	0.012	BQL	BQL	0.002	BQL

Table 8: Natural Attenuation Properties

	Oxygen (DO) (mg/l)				Nitrate (NO3)				Ferrious Iron (Fe2+)			
	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10
MW-3	0.3	0.2	0.2	0.1	211	BQL	BQL	BQL	NS	42500	14400	17400
MW-11	0.3	0.9	0.9	0.5	2060	BQL	BQL	BQL	36900	33700	32900	39900
MW-26	1.2	0.9	1.0	0.4	BQL	BQL	BQL	BQL	11500	23800	25200	23400
MW-27	4.4	0.8	0.7	2.8	0.69	BQL	869	BQL	3720	4160	25.8	730
MW-5	0.1	0.1	0.1	0.3	110	BQL	BQL	BQL	NS	35400	41500	43500
MW-16	0.1	0.1	0.1	0.3	196.5	BQL	108	94	NS	6930	331	7040
MW-6	3.4	0.6	0.7	0.7	1060	NS	471	BQL	703	168	32.6	309
MW-13	0.7	0.8	0.8	0.9	115	NS	181	BQL	3470	1600	1960	2020
MW-7	0.3	0.3	0.3	0.2	127	BQL	BQL	BQL	NS	26000	29000	36100
MW-12	0.2	0.9	0.2	0.9	BQL	15	BQL	BQL	NS	1680	5930	4680
MW-12D	0.1	0.1	0.2	0.1	100	BQL	BQL	BQL	NS	860	3040	2500
MW-24	4.1	3.9	3.1	0.4	171	NS	133	BQL	576	108	2600	3390
MW-25	0.9	1.0	1.1	0.5	548	NS	716	BQL	777.0	233	167	260
MW-18	3.9	3.8	3.7	3.6	BQL	NS	120	93	5460	1090	32100	22600

Note:
1. The selected parameters consist of target properties to help identify the attenuation environment.
2. Analytes were analyzed in accordance with the appropriate method, listed on Table 6.
3. DO detections are presented in milligrams per liter (mg/L); all others are presented in micrograms per liter (ug/L).
4. BQL = Below Quantitation Limit.
5. NS = Not Sampled.
6. Red Text identifies an increase in concentration when compared to the prior event.
7. Green Text identifies a decrease in concentratios when compared to the prior event.

Table 8: Natural Attenuation Properties

	Sulfate (SO4)				Methane			
	Jun-09	Dec-09	Jul-10	Dec-10	Jun-09	Dec-09	Jul-10	Dec-10
MW-3	BQL	BQL	BQL	1900	10000	8400	5600	6600
MW-11	BQL	BQL	BQL	3600	4260	4600	4100	3300
MW-26	BQL	BQL	BQL	4700	240	2100	480	700
MW-27	16200	31600	13300	5900	BQL	1.1	2.7	0.390
MW-5	BQL	BQL	BQL	5200	4100	3800	3100	7500
MW-16	BQL	BQL	BQL	5700	7490	5100	5100	7400
MW-6	BQL	BQL	BQL	3300	60.9	24	21	23
MW-13	20300	23300	19700	27000	52.5	14	22	22
MW-7	BQL	BQL	BQL	2600	7900.0	7600	5100	4700
MW-12	BQL	BQL	BQL	3100	406.0	8600	5400	2900
MW-12D	BQL	BQL	BQL	2100	2820	1000	480	0.370
MW-24	BQL	5340	5570	7100	BQL	1.3	260	160
MW-25	BQL	BQL	BQL	3300	6.8	1.2	340	130
MW-18	54900	8320	5550	5900	BQL	0.1	0.044	BQL

Table 9: Tree Evaluation Summary

Tree Number	Height (in)	Middle Width (in)	Trunk Circumference (in)	Height (in)	Middle Width (in)	Trunk Circumference (in)
	07/14/2010			12/17/2010		
1	31	16	1.75	31	15	1.75
2	13	11	1.5	13	12	1.5
3	28	24	2	28	24	2
4	28	23	2	28	23	2
5	20	6	2	21	6	2
6	19	7	2.25	19	8	2.25
7	22	5	2	23	6	2
8	24	11	1.5	25	12	1.5
9	19	6	2	22	6	2
10	27	8	2.5	27	9	2.5

NOTE:
Bud-only cuttings planted with approximate 12-inch stick-up
Initial tree circumference approximately 1-inch

Table 10: Timeline/Schedule of Corrective Action

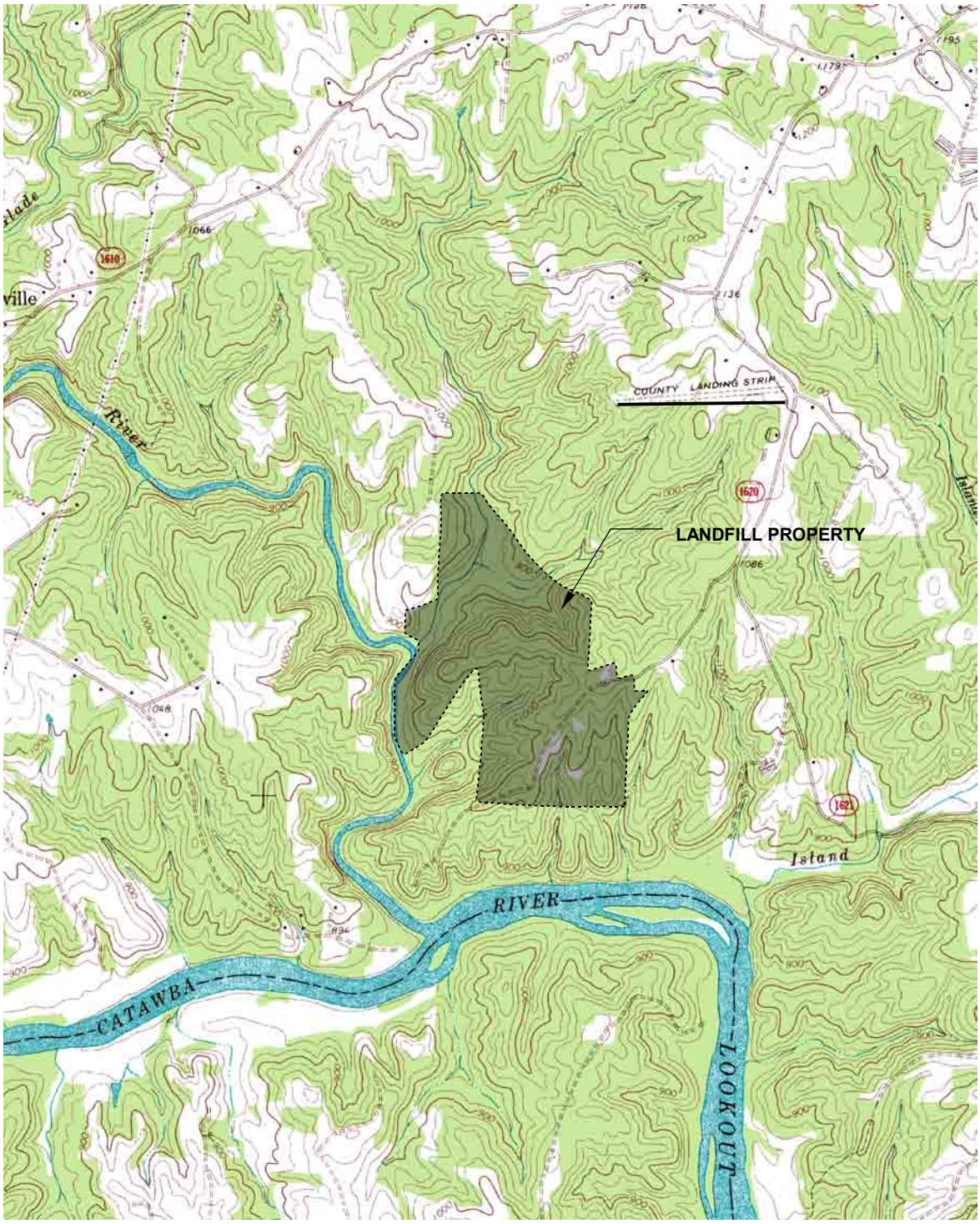
DATE	EVENT DESCRIPTION
February 2011	**BAC-9™ Injection at IW-1**
March 2011	Injection Event Report (~30 days after injection results)
April/May 2011	Pilot Test Blower System
June 2011	Semi-Annual Water Quality Sampling Event + 1st quarterly injection monitoring, implement permanent active methane system if successful pilot test
September 2011	2nd quarterly injection monitoring
December 2011	Semi-Annual Water Quality Sampling Event + 3rd quarterly injection monitoring
March 2012	4th quarterly injection monitoring
June 2012	Semi-Annual Water Quality Sampling Event + 5th quarterly injection monitoring
December 2012	Semi-Annual Water Quality Sampling Event + 6th quarterly injection monitoring
March 2013	**Additional Injection if determined necessary**
April 2013	Injection Event Report (~30 days after injection, if necessary)
May 2013	Final injection letter, if additional injections are not conducted
June 2013	Semi-Annual Water Quality Sampling Event
December 2013	Semi-Annual Water Quality Sampling Event
April/May 2014	**5 year Corrective Action Evaluation Report (CAER)**

PLATES

Topographic Map with Site Location

PLATE 1

Alexander County MSWLF: Corrective Action Evaluation Report



QUADRANGLE LEGEND

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

NOTE: Topographical map assembled from corresponding USGS 7.5-min. quadrangles of the subject region.

Date Completed	01/15/2011
Created By	M. German
Project Name	Corrective Action Evaluation Report
Site Name	Alexander County Landfill
Project Number	G11047.0

Municipal Engineering Services Company, PA

0 1/2 1 MILE

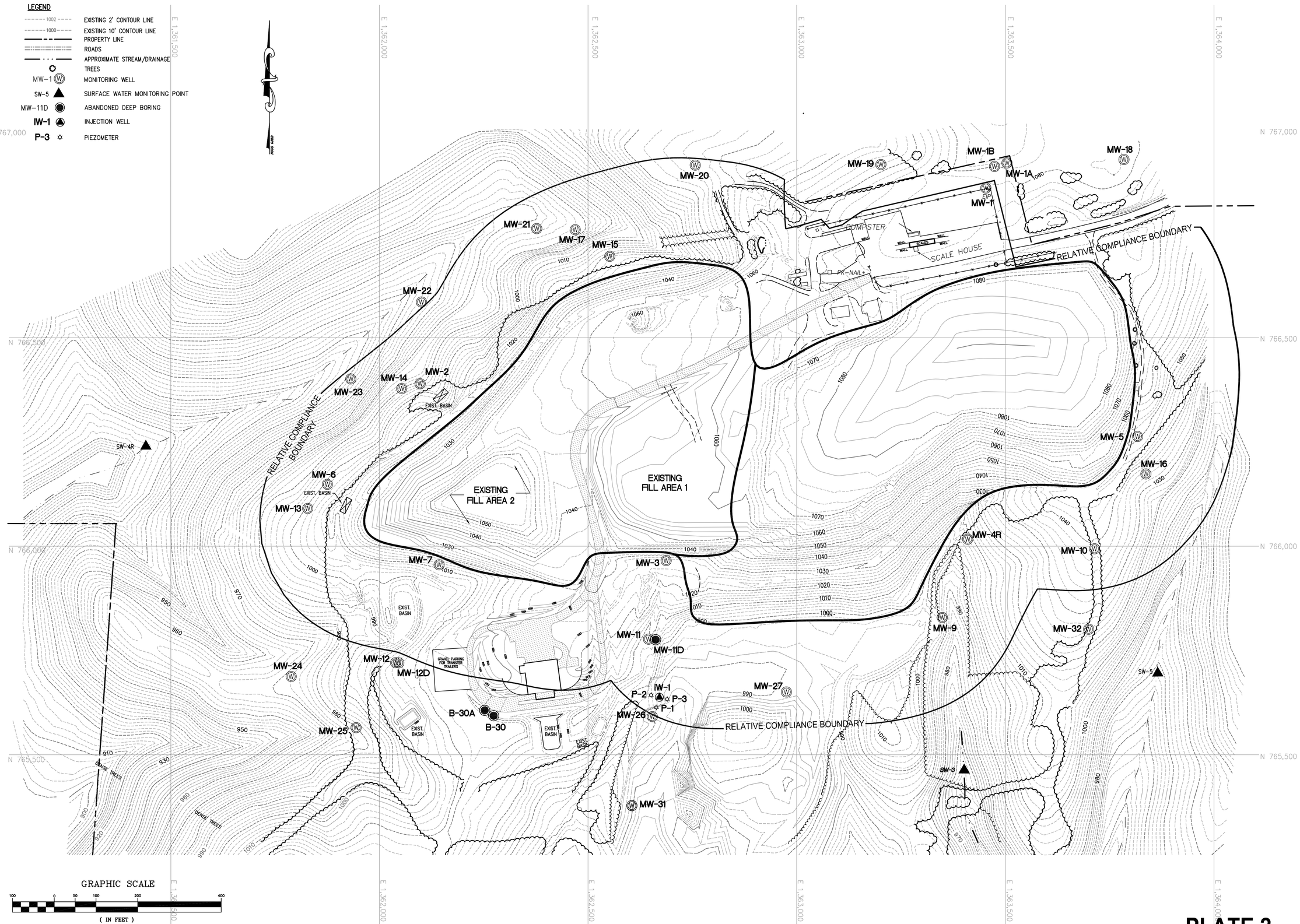


PLATE 2

LICENSE NUMBER: C-0281

Municipal Services

Engineering Company, P.A.

P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1767

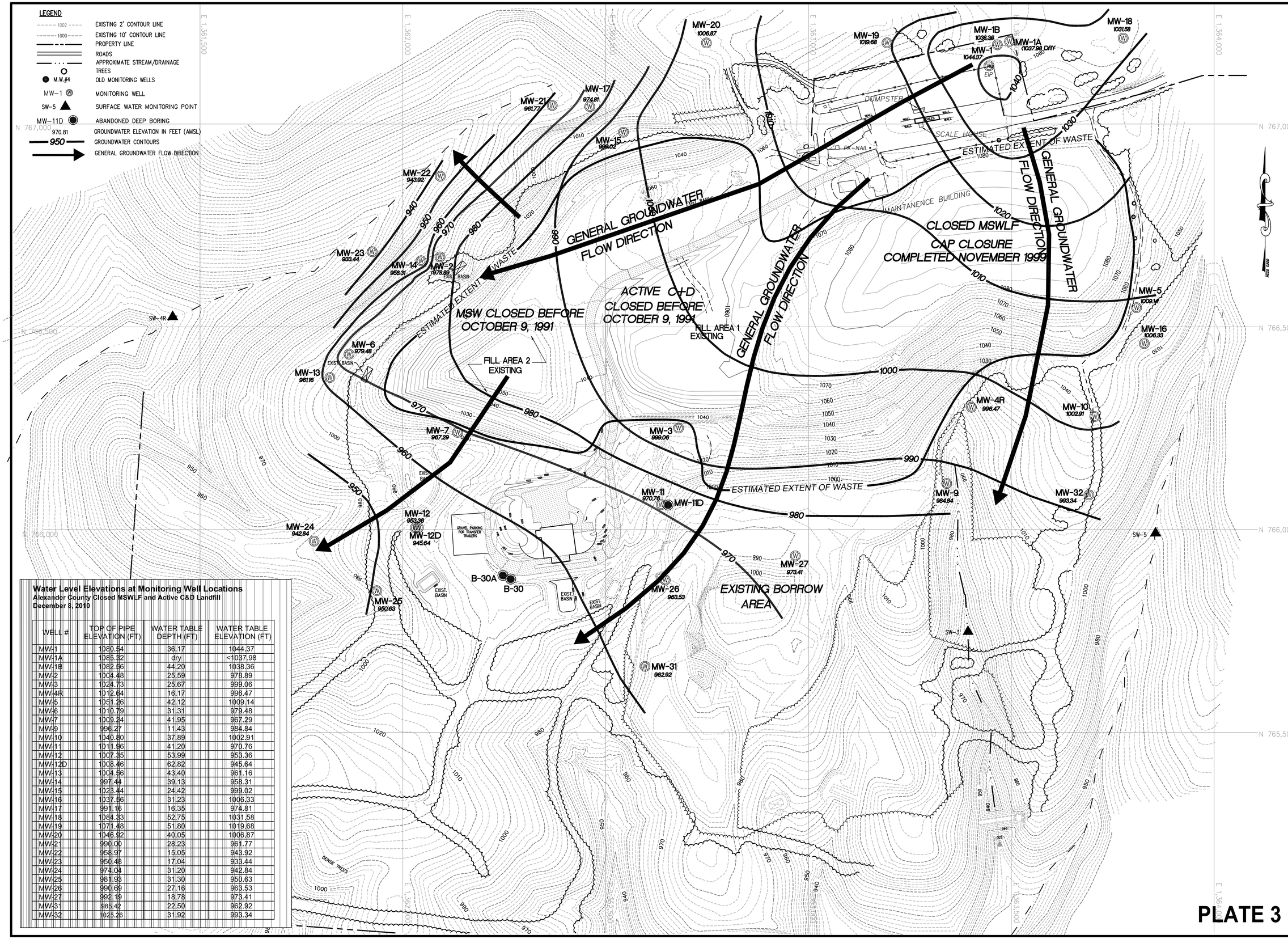
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

SITE MAP WITH EXISTING SAMPLING LOCATIONS

SCALE:	1" = 100'
DATE:	8/10/2010
DRWN. BY:	M. GERMAN
CHKD. BY:	M. GERMAN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 2
SHEET NO.	1 OF 1



Water Level Elevations at Monitoring Well Locations
Alexander County Closed MSWLF and Active C&D Landfill
December 8, 2010

WELL #	TOP OF PIPE ELEVATION (FT)	WATER TABLE DEPTH (FT)	WATER TABLE ELEVATION (FT)
MW-1	1080.54	36.17	1044.37
MW-1A	1085.32	dry	<1037.98
MW-1B	1082.56	44.20	1038.36
MW-2	1004.48	25.59	978.89
MW-3	1024.73	25.67	999.06
MW-4R	1012.64	16.17	996.47
MW-5	1051.26	42.12	1009.14
MW-6	1010.79	31.31	979.48
MW-7	1009.24	41.95	967.29
MW-9	996.27	11.43	984.84
MW-10	1040.80	37.89	1002.91
MW-11	1011.96	41.20	970.76
MW-12	1007.35	53.99	953.36
MW-12D	1008.46	62.82	945.64
MW-13	1004.56	43.40	961.16
MW-14	997.44	39.13	958.31
MW-15	1023.44	24.42	999.02
MW-16	1037.56	31.23	1006.33
MW-17	991.16	16.35	974.81
MW-18	1084.33	52.75	1031.58
MW-19	1071.48	51.80	1019.68
MW-20	1046.92	40.05	1006.87
MW-21	990.00	28.23	961.77
MW-22	958.97	15.05	943.92
MW-23	950.48	17.04	933.44
MW-24	974.04	31.20	942.84
MW-25	981.93	31.30	950.63
MW-26	990.69	27.16	963.53
MW-27	992.19	18.78	973.41
MW-31	985.42	22.50	962.92
MW-32	1025.26	31.92	993.34

PLATE 3

Municipal Services Engineering Company, P.A.
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 346 BOONE, N.C. 28607 (828) 262-1767
LICENSE NUMBER: C-0281

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

SINGLE DAY POTENTIOMETRIC MAP
DECEMBER 8, 2011

SCALE: 1" = 100'
DATE: 03/16/2011
DRWN. BY: J. PFOHL
CHKD. BY: M. GERMAN
PROJECT NUMBER G11047.0
DRAWING NO. PLATE 3
SHEET NO. 1 OF 1

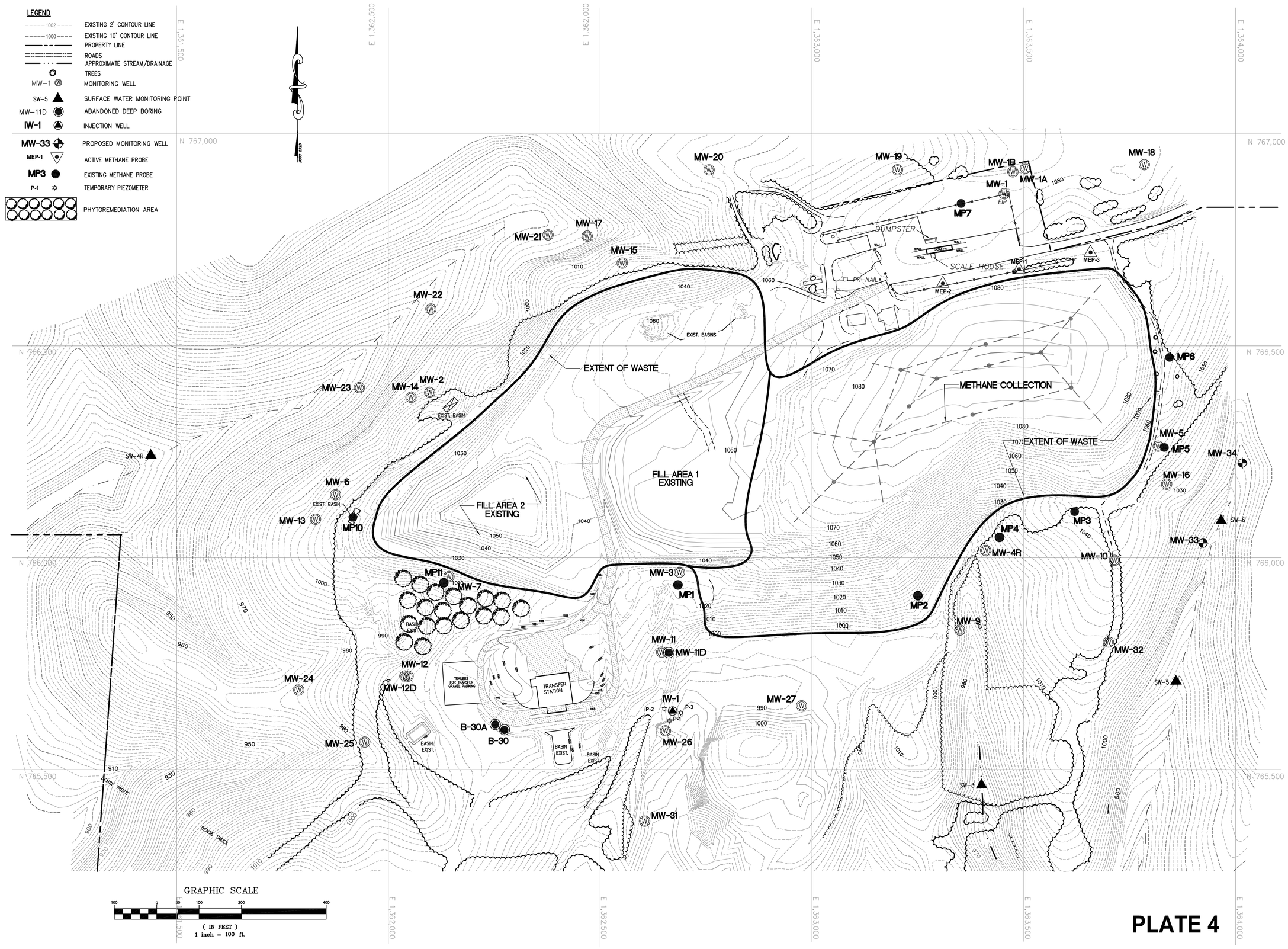


PLATE 4

Engineering Company, P.A.
P.O. BOX 349 BOONE, N.C. 28607
(828) 262-1767

Municipal Services
P.O. BOX 97 GARNER, N.C. 27529
(919) 772-5393

LICENSE NUMBER: C-0281

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

REMEDIATION AREA MAP

SCALE:	1" = 100'
DATE:	01/19/11
DRWN. BY:	M. GERMAN
CHKD. BY:	M. GERMAN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 4
SHEET NO.	1 OF 1

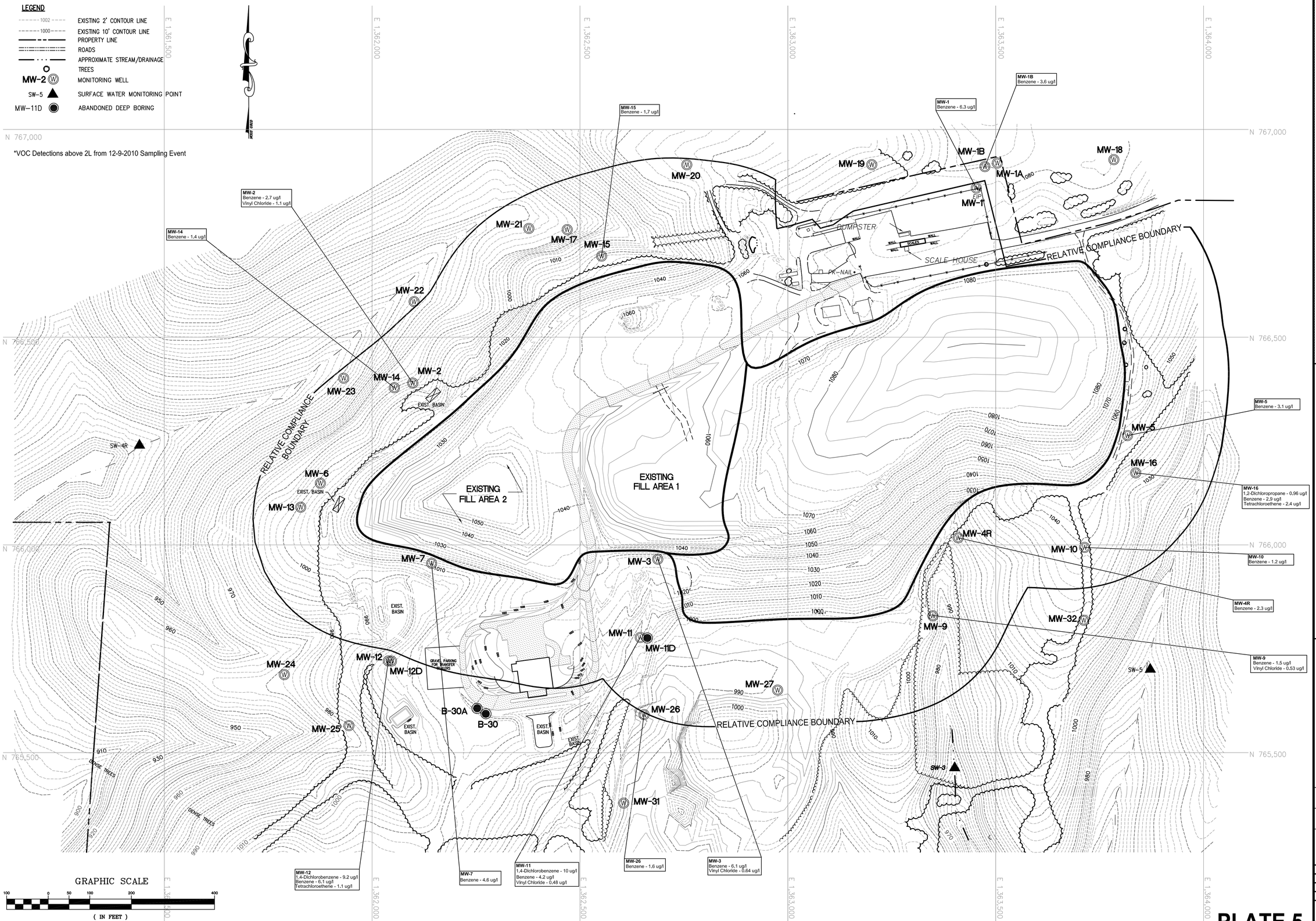


PLATE 5

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

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

DECEMBER 2010 CONTAMINANTS DETECTED ABOVE 2L STANDARD

SCALE:	1" = 100'
DATE:	1/20/2011
DRWN. BY:	M. GERMAN
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 5
SHEET NO.	1 OF 1

Phytoremediation Photos **PLATE 6A**

Phytoremediation Photos **PLATE 6B**

LEGEND

- EXISTING 2' CONTOUR LINE
- EXISTING 10' CONTOUR LINE
- PROPERTY LINE
- ROADS
- APPROXIMATE STREAM/DRAINAGE
- TREES
- MW-1 MONITORING WELL
- SW-5 SURFACE WATER MONITORING POINT
- MW-11D ABANDONED DEEP BORING
- ESTIMATED 1,4-DICHLOROBENZENE (1,4-DCB) IMPACT 2L STANDARD (6.0 µg/L)
- 2.0 1,4-DCB DETECTION (DECEMBER 2010)

** Indicates 1,4 -DCB detection above the 2L Standard

2L EXCEEDANCE	
MW-11	10.0 ug/l
MW-12	9.2 ug/l

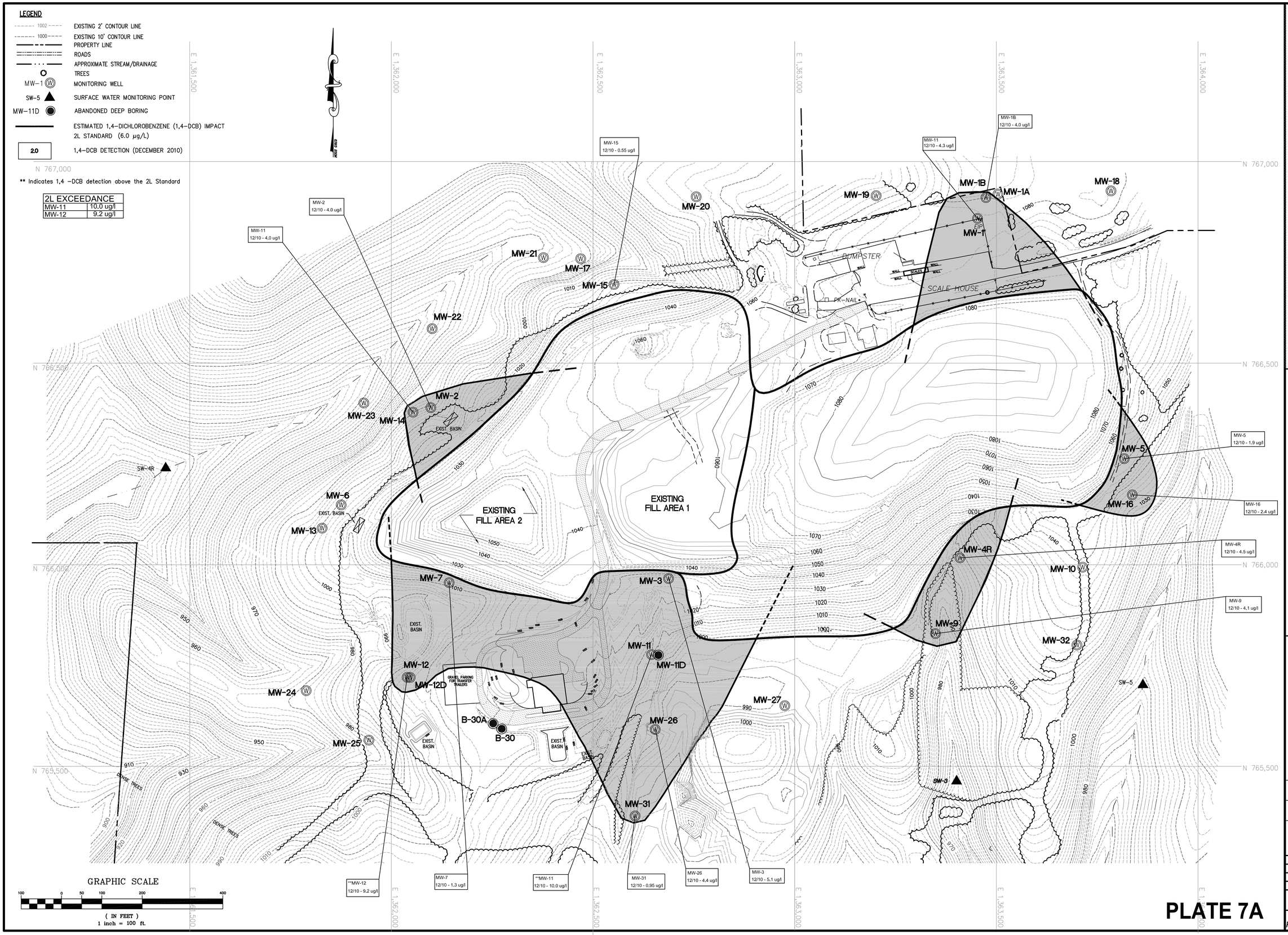


PLATE 7A

Municipal Services Engineering Company, P.A.
LICENSE NUMBER: C-0281
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393
P.O. BOX 348 BOONE, N.C. 28607 (828) 262-1767

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

1,4-DICHLOROBENZENE ISOCONCENTRATION MAP DEC 2010

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	R.MOSS
CHKD. BY:	M.GERMAN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7A
SHEET NO.	1 OF 1

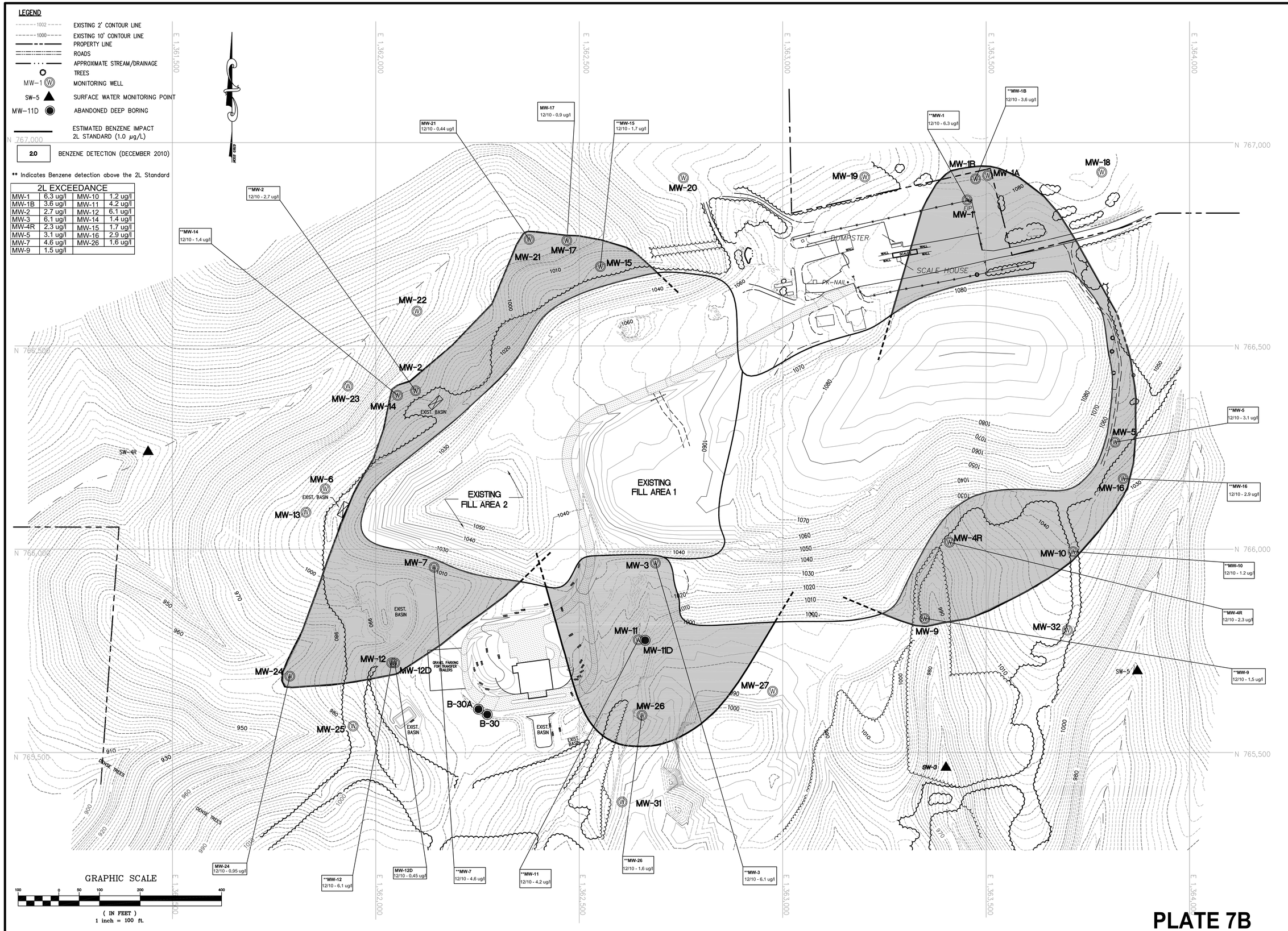


PLATE 7B

Engineering Company, P.A.
P.O. BOX 349 BOONE, N.C. 28607
(828) 262-1767

Municipal Services
P.O. BOX 97 GARNER, N.C. 27529
(919) 772-5393

LICENSE NUMBER: C-0281

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

BENZENE ISOCONCENTRATION MAP
DECEMBER 2010

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	R.MOSS
CHKD. BY:	M.GERMAN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7B
SHEET NO.	1 OF 1

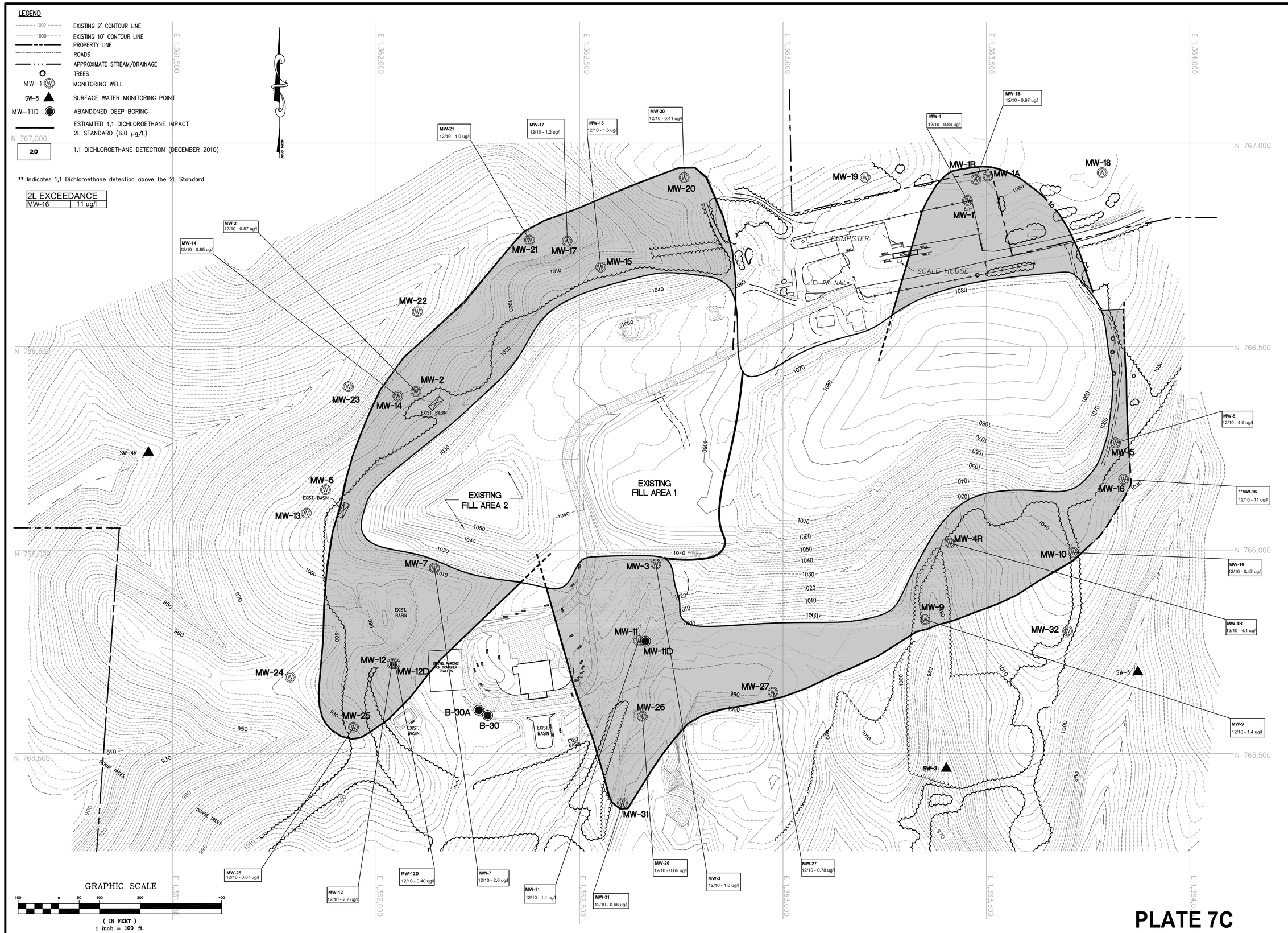


PLATE 7C

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

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY NORTH CAROLINA

1,1-DICHLOROETHANE ISOCONCENTRATION MAP DEC 2010

DATE	BY	REV.	DESCRIPTION

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	M. GERMAN
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7C
SHEET NO.	1 OF 1

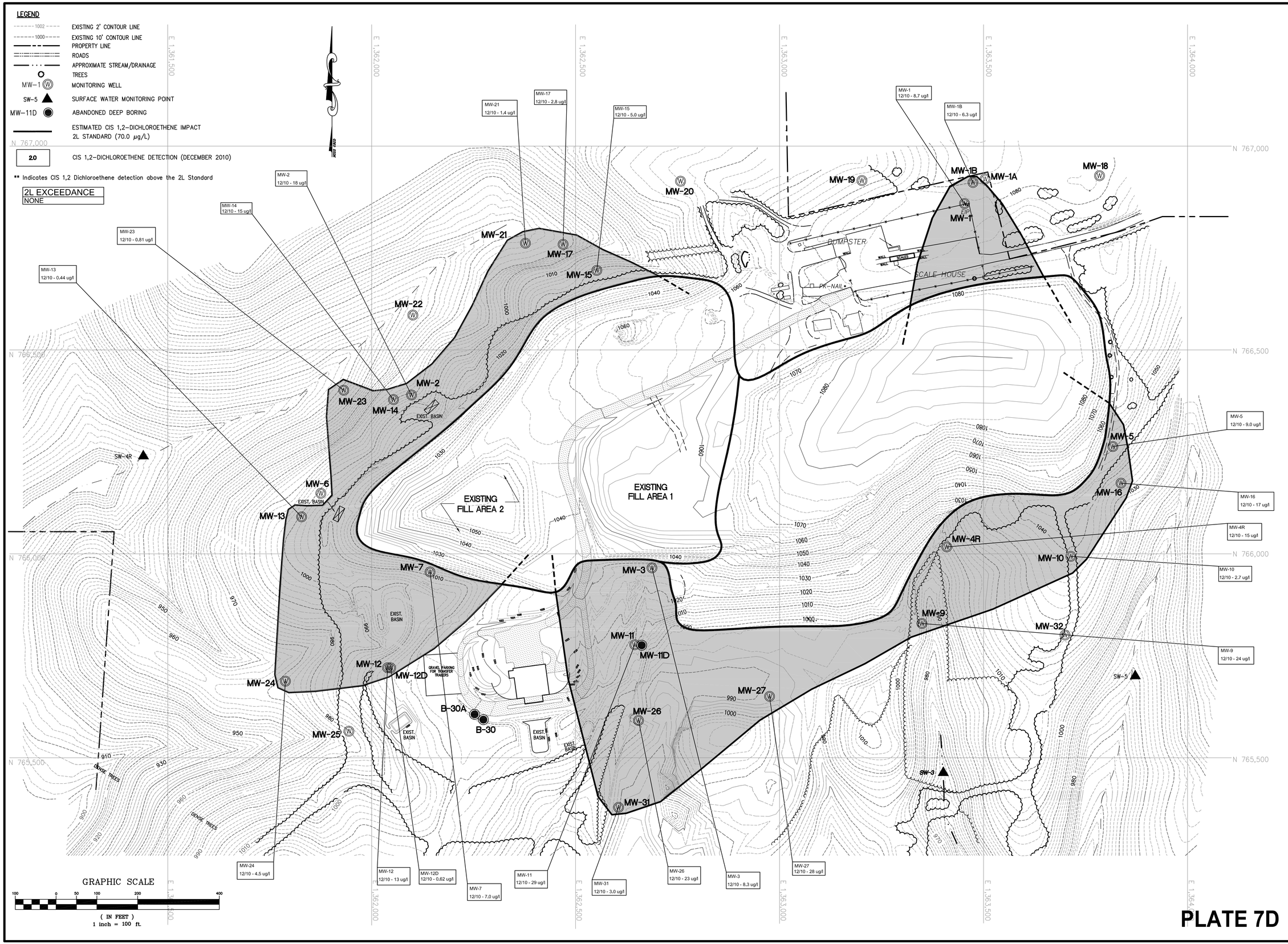


PLATE 7D

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

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

CIS-1,2 DICHLOROETHENE ISOCONCENTRATION MAP DEC 2010

SCALE:	1" = 100'
DATE:	3/10/2011
DRWN. BY:	M. GERMAN
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7D
SHEET NO.	1 OF 1

LEGEND

- EXISTING 2' CONTOUR LINE
- EXISTING 10' CONTOUR LINE
- PROPERTY LINE
- ROADS
- APPROXIMATE STREAM/DRAINAGE
- TREES
- MW-1 MONITORING WELL
- SW-5 SURFACE WATER MONITORING POINT
- MW-11D ABANDONED DEEP BORING
- ESTIMATED TETRACHLOROETHENE (PCE) IMPACT 2L STANDARD (0.7 µg/L)
- 2.0 PCE DETECTION (DECEMBER 2010)

** Indicates PCE detection above the 2L Standard

2L EXCEEDANCE	
MW-12	1.1 ug/l
MW-16	2.4 ug/l

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

PLATE 7E

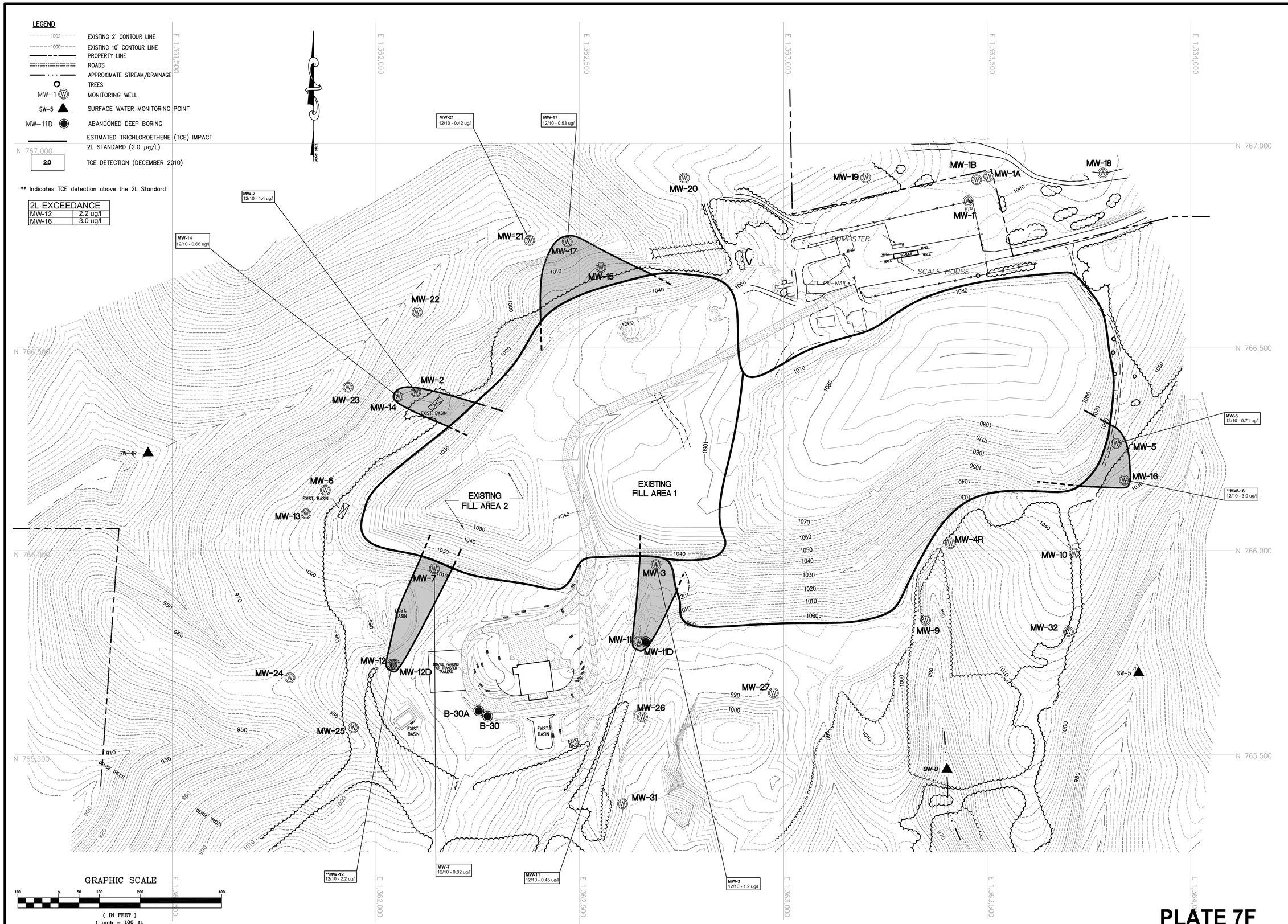
Municipal Engineering Services Company, P.A.
LICENSE NUMBER: C-0281
P.O. BOX 349 BOONE, N.C. 28607 (828) 262-1707
P.O. BOX 97 GARNER, N.C. 27529 (919) 772-5393

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

TETRACHLOROETHENE (PCE) ISOCONCENTRATION MAP DEC 2010

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	R.MOSS
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7E
SHEET NO.	1 OF 1



LICENSE NUMBER: C-0281

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

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

TRICHLOROETHENE ISOCONCENTRATION MAP DEC 2010

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	M. GERMAN
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7F
SHEET NO.	1 OF 1

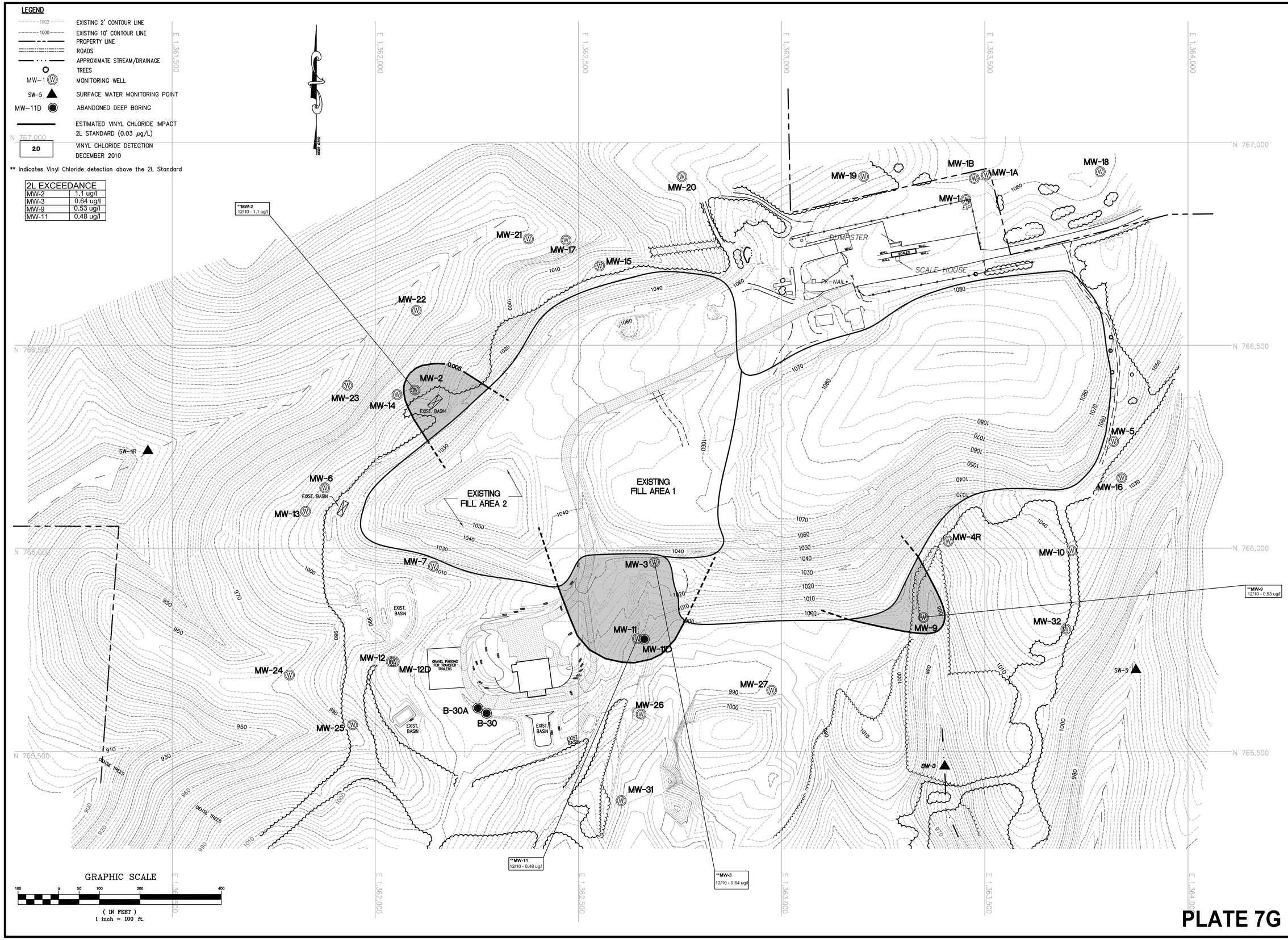


PLATE 7G

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

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

VINYL CHLORIDE ISOCONCENTRATION MAP DEC 2010

SCALE:	1" = 100'
DATE:	03/10/2011
DRWN. BY:	R.MOSS
CHKD. BY:	M. BROWN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 7G
SHEET NO.	1 OF 1

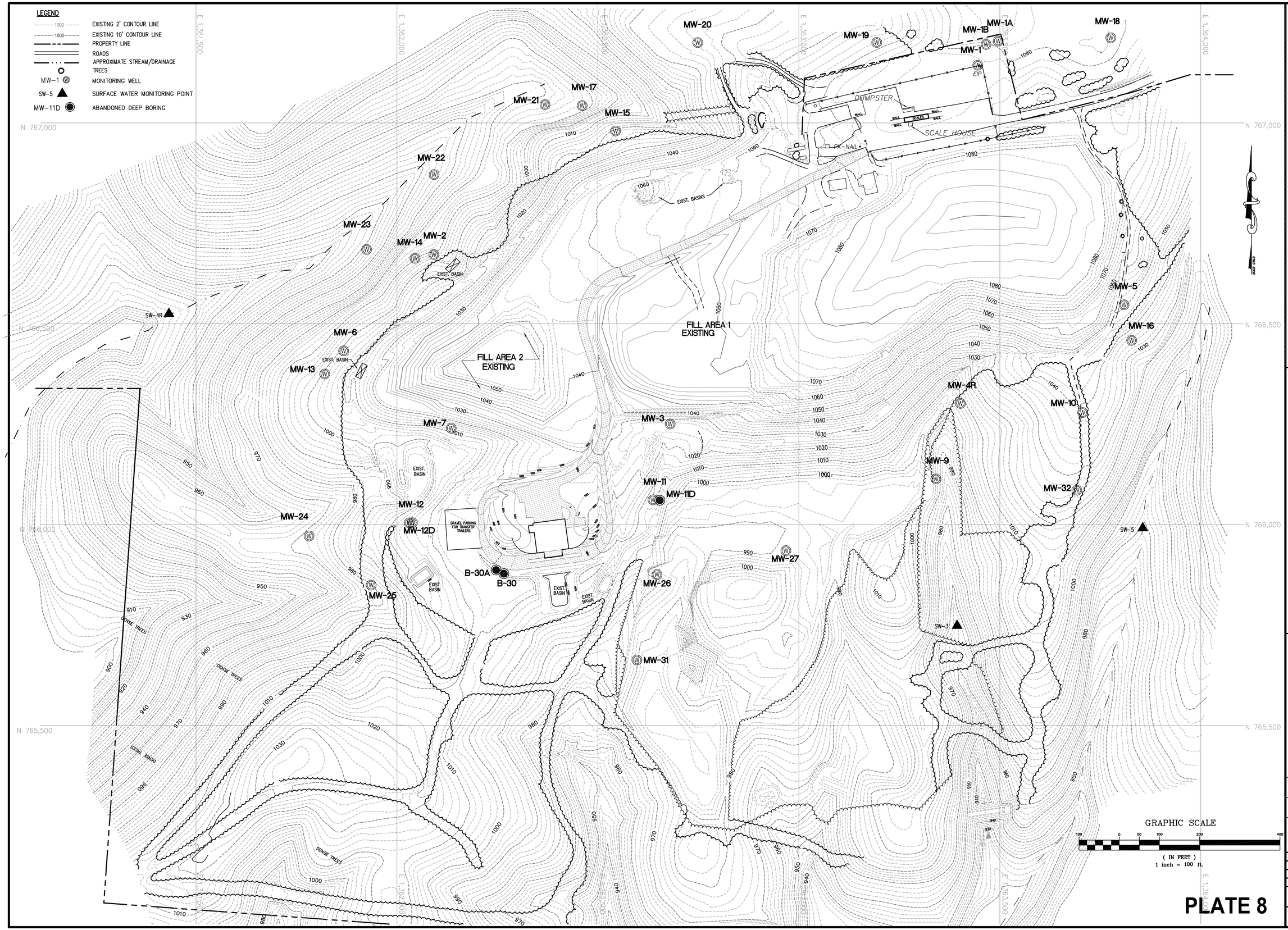


PLATE 8

Engineering Company, P.A.
P.O. BOX 349 BOONE, N.C. 28607
(828) 262-1767

Municipal Services
P.O. BOX 97 GARNER, N.C. 27529
(919) 772-5393

LICENSE NUMBER: C-0281

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

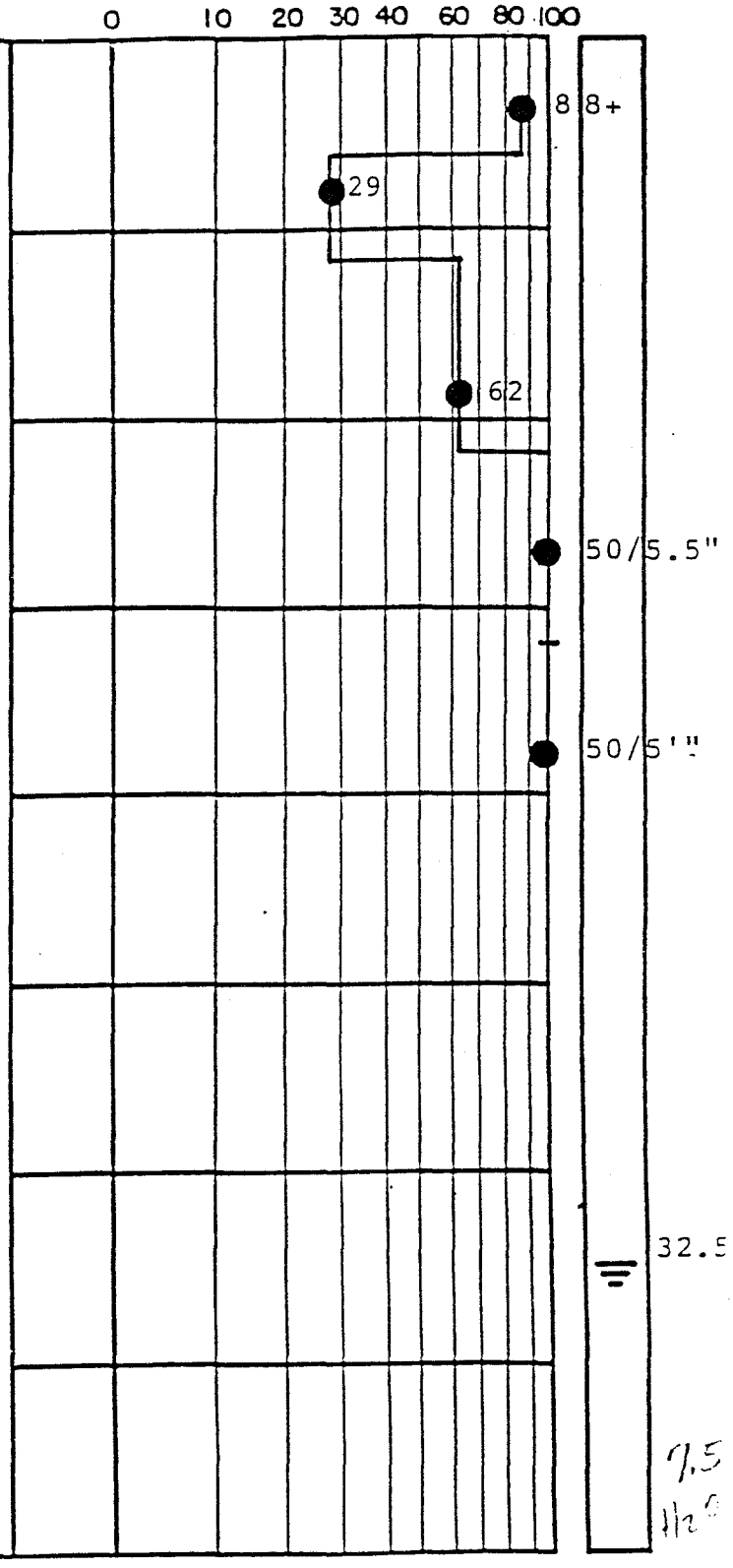
DATE	BY	REV.	DESCRIPTION

FACILITY MAP

SCALE:	1" = 100'
DATE:	04/09/08
DRWN. BY:	L. HAMPTON
CHKD. BY:	E. CALDWELL
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE 8
SHEET NO.	1 OF 1

APPENDIX A

0.0	Very Dense Tan, Brown, and Orange Slightly Micaceous Silty Coarse to Fine SAND (Residual)
3.0	Firm Tan, Brown, and Orange Silty Coarse to Fine SAND
7.0	Very Dense Brown, White, and Orange Silty Coarse to Fine SAND
11.5	Partially Weathered Rock When Sampled Becomes Brown, White, and Orange Slightly Micaceous Silty Coarse to Fine SAND
16.0	Very Dense Brown, Orange, and Red Slightly Micaceous Silty Coarse to Fine SAND
19.0	Partially Weathered Rock When Sampled Becomes Tan and White Coarse to Fine SAND
29.4	Graphite
31.0	Biotite Gneiss with Quartz Seams and Amethyst and Pyrite Crystals Moderately Weathered and Fractured
41.0	Coring Terminated



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE
50% ROCK CORE RECOVERY
LOSS OF DRILLING WATER
WATER TABLE-24HR.
WATER TABLE-1HR.
CAVE-IN DEPTH

TEST BORING RECORD

BORING NO. MW-1
DATE DRILLED 9/14/90
JOB NO. 035-90-003

TRIGON

/H	DESCRIPTION	ELEV.	●PENETRATION-BLOWS PER FT. (0 10 20 30 40 60 80 100)	
0.0	Firm Brown, Orange, and Tan Slightly Micaceous Medium to Fine Sandy SILT (Residual)		7	
3.0	Very Dense Tan, Black, and Orange Slightly Micaceous Silty Coarse to Fine SAND		79	
7.0	Partially Weathered Rock When Sampled Becomes Brown, Orange, and White Micaceous Silty Coarse to Fine SAND		50/ 5"	
			50/ 6"	
			50/ 5"	18.
			50/ 4'	
			50/ 3'	
31.0	Boring Terminated			12

BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

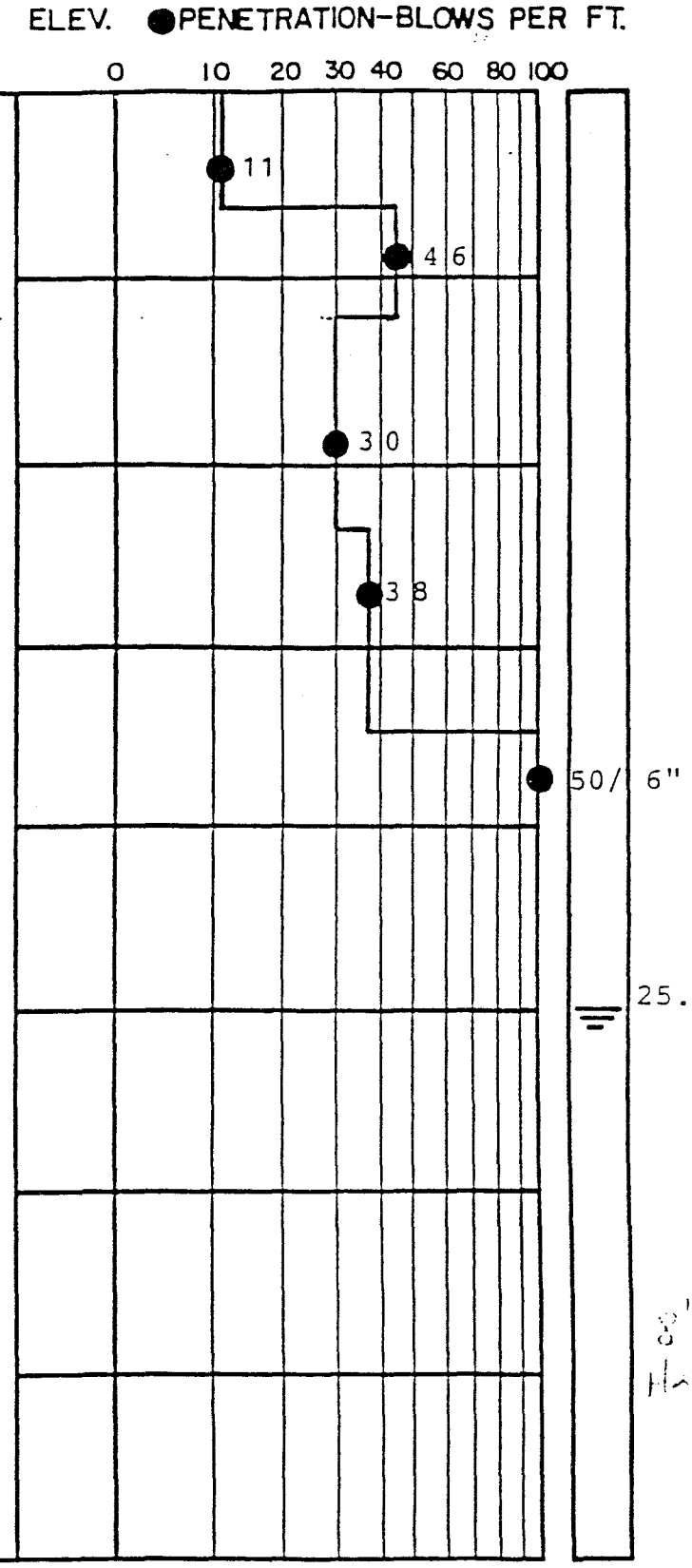
UNDISTURBED SAMPLE
50% ROCK CORE RECOVERY
◀ LOSS OF DRILLING WATER
WATER TABLE-24HR.
WATER TABLE-1HR.
CAVE-IN DEPTH

TEST BORING RECORD

BORING NO. MW-2
DATE DRILLED 9/6/90
JOB NO. 035-90-003

TRIGON

TH	DESCRIPTION	ELEV.
0.0	Stiff Orange-Brown Sandy Slightly Clayey SILT (Residual)	
3.0	Dense Orange, Yellow, Tan Slightly Micaceous Fine Sandy SILT	
7.0	Very Stiff Green, Yellow, Tan Slightly Micaceous Fine Sandy SILT	
12.0	Dense White, Tan, Grey Micaceous Silty SAND with Rock Fragments	
17.5	Partially Weathered Rock When Sampled Becomes Grey, Tan Slightly Micaceous Fine Sandy SILT	
23.1	Biotite Gneiss with Pyrite Crystals and Prominent Water Bearing Quartz Seam at about 28 Feet Slightly Weathered	
36.7	Coring Terminated	



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

ETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER
LING 30 IN. REQUIRED TO DRIVE 1.4 IN. I.D. SAMPLER 1 FT.

UNDISTURBED SAMPLE
50 % ROCK CORE RECOVERY
LOSS OF DRILLING WATER
WATER TABLE-24HR.
WATER TABLE-1HR.
CAVE-IN DEPTH

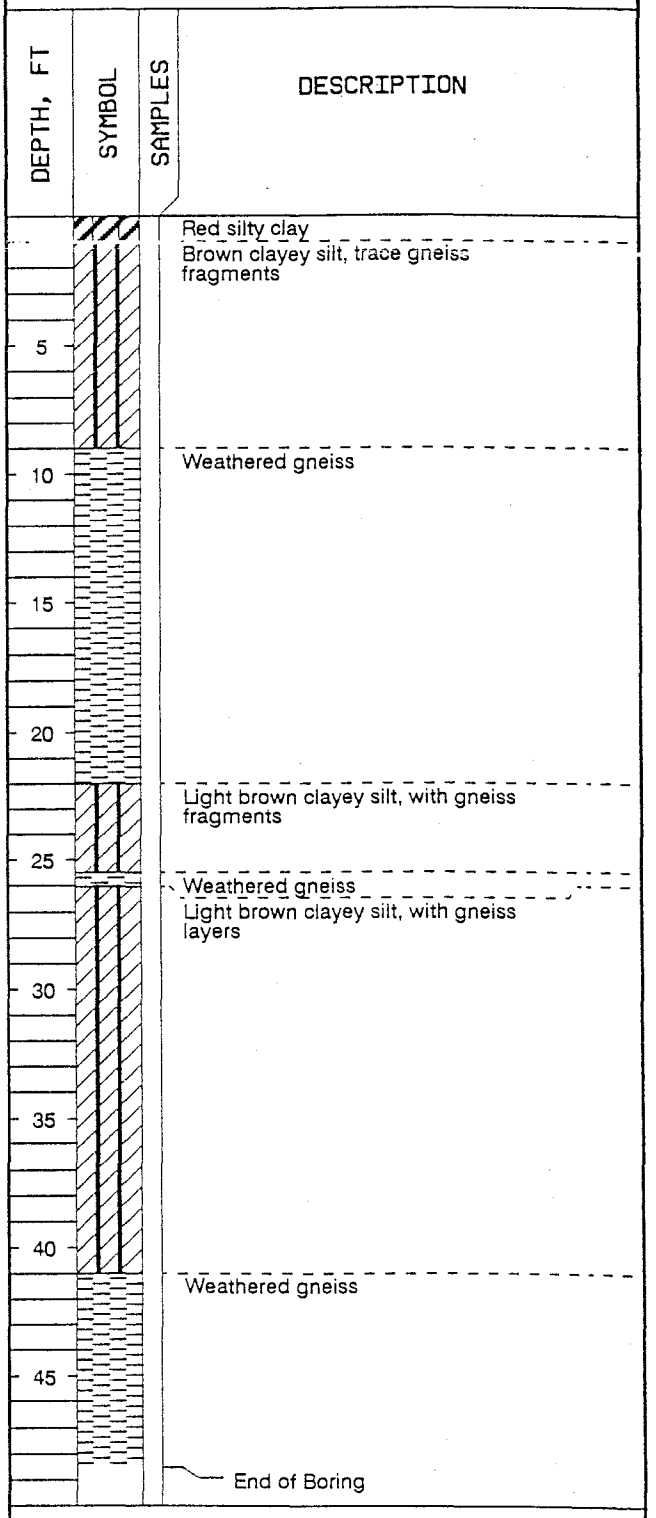
TEST BORING RECORD

BORING NO. MW-3
DATE DRILLED 9/19/90
JOB NO. 035-90-003

TRIGON

MONITORING WELL 1A

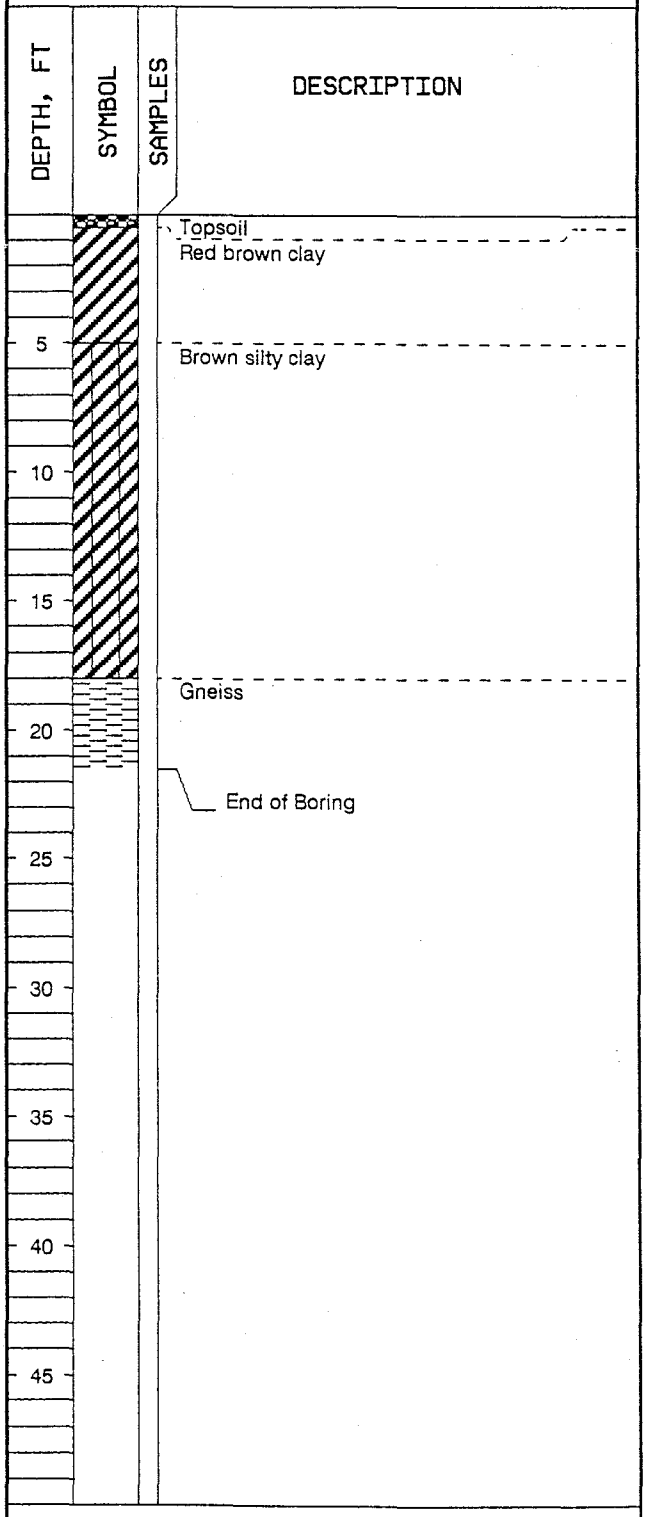
PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans



COMPLETION DEPTH: 48.5 ft DATE: 9-30-94
DEPTH TO WATER: 39.3 ft while drilling

MONITORING WELL 4R

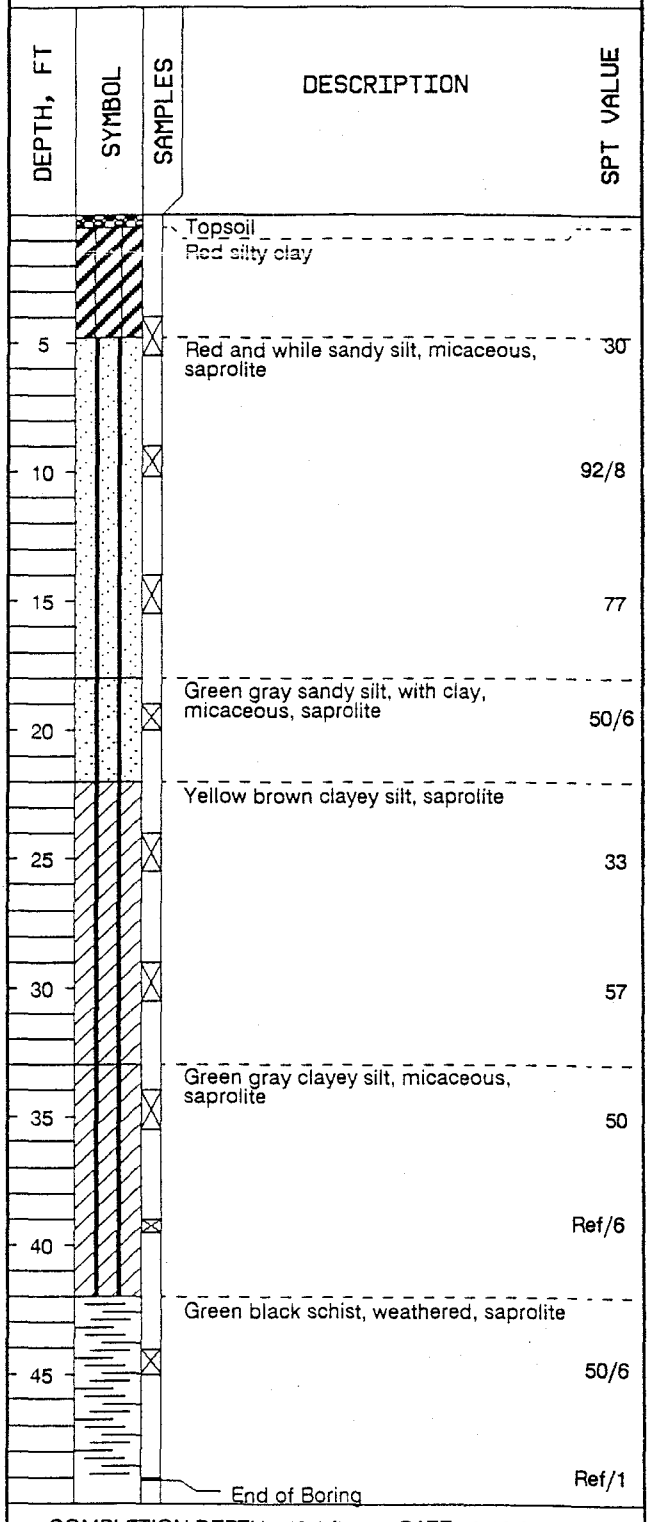
PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans



COMPLETION DEPTH: 21.5 ft DATE: 9-30-94
DEPTH TO WATER: 12 ft after drilling

MONITORING WELL 5

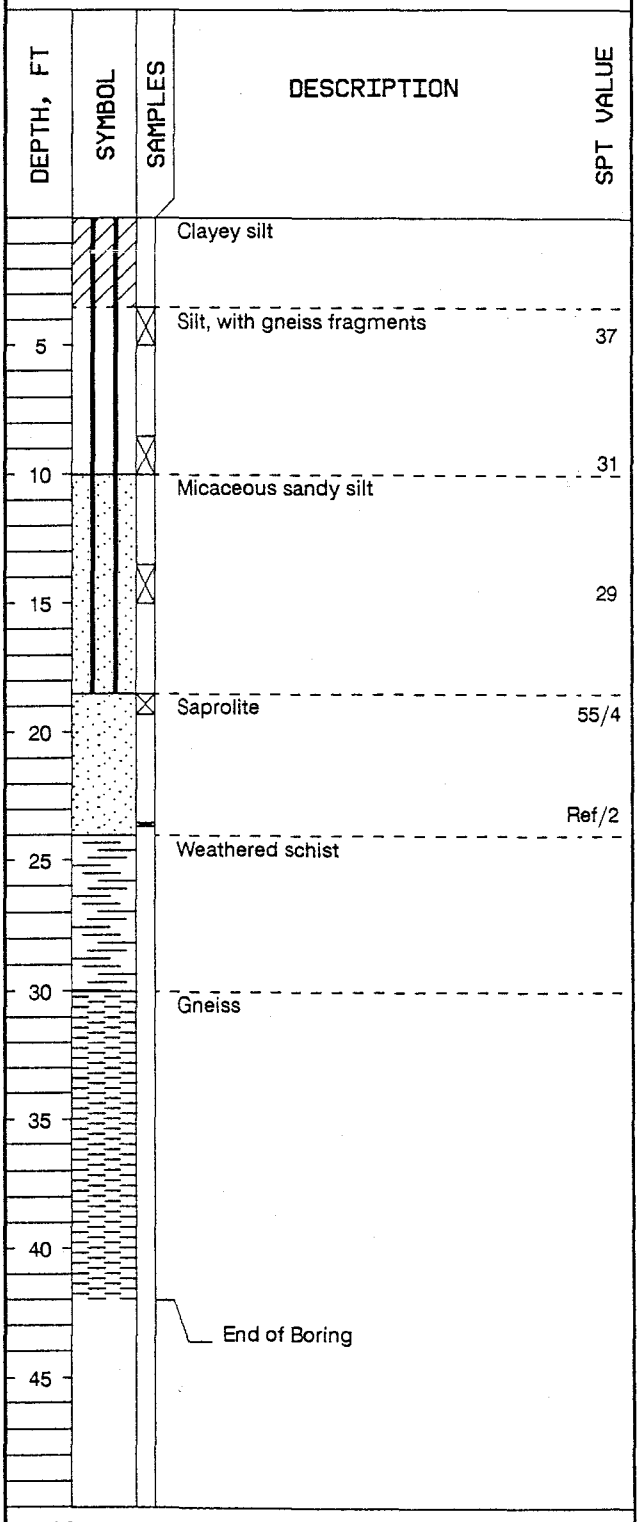
PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans



COMPLETION DEPTH: 49.1 ft DATE: 9-16-94
DEPTH TO WATER: 41.3 ft after drilling, 37.1 ft after 12 hrs

MONITORING WELL 6

PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans



COMPLETION DEPTH: 42.0 ft DATE: 9-29-94
DEPTH TO WATER: 30 ft after drilling

MONITORING WELL 7

PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION
			Brown silty clay
5			-grades with rock fragments
			-more rock fragments
10			
			Weathered gneiss
15			
20			
25			
30			
35			
			Gneiss
40			
45			

COMPLETION DEPTH: 54.0 ft DATE: 9-29-94
DEPTH TO WATER: 48 ft after 24 hrs

MONITORING WELL 7 (cont)

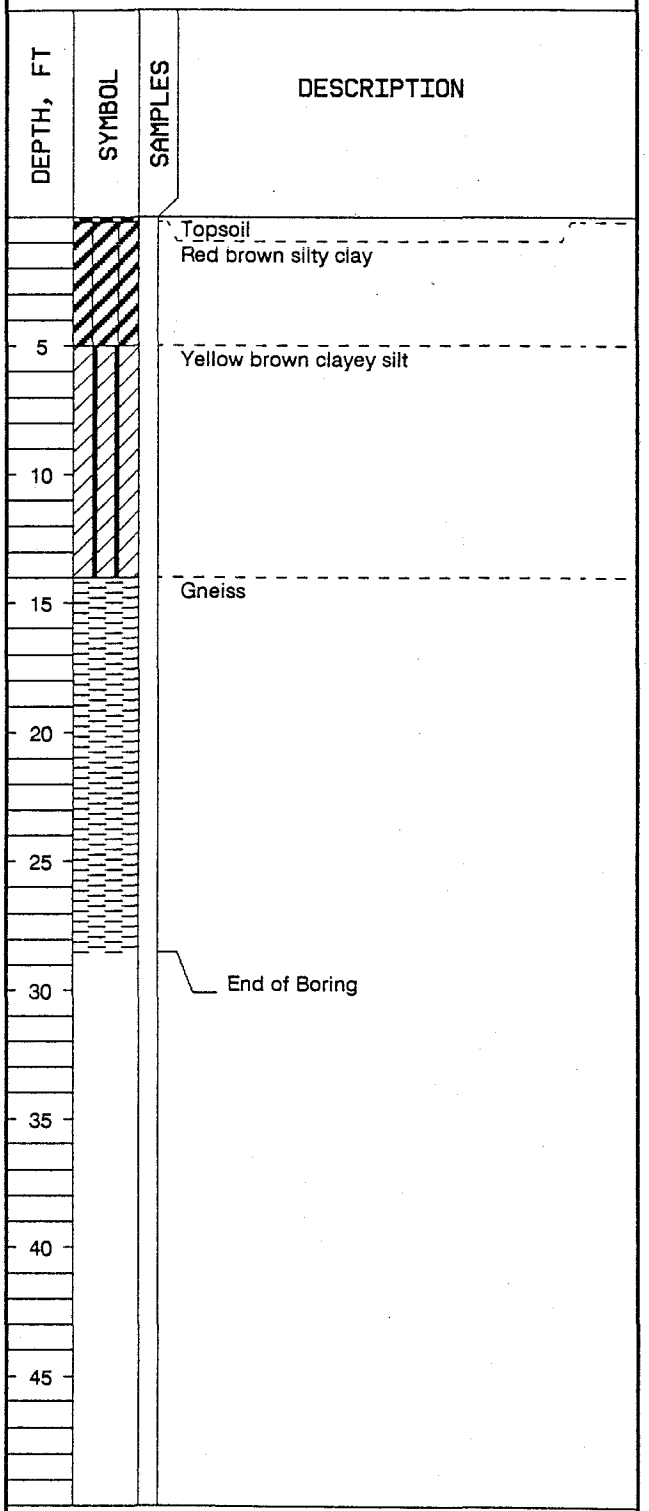
PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION
55			End of Boring
60			
65			
70			
75			
80			
85			
90			
95			

COMPLETION DEPTH: 54.0 ft DATE: 9-29-94
DEPTH TO WATER: 48 ft after 24 hrs

MONITORING WELL 8

PROJECT: Alexander County Landfill
Taylorsville, North Carolina
LOCATION: see Landfill Plans



COMPLETION DEPTH: 28.5 ft DATE: 9-29-94
DEPTH TO WATER: 12 ft after drilling

GAI CONSULTANTS

LOG OF BORING: MW-9

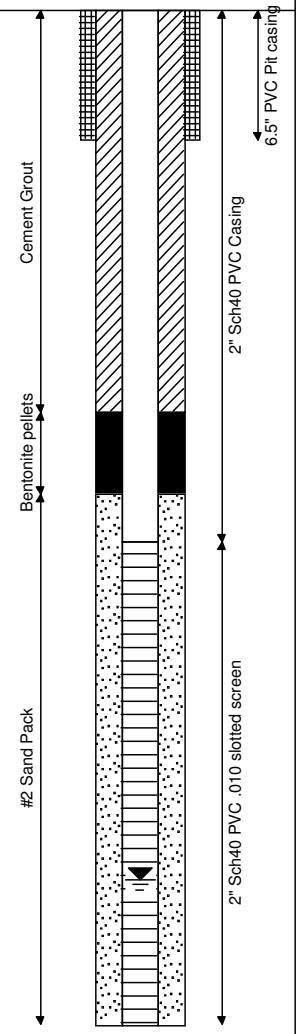
Alexander County Closed Landfill **Project No. G99006.0**

Drilling contractor: Graham & Currie
Drill rig & method: 6" O.D tricomb air rotary
Logged by: Jonathan Pfohl

Date started: 10/24/2000
Date ended: 10/24/2000
Completion depth: 31.50 ft
Stickup height: 3.00 ft

Surface elevation: 993.00 ft (MSL)
Top of pipe elevation: 996.00 ft (MSL)
Depth to water (TOB): -99999.00 ft
Depth to water (24hrs): 27.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks	Well Diagram
5				- 4 ft. placed 6.5 " I.D PVC pit casing to stabilize the boring due to soft fill material conditions.	
10				- 7ft. Bluish gray weathered rock that becomes increasingly hard w/ depth.	
15					
20					
25					
30					
				Boring terminated at 31.5 feet	
35					
40					



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LOG OF BORING: MW-10

Alexander County Closed Landfill **Project No. G99006.0**

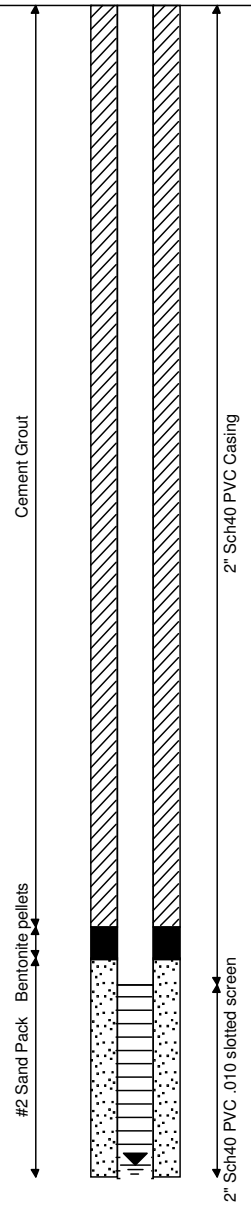
Drilling contractor: Graham & Currie
Drill rig & method: 6.5" O.D DTH
Logged by: Jonathan Pfohl

Date started:
Date ended:
Completion depth: 91.00 ft
Stickup height: 3.00 ft

Surface elevation: 1037.00 ft (MSL)
Top of pipe elevation: 1040.00 ft (MSL)
Depth to water (TOB): dry
Depth to water (24hrs): 90.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
5				
10				- 0' - 17' SILTY CLAY; Tannish Brown.
15				
20				
25				- 17' - 30' SILTY CLAY; brown, micaceous.
30				- 30' - 32' WEATHERED ROCK; Grayish blue.
35				
40				- 36' - 41' ROCK; Hard, bluish gray.
45				
50				- 41' - 61' ROCK; Bluish gray w/ fractures.
55				- Obvious rock fracture @ 55'.
60				
65				
70				
75				- 61' - 86' ROCK; Gray Competent hard rock.
80				
85				
90				- 86' - 91' ROCK; Bluish gray, competent w/ a few fractures.
95				Boring terminated at 91.0 feet
100				

Well Diagram



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LOG OF BORING: MW-11

Alexander County Closed Landfill **Project No. G99006.0**

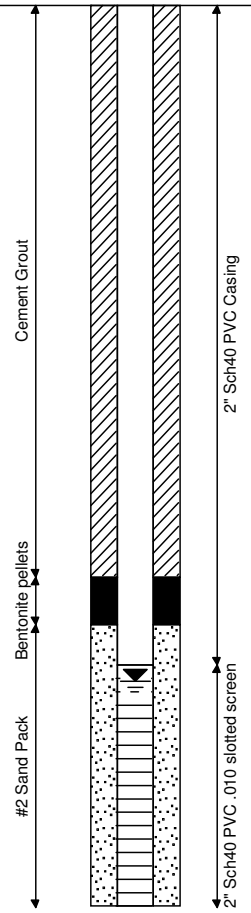
Drilling contractor: Graham & Currie
Drill rig & method: 6.5" O.D DTH
Logged by: Jonathan Pfohl

Date started: 10/24/2000
Date ended: 10/24/2000
Completion depth: 56.00 ft
Stickup height: 3.00 ft

Surface elevation: 1008.00 ft (MSL)
Top of pipe elevation: 1011.00 ft (MSL)
Depth to water (TOB): 42.00 ft
Depth to water (24hrs): 42.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				- 0' - 2' SANDY CLAY; Tannish Brown.
				- 2' - 4' CLAY; Oange, micaceous.
5				
10				
				- 4' - 17' SANDY SILT; Tannish brown.
15				
20				
25				
30				- 17' - 36' PARTIALLY WEATHERED ROCK; Bluish gray.
35				
40				
				- 36' - 56' ROCK; Bluish gray, competent.
45				- Tricomb refusal @ 46' convert to DTH.
50				
55				
				Boring terminated at 56.0 feet
60				
65				
70				
75				
80				

Well Diagram



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LOG OF BORING: MW-11D

Alexander County **Project No. G03003.0**

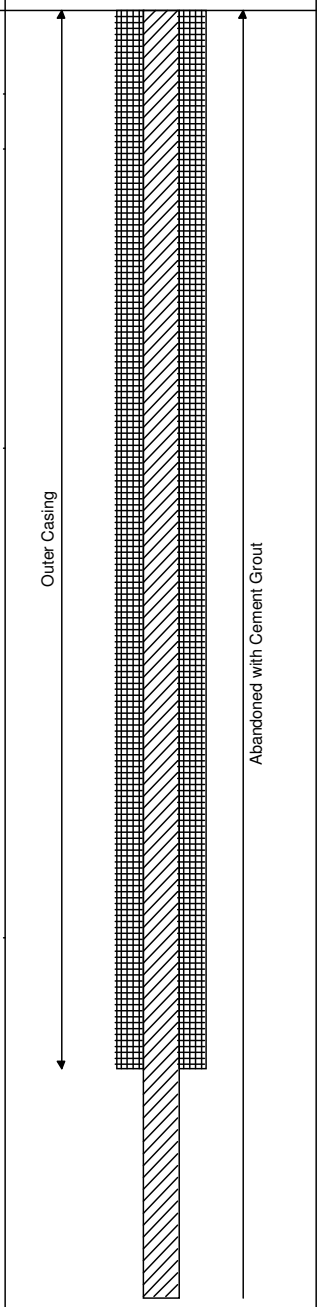
Drilling contractor: Accurate Drilling - Titan Atlantic
Drill rig & method: 6" DTH, 3 7/8 HQ Core
Logged by: J. Pfohl / E. Caldwell

Date started: 5/27/2003
Date ended: 5/28/2003
Completion depth: 120.75 ft
Stickup height:

Surface elevation:
Top of pipe elevation:
Depth to water (TOB):
Depth to water (24hrs): DRY

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Soil description from adjacent MW-11
				Sandy Clay, tannish brown
				Clay, orange, micaceous
5				Sandy Silt, tannish brown
10				
15				
				Partialy Weathered Rock - bluish gray
20				
25				
30				
35				
				Rock - buish gray
40				Run 1: (REC) 1.6'/5.0' = 32%, (RQD) 0.0/5.0 = 0%, Sillmanite Gneiss, fine grain, very fractured (41.1'-46.1')
45				Run 2: (REC) 0.9'/1.9' = 47%, (RQD) 0.0/1.9' = 0%, As above very fractured (46.1'-48.0')
				Run 3: (REC) 3.5'/5.0' = 70%, (RQD) 0.0/5.0 = 0%, As above very fractured (48.0'-53.0')
50				

Well Diagram



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LOG OF BORING: MW-11D

Alexander County **Project No. G03003.0**

Drilling contractor: Accurate Drilling - Titan Atlantic
Drill rig & method: 6" DTH, 3 7/8 HQ Core
Logged by: J. Pfohl / E. Caldwell

Date started: 5/27/2003
Date ended: 5/28/2003
Completion depth: 120.75 ft
Stickup height:

Surface elevation:
Top of pipe elevation:
Depth to water (TOB):
Depth to water (24hrs): DRY

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks	Well Diagram
55				Run 4: (REC) 5.0'/5.0' = 100%, (RQD) 5.0'/5.0' = 100%, Sillmanite Gneiss, heterogenous, minor quartz filled fractures, minor pyrite (53.0'-58.0')	Abandoned with Cement Grout
60				Run 5: (REC) 4.0/4.0 = 100%, (RQD) 4.0/4.0 = 100% As above with garnets (58.0'-62.0')	
65				Run 6: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (62.0'-67.0')	
70				Run 7: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (67.0'-72.0')	
75				Run 8: (REC) 3.75/3.75 = 100%, (RQD) 3.75/3.75 = 100% As above (72.0'-75.75')	
80				Run 9: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above, with interbedded mica schist (75.75'-80.75')	
85				Run 10: (REC) 5.2/5.2 = 100%, (RQD) 5.2/5.2 = 100% As above (80.75'-85.95')	
90				Run 11: (REC) 5.21/5.21 = 100%, (RQD) 5.21/5.21 = 100% As above (85.95'-91.16')	
95				Run 12: (REC) 4.59/4.59 = 100%, (RQD) 4.59/4.59 = 100% As above (91.16'-95.75')	
100				Run 13: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (95.75'-100.75')	

LOG OF BORING: MW-11D

Alexander County **Project No. G03003.0**

Drilling contractor: Accurate Drilling - Titan Atlantic
Drill rig & method: 6" DTH, 3 7/8 HQ Core
Logged by: J. Pfohl / E. Caldwell

Date started: 5/27/2003
Date ended: 5/28/2003
Completion depth: 120.75 ft
Stickup height:

Surface elevation:
Top of pipe elevation:
Depth to water (TOB):
Depth to water (24hrs): DRY

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks	Well Diagram
				Run 14: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (100.75'-105.75')	Abandoned with Cement Grout
105				Run 15: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (105.75'-110.75')	
110				Run 16: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (110.75'-115.75')	
				Fracture, minor, pyrite, appears to be dry	
115				Run 17: (REC) 5.0/5.0 = 100%, (RQD) 5.0/5.0 = 100% As above (115.75'-120.75')	
120				Boring terminated at 120.8 feet	
125					
130					
135					
140					
145					
150					

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LOG OF BORING: MW-12

Alexander County Closed Landfill **Project No. G99006.0**

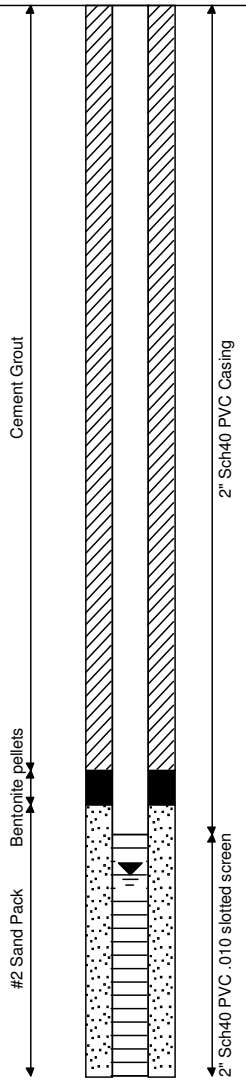
Drilling contractor: Graham & Currie
Drill rig & method: 6.0" O.D Tricomb air rotary
Logged by: Jonathan Pfohl

Date started: 10/23/2000
Date ended: 10/23/2000
Completion depth: 68.00 ft
Stickup height: 3.00 ft

Surface elevation: 1004.00 ft (MSL)
Top of pipe elevation: 1007.00 ft (MSL)
Depth to water (TOB): -99999.00 ft
Depth to water (24hrs): 54.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
5, 10, 15				- 0' - 18' SANDY SILT; Tannish Brown.
20, 25, 30, 35				- 18' - 38' PARTIALLY WEATHERED ROCK; Brownish Gray, micaceous.
40, 45, 50, 55				- 38' - 58' SILT; Grayish brown, harder w/ depth, micaceous.
60				- 58' - 66' SLIGHTLY WEATHERED ROCK; Bluish gray.
65				- 66' - 68' ROCK; Bluish gray, competent.
70				- Boring caved into 66.5' from 68'.
75, 80				Boring terminated at 68.0 feet

Well Diagram



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LOG OF BORING: MW-12D

Alexander County Landfill **Project No. G03003.0**

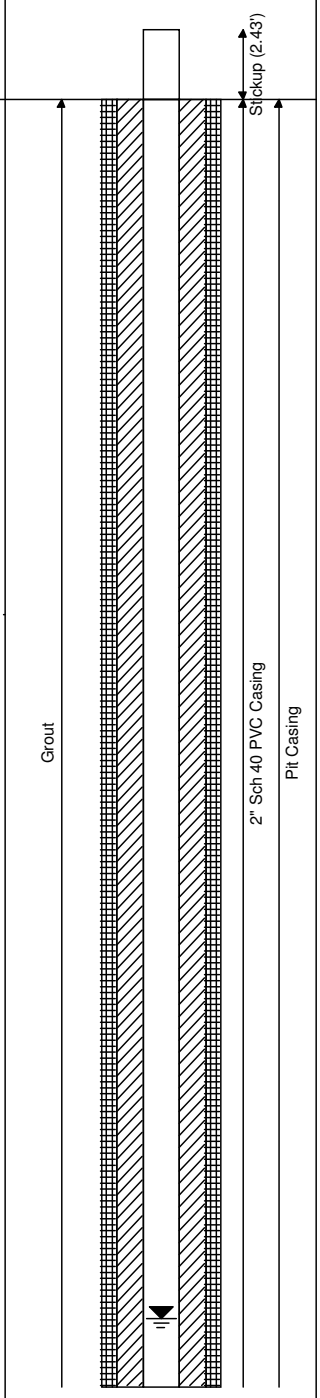
Drilling contractor: Titan Atlantic - sub. Accurate Drilling
Drill rig & method: 3 7/8 Tricomb 3 7/8 HQ Core
Logged by: J. Pfohl

Date started: 6/10/2003
Date ended: 6/10/2003
Completion depth: 102.50 ft
Stickup height: 2.43 ft

Surface elevation: 1006.03 ft (MSL)
Top of pipe elevation: 1008.46 ft (MSL)
Depth to water (TOB): Dry
Depth to water (24hrs): 42.58 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Soil description from adjacent MW-12
				Sandy Silt, tannish brown
5				
10				
15				
				Partially Weathered Rock - brownish gray, micaceous
20				
25				
30				
35				
				Silt, grayish brown, micacous
40				
45				

Well Diagram



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LOG OF BORING: MW-12D

Alexander County Landfill **Project No. G03003.0**

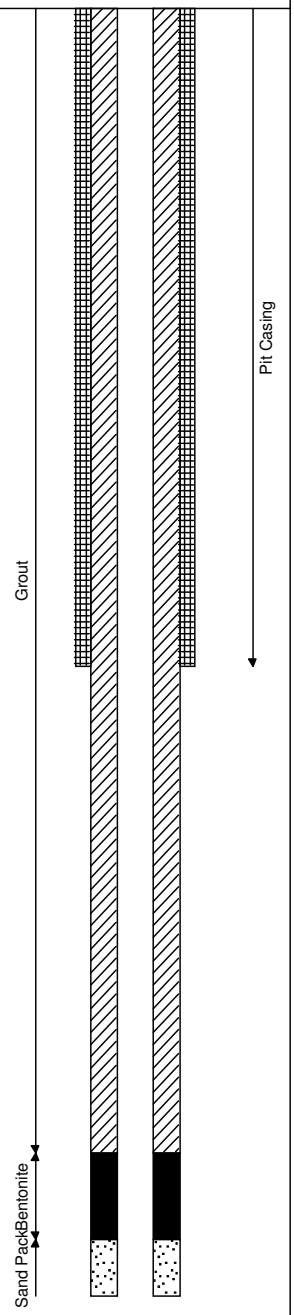
Drilling contractor: Titan Atlantic - sub. Accurate Drilling
Drill rig & method: 3 7/8 Tricomb 3 7/8 HQ Core
Logged by: J. Pfohl

Date started: 6/10/2003
Date ended: 6/10/2003
Completion depth: 102.50 ft
Stickup height: 2.43 ft

Surface elevation: 1006.03 ft (MSL)
Top of pipe elevation: 1008.46 ft (MSL)
Depth to water (TOB): Dry
Depth to water (24hrs): 42.58 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
50				
55				
				Slightly Weathered Rock - bluish gray
60				
65				Rock - bluish gray
70				Run 1: (REC) 5.4'/5.4' = 100%, (RQD) 5.0'/5.4' = 92.6%, Gneiss, micaceous (70.2'-75.6')
75				Run 2: (REC) 5.0'/5.0' = 100%, (RQD) 4.5'/5.0' = 90.0%, Gneiss quartzitic, interbedded schist (75.6'-80.6')
				fracture
80				Run 3: (REC) 5.0'/5.0' = 100%, (RQD) 3.4'/5.0' = 68.0%, As above (80.6'-85.6')
85				Run 4: (REC) 4.26'/4.26' = 100', (RQD) 3.4'/4.26' = 79.8%, As above (85.6'-89.86')
90				Run 5: (REC) 5.0/5.0' = 100%, (RQD) 5.0'/5.0' = 100% As above (89.86'-94.86')

Well Diagram



LOG OF BORING: MW-12D

Alexander County Landfill **Project No. G03003.0**

Drilling contractor: Titan Atlantic - sub. Accurate Drilling
Drill rig & method: 3 7/8 Tricomb 3 7/8 HQ Core
Logged by: J. Pfohl

Date started: 6/10/2003
Date ended: 6/10/2003
Completion depth: 102.50 ft
Stickup height: 2.43 ft

Surface elevation: 1006.03 ft (MSL)
Top of pipe elevation: 1008.46 ft (MSL)
Depth to water (TOB): Dry
Depth to water (24hrs): 42.58 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks	Well Diagram
95				Run 6: (REC) 5.0'/5.0' = 100%, (RQD) 5.0'/5.0' = 100% As above (94.86'-99.86')	Sand Pack; 2" Sch 40 PVC 0.010 Slotted Pipe
100				Run 7: (REC) 2.6'/2.6' = 100%, (RQD) 2.6'/2.6' = 100% As above (99.86'-102.46')	
				Boring terminated at 102.5 feet	
105					
110					
115					
120					
125					
130					
135					

LOG OF BORING: MW-13

Alexander County Closed Landfill **Project No. G99006.0**

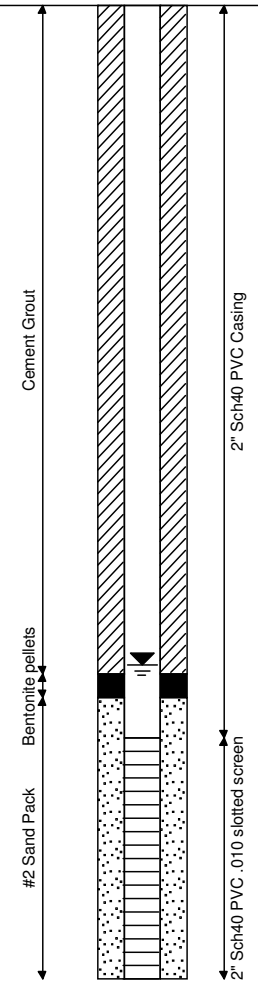
Drilling contractor: Graham & Currie
Drill rig & method: 6.5" O.D DTH
Logged by: Jonathan Pfohl

Date started: 10/25/2000
Date ended: 10/25/2000
Completion depth: 60.50 ft
Stickup height: 3.00 ft

Surface elevation: 1001.00 ft (MSL)
Top of pipe elevation: 1004.00 ft (MSL)
Depth to water (TOB): 57.00 ft
Depth to water (24hrs): 41.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				- 0' - 2' CLAYEY SILT; Tannish Brown.
5				
10				
15				
20				
25				
30				- 18' - 38' PARTIALLY WEATHERED ROCK; Brownish Gray, micaceous.
				- 30' - 37' ROCK; Bluish gray, hard.
35				
40				- 40' - 42' ROCK; Gray, competent.
45				- 44.5'- Tricomb rollerbit refusal converted to 6.5" O.D DTH.
50				- 42' - 61.5' ROCK; Gray competent Gneiss.
55				
60				Boring terminated at 60.5 feet
65				
70				
75				
80				

Well Diagram



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LOG OF BORING: MW-14

Alexander County Closed Landfill **Project No. G99006.0**

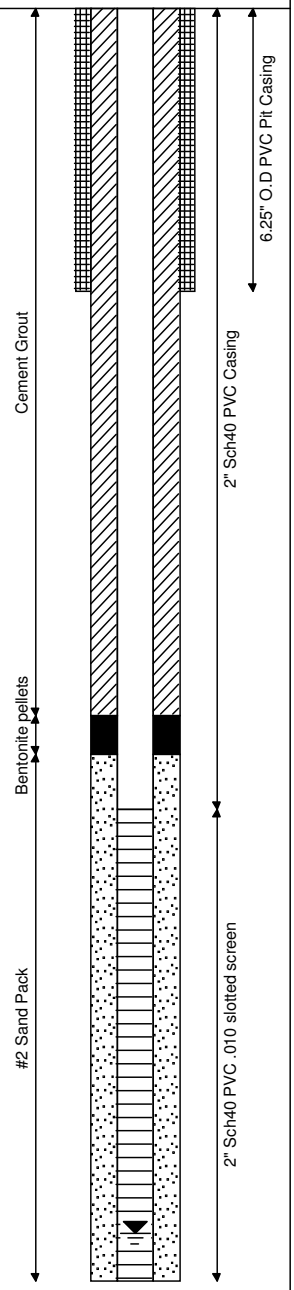
Drilling contractor: Graham & Currie
Drill rig & method: 6.0" O.D Tricomb air rotary
Logged by: Jonathan Pfohl

Date started: 10/26/2000
Date ended: 10/26/2000
Completion depth: 40.50 ft
Stickup height: 3.00 ft

Surface elevation: 994.00 ft (MSL)
Top of pipe elevation: 997.00 ft (MSL)
Depth to water (TOB): -99999.00 ft
Depth to water (24hrs): 39.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
5				- 0' - 10' CLAYEY SILT; Fill material placed for drill rig stabilization.
10				- 10' - 12.5' SANDY CLAY; Brown, hard pan.
15				
20				- 12.5' - 33.5' SANDY SILT; Brown, soft, micas.
25				
30				
35				- 33.5' - 37.5' WEATHERED ROCK; Bluish brown.
40				- 37.5' - 40.5' ROCK; Bluish Gray competent hard Gneiss.
				Boring terminated at 40.5 feet

Well Diagram



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LOG OF BORING: MW-15

Alexander County Closed Landfill **Project No. G99006.0**

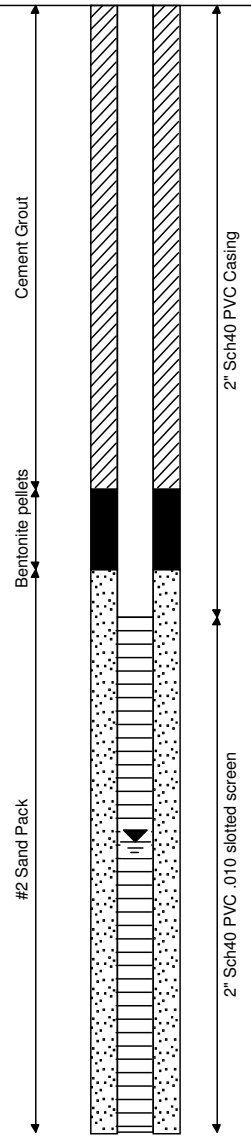
Drilling contractor: Graham & Currie
Drill rig & method: 6.0" O.D Tricomb air rotary
Logged by: Jonathan Pfohl

Date started: 10/25/2000
Date ended: 10/25/2000
Completion depth: 35.00 ft
Stickup height: 3.00 ft

Surface elevation: 1020.00 ft (MSL)
Top of pipe elevation: 1023.00 ft (MSL)
Depth to water (TOB): -99999.00 ft
Depth to water (24hrs): 26.00 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
5				
10				- 0' - 16' CLAYEY SILT; Tannish brown, soft.
15				
20				
25				- 21' - 26' WEATHERED ROCK; Grayish black, slightly harder w/ depth. - 25' WEATHERED ROCK turned from black to brown.
30				- 26' - 35' ROCK; Grayish blue, hard competent Gneiss.
35				Boring terminated at 35.0 feet
40				

Well Diagram



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LOG OF BORING: MW-16

Alexander County Closed MSWLF **Project No. G07060.0**

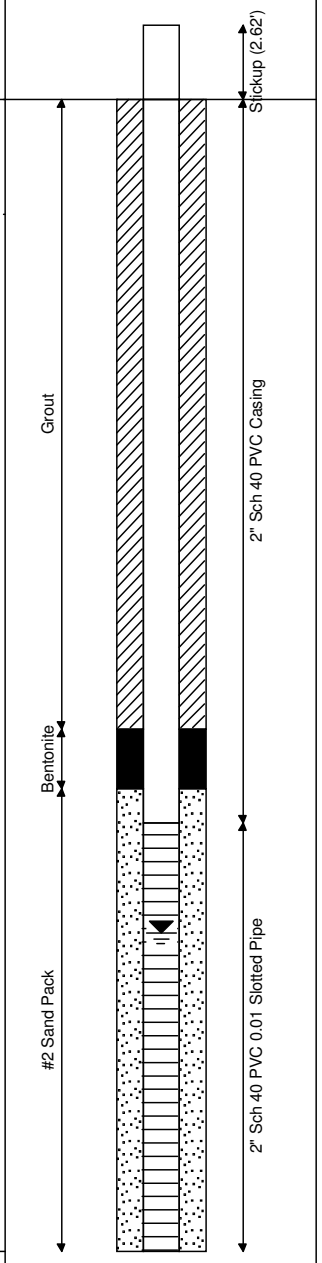
Drilling contractor: Derry's Well Drilling
Drill rig & method: 7.75" HSA
Logged by: J. Pfohl

Date started: 12/20/2007
Date ended: 12/20/2007
Completion depth: 40.25 ft
Stickup height: 2.62 ft

Surface elevation: 1034.94 ft (MSL)
Top of pipe elevation: 1037.56 ft (MSL)
Depth to water (TOB): 30.52 ft
Depth to water (24hrs): 29.13 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
	23			Silty Clay; red, slightly micaceous, cohesive, moist
	25			Sandy Silt; light brown, micaceous, dry
5				
10	46			Sandy Silt; same as above, more dense
15				
20	62			Silty Sand/Saprolite; medium brown, few quartz and gneiss fragments, micaceous, dry
25				
30	80			Silty Sand/Saprolite; same as above, moist
35				Bulk Sample - Silty Sand, Gravel = 6.71%, Sand = 66.26%, Silt & Clay = 27.03%, LL = 28%, PL = 26%, PI = 2%
40				Boring terminated at 40.3 feet
45				

Well Diagram



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LOG OF BORING: MW-17

Alexander County Landfill **Project No. G03003.0**

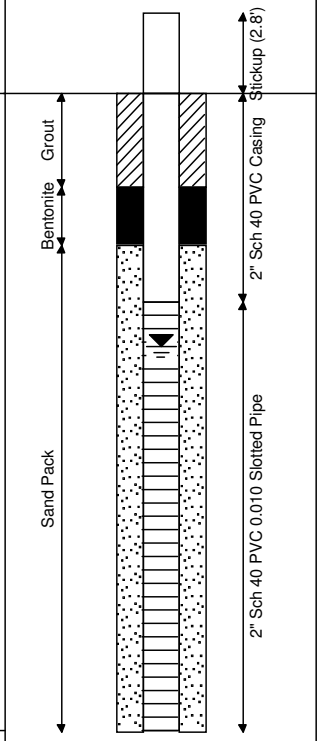
Drilling contractor: Titan Atlantic-sub. Accurate Drilling
Drill rig & method: 6" HSA OD
Logged by: J. Pfohl

Date started: 6/10/2003
Date ended: 6/10/2003
Completion depth: 22.30 ft
Stickup height: 2.80 ft

Surface elevation: 988.36 ft (MSL)
Top of pipe elevation: 991.16 ft (MSL)
Depth to water (TOB): 9.30 ft
Depth to water (24hrs): 8.86 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
	3			Top Soil, moist
	50/3"			Partially Weathered Rock - dry
5				
	50/5"			Partially Weathered Rock - interbeded soft layers
10				
15				
	50/2"			Partially Weathered Rock
20				
				Boring terminated at 22.3 feet
25				
30				
35				
40				
45				

Well Diagram



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LOG OF BORING: MW-18

Alexander County Closed MSWLF **Project No. G07060.0**

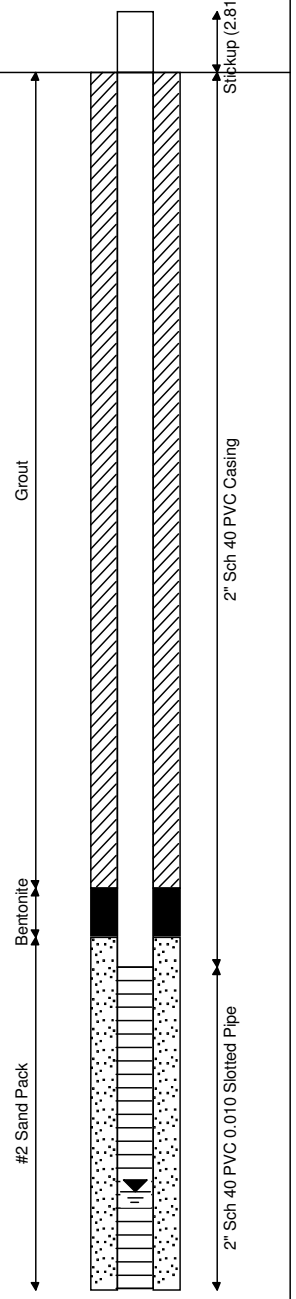
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH, no SPT
Logged by: J. Pfohl

Date started: 12/19/2007
Date ended: 12/19/2007
Completion depth: 56.70 ft
Stickup height: 2.81 ft

Surface elevation: 1081.52 ft (MSL)
Top of pipe elevation: 1084.33 ft (MSL)
Depth to water (TOB): 53.29 ft
Depth to water (24hrs): 52.17 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, slightly micaceous, cohesive, moist
5				Silty Sand; yellow red, poorly sorted, slightly micaceous, more dense with depth, dry
10				
15				Silty Sand/Saprolite; yellow red, same as above, more dense
				PWR; brown, interlayered with brown silty sand, trace gneiss fragments, dry
20				Top of Competent Rock = 1061.02 amsl - weathered, brown, dry
25				Gneiss; grey, competent, very hard, dry
30				
35				Clay Silt; brown, soft, dry
40				
45				Gneiss; grey, competent, few fractures
50				Gneiss; soft fracture, water zone
				Gneiss; grey, competent
55				
				Boring terminated at 56.7 feet
60				

Well Diagram



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LOG OF BORING: MW-19

Alexander County Closed MSWLF **Project No. G07060.0**

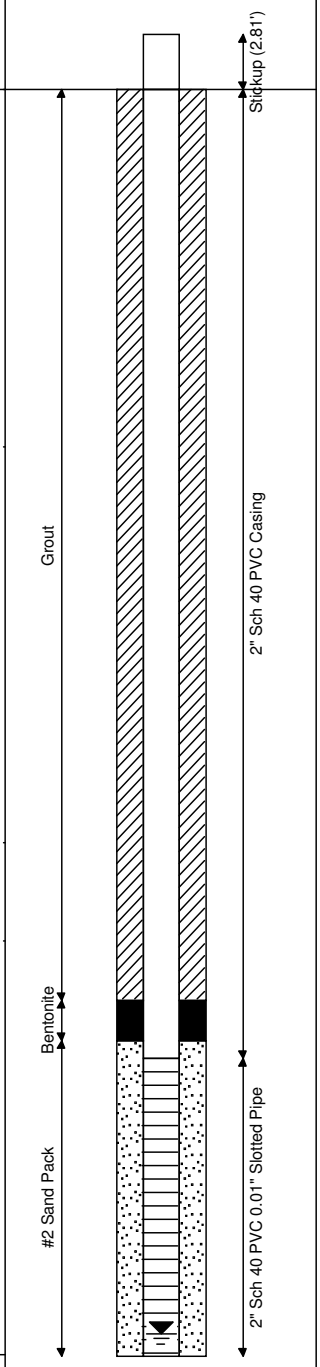
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH
Logged by: J. Pfohl

Date started: 12/20/2007
Date ended: 12/20/2007
Completion depth: 63.92 ft
Stickup height: 2.81 ft

Surface elevation: 1068.67 ft (MSL)
Top of pipe elevation: 1071.48 ft (MSL)
Depth to water (TOB): 63.71 ft
Depth to water (24hrs): 62.80 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, cohesive, micaceous, moist, cohesive
5				Clayey Silt; light to medium brown, micaceous, dense, dry
10				
15				
20				Silty Sand/Saprolite; yellow red, poorly sorted, slightly micaceous, more dense with depth, dry
25				
30				
35				
40				PWR; weathered gneiss, brown, few angular grains, dry.
45				Top of Competent Rock = 1025.67 amsl - Gneiss; grey, few fractures, dry
50				
55				7 Day water level
60				
65				Boring terminated at 63.9 feet

Well Diagram



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LOG OF BORING: MW-20

Alexander County Closed MSWLF **Project No. G07060.0**

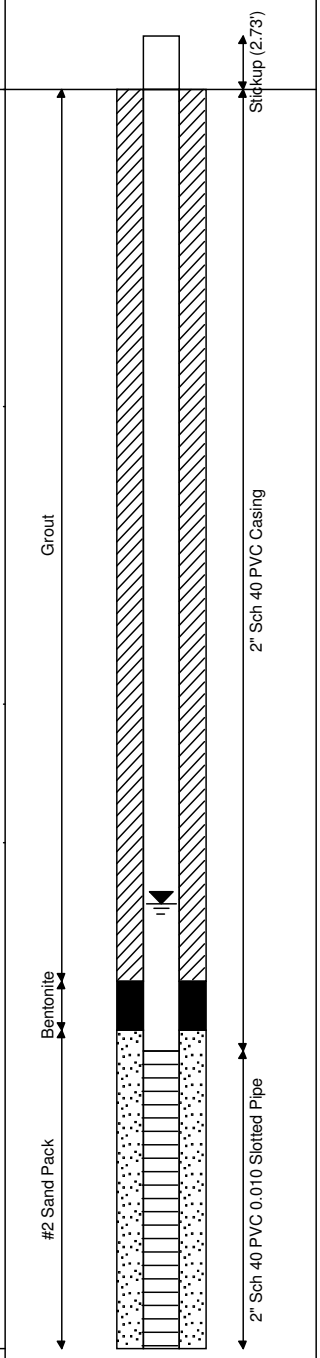
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH
Logged by: J. Pfohl

Date started: 12/20/2007
Date ended: 12/20/2007
Completion depth: 63.55 ft
Stickup height: 2.73 ft

Surface elevation: 1044.19 ft (MSL)
Top of pipe elevation: 1046.92 ft (MSL)
Depth to water (TOB): 42.38 ft
Depth to water (24hrs): 41.08 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Clayey Silt; red, cohesive, moist
				Clayey Silt; light brown, darker and more dense with depth, dry
5				
10				
15				
				Silty Sand/Saprolite; yellow red, fine grained silt interlayered with coarse grained micaceous sand, more dense with depth, dry
20				
25				
30				
				PWR; brown, weathered gneiss, layers of grey gneiss, angular fragments, micaceous, dry
35				
				Top of Competent Rock = 1006.19 amsl
40				Gneiss; grey, few fractures, dry
45				
50				
55				
60				
65				Boring terminated at 63.5 feet

Well Diagram



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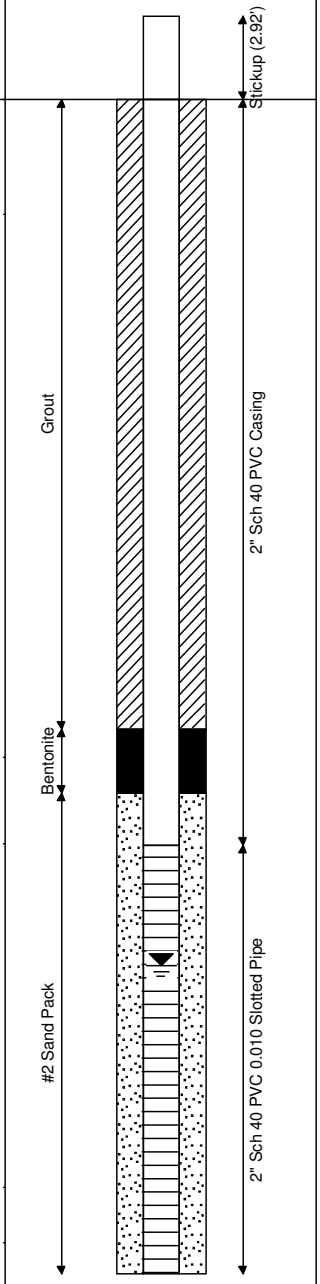
LOG OF BORING: MW-21

Alexander County Closed MSWLF **Project No. G07060.0**

Drilling contractor:	Derry's Well Drilling	Date started:	12/19/2007	Surface elevation:	987.08 ft (MSL)
Drill rig & method:	6" OD DTH	Date ended:	12/19/2007	Top of pipe elevation:	990.00 ft (MSL)
Logged by:	J. Pfohl	Completion depth:	41.05 ft	Depth to water (TOB):	32.27 ft
		Stickup height:	2.92 ft	Depth to water (24hrs):	30.28 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Clayey Silt; red brown, cohesive, few root fragments, moist
5				Silty Sand; medium brown, poorly sorted, slightly micaceous, dry
10				Silty Sand; light brown, poorly sorted, few angluar rock fragments, more dense with depth, dry
15				
20				
				PWR; brown weatherd gneiss, dense, dry
25				Silty Sand; yellow orange, medium to fine grained sand, few PWR zones, micaceous, more dense with depth, dry
30				Silty Sand/Saprolite; yellow orange, darker with depth, micaceous, dry
35				
				PWR layer
40				Silty Sand/Saprolite
				Boring terminated at 41.0 feet
45				

Well Diagram



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LOG OF BORING: MW-22

Alexander County Closed MSWLF **Project No. G07060.0**

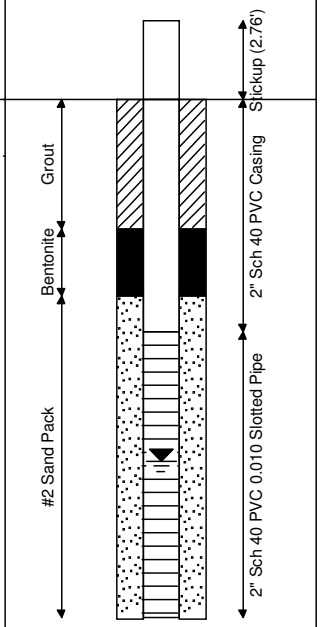
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH
Logged by: J. Pfohl

Date started: 12/19/2007
Date ended: 12/19/2007
Completion depth: 18.12 ft
Stickup height: 2.76 ft

Surface elevation: 956.21 ft (MSL)
Top of pipe elevation: 958.97 ft (MSL)
Depth to water (TOB): 12.76 ft
Depth to water (24hrs): 12.64 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Clayey Silt; red brown, cohesive, moist
				Silty Sand; medium brown, poorly sorted, micaceous, soft, dry
5				
				Silty Sand; dark brown, poorly sorted, dense, micaceous, moist
10				
15				
				Bulk Sample- Silty Sand, Gravel = 14.99%, Sand = 67.92%, Silt & Clay = 17.09%, LL = 28, PL = 26%, PI =2%
20				Boring terminated at 18.1 feet
25				
30				
35				
40				
45				

Well Diagram



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LOG OF BORING: MW-23

Alexander County Closed MSWLF **Project No. G07060.0**

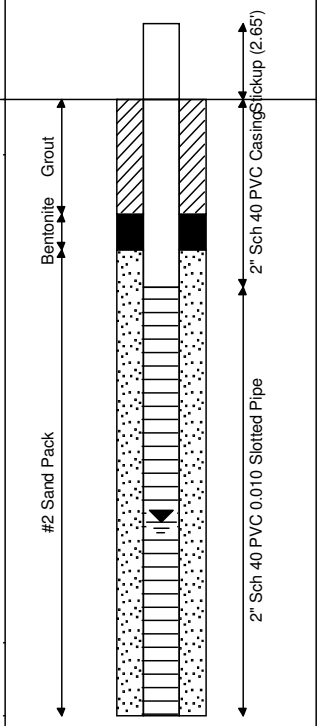
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH
Logged by: J. Pfohl

Date started: 12/19/2007
Date ended: 12/19/2007
Completion depth: 21.54 ft
Stickup height: 2.65 ft

Surface elevation: 947.83 ft (MSL)
Top of pipe elevation: 950.48 ft (MSL)
Depth to water (TOB): 15.71 ft
Depth to water (24hrs): 14.79 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Clayey Silt; red brown, cohesive, micaceous, moist
				Silty Sand/Saprolite; yellow orange, poorly sorted, several angualr gneiss fragments, more dense with depth
5				
10				
15				Silty Sand/Saprolite; dark brown, poorly sorted, several angular gravel sized gneiss fragments, highly micaceous, strong relict structure, moist
20				PWR; dark brown, moist
				Top of Competent Rock = 926.29 amsl - Gneiss, grey, competent
				Boring terminated at 21.5 feet
25				
30				
35				
40				
45				

Well Diagram



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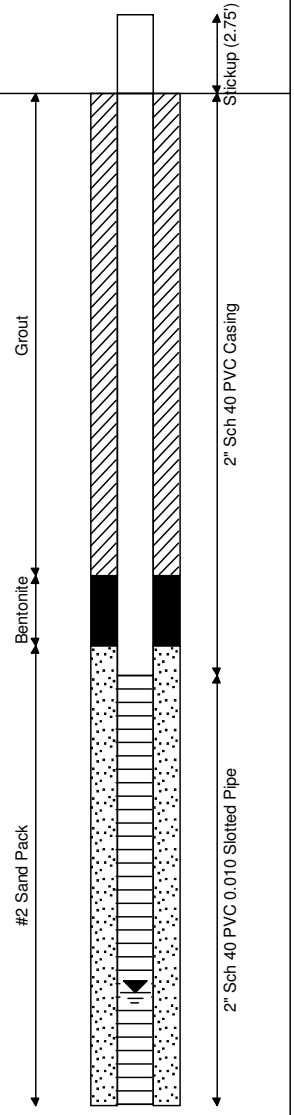
LOG OF BORING: MW-24

Alexander County Closed MSWLF **Project No. G07060.0**

Drilling contractor:	Derry's Well Drilling	Date started:	12/20/2007	Surface elevation:	971.29 ft (MSL)
Drill rig & method:	6" OD DTH, no SPT	Date ended:	12/20/2007	Top of pipe elevation:	974.04 ft (MSL)
Logged by:	J. Pfohl	Completion depth:	35.35 ft	Depth to water (TOB):	32.43 ft
		Stickup height:	2.75 ft	Depth to water (24hrs):	31.43 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, cohesive, moist, soft
5				
				Silty Sand; red, fine grained, few cohesive clay nodules, slightly micaceous, dry
10				Sandy Silt; light brown, fine grained, soft, dry
				Silty Sand; brown, well sorted, fine grained, dense, dry, more dense with depth
15				
20				
25				Silty Sand; same as above with more gneiss fragments
30				
				PWR; light brown, schistose, high mica content, dense, dry
35				
				Top of Competent Rock = 935.94 amsl - Gneiss
				Boring terminated at 35.4 feet
40				
45				

Well Diagram



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LOG OF BORING: MW-25

Alexander County Closed MSWLF **Project No. G07060.0**

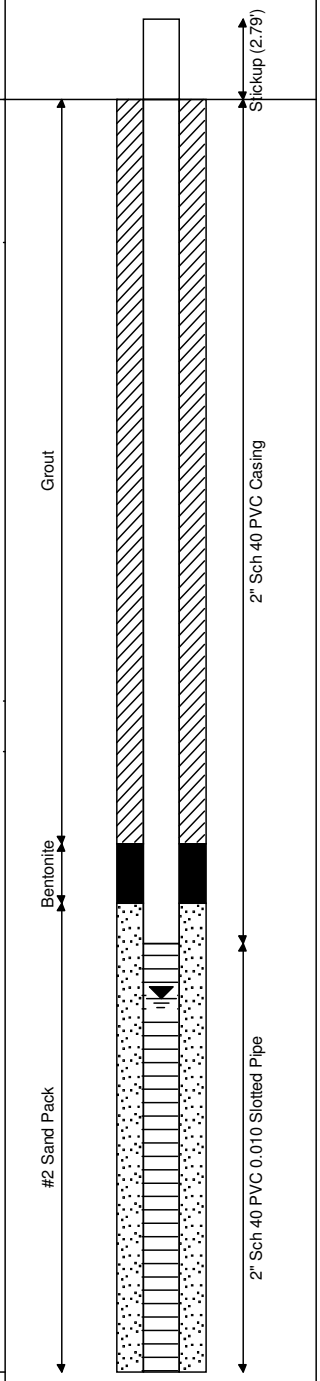
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD DTH, no SPT
Logged by: J. Pfohl

Date started: 12/19/2007
Date ended: 12/19/2007
Completion depth: 44.48 ft
Stickup height: 2.79 ft

Surface elevation: 979.14 ft (MSL)
Top of pipe elevation: 981.93 ft (MSL)
Depth to water (TOB): 31.23 ft
Depth to water (24hrs): 31.39 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, cohesive, soft, moist
5				Silty Sand; dark brown, well sorted, fine grained, dry
				Silty Sand; medium brown, well sorted, fine grained, few rock fragments, dry
10				
15				Silty Sand/Saprolite; light brown, dense, large amount of angular gniess fragments relict structure, micaceous, dry
20				
				PWR; light brown schist, very micaceous, dense, dry
				Top of Competent Rock = 956.34 amsl - Gneiss; grey, hard
25				
30				Fracture Observed
35				
40				
45				Boring terminated at 44.5 feet

Well Diagram



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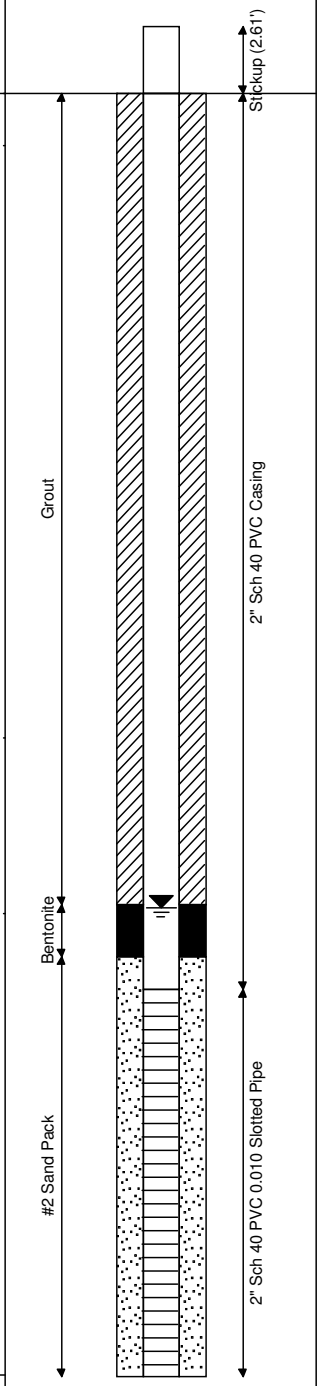
LOG OF BORING: MW-26

Alexander County Closed MSWLF **Project No. G07060.0**

Drilling contractor:	Derry's Well Drilling	Date started:	12/19/2007	Surface elevation:	988.08 ft (MSL)
Drill rig & method:	6" OD DTH	Date ended:	12/20/2007	Top of pipe elevation:	990.69 ft (MSL)
Logged by:	J. Pfohl	Completion depth:	49.80 ft	Depth to water (TOB):	37.24 ft
		Stickup height:	2.61 ft	Depth to water (24hrs):	31.59 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, cohesive, moist
				Silty Sand; medium brown, poorly sorted, micaceous, dry
5				
10				Silty Sand/Saprolite; light brown, poorly sorted, predominantly gravel sized fragments, micaceous, dry, more dense with depth
15				
20				
25				PWR; light brown schist, schist and gneiss fragments, micaceous, dry
30				
				Top of Competent Rock = 956.23 amsl - Gniess; grey, hard,
35				
40				
45				Fracture zone (44.80' -46.00' BGS)
50				Boring terminated at 49.8 feet

Well Diagram



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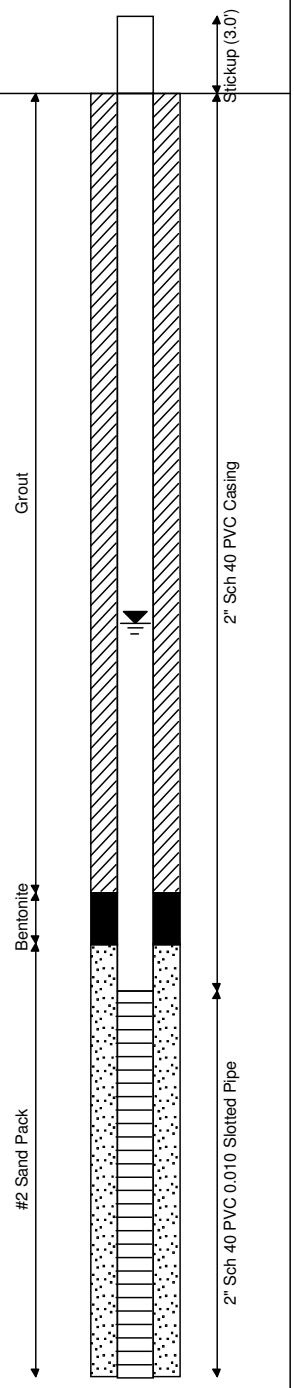
LOG OF BORING: MW-27

Alexander County Closed MSWLF **Project No. G07060.0**

Drilling contractor:	Derry's Well Drilling	Date started:	12/20/2007	Surface elevation:	989.19 ft (MSL)
Drill rig & method:	6" OD DTH	Date ended:	12/20/2007	Top of pipe elevation:	992.19 ft (MSL)
Logged by:	J. Pfohl	Completion depth:	49.82 ft	Depth to water (TOB):	35.50 ft
		Stickup height:	3.00 ft	Depth to water (24hrs):	20.57 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Clay; red, cohesive, moist
				Silty Sand; medium brown, poorly sorted, micaceous, dry
5				
				Silty Sand/Saprolite; light brown, poorly sorted, gravel sized fragments, more dense with depth, micaceous, dry
10				
15				
				PWR; light grey gneiss, dense, schist and gneiss fragments, micaceous, dry
20				
				Top of Competent Rock = 965.49 amsl - Gneiss; grey, hard, few fractures
25				
30				
35				
40				
45				
				Fracture
50				Boring terminated at 49.8 feet

Well Diagram



Municipal Engineering Services Company, P.A.

Operation/Construction Managers Civil/Sanitary EngineersEnvironmental Studies

PO Box 97, Garner, North Carolina 27529 (919) 772-5393PO Box 349, Boone, North Carolina 28607 (828) 262-1767

LOG OF BORING: MW-31

Alexander County Landfill **Project No. G07060.0**

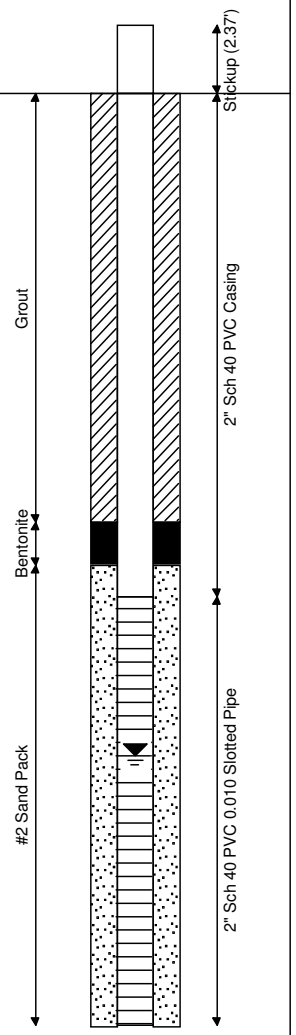
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD Air Rotary
Logged by: J. Pfohl

Date started: 8/16/2010
Date ended: 8/16/2010
Completion depth: 32.56 ft
Stickup height: 2.37 ft

Surface elevation: 983.05 ft (MSL)
Top of pipe elevation: 985.42 ft (MSL)
Depth to water (TOB): 23.53 ft
Depth to water (24hrs): 23.12 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
5				Silty Sand; yellow brown, coarse grained, well sorted, cobble size fragments, moderately dense, dry (4'-5' cutting sample retrieval)
10				Silty Sand; yellow brown, fine to medium grained, less dense, dry (9'-10' cutting sample retrieval)
15				Silty Sand; same as above (14'-15' cutting sample retrieval)
20				Silty Sand, Saprolite; yellow brown, fine to medium grained, few cobble size angular fragments, moderately dense, slightly cohesive, slightly moist (19'-20' cutting sample retrieval)
25				Silty Sand, Saprolite; yellow brown, fine grained, micaceous, few PWR fragments, moderately dense, dry (24'-25' cutting sample retrieval)
30				Silty Sand, Saprolite; fine grained, micaceous, dense, slight cohesiveness, moist (29'-30' cutting sample retrieval)
35				Boring terminated at 32.6 feet
40				
45				

Well Diagram



Municipal Engineering Services Company, P.A.
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PO Box 97, Garner, North Carolina 27529 (919) 772-5393 PO Box 349, Boone, North Carolina 28607 (828) 262-1767

LOG OF BORING: MW-32

Alexander County Landfill **Project No. G07060.0**

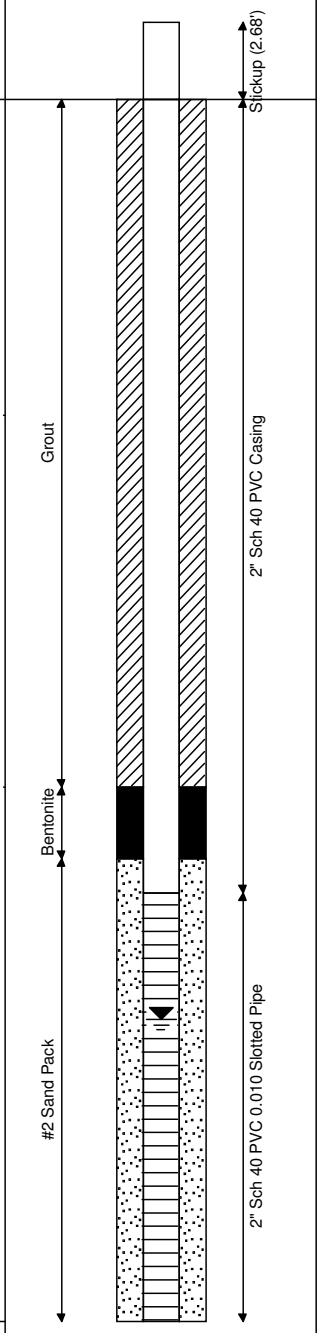
Drilling contractor: Derry's Well Drilling
Drill rig & method: 6" OD Air Rotary DTH
Logged by: J. Pfohl

Date started: 8/16/2010
Date ended: 8/16/2010
Completion depth: 42.70 ft
Stickup height: 2.68 ft

Surface elevation: 1022.57 ft (MSL)
Top of pipe elevation: 1025.26 ft (MSL)
Depth to water (TOB): 32.08 ft
Depth to water (24hrs): 32.16 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Clayey Silt; red brown, homogeneous, moist
5				Clayey Silt; red brown, homogeneous, slightly cohesive, low density, moist (4'-5' cutting sample retrieval)
10				Silty Sand; brown, micaceous, few cobble size PWR fragments, moderately dense, dry (9'-10' cutting sample retrieval)
				PWR; brown, moderately dense, dry
15				PWR; brown, moderately dense, few cobble size PWR fragments, micaceous, dry (14'-15' cutting sample retrieval)
				Saporlite seam; dry, less dense
20				PWR; brown, moderately dense to very dense, large rock fragments, dry (19'-20' cutting sample retrieval)
25				Rock; Gneiss, grey, competent, very dense, dry (24'-25' cutting sample retrieval)
30				
35				
40				
				Boring terminated at 42.7 feet
45				

Well Diagram



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LOG OF BORING: IW-1

Alexander County Acitve C&D over Closed MSW **Project No. G10059.0**

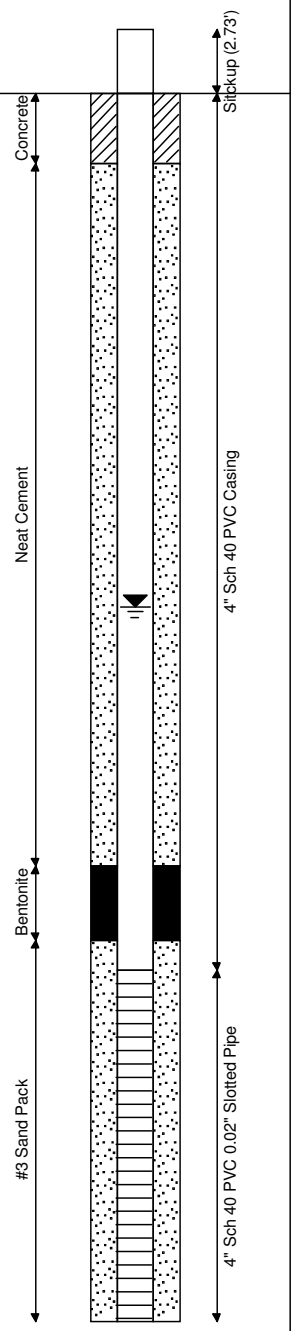
Drilling contractor: Derrys Well Drilling
Drill rig & method: 8" OD DTH
Logged by: J. Pfohl

Date started: 2/14/2011
Date ended: 2/14/2011
Completion depth: 52.44 ft
Stickup height: 2.73 ft

Surface elevation: 987.71 ft (MSL)
Top of pipe elevation: 990.44 ft (MSL)
Depth to water (TOB): 24.92 ft
Depth to water (24hrs): 21.92 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Sand; medium red, some cohesive clay, moderately dense, dry
5				Silty Sand; medium red, poorly sorted, micaceous, moderately dense, dry
10				Silty Sand; brown, poorly sorted, micaceous, moderately dense, dry
				Silty Sand; brown, becomming more dense
15				Silty Sand/Saprolite; poorly sorted, gravel size PWR fragments, increasingly more dense with depth, dry
				PWR; brown, very dense, unconsolidated boulder
20				Silty Sand/Saprolite; poorly sorted fine to coarse grained, micaceous, moderately dense, dry
25				PWR; brown, schistose & gneissic structure, very dense, micaceous, dry
				Rock; grey, competent
30				
35				
40				
45				
50				
				Boring terminated at 52.4 feet
55				

Well Diagram



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Operation/Construction Managers Civil/Sanitary Engineers Environmental Studies
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LOG OF BORING: P-1

Alexander County **Project No. G10059.0**

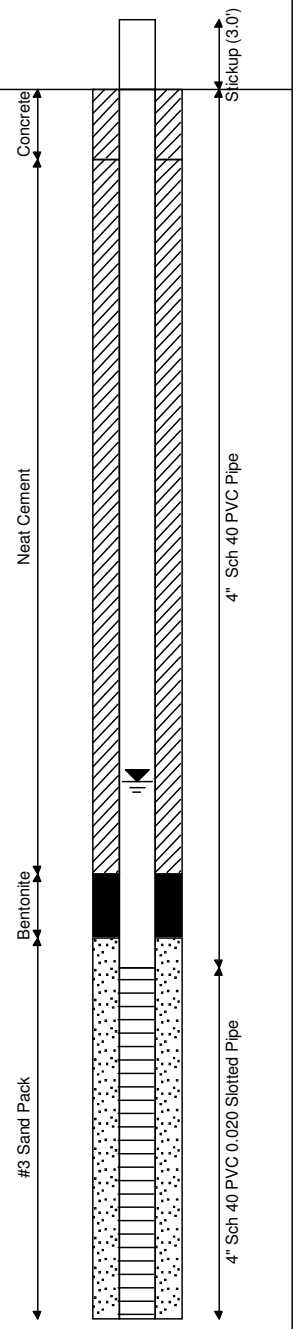
Drilling contractor: Derrys Well Drilling
Drill rig & method: 6.5" DTH
Logged by: J. Pfohl

Date started: 2/14/2011
Date ended: 2/14/2011
Completion depth: 52.48 ft
Stickup height: 3.00 ft

Surface elevation: 987.71 ft (MSL)
Top of pipe elevation: 990.71 ft (MSL)
Depth to water (TOB): 39.00 ft
Depth to water (24hrs): 29.57 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Sand with Clay; red, dry
5				Silty Sand; medium red, poorly sorted, moderately dense, micaceous, dry
10				Silty Sand; Brown, poorly sorted, moderately dense, micaceous, dry
				Silty Sand/Saprolite with PWR fragments; more dense, dry
15				Silty Sand; moderately brown, poorly sorted, density increases with depth, gravel size PWR fragments, dry
20				
25				PWR; light brown, schistose texture, micaceous, dry
30				Rock; grey, competent and dense, dry
35				
40				
45				
50				
				Boring terminated at 52.5 feet
55				

Well Diagram



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LOG OF BORING: P-2

Alexander County Active C&D over Closed MSW **Project No. G10059.0**

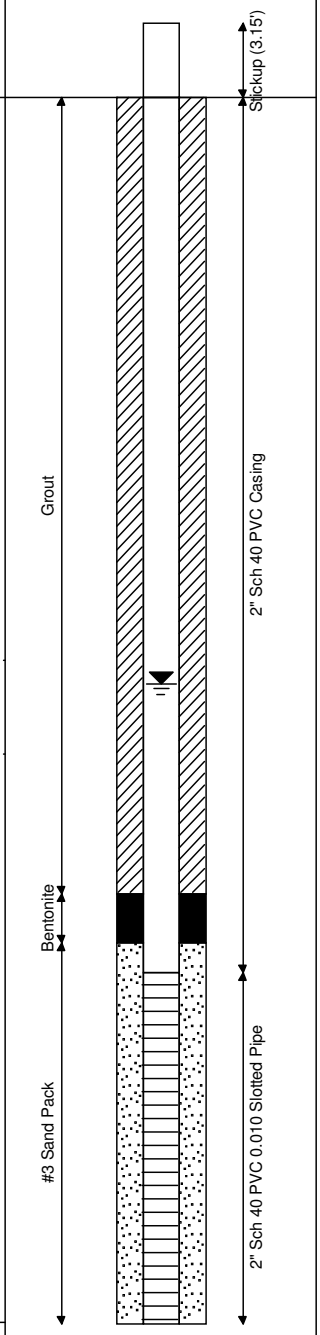
Drilling contractor: Derrys Well Drilling
Drill rig & method: 6.5" DTH
Logged by: J. Pfohl

Date started: 2/14/2011
Date ended: 2/14/2011
Completion depth: 52.36 ft
Stickup height: 3.15 ft

Surface elevation: 989.07 ft (MSL)
Top of pipe elevation: 992.23 ft (MSL)
Depth to water (TOB): 28.05 ft
Depth to water (24hrs): 25.05 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Sand with Clay, cohesive clay, micaceous, moist
5				Silty Sand; medium brown, poorly sorted, fine to medium grained, micaceous, dry
10				Same as above
				Silty Sand/Saproltel; some PWR fragments, increasing density with depth, micaceous, dry
15				
20				Same as above
25				PWR; brown, angular schistose fragments, dry
				Rock; gneiss, grey, dense, competent, dry
30				
35				
40				
45				
50				
				Boring terminated at 52.4 feet
55				

Well Diagram



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Operation/Construction Managers Civil/Sanitary Engineers Environmental Studies
PO Box 97, Garner, North Carolina 27529 (919) 772-5393 PO Box 349, Boone, North Carolina 28607 (828) 262-1767

LOG OF BORING: P-3

Alexander County Active C&D over Closed MSW **Project No. G10059.0**

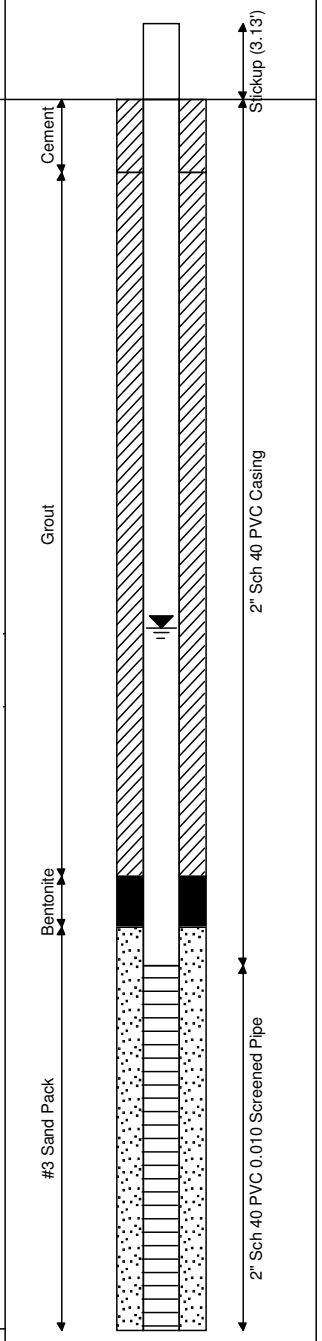
Drilling contractor: Derrys Well Drilling
Drill rig & method: 6.5" DTH
Logged by: J. Pfohl

Date started: 2/14/2011
Date ended: 2/14/2011
Completion depth: 50.64 ft
Stickup height: 3.13 ft

Surface elevation: 985.49 ft (MSL)
Top of pipe elevation: 988.62 ft (MSL)
Depth to water (TOB): 27.75 ft
Depth to water (24hrs): 21.75 ft

Depth (ft)	SPT (bpf)	Soil Type Symbol	Sample	Description of Material & Remarks
				Silty Sand with Clay; red brown, cohesive, micaceous, moist
5				Silty Sand; medium red, poorly sorted, few quartz fragments, micaceous, moderately dense, dry
10				Silty Sand; brown, poorly sorted, micaceous, moderately dense, dry
15				Silty Sand/Saprolite; brown, poorly sorted, few angular schist fragments, increased density with depth, dry
20				Silty Sand; brown, less dense, dry
				PWR; schist, variable density, dry
25				Rock; gneiss, grey, competent, large cuttings, dry
30				
35				
40				
45				
50				Boring terminated at 50.6 feet

Well Diagram



Municipal Engineering Services Company, P.A.
Operation/Construction Managers Civil/Sanitary Engineers Environmental Studies
PO Box 97, Garner, North Carolina 27529 (919) 772-5393 PO Box 349, Boone, North Carolina 28607 (828) 262-1767

NORTH CAROL
DIVISI

FOR OFFICE USE ONLY

Serial No. _____
Long. _____ Pc _____

Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Trigon Engineering Consultants

DRILLER REGISTRATION NUMBER: 813

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)

Well No. MW-1

Nearest Town: Millersville

County: Alexander

(Road, Community, or Subdivision and Lot No.)

2. OWNER: County of Alexander

ADDRESS: 255 Liledoun Road (Street or Route No.)

Taylorsville (City or Town) NC (State) 28681 (Zip Code)

3. DATE DRILLED: 9/14/90 USE OF WELL: Monitor GW

4. TOTAL DEPTH: 40' CUTTINGS COLLECTED: ☐ Yes ☒ No

5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

6. STATIC WATER LEVEL: 35.0 FT. ☐ above ☒ below TOP OF CASING.

TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.

7. YIELD (gpm): N/A METHOD OF TEST: N/A

8. WATER ZONES (depth): 40' to 32.5 below surface

9. CHLORINATION: Type N/A Amount _____

10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	0	25	2"	Sch.40	PVC

11. GROUT:

	Depth From	Depth To	Material	Method
	0	17.5	cement/bent.	poured
	17.5	23.0	Bentonite	

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	25	40	2 in.	0.10 in.	PVC-40
			in.	in.	
			in.	in.	

13. GRAVEL PACK:

	Depth From	Depth To	Size	Material
	23	40	6"	sand

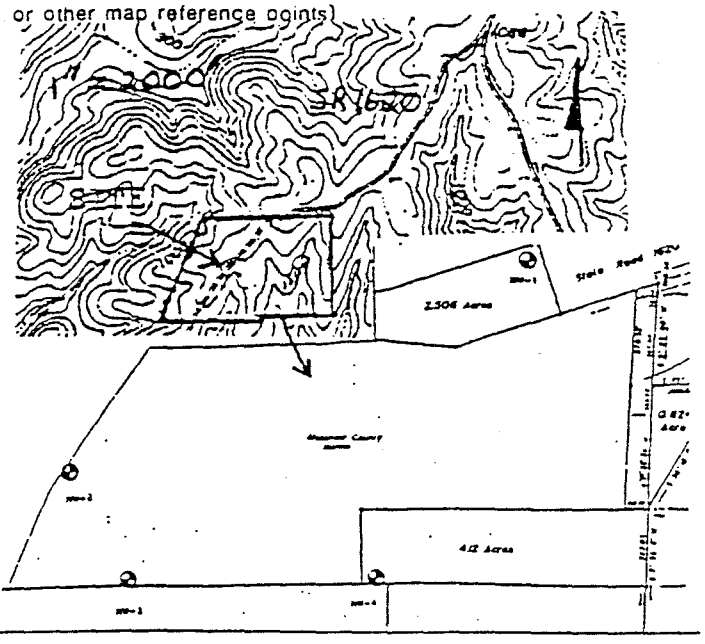
14. REMARKS: Bentonite seal from 17.5' to 23'

Depth From	Depth To	DRILLING LOG Formation Description
0	11.5	Firm to very dense silty coarse to fine SAND
11.5	16	Partially weathered rock sampled as silty coarse to fine SAND
16	19	Very dense silty coarse to fine SAND
19	29.4	Partially weathered rock sampled as coarse to fine SAND
29.4	31	Graphite seam
31	40	Biotite gneiss moderately weathered and fractured with pyrite, amethyst, and quartz crystals

If additional space is needed use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT: Tom [illegible] DATE: 10/17/90

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REVISED 2/90

ARIGON

ENGINEERING CONSULTANTS, INC. Greensboro, N.C.

Job Number: 035-90-003
Project Name: Alexander County Landfill
Location: Alexander County North Carolina

ound Surface Elevation: _____

Well Number: MW-1

Total Depth of Well: 40'

Date Installed: 9/14/90

Granular Backfill Material: Sand

Slot Size: .010

Screen Material: Schedule 40 PVC

Screen Diameter: 2"

Riser Material: Schedule 40 PVC

Riser Diameter: 2"

Drilling Technique: Hollow stem auger/NX Coring

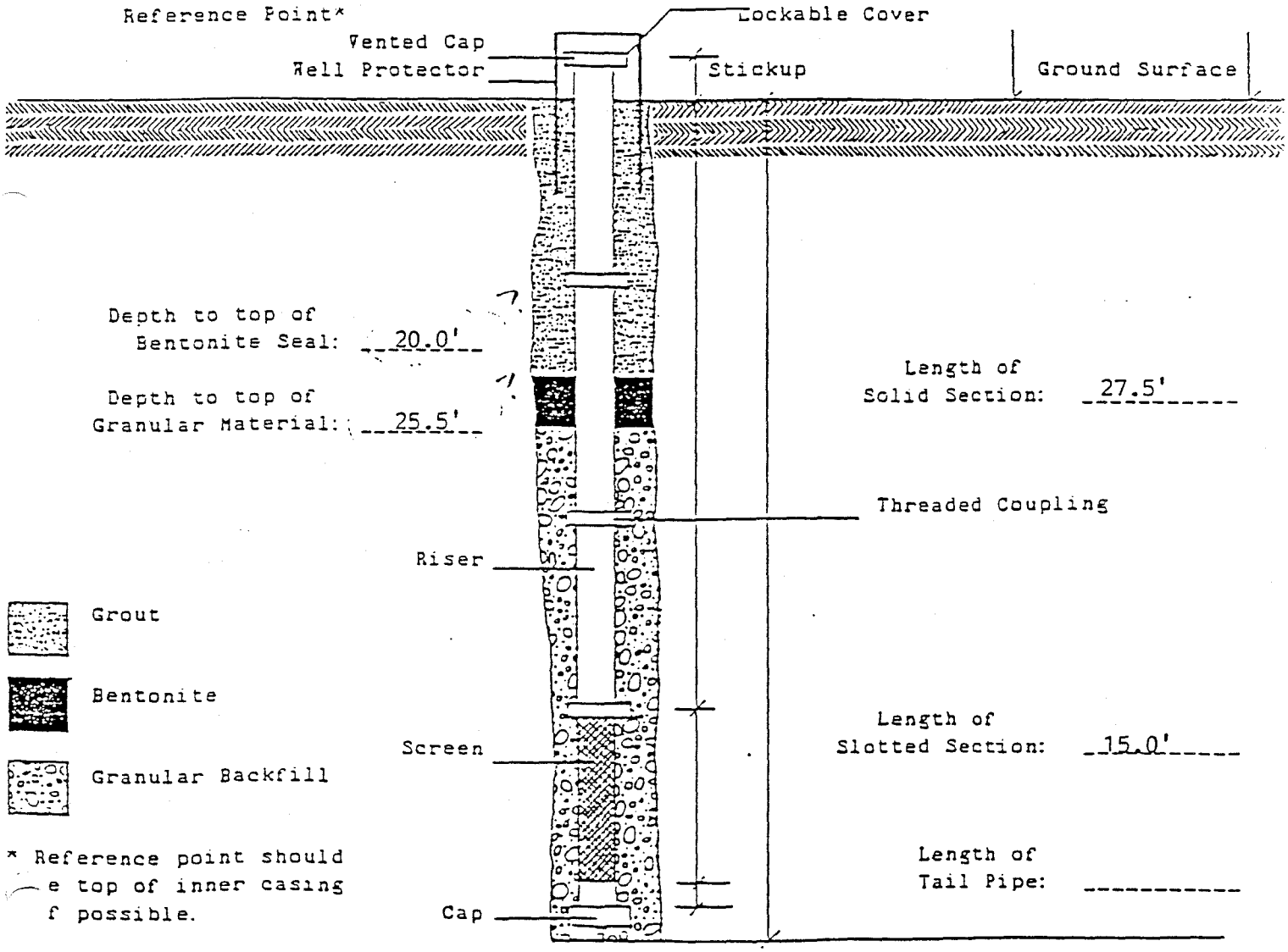
Driller: B. King

Borehole Diameter: 6"

Lock Data: _____

Key Code/Combination: _____

Stabilized Water Level: 32.5' feet below ground surface. Measured on: 9/18/90



* Reference point should e top of inner casing f possible.

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Taylorsville County: Alexander
SR 1620
(Road, Community, or Subdivision and Lot No.)

2. OWNER Alexander County Attn: Charles Mashburn
ADDRESS Admin Bldg 255 Liledown Rd
(Street or Route No.)
Taylorsville NC 28681
City or Town State Zip Code

3. DATE DRILLED 9-30-94 USE OF WELL Monitoring
4. TOTAL DEPTH 48.5'
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ± 43.5 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3.0 FT. Above Land Surface*
* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+3.0	32.5	2"	Sch 40	PVC

13. GROUT:

	Depth From	Depth To	Material	Method
	0	30.0	neat cement	grout
	30.0	31.0	bentonite	pellet

14. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	32.5	47.5	2 in.	.010 in.	PVC
			in.	in.	
			in.	in.	

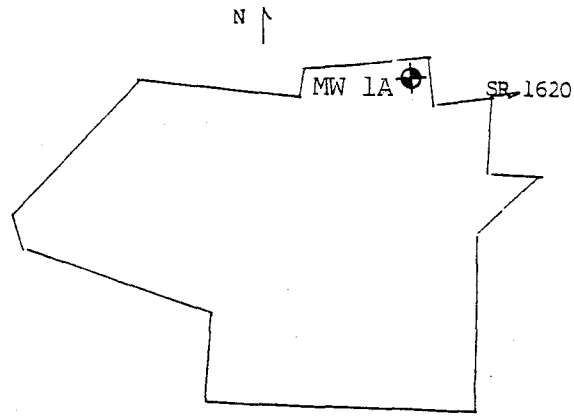
15. SAND/GRAVEL PACK:

	Depth From	Depth To	Size	Material
	31.0	48.5	gravel	silica

16. REMARKS: Monitoring Well 1A

DEPTH From - To	DRILLING LOG Formation Description
0 - 1	Red silty clay
1 - 9	Brown clayey silt, few gneiss fragments
9 - 22	Weathered gneiss
22 - 25.5	Light brown, clayey silt, gneiss fragments
25.5 - 26	Weathered gneiss
26 - 41	Light brown clayey silt with layers of gneiss
41 - 48.5	Weathered gneiss

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Cheryl Marks 10-3-94
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REV. 9/91

Submit original to Division of Environmental Management and copy to well owner.

MW-1B WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Derry Honeycutt CERTIFICATION # 2663

WELL CONTRACTOR COMPANY NAME Derry's Well Drilling PHONE # ( )

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ■ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Taylorsville County Alexander
Paynes Dairy Rd.
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐ Ridge ☐ Slope ☐ Valley ■ Flat
(check appropriate box)
Latitude/longitude of well location
35.1716/-77.4234
(degrees/minutes/seconds)
Latitude/longitude source: ☐ GPS ■ Topographic map
(check box)

3. OWNER: Alexander Co. Solid Waste
Address 255 Liledown Rd.
(Street or Route No.)
Taylorsville NC 28681
City or Town State Zip Code
(828)-632-1101
Area code- Phone number

4. DATE DRILLED 5/21/03
5. TOTAL DEPTH: 61 ft.
6. DOES WELL REPLACE EXISTING WELL? YES ■ NO ☐
7. STATIC WATER LEVEL Below Top of Casing: _____ FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 3.00 FT. Above Land Surface*
***Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.**
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): _____

DEPT From	DEPT To	DRILLING LOG Formation Description
0	1'	Red Silty Clay
1'	9'	Clayey Silt
9'	22'	Weathered Gneiss
22'	25'	Clayey Silt
25'	26'	Weathered Gneiss
26'	41'	Clayey Silt
41'	61'	Weathered Gneiss

Taken from Boring Log for MW-1A

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.

11. DISINFECTION: Type N/A Amount N/A
12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +3.00	To 46	Ft.	2"	Sch 40	PVC
From	To	Ft.			
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 43	To 44.5	Ft.	3/8" Bentonite	Pour
From 0	To 43	Ft.	neat cement	Tremie

14. SCREEN:

	Depth		Diameter		Slot Size		Material
From 46	To 61	Ft.	2	in.	.010	in.	PVC
From	To	Ft.		in.		in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 43	To 44.5	Ft.	#2	Silica Sand
From	To	Ft.		

16. REMARKS: Constructed to replace Background MW-1A which has been dry at times

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

_____
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Trigon Engineering Consultants

DRILLER REGISTRATION NUMBER 813

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

WELL LOCATION: (Show sketch of the location below)

Well No MW-2

Nearest Town: Millersville

County: Alexander

Road, Community, or Subdivision and Lot No.)

OWNER County of Alexander

ADDRESS 255 Liledoun Road (Street or Route No.)

Taylorsville (City or Town) NC (State) 28681 (Zip Code)

DATE DRILLED 9/6/90 USE OF WELL Monitor GW

TOTAL DEPTH 30' CUTTINGS COLLECTED ☐ Yes ☒ No

DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

STATIC WATER LEVEL: 20.5 FT. ☐ above ☒ below TOP OF CASING.

TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.

YIELD (gpm): NA METHOD OF TEST NA

WATER ZONES (depth): 30' to 18' below surface

CHLORINATION: Type NA Amount NA

CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	0	15	2	Sch.40	PVC

GROUT:

	Depth From	Depth To	Material	Method
	0	11	Cement/Bent.	poured
	11	13	Bentonite	

SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	15	30	2"	.010	PVC-40

GRAVEL PACK:

	Depth From	Depth To	Size	Material
	13	30	10"	sand

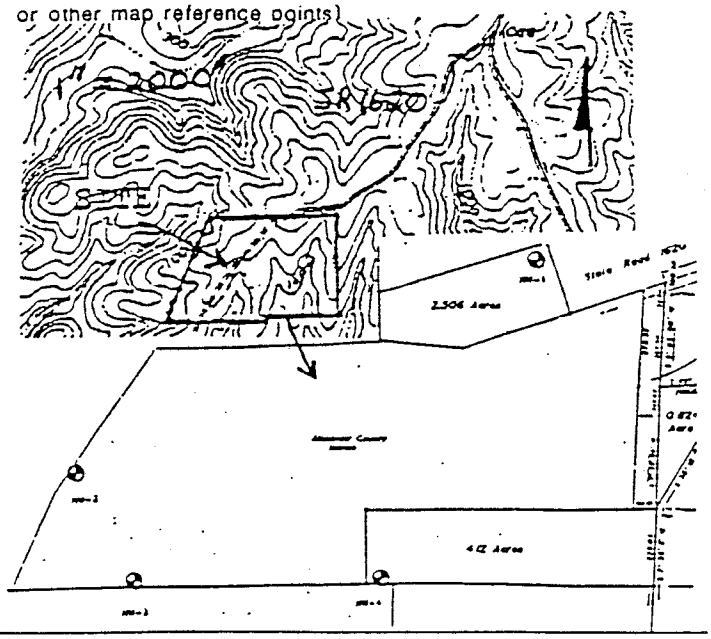
REMARKS: Bentonite seal 11 to 13'

DRILLING LOG

Depth From	Depth To	Formation Description
0	3	Firm brown, orange, and tan slightly micaceous medium to fine sandy SILT (Residual)
3	7	Very dense tan, black, and orange slightly micaceous silty coarse to fine SAND
7	30	Partially weathered rock when sampled becomes brown, orange, and white micaceous silty coarse to fine SAND

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT — DATE 10/17/90

GW-1 REVISED 2/90

Submit original to Division of Environmental Management and copy to well owner.

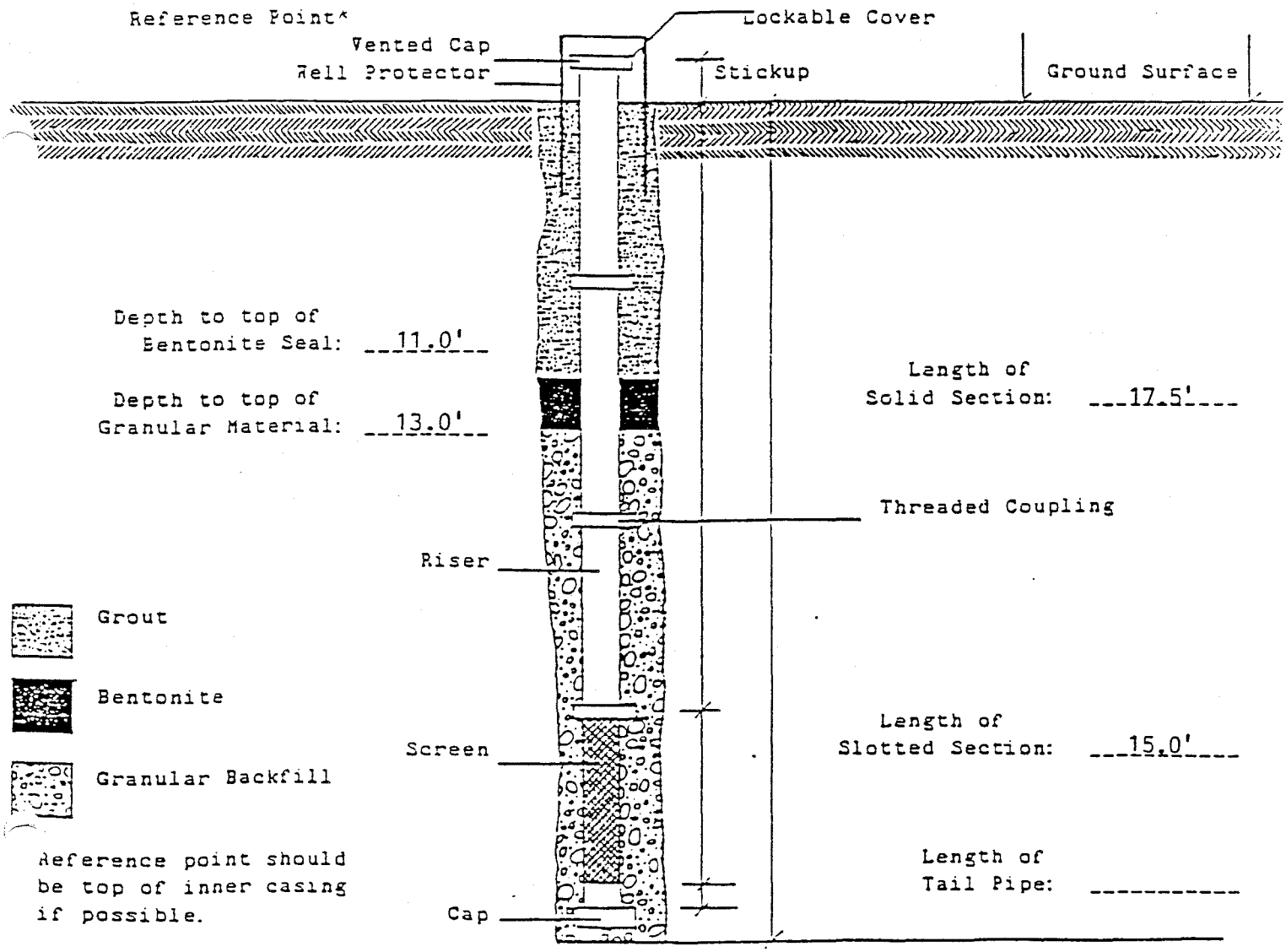
TRIGON

E GINEERING CONSULTANTS, INC. Greensboro, N.C.

Date: 10/18/90
Job Number: 035-90-003
Project Name: Alexander County Landfill
Location: Alexander County North Carolina

Ground Surface Elevation: _____
Well Number: MW-2
Total Depth of Well: 30'
Date Installed: 9/~~12~~6/90
Granular Backfill Material: Sand
Slot Size: .010"
Screen Material: Schedule 40 PVC
Screen Diameter: 2"
Riser Material: Schedule 40 PVC
Riser Diameter: 2"
Drilling Technique: Hollow-stem auger
Driller: B. King
Borehole Diameter: 10"
Lock Data: _____
Key Code/Combination: _____

Stabilized Water Level: 18.0 feet below ground surface. Measured on: 9/12/90



Reference point should be top of inner casing if possible.

CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY

Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: Trigon Engineering Consultants

DRILLER REGISTRATION NUMBER: 813

STATE WELL CONSTRUCTION PERMIT NUMBER: NA

WELL LOCATION: (Show sketch of the location below)

Well No. MW-3

Nearest Town: Millersville

County: Alexander

Road, Community, or Subdivision and Lot No.)

OWNER: County of Alexander

ADDRESS: 255 Liledoun Road (Street or Route No.)

Taylorsville (City or Town) NC (State) 28681 (Zip Code)

DATE DRILLED: 9/19/90 USE OF WELL: Monitor GW

TOTAL DEPTH: 33.0' CUTTINGS COLLECTED: ☐ Yes ☒ No

DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No

STATIC WATER LEVEL: 27.0 FT. ☐ above ☒ below TOP OF CASING.

TOP OF CASING IS 2.0 FT. ABOVE LAND SURFACE.

YIELD (gpm): NA METHOD OF TEST: NA

WATER ZONES (depth): 25' to 33' below surface

CHLORINATION: Type NA Amount _____

Depth From	Depth To	DRILLING LOG Formation Description
0	3	Stiff orange-brown sandy slightly clayey SILT (Residual)
3	7	Dense orange, yellow, tan slightly micaceous fine sandy SILT
7	12	Very stiff green, yellow, tan slightly micaceous fine sandy SILT
12	17.5	Dense white, tan, grey micaceous silty SAND with rock fragments
17.5	23.1	Partially weathered rock when sampled becomes grey, tan slightl micaceous fine sandy SILT
		SEE BACK

If additional space is needed use back of form.

CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	0	13	2"	Sch.40	PVC

GROUT:

	Depth From	Depth To	Material	Method
	8.0'	1.0'	cement/bent.	poured
	8	11	Bentonite	

SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
(X)	13.0'	33.0'	2"	.010 in.	PVC/40

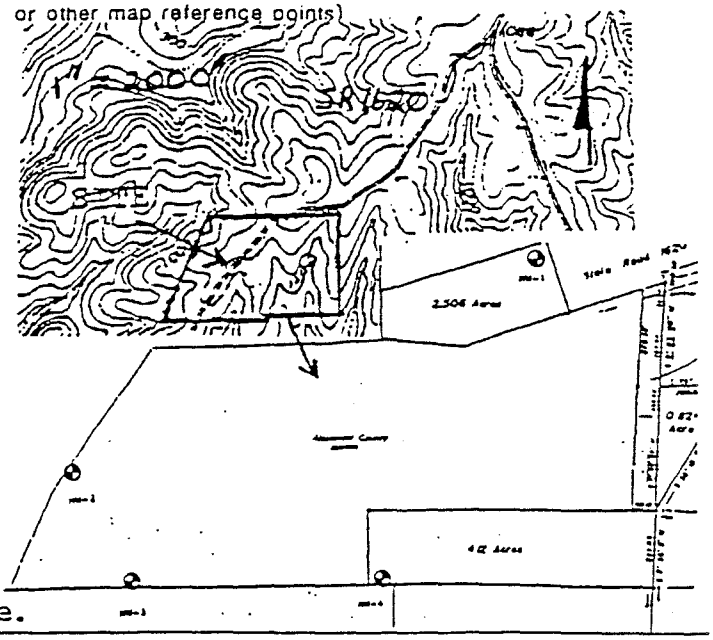
GRAVEL PACK:

	Depth From	Depth To	Size	Material
	11.0'	33.0'	6"	sand

REMARKS: Bentonite seal from 8' to 11' below surface.
Concrete from 1.0' to 0.0'. Locking cover.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT _____ DATE 10/18/90

Submit original to Division of Environmental Management and copy to well owner.

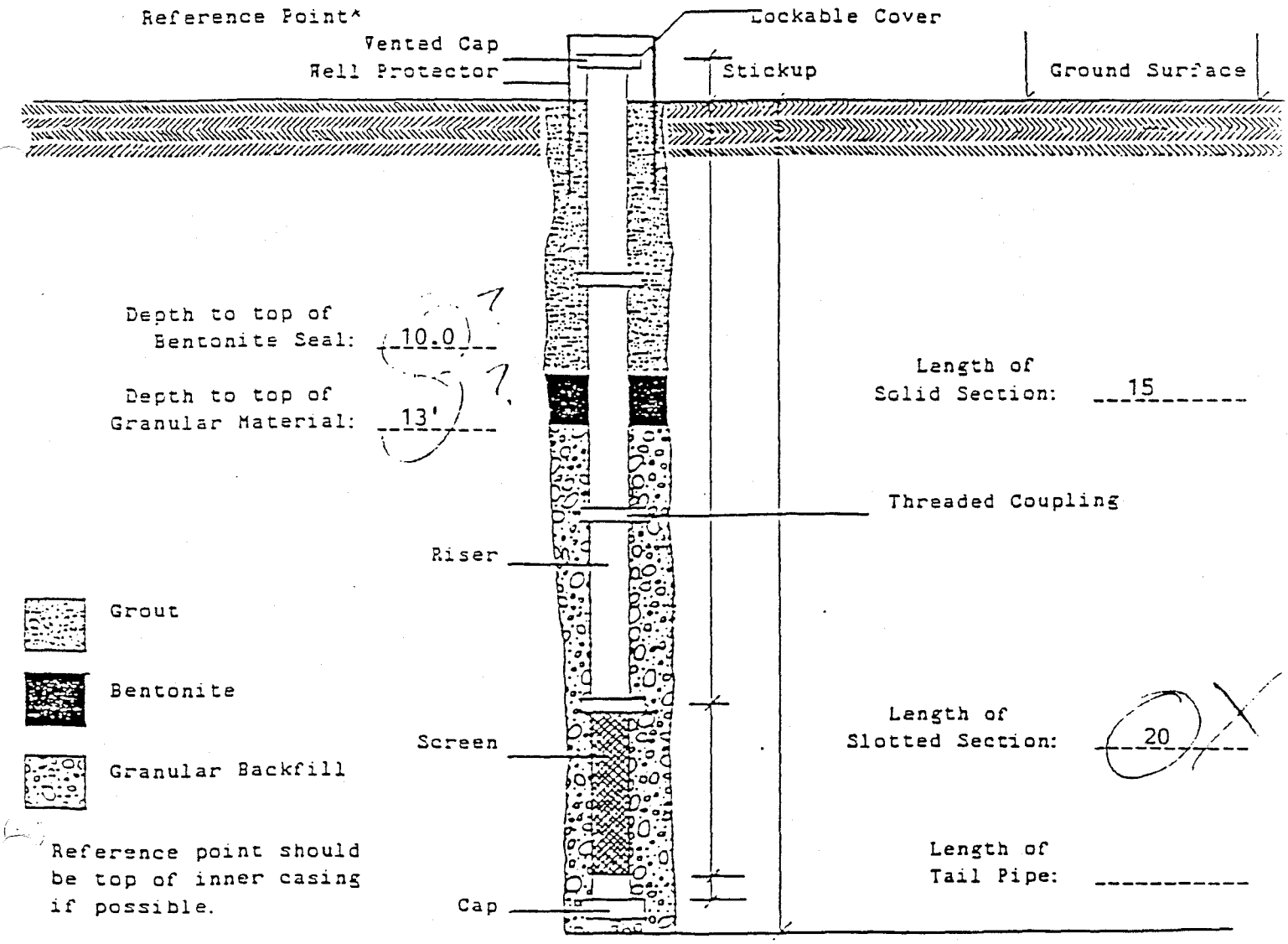
GW-1 REVISED 2/90

TRIGON

ENGINEERING CONSULTANTS, INC. Greensboro, N.C.

Date: 10/18/90
Job Number: 035-90-003
Project Name: Alexander County Landfill
Location: Alexander County

Ground Surface Elevation: _____
Well Number: MW-3
Total Depth of Well: 33.0'
Date Installed: 9/~~21~~19/90
Granular Backfill Material: Sand
Slot Size: .010
Screen Material: Schedule 40 PVC
Screen Diameter: 2"
Riser Material: Schedule 40 PVC
Riser Diameter: 2"
Drilling Technique: Hollow-stem Auger/NX Coring
Driller: B. King
Borehole Diameter: 6"
Lock Data: _____
Key Code/Combination: _____
Stabilized Water Level: 25.0 feet below ground surface. Measured on: 9/21/90



Reference point should be top of inner casing if possible.

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY	
QUAD. NO.	SERIAL NO.
Lat.	Long. / RO
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Taylorsville County: Alexander
   SR 1620
   (Road, Community, or Subdivision and Lot No.)
2. OWNER Alexander County Attn: Charles Mashburn
   ADDRESS Admin Bldg 255 Liledown Rd
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
3. DATE DRILLED 9-30-94 USE OF WELL Monitoring
4. TOTAL DEPTH 21.5
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ± 11.7 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.7 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth):
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+ 2.7	25.5	2"	Sch 40	PVC

13. GROUT:

	Depth From	Depth To	Material	Method
	0	3.5	neat cement	grout
	3.5	4.5	bentonite	pellet

14. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	5.5	20.5	2 in.	.010 in.	PVC
			in.	in.	
			in.	in.	

15. SAND/GRAVEL PACK:

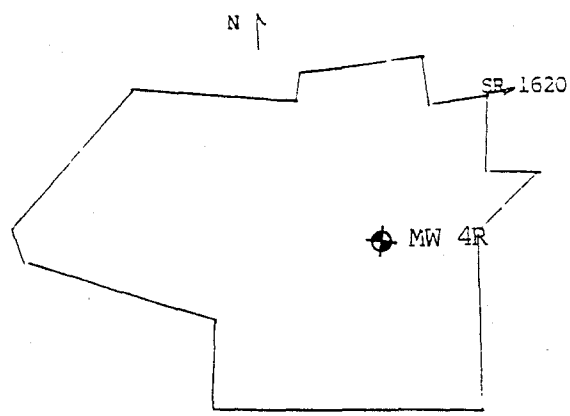
	Depth From	Depth To	Size	Material
	4.5	21.5	gravel	silica

16. REMARKS: Monitoring Well 4R

DEPTH From	DEPTH To	DRILLING LOG Formation Description
0	0.5	Top soil
0.5	5.0	Red brown clay
5.0	18.0	Brown silty clay
18.0	21.5	Gneiss

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Cheryl Marks 10-5-94

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Taylorsville County: Alexander
   SR 1620
   (Road, Community, or Subdivision and Lot No.)
2. OWNER Alexander County Attn: Charles Mashburn
   ADDRESS Admin Bldg 255 Liledown Rd
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
3. DATE DRILLED 9-15-94 USE OF WELL Monitoring
4. TOTAL DEPTH 49.1'
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: 39.11 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.48 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): 37 - 49'
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.48	33.80 Ft.	2"	Sch 40	PVC
		Ft.			
		Ft.			

13. GROUT:

	Depth From	Depth To	Material	Method
	0	30.1 Ft.	neat cement	grout
	30.1	32.0 Ft.	bentonite	pellet

14. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	33.80	48.80 Ft	2 in.	.010 in.	PVC
		Ft.	in.	in.	
		Ft.	in.	in.	

15. SAND/GRAVEL PACK:

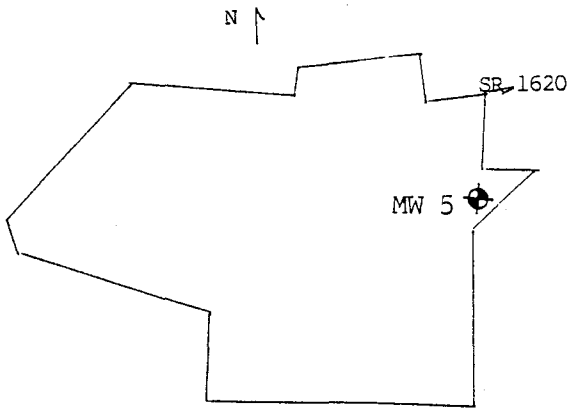
	Depth From	Depth To	Size	Material
	32.0	49.1 Ft.	gravel	silica
		Ft.		

16. REMARKS: Monitoring Well 5

DEPTH From To	DRILLING LOG Formation Description
0 - 6"	Topsoil
6"- 4.75'	Red silty clay
4.75 - 18	Red and white sandy silt micaceous, saprolite
18 - 22	Green gray, sandy silt clayey, micaceous saprolite
22 - 33	Yellow brown clayey silt saprolite
33 - 42	Green gray clayey silt micaeous, saprolite
42 - 49.1	Schist, green black, soft weathered, saprolite

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Edward A Cuatin Jr 10/6/94

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY
QUAD. NO. _____ SERIAL NO. _____
Lat. _____ Long. _____ RO _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Taylorsville County: Alexander
   SR 1620
   (Road, Community, or Subdivision and Lot No.)
2. OWNER Alexander County Attn: Charles Mashburn
   ADDRESS Admin Bldg 255 Liledown Rd
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
3. DATE DRILLED 9-29-94 USE OF WELL Monitoring
4. TOTAL DEPTH 42.0'
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ±36.0 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. CHLORINATION: Type N/A Amount _____
12. CASING:

	Depth From	Depth To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.5	26.0		2"	Sch 40	PVC

13. GROUT:

	Depth From	Depth To	Ft.	Material	Method
	0	23.5		neat cement	grout
	23.5	24.5		bentonite	pellet

14. SCREEN:

	Depth From	Depth To	Ft.	Diameter	Slot Size	Material
	26.0	41.0		2 in.	.010 in.	PVC
				in.	in.	
				in.	in.	

15. SAND/GRAVEL PACK:

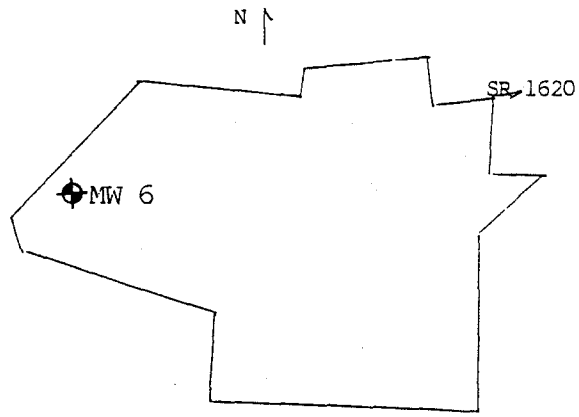
	Depth From	Depth To	Ft.	Size	Material
	24.5	42.0		gravel	silica

16. REMARKS: Monitoring Well 6

DEPTH From - To	DRILLING LOG Formation Description
0 - 3.5	Clayey silt
3.5 - 10.0	Silt, gneiss fragments
10.0 - 18.5	Micaeous sandy silt
18.5 - 24.0	Saprolite
24.0 - 30.0	Weathered schist
30.0 - 42.0	Gneiss

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Cheryl Marks

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY	
QUAD. NO.	SERIAL NO.
Lat.	Long. / RO
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Taylorsville County: Alexander
   SR 1620
   (Road, Community, or Subdivision and Lot No.)
2. OWNER Alexander County Attn: Charles Mashburn
   ADDRESS Admin Bldg 255 Liledown Rd
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
3. DATE DRILLED 9-29-94 USE OF WELL Monitoring
4. TOTAL DEPTH 54'
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ±50 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2 FT. Above Land Surface*
   * Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118
9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth):
11. CHLORINATION: Type N/A Amount

DEPTH From	To	DRILLING LOG Formation Description
0	4.5	Brown silty clay
4.5	8.0	as above with rock fragments
8.0	12.0	Abundant rock fragments
12.0	36.5	Weathered gneiss
36.5	54.0	Gneiss

If additional space is needed use back of form

12. CASING:

	Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
From	+2	38		2"	Sch 40	PVC
From						
From						

13. GROUT:

	Depth From	To	Ft.	Material	Method
From	0	36		neat cement	grout
From	36	37		bentonite	pellet

14. SCREEN:

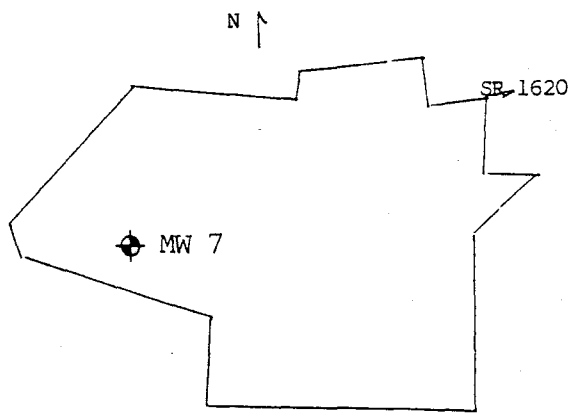
	Depth From	To	Ft	Diameter	in.	Slot Size	in.	Material
From	38	53		2		.010		PVC
From								
From								

15. SAND/GRAVEL PACK:

	Depth From	To	Ft.	Size	Material
From	37	54		gravel	silica
From					

16. REMARKS: Monitoring Well 7

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Cheryl Marks

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner.

GW-1 REV. 9/91

North Carolina - Department of Environment, Health, and Natural Resources
Division of Environmental Management - Groundwater Section
P.O. Box 29535 - Raleigh, N.C. 27626-0535
Phone (919) 733-3221

FOR OFFICE USE ONLY	
QUAD. NO.	SERIAL NO.
Lat.	Long. / RO
Minor Basin	
Basin Code	
Header Ent.	GW-1 Ent.

WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: GAI Consultants

DRILLER REGISTRATION NUMBER: 446

STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: Taylorsville County: Alexander
   SR 1620
   (Road, Community, or Subdivision and Lot No.)
2. OWNER Alexander County Attn: Charles Mashburn
   ADDRESS Admin Bldg 255 Liledown Rd
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
3. DATE DRILLED 9-29-94 USE OF WELL Monitoring
4. TOTAL DEPTH 28.5
5. CUTTINGS COLLECTED YES [ ] NO [x]
6. DOES WELL REPLACE EXISTING WELL? YES [ ] NO [x]
7. STATIC WATER LEVEL Below Top of Casing: ±12.8 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.8 FT. Above Land Surface*

* Casing Terminated at/or below land surface is illegal unless a variance is issued in accordance with 15A NCAC 2C .0118

9. YIELD (gpm): N/A METHOD OF TEST
10. WATER ZONES (depth):
11. CHLORINATION: Type N/A Amount
12. CASING:

	Depth From	Depth To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
	±2.8	12.5		2"	Sch 40	PVC

13. GROUT:

	Depth From	Depth To	Ft.	Material	Method
	0	10.5		neat cement	grout
	10.5	11.5		bentonite	pellet

14. SCREEN:

	Depth From	Depth To	Ft.	Diameter	in.	Slot Size	in.	Material
	12.5	27.5		2		.010		PVC

15. SAND/GRAVEL PACK:

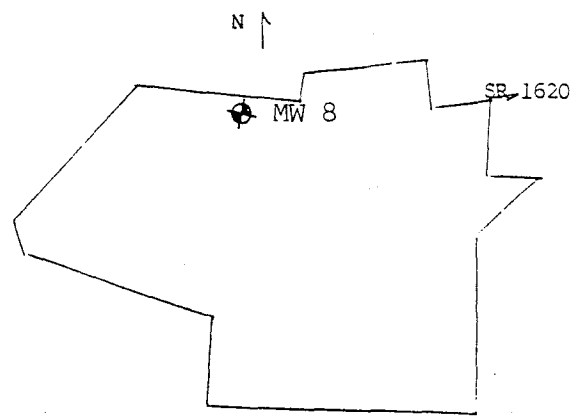
	Depth From	Depth To	Ft.	Size	Material
	11.5	28.5		gravel	silica

16. REMARKS: Monitoring Well 8

DEPTH From – To	DRILLING LOG Formation Description
0 - 1.0	Top soil
1.0 - 5.0	Red brown silty clay
5.0 - 14.0	Yellow brown clayey silt
14.0 - 28.5	Gneiss

If additional space is needed use back of form

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Cheryl Mashburn

SIGNATURE OF CONTRACTOR OR AGENT DATE

Submit original to Division of Environmental Management and copy to well owner

GW-1 REV. 9/91

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 9

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC — County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville — NC — 28681
   City or Town — State — Zip Code
4. DATE DRILLED; 10/24/00
5. TOTAL DEPTH 32 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): ?'
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	7 Ft.	6.25"	SDR21	pvc

14. GROUT OUTER CASING:

Depth From	To	Material	Method
0	7 Ft.	Portland	Pour

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	16.5 Ft.	2"	sch40	pvc

16. GROUT:

Depth From	To	Material	Method
0	13.5 Ft.	cement	tremie

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
16.5	32 Ft.	2 in.	.010 in.	pvc
		in.	in.	
		in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
14	32 Ft.	10/30	silica

19. BENTONITE

Depth From	To	Material
13	14 Ft.	Holeplug

DEPTH From	To	DRILLING LOG Formation Description
0'	7'	Fill Material
7'	32'	Blue Rock

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 10

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC — County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville — NC — 28681
   City or Town — State — Zip Code
4. DATE DRILLED; 10/25/00
5. TOTAL DEPTH 92 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): 41' - 61'
    86' - 91
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material

14. GROUT OUTER CASING:

Depth From	To	Material	Method

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	76	2"	sch40	pvc

16. GROUT:

Depth From	To	Material	Method
0	71.5	cement	tremie

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
76	91	2 in.	.010 in.	pvc
		in.	in.	
		in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
74	91	10/30	silica

19. BENTONITE

Depth From	To	Material
71	74	Holeplug

DEPTH From	To	DRILLING LOG Formation Description
0'	17'	Tan Clays, Silts
17'	30'	Clays with Mica, Silts
30'	32'	Weathered Rock
32'	36'	tan color weathered rock
36'	41'	Hard bluish color rock fracture at 55 ft.
41'	61'	Blue Grey rock w/fractures
61'	66'	Competent grey rock
66'	72'	Competent grey rock
72'	86'	Competent grey rock
86'	91'	Blue grey rock w/fracture

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 11

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2573
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville NC 28681
   City or Town State Zip Code
4. DATE DRILLED; 10/24/00
5. TOTAL DEPTH 56 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): 42' to 56'
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material

14. GROUT OUTER CASING:

Depth From	To	Material	Method

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	41	2"	sch40	pvc

16. GROUT:

Depth From	To	Material	Method
0	35	cement	tremie

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
41	56	2 in.	.010 in.	pvc
		in.	in.	
		in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
38.5	36	10/30	silica

19. BENTONITE

Depth From	To	Material
35.5	38.5	Holeplug

DEPTH From	To	DRILLING LOG Formation Description
0'	2'	Sand & Clay
2'	4'	Orange Clay
4'	17'	Clay, Sand Silt
17'	33'	Weathered Rock
33'	36'	Silts, and Rock
36'	42'	Rock
42'	56'	Grey Metamorphic Rock

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 12

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville (City or Town) NC (State) 28681 (Zip Code)
4. DATE DRILLED; 10/23/00
5. TOTAL DEPTH 68 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): 38' to 68'
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From	To Ft.			
From	To Ft.			
From	To Ft.			

14. GROUT OUTER CASING:

Depth		Material	Method
From	To Ft.		
From	To Ft.		

15. INNER CASING:

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From +3	To 53 Ft.	2"	sch40	pvc
From	To Ft.			
From	To Ft.			

16. GROUT:

Depth		Material	Method
From 0	To 49 Ft.	cement	tremie
From	To Ft.		

17. SCREEN;

Depth		Diameter	Slot Size	Material
From 53	To 68 Ft.	2 in.	.010 in.	pvc
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

18. SAND/GRAVEL PACK:

Depth		Size	Material
From 51	To 68 Ft.	10/30	silica
From	To Ft.		

19. BENTONITE

Depth		Material
From 49	To 51 Ft.	Holeplug
From	To Ft.	

DEPTH From	To	DRILLING LOG Formation Description
0'	18'	Sand & Silt
18'	23'	Sand, weathered Rock
23'	28'	Weathered Rock, Silts
28'	38'	Weathered Rock
38'	42'	Silts, Mica
42'	48'	Silts, Mica
48'	58'	Silts, Mica
58'	66'	Medium Hardness Rock
66'	68'	Hard Competent Rock

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

JUL 14 2003

WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Sherwood Gower CERTIFICATION # 2984

WELL CONTRACTOR COMPANY NAME Accurate Drilling Inc. PHONE # 919 510-0806

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☑ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Taylorsville County Al
MSW LandFill
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____
(degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map
(check box)

3. OWNER: _____
Address _____
(Street or Route No.)
_____
City or Town State Zip Code
(____)-_____
Area code- Phone number

4. DATE DRILLED 6-11-03
5. TOTAL DEPTH: 102.5
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☑
7. STATIC WATER LEVEL Below Top of Casing: ? FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____
11. DISINFECTION: Type _____ Amount _____

DEPTH From	To	DRILLING LOG Formation Description

12. CASING:

	Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From 0.0	To 68	Ft.	4"	Sch 40	PVC
From 2.5	To 90	Ft.	2"	Sch 40	PVC
From	To	Ft.			

13. GROUT:

	Depth		Material	Method
From 0.0	To 68	Ft.	Portland	Trimmie
From 90.0	To 0.0	Ft.	Portland	Trimie

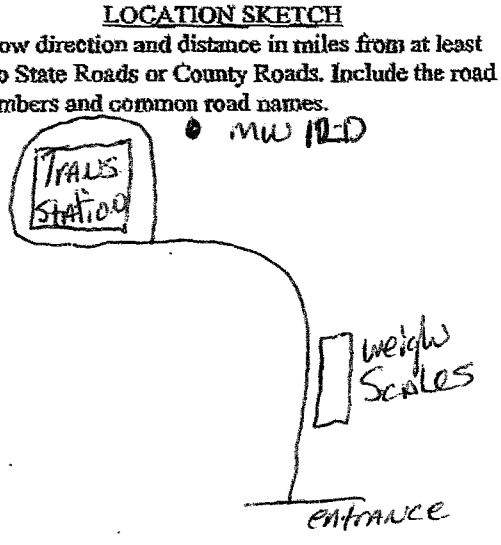
14. SCREEN:

	Depth		Diameter	Slot Size	Material
From 100'	To 90'	Ft.	2" in.	010 in.	PVC
From	To	Ft.	in.	in.	

15. SAND/GRAVEL PACK:

	Depth		Size	Material
From 102.5	To 88'	Ft.	#2	Sand
From	To	Ft.		

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.



16. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Sherwood Gower 6-11-03
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 13

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville (City or Town) NC (State) 28681 (Zip Code)
4. DATE DRILLED; 10/25/00
5. TOTAL DEPTH 61.5 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): unknown
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material

14. GROUT OUTER CASING:

Depth From	To	Material	Method

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	46.5	2"	sch40	pvc

16. GROUT:

Depth From	To	Material	Method
0	41.5	cement	tremie

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
46.5	60.5	2 in.	.010 in.	pvc
		in.	in.	
		in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
43	61.5	10/30	silica

19. BENTONITE

Depth From	To	Material
41	43	Holeplug

DEPTH From	To	DRILLING LOG Formation Description
0'	2'	Tan Clays, Silts
2'	17.5'	clays, silts, weathered rock
17.5'	30'	silt, clay, weathered rock
30'	37'	grayish blue rock, hard
37'	40'	gray blue rock, soft
40'	42'	grey rock
42'	61.5'	gneiss

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 14

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x]
Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
Nearest Town: Taylorsville, NC County: Alexander
Paynes Dairy Rd
(Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
Address: 255 Liledown Rd.
(Street or Route No.)
Taylorsville NC 28681
City or Town State Zip Code
4. DATE DRILLED; 10/26/00
5. TOTAL DEPTH 40.5 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
* Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): Unknown
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
0	12 Ft.	6.25"	sdr 21	pvc
	Ft.			
	Ft.			

14. GROUT OUTER CASING:

Depth From	To	Material	Method
0	12 Ft.	portland	pour
	Ft.		

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	25.5 Ft.	2"	sch40	pvc
	Ft.			
	Ft.			

16. GROUT:

Depth From	To	Material	Method
0	22.5 Ft.	cement	tremie
	Ft.		

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
25.5	40.5 Ft.	2 in.	.010 in.	pvc
	Ft.	in.	in.	
	Ft.	in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
23.5	40.5 Ft.	10/30	silica
	Ft.		

19. BENTONITE

Depth From	To	Material
22.5	23.5 Ft.	Holeplug
	Ft.	

DEPTH From	To	DRILLING LOG Formation Description
0'	10'	Fill material
10'	12'	Hard pan clays
12'	23.5'	soft sands, silts
23.5'	33.5'	soft sands, silts
33.5'	37.5'	bluish brown weathered rock
37.5'	40.5'	Competent and hard bluish rock

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section
1628 Mail Service Center, Raleigh, NC 27699-1628

WELL CONSTRUCTION RECORD
For MW - 15

Well Contractor; Graham & Currie Well Drilling Co., Inc.
Well Contractor Certification#; 2372
State Well Construction Permit No. N/A

1. WELL USE (Check Applicable Box): Residential [ ] Municipal [ ] Industrial [ ] Agricultural [ ] Monitoring [x] Recovery [ ] Heat Pump Water Injection [ ] Other [ ] If Other, List Use;
2. WELL LOCATION:
   Nearest Town: Taylorsville, NC — County: Alexander
   Paynes Dairy Rd
   (Road No., Community, or Subdivision and Lot No.)
3. OWNER: Alexander County Solid Waste
   Address: 255 Liledown Rd.
   (Street or Route No.)
   Taylorsville (City or Town) NC (State) 28681 (Zip Code)
4. DATE DRILLED; 10/25/00
5. TOTAL DEPTH 35 ft.
6. CUTTINGS COLLECTED YES [ ] NO [x]
7. DOES WELL REPLACE EXISTING WELL? YES [] NO [X]
8. STATIC WATER LEVEL: n/a ft. below top of casing
9. TOP OF CASING IS 3 ft. above land surface.
   * Top of casing is terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118
10. WELL YIELD: n/a gpm. / METHOD OF TEST
11. WATER ZONES (depth): unknown
12. CHLORINATION: Type N/A Amount
13. OUTER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	Ft.			
	Ft.			
	Ft.			

14. GROUT OUTER CASING:

Depth From	To	Material	Method
	Ft.		
	Ft.		

15. INNER CASING:

Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
+3	19 Ft.	2"	sch40	pvc
	Ft.			
	Ft.			

16. GROUT:

Depth From	To	Material	Method
0	14.5 Ft.	cement	tremie
	Ft.		

17. SCREEN;

Depth From	To	Diameter	Slot Size	Material
19	35 Ft.	2 in.	.010 in.	pvc
	Ft.	in.	in.	
	Ft.	in.	in.	

18. SAND/GRAVEL PACK:

Depth From	To	Size	Material
17	35 Ft.	10/30	silica
	Ft.		

19. BENTONITE

Depth From	To	Material
14.5	17 Ft.	Holeplug
	Ft.	

DEPTH From	To	DRILLING LOG Formation Description
0'	16'	Tan Silts, Clay
16'	21'	Tan Silts, Clay
21'	26'	gray weathered rock
26'	32'	grayish blue rock, hard
32'	35'	gray blue rock, hard

If additional space is needed use back of form

Location Sketch
(Show direction and distance from at least two state Roads, or other map reference points.)

I DO HERBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

FOR OFFICE USE ONLY
Quad No.
Serial No.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

MW-16

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-16

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 8:00 AM ■ PM ☐

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
■ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N 35.8370

LONGITUDE W-81.14645

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 40.25'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 31.75 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 28.75 To >40.25 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	25.25	2		sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	22		Bent. Grout	Tremie
22	24.10		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
25.25	40.25	2	in.	.01 in.	PVC
			in.	in.	
			in.	in.	

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
24.10	40.25		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	2	Silty Clay - Red
2	14	Sandy Silt - Lt. Brown
14	40.25	Silty Sand - Med. Brown

12. REMARKS:

~~Unconfined aquifer.~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

WELL CONSTRUCTION RECORD

JUL 1 4 2003

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Sherwood Gower CERTIFICATION # 2984

WELL CONTRACTOR COMPANY NAME Accurate Drilling Inc PHONE # 919) 570 0806

STATE WELL CONSTRUCTION PERMIT# _____ (if applicable) ASSOCIATED WQ PERMIT# _____ (if applicable)

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐ Monitoring ☐ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:
Nearest Town: Taylorsville County Al
MSW Landfill
(Street Name, Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land setting
☐Ridge ☐Slope ☐Valley ☐Flat
(check appropriate box)
Latitude/longitude of well location
_____ (degrees/minutes/seconds)
Latitude/longitude source: ☐GPS ☐Topographic map (check box)

3. OWNER: _____
Address _____ (Street or Route No.)
_____ City or Town State Zip Code
(___)- _____ Area code- Phone number

4. DATE DRILLED 6-11-03
5. TOTAL DEPTH: 22.3
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☑
7. STATIC WATER LEVEL Below Top of Casing: _____ FT. (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 2.5 FT. Above Land Surface*
*Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C .0118.
9. YIELD (gpm): _____ METHOD OF TEST _____
10. WATER ZONES (depth): _____

DEPTH From	To	DRILLING LOG Formation Description

11. DISINFECTION: Type _____ Amount _____
12. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	2.5	7.3	2"	Sch 40	PVC

13. GROUT:

	Depth From	To	Material	Method
	0.0	3.3	Cement	mix Poor

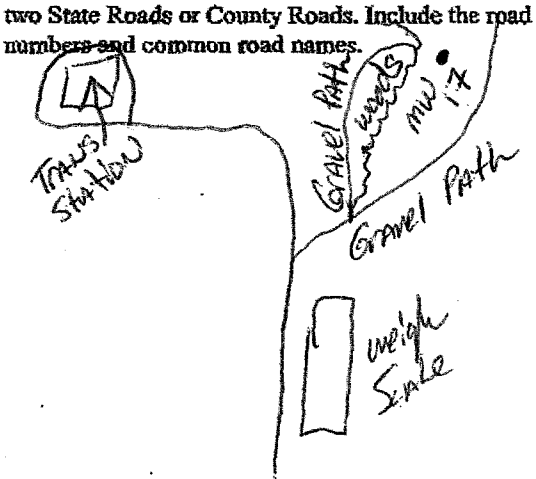
14. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
	22.3	7.3	2" in.	.010 in.	PVC
			in.	in.	

15. SAND/GRAVEL PACK:

	Depth From	To	Size	Material
	22.3	5.3	#2	PVC

LOCATION SKETCH
Show direction and distance in miles from at least two State Roads or County Roads. Include the road numbers and common road names.



16. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER

Sherwood Gower 6/11/03
SIGNATURE OF PERSON CONSTRUCTING THE WELL DATE

Submit the original to the Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC 27699-1636 Phone No. (919) 733-3221, within 30 days.

GW-1 REV. 07/2001

MW-18

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle NC 28001
City or Town State Zip Code

(704)-982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-18

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/19/07

TIME COMPLETED 10:00 AM ■ PM ☐

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ■ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.83907

LONGITUDE W-81.14716

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ☐ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville NC 28681
City or Town State Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville NC 28681
City or Town State Zip Code

(828)-632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 56.70'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 54.98 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 51.98 To 53.00 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	41.70		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	38		Bent. Grout	Tremie
38	40.25		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter in.	Slot Size in.	Material
41.70	56.70		2	0.01	PVC

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
40.25	56.70		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	3	Silty clay - Red
3	16	Silty Sand - Yellowish Red
16	20.5	PWR - Brown
20.5	35	Rock - Gneiss Gray
35	45	Clayey Silt - Brown
45	56.70	Rock : Gneiss Gray

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-19

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-19

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 10:00 AM ■ PM ☐

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ■ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.83925

LONGITUDE W-81.14874

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville NC 28681
City or Town State Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 63.92'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 62.61 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 53.50 To 59.00 From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

7. CASING:

Depth		Diameter	Thickness/Weight	Material
From 0	To 48.92 Ft.	2"	sch40	PVC
From	To Ft.			
From	To Ft.			

8. GROUT:

Depth		Material	Method
From 0	To 46 Ft.	Bent. Grout	Tremie
From 46	To 48 Ft.	Bent. Pellets	Pour
From	To Ft.		

9. SCREEN:

Depth		Diameter	Slot Size	Material
From 48.92	To 63.92 Ft.	2 in.	0.01 in.	PVC
From	To Ft.	in.	in.	
From	To Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
From 48	To 63.92 Ft.	#2	Silica Filter Sand
From	To Ft.		
From	To Ft.		

11. DRILLING LOG

From	To	Formation Description
0	6	Silty Clay - Red
6	18	Clayey Silt - Med. Brown
18	38	Silty Sand - Y. Red Saprolite
38	43	PWR - Brown
43	63.92	Rocks ; Gneiss Gray

12. REMARKS:

~~Water not static in 6c.~~ ▽ 56.50' Below Casing 7 Days

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR — DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-20

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-20

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 1:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
■ Slope ☐ Valley ☐ Flat ■ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.83899

LONGITUDE W-81.15020

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 63.55'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 40.81 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):

From	To	From	To
55.00	56.00		

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	48.55		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	45		Bent. Grout	Tremie
45	47.50		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
48.55	63.55		2 in.	0.01 in.	PVC
			in.	in.	
			in.	in.	

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
47.50	63.55		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	2	Clayey Silt; Red
2	16	Clayey Silt; Y. Red Saprolite
16	31	Silty Sand; Y. Red Saprolite
31	38	PWR; Brown
38	63.55	Rock; Gneiss Gray

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-21

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-21

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/19/07

TIME COMPLETED 1:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ☐ Flat ☑ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.83875

LONGITUDE W-81.51270

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville NC 28681
City or Town State Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 41.05'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☑

c. WATER LEVEL Below Top of Casing: 33.20 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 30.20 To >41.05 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Diameter	Thickness/Weight	Material
0	26.05	2"	sch40	PVC

8. GROUT:

From	To	Material	Method
0	22	Bent. Grout	Tremie
22	24.25	Bent. Pellets	Pour

9. SCREEN:

From	To	Diameter	Slot Size	Material
26.05	41.05	2 in.	0.01 in.	PVC
		in.	in.	
		in.	in.	

10. SAND/GRAVEL PACK:

From	To	Size	Material
24.25	41.05	#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	4	Clayey Silt - Reddish Brown
4	23	Silty Sand - Med. Brown
23	26	PWR - Brown
26	38	Silty Sand: Y. Orange
38	39	PWR - Brown
39	41.05	Silty Sand - Y. Orange saprolite

12. REMARKS:

~~Unconfined aquifer~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR 12-28-07 DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-22

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704)-982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-22

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/19/07

TIME COMPLETED 6:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ■ Valley ☐ Flat ☑ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.8381

LONGITUDE W-81.15243

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828)-632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 18.12'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 15.41 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 12.41 To >18.12 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Diameter	Thickness/Weight	Material
0	8.12	2"	sch40	PVC

8. GROUT:

From	To	Material	Method
0	4.5	Bent. Grout	Tremie
4.5	6.85	Bent. Pellets	Pour

9. SCREEN:

From	To	Diameter	Slot Size	Material
8.12	18.12	2 in.	0.01 in.	PVC
		in.	in.	
		in.	in.	

10. SAND/GRAVEL PACK:

From	To	Size	Material
6.85	18.12	#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	2	Clayey Silt; Red. Brown
2	18.12	Silty Sand; Dark Brown Saprolite

12. REMARKS:

~~Unconfined aquifer.~~ Very wet.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-23

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-23

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/19/07

TIME COMPLETED 2:30 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☑ Slope ■ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.837554

LONGITUDE W-81.529997

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville NC 28681
City or Town State Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 21.54'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 17.44 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 14.44 To >21.54 From To
From To From To
From To From To

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	6.54		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	4		Bent. Grout	Tremie
4	5		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
6.54	21.54		2 in.	0.01 in.	PVC
			in.	in.	
			in.	in.	

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
5.25	21.54		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	1	Clayey Silt; Red, Brown
1	19	Silty Sand; Dark Brown saprolite
19	21.54	PWR; Dark Brown
21.54		Rock; Gneiss Gray

12. REMARKS:

~~Unconfined aquifer~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR 12-28-07 DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev 12/07

MW-24

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704)-982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-24

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 3:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ■ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N35.835694

LONGITUDE W-81.153318

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828)-632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 35.35'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 34.18 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 31.18 To >35.35 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	20.35		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	16.85		Bent. Grout	Tremie
16.85	19.30		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter in.	Slot Size in.	Material
20.35	35.35		2	0.01	PVC

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
19.30	35.35		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	6	Silty Clay; Red
6	10	Silty Sand; Red
10	13	Sandy Silt; Lt. Brown
13	31	Silty Sand; Brown Saprolite
31	35.35	PWR; Brown
35.35		Rock Gneiss; Gray

12. REMARKS:

~~Unconfined aquifer~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-25

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-25

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/19/07

TIME COMPLETED 4:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☑ Slope ☐ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N 35.835249

LONGITUDE W-81.152769

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 44.48'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☐

c. WATER LEVEL Below Top of Casing: 34.18 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 33.00 To 33.50 From 41.00 To 41.50
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	20.35		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	26		Bent. Grout	Tremie
26	28.10		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter in.	Slot Size in.	Material
29.48	44.48		2	0.01	PVC

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
28.10	44.48		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	5	Silty Clay; Red
5	16	Silty Sand; Dark Brown
16	21	Silty Sand; Light Brown Saprolite
21	22.80	PWR; Brown
22.80	44.48	Rock; Gneiss Gray

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-26

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-26

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 7:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☒ Valley ☐ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N 35. 835888

LONGITUDE W-81. 15051975

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 49.80'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 34.18 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 44.80 To 46.00 From ___ To ___
From ___ To ___ From ___ To ___
From ___ To ___ From ___ To ___

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	34.80		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	31.50		Bent. Grout	Tremie
31.50	33.50		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter	Slot Size	Material
34.80	49.80		2 in.	0.01 in.	PVC

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
33.50	49.80		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	2	Silty Clay; Red
2	25	Silty Sand; Lt-Brown Saprolite
25	31.85	PWR; Lt. Brown
31.85	49.80	Rock; Gneiss Gray

12. REMARKS:

Water appears confined.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

MW-27

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

STREET ADDRESS 44283-A NC 24/27/73

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code- Phone number

2. WELL INFORMATION:

SITE WELL ID #(if applicable) MW-27

WELL CONSTRUCTION PERMIT#(if applicable)

OTHER ASSOCIATED PERMIT #(if applicable) Landfill 02-01

3. WELL USE (Check Applicable Box) Monitoring ■ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☐ (list use)

DATE DRILLED 12/20/07

TIME COMPLETED 5:00 AM ☐ PM ■

4. WELL LOCATION:

CITY: Taylorsville COUNTY Alexander

2500 Payne Dairy Rd Taylorsville, NC 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:
☐ Slope ☐ Valley ■ Flat ☐ Ridge ☐ Other
(check appropriate box)

LATITUDE N 35.835567

LONGITUDE W-81.149379

May be in degrees, minutes, seconds or in a decimal format

Latitude/longitude source: ■ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map and attached to this form if not using GPS)

5. FACILITY- is the name of the business where the well is located.

FACILITY ID #(if applicable)

NAME OF FACILITY Alexander Co. Landfill

STREET ADDRESS 2500 Payne Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

CONTACT PERSON Mr. Josh Mitchell

MAILING ADDRESS 621 Liledoun Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

(828) 632-9467
Area code - Phone number

6. WELL DETAILS:

a. TOTAL DEPTH: 49.82'

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ■

c. WATER LEVEL Below Top of Casing: 23.57 FT.
(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. YIELD (gpm): na METHOD OF TEST na

f. DISINFECTION: Type na Amount na

g. WATER ZONES (depth):
From 48.00 To 49.00 From ____ To ____
From ____ To ____ From ____ To ____
From ____ To ____ From ____ To ____

7. CASING:

From	To	Ft.	Diameter	Thickness/Weight	Material
0	34.82		2"	sch40	PVC

8. GROUT:

From	To	Ft.	Material	Method
0	31		Bent. Grout	Tremie
31	33		Bent. Pellets	Pour

9. SCREEN:

From	To	Ft.	Diameter in.	Slot Size in.	Material
34.82	49.82		2	0.01	PVC

10. SAND/GRAVEL PACK:

From	To	Ft.	Size	Material
33	49.82		#2	Silica Filter Sand

11. DRILLING LOG

From	To	Formation Description
0	1	Silty Clay; Red
1	18	Silty Sand; Med. Brown
18	23.70	PWR; Lt. Gray
23.70	49.82	Rock; Gneiss; Gray

12. REMARKS:

Water appears to be confined in Rock. Fracture @ 48' BGS.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR | DATE 12-28-07

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit the original to the Division of Water Quality within 30 days. Attn: Information Mgt., 1617 Mail Service Center – Raleigh, NC 27699-1617 Phone No. (919) 733-7015 ext 568.

Form GW-1b
Rev.12/07

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28002
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) MW-31

3. WELL USE (Check One Box) Monitoring ☑ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 8/16/10

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐ Slope ☑ Valley ☐ Flat ☐ Ridge ☐ Other

LATITUDE 36 ° ' " DMS **OR** 35.8350 DD

LONGITUDE 75 ° ' " DMS **OR** 81.15062 DD

Latitude/longitude source: ☑ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 32.56' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 23.12 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 2.13 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 20.99	Bottom >32.56	Top	Bottom
Top	Bottom	Top	Bottom
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +2.13	Bottom 17.56 Ft.	2"	sch40	PVC
Top	Bottom Ft.			
Top	Bottom Ft.			

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00 Ft.	Concrete	Gravity
Top 3.00	Bottom 15.00 Ft.	Bent. Grout	Tremie
Top 15.00	Bottom 16.46 Ft.	Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 17.56	Bottom 32.56 Ft.	2 in.	0.01 in.	PVC
Top	Bottom Ft.	in.	in.	
Top	Bottom Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 16.46	Bottom 32.56 Ft.	#2	Filter Sand
Top	Bottom Ft.		
Top	Bottom Ft.		

11. DRILLING LOG

Top	Bottom	Formation Description
0	32.56	Soil; Silty Sand, Yellowish Brown

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Derry L. Huneycutt 8/22/10
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Form GW-1b
Rev. 2/09

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28002
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) MW-32

3. WELL USE (Check One Box) Monitoring ☑ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☐ (list use)

DATE DRILLED 8/16/10

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐Slope ☐Valley ☐Flat ☑Ridge ☐Other

LATITUDE 36 ° ' " DMS **OR** 35.8360 DD

LONGITUDE 75 ° ' " DMS **OR** 81.1469 DD

Latitude/longitude source: ☑GPS ☐Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 42.70' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 32.16 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 29.5	Bottom 30	Top 33	Bottom 34
Top	Bottom	Top	Bottom
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +3.00	Bottom 27.70	Ft. 2"	sch40	PVC
Top	Bottom	Ft.		
Top	Bottom	Ft.		

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00	Ft. Concrete	Gravity
Top 3.00	Bottom 24.00	Ft. Bent. Grout	Tremie
Top 24.00	Bottom 26.52	Ft. Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 27.70	Bottom 42.70	Ft. 2 in.	0.01 in.	PVC
Top	Bottom	Ft. in.	in.	
Top	Bottom	Ft. in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 26.52	Bottom 42.70	Ft. #2	Filter Sand
Top	Bottom	Ft.	
Top	Bottom	Ft.	

11. DRILLING LOG

Top	Bottom	Formation Description
0	5	Soil;Clayey Silt, Reddish Brown
5	11	Soil;Silty Sand, Brown
11	24.5	PWR; Brown, variable density
24.5	42.70	Rock; Gray, competant, dense

12. REMARKS:

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR 8/22/10 DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Form GW-1b
Rev. 2/09

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT# WI0300160

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) IW-1

3. WELL USE (Check One Box) Monitoring ☐ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☑

Irrigation ☐ Other ☐ (list use) _____

DATE DRILLED 2/14/11

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)

☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other _____

LATITUDE 36 ° ___ ' ___ " DMS OR 35.835521 DD

LONGITUDE 75 ° ___ ' ___ " DMS OR 81.150435 DD

Latitude/longitude source: ☑ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 52.44' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 24.92 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 30	Bottom 31	Top 38	Bottom 38.25
Top 46.5	Bottom 47	Top 51	Bottom 51.25
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +3.00	Bottom 37.44 Ft.	4"	sch40	PVC
Top	Bottom Ft.			
Top	Bottom Ft.			

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00 Ft.	Concrete	Gravity
Top 3.00	Bottom 33.00 Ft.	Cement	Tremie
Top 33.00	Bottom 36.15 Ft.	Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 37.44	Bottom 52.44 Ft.	4.00 in.	0.02 in.	PVC
Top	Bottom Ft.	in.	in.	
Top	Bottom Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 36.15	Bottom 52.44 Ft.	#3	Filter Sand
Top	Bottom Ft.		
Top	Bottom Ft.		

11. DRILLING LOG

Top	Bottom	Formation Description
0	13	Soil;Silty Sand, Brown
13	17	Soil;Silty Sand, Saprolite, Brown
17	19	PWR; Boulder, Brown
19	26	Soil;Silty Sand, Saprolite, Brown
26	28	PWR; Brown, High Density
28	52.44	Rock; Gray, competant, dense

12. REMARKS:

~~Locking Steel Case. Very Low Yield.~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Derry L. Huneycutt 2/17/11
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) P-1

3. WELL USE (Check One Box) Monitoring ☐ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☑ (list use) Temp. Piez for Study

DATE DRILLED 2/14/11

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other

LATITUDE 36 ° ' " DMS OR 35.835448 DD

LONGITUDE 75 ° ' " DMS OR 81.150449 DD

Latitude/longitude source: ☑ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 52.48' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 29.57 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 39	Bottom 39.5	Top 44	Bottom 47
Top	Bottom	Top	Bottom
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +3.00	Bottom 37.48 Ft.	2"	sch40	PVC
Top	Bottom Ft.			
Top	Bottom Ft.			

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00 Ft.	Concrete	Gravity
Top 3.00	Bottom 33.5 Ft.	Cement	Tremie
Top 33.50	Bottom 36.2 Ft.	Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 37.48	Bottom 52.48 Ft.	2.00 in.	0.02 in.	PVC
Top	Bottom Ft.	in.	in.	
Top	Bottom Ft.	in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 36.20	Bottom 52.48 Ft.	#3	Filter Sand
Top	Bottom Ft.		
Top	Bottom Ft.		

11. DRILLING LOG

Top	Bottom	Formation Description
0	13	Soil;Silty Sand, Brown
13	16	Soil;Silty Sand, Saprolite, Brown
16	25	Soil;Silty Sand, Brown
25	29	PWR: Brown, High Density
29	52.48	Rock: Gray, competant, dense

12. REMARKS:

Very Low Yield.

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Derry L. Huneycutt 2/17/11
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28001
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) P-2

3. WELL USE (Check One Box) Monitoring ☐ Municipal/Public ☐ Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐ Irrigation ☐ Other ☑ (list use) Temp. Piez for Study

DATE DRILLED 2/14/11

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)

☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other

LATITUDE 36 ° ' " DMS OR 35.835536 DD

LONGITUDE 75 ° ' " DMS OR 81.150505 DD

Latitude/longitude source: ☑ GPS ☐ Topographic map

(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 52.36' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 28.05 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 38	Bottom 38.5	Top 48	Bottom 48.75
Top	Bottom	Top	Bottom
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +3.00	Bottom 37.36	Ft. 2"	sch40	PVC
Top	Bottom	Ft.		
Top	Bottom	Ft.		

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00	Ft. Concrete	Gravity
Top 3.00	Bottom 34	Ft. Cement	Tremie
Top 34	Bottom 36.10	Ft. Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 37.36	Bottom 52.36	Ft. 2.00 in.	0.02 in.	PVC
Top	Bottom	Ft. in.	in.	
Top	Bottom	Ft. in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 36.10	Bottom 52.36	Ft. #3	Filter Sand
Top	Bottom	Ft.	
Top	Bottom	Ft.	

11. DRILLING LOG

Top	Bottom	Formation Description
0	13	Soil;Silty Sand, Brown
13	24	Soil;Silty Sand, Saprolite, Brown
24	28	PWR; Brown, High Density
28	52.36	Rock; Gray, competant, dense

12. REMARKS:

~~Very Low Yield.~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE 2/17/11

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

NON RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle NC 28002
City or Town State Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

WELL CONSTRUCTION PERMIT#

OTHER ASSOCIATED PERMIT#(if applicable) Landfill 02-01

SITE WELL ID #(if applicable) P-3

3. WELL USE (Check One Box) Monitoring ☐ Municipal/Public ☐
Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐
Irrigation ☐ Other ☑ (list use) Temp. Piez for Study

DATE DRILLED 2/14/11

4. WELL LOCATION:

2500 Paynes Dairy Rd. 28681
(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

CITY: Taylorsville COUNTY Alexander

TOPOGRAPHIC / LAND SETTING: (check appropriate box)
☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other

LATITUDE 36 ° ' " DMS OR 35.835507 DD

LONGITUDE 75 ° ' " DMS OR 81.150370 DD

Latitude/longitude source: ☑ GPS ☐ Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

5. FACILITY (Name of the business where the well is located.)

Alexander Co. MSWLF 02-01
Facility Name Facility ID# (if applicable)

2500 Paynes Dairy Road
Street Address

Taylorsville NC 28681
City or Town State Zip Code

Mr. Josh Mitchell
Contact Name

621 Liledoun Road
Mailing Address

Taylorsville NC 28681
City or Town State Zip Code

(828) 632-9467
Area code Phone number

6. WELL DETAILS:

a. **TOTAL DEPTH:** 50.64' BGS

b. **DOES WELL REPLACE EXISTING WELL?** YES ☐ NO ☑

c. **WATER LEVEL** Below Top of Casing: 24.75 FT.
(Use "+" if Above Top of Casing)

d. **TOP OF CASING IS** 3.00 FT. Above Land Surface*
*Top of casing terminated at/or below land surface may require a variance in accordance with 15A NCAC 2C .0118.

e. **YIELD (gpm):** na **METHOD OF TEST** na

f. **DISINFECTION: Type** na **Amount** na

g. **WATER ZONES** (depth):

Top 36	Bottom 41	Top	Bottom
Top	Bottom	Top	Bottom
Top	Bottom	Top	Bottom

7. CASING:

Depth		Diameter	Thickness/ Weight	Material
Top +3.00	Bottom 35.64	Ft. 2"	sch40	PVC
Top	Bottom	Ft.		
Top	Bottom	Ft.		

8. GROUT:

Depth		Material	Method
Top 0	Bottom 3.00	Ft. Concrete	Gravity
Top 3.00	Bottom 32	Ft. Cement	Tremie
Top 32	Bottom 34.05	Ft. Bent. Chips	Gravity

9. SCREEN:

Depth		Diameter	Slot Size	Material
Top 35.64	Bottom 50.64	Ft. 2.00 in.	0.01 in.	PVC
Top	Bottom	Ft. in.	in.	
Top	Bottom	Ft. in.	in.	

10. SAND/GRAVEL PACK:

Depth		Size	Material
Top 34.05	Bottom 50.64	Ft. #3	Filter Sand
Top	Bottom	Ft.	
Top	Bottom	Ft.	

11. DRILLING LOG

Top	Bottom	Formation Description
0	17	Soil;Silty Sand, Brown
17	20	Soil;Silty Sand, Saprolite, Brown
20	22	Soil;Silty Sand, Brown
22	25	PWR; Brown, High Density
25	50.64	Rock; Gray, competant, dense

12. REMARKS:

~~Very Low Yield.~~

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Derry L. Huneycutt 2/17/11
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE

Derry Huneycutt
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

Submit within 30 days of completion to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-161, Phone : (919) 807-6300

Form GW-1b
Rev. 2/09

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section - 1636 Mail Service Center - Raleigh, NC 27699-1639 - Phone No. (919) 733-3221

WELL ABANDONMENT RECORD

WELL CONTRACTOR Sherwood Gower

WELL CONTRACTOR CERTIFICATION # 2984

1. WELL USE (Check Applicable Box): Residential ☐ Municipal ☐ Industrial ☐ Agricultural ☐ Monitoring ☑ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use: _____

2. WELL LOCATION: (Show a sketch of the location on back of form.)
Nearest Town: Taylersville County Al Co.
MSW Landfill
(Road Name and Number, Community, Subdivision, Lot No.) Quadrangle No.

3. OWNER: Al Co.

4. ADDRESS: _____

5. TOPOGRAPHY: draw, slope, hilltop, valley, flat (circle one)

6. TOTAL DEPTH: 120' DIAMETER 2"

7. CASING REMOVED:

feet	diameter
110'	2"

8. DISINFECTION: N/A Dry
(Amount of 70% hypochlorite used:)

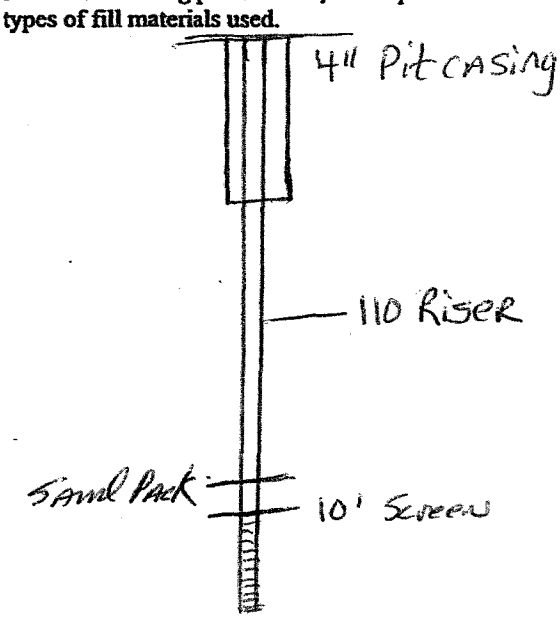
9. SEALING MATERIAL:

Neat Cement	Sand Cement
bags of cement _____	bags of cement _____
gallons of water _____	gallons of water _____

Other
Type material Easy Grout
Amount 200 lbs @ 96 gal

10. EXPLAIN METHOD EMPLACEMENT OF MATERIAL.
Trimmie grout w/ Pump

WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used.



11. DATE WELL ABANDONED June 11, 03

I do hereby certify that this well was abandoned in accordance with 15A NCAC 2C, well construction standards, and that a copy of the record has been provided to the well owner.

Signature of person abandoning the well Sherwood Gower Date June 11, 03

WELL LOCATION: Draw a location sketch on the reverse of this sheet, showing the direction and distance of the well to at least two (2) nearby reference points such as roads, intersections and streams. Identify roads with State Highway road identification numbers.

Submit original to the Division of Water Quality, Groundwater Section, one copy to the owner within 30 days from completion of abandonment.

GW-30 Revised 12/99

WELL ABANDONMENT RECORD

North Carolina Department of Environment and Natural Resources- Division of Water Quality

WELL CONTRACTOR CERTIFICATION # 2663

1. WELL CONTRACTOR:

Derry Huneycutt
Well Contractor (Individual) Name

Derry's Well Drilling Inc.
Well Contractor Company Name

44283-A NC 24/27/73
Street Address

Albemarle | NC | 28001
City or Town | State | Zip Code

(704) 982-3070
Area code Phone number

2. WELL INFORMATION:

SITE WELL ID # (if applicable) Water Supply Well

STATE WELL PERMIT # (if applicable)

COUNTY WELL PERMIT # (if applicable)

DWQ or OTHER PERMIT # (if applicable)

WELL USE (Check applicable use) ☐ **Monitoring** ☑ **Residential**

☐ **Municipal/Public** ☐ **Industrial/Commercial** ☐ **Agricultural**

☐ **Recovery** ☐ **Injection** ☐ **Irrigation**

☐ Other (list use) Not previously used as potable source only cleaning & dust suppression

3. WELL LOCATION:

COUNTY Alexander QUADRANGIE NAME Taylorsville

NEAREST TOWN: Taylorsville

2500 Paynes Dairy Road 28681
(Street/Road Name, Number, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING:

☐ Slope ☐ Valley ☑ Flat ☐ Ridge ☐ Other
(Check appropriate setting)

LATITUDE 36 ° ' " DMS **OR** 35.8344 DD

LONGITUDE 75 ° ' " DMS **OR** 81.1526 DD

Latitude/longitude source: ☐GPS ☐Topographic map
(location of well must be shown on a USGS topo map andattached to this form if not using GPS)

4a. FACILITY - The name of the business where the well is located. Complete 4a :
(If a residential well, skip 4a; complete 4b, well owner information only.)

FACILITY ID # (If applicable)

NAME OF FACILITY Alexander Co. MSWLF

STREET ADDRESS 2500 Paynes Dairy Road

Taylorsville | NC | 28681
City or Town | State | Zip Code

4b. CONTACT PERSON/WELL OWNER:

NAME Mr. Josh Mitchell

STREET ADDRESS 621 Liledoun Rd Taylorsville NC 28681

5. WELL DETAILS:

a. Total Depth 630 ft. Diameter: 6 in.

b. Water Level (Below Measuring Point): 140 ft.

Measuring point is 0 ft. above land surface.

6. CASING:

	Length	Diameter
a. Casing Depth (if known):	36 ft.	6 in.
b. Casing Removed:	1.5 ft.	6 in.

7. DISINFECTION: 22 ounces

(Amount of 65%75% calcium hypochlorite used)

8. SEALING MATERIAL:

Neat Cement

Cement 94 lb.
Water 6 gal.

Sand Cement

Cement lb.
Water gal.

Bentonite

Bentonite 100 lb.

Type: ☑ Slurry ☐ Pellets

Water 52 gal.

Other

Type material Washed Gravel #67

Amount 11,600 lbs

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL:

Gravity filled with gravel then pressure tremie grouted bentonite grout and neat cement from bottom to ground surface. Abandoned under supervision of Alexander Co. Env. Health Dept. inspector.

10. WELL DIAGRAM : Draw a detailed sketch of thwell on the back of this form showing total depth, depth and diameter of screens (if any) remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materialsused

11. DATE WELL ABANDONED 8/17/10

I DO HEREBY CERTIFY THAT THIS WELL WAS ABANDONED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

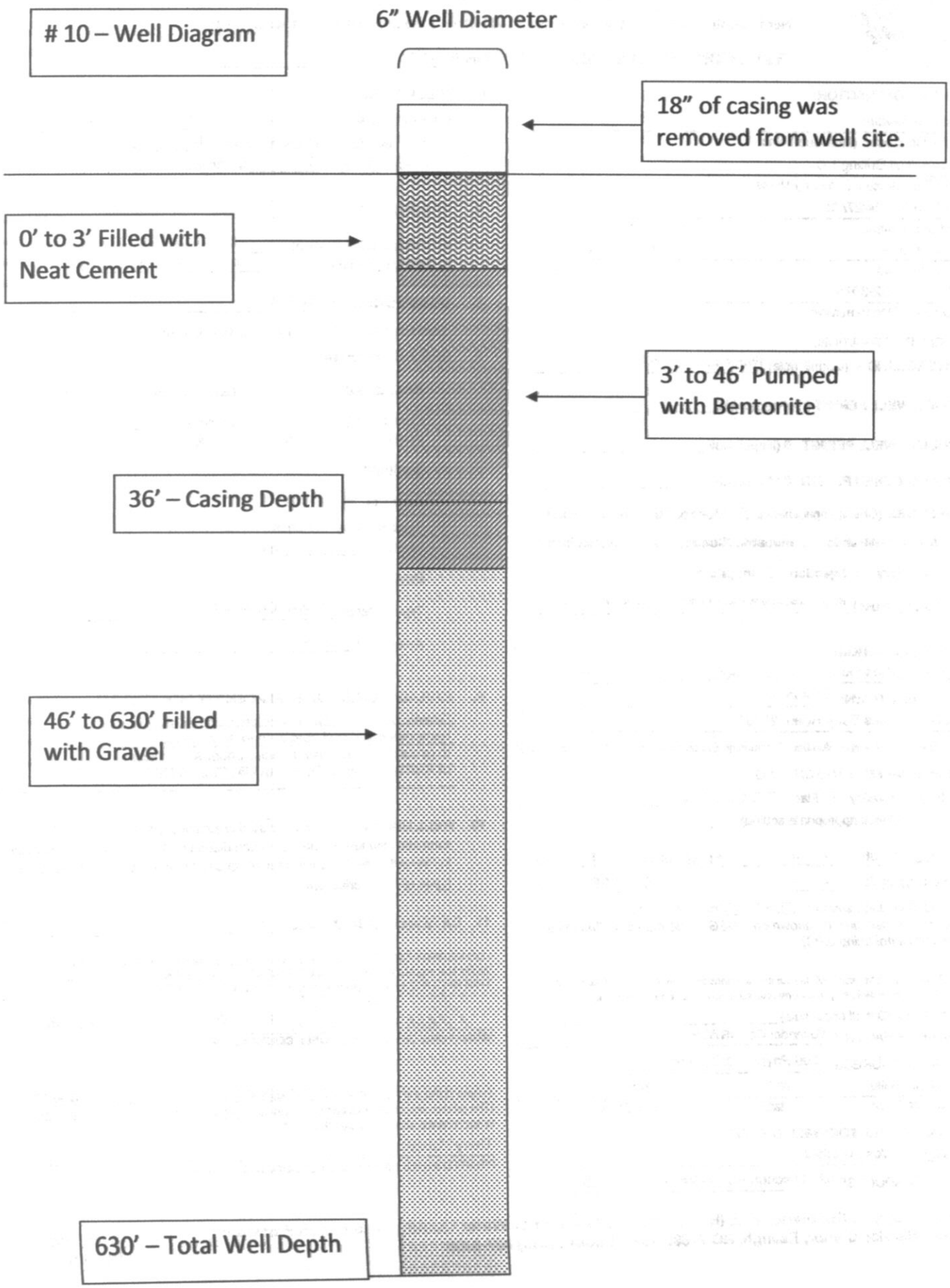
Derry L. Huneycutt 8-22-10
SIGNATURE OF CERTIFIED WELL CONTRACTOR **DATE**

SIGNATURE OF PRIVATE WELL OWNER ABANDONING THE WELL **DATE**
(The private well owner must be an individual wpersonallyabandons his/her residential well in accordance with 15A NCAC 2C .0113.)

Derry Huneycutt
PRINTED NAME OF PERSON ABANDONING THE WE LL

Submit a copy to the owner and the original to: Division of Water Quality - Information Processing, 1617 Mail Service Center, Raleigh, NC 27699-1617, Phone : (919) 807-6300

Form GW-30
Rev. 5/10


10 – Well Diagram
6" Well Diameter
18" of casing was removed from well site.
0' to 3' Filled with Neat Cement
3' to 46' Pumped with Bentonite
36' – Casing Depth
46' to 630' Filled with Gravel
630' – Total Well Depth

APPENDIX B

Groundwater and Surface Water Sampling and Analysis Plan

Prepared for

Alexander County Landfill
Taylorsville, North Carolina

MESCO Project Number: G11047.0

This report is included in Appendix B, part of the Corrective Action Plan

Original Submitted: February 6, 2009
Revision 2 Submitted: December 20, 2010
Revision 3 Submitted: March 22, 2011

NORTH CAROLINA LICENSED SEAL 2275 GEOLOGIST MADELINE GERMAN

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TABLE OF CONTENTS

1 INTRODUCTION AND OBJECTIVE 1

2 GROUNDWATER AND SURFACE WATER 2

2.1 ON LOCATION 2
2.1.1 Existing Conditions 2
2.1.2 Potential Additions with further Corrective Action 3
2.1.3 Water Quality Monitoring 3
2.1.4 Natural Attenuation Monitoring 3
2.2 SAMPLING 3
2.2.1 Set-Up 3
2.2.2 Equipment 4
2.2.3 Purging 5
2.2.4 Groundwater 6
2.2.5 Surface Water 7
2.2.6 Investigation Derived Waste 7
2.2.7 Chain of Custody 8

3 ANALYSIS 9

4 CONCLUSION 9

TABLES

Table B-1 ..... Summary of Ground and Surface Water Monitoring Points

PLATES

Plate A ..... Site Map with Existing Sampling Locations
Plate B ..... Typical Monitoring Well
Plate C ..... Graphical Plot of Standing Volumes of Water

1 INTRODUCTION AND OBJECTIVE

The Ground and Surface Water Sampling and Analysis Plan (SAP) objective is to provide clear guidelines and procedures for field and laboratory personnel when obtaining and analyzing groundwater and surface water samples. This plan applies to the Alexander County C&D Landfill over Closed MSW Landfill. This plan is an update requested by the Solid Waste Section (SWS), per their August 3, 2010 letter, and supersedes the Ground and Surface Water Sampling and Analysis Plan included in the Corrective Action Plan (CAP) – Addendum, December 2010. The sampling procedures outlined in this analysis plan are guidelines by which sampling will be performed. Deviation from the procedures may be warranted depending on facility conditions or unforeseen sampling variables. Alternative sampling procedures must conform to the Solid Waste Section Guidelines for Groundwater, Soil and Surface Water Sampling (Guidance Document).

Groundwater and surface water monitoring points shall be sampled semi-annually for the constituents listed in 40 CFR 258, Appendix I [and or select Appendix II listed constituents as promulgated in 15A NCAC 13B]. Additionally, monitoring wells MW-5, MW-11, MW-12, MW-12D, MW-16 and MW-26 will be sampled for parameters from the following suite of Monitored Natural Attenuation (MNA) parameters, based on independent well conditions and NCDENR SWS approval. MW-18 will serve as the background MNA well.

MNA Performance Parameters		
Parameter	**Analysis Type**	**Analytical Method**
Dissolved Oxygen (DO)	Field Reading	Multi-parameter Field Instrument w/ flow-through cell
pH	Field Reading	
Oxidation-Reduction Potential (ORP)	Field Reading	
Turbidity	Field Reading	
Conductivity	Field Reading	
Temperature	Field Reading	
Dissolved CO_2	Field Reading	Field Instrument / Hach Kit
Alkalinity (Total as $CaCO_3$)*	Laboratory/Field*	SM2320B or EPA 310.2
Chloride*	Laboratory/Field*	SM 4500-CL-E or EPA 300.0
Iron	Laboratory	EPA 6010
Nitrate*	Laboratory/Field*	EPA 353.2 / SM 2320B
Sulfate*	Laboratory/Field*	ASTM D516-90 or EPA 300.0
Sulfide*	Laboratory/Field*	SM18 4500-S D or SM 4500-S2D
TOC/BOD/COD	Laboratory	SM 5310B / SM 5210B / SM 5220D
Methane	Laboratory	AM20GAX
Ethane, Ethene	Laboratory	AM20GAX
Hydrogen	Laboratory	AM20GAX
Volatile Fatty Acids	Laboratory	AM23G
*For budgetary considerations these analyses may be performed in the field using Hach® brand color wheel test kits. Historical iron concentrations have exceeded Hach kit quantitation limits.		

2 GROUNDWATER AND SURFACE WATER

2.1 ON LOCATION

2.1.1 Existing Conditions

The nature of the groundwater flow, geology, creek location, and close proximity of several drainage features will require extensive monitoring for early detection of a release. The monitoring plan consists of thirty-one (31) monitoring wells (MW-1 through MW-3, MW-4R, MW-5 through MW-7, MW-9 through MW-27, MW-1A, MW-1B, MW-12D, MW-31 and MW-32) and three (3) surfacewater monitoring points (SW-3, SW-4R and SW-5). Monitoring points included in this plan are summarized in **Table B-1**. Locations of existing monitoring points are shown on **Plate A**.

Monitoring well MW-1 is the original background well located upgradient of the landfill. It has since been replaced with upgradient background wells MW-1A, MW-1B, and recently by MW-18. MW-5, MW-16, MW-10 and MW-32 are downgradient wells used for the detection of a release from the northeastern portion of the landfill. MW-4R and MW-9 are downgradient wells installed on the southeastern half of the landfill. MW-3 is a downgradient monitoring well located just outside the waste limit near the center of the landfill, and was selected based on the southerly flow of groundwater in the northern portion of the landfill. MW-11, MW-26, MW-27 and MW-31 are also downgradient wells positioned to monitor the center of the landfill and track plume migration. MW-7, MW-12, MW-24, and MW-25 are southwestern, downgradient monitoring wells, positioned to intersect the more southerly flow from the northern portion of both units. Monitoring well MW-12D is used for monitoring the bedrock aquifer. MW-6 and MW-13 are downgradient monitoring wells located on the western side of the landfill, positioned to detect a release flowing towards a local Catawba River tributary. MW-2 and MW-14 are downgradient monitoring wells on the western side positioned to monitor groundwater flow from the northern portion prior to reaching the property line. MW-20 is a downgradient monitoring well located north of the facility. MW-21, MW-22, and MW-23 are downgradient wells along the northwestern side of the landfill positioned to monitor groundwater before reaching the local Catawba River tributary. Monitoring wells MW-15 and MW-17 are located north of the landfill and are positioned to monitor a release flowing towards the local Catawba River tributary. MW-19 was installed slightly off the property, north of the facility as a downgradient monitoring well. Existing monitoring locations are shown on **Plate A**.

Surfacewater sampling point SW-3 is located south of the landfill downstream on a Catawba River tributary. Surfacewater sampling point SW-4R is located downstream of the landfill on the Little River tributary, where it flows past the landfill on the northwestern side. Surfacewater sampling point SW-5 is located along another local Catawba River tributary on the eastern side of the facility. Surfacewater sampling locations are shown in **Plate A**.

2.1.2 Potential Additions with further Corrective Action

Providing for potential contaminant plume migration is a dynamic situation. Future monitoring wells MW-28 and MW-29 were proposed in the CAP to be installed in the southwestern portion of the facility in the vicinity of existing monitoring well MW-24. These wells will be installed in the event contaminants appear to have migrated past the existing MW-24.

Future monitoring wells MW-33 and MW-34 were proposed in the CAP to be advanced in the vicinity of MW-5 and MW-16. With the acquisition of additional property, these wells are proposed to be installed in locations determined to best delineate the contamination extent in this area of concern. Additional wells may be installed if necessary. SW-6 is proposed on the new property, upstream from SW-5 on the same tributary.

2.1.3 Water Quality Monitoring

Water Quality monitoring will involve groundwater collection for analysis for the 40 CFR 258, Appendix I constituents [and or select Appendix II listed constituents as promulgated in 15A NCAC 13B]. Field parameters including dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, temperature, turbidity, and conductivity will also be collected. Water Quality monitoring will be performed on MW-1, MW-1A, MW-1B, MW-2, MW-4R, MW-5, MW-6, MW-9, MW-10, MW-11, MW-12, MW-12D, MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, MW-27, MW-31 and MW-32.

Proposed wells MW-28, MW-29, MW-33 and MW-34 will be sampled for Appendix I VOCs when installed. At the subsequent semi-annual sampling event they will be included with the water quality monitoring schedule and sampled for the 40 CFR 258, Appendix I constituents [and or select Appendix II listed constituents as promulgated in 15A NCAC 13B].

2.1.4 Natural Attenuation Monitoring

Natural attenuation monitoring (MNA) will be performed on monitoring wells MW-5, MW-11, MW-12, MW-12D, MW-16 and MW-26 in addition to traditional water quality monitoring.

2.2 SAMPLING

Wells will be sampled in order from least to greatest contamination unless no information is available; then they will be sampled in order working down gradient. In both cases, background well samples will be collected prior to collecting monitoring well samples.

2.2.1 Set-Up

A clean sheet of plastic should be placed around the well to provide a clean surface for sampling equipment. The total well depth read from the well tag and the measured depth to water, determined using the water level indicator, will be used to compute the depth of water in the well. The total well depth will be measured and

compared to the depth indicated on the well tag as a check for siltation or blockage at depth, using the chart on **Plate C**. For example, if a two-inch well is 29 feet deep and has a measured depth to water of 10 feet, there are 19 feet of standing water or 3.3 gallons in the well.

The EPA recommends the indicator parameters: pH, specific conductance and temperature are measured on purged and recovered monitoring wells before collecting samples. When three consecutive measurements are within a 10% range, temperature and specific conductance are considered stable; pH is considered stable when three consecutive measurements are within a range of 0.2 units. Collected information, including the depth to water, pH, temperature and specific conductivity of the sample measured in the field at each well sampled will be recorded on a field data sheet or in a field logbook with copies submitted to the Division of Waste Management with the analytical results.

Meters will be calibrated immediately prior to purging and sampling and those readings recorded in a field logbook or sampling data sheet. The meters should be recalibrated at the end of each sampling event and those readings recorded in the log also. Entries will always include pre- and post- calibration readings as well as the model and serial number of the equipment and the date, time, and person performing the calibration(s). Two standards, which bracket the average or suspected measurements for pH and specific conductance, will be used at the site. Additionally, if an equipment blank needs to be run, it should be done before any sampling is started.

2.2.2 Equipment

Groundwater purging and sampling will be performed using a submersible pump and disposable polyethylene bailers. Each location will be sampled with a new bailer to prevent cross-contamination issues. The following procedure will be used to decontaminate the submersible pump:

1. Phosphate-free detergent & de-ionized or distilled water rinse.
2. De-ionized or distilled water rinse.
3. Isopropyl alcohol (isopropanol) rinse.
4. De-ionized or distilled water rinse.

Alternative sampling equipment may be warranted, depending on variable field conditions; any alternative equipment and procedures must conform to the Guidance Document. The standard equipment necessary to conduct sampling for each well consists of sample containers (including trip blanks and equipment blanks), one wide-mouth container, at least two 600-ft spools of 1/4-inch nylon rope, at least two boxes of un-powdered disposable gloves, one box of large plastic bags, temperature indicator, pH indicator, conductivity indicator, water level indicator, storage coolers and ice. If the total depth of all wells to be sampled exceeds 1,200 feet, additional spools of rope will be required to complete the sampling. If the number of wells to be sampled exceeds one third of the number of pairs of gloves in stock, additional boxes of gloves will be

necessary. Any equipment subject to damage and contamination will be transported in sealed, plastic bags or storage containers.

Each sample container will be clearly labeled providing the site name, county location, well identification number, parameters to be analyzed, preservative added, date and time of sampling and initials of the sampler. Samples to be analyzed for organic content will be collected in four 40-ml glass vials with Teflon caps. The sample vials will be filled with no air left in the vials. Samples to be analyzed for inorganic contamination will be collected in a quart/1-liter polyethylene container with ½ inch space for air permitted.

Sample containers will be obtained from an independent North Carolina certified laboratory in a sterilized condition. Some of the containers will have a pre-measured amount of preservative in them as necessary. In this event, care will be taken not to rinse the container or allow the preservative to wash out during sampling.

2.2.3 Purging

Purging is done prior to sampling to remove stagnant water from the well and to introduce fresh groundwater for sampling. Each well will be purged approximately three to five well volumes (quantity of water in the well), or until dry. In the previous example, 10 gallons would be adequate.

After determining the amount of water to be purged from a well, the equipment necessary will be assembled including rope, a 5-gallon bucket, bailer and gloves. Pull the top portion of wrapping away exposing the eyelet, keeping the bailer in a stable upright position. Using gloved hands: secure rope to the bailer via the eyelet hole and suspend to remove the remaining wrapping. These gloves are now contaminated and cannot touch the bailer or the rope. Clean, gloved hands will slowly lower the suspended bailer into the well until the bailer contacts groundwater. Cut the rope to length and secure it, to prevent loss of the bailer, again replace contaminated gloves. During purging, the rope cannot touch the ground or contaminated surfaces including, dirtied plastics, gloves, boots, etc. Many methods are available and it is to the sampler's discretion which method they prefer. The wind-mill method, looping the rope between thumbs, bucket method, where rope is lowered into a clean plastic bag lining a bucket, or simply placing plastic onto the ground near the well covering shoes, are commonly used.

If purging and sampling of a well are performed at separate times, the bailer will be left suspended in the well, above the water table, with the rope secured. The remaining rope will be removed, in order to prevent contamination issues. The rope may be doubled and grasped in a tight loop in one hand then covered by pulling the corresponding hand's glove on top, inside out. The procedure can be repeated using the other hand if necessary. The glove-encased rope will be set on top of the well head until time to sample. Alternatively,

the rope remaining after securing may be gathered in a tight loop and pushed into the 2-inch PVC well pipe and left. Even when sampling immediately follows purging, new gloves will be necessary.

Based on the number of wells to be sampled and their proximity to each other, the wells may be purged one after another with sampling to follow. In this manner, if a well is purged dry, it may be allowed to recharge prior to sampling.

2.2.4 Groundwater

Samples will be collected for the various analyses in laboratory-supplied containers. Each sample container will be clearly labeled providing the following information: site name, county location, sample identification number, parameters to be analyzed, preservative added, date and time of sampling, and sampler initials.
Sample containers will be obtained from an independent laboratory in a sterilized condition and with the appropriate, method-specific preservative. Care will be taken by the field technician to not allow the preservative to wash out of the sample containers during sampling.

Bottles should be filled in the following order, in accordance with the Guidance Document:

1. Organics and Volatile Inorganics
2. Organics, Petroleum Hydrocarbons, Aggregate Organics and Oil and Grease
3. Total Metals
4. Inorganic Nonmetallics, Physical and Aggregate Properties and Biologicals
5. Microbiological

To collect a sample, lower the bailer into the well slowly, with gloved hands, to avoid releasing any volatiles from the groundwater; the bailer should not splash or smack the water surface. Once full, the bailer will be retrieved and containers filled by emptying the water through the hole at the bottom of the bailer. To top off the VOC's, collect some of the groundwater in the cap and pour it onto the sample's contents to acquire the needed meniscus to eliminate air bubbles. The polyethylene containers will be filled and sealed with the cap, leaving about 1/2 inch of airspace at the top. In addition to collecting the samples, water will be collected in the wide-mouth container for pH, temperature, and conductivity measurements. Upon completion of sampling, sample containers will be placed in labeled and sealed plastic bags, including equipment and trip blanks, and stored on ice in coolers. The used gloves and rope will be properly discarded.

Water Quality Sampling Containers

Samples to be analyzed for VOC concentrations will be collected in three 40-ml glass vials with Teflon septa caps. The sample vials will be filled with zero headspace in the vials. Samples to be analyzed for inorganic

compound concentrations will be collected into various polyethylene containers, with ½ inch space for air permitted. Sample containers will be obtained from an independent laboratory in a sterilized condition. Some containers may contain a pre-measured amount of preservative, as necessary. Care will be taken not to rinse the container or to allow the preservative to wash out during sampling.

MNA Sampling Containers

Groundwater samples analyzed for select MNA performance parameters will be collected in the corresponding container types from the table below.

MNA Parameter	Volume	Bottle Type	Preservative
Alkalinity	250 mL	Plastic	none; cool to 4°C
Chloride	125 mL	Plastic	none; cool to 4°C
TOC/COD	250 mL	Glass	Sulfuric acid (H_2SO_4)
BOD	500 mL	Polyethylene	none; cool to 4°C
Iron	125 mL	Plastic	Nitric acid (HNO_3)
Nitrate	125 mL	Plastic	Sulfuric acid (H_2SO_4)
Sulfate	125 mL	Plastic	none; cool to 4°C
Sulfide	250 mL	Glass	Sodium hydroxide (NaOH)
Methane/Ethane/Ethene	125 mL	Plastic	Trisodium phosphate
Hydrogen	-	-	proprietary lab sampler
Volatile Fatty Acids	40 mL	Glass	Benzalkonium chloride

2.2.5 Surface Water

Surface water samples will be collected with consideration to minimize turbulence and aeration. Surface water samples will be collected by a field technician wearing disposable non-powdered gloves. Surface water sample containers will be handled with gloves on, keeping one hand near the base. Containers will be dipped at location points with extreme caution in order to avoid contamination at the mouth of the container, pushing rapidly at an angle into the water, mouth up and tilted towards the stream current to fill, so as not to lose any of the preservative into the surrounding water. If there is little current movement, the container will be moved slowly through the water laterally. During times of drought, if the water is not deep enough to allow filling of the container, a pool may be scooped out of the bottom of the stream to obtain a sample. The pool will be allowed to clear before sampling. Containers will be filled in the same manner and treated as the ground water samples; sealed in labeled, plastic bags, stored in an ice-filled cooler to chill the samples to 4°C pending transport to a NCDENR-certified analytical laboratory. In addition to collecting the samples, water will be collected in the wide-mouth container for pH, temperature and conductivity measurements.

2.2.6 Investigation Derived Waste

Any investigation derived waste (IDW) will be properly managed and disposed of to prevent contamination of previously uncontaminated areas. Water, soil, drilling mud, decontamination waste, discarded personal protective equipment and any other substance possibly contaminated during site investigations, drilling

activities or daily operation procedures will be properly discarded. Any IDW that is determined to be RCRA-hazardous will be managed according to local, state and federal regulations. Any containers for storage of IDW will be periodically inspected to ensure they are properly labeled and in good condition.

2.2.7 Chain of Custody

Chain-of-custody (C-O-C) forms will be used to document the handling of collected samples and list individuals who have taken possession of a sample set, including field personnel, laboratory couriers, and laboratory personnel. Trip blanks, equipment blanks and sample containers will travel and be stored on ice in coolers for transport to a North Carolina-certified laboratory. Trip blanks will remain in the condition they are received from the laboratory and will not be opened or tampered with during the sampling. Samples will be carefully packed to protect the integrity of the sample and maintain a temperature of approximately 4 degrees Celsius. A chain-of-custody record will be completed for each day's samples, describing each sample (including QA/QC samples), the number of containers, the sample location, the date and time, the sample matrix (soil, water, etc.), the laboratory analyses to be conducted, the signature of the sampler, the regulatory agency and the signatures of everyone through whom the samples change hands and the dates and times of the transfers.

3 ANALYSIS

When the water samples reach the laboratory, they will be transferred to a sample custodian who will sign the C-O-C documentation as receipt of the samples. Internal control of the water samples in the laboratory will be in accordance with QA/QC procedures for the laboratory. Copies of QA/QC manuals for approved laboratories are on file at the Division of Solid Waste.

Groundwater and surface water samples will be analyzed for the Appendix I list of constituents [and or select Appendix II listed constituents as promulgated in 15A NCAC 13B]. QA/QC procedures utilized during the testing will be in conformance with the laboratory QA/QC manual. Samples from monitoring wells MW-3, MW-5, MW-7, MW-11, MW-12, MW-12D, MW-16 and MW-26, will also be analyzed for the appropriate MNA performance parameters.

4 CONCLUSION

The ground and surface water monitoring plan for the Alexander County C&D Landfill is designed to be effective in the early detection of a possible release of hazardous constituents to the unconfined surficial and upper bedrock aquifers, and to provide indicator parameters for the natural degradation, injection, and phytoremediation processes.

Table B-1: Summary of Ground and Surface Water Monitoring Points

Sampling Point	Type	Gradient	Total Depth (ft)	Designation
MW-1	Monitoring Well	Up	40	Monitoring Well
MW-1A	Monitoring Well	Up	47.5	Monitoring Well
MW-1B	Monitoring Well	Up	61	Monitoring Well
MW-2	Monitoring Well	Down	30	Monitoring Well
MW-3	Monitoring Well	Down	33	Monitoring Well
MW-4R	Monitoring Well	Down	20.5	Monitoring Well
MW-5	Monitoring Well	Down	48.8	Monitoring Well
MW-6	Monitoring Well	Down	41	Monitoring Well
MW-7	Monitoring Well	Down	53	Monitoring Well
MW-9	Monitoring Well	Down	31.5	Monitoring Well
MW-10	Monitoring Well	Down	91	Monitoring Well
MW-11	Monitoring Well	Down	56	Monitoring Well
MW-12	Monitoring Well	Down	66.5	Monitoring Well
MW-12D	Monitoring Well	Down	100	Monitoring Well
MW-13	Monitoring Well	Down	60.5	Monitoring Well
MW-14	Monitoring Well	Down	40.5	Monitoring Well
MW-15	Monitoring Well	Down	35	Monitoring Well
MW-16	Monitoring Well	Down	40.25	Monitoring Well
MW-17	Monitoring Well	Down	22.3	Monitoring Well
MW-18	Monitoring Well	Up	56.7	Background Well
MW-19	Monitoring Well	Down	63.92	Monitoring Well
MW-20	Monitoring Well	Down	63.55	Monitoring Well
MW-21	Monitoring Well	Down	41.05	Monitoring Well
MW-22	Monitoring Well	Down	18.12	Monitoring Well
MW-23	Monitoring Well	Down	21.54	Monitoring Well
MW-24	Monitoring Well	Down	35.35	Monitoring Well
MW-25	Monitoring Well	Down	44.48	Monitoring Well
MW-26	Monitoring Well	Down	49.8	Monitoring Well
MW-27	Monitoring Well	Down	49.82	Monitoring Well
MW-31	Monitoring Well	Down	32.58	Monitoring Well
MW-32	Monitoring Well	Down	42.70	Monitoring Well
MW-28	*Proposed Monitoring Well*	*Down*	*TBD*	*Proposed Monitoring Well*
MW-29	*Proposed Monitoring Well*	*Down*	*TBD*	*Proposed Monitoring Well*
MW-33	*Proposed Monitoring Well*	*Down*	*TBD*	*Proposed Monitoring Well*
MW-34	*Proposed Monitoring Well*	*Down*	*TBD*	*Proposed Monitoring Well*
SW-3	Surface Water	Down Stream		Tributary
SW-4R	Surface Water	Down Stream		Tributary
SW-5	Surface Water	Down Stream		Tributary
SW-6	Surface Water	Down Stream		Tributary

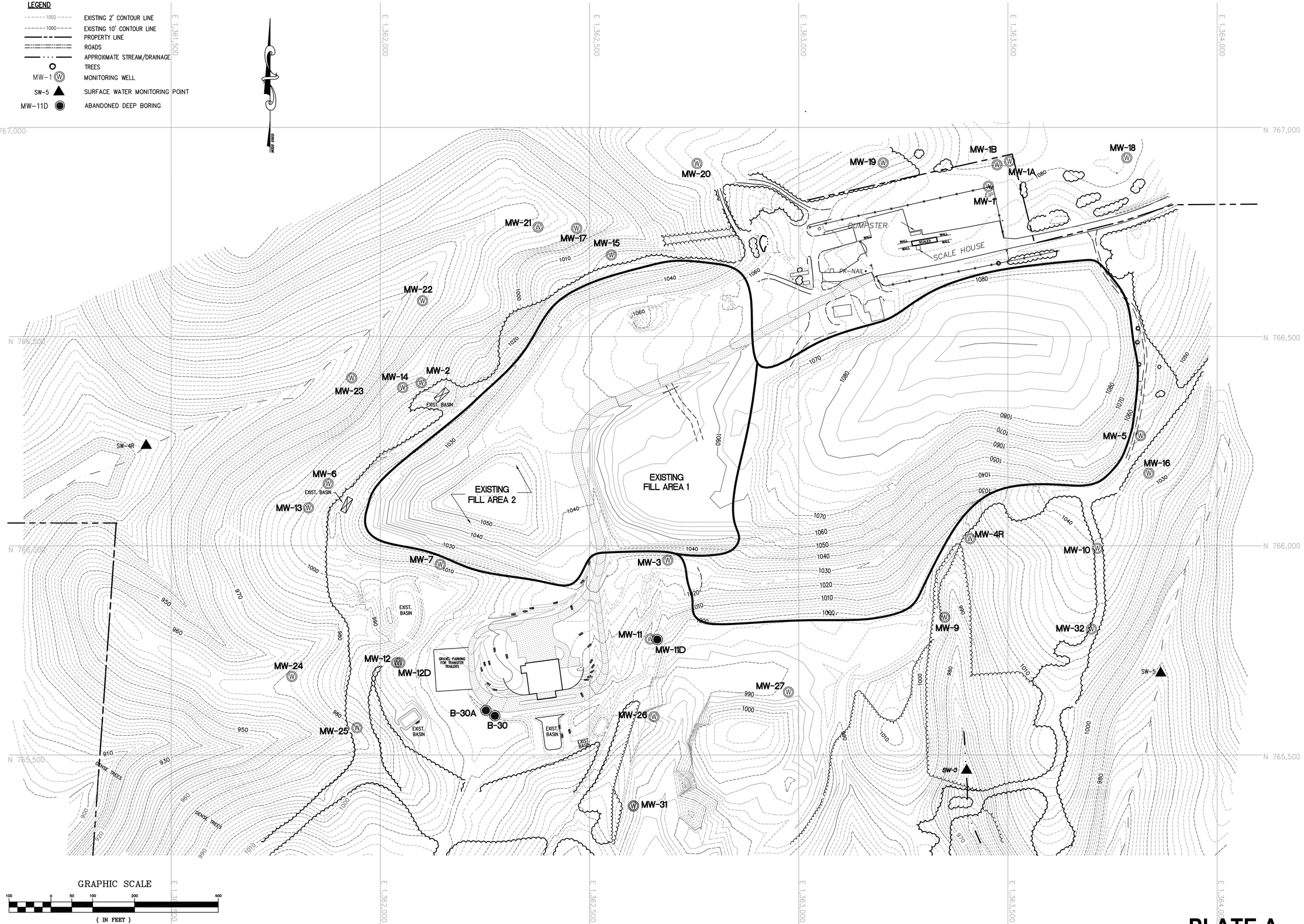


PLATE A

Engineering Company, P.A.
P.O. BOX 349 BOONE, N.C. 28607
(828) 262-1767

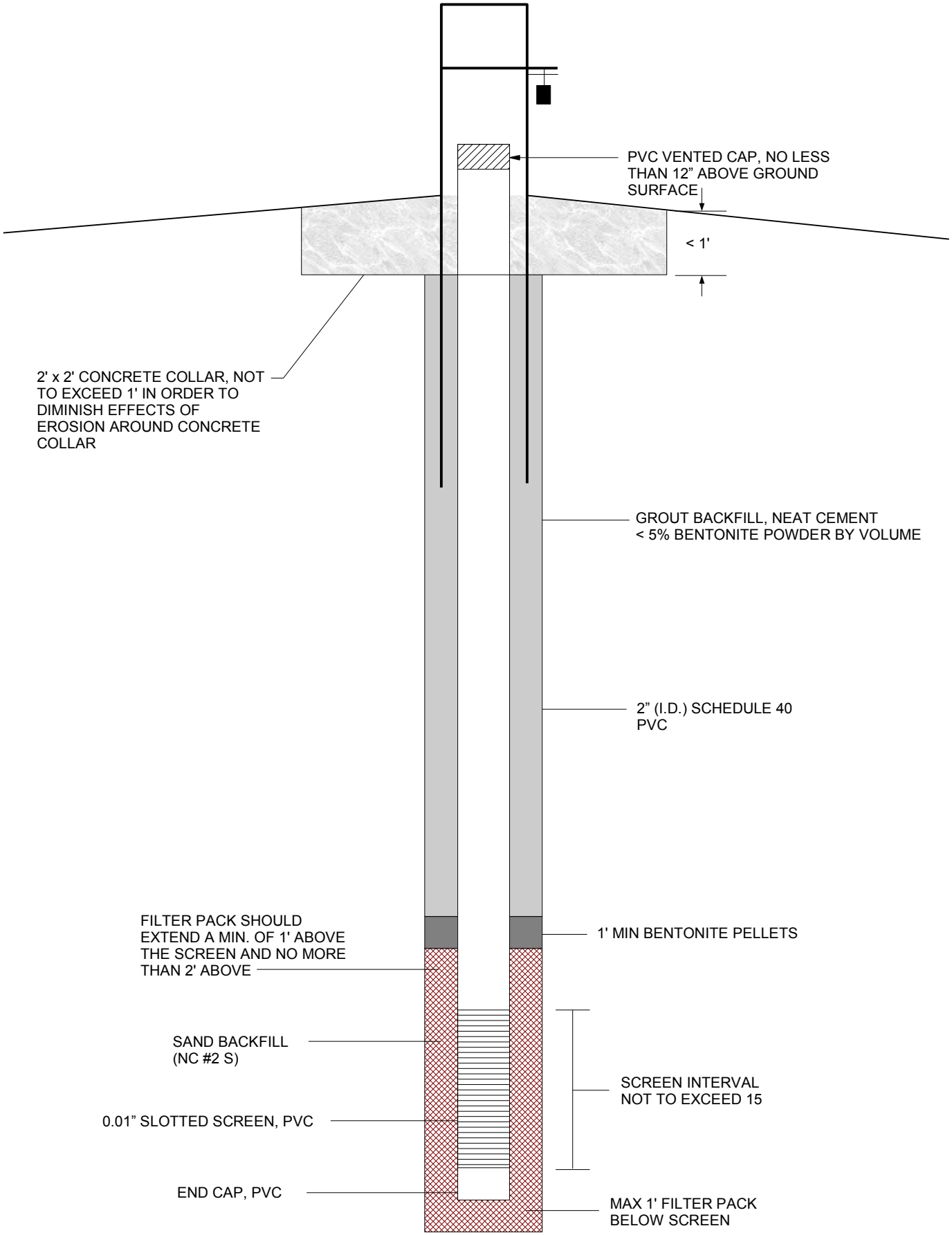
Municipal Services
LICENSE NUMBER: C-0281
P.O. BOX 97 GARNER, N.C. 27529
(919) 772-5393

CONSTRUCTION AND DEMOLITION LANDFILL FACILITY
ALEXANDER COUNTY
NORTH CAROLINA

DATE	BY	REV.	DESCRIPTION

SITE MAP WITH EXISTING SAMPLING LOCATIONS

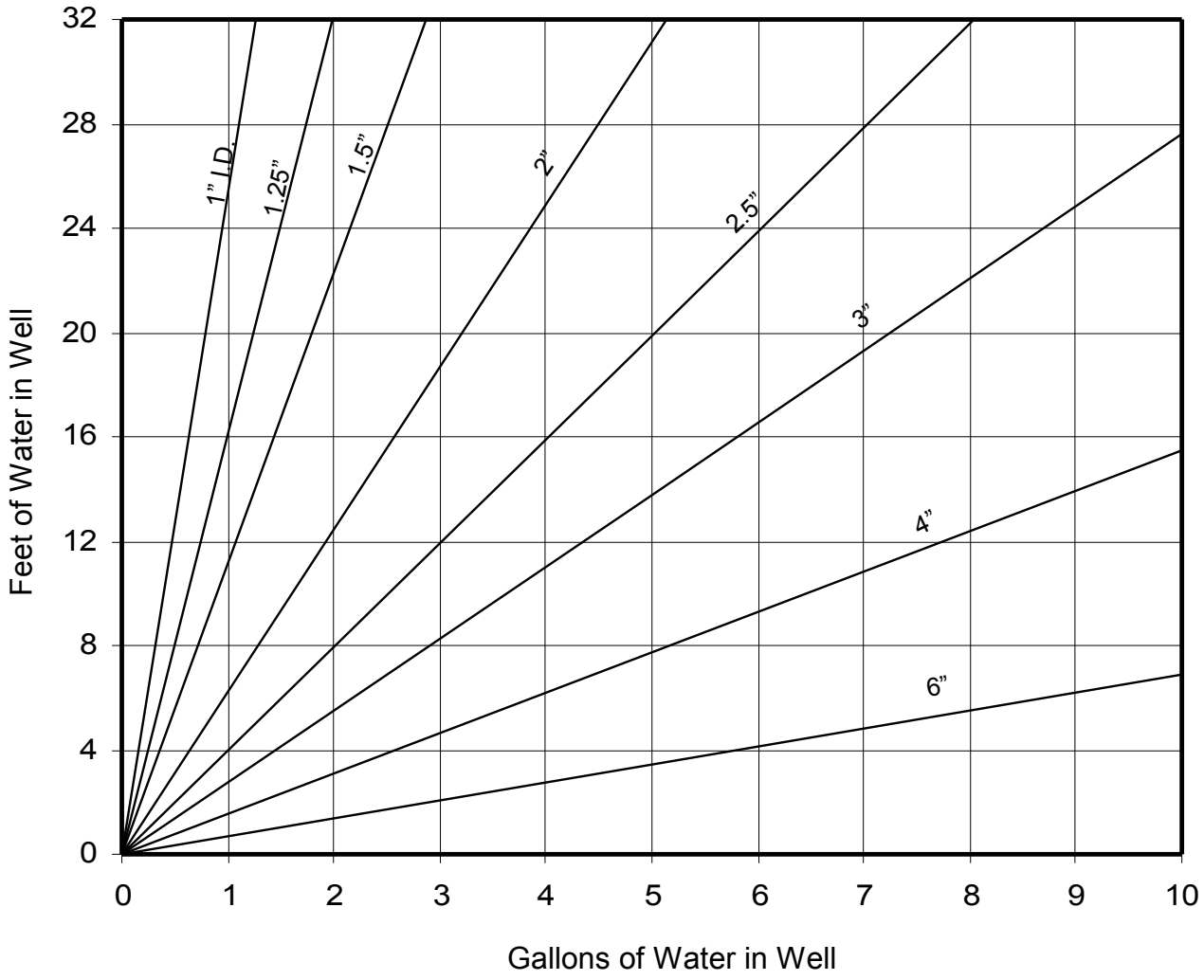
SCALE:	1" = 100'
DATE:	8/10/2010
DRWN. BY:	M. GERMAN
CHKD. BY:	M. GERMAN
PROJECT NUMBER	G11047.0
DRAWING NO.	PLATE A
SHEET NO.	1 OF 1



NOTE: SHALLOW WELLS REQUIRE A MINIMUM OF 5' COMBINED THICKNESS OF GROUT AND BENTONITE.

TYPICAL MONITORING WELL

PLATE B



GRAPHICAL PLOT OF STANDING VOLUMES OF WATER

PLATE C

APPENDIX C

MATERIAL SAFETY DATA SHEET

EMULSIFIED EDIBLE OIL SUBSTRATE

D.O.T. HAZARD CLASSIFICATION: NONE

	----HMIS----
HEALTH	1
FLAMMABILITY	0
REACTIVITY	0
PERSONAL PROTECTION	B

MANUFACTURER'S NAME

EOS Remediation, LLC
1101 Nowell Road
Raleigh, NC 27607
www.EOSRemediation.com

DATE OF PREPARATION
01-24-03, Rev. 04-19-05

INFORMATION TELEPHONE NO.
919-873-2204

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME **EOS®CONCENTRATE 598B42**
PRODUCT CLASS **VEGETABLE OIL BASED EMULSION**
CAS NUMBER **MIXTURE**

SECTION II - HAZARDOUS INGREDIENTS

COMPONENT(S) EXPOSURE LIMIT

THIS PRODUCT IS A MIXTURE OF EDIBLE FOOD GRADE ADDITIVES AND CONTAINS NO HAZARDOUS INGREDIENTS.

SECTION III - PHYSICAL DATA

BOILING POINT:	**212°F**
SPECIFIC GRAVITY:	**0.97; .92 (pure oil phase)**
VAPOR PRESSURE:	**NOT ESTABLISHED**
PERCENT VOLATILE BY VOLUME (%):	**24 (AS WATER)**
VAPOR DENSITY:	**HEAVIER THAN AIR**
EVAPORATION RATE:	**NOT ESTABLISHED**
SOLUBILITY IN WATER:	**SOLUBLE**
APPEARANCE AND ODOR:	**OFF WHITE LIQUID WITH VEGETABLE OIL ODOR**

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	**>300°F**
FLAMMABLE LIMITS:	**NOT ESTABLISHED**
EXTINGUISHING MEDIA:	**CO_2, FOAM, DRY CHEMICAL** **NOTE: WATER, FOG, AND FOAM MAY CAUSE FROTHING AND SPATTERING.**
UNUSUAL FIRE AND EXPLOSION HAZARDS:	**BURNING WILL CAUSE OXIDES OF CARBON.**
SPECIAL FIRE FIGHTING PROCEDURES:	**WEAR SELF CONTAINED BREATHING APPARATUS AND CHEMICAL RESISTANT CLOTHING. USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.**

SECTION V - PHYSICAL HAZARDS

STABILITY:	**STABLE**
CONDITIONS TO AVOID:	**NONE**
INCOMPATIBILITY:	**STRONG ACIDS AND OXIDIZERS.**
HAZARDOUS DECOMPOSITION PRODUCTS:	**THERMAL DECOMPOSITION MAY PRODUCE OXIDES OF CARBON.**
HAZARDOUS POLYMERIZATION:	**WILL NOT OCCUR**

SECTION VI - HEALTH HAZARDS

SIGNS AND SYMPTOMS OF EXPOSURE:

1. Acute Overexposure - **NONE**
2. Chronic Overexposure - **NONE**

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: **NONE KNOWN**

CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN:

N.T.P. - **NO** I.A.R.C. - **NO** OSHA - **NO**

EMERGENCY AND FIRST AID PROCEDURES:

1.) Inhalation-	**REMOVE TO FRESH AIR.**
2.) Eyes-	**FLUSH WITH WATER FOR 15 MINUTES, IF IRRITATION PERSISTS SEE PHYSICIAN.**
3.) Skin-	**WASH WITH MILD SOAP AND WATER.**
4.) Ingestion-	**PRODUCT IS NON-TOXIC. IF NAUSEA OCCURS, INDUCE VOMITING AND SEEK MEDICAL ATTENTION.**

SECTION VII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	**NOT NORMALLY REQUIRED**
VENTILATION:	**LOCAL EXHAUST**
PROTECTIVE GLOVES:	**NOT NORMALLY REQUIRED**
EYE PROTECTION:	**NOT NORMALLY REQUIRED**
OTHER PROTECTIVE CLOTHING OR EQUIPMENT:	**NONE**

SECTION VIII - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:	**DO NOT STORE NEAR EXCESSIVE HEAT OR OXIDIZERS.**
OTHER PRECAUTIONS:	**NONE**
STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED:	**SOAK UP WITH DRY ABSORBENT AND FLUSH AREA WITH LARGE AMOUNTS OF WATER.**
WASTE DISPOSAL METHODS:	**DISPOSE OF ACCORDING TO FEDERAL, STATE, AND LOCAL REGULATIONS.**

SECTION IX - ADDITIONAL REGULATORY INFORMATION

SARA TITLE III

UNDER THE PROVISIONS OF TITLE 111, SECTION 311/312 OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATIONS ACT, THIS PRODUCT IS CLASSIFIED INTO THE FOLLOWING HAZARD CATEGORIES: **NONE**

THIS PRODUCT DOES **NOT** CONTAIN SECTION 313 REPORTABLE INGREDIENTS.

THE INFORMATION CONTAINED HEREIN IS BASED ON AVAILABLE DATA AND IS BELIEVED TO BE CORRECT. HOWEVER, EOS REMEDIATION, INC. MAKES NO WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED THEREOF. THIS INFORMATION AND PRODUCT ARE FURNISHED ON THE CONDITION THAT THE PERSON RECEIVING THEM SHALL MAKE HIS/HER OWN DETERMINATION AS TO THE SUITABILITY OF THE PRODUCT FOR HIS/HER PARTICULAR PURPOSE.

Material Safety Data Sheet
BAC-9™

SECTION 1 - MATERIAL IDENTIFICATION AND INFORMATION

Material Name: DHC microbial consortium (BAC-9™)
Date Prepared: 1/05/2006 CAS #: N/A (Not Applicable)
Material Description: Non-hazardous, naturally occurring non-altered anaerobic microbes and enzymes in a water-based medium.

SECTION 2 - INGREDIENTS

Components	%	OSHA PEL	ACGIH TLV	OTHER LIMITS
Non-Hazardous Ingredients	100	N/A	N/A	N/A

SECTION 3 - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: 100°C (water)

Specific Gravity (H2O = 1): 0.9 - 1.1

Vapor Pressure @ 25°C: 24 mm Hg (water)

Melting Point: 0°C (water)

Vapor Density: N/A

Evaporation Rate (H2O = 1): 0.9 - 1.1

Solubility in Water:

Soluble Water Reactive: No

pH: 6.0 - 8.0

Appearance and Odor: Murky, yellow to grey water. Musty odor.

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Flammable Limits: N/A

Extinguishing Media: Foam, carbon dioxide, water

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

SECTION 5 - REACTIVITY DATA

Stability: Stable

Conditions to Avoid: None

Incompatibility (Materials to Avoid): Water-reactive materials

Hazardous Decomposition Byproducts: None

SECTION 6 - HEALTH HAZARD DATA

HEALTH EFFECTS
The effects of exposure to this material have not been determined. Safe handling of this material on a long-term basis will avoid any possible effect from repetitive acute exposures. Below are possible health effects based on information from similar materials. Individuals hyper allergic to enzymes or other related proteins should not handle.
Ingestion: Ingestion of large quantities may result in abdominal discomfort including nausea, vomiting, cramps, diarrhea, and fever. Inhalation: Hypersensitive individuals may experience breathing difficulties after
inhalation of aerosols.

Skin Absorption: N/A

Skin Contact: May cause skin irritation. Hypersensitive individuals may experience allergic reactions to enzymes.

Eye Contact: May cause eye irritation.

FIRST AID
Ingestion: Get medical attention if allergic symptoms develop (observe for 48 hours).
Never give anything by mouth to an unconscious or convulsing person.
Inhalation: Get medical attention if allergic symptoms develop.
Skin Absorption: N/A
Skin Contact: Wash affected area with soap and water. Get medical attention if allergic symptoms develop.
Eye Contact: Flush eyes with plenty of water for at least 15 minutes using an eyewash fountain, if available. Get medical attention if irritation occurs.

NOTE TO PHYSICIANS: All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this material may have occurred.

SECTION 7 - SPILL AND LEAK PROCEDURES

Reportable quantities (in lbs of EPA Hazardous Substances): N/A

Steps to be taken in case of spill or release: No emergency results from spillage.
However, spills should be cleaned up promptly. All personnel involved in the cleanup must wear protective clothing and avoid skin contact. Absorb spilled material or vacuum into a container. After clean-up, disinfect all cleaning materials and storage containers that come in contact with the spilled liquid.

Waste Disposal Method: No special disposal methods are required. The material may be sewered, and is compatible with all known biological treatment methods. To reduce odors and permanently inactivate microorganisms, mix 100 parts (by volume) of BAC-9 consortium with 1 part (by volume) of bleach. Dispose of in accordance with local, state and federal regulations.

SECTION 8 - HANDLING AND STORAGE

Hand Protection: Rubber gloves.

Eye Protection: Safety goggles with side splash shields.

Protective Clothing: Use adequate clothing to prevent skin contact.

Respiratory Protection: Surgical mask.

Ventilation: Provide adequate ventilation to remove odors.

Storage & Handling: Material may be stored for up to 3 weeks at 2-4℃ without aeration.

Other Precautions: An eyewash station in the work area is recommended.

While the information and recommendations set forth herein are believed to be accurate as of the date hereof, EOS Remediation, Inc. MAKES NO WARRANTY WITH RESPECT HERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

EOS Remediation, Inc.

1101 Nowell Road, Raleigh, NC 27607
(919) 873-2204● Fax (919) 873-1074
www.eosremediation.com

Emulsified Oil Substrate (EOS®)

EOS Remediation's family of products incorporate a proven, patented (US 6,398,960; EP 1315675) technology that results from more than seven years of research and testing by accomplished bioremediation scientists and engineers. Information about **EOS®** science, performance, ease of use, cost effectiveness and on-site success has been documented in countless papers and published in more than 100 scientific publications. Our products are the most-tested, researched and accredited options available.

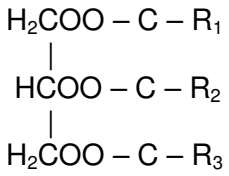
Brief Description of EOS®

The **EOS®** amendment, when injected into the aquifer, is designed to stimulate the anaerobic biodegradation / biotransformation of a wide variety of chlorinated solvents (e.g., PCE, TCE, TCA, cis-DCE and 1,2-DCA), energetic materials (perchlorate, RDX, TNT, etc.), and some heavy metals and radionuclides, into non-toxic end products. The **EOS®** amendment is easy to handle, has a low viscosity similar to milk, does not clog aquifers, can be distributed over a larger volume of the aquifer (relative to other *in-situ* treatments) and lasts well in excess of three years.

In a two-step reductive dechlorination reaction carried out by microorganisms residing in or added to the aquifer, the emulsified oil is slowly degraded with the consumption of oxygen and the production of hydrogen. The hydrogen is then available to support anaerobic conditions and reductive dechlorination. Anaerobic degradation of other compounds occurs by microbes using **EOS®** for both carbon and energy.

Fermentation Process

All animal and vegetable fats and oils, including soybean oils, are classified as triglycerides and contain three long chain fatty acids attached (esterified) to a glycerol core. When all fatty acids in a triglyceride are identical, it is termed a "simple" triglyceride. The more common forms, however, are "mixed" triglycerides that contain two or three different fatty acids. The molecular structure of a typical mixed triglyceride is shown below.



Where R_1, R_2 and R_3 represent different long-chain fatty acids. The primary fatty acid in soybean oil is linolenic acid.

All triglycerides (edible fats and oils) can be anaerobically fermented to hydrogen and acetate. Anaerobic fermentation is believed to occur through a two-step process where the ester linkages between the glycerol and the fatty acids are hydrolyzed releasing free fatty acids and glycerol to solution. The glycerol then degrades to 1,3-propanediol and subsequently to acetate. Saturated fatty acids undergo further breakdown by beta oxidation resulting in the formation of two molecules of hydrogen (H_2), one molecule of acetic acid ($C_2H_3O_2^-$), and the original molecule of acid appears as a new acid derivative with two less carbon atoms.

$$C_nH_{2n}O_2 + 2H_2O \rightarrow 2H_2 + C_2H_3O_2^- + H^+ + C_{n-2}H_{2n-4}O_2$$

By successive oxidation at the beta carbon atom, long-chain fatty acids are whittled into progressively shorter fatty acids and acetic acid.

National Recognition / Case Studies

EOS® has been proven effective in over 100 scientific publications.

Successful bioremediation of recalcitrant compounds means having the right talent on your team and using the right approach and materials. Scientists and engineers with over 30 years of success, documented in over 100 scientific publications and supported by a premier R&D program, assure that by using **EOS®** you are selecting the best product for bioremediation in the industry today. This level of experience is not available with other vendors.

At EOS Remediation, *in-situ* anaerobic bioremediation is our specialty. Fortune 500 Company research centers and international consulting firms have independently verified our enhanced oil emulsion, **EOS®**, as a technically superior remedial product.

"The Environmental Security Technology Certification Program (ESTCP) is a Department of Defense (DoD) program that promotes innovative, cost-effective environmental technologies through demonstration and validation at DoD sites" (www.estcp.org). ESTCP has recently published the following two documents:

- ***Protocol for Enhanced In Situ Bioremediation Using Emulsified Edible Oil (May 2006)***. This protocol provides an in-depth discussion of the strengths and limitations of the emulsified oil technology for anaerobic bioremediation, patented by Solutions-IES of Raleigh, NC. Detailed procedures are presented for the planning, design and installation of emulsified oil barriers and source area treatments.

- ***Edible Oil Barriers for Treatment of Perchlorate Contaminated Groundwater (February 2006)***. A single EOS injection was effective in treating TCA and perchlorate contaminated groundwater for over two and one-half years, resulting in greater than 99.9% reduction in perchlorate. Solutions-IES describes the site characterization, design, implementation, monitoring results and lessons learned from this effective remedial approach.

The technology has been featured twice in Pollution Engineering, including once as the cover story.

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EOS® also has been featured in the September 2002 issue of EPA Technologies New Trends, http://www.clu-in.org/download/newsltrs/tnandt0902.pdf and in two articles in the November 2006 EPA Technologies New Trends, http://www.clu-in.org/download/newsltrs/tnandt1106.pdf. The featured article in the November 2006 issue discusses the successful remediation of chlorinated solvents and perchlorate at a DoD site in Maryland by Solutions-IES, a professional geoenvironmental engineering firm. The second article describes the rejuvenation of a mulch biobarrier using **EOS®** at the Naval Weapons Industrial Reserve Plant (NWIRP) in McGregor , TX.

The following link is to the "Army Chemical Review". The Army Environmental Center wrote an article (July-December 2005) about the use of **EOS®** at the Tarheel Army Missile Plant in Burlington, NC.
http://www.wood.army.mil/chmdsd/Army_Chemical_Review/Jul-Dec05toc.htm
"New Technology Helps Mother Nature Expedite Cleanups ".

The following link is an article published by the Society of Military Engineers in October 2005 on the use of **EOS®** for remediating chlorinated solvents and perchlorate at a site for ESTCP (Environmental Security Technology Certification Program), DoD's research and development arm. http://www.same.org/i4a/pages/index.cfm?pageid=4450

General Design Considerations

In the field **EOS®** concentrate is diluted easily with water and can be injected under low pressure to readily disperse the emulsion away from the injection points. This allows broader coverage and wider impact area using fewer injection points. **EOS®** can be injected by direct-push apparatus in shallower aquifers or via drilled injection wells constructed to access deeper or specific zones of contamination. Upon request, we will travel to your site to assist with injection.

*Injection approach for **EOS®** can be easily modified to fit site conditions.*

Field Mixing and Injection Approaches: One design considerations when using emulsified oil is the ability to move the material away from the injection point to minimize the number of injection points required. There are two mixing methods currently used in the field. Each method has the same results. The first method is a "batch" process where a dilute emulsion mixture is prepared in a container, then injected and followed with clean (potable) water or groundwater "chase." The second is a "continuous" process where emulsion concentrate is introduced into the water stream during the injection. The calculated treatment volume for either approach depends upon the total volume of fluid (emulsion and water) injected.

- **Batch Mixing With Water Chase:** The calculated volume of emulsion concentrate is mixed with at least 4 parts water. The mixture is inject using a low pressure pump outfitted with a manifold, flow totalizer, and pressure gage modified for the number of wells being injected simultaneously. After the calculated volume of emulsion mixture has been injected, the emulsion chased with water using the same injection equipment. Chase water is continued until the calculated total volume of fluid has been injected.

- **Continuous Mixing "On the fly":** A metering device (e.g., EOS® DI520 Metering System) or a controlled feed pump is used to introduce the concentrated emulsion

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into the stream of water being injected. The manifold system is the same as described in batch mixing above. Injection continues until the calculated volumes are injected. The dilution rates for this equipment are 5 to 20 percent of the total flow.

Groundwater Recirculation: Recirculation (groundwater recovery and re-injection) can be used to eliminate or reduce the need for an accessible supply of (potable) water for mixing. Consultants and practitioners should note that the reuse of groundwater is subject to regulation by many States, and specific requirements for its treatment and/or handling may be required. Nevertheless, the most common approach is to pump groundwater from one or more wells and inject the groundwater along with the **EOS®** emulsion into one or more injection wells. The injection process is continued until the design volume has been emplaced or visual indications support that the emulsion has been pushed throughout the treatment zone. Applicators have reported on some sites visual indications of **EOS®** as noted by cloudiness or milkiness in wells located 20 to 50 feet from the injection point(s).

Another injection process design has the initial emulsion injection into injection point one and the next injection into the recovery well and vice versa. The decision to perform the injection in two steps is based upon the transport of the emulsion through the subsurface. If the emulsion travels to and is recovered in the recovery well during the initial injection, there may be little benefit in performing the second step injection. If emulsion is not observed in the recovery well after a reasonable amount of time, the reverse recirculation phase should be considered.

In general, recirculation continues until the design volume has been injected or until the emulsion is no longer mobile. The recirculation time frame can range from a few days to several weeks, dependent on the aquifer characteristics and injection well separation distances. With appropriate controls, the recirculation step can be unattended. Visual milkiness and cloudiness are indicators of emulsion breakthrough. Comparison of several sets of laboratory TOC analyses on groundwater recovered from the recovery well(s) is the best indicator of emulsion sorption/mobility.

Distance of Oil Transport

*The surface charge characteristic of **EOS®** is designed for good transport and retention.*

An important consideration in evaluating a bioremediation amendment is the transport, dispersion and retention of edible oil emulsions in a wide variety of soil types. This evaluation can be described by colloid transport theory. When the oil droplets are significantly smaller than pore spaces (as is the case with **EOS®**), oil retention is controlled by the chemical properties of the droplet and soil surfaces. The surfactants in **EOS®** have significant benefits: the surfactants have been tested and chosen so sorption to aquifer sediment is moderate to allow effective distribution from the injection points and good retention by the aquifer materials. Therefore, a small amount of **EOS®** can be spread over a larger volume of aquifer. Other emulsion blenders make their emulsions, in part, with lecithin. Lecithin contains functional groups with both positive charges (ammonia groups) and negative charges (phosphate groups). As a consequence, lecithin-based emulsions adsorb very strongly to clays and, when compared to **EOS®**, more substrate is necessary to treat the same volume of aquifer.

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EOS® is designed to move easily through most formations at low pressure (typically 5 to 10 psi, measured at the wellhead). Low injection pressures are desirable as the potential of hydraulic fracturing is minimized and lower pressure centrifugal pumps can be used in lieu of high-pressure piston or positive displacement pumps.

When field conditions are suitable, the low viscosity of **EOS®** allows the emulsion to be gravity drained into injection wells from portable tanks or totes

Aquifer Response Time Following Application

From a practical standpoint, measurement of dissolved oxygen and oxidation-reduction potential (ORP) are the best indicators of overall aquifer condition. Our experience has shown that ORP measurements are a better indicator and a reading of –50 mV or less is a good indicator of anaerobic aquifer conditions. The use on ORP measurements coupled with laboratory analyses of groundwater for ferrous iron, nitrate, sulfate, and methane can be used to confirm the presence of reduction conditions.

By design, **EOS®** promotes a rapid change from oxidative to reduction conditions due to the incorporated lactate that initiates a quick metabolic response. Normally a reduction in ORP occurs within a week of injection.

EOS® Designed to Maximize Product Longevity in the Subsurface

The effective life of **EOS®** treatment is a function of the groundwater flow velocity, the amount of **EOS®** injected, and capacity of the aquifer to adsorb **EOS®**. Extensive laboratory and field studies have shown that **EOS®** supports anaerobic biodegradation for 3 to 5 years depending on the amount of substrate injected and specific site conditions. In a laboratory column study, Long and Borden (2005) illustrated that a single injection of emulsified soybean oil can support complete reductive dechlorination of 10,000 µg/L tetrachloroethene (PCE) to ethene for greater than 14 months and up to seven years, based on mass balance calculations. Field tests of the emulsified oil technology by the Air Force Center for Environmental Excellence (AFCEE) have shown that emulsified edible oils have lasted over 3.5 years at Dover Air Force Base (AFB), over 3 years at Edwards AFB, and over 2.5 years at Altus AFB. A recent biobarrier project supported by the Environmental Security Technology Certification Program (http://www.estcp.org/projects/cleanup/200221o.cfm) was designed for an 18-month life. The project demonstrated that a single **EOS®** injection exceeded the design life while reducing influent perchlorate concentrations to below detection (over 99.9% reduction) with concurrent reduction of 1,1,1-TCA to non-toxic end-products (Zawtocki et al., 2004). Monitoring for 2.5 years has shown that **EOS®** continues to be effective in the biobarrier.

One factor influencing design life is the amount of **EOS®** adsorbed by the aquifer material. In an extensive series of laboratory and field studies, Borden et al. (2003, 2004), Coulibaly and Borden (2003, 2004), Jung and Borden (2003) and Zawtocki et al. (2004) have shown that: (1) **EOS®** retention by the aquifer material is a controlled by the number of positively charged adsorption sites in the aquifer material; and (2) once the oil droplets in **EOS®** attach to the grain surfaces, they bind very strongly and are not dislodged over time or with extended flushing.

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Little Impact on Groundwater Flow

*Easily dispersed **EOS®** oil droplets yield low appreciable permeability loss.*

Coulibaly and Borden (2004) conducted column experiments to evaluate emulsion transport and associated permeability loss in sands with varying clay contents. They concluded that **EOS®** had little effect on hydraulic conductivity. However, the experiments indicated that when a non-emulsified oil is injected, hydraulic conductivity loss is much greater and does not return to preinjection levels during the post-emulsion water flush (Coulibaly and Borden, 2004; Ullmann, 2004). **EOS®** was shown not to significantly impact groundwater migration or flow.

Process Monitoring Protocols[1]

Biodegradation of organic recalcitrant compounds stimulated by substrate addition creates measurable changes in the chemistry of groundwater in the treated area. By measuring these changes, it is possible to document and quantitatively evaluate the effect of adding **EOS®** to the subsurface to enhance anaerobic biodegradation at a site. Guidance on evaluating these protocols can be found in various publications on MNA and enhanced bioremediation including AFCEE et al. (2004), USEPA (1998), National Academy of Sciences (2000), ITRC (1999), and Morse et al. (1998). To assist in implementing an **EOS®** project, the Table below provides an outline of the parameters and methods that other practitioners have used to monitor the progress of an **EOS®**-based project.

Analysis	Method / Reference	Recommended Frequency of Analysis
pH	Field probe with direct reading meter calibrated in the field according to the supplier's specifications (field)	Each sampling round
Temperature	Field probe with direct reading meter (field)	Each sampling round
Oxidation-Reduction Potential (ORP)	A2580B Measurements made with field meter and ion-specific electrodes (field)	Each sampling round
Dissolved oxygen	Dissolved oxygen meter calibrated in the field according to the supplier's specifications (field)	Each sampling round
Conductivity	E120.1/SW9050, direct reading meter (field)	Each sampling round
Major Cations	USEPA SW6010 (laboratory)	Optional
Aromatic and chlorinated hydrocarbons	USEPA SW8260B (laboratory)	Each sampling round
Nitrate -N	IC method E300 (laboratory)	Each sampling round
Iron (II) (Fe^{2+})	Colorimetric Hach Method # 8146 (field)	Each sampling round
Sulfate (SO_4^{2-})	IC method E300 (laboratory) or by Hach method # 8051 (field)	Each sampling round

[1] *The following information is provided to assist the environmental professional in evaluating the use of EOS® technology. In no event shall EOS Remediation, Inc. have any responsibility or liability for any consequences of any use, misuse, inability to use, or reliance upon the information contained herein, nor does either warrant or otherwise represent in any way the accuracy, adequacy, efficacy, or applicability of the contents hereof.*

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Analysis	Method / Reference	Recommended Frequency of Analysis
Methane, ethane, and ethene	Kampbell *et al.*, 1989 or USEPA SW3810 Modified (laboratory)	Each sampling round
Total or Dissolved Organic Carbon (TOC/DOC)	USEPA SW9060 (laboratory)	Each sampling round

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Michael F. Easley, Governor

William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E. Director
Division of Water Quality

January 25, 2007

Gary Birk
Director of Marketing & Sales
EOS Remediation, Inc.
1101 Nowell Road
Raleigh, NC 27607

Subject: EOS® Remediation Product Line Risk Assessment

Dear Mr. Birk,

In response to our conversations over the past week regarding risk evaluation for the EOS® product line, you stated that the product, EOS® that was originally approved in 2003 has been renamed to EOS® 598B42. From my conversation today with Dr. Luanne Williams of the Division of Public Health, Epidemiology Section the products EOS® 400, EOS® 450, EOS® 598, EOS® 600 and EOS® 600EX can all be considered approved under the original approval for EOS® now called EOS® 598B42. This approval stems from the similarities in the formulation noted from her inspection of the product literature at the EOS® Remediation Inc. web site: http://www.eosremediation.com/literature/EOS_Family_of_%20Products.html.

If you have any questions regarding this letter, please contact me at (919) 715-6164 or Peter.Pozzo@NCmail.net.

Sincerely,

Peter Pozzo
Hydrogeologist
Aquifer Protection Section

cc: UIC Files
Dr. Luanne Williams, Epidemiology Section

Aquifer Protection Section
Internet: http://h2o.enr.state.nc.us

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Michael F. Easley, Governor
Dempsey Benton, Secretary

Leah Devlin, DDS, MPH
State Health Director

January 18, 2008

MEMORANDUM

TO: Qu Qi
Underground Injection Control Program
Aquifer Protection Section

FROM: Luanne K. Williams, Pharm.D., Toxicologist
Medical Evaluation and Risk Assessment Unit
Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

SUBJECT: Use of a Biological Product BAC-9® to Enhance Biodegradation of Groundwater Contaminated with Chlorinated Compounds

I am writing in response to a request for a health risk evaluation regarding the use of use of a biological product BAC-9 ® to enhance biodegradation of groundwater contaminated with chlorinated compounds. Based upon my review of the information submitted, I offer the following health risk evaluation:

PRECAUTIONS DURING APPLICATION

1. The microorganisms in BAC-9® are naturally found in soil. These microorganisms are not ordinarily associated with infection in healthy humans (except through an existing wound). However, these microorganisms may cause infection in the young, the aged, and immunocompromised such as individuals with AIDS, cancer, hepatitis, or with individuals following dialysis or surgical procedures. In addition, some of the ingredients within the BAC-9 ® product have been known to cause eye, skin, and lung irritation.

2. Also, be aware that mixing potassium with some of the metal and acid ingredients listed in the product have been reported to be possibly explosive. Care should be taken to review the MSDS sheets for each ingredient listed to ensure that there would be no explosive hazard.

3. If the products are released into the environment in a way that could result in a suspension of fine solid or liquid particles (e.g., grinding, blending, vigorous shaking or mixing), then it is imperative that proper personal protective equipment be used. The application process should be reviewed by an industrial hygienist to ensure that the most appropriate personal protective equipment is used.

4. Persons working with this product should at least wear goggles or a face shield, gloves, and protective clothing. Face and body protection should be used for anticipated splashes or sprays. Again, consult with an industrial hygienist to ensure proper protection.

5. Eating, drinking, smoking, handling contact lenses, and applying cosmetics should never be permitted in the application area during or immediately following application. Safety controls should be in place to ensure that the check valve and the pressure delivery systems are working properly.

6. The Material Safety Data Sheets should be followed to prevent adverse reactions and injuries.

7. Access to the area of application should be limited to the workers applying the product. In order to minimize exposure to unprotected individuals, measures should be taken to prevent access to the area of application.

8. Efforts should be made to prevent contamination of existing or future wells and surface water that may be located near the application area.

Please do not hesitate to call me if you have any questions at (919) 707-5912.

cc: Dr. Robert Steffan
Shaw Environmental, Inc.
17 Princess Road
Lawrenceville, NJ 08648

Mr. Gary Birk
Ms. Susan Bostian
EOS Remediation, Inc.
1101 Nowell Road
Raleigh, NC 27607

EOS Remediation, LLC

Formulations

EOS® Family of Proven Products

EOS Remediation's family of soybean oil emulsions / emulsified vegetable oil (EVO™) includes several product formulations. Selecting the appropriate product for your project is important. The comparison chart below provides information needed to compare and understand each product offering.

Ingredients / Composition	EOS® 450 (% by Weight)	EOS® 598 (% by Weight)	EOS® 598B42 (% by Weight)
Soybean Oil (food grade)	49.9 ± 2%	59.8 ± 2%	59.8 ± 2%
Long Chain Fatty Acids	0.9 ± 0.2%	0	0
Fast Release Soluble Substrate	4 ± 0.2%	4 ± 0.2%	4 ± 0.2%
Food Additives / Emulsifiers / Preservatives	10.1 ± 0.2%	10.1 ± 0.2%	10.1 ± 0.2%
Extracts	No	No	2 ± 0.2%
Water	Balance	Balance	Balance
Percent Organic, by weight	63 ± 2%	72 ± 2%	74 ± 2%
EOS® Vitamin B_{12} Supplement	No	No	Yes

*EOS Remediation reserves the right to change Product specifications and formulations without notice and without liability for such changes.

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EOS Remediation, LLC

Benefits

Benefit of B_{12} for *Dehalococcoides ethenogenes*

Several studies have shown that growth of dechlorinating microorganisms may be enhanced by providing these bacteria with amino acids and/or vitamins (Deweerd et al, Appl. Environ. Micro, 1929-1934, 1991; Holliger et al, Arch. Microbiol, 313-321, 1998; Maymo-Gatell et al, Science, 1568-1571, 1997). Consequently, microbiologists often include vitamin B_{12} and yeast extract to generate conditions for optimum growth (Morse et al, Draft Technical Protocol: A Treatability Test for Evaluating the Potential Applicability of the Reductive Anaerobic Biological In Situ Treatment Technology (RABITT) to Remediate Chloroethenes, ESTCP, 1998).

EOS® 598B42 offers added value by providing an optimal diet for the halorespiring bacteria.

In January 2005, researchers at Cornell University issued a press release on a bacterium that detoxifies PCE. The news release states that "... the academic and corporate researchers are learning more about Dehalococcoides husbandry. For example, it seems to like a cocktail of acetate, vitamin B_{12} and extracts of mixed microbial cultures as nutrients."

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EOS Remediation, LLC

BAC-9™

Accelerating the Effectiveness of Biostimulation

EOS Remediation offers ***BAC-9™*** - an enriched bioaugmentation culture capable of degrading chlorinated solvents to innocuous compounds efficiently via halorespiration. Time can often be a significant factor and expense for *in situ* bioremediation projects. By initial addition of ***BAC-9™*** at a project site, the contaminated area receives a "jump start" from the microbial community, reducing the time required to grow the *Dehalococcoides* . population to effective cell densities.sp

Types of Application

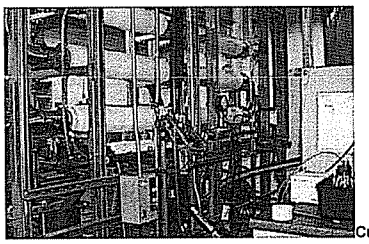
- Direct injection for *in situ* treatment of chlorinated ethenes.
- Inoculation of on-site bioreactors.

Best Conditions for Use

- Accelerated site closeout preference.
- Inadequate native dechlorinator population density.

Application Results

- Rapidly and completely degrades *cis*-1,2-dichloroethene (*cis*-DCE) and vinyl chloride (VC).
- Effective on many other chlorinated solvents: tetrachloroethene (PCE), trichloroethene, (TCE), trichloroethane (TCA), carbon tetrachloride (CT), chloroform (CF).
- Resistant to and effectively reduces high contaminant concentrations.



Custom Enrichments

If indigenous *Dehalococcoides* group organisms are at low population densities, EOS Remediation has resources to develop enrichments from site groundwater for use during bioaugmentation. Based on your site requirements, custom indigenous enrichments can be produced in fermentors ranging from 7 to 4000 liters per batch. *Dehalococcoides sp.* cell density is monitored using real-time quantitative polymerase chain reaction (PCR).

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EOS BAC-9™ USER INSTRUCTION

EOS BAC-9™ is a mixture of living bacteria including members of the *Dehalococcoides* genus that are capable of anaerobically degrade chlorinated contaminants. The culture has been tested to ensure that it is free of the most common pathogenic bacteria, but like all living cultures it should be handled with due care to prevent contamination of surfaces or persons.

WARNING

1. The BAC-9™ containing Keg is pressurized to 10 to 15 psi with Nitrogen before shipping.

2. Wear suitable eye protection, gloves, respirator and protective clothing.

3. Gas cylinders used to dispense culture MUST be equipped with a proper pressure regulator

4. During operation DO NOT exceed the keg's maximum working pressure of 15 psi.

UNPACKING

1. Carefully remove keg from shipping container and stand upright. DO NOT use the plastic sight tube as a handle.

2. Carefully check the keg, connectors, valves and tubing for any damage or defects. If defects or damage is observed, do not use. Report any damage to EOS Remediation, Inc., Inc. immediately (phone 919.873.2204). A back up set of quick connects is provided in the packaging material.

3. Check and ensure that all valves are in the CLOSED position.

Culture Keg in Cooler

SET-UP

1. Ensure that the VALVE attached to the GREY quick connect is tightly closed.

2. Using an appropriate length of reinforced ¼" ID tubing, connect the GREY quick connect fitting assembly to the gas tank regulator.

3. The GREY connector is designed only for use with the "Gas In" line.

4. Ensure that the VALVE attached to the BLACK quick connect is tightly closed.

5. Using an appropriate length of reinforced ¼" ID tubing, connect the BLACK quick connect fitting assembly to the desired injection point

6. The BLACK connector is designed only for use with the "Liquid Out" line.

Culture Keg with Quick Connects Attached

OPERATION

1. Set up the gas pressure on the delivery gas (Nitrogen or Argon) tank regulator at 10 to 15 psi.

2. Place the keg on a scale or use sight tube to control and monitor culture delivery

3. Attach the GREY connector to the ball-lock fitting on the keg marked "IN" by pulling up the barrel of connector and pushing it all the way down onto the ball lock fitting of the keg. Release the barrel on the quick connect. A Click sound indicates that connector was properly attached to the keg fitting.

4. Attach the BLACK quick connect assembly to the fitting on the keg marked “OUT” the same way as grey connector.

5. Slowly open the valve on “Gas in” line. This action will pressurize the keg with delivery gas.

.

6. Gradually open the valve on the “Liquid Out” line to provide the desired flow of bacterial suspension. Delivery of the culture can be monitored by watching the liquid level in the sight window, or by using an installed flow meter (not supplied)

7. After delivery of the desired volume of culture, close the valves on the ‘Liquid Out” line and the “Gas In” line.

8. Disconnect the connectors from keg by pulling up on the barrel of the quick connects.

Example Delivery Set-up

Use of Sight Tube to Monitor Culture Volume

STORAGE

If the schedule of bacteria application requires adding the bacteria over a period of more than one day, the keg(s) should be stored at a temperature 2-4 ℃, but freezing must be avoid. This can normally be achieved by storing the kegs under ice in the provided coolers. Keg should be pressurized with Nitrogen to pressure 10- 15 psi before storing to ensure a tight seal on the keg cap.

SHIPPING

After completion of operation, please, ship cooler with keg and all attachments back to the following address:

Simon Vainberg
17 Princess Road, Lawrenceville, NJ 08648

Cooler and Keg Packed for Return Shipment

EOS Remediation provides proven bioremediation technologies to clean up groundwater contamination. For additional information, please contact EOS Remediation at:

EOS Remediation, Inc.

EOS Remediation, Inc.
Phone: (888) 873-2204 ▪ Fax: (919) 873-1074
Web: www.EOSRemediation.com

User Manual for the Shaw Calibrated Culture Delivery System

USER INSTRUCTION

WARNINGS

1. **Keg is pressurized to 10 to 15 psi with Nitrogen before shipping.**

2. **Wear suitable eye protection, gloves, respirator and protective clothing.**

3. **Gas cylinders used to dispense culture MUST be equipped with a proper pressure regulator.**

4. **During operation DO NOT exceed the keg's maximum working pressure of 15 psi.**

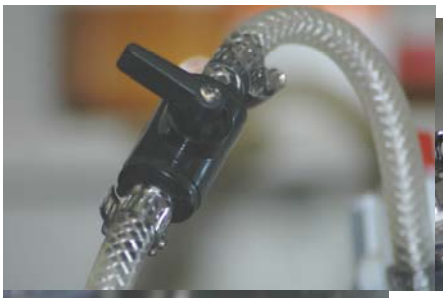
UNPACKING

1. **Carefully remove keg and measuring cylinder from shipping container and stand keg upright.**

2. **Attach measuring cylinder to the keg by using the black Velcro straps.**

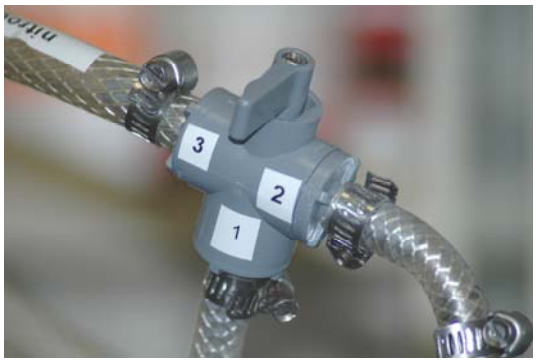
3. **Carefully check the keg, measuring cylinder, connectors, valves and tubing for any damage or defects. If any defects or damage is observed, do not use. Report any damage to Shaw Environmental, Inc. immediately at 609-895-5376. A back-up set of quick connects is provided in the packaging material.**

4. **Check and ensure that black, white and green valves are in the CLOSED position and grey three-way valve is in position "1" (handle of the valve should be directed to position perpendicular to the body of the valve).**

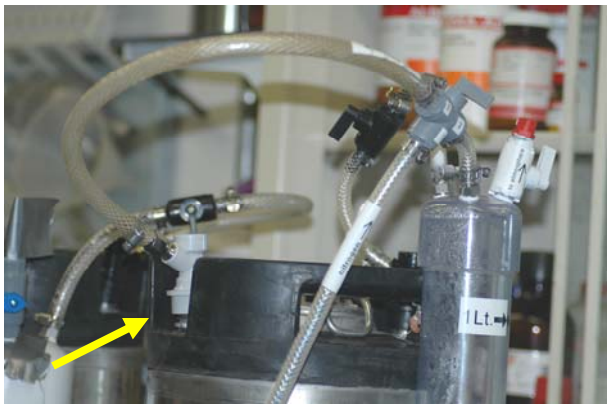


SET-UP

1. **Using an appropriate length of reinforced ¼" ID tubing, connect the tubing marked "Nitrogen tank →" to the gas tank regulator. Another end of the tubing is connected to position "1" of three way grey valve.**



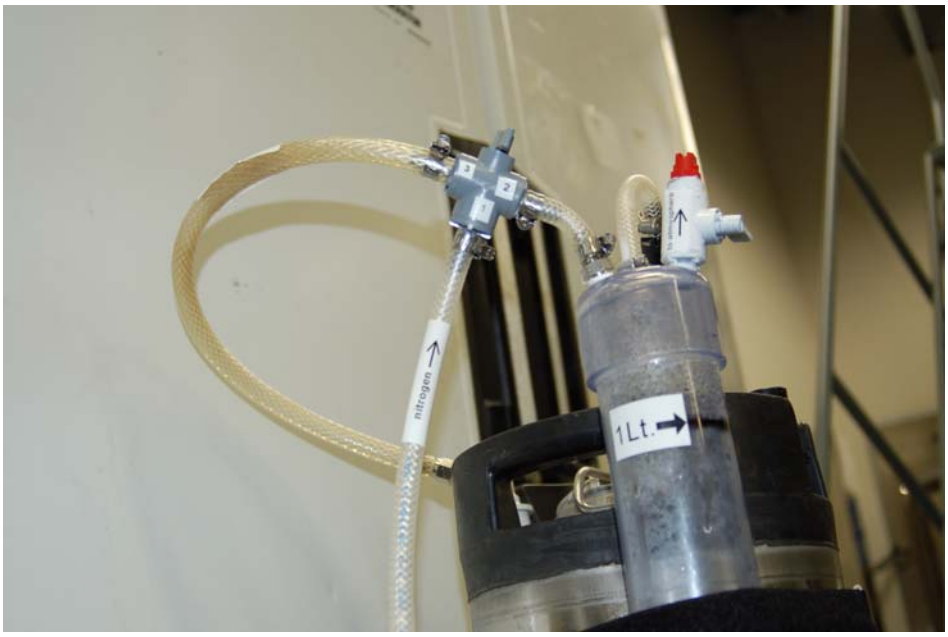
2. **Connect the GREY connector to Gas "In" fitting of the keg. Be sure that the GREY connector is designed to be connected only to Gas "In" keg's fitting.**



3. **Connect the Black connector to Liquid "Out" fitting of the keg. Be sure that the Black connector is designed to be connected only to Liquid "Out" keg's fitting. Ensure that the black valve attached to the BLACK quick connect is tightly closed.**

4. **Connect an appropriate length of reinforced ¼" ID tubing marked "Bacteria → " by the barbed fitting to the site tubing to distribute bacterial culture to the desired injection point. Do Not Connect This Line To The Injection Line Yet**

Keg and measuring cylinder attached to the keg's fittings black and grey connectors.



Measuring cylinder with attached three way grey valve.

Keg and measuring cylinder connected to delivery gas tank.

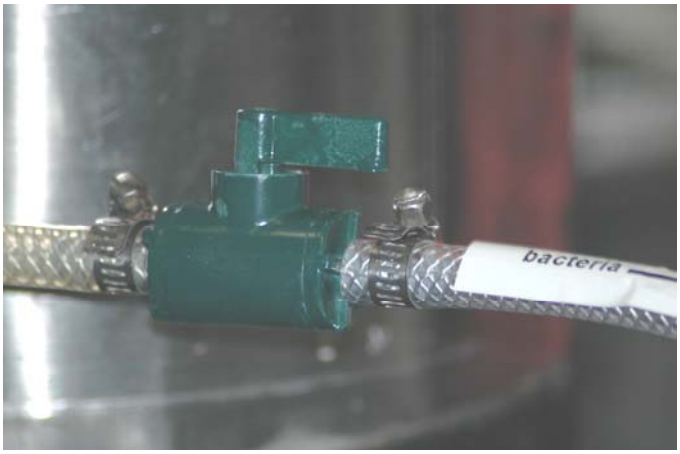
OPERATION

1. **Set up the gas pressure on the delivery gas (Nitrogen or Argon) tank regulator at 10 to 15 psi.**

2. **Remove air from injection line by the following procedure:**

   A. **Be sure that at this point that the injection line is not connected to the injection point.**

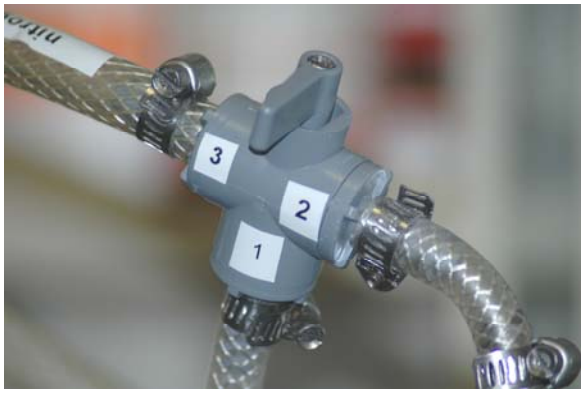
   B. **Open the green valve located on the bottom of measuring cylinder.**



C. **Slowly turn the three way grey valve to position ”2” to start supplying the delivery gas (nitrogen, argon) to the measuring cylinder and injection tubing. Flush the cylinder and injection tubing with gas for 2-3 min.**

D. **Close the green valve.**

E. **Turn the three way grey valve to position “1”.**



F. **Open the white valve "to atmosphere"position to release any gas pressure in the measuring cylinder. The white valve is equipped with a check valve that prevents the air from being added into the measuring cylinder.**

3. Add the required amount of bacteria to the measuring cylinder:

A. Turn the grey three way valve to position "3" to pressurize the keg with delivery gas.

B. Slowly open the black valve to add bacteria from the keg to the cylinder.

C. Add the required amount of bacteria and close the black valve.

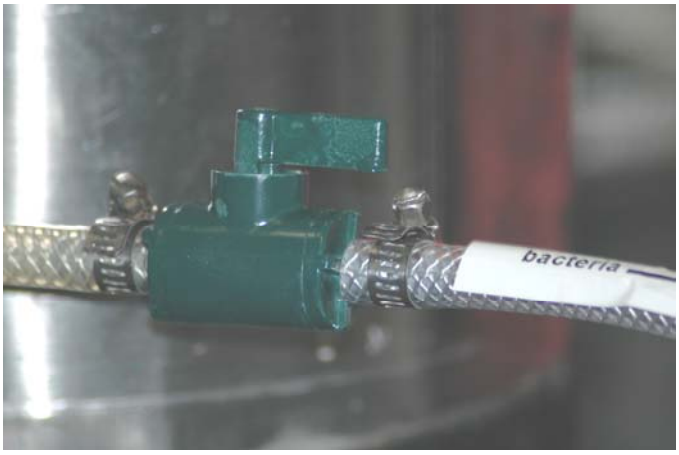
D. Close the white valve.

4. **Transfering the measured amount of bacteria from the measuring cylinder to the injection point:**

A. Be sure that at this point that the injection line is connected to the injection point.

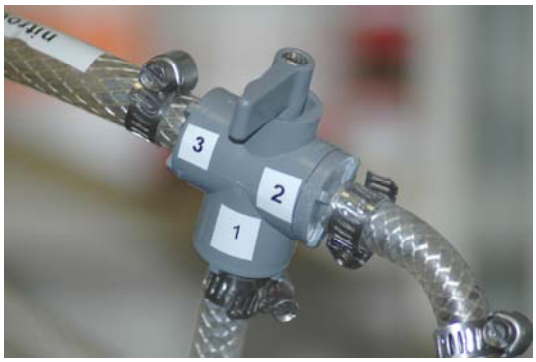
B. Turn the grey three way valve to position"2" to pressurize the measuring cylinder with delivery gas.

C. Slowly open the green valve on the "bacteria →" line to provide the desired flow of bacterial suspension. Delivery of the culture can be monitored by watching the liquid level in the measuring cylinder.



5. **After delivery of the desired volume of bacterial suspension, close the green valve.**

A. Turn the grey three way valve to position "1".



6. **To add more bacteria, follow the instructions according to steps 3 and 4 above.**
7. **After finishing distributing the bacteria, disconnect the black and grey connectors from the keg by pulling up on the barrel of the quick connects.**

STORAGE

If the schedule of bacteria application requires adding the bacteria over a period of more than one day, the keg(s) should be stored at a temperature 2-4 °C, but do not freeze. This can normally be achieved by storing the kegs under ice in the provided coolers. The keg should be pressurized with Nitrogen to pressure 10- 15 psi before storing to ensure a tight seal on the keg cap.

SHIPPING

Cooler and Keg Packed for Return Shipment

After completion of operation, please ship the cooler with keg and all attachments back to the following address:

Simon Vainberg
Shaw Environmental, Inc.
17 Princess Road, Lawrenceville, NJ 08648

APPENDIX D

FILED
BOOK 546 PAGE 2247
2011 MAR -4 PM 4:50
REGISTER OF DEEDS
ALEXANDER COUNTY, NC

BK 0546 PG 2247

ALEXANDER COUNTY TAX COLLECTOR
MAR 4 2011
NO DELINQUENT TAXES

Issued Mar 04 2011
$172.00
State of North Carolina
Alexander County
Real Estate Excise Tax
110892

NORTH CAROLINA SPECIAL WARRANTY DEED

Excise Tax ~~$170.00~~ $172.00 JMC

S-Tract 25.00

Tax Lot No. F-11 0007A _____ Parcel Identifier No. 0062694 _____

Verified by _____ County on the _____ day of _____, _____

By _____

Mail after recording to Robert E. Campbell, Esq., 214 Main Ave. Drive, Taylorsville, NC 28681

This instrument was prepared by Robinson, Bradshaw & Hinson, P.A.,101 N. Tryon Street, Suite 1900, Charlotte, NC 28246

Brief description for the Index

15.70 Acres, Plat Book 8, Page 108

THIS DEED made this 3rd day of March, 2011, by and between

GRANTOR	GRANTEE
CRESCENT RESOURCES, LLC, a Georgia limited liability company (successor by election and entity conversion to Crescent Resources of Georgia, Inc., a Georgia corporation, successor by merger to Crescent Resources, Inc., a South Carolina corporation, formerly known as Crescent Land & Timber Corp., a South Carolina corporation) 227 West Trade Street, Suite 1000 Charlotte, NC 28202	ALEXANDER COUNTY, a political subdivision of the State of North Carolina 621 Liledoun Road Taylorsville, North Carolina 28681 Attention: County Manager

Enter in appropriate block for each party: name, address, and, if appropriate, character of entity, e.g. corporation or partnership.

The designation Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine or neuter as required by context.

WITNESSETH, that the Grantor, for a valuable consideration paid by the Grantee, the receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee in fee simple, that certain lot or parcel of land situated in Millers Township, Alexander County, North Carolina, and more particularly described as follows:

> Being all of that certain lot or parcel of land situated in Millers Township, Alexander County, North Carolina, as described and shown on plat of survey captioned "Crescent Resources, LLC, Lookout Shoals Development, Boundary Survey of Portion of J.C. Bell Tract, LOS-41" prepared by Jay A. Hallman, Professional Land Surveyor, and recorded on March 24, 2003, in Plat Book 8, Page 108, in the office of the Register of Deeds of Alexander County, North Carolina, and containing approximately 15.70 acres according to such survey; INCLUDING, without limitation, the easement rights appurtenant to the property as evidenced by that certain Agreement dated November 5, 1979, between James L. Correll and wife, Kathy W. Correll; Tony J. Correll and wife, Linda R. Correll; and Crescent Land & Timber Corp., a South Carolina corporation (presently known as Crescent Resources, LLC, a Georgia limited liability company), recorded in Deed Book 217, Page 267, Alexander County Registry.

The property hereinabove described was acquired by Grantor by instrument recorded in Deed Book 95, Page 98.

A map showing the above described property is recorded in Plat Book 8 page 108.

All or a portion of the property herein conveyed ☐ includes or ☒ does not include the primary residence of a Grantor.

TO HAVE AND TO HOLD the aforesaid lot or parcel of land and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

And the Grantor covenants with the Grantee, that Grantor has done nothing to impair such title as Grantor received, and Grantor will warrant and defend the title against the lawful claims of all persons claiming by, under or through Grantor, except for the exceptions hereinafter stated.

Title to the property is subject to the lien of ad valorem property taxes and charges accruing on and after January 1, 2011, and all enforceable restrictions, conditions, easements and rights of way of record, including, but not limited to, that certain Agreement dated November 5, 1979, recorded in Deed Book 217, Page 267, Alexander County Registry.

By its acceptance of this deed, as evidenced by the consideration paid, the Grantee, for itself, its successors and assigns, hereby releases, and agrees to defend, indemnify and hold harmless, the Grantor from and against any and all claims, causes of actions or costs (including but not limited to reasonable attorneys fees) that might arise in connection with or as a result of any violation of any local, state or federal environmental law with respect to the subject property, no matter when or how such violation may have first occurred. The Grantee accepts the property "AS-IS" in its present condition and without any warranty whatsoever except as expressly stated in this deed. Further, the Grantee, for itself, its successors and assigns, assumes all liability of the Grantor that may arise or have arisen in connection with or as a result of any violation of any local, state or federal environmental law with respect to the subject property, no matter when or how such violation may have first occurred.

IN WITNESS WHEREOF, the Grantor has caused this instrument to be signed in its name by its duly authorized manager/officer the day and year first above written.

CRESCENT RESOURCES, LLC, a Georgia limited liability company

Use Black Ink

By: _____

Name: James M. Short, Jr.
Title: President, Land Management

[Acknowledgment begins on following page]

STATE OF NORTH CAROLINA

COUNTY OF MECKLENBURG

I, Susan Higginson, a Notary Public of Gaston County and State of North Carolina, do hereby certify that James M. Short, Jr., ("Signatory"), personally came before me this day and acknowledged that he is President, Land Management, of Crescent Resources, LLC, a Georgia limited liability company, and that he, as President, Land Management, being authorized to do so, executed the foregoing instrument on behalf of the company.

I certify that the Signatory personally appeared before me this day, and

(*check one of the following*)

__X__ (I have personal knowledge of the identity of the Signatory); **or**

_____ (I have seen satisfactory evidence of the Signatory's identity, by a current state or federal identification with the Signatory's photograph in the form of:

(*check one of the following*)

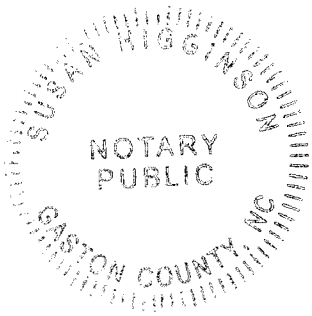
_____ a driver's license *or*

_____ in the form of _____); **or**

_____ (a credible witness has sworn to the identity of the Signatory).

The Signatory acknowledged to me that he voluntarily signed the foregoing instrument for the purpose stated in the capacity indicated.

Witness my hand and official stamp or seal this 3rd day of March, 2011.



Notary Public

Susan Higginson

Notary's printed or typed name

*[**Note:** Notary Public must sign exactly as on notary seal]*

My Commission Expires: March 27, 2011

[NOTARY SEAL] (MUST BE FULLY LEGIBLE)

APPENDIX E

BIOCHLOR

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-1 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	69.5	(ft/yr)
or			
Hydraulic Conductivity	K	5.6E-05	(cm/sec)
Hydraulic Gradient	i	0.12	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	25	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R
or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

	λ (1/yr)	half-life (yrs)	Yield
Zone 1			
PCE → TCE	0.070	9.90	0.79
TCE → DCE	0.050	13.90	0.74
DCE → VC	0.178	3.90	0.64
VC → ETH	0.119	5.80	0.45
Zone 2	λ (1/yr)	half-life (yrs)	
PCE → TCE	0.000		
TCE → DCE	0.000		
DCE → VC	0.000		
VC → ETH	0.000		

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	300	(ft)
Modeled Area Length*	250	(ft)
Zone 1 Length*	250	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 300

Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.01	0.1
TCE	0.01	0.1
DCE	0.01	0.1
VC	0.01	0.1
ETH	0.01	0.1

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0										
TCE Conc. (mg/L)	0.0										
DCE Conc. (mg/L)	0.0										
VC Conc. (mg/L)	0.0										
ETH Conc. (mg/L)	0.0										
Distance from Source (ft)	240										
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

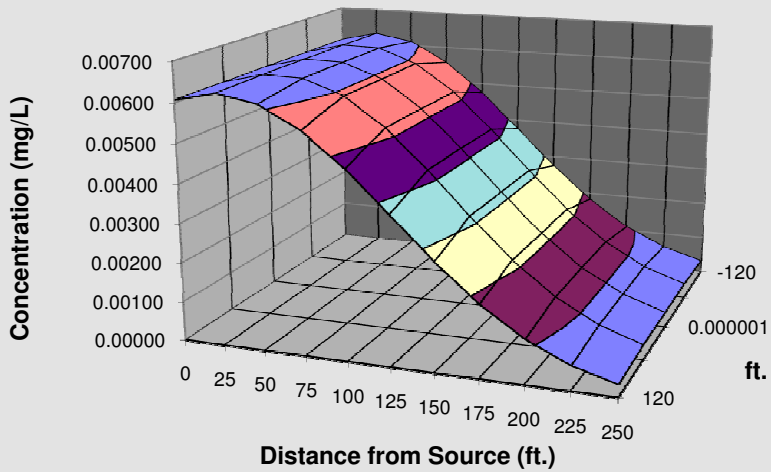
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓	Distance from Source (ft) 0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.297E-03	6.116E-03	5.566E-03	4.739E-03	3.747E-03	2.731E-03	1.825E-03	1.112E-03	6.156E-04	3.088E-04
60	6.065E-03	6.320E-03	6.298E-03	5.925E-03	5.206E-03	4.233E-03	3.162E-03	2.158E-03	1.339E-03	7.531E-04	3.829E-04
0	6.065E-03	6.320E-03	6.298E-03	5.925E-03	5.206E-03	4.234E-03	3.164E-03	2.160E-03	1.342E-03	7.558E-04	3.850E-04
-60	6.065E-03	6.320E-03	6.298E-03	5.925E-03	5.206E-03	4.233E-03	3.162E-03	2.158E-03	1.339E-03	7.531E-04	3.829E-04
-120	6.065E-03	6.297E-03	6.116E-03	5.566E-03	4.739E-03	3.747E-03	2.731E-03	1.825E-03	1.112E-03	6.156E-04	3.088E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.3E+0	8.1E+0	6.5E+0	4.8E+0	3.3E+0	2.0E+0	1.1E+0	5.7E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.502E-02	(Kg)
Mass Removed	1.355E-03	(Kg)
% Biotransformed =	**+5.1%**	
% Change in Mass Rate =	**94.2 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.581E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

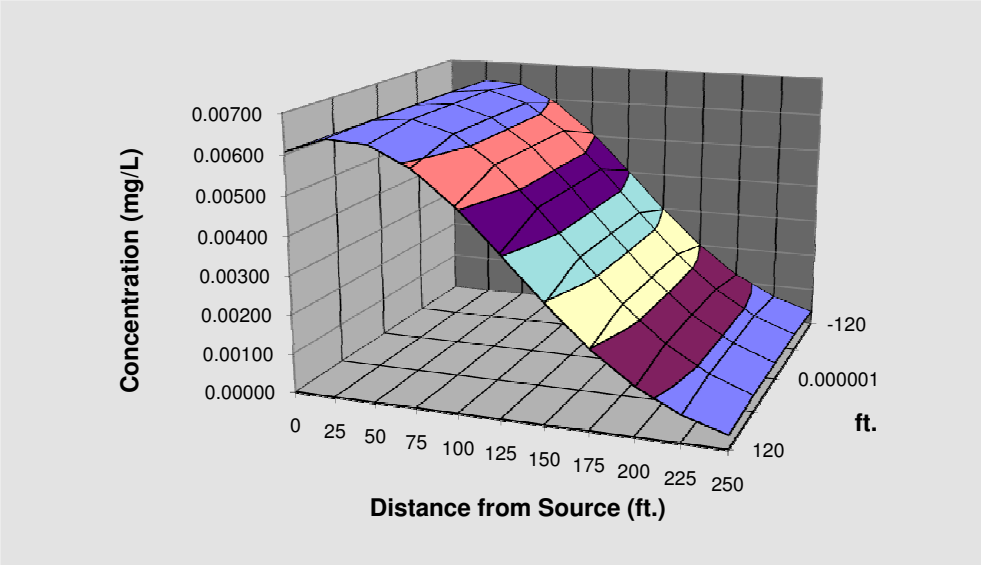
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.449E-03	6.383E-03	5.897E-03	5.079E-03	4.053E-03	2.975E-03	1.998E-03	1.223E-03	6.792E-04	3.416E-04
60	6.065E-03	6.472E-03	6.573E-03	6.278E-03	5.581E-03	4.579E-03	3.444E-03	2.363E-03	1.472E-03	8.308E-04	4.236E-04
0	6.065E-03	6.472E-03	6.573E-03	6.278E-03	5.581E-03	4.580E-03	3.446E-03	2.365E-03	1.476E-03	8.339E-04	4.259E-04
-60	6.065E-03	6.472E-03	6.573E-03	6.278E-03	5.581E-03	4.579E-03	3.444E-03	2.363E-03	1.472E-03	8.308E-04	4.236E-04
-120	6.065E-03	6.449E-03	6.383E-03	5.897E-03	5.079E-03	4.053E-03	2.975E-03	1.998E-03	1.223E-03	6.792E-04	3.416E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.1E+1	9.9E+0	8.7E+0	7.1E+0	5.3E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.645E-02	(Kg)
Mass Removed	-7.279E-05	(Kg)
% Biotransformed =	-0.3 %	
% Change in Mass Rate =	93.5 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

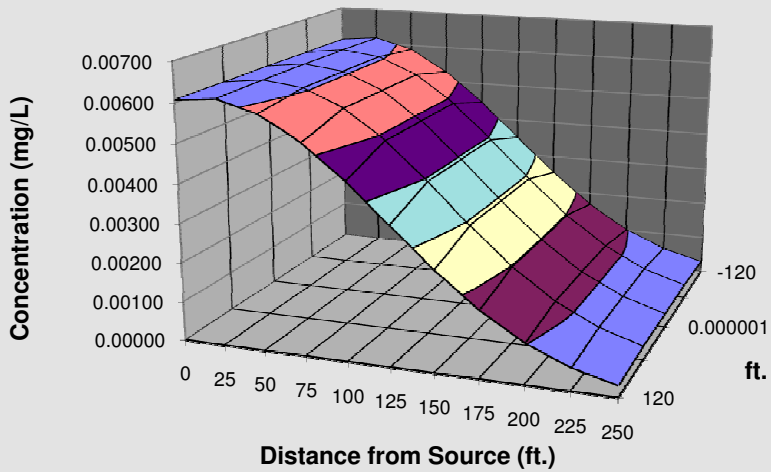
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓	Distance from Source (ft) 0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.163E-03	5.882E-03	5.279E-03	4.447E-03	3.487E-03	2.526E-03	1.679E-03	1.019E-03	5.625E-04	2.815E-04
60	6.065E-03	6.186E-03	6.057E-03	5.620E-03	4.886E-03	3.940E-03	2.924E-03	1.985E-03	1.227E-03	6.882E-04	3.491E-04
0	6.065E-03	6.186E-03	6.057E-03	5.620E-03	4.886E-03	3.940E-03	2.926E-03	1.988E-03	1.230E-03	6.907E-04	3.510E-04
-60	6.065E-03	6.186E-03	6.057E-03	5.620E-03	4.886E-03	3.940E-03	2.924E-03	1.985E-03	1.227E-03	6.882E-04	3.491E-04
-120	6.065E-03	6.163E-03	5.882E-03	5.279E-03	4.447E-03	3.487E-03	2.526E-03	1.679E-03	1.019E-03	5.625E-04	2.815E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	9.7E+0	8.9E+0	7.6E+0	6.1E+0	4.5E+0	3.0E+0	1.9E+0	1.0E+0	5.2E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.380E-02	(Kg)
Mass Removed	2.576E-03	(Kg)
% Biotransformed =	+9.8%	
% Change in Mass Rate =	94.7 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.244E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

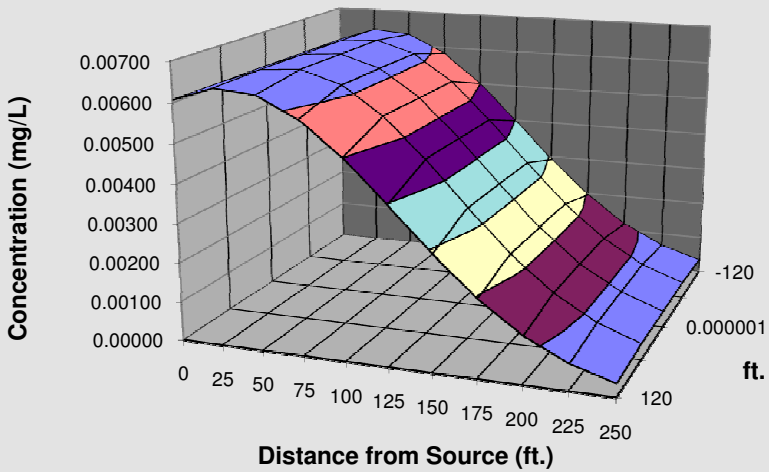
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓	Distance from Source (ft) 0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.420E-03	6.328E-03	5.826E-03	5.003E-03	3.982E-03	2.917E-03	1.956E-03	1.196E-03	6.635E-04	3.334E-04
60	6.065E-03	6.443E-03	6.517E-03	6.202E-03	5.497E-03	4.499E-03	3.377E-03	2.313E-03	1.440E-03	8.116E-04	4.135E-04
0	6.065E-03	6.443E-03	6.517E-03	6.202E-03	5.497E-03	4.500E-03	3.379E-03	2.316E-03	1.443E-03	8.146E-04	4.157E-04
-60	6.065E-03	6.443E-03	6.517E-03	6.202E-03	5.497E-03	4.499E-03	3.377E-03	2.313E-03	1.440E-03	8.116E-04	4.135E-04
-120	6.065E-03	6.420E-03	6.328E-03	5.826E-03	5.003E-03	3.982E-03	2.917E-03	1.956E-03	1.196E-03	6.635E-04	3.334E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.8E+0	8.6E+0	6.9E+0	5.2E+0	3.5E+0	2.2E+0	1.2E+0	6.2E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.613E-02	(Kg)
Mass Removed	2.480E-04	(Kg)
% Biotransformed =	**+0.9%**	
% Change in Mass Rate =	**93.7 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

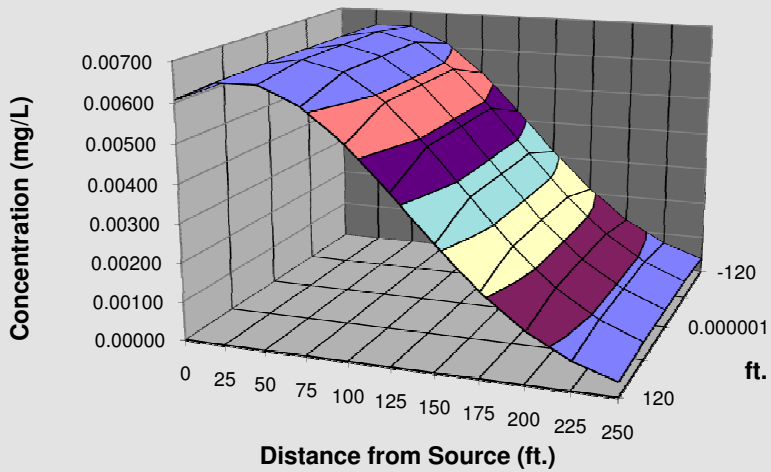
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.551E-03	6.567E-03	6.127E-03	5.318E-03	4.268E-03	3.148E-03	2.122E-03	1.302E-03	7.249E-04	3.652E-04
60	6.065E-03	6.575E-03	6.762E-03	6.523E-03	5.843E-03	4.823E-03	3.644E-03	2.509E-03	1.568E-03	8.868E-04	4.530E-04
0	6.065E-03	6.575E-03	6.762E-03	6.523E-03	5.843E-03	4.824E-03	3.646E-03	2.512E-03	1.571E-03	8.901E-04	4.554E-04
-60	6.065E-03	6.575E-03	6.762E-03	6.523E-03	5.843E-03	4.823E-03	3.644E-03	2.509E-03	1.568E-03	8.868E-04	4.530E-04
-120	6.065E-03	6.551E-03	6.567E-03	6.127E-03	5.318E-03	4.268E-03	3.148E-03	2.122E-03	1.302E-03	7.249E-04	3.652E-04
MASS RATE (mg/day)	9.8E+0	1.1E+1	1.1E+1	1.0E+1	9.1E+0	7.4E+0	5.6E+0	3.8E+0	2.4E+0	1.3E+0	6.8E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.745E-02	(Kg)
Mass Removed	-1.073E-03	(Kg)
% Biotransformed =	**-4.1 %**	
% Change in Mass Rate =	**93.1 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

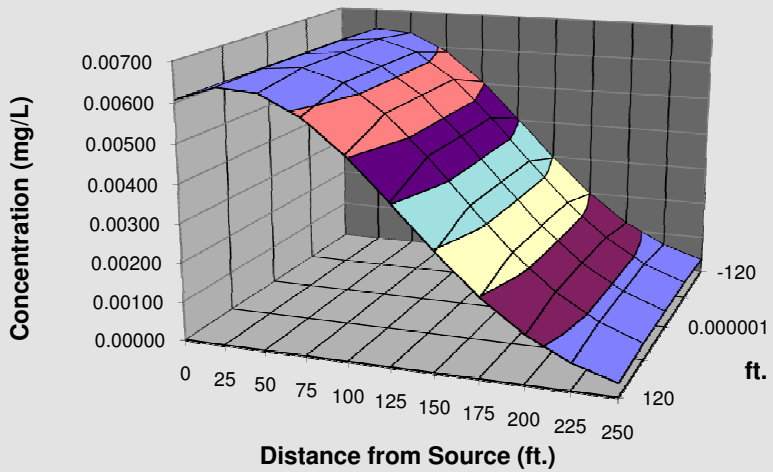
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.502E-02	(Kg)
Mass Removed	1.355E-03	(Kg)
% Biotransformed =	+5.1%	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

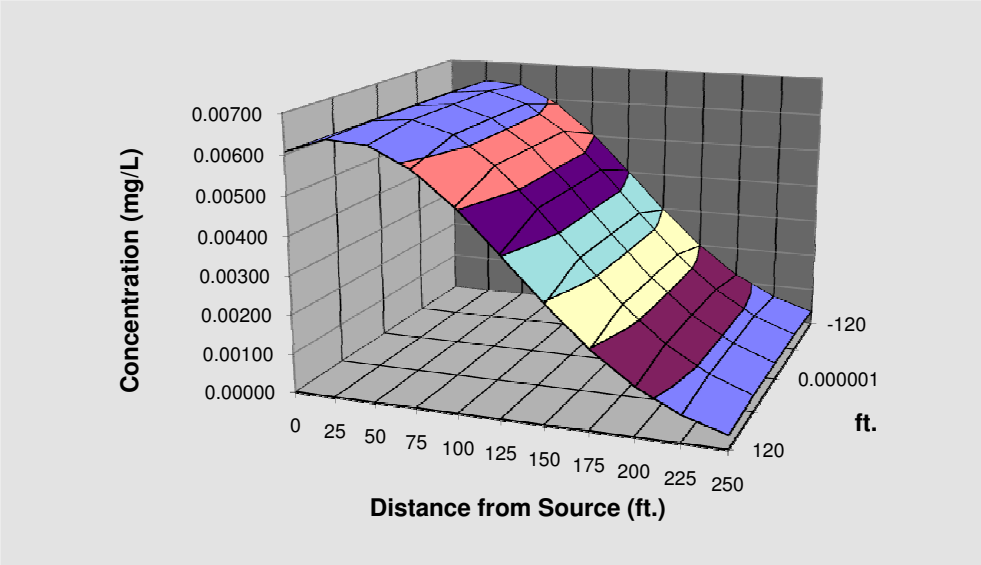
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.645E-02	(Kg)
Mass Removed	-7.279E-05	(Kg)
% Biotransformed =	-0.3 %	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

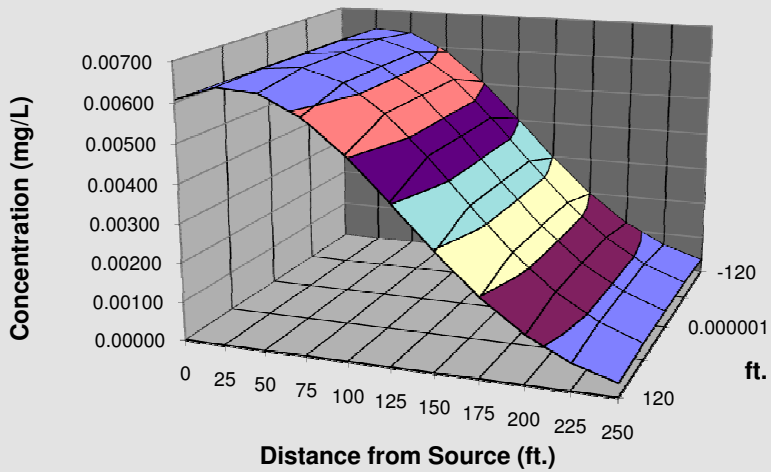
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: No Degradation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.380E-02	(Kg)
Mass Removed	2.576E-03	(Kg)
% Biotransformed =	+9.8%	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

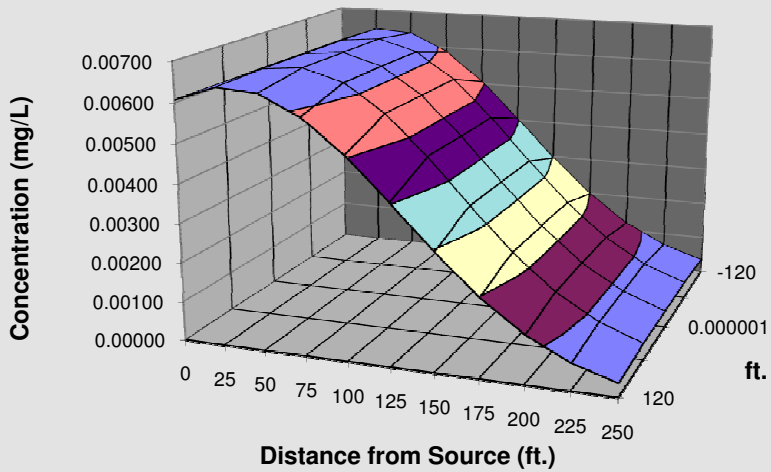
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: No Degradation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.613E-02	(Kg)
Mass Removed	2.480E-04	(Kg)
% Biotransformed =	+0.9%	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE
○ TCE
○ DCE
○ VC
◉ ETH

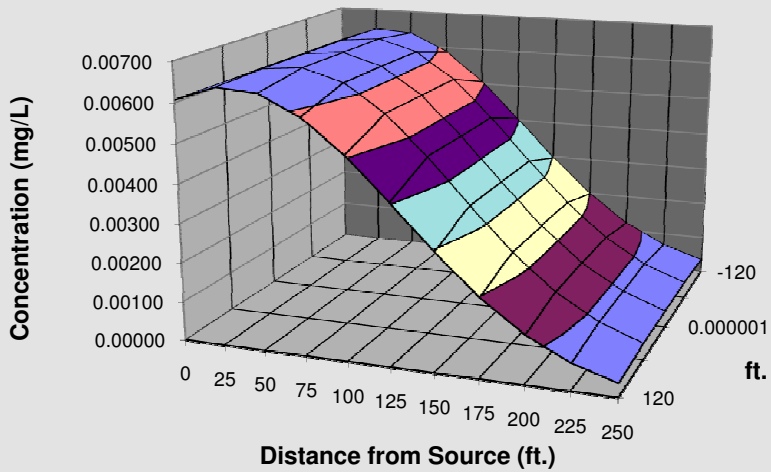
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: No Degradation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.745E-02	(Kg)
Mass Removed	-1.073E-03	(Kg)
% Biotransformed =	-4.1 %	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-1 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	69.5	(ft/yr)
or			
Hydraulic Conductivity	K	5.6E-05	(cm/sec)
Hydraulic Gradient	i	0.12	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	25	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

	λ (1/yr)	half-life (yrs)	Yield
Zone 1			
PCE → TCE	1.195	0.58	0.79
TCE → DCE	0.900	0.77	0.74
DCE → VC	3.300	0.21	0.64
VC → ETH	2.567	0.27	0.45
Zone 2	λ (1/yr)	half-life (yrs)	
PCE → TCE	0.000		
TCE → DCE	0.000		
DCE → VC	0.000		
VC → ETH	0.000		

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	300	(ft)
Modeled Area Length*	250	(ft)
Zone 1 Length*	250	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

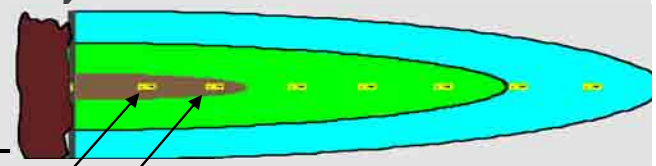
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 300

Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.01	0.1
TCE	0.01	0.1
DCE	0.01	0.1
VC	0.01	0.1
ETH	0.01	0.1

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0										
TCE Conc. (mg/L)	0.0										
DCE Conc. (mg/L)	0.0										
VC Conc. (mg/L)	0.0										
ETH Conc. (mg/L)	0.0										
Distance from Source (ft)	240										
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

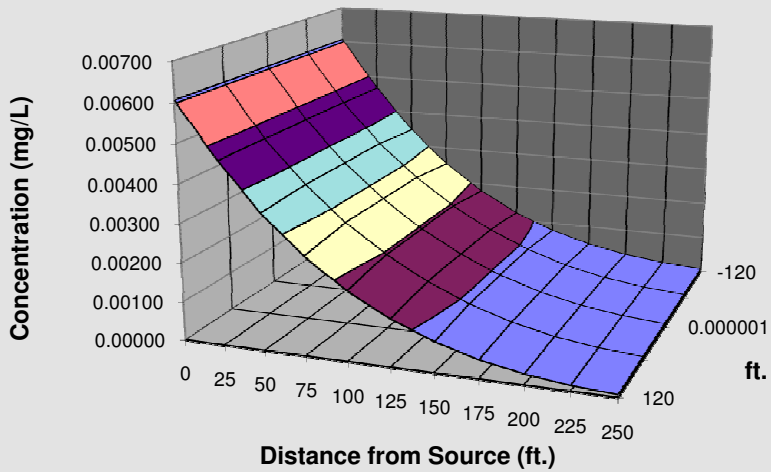
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	4.664E-03	3.473E-03	2.520E-03	1.778E-03	1.207E-03	7.795E-04	4.730E-04	2.671E-04	1.392E-04	6.657E-05
60	6.065E-03	4.681E-03	3.577E-03	2.683E-03	1.953E-03	1.364E-03	9.024E-04	5.593E-04	3.216E-04	1.703E-04	8.256E-05
0	6.065E-03	4.681E-03	3.577E-03	2.683E-03	1.953E-03	1.364E-03	9.028E-04	5.599E-04	3.224E-04	1.710E-04	8.301E-05
-60	6.065E-03	4.681E-03	3.577E-03	2.683E-03	1.953E-03	1.364E-03	9.024E-04	5.593E-04	3.216E-04	1.703E-04	8.256E-05
-120	6.065E-03	4.664E-03	3.473E-03	2.520E-03	1.778E-03	1.207E-03	7.795E-04	4.730E-04	2.671E-04	1.392E-04	6.657E-05
MASS RATE (mg/day)	9.8E+0	7.6E+0	5.7E+0	4.2E+0	3.0E+0	2.1E+0	1.4E+0	8.5E-1	4.9E-1	2.6E-1	1.2E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.257E-02	(Kg)
Mass Removed	1.380E-02	(Kg)
% Biotransformed =	+52.3%	
% Change in Mass Rate =	98.7 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	5.610E-02	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

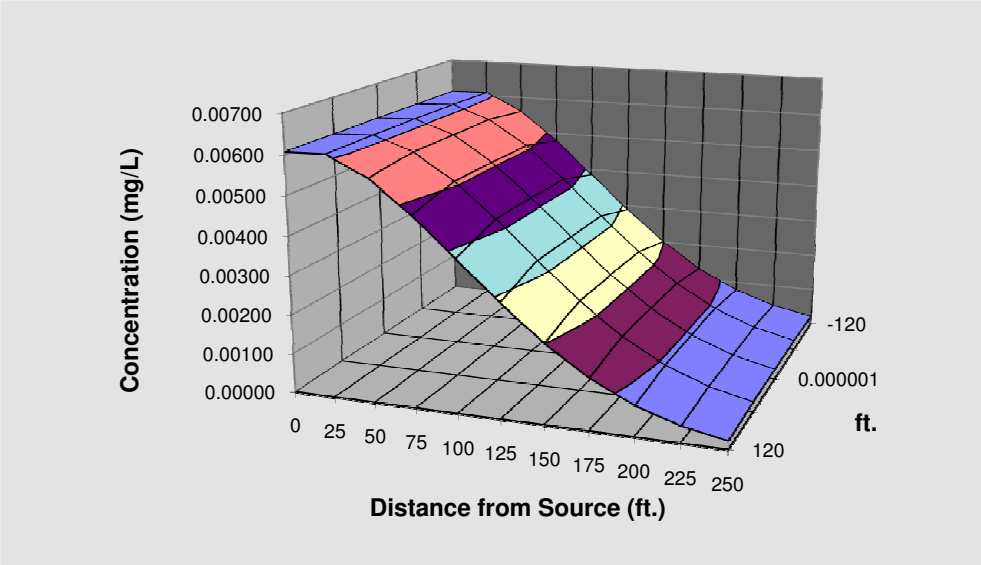
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.087E-03	5.586E-03	4.779E-03	3.838E-03	2.883E-03	2.013E-03	1.297E-03	7.674E-04	4.148E-04	2.040E-04
60	6.065E-03	6.110E-03	5.752E-03	5.088E-03	4.217E-03	3.257E-03	2.330E-03	1.534E-03	9.241E-04	5.074E-04	2.530E-04
0	6.065E-03	6.110E-03	5.752E-03	5.088E-03	4.217E-03	3.258E-03	2.331E-03	1.535E-03	9.261E-04	5.092E-04	2.544E-04
-60	6.065E-03	6.110E-03	5.752E-03	5.088E-03	4.217E-03	3.257E-03	2.330E-03	1.534E-03	9.241E-04	5.074E-04	2.530E-04
-120	6.065E-03	6.087E-03	5.586E-03	4.779E-03	3.838E-03	2.883E-03	2.013E-03	1.297E-03	7.674E-04	4.148E-04	2.040E-04
MASS RATE (mg/day)	9.8E+0	9.9E+0	9.2E+0	8.0E+0	6.6E+0	5.0E+0	3.6E+0	2.3E+0	1.4E+0	7.6E-1	3.8E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.133E-02	(Kg)
Mass Removed	5.042E-03	(Kg)
% Biotransformed =	+19.1%	
% Change in Mass Rate =	96.1 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.020E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

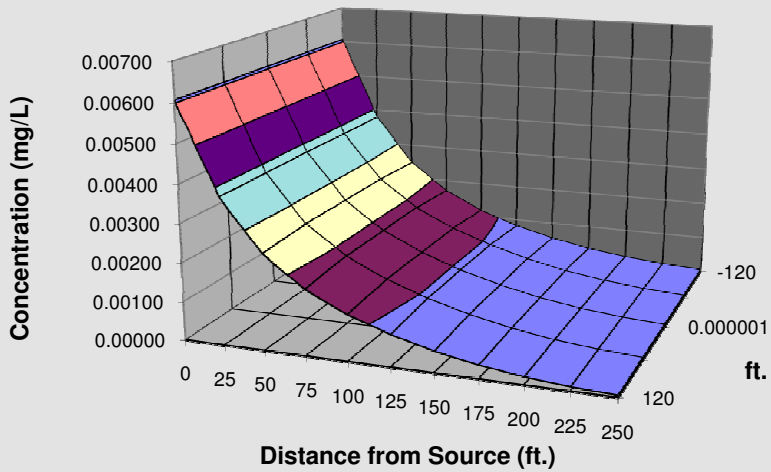
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	3.775E-03	2.470E-03	1.691E-03	1.183E-03	8.184E-04	5.442E-04	3.407E-04	1.981E-04	1.059E-04	5.174E-05
60	6.065E-03	3.789E-03	2.543E-03	1.800E-03	1.300E-03	9.247E-04	6.300E-04	4.029E-04	2.385E-04	1.296E-04	6.416E-05
0	6.065E-03	3.789E-03	2.543E-03	1.800E-03	1.300E-03	9.248E-04	6.303E-04	4.034E-04	2.391E-04	1.300E-04	6.451E-05
-60	6.065E-03	3.789E-03	2.543E-03	1.800E-03	1.300E-03	9.247E-04	6.300E-04	4.029E-04	2.385E-04	1.296E-04	6.416E-05
-120	6.065E-03	3.775E-03	2.470E-03	1.691E-03	1.183E-03	8.184E-04	5.442E-04	3.407E-04	1.981E-04	1.059E-04	5.174E-05
MASS RATE (mg/day)	9.8E+0	6.1E+0	4.1E+0	2.8E+0	2.0E+0	1.4E+0	9.6E-1	6.1E-1	3.6E-1	1.9E-1	9.6E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: **0.070** mg/L Displayed Model: **Biotransformation** Displayed Compound: **DCE**



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	*(Kg)*
- Plume Mass If Biotransformation/Production	9.683E-03	*(Kg)*
Mass Removed	1.669E-02	*(Kg)*

If "Can't Calc.", make model area longer

% Biotransformed = **+63.3%**

% Change in Mass Rate = **99.0 %** (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	5.610E-02	*MGal*
Flow Rate of Water Through Source Area	4.275E-04	*MGD*

Compare to Pump and Treat

Pumping Rate		*(gpm)*
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		*(yr)*

Plot All Data Plot Data > Target

Mass HELP **To Centerline** **Return to Input**

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

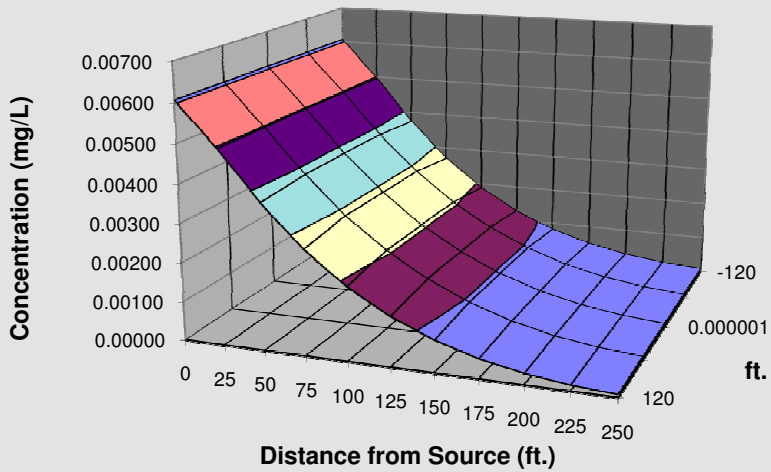
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	4.958E-03	3.730E-03	2.687E-03	1.879E-03	1.269E-03	8.179E-04	4.973E-04	2.820E-04	1.477E-04	7.100E-05
60	6.065E-03	4.977E-03	3.841E-03	2.861E-03	2.064E-03	1.433E-03	9.469E-04	5.880E-04	3.396E-04	1.807E-04	8.806E-05
0	6.065E-03	4.977E-03	3.841E-03	2.861E-03	2.064E-03	1.433E-03	9.473E-04	5.887E-04	3.403E-04	1.814E-04	8.854E-05
-60	6.065E-03	4.977E-03	3.841E-03	2.861E-03	2.064E-03	1.433E-03	9.469E-04	5.880E-04	3.396E-04	1.807E-04	8.806E-05
-120	6.065E-03	4.958E-03	3.730E-03	2.687E-03	1.879E-03	1.269E-03	8.179E-04	4.973E-04	2.820E-04	1.477E-04	7.100E-05
MASS RATE (mg/day)	9.8E+0	8.0E+0	6.1E+0	4.5E+0	3.2E+0	2.2E+0	1.4E+0	8.9E-1	5.1E-1	2.7E-1	1.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.324E-02	(Kg)
Mass Removed	1.314E-02	(Kg)
% Biotransformed =	+49.8%	
% Change in Mass Rate =	98.7 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	5.610E-02	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

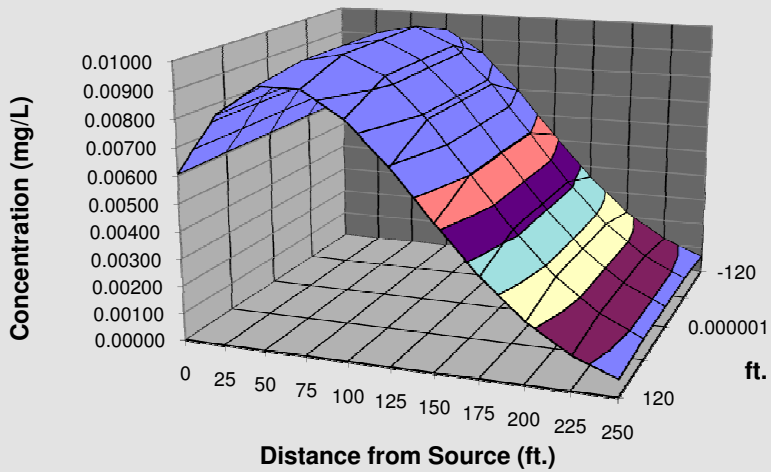
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	8.255E-03	9.344E-03	9.335E-03	8.438E-03	6.944E-03	5.204E-03	3.546E-03	2.192E-03	1.227E-03	6.204E-04
60	6.065E-03	8.285E-03	9.622E-03	9.938E-03	9.271E-03	7.846E-03	6.025E-03	4.193E-03	2.639E-03	1.501E-03	7.695E-04
0	6.065E-03	8.285E-03	9.622E-03	9.938E-03	9.271E-03	7.847E-03	6.028E-03	4.198E-03	2.645E-03	1.506E-03	7.737E-04
-60	6.065E-03	8.285E-03	9.622E-03	9.938E-03	9.271E-03	7.846E-03	6.025E-03	4.193E-03	2.639E-03	1.501E-03	7.695E-04
-120	6.065E-03	8.255E-03	9.344E-03	9.335E-03	8.438E-03	6.944E-03	5.204E-03	3.546E-03	2.192E-03	1.227E-03	6.204E-04
MASS RATE (mg/day)	9.8E+0	1.3E+1	1.5E+1	1.6E+1	1.4E+1	1.2E+1	9.2E+0	6.4E+0	4.0E+0	2.3E+0	1.1E+0

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	4.055E-02	(Kg)
Mass Removed	-1.417E-02	(Kg)
% Biotransformed =	-53.7 %	
% Change in Mass Rate =	88.3 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	3.927E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

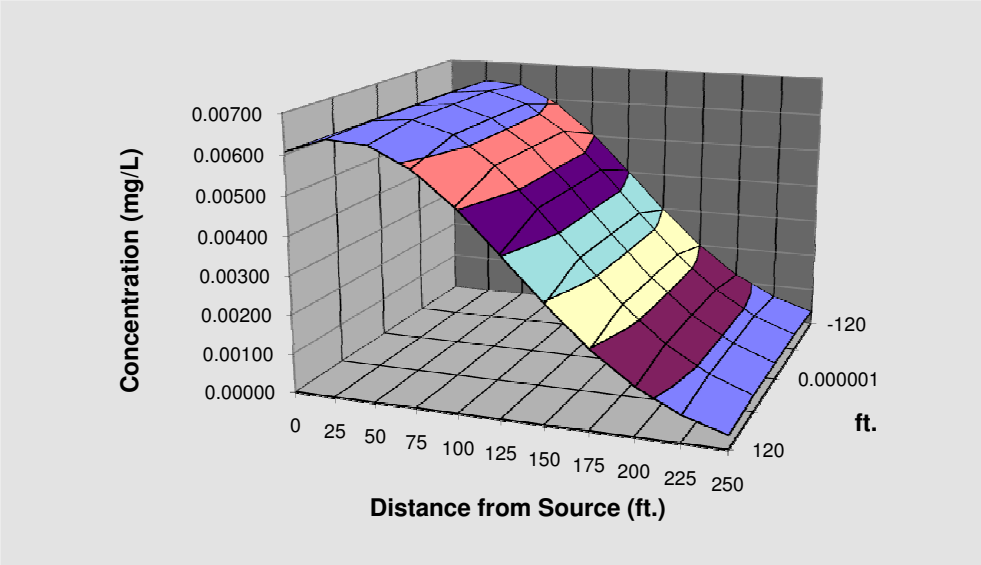
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.257E-02	(Kg)
Mass Removed	1.380E-02	(Kg)
% Biotransformed =	**+52.3%**	
% Change in Mass Rate =	**93.6 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

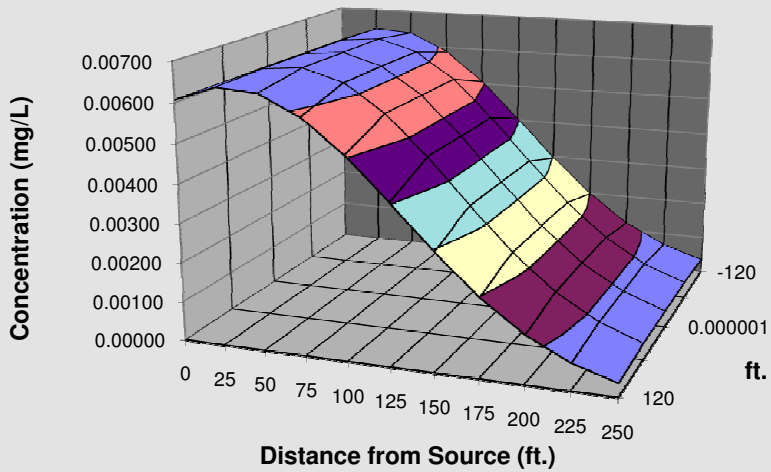
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.133E-02	(Kg)
Mass Removed	5.042E-03	(Kg)
% Biotransformed =	+19.1%	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

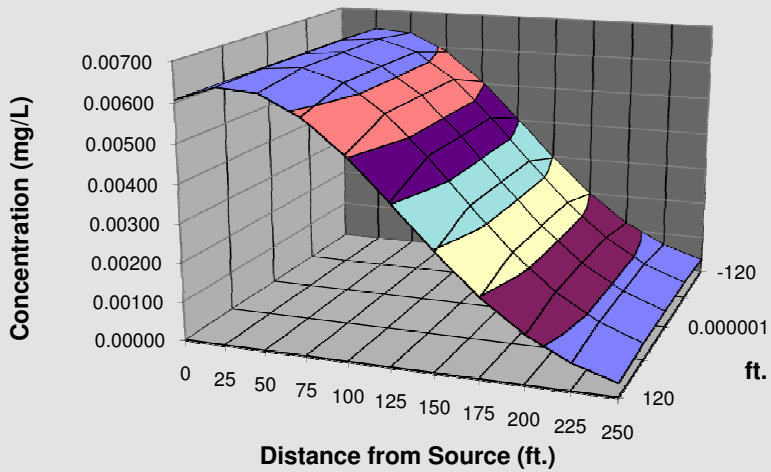
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: No Degradation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	9.683E-03	(Kg)
Mass Removed	1.669E-02	(Kg)
% Biotransformed =	+63.3%	
% Change in Mass Rate =	93.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

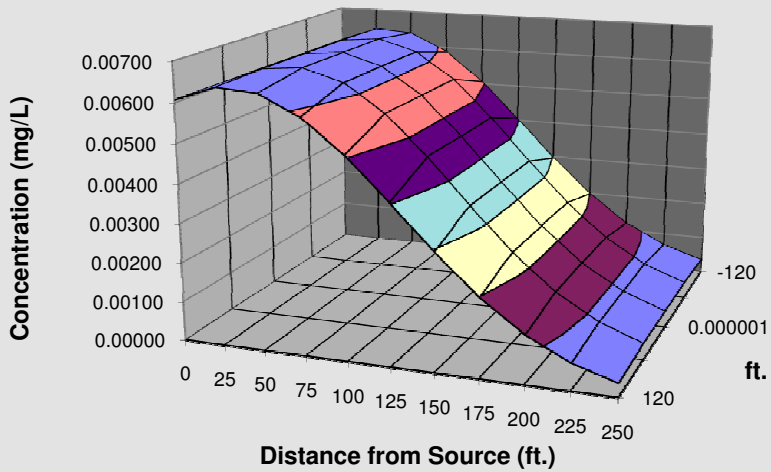
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: No Degradation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.324E-02	(Kg)
Mass Removed	1.314E-02	(Kg)
% Biotransformed =	**+49.8%**	
% Change in Mass Rate =	**93.6 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

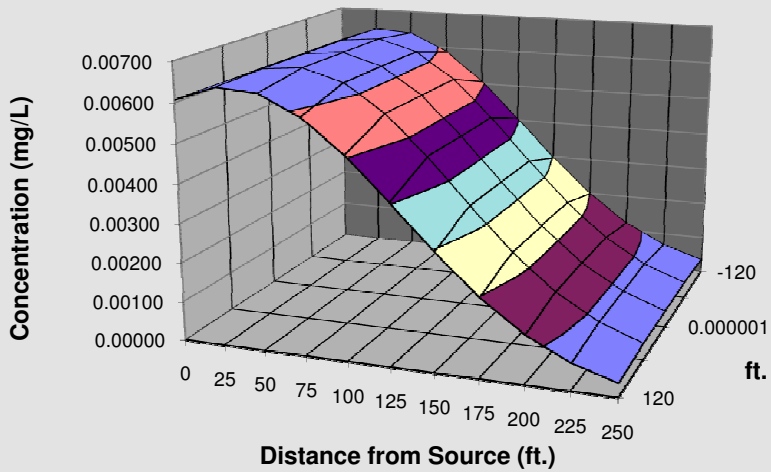
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
0	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.563E-03	3.432E-03	2.356E-03	1.470E-03	8.305E-04	4.242E-04
-60	6.065E-03	6.463E-03	6.558E-03	6.259E-03	5.562E-03	4.562E-03	3.431E-03	2.353E-03	1.466E-03	8.274E-04	4.219E-04
-120	6.065E-03	6.439E-03	6.368E-03	5.879E-03	5.062E-03	4.038E-03	2.963E-03	1.990E-03	1.218E-03	6.764E-04	3.402E-04
MASS RATE (mg/day)	9.8E+0	1.0E+1	1.0E+1	9.9E+0	8.7E+0	7.0E+0	5.2E+0	3.6E+0	2.2E+0	1.2E+0	6.3E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: No Degradation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.638E-02	(Kg)
- Plume Mass If Biotransformation/Production	4.055E-02	(Kg)
Mass Removed	-1.417E-02	(Kg)
% Biotransformed =	**-53.7 %**	
% Change in Mass Rate =	**93.6 %** (source to edge)	

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.805E-01	MGal
Flow Rate of Water Through Source Area	4.275E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-16 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	132.1	(ft/yr)
or			
Hydraulic Conductivity	K	4.7E-04	(cm/sec)
Hydraulic Gradient	i	0.06	(ft/ft)
Effective Porosity	n	0.22	(-)

2. DISPERSION

Alpha x*	20	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	4.29	(-)
TCE	130	(L/kg)	2.00	(-)
DCE	125	(L/kg)	1.97	(-)
VC	30	(L/kg)	1.23	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**1.97**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	0.070	9.90	0.79
TCE → DCE	0.050	13.90	0.74
DCE → VC	0.178	3.90	0.64
VC → ETH	0.119	5.80	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	200	(ft)
Modeled Area Length*	250	(ft)
Zone 1 Length*	250	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

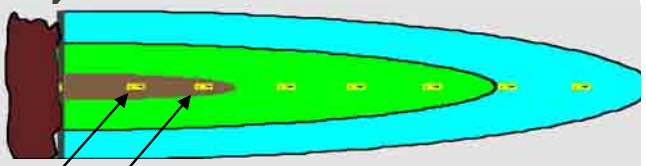
Source Options

Source Thickness in Sat. Zone* 10 (ft)

Width* (ft) Y1 200

Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.10	0.1
TCE	0.10	0.1
DCE	0.00	0.1
VC	0.000	0.1
ETH	0	0.1

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0	0.0024									
TCE Conc. (mg/L)	0.00710	0.0030									
DCE Conc. (mg/L)	0.0	0.0									
VC Conc. (mg/L)	0.0	0.0									
ETH Conc. (mg/L)	0.0	0.0									
Distance from Source (ft)	25	75									
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

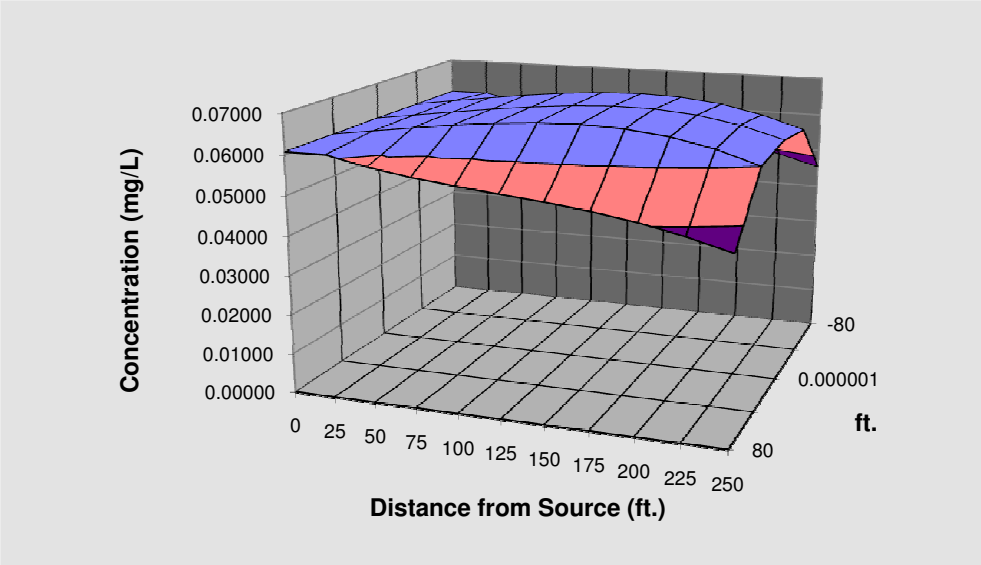
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.070E-02	5.856E-02	5.687E-02	5.564E-02	5.463E-02	5.360E-02	5.233E-02	5.066E-02	4.843E-02	4.556E-02
40	6.065E-02	6.212E-02	6.356E-02	6.491E-02	6.605E-02	6.684E-02	6.712E-02	6.673E-02	6.551E-02	6.331E-02	6.007E-02
0	6.065E-02	6.212E-02	6.356E-02	6.492E-02	6.614E-02	6.708E-02	6.760E-02	6.750E-02	6.661E-02	6.473E-02	6.176E-02
-40	6.065E-02	6.212E-02	6.356E-02	6.491E-02	6.605E-02	6.684E-02	6.712E-02	6.673E-02	6.551E-02	6.331E-02	6.007E-02
-80	6.065E-02	6.070E-02	5.856E-02	5.687E-02	5.564E-02	5.463E-02	5.360E-02	5.233E-02	5.066E-02	4.843E-02	4.556E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.8E+2	2.8E+2	2.8E+2	2.8E+2	2.8E+2	2.8E+2	2.7E+2	2.6E+2	2.5E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.880E-01	(Kg)
Mass Removed	2.637E-02	(Kg)
% Biotransformed =	+6.4%	
% Change in Mass Rate =	10.0 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

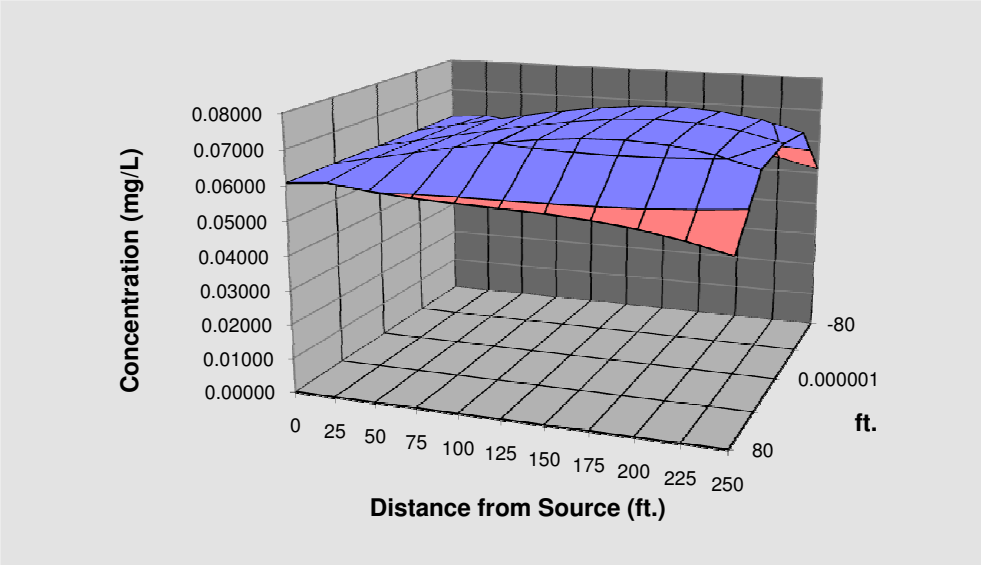
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.161E-02	6.029E-02	5.938E-02	5.889E-02	5.857E-02	5.816E-02	5.742E-02	5.615E-02	5.417E-02	5.137E-02
40	6.065E-02	6.304E-02	6.544E-02	6.777E-02	6.990E-02	7.165E-02	7.282E-02	7.321E-02	7.261E-02	7.082E-02	6.774E-02
0	6.065E-02	6.304E-02	6.544E-02	6.779E-02	7.000E-02	7.191E-02	7.334E-02	7.406E-02	7.383E-02	7.241E-02	6.965E-02
-40	6.065E-02	6.304E-02	6.544E-02	6.777E-02	6.990E-02	7.165E-02	7.282E-02	7.321E-02	7.261E-02	7.082E-02	6.774E-02
-80	6.065E-02	6.161E-02	6.029E-02	5.938E-02	5.889E-02	5.857E-02	5.816E-02	5.742E-02	5.615E-02	5.417E-02	5.137E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.9E+2	2.9E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	2.9E+2	2.8E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	4.156E-01	(Kg)
Mass Removed	-1.189E-03	(Kg)
% Biotransformed =	-0.3 %	
% Change in Mass Rate =	-1.5 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

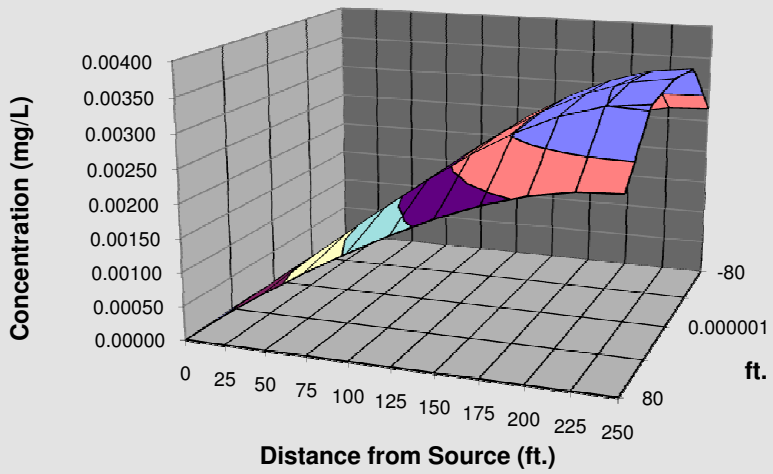
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	1.740E-10	4.324E-04	8.275E-04	1.193E-03	1.536E-03	1.854E-03	2.139E-03	2.379E-03	2.561E-03	2.672E-03	2.701E-03
40	1.740E-10	4.425E-04	8.981E-04	1.361E-03	1.823E-03	2.268E-03	2.678E-03	3.034E-03	3.312E-03	3.493E-03	3.561E-03
0	1.740E-10	4.425E-04	8.981E-04	1.362E-03	1.825E-03	2.276E-03	2.698E-03	3.069E-03	3.368E-03	3.571E-03	3.661E-03
-40	1.740E-10	4.425E-04	8.981E-04	1.361E-03	1.823E-03	2.268E-03	2.678E-03	3.034E-03	3.312E-03	3.493E-03	3.561E-03
-80	1.740E-10	4.324E-04	8.275E-04	1.193E-03	1.536E-03	1.854E-03	2.139E-03	2.379E-03	2.561E-03	2.672E-03	2.701E-03
MASS RATE (mg/day)	7.8E-7	2.0E+0	3.9E+0	5.8E+0	7.7E+0	9.5E+0	1.1E+1	1.3E+1	1.4E+1	1.4E+1	1.5E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	1.291E-02	(Kg)
Mass Removed	-1.291E-02	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = ########## (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

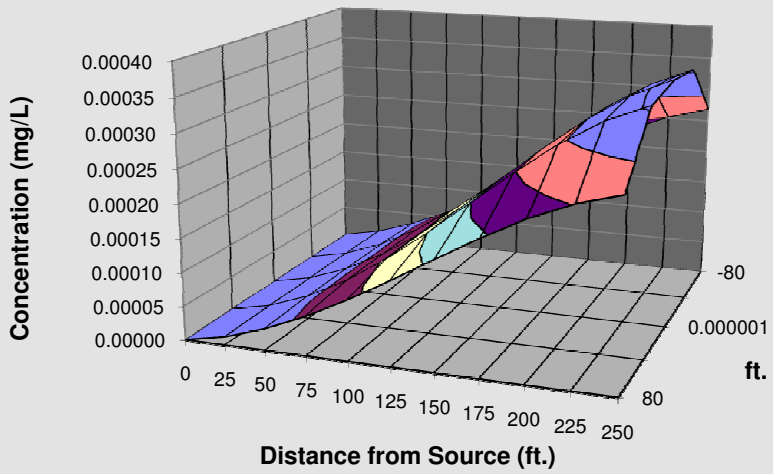
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	3.063E-12	1.218E-05	3.176E-05	5.748E-05	8.831E-05	1.228E-04	1.590E-04	1.944E-04	2.264E-04	2.521E-04	2.692E-04
40	3.063E-12	1.246E-05	3.447E-05	6.561E-05	1.048E-04	1.502E-04	1.990E-04	2.479E-04	2.928E-04	3.296E-04	3.550E-04
0	3.063E-12	1.246E-05	3.447E-05	6.563E-05	1.050E-04	1.508E-04	2.005E-04	2.508E-04	2.977E-04	3.370E-04	3.650E-04
-40	3.063E-12	1.246E-05	3.447E-05	6.561E-05	1.048E-04	1.502E-04	1.990E-04	2.479E-04	2.928E-04	3.296E-04	3.550E-04
-80	3.063E-12	1.218E-05	3.176E-05	5.748E-05	8.831E-05	1.228E-04	1.590E-04	1.944E-04	2.264E-04	2.521E-04	2.692E-04
MASS RATE (mg/day)	1.4E-8	5.6E-2	1.5E-1	2.8E-1	4.4E-1	6.3E-1	8.3E-1	1.0E+0	1.2E+0	1.4E+0	1.5E+0

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	1.007E-03	(Kg)
Mass Removed	-1.007E-03	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = ########## (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE
○ TCE
○ DCE
○ VC
◉ ETH

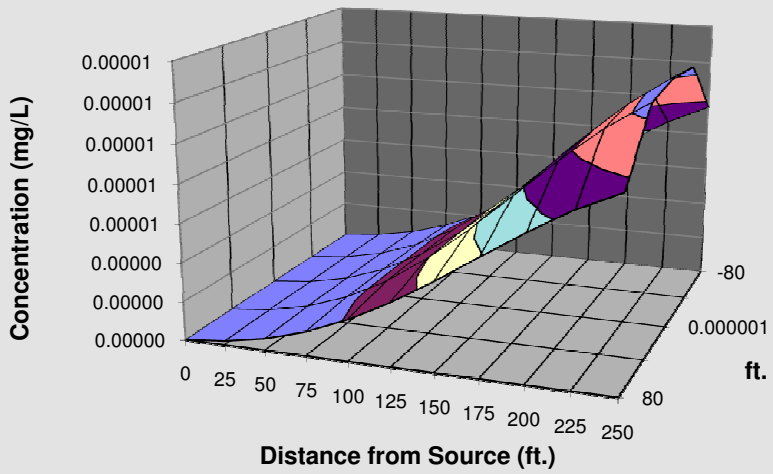
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	4.815E-14	2.058E-07	6.052E-07	1.233E-06	2.108E-06	3.216E-06	4.512E-06	5.912E-06	7.303E-06	8.554E-06	9.535E-06
40	4.815E-14	2.106E-07	6.568E-07	1.408E-06	2.502E-06	3.935E-06	5.650E-06	7.538E-06	9.443E-06	1.118E-05	1.257E-05
0	4.815E-14	2.106E-07	6.569E-07	1.408E-06	2.505E-06	3.949E-06	5.690E-06	7.626E-06	9.602E-06	1.143E-05	1.293E-05
-40	4.815E-14	2.106E-07	6.568E-07	1.408E-06	2.502E-06	3.935E-06	5.650E-06	7.538E-06	9.443E-06	1.118E-05	1.257E-05
-80	4.815E-14	2.058E-07	6.052E-07	1.233E-06	2.108E-06	3.216E-06	4.512E-06	5.912E-06	7.303E-06	8.554E-06	9.535E-06
MASS RATE (mg/day)	2.2E-10	9.4E-4	2.9E-3	6.0E-3	1.1E-2	1.6E-2	2.3E-2	3.1E-2	3.9E-2	4.6E-2	5.1E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	3.091E-05	(Kg)
Mass Removed	-3.091E-05	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = ########## (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → PCE / TCE / DCE / VC / ETH

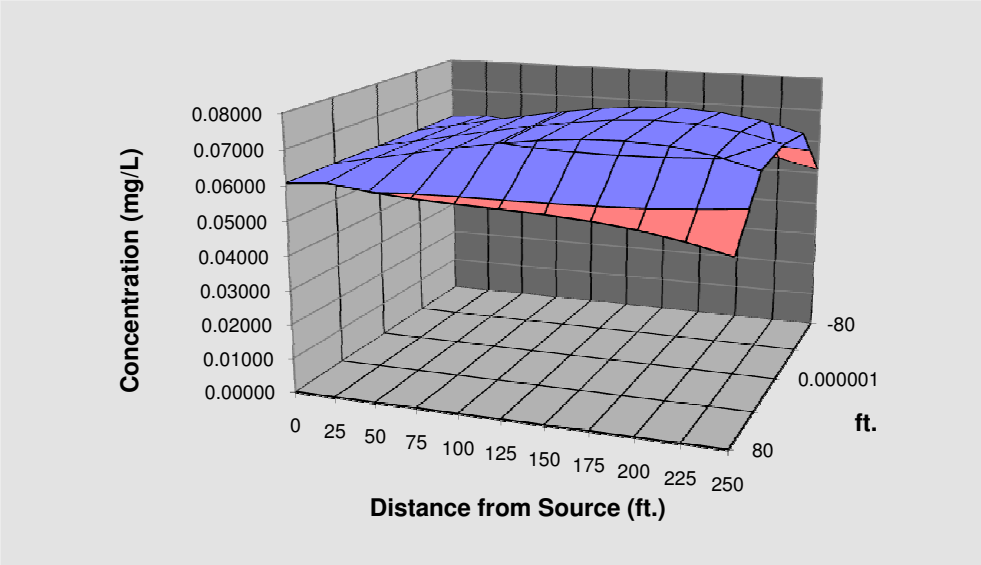
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
0	6.065E-02	6.298E-02	6.533E-02	6.763E-02	6.980E-02	7.168E-02	7.309E-02	7.379E-02	7.355E-02	7.213E-02	6.938E-02
-40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
-80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.9E+2	2.9E+2	2.9E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	2.9E+2	2.8E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.880E-01	(Kg)
Mass Removed	2.637E-02	(Kg)
% Biotransformed =	+6.4%	
% Change in Mass Rate =	-1.1 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

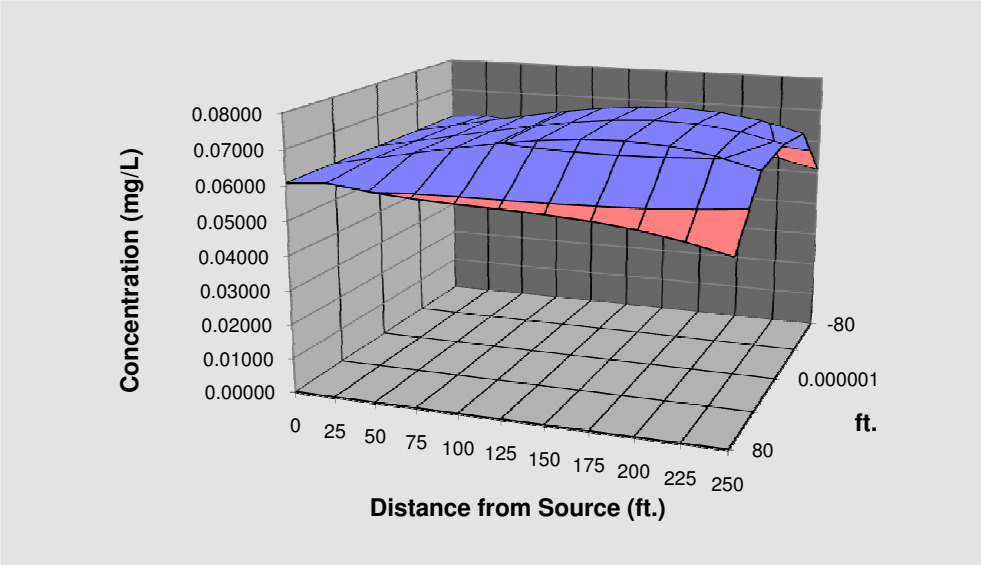
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
0	6.065E-02	6.298E-02	6.533E-02	6.763E-02	6.980E-02	7.168E-02	7.309E-02	7.379E-02	7.355E-02	7.213E-02	6.938E-02
-40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
-80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.9E+2	2.9E+2	2.9E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	2.9E+2	2.8E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	4.156E-01	(Kg)
Mass Removed	-1.189E-03	(Kg)
% Biotransformed =	-0.3 %	
% Change in Mass Rate =	-1.1 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-16 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	132.1	(ft/yr)
or			
Hydraulic Conductivity	K	4.7E-04	(cm/sec)
Hydraulic Gradient	i	0.06	(ft/ft)
Effective Porosity	n	0.22	(-)

2. DISPERSION

Alpha x*	20	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	4.29	(-)
TCE	130	(L/kg)	2.00	(-)
DCE	125	(L/kg)	1.97	(-)
VC	30	(L/kg)	1.23	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**1.97**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	1.195	0.58	0.79
TCE → DCE	0.900	0.77	0.74
DCE → VC	3.300	0.21	0.64
VC → ETH	2.567	0.27	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	200	(ft)
Modeled Area Length*	250	(ft)
Zone 1 Length*	250	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

Source Options

Source Thickness in Sat. Zone* 10 (ft)

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

	Y1	
Width* (ft)	200	
Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.10	0.1
TCE	0.10	0.1
DCE	0.00	0.1
VC	0.000	0.1
ETH	0	0.1

View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0	0.0024									
TCE Conc. (mg/L)	0.00710	0.0030									
DCE Conc. (mg/L)	0.0	0.0									
VC Conc. (mg/L)	0.0	0.0									
ETH Conc. (mg/L)	0.0	0.0									
Distance from Source (ft)	25	75									
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

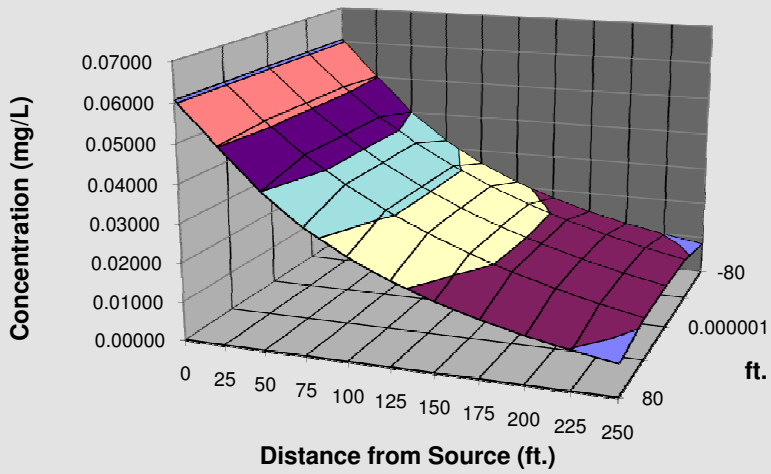
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	5.017E-02	4.003E-02	3.220E-02	2.617E-02	2.142E-02	1.761E-02	1.451E-02	1.197E-02	9.843E-03	8.061E-03
40	6.065E-02	5.134E-02	4.345E-02	3.676E-02	3.106E-02	2.620E-02	2.205E-02	1.851E-02	1.547E-02	1.287E-02	1.063E-02
0	6.065E-02	5.134E-02	4.345E-02	3.677E-02	3.110E-02	2.630E-02	2.221E-02	1.872E-02	1.573E-02	1.316E-02	1.093E-02
-40	6.065E-02	5.134E-02	4.345E-02	3.676E-02	3.106E-02	2.620E-02	2.205E-02	1.851E-02	1.547E-02	1.287E-02	1.063E-02
-80	6.065E-02	5.017E-02	4.003E-02	3.220E-02	2.617E-02	2.142E-02	1.761E-02	1.451E-02	1.197E-02	9.843E-03	8.061E-03
MASS RATE (mg/day)	2.7E+2	2.3E+2	1.9E+2	1.6E+2	1.3E+2	1.1E+2	9.1E+1	7.6E+1	6.4E+1	5.3E+1	4.4E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	1.740E-01	(Kg)
Mass Removed	2.403E-01	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed = +58.0%

% Change in Mass Rate = 84.1 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

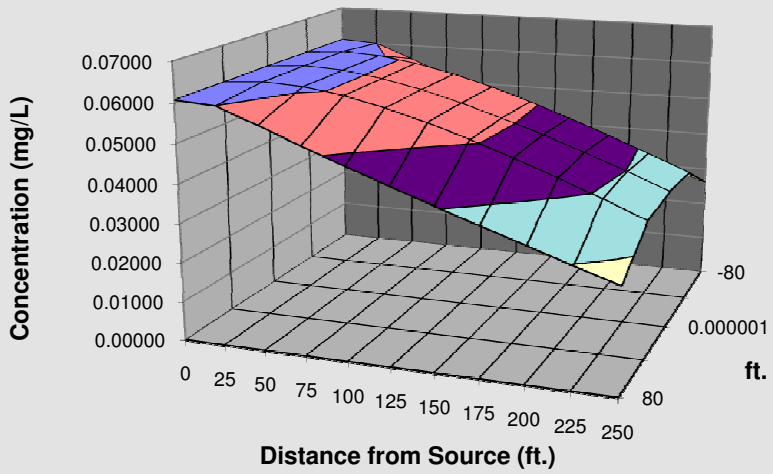
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	5.999E-02	5.606E-02	5.197E-02	4.804E-02	4.424E-02	4.054E-02	3.692E-02	3.334E-02	2.980E-02	2.631E-02
40	6.065E-02	6.139E-02	6.084E-02	5.932E-02	5.702E-02	5.412E-02	5.077E-02	4.707E-02	4.311E-02	3.896E-02	3.470E-02
0	6.065E-02	6.139E-02	6.084E-02	5.933E-02	5.710E-02	5.432E-02	5.113E-02	4.762E-02	4.383E-02	3.984E-02	3.567E-02
-40	6.065E-02	6.139E-02	6.084E-02	5.932E-02	5.702E-02	5.412E-02	5.077E-02	4.707E-02	4.311E-02	3.896E-02	3.470E-02
-80	6.065E-02	5.999E-02	5.606E-02	5.197E-02	4.804E-02	4.424E-02	4.054E-02	3.692E-02	3.334E-02	2.980E-02	2.631E-02
MASS RATE (mg/day)	2.7E+2	2.7E+2	2.7E+2	2.5E+2	2.4E+2	2.3E+2	2.1E+2	1.9E+2	1.8E+2	1.6E+2	1.4E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.099E-01	(Kg)
Mass Removed	1.045E-01	(Kg)
% Biotransformed =	+25.2%	
% Change in Mass Rate =	48.0 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

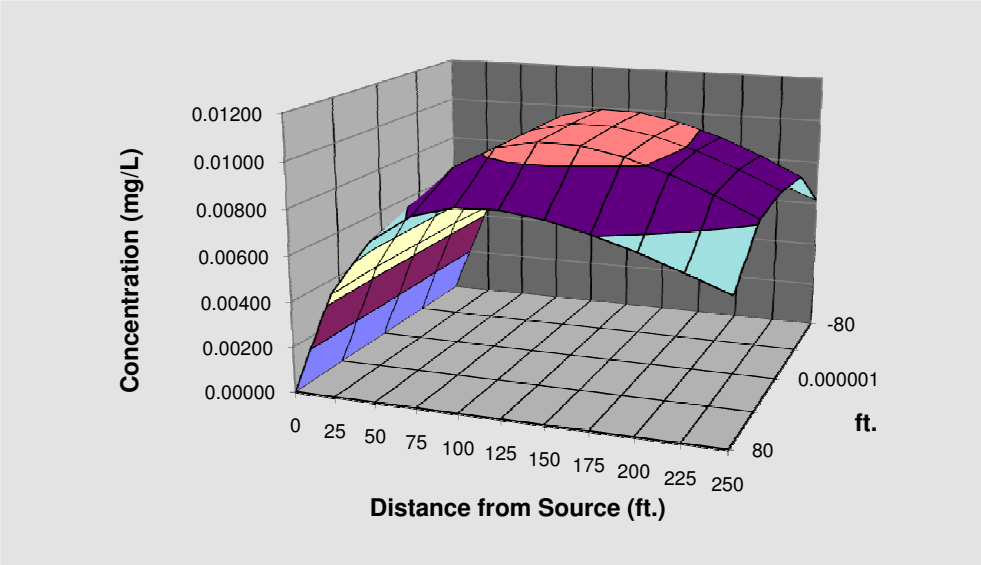
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	2.274E-09	4.511E-03	6.958E-03	8.171E-03	8.664E-03	8.714E-03	8.480E-03	8.060E-03	7.512E-03	6.878E-03	6.184E-03
40	2.274E-09	4.616E-03	7.552E-03	9.326E-03	1.028E-02	1.066E-02	1.062E-02	1.028E-02	9.714E-03	8.992E-03	8.154E-03
0	2.274E-09	4.616E-03	7.552E-03	9.329E-03	1.030E-02	1.070E-02	1.069E-02	1.040E-02	9.877E-03	9.193E-03	8.384E-03
-40	2.274E-09	4.616E-03	7.552E-03	9.326E-03	1.028E-02	1.066E-02	1.062E-02	1.028E-02	9.714E-03	8.992E-03	8.154E-03
-80	2.274E-09	4.511E-03	6.958E-03	8.171E-03	8.664E-03	8.714E-03	8.480E-03	8.060E-03	7.512E-03	6.878E-03	6.184E-03
MASS RATE (mg/day)	1.0E-5	2.1E+1	3.3E+1	4.0E+1	4.3E+1	4.5E+1	4.4E+1	4.2E+1	4.0E+1	3.7E+1	3.3E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	5.137E-02	(Kg)
Mass Removed	-5.137E-02	(Kg)
% Biotransformed =		
% Change in Mass Rate =	###########	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

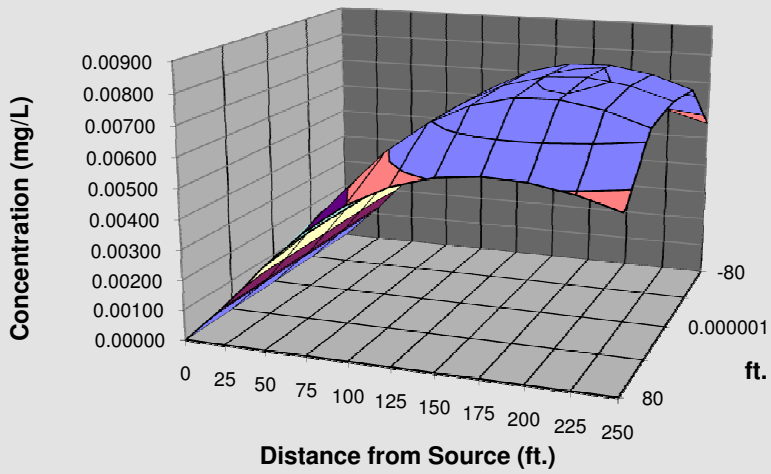
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	3.507E-10	1.251E-03	2.700E-03	3.976E-03	4.969E-03	5.660E-03	6.067E-03	6.222E-03	6.162E-03	5.923E-03	5.538E-03
40	3.507E-10	1.280E-03	2.930E-03	4.538E-03	5.898E-03	6.924E-03	7.597E-03	7.933E-03	7.968E-03	7.743E-03	7.303E-03
0	3.507E-10	1.280E-03	2.930E-03	4.540E-03	5.906E-03	6.949E-03	7.651E-03	8.026E-03	8.102E-03	7.917E-03	7.508E-03
-40	3.507E-10	1.280E-03	2.930E-03	4.538E-03	5.898E-03	6.924E-03	7.597E-03	7.933E-03	7.968E-03	7.743E-03	7.303E-03
-80	3.507E-10	1.251E-03	2.700E-03	3.976E-03	4.969E-03	5.660E-03	6.067E-03	6.222E-03	6.162E-03	5.923E-03	5.538E-03
MASS RATE (mg/day)	1.6E-6	5.7E+0	1.3E+1	1.9E+1	2.5E+1	2.9E+1	3.2E+1	3.3E+1	3.3E+1	3.2E+1	3.0E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	3.402E-02	(Kg)
Mass Removed	-3.402E-02	(Kg)
% Biotransformed =		
% Change in Mass Rate =	##########	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

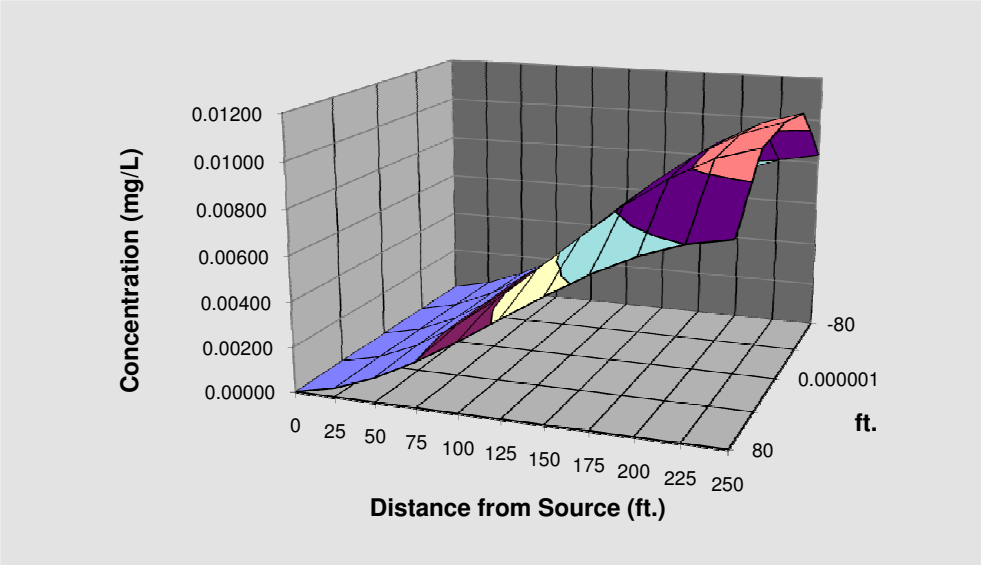
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	9.608E-11	3.968E-04	1.079E-03	1.993E-03	3.072E-03	4.234E-03	5.393E-03	6.463E-03	7.359E-03	8.010E-03	8.364E-03
40	9.608E-11	4.061E-04	1.171E-03	2.275E-03	3.646E-03	5.180E-03	6.754E-03	8.240E-03	9.515E-03	1.047E-02	1.103E-02
0	9.608E-11	4.061E-04	1.171E-03	2.276E-03	3.651E-03	5.199E-03	6.802E-03	8.336E-03	9.675E-03	1.071E-02	1.134E-02
-40	9.608E-11	4.061E-04	1.171E-03	2.275E-03	3.646E-03	5.180E-03	6.754E-03	8.240E-03	9.515E-03	1.047E-02	1.103E-02
-80	9.608E-11	3.968E-04	1.079E-03	1.993E-03	3.072E-03	4.234E-03	5.393E-03	6.463E-03	7.359E-03	8.010E-03	8.364E-03
MASS RATE (mg/day)	4.3E-7	1.8E+0	5.1E+0	9.7E+0	1.5E+1	2.2E+1	2.8E+1	3.4E+1	3.9E+1	4.3E+1	4.5E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	3.301E-02	(Kg)
Mass Removed	-3.301E-02	(Kg)
% Biotransformed =		
% Change in Mass Rate =	###########	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

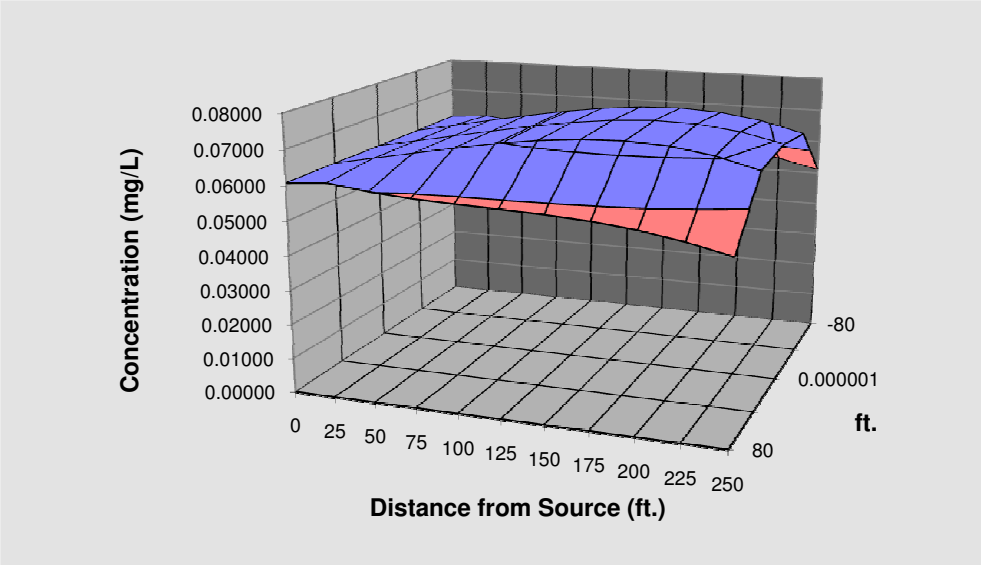
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
0	6.065E-02	6.298E-02	6.533E-02	6.763E-02	6.980E-02	7.168E-02	7.309E-02	7.379E-02	7.355E-02	7.213E-02	6.938E-02
-40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
-80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.9E+2	2.9E+2	2.9E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	2.9E+2	2.8E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	1.740E-01	(Kg)
Mass Removed	2.403E-01	(Kg)
% Biotransformed =	+58.0%	
% Change in Mass Rate =	-1.1 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

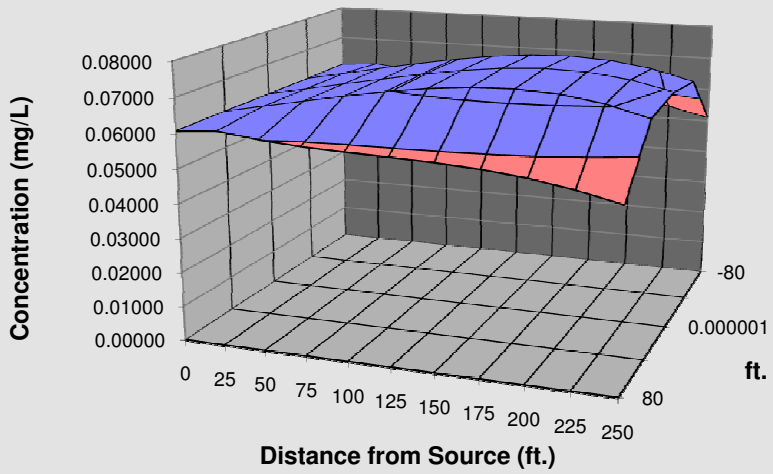
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	25	50	75	100	125	150	175	200	225	250
80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
0	6.065E-02	6.298E-02	6.533E-02	6.763E-02	6.980E-02	7.168E-02	7.309E-02	7.379E-02	7.355E-02	7.213E-02	6.938E-02
-40	6.065E-02	6.298E-02	6.533E-02	6.761E-02	6.970E-02	7.142E-02	7.257E-02	7.294E-02	7.233E-02	7.055E-02	6.748E-02
-80	6.065E-02	6.155E-02	6.019E-02	5.924E-02	5.872E-02	5.838E-02	5.795E-02	5.721E-02	5.594E-02	5.397E-02	5.118E-02
MASS RATE (mg/day)	2.7E+2	2.8E+2	2.9E+2	2.9E+2	2.9E+2	3.0E+2	3.0E+2	3.0E+2	3.0E+2	2.9E+2	2.8E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	4.144E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.099E-01	(Kg)
Mass Removed	1.045E-01	(Kg)
% Biotransformed =	+25.2%	
% Change in Mass Rate =	-1.1 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	1.191E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-24 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	1117.4	(ft/yr)
or			
Hydraulic Conductivity	K	2.7E-03	(cm/sec)
Hydraulic Gradient	i	0.04	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	20	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	0.070	9.90	0.79
TCE → DCE	0.050	13.90	0.74
DCE → VC	0.178	3.90	0.64
VC → ETH	0.119	5.80	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	200	(ft)
Modeled Area Length*	280	(ft)
Zone 1 Length*	280	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

Source Options

Source Thickness in Sat. Zone* 12 (ft)

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

	Y1	
Width* (ft)	200	
Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.10	0.1
TCE	0.10	0.1
DCE	0.00	0.1
VC	0.000	0.1
ETH	0.001	0.1

View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	.0	0.0011									
TCE Conc. (mg/L)	0.00082	0.0022									
DCE Conc. (mg/L)	.0	.0									
VC Conc. (mg/L)	0.0	0.0									
ETH Conc. (mg/L)	7.1E-05	3.8E-05									
Distance from Source (ft)	20	260									
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

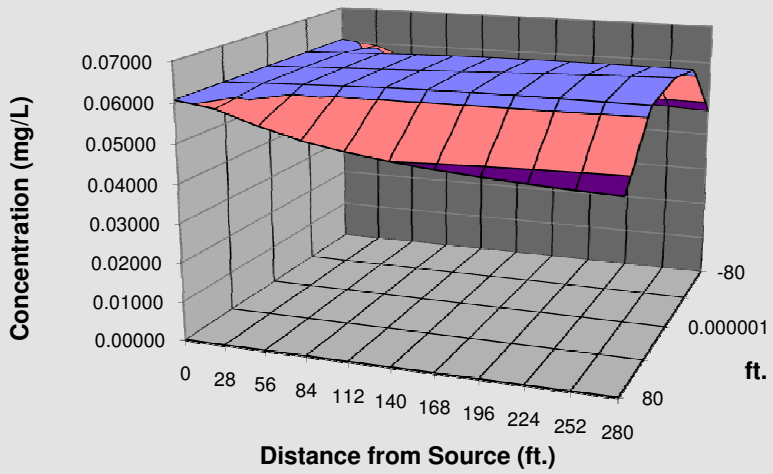
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.923E-02	5.583E-02	5.327E-02	5.144E-02	5.009E-02	4.906E-02	4.826E-02	4.764E-02	4.714E-02	4.674E-02
40	6.065E-02	6.102E-02	6.140E-02	6.174E-02	6.201E-02	6.218E-02	6.227E-02	6.228E-02	6.225E-02	6.219E-02	6.212E-02
0	6.065E-02	6.102E-02	6.140E-02	6.177E-02	6.215E-02	6.253E-02	6.291E-02	6.328E-02	6.363E-02	6.397E-02	6.429E-02
-40	6.065E-02	6.102E-02	6.140E-02	6.174E-02	6.201E-02	6.218E-02	6.227E-02	6.228E-02	6.225E-02	6.219E-02	6.212E-02
-80	6.065E-02	5.923E-02	5.583E-02	5.327E-02	5.144E-02	5.009E-02	4.906E-02	4.826E-02	4.764E-02	4.714E-02	4.674E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.607E-01	(Kg)
Mass Removed	3.326E-03	(Kg)
% Biotransformed =	+0.9%	
% Change in Mass Rate =	7.0 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

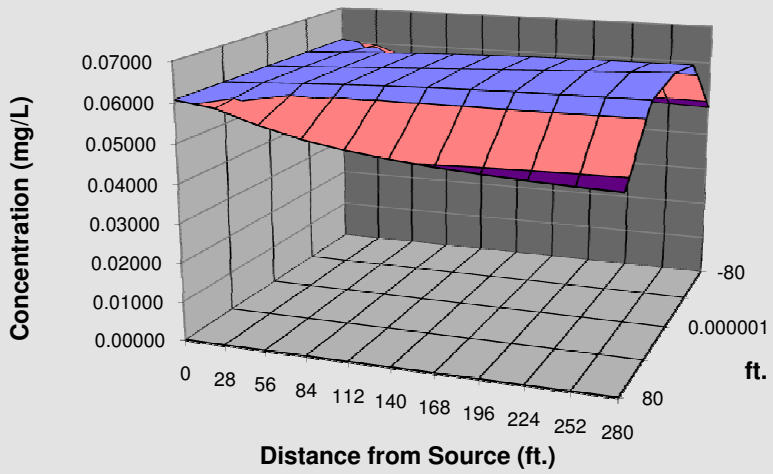
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.934E-02	5.604E-02	5.358E-02	5.183E-02	5.057E-02	4.963E-02	4.891E-02	4.837E-02	4.795E-02	4.764E-02
40	6.065E-02	6.114E-02	6.163E-02	6.210E-02	6.249E-02	6.278E-02	6.298E-02	6.312E-02	6.321E-02	6.327E-02	6.331E-02
0	6.065E-02	6.114E-02	6.163E-02	6.213E-02	6.263E-02	6.313E-02	6.363E-02	6.413E-02	6.461E-02	6.508E-02	6.552E-02
-40	6.065E-02	6.114E-02	6.163E-02	6.210E-02	6.249E-02	6.278E-02	6.298E-02	6.312E-02	6.321E-02	6.327E-02	6.331E-02
-80	6.065E-02	5.934E-02	5.604E-02	5.358E-02	5.183E-02	5.057E-02	4.963E-02	4.891E-02	4.837E-02	4.795E-02	4.764E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.643E-01	(Kg)
Mass Removed	-2.559E-04	(Kg)
% Biotransformed =	-0.1 %	
% Change in Mass Rate =	5.2 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

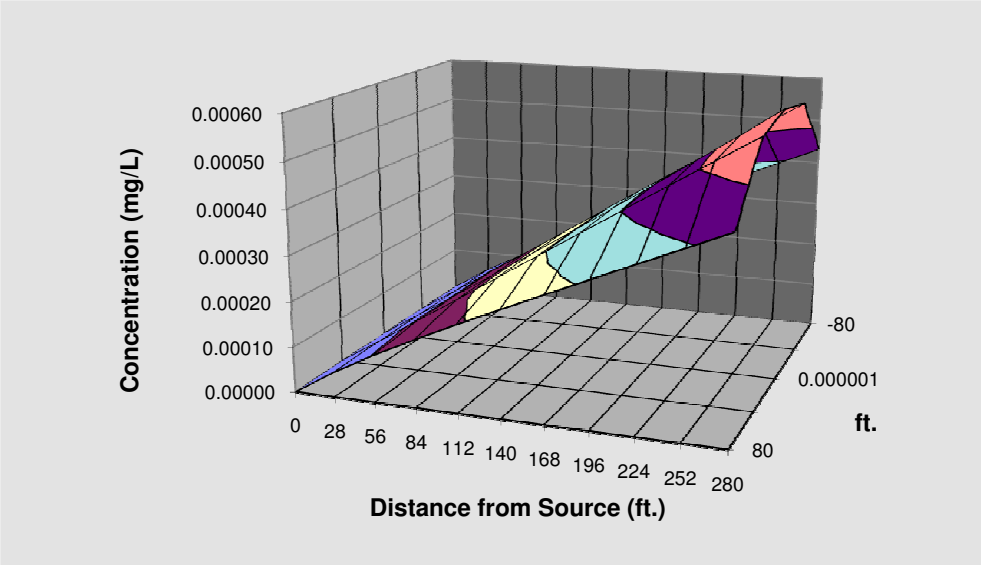
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	2.012E-11	5.499E-05	1.036E-04	1.483E-04	1.908E-04	2.322E-04	2.728E-04	3.129E-04	3.529E-04	3.926E-04	4.324E-04
40	2.012E-11	5.666E-05	1.140E-04	1.718E-04	2.300E-04	2.882E-04	3.462E-04	4.038E-04	4.611E-04	5.181E-04	5.747E-04
0	2.012E-11	5.666E-05	1.140E-04	1.719E-04	2.305E-04	2.898E-04	3.498E-04	4.103E-04	4.714E-04	5.329E-04	5.948E-04
-40	2.012E-11	5.666E-05	1.140E-04	1.718E-04	2.300E-04	2.882E-04	3.462E-04	4.038E-04	4.611E-04	5.181E-04	5.747E-04
-80	2.012E-11	5.499E-05	1.036E-04	1.483E-04	1.908E-04	2.322E-04	2.728E-04	3.129E-04	3.529E-04	3.926E-04	4.324E-04
MASS RATE (mg/day)	4.2E-7	1.2E+0	2.3E+0	3.4E+0	4.5E+0	5.5E+0	6.6E+0	7.7E+0	8.7E+0	9.8E+0	1.1E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	1.728E-03	(Kg)
Mass Removed	-1.728E-03	(Kg)
% Biotransformed =		
% Change in Mass Rate =	##########	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

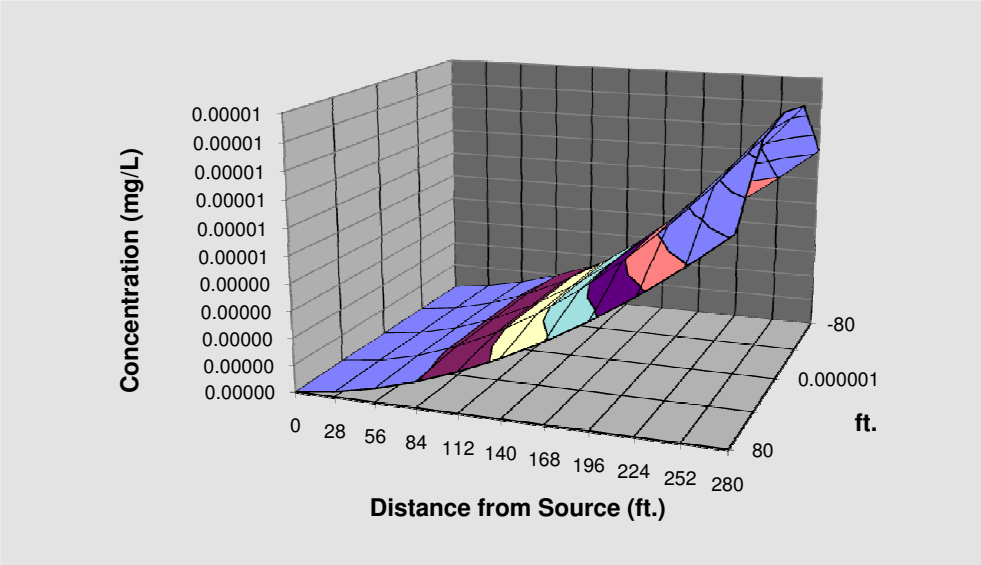
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	4.190E-14	1.940E-07	5.153E-07	9.514E-07	1.500E-06	2.160E-06	2.931E-06	3.813E-06	4.807E-06	5.914E-06	7.135E-06
40	4.190E-14	1.999E-07	5.667E-07	1.103E-06	1.808E-06	2.681E-06	3.719E-06	4.920E-06	6.282E-06	7.804E-06	9.483E-06
0	4.190E-14	1.999E-07	5.667E-07	1.103E-06	1.812E-06	2.696E-06	3.758E-06	4.999E-06	6.422E-06	8.027E-06	9.815E-06
-40	4.190E-14	1.999E-07	5.667E-07	1.103E-06	1.808E-06	2.681E-06	3.719E-06	4.920E-06	6.282E-06	7.804E-06	9.483E-06
-80	4.190E-14	1.940E-07	5.153E-07	9.514E-07	1.500E-06	2.160E-06	2.931E-06	3.813E-06	4.807E-06	5.914E-06	7.135E-06
MASS RATE (mg/day)	8.7E-10	4.1E-3	1.1E-2	2.2E-2	3.5E-2	5.1E-2	7.1E-2	9.3E-2	1.2E-1	1.5E-1	1.8E-1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	2.096E-05	(Kg)
Mass Removed	-2.096E-05	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = ########## (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

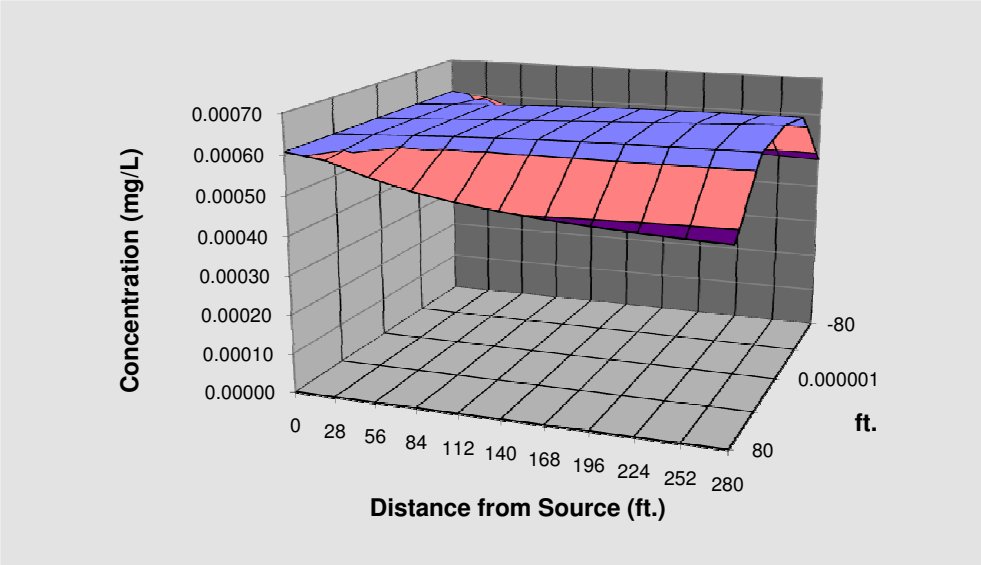
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.758E-04
40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.274E-04	6.293E-04	6.306E-04	6.315E-04	6.320E-04	6.323E-04
0	6.065E-04	6.113E-04	6.162E-04	6.210E-04	6.259E-04	6.309E-04	6.358E-04	6.407E-04	6.455E-04	6.501E-04	6.544E-04
-40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.274E-04	6.293E-04	6.306E-04	6.315E-04	6.320E-04	6.323E-04
-80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.758E-04
MASS RATE (mg/day)	1.3E+1	1.3E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-03	(Kg)
- Plume Mass If Biotransformation/Production	3.641E-03	(Kg)
Mass Removed	-1.033E-07	(Kg)
% Biotransformed =	-0.0 %	
% Change in Mass Rate =	5.3 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

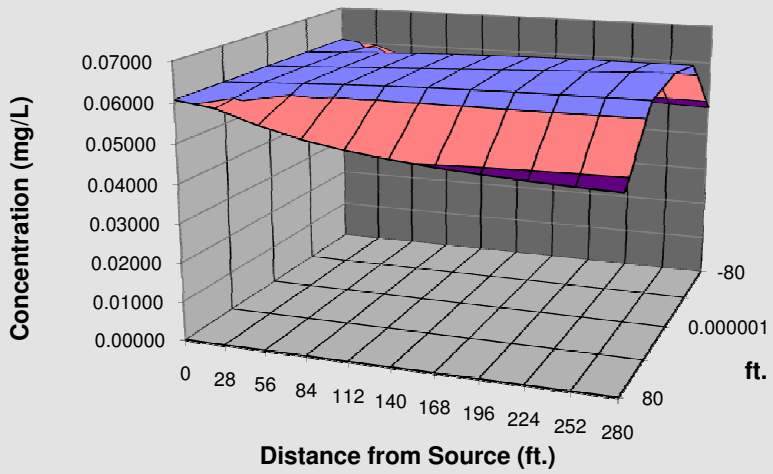
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
0	6.065E-02	6.113E-02	6.162E-02	6.210E-02	6.259E-02	6.309E-02	6.358E-02	6.407E-02	6.454E-02	6.500E-02	6.544E-02
-40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
-80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.607E-01	(Kg)
Mass Removed	3.326E-03	(Kg)
% Biotransformed =	+0.9%	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

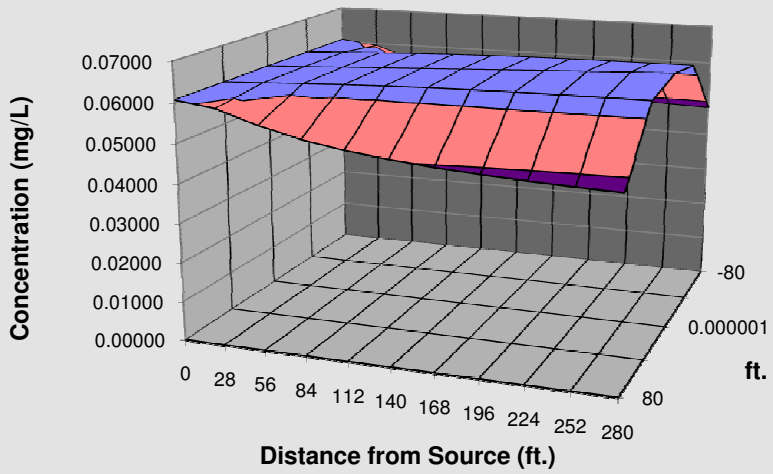
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
0	6.065E-02	6.113E-02	6.162E-02	6.210E-02	6.259E-02	6.309E-02	6.358E-02	6.407E-02	6.454E-02	6.500E-02	6.544E-02
-40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
-80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.643E-01	(Kg)
Mass Removed	-2.559E-04	(Kg)
% Biotransformed =	-0.1 %	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

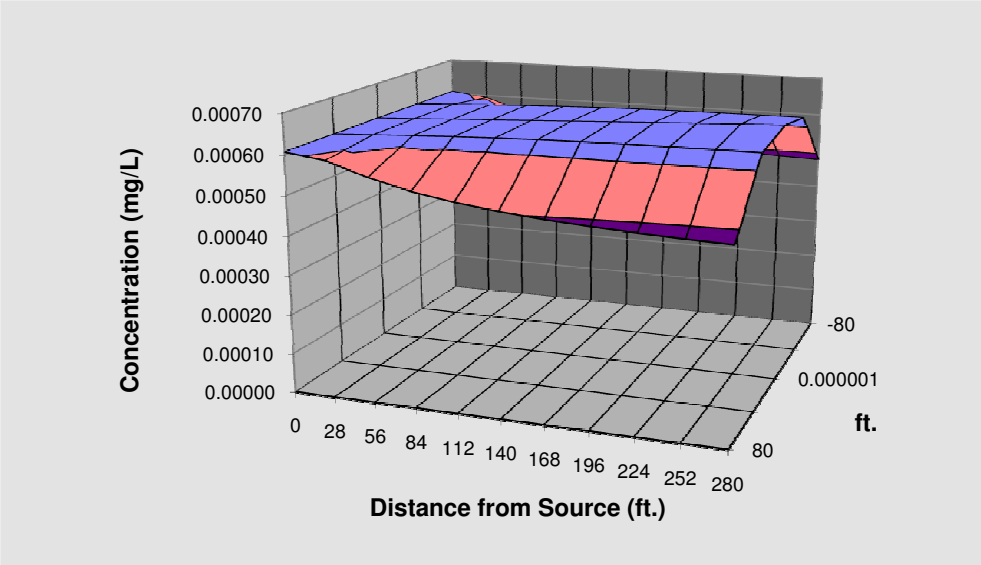
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.757E-04
40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.273E-04	6.293E-04	6.306E-04	6.314E-04	6.319E-04	6.323E-04
0	6.065E-04	6.113E-04	6.162E-04	6.210E-04	6.259E-04	6.309E-04	6.358E-04	6.407E-04	6.454E-04	6.500E-04	6.544E-04
-40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.273E-04	6.293E-04	6.306E-04	6.314E-04	6.319E-04	6.323E-04
-80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.757E-04
MASS RATE (mg/day)	1.3E+1	1.3E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: No Degradation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-03	(Kg)
- Plume Mass If Biotransformation/Production	3.641E-03	(Kg)
Mass Removed	-1.033E-07	(Kg)
% Biotransformed =	-0.0 %	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-24 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	1117.4	(ft/yr)
or			
Hydraulic Conductivity	K	2.7E-03	(cm/sec)
Hydraulic Gradient	i	0.04	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	20	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	1.195	0.58	0.79
TCE → DCE	0.900	0.77	0.74
DCE → VC	3.300	0.21	0.64
VC → ETH	2.567	0.27	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	200	(ft)
Modeled Area Length*	280	(ft)
Zone 1 Length*	280	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying
Single Planar

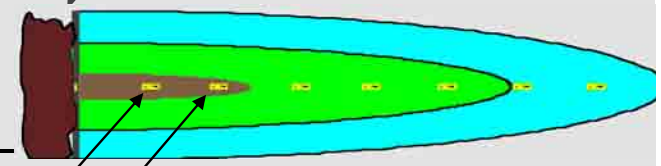
Source Options

Source Thickness in Sat. Zone* 12 (ft)

Width* (ft) Y1 200

Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.10	0.1
TCE	0.10	0.1
DCE	0.00	0.1
VC	0.000	0.1
ETH	0.001	0.1

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	.0	0.0011									
TCE Conc. (mg/L)	0.00082	0.0022									
DCE Conc. (mg/L)	.0	.0									
VC Conc. (mg/L)	0.0	0.0									
ETH Conc. (mg/L)	7.1E-05	3.8E-05									
Distance from Source (ft)	20	260									
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

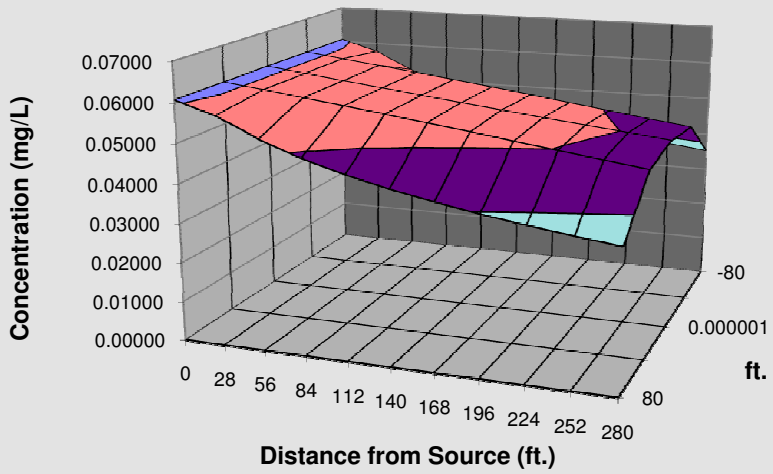
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.760E-02	5.280E-02	4.900E-02	4.601E-02	4.357E-02	4.151E-02	3.971E-02	3.812E-02	3.668E-02	3.537E-02
40	6.065E-02	5.935E-02	5.807E-02	5.679E-02	5.547E-02	5.409E-02	5.268E-02	5.124E-02	4.981E-02	4.840E-02	4.701E-02
0	6.065E-02	5.935E-02	5.807E-02	5.682E-02	5.559E-02	5.440E-02	5.322E-02	5.206E-02	5.092E-02	4.978E-02	4.865E-02
-40	6.065E-02	5.935E-02	5.807E-02	5.679E-02	5.547E-02	5.409E-02	5.268E-02	5.124E-02	4.981E-02	4.840E-02	4.701E-02
-80	6.065E-02	5.760E-02	5.280E-02	4.900E-02	4.601E-02	4.357E-02	4.151E-02	3.971E-02	3.812E-02	3.668E-02	3.537E-02
MASS RATE (mg/day)	1.3E+3	1.2E+3	1.2E+3	1.1E+3	1.1E+3	1.0E+3	1.0E+3	9.7E+2	9.4E+2	9.1E+2	8.9E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.134E-01	(Kg)
Mass Removed	5.062E-02	(Kg)
% Biotransformed =	+13.9%	
% Change in Mass Rate =	29.6 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

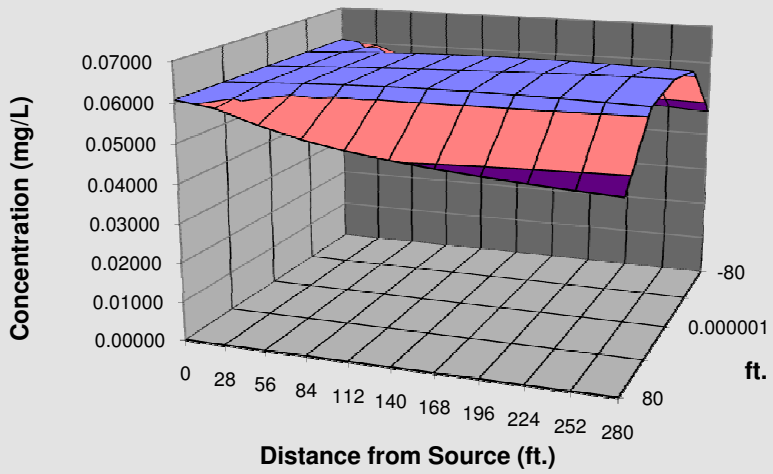
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.936E-02	5.603E-02	5.352E-02	5.169E-02	5.031E-02	4.924E-02	4.838E-02	4.766E-02	4.705E-02	4.652E-02
40	6.065E-02	6.116E-02	6.162E-02	6.202E-02	6.231E-02	6.246E-02	6.250E-02	6.243E-02	6.228E-02	6.207E-02	6.182E-02
0	6.065E-02	6.116E-02	6.162E-02	6.206E-02	6.245E-02	6.281E-02	6.314E-02	6.342E-02	6.366E-02	6.385E-02	6.398E-02
-40	6.065E-02	6.116E-02	6.162E-02	6.202E-02	6.231E-02	6.246E-02	6.250E-02	6.243E-02	6.228E-02	6.207E-02	6.182E-02
-80	6.065E-02	5.936E-02	5.603E-02	5.352E-02	5.169E-02	5.031E-02	4.924E-02	4.838E-02	4.766E-02	4.705E-02	4.652E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.614E-01	(Kg)
Mass Removed	2.646E-03	(Kg)
% Biotransformed =	+0.7%	
% Change in Mass Rate =	7.5 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

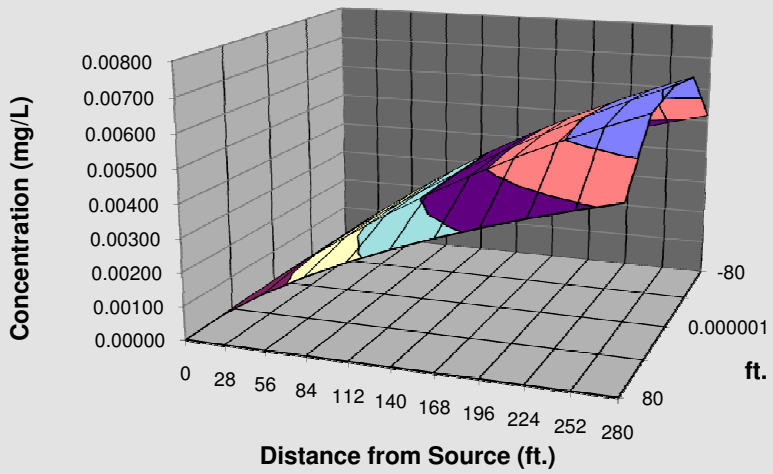
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	3.447E-10	9.079E-04	1.649E-03	2.275E-03	2.823E-03	3.314E-03	3.757E-03	4.160E-03	4.529E-03	4.867E-03	5.178E-03
40	3.447E-10	9.354E-04	1.813E-03	2.636E-03	3.403E-03	4.114E-03	4.768E-03	5.369E-03	5.919E-03	6.422E-03	6.881E-03
0	3.447E-10	9.354E-04	1.814E-03	2.638E-03	3.411E-03	4.137E-03	4.817E-03	5.455E-03	6.050E-03	6.605E-03	7.122E-03
-40	3.447E-10	9.354E-04	1.813E-03	2.636E-03	3.403E-03	4.114E-03	4.768E-03	5.369E-03	5.919E-03	6.422E-03	6.881E-03
-80	3.447E-10	9.079E-04	1.649E-03	2.275E-03	2.823E-03	3.314E-03	3.757E-03	4.160E-03	4.529E-03	4.867E-03	5.178E-03
MASS RATE (mg/day)	7.2E-6	1.9E+1	3.6E+1	5.2E+1	6.6E+1	7.9E+1	9.1E+1	1.0E+2	1.1E+2	1.2E+2	1.3E+2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	2.311E-02	(Kg)
Mass Removed	-2.311E-02	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = ########## (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

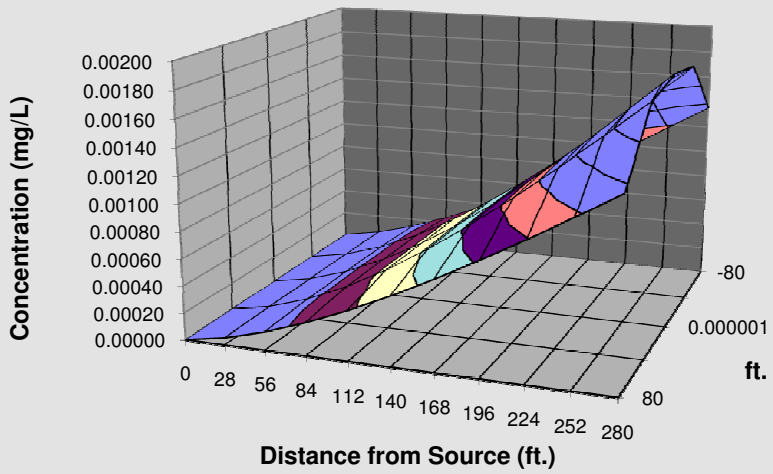
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	1.166E-11	5.301E-05	1.362E-04	2.420E-04	3.664E-04	5.063E-04	6.590E-04	8.223E-04	9.940E-04	1.173E-03	1.356E-03
40	1.166E-11	5.462E-05	1.497E-04	2.804E-04	4.417E-04	6.285E-04	8.364E-04	1.061E-03	1.299E-03	1.547E-03	1.803E-03
0	1.166E-11	5.462E-05	1.497E-04	2.806E-04	4.427E-04	6.321E-04	8.450E-04	1.078E-03	1.328E-03	1.591E-03	1.866E-03
-40	1.166E-11	5.462E-05	1.497E-04	2.804E-04	4.417E-04	6.285E-04	8.364E-04	1.061E-03	1.299E-03	1.547E-03	1.803E-03
-80	1.166E-11	5.301E-05	1.362E-04	2.420E-04	3.664E-04	5.063E-04	6.590E-04	8.223E-04	9.940E-04	1.173E-03	1.356E-03
MASS RATE (mg/day)	2.4E-7	1.1E+0	3.0E+0	5.5E+0	8.6E+0	1.2E+1	1.6E+1	2.0E+1	2.5E+1	2.9E+1	3.4E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	4.408E-03	(Kg)
Mass Removed	-4.408E-03	(Kg)
% Biotransformed =		
% Change in Mass Rate =	##########	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

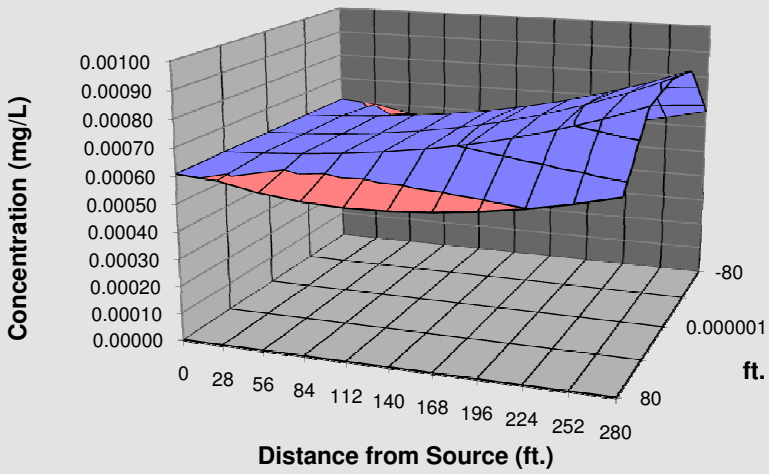
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-04	5.957E-04	5.674E-04	5.505E-04	5.443E-04	5.469E-04	5.572E-04	5.744E-04	5.983E-04	6.286E-04	6.653E-04
40	6.065E-04	6.138E-04	6.240E-04	6.380E-04	6.562E-04	6.790E-04	7.071E-04	7.412E-04	7.818E-04	8.294E-04	8.842E-04
0	6.065E-04	6.138E-04	6.240E-04	6.384E-04	6.577E-04	6.828E-04	7.144E-04	7.530E-04	7.992E-04	8.531E-04	9.152E-04
-40	6.065E-04	6.138E-04	6.240E-04	6.380E-04	6.562E-04	6.790E-04	7.071E-04	7.412E-04	7.818E-04	8.294E-04	8.842E-04
-80	6.065E-04	5.957E-04	5.674E-04	5.505E-04	5.443E-04	5.469E-04	5.572E-04	5.744E-04	5.983E-04	6.286E-04	6.653E-04
MASS RATE (mg/day)	1.3E+1	1.3E+1	1.3E+1	1.3E+1	1.3E+1	1.3E+1	1.3E+1	1.4E+1	1.5E+1	1.6E+1	1.7E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-03	(Kg)
- Plume Mass If Biotransformation/Production	4.129E-03	(Kg)
Mass Removed	-4.880E-04	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed = -13.4 %

% Change in Mass Rate = -32.4 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ◉ PCE
○ TCE
○ DCE
○ VC
○ ETH

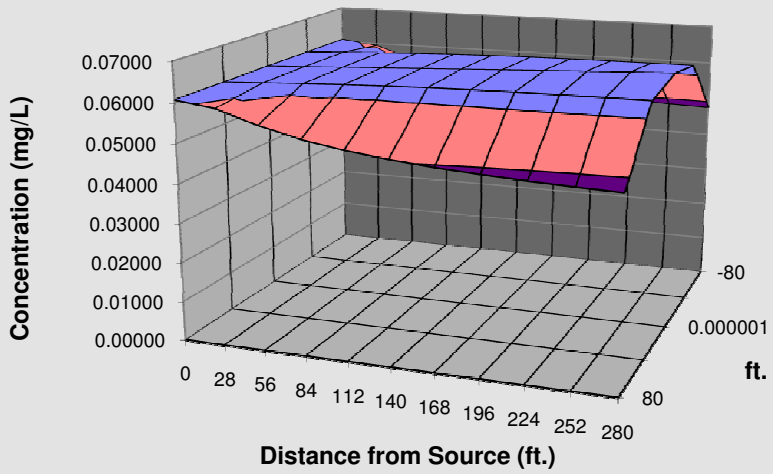
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
0	6.065E-02	6.113E-02	6.162E-02	6.210E-02	6.259E-02	6.309E-02	6.358E-02	6.407E-02	6.454E-02	6.500E-02	6.544E-02
-40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
-80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: PCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.134E-01	(Kg)
Mass Removed	5.062E-02	(Kg)
% Biotransformed =	+13.9%	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

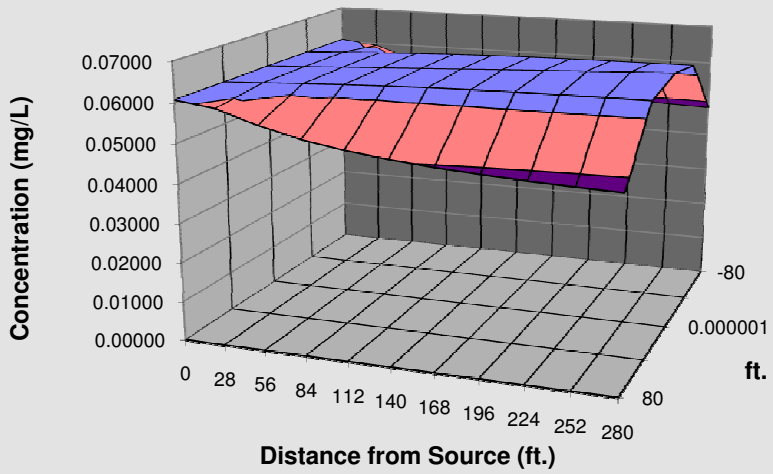
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
0	6.065E-02	6.113E-02	6.162E-02	6.210E-02	6.259E-02	6.309E-02	6.358E-02	6.407E-02	6.454E-02	6.500E-02	6.544E-02
-40	6.065E-02	6.113E-02	6.161E-02	6.207E-02	6.245E-02	6.273E-02	6.293E-02	6.306E-02	6.314E-02	6.319E-02	6.323E-02
-80	6.065E-02	5.934E-02	5.603E-02	5.356E-02	5.181E-02	5.053E-02	4.959E-02	4.887E-02	4.832E-02	4.790E-02	4.757E-02
MASS RATE (mg/day)	1.3E+3	1.3E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3	1.2E+3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-01	(Kg)
- Plume Mass If Biotransformation/Production	3.614E-01	(Kg)
Mass Removed	2.646E-03	(Kg)
% Biotransformed =	+0.7%	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	Can't Calc.	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.		
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

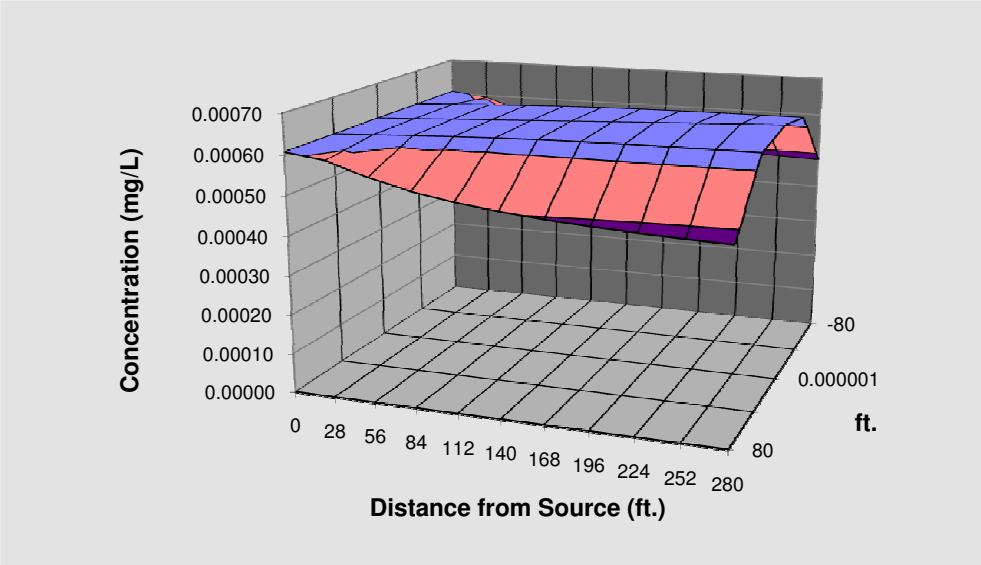
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	28	56	84	112	140	168	196	224	252	280
80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.757E-04
40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.273E-04	6.293E-04	6.306E-04	6.314E-04	6.319E-04	6.323E-04
0	6.065E-04	6.113E-04	6.162E-04	6.210E-04	6.259E-04	6.309E-04	6.358E-04	6.407E-04	6.454E-04	6.500E-04	6.544E-04
-40	6.065E-04	6.113E-04	6.161E-04	6.207E-04	6.245E-04	6.273E-04	6.293E-04	6.306E-04	6.314E-04	6.319E-04	6.323E-04
-80	6.065E-04	5.934E-04	5.603E-04	5.356E-04	5.181E-04	5.053E-04	4.959E-04	4.887E-04	4.832E-04	4.790E-04	4.757E-04
MASS RATE (mg/day)	1.3E+1	1.3E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1	1.2E+1

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: No Degradation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	3.641E-03	(Kg)
- Plume Mass If Biotransformation/Production	4.129E-03	(Kg)
Mass Removed	-4.880E-04	(Kg)
% Biotransformed =	-13.4 %	
% Change in Mass Rate =	5.4 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	5.496E-03	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-26 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	82.8	(ft/yr)
or			
Hydraulic Conductivity	K	6.7E-05	(cm/sec)
Hydraulic Gradient	i	0.12	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	40	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	0.070	9.90	0.79
TCE → DCE	0.050	13.90	0.74
DCE → VC	0.178	3.90	0.64
VC → ETH	0.119	5.80	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	150	(ft)
Modeled Area Length*	400	(ft)
Zone 1 Length*	400	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

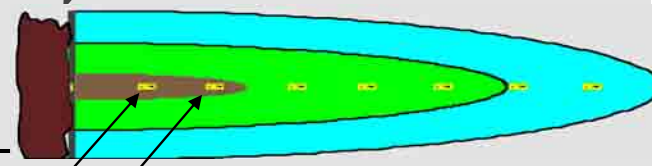
Source Options

Source Thickness in Sat. Zone* 15 (ft)

Width* (ft) Y1 150

Conc. (mg/L)*	C1	k_s* (1/yr)
PCE	0.00	0.1
TCE	0.01	0.1
DCE	0.00	0.1
VC	0.010	0.1
ETH	0	0.1

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0	0.0004	0.0								
TCE Conc. (mg/L)	0.00120	0.0005	0.0								
DCE Conc. (mg/L)	0.0	0.0	0.0								
VC Conc. (mg/L)	0.00064	0.00048	0.0								
ETH Conc. (mg/L)	1.1E-03	4.2E-05	7.0E-05								
Distance from Source (ft)	0	210	255								
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

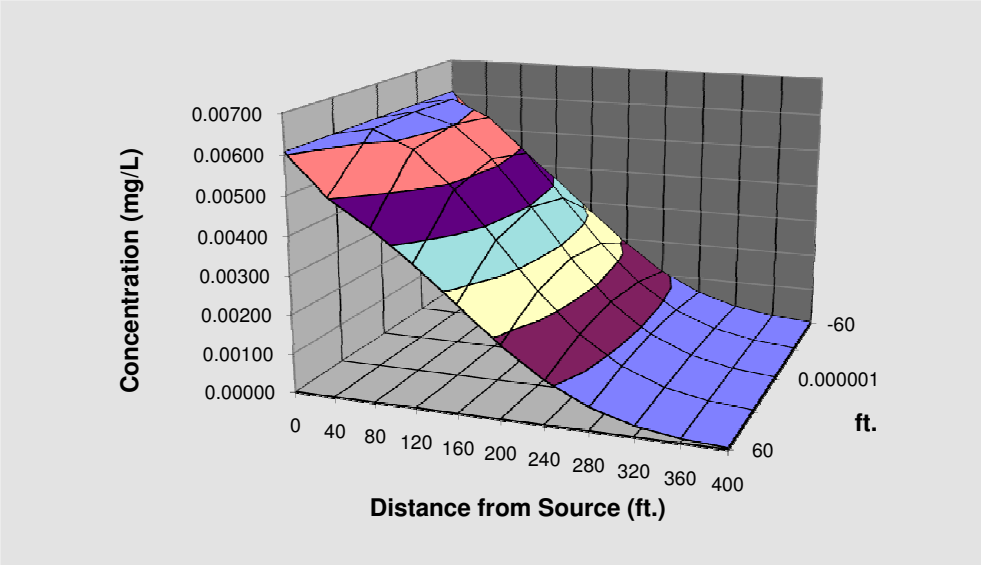
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	5.034E-03	4.370E-03	3.610E-03	2.725E-03	1.844E-03	1.106E-03	5.837E-04	2.697E-04	1.086E-04	3.807E-05
30	6.065E-03	6.262E-03	5.814E-03	4.877E-03	3.678E-03	2.470E-03	1.467E-03	7.655E-04	3.495E-04	1.392E-04	4.823E-05
0	6.065E-03	6.300E-03	6.023E-03	5.182E-03	3.965E-03	2.681E-03	1.595E-03	8.321E-04	3.793E-04	1.507E-04	5.206E-05
-30	6.065E-03	6.262E-03	5.814E-03	4.877E-03	3.678E-03	2.470E-03	1.467E-03	7.655E-04	3.495E-04	1.392E-04	4.823E-05
-60	6.065E-03	5.034E-03	4.370E-03	3.610E-03	2.725E-03	1.844E-03	1.106E-03	5.837E-04	2.697E-04	1.086E-04	3.807E-05
MASS RATE (mg/day)	8.8E+0	8.3E+0	7.6E+0	6.4E+0	4.8E+0	3.3E+0	1.9E+0	1.0E+0	4.7E-1	1.9E-1	6.5E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.124E-02	(Kg)
Mass Removed	7.790E-04	(Kg)
% Biotransformed =	+3.5%	
% Change in Mass Rate =	99.3 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	1.885E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

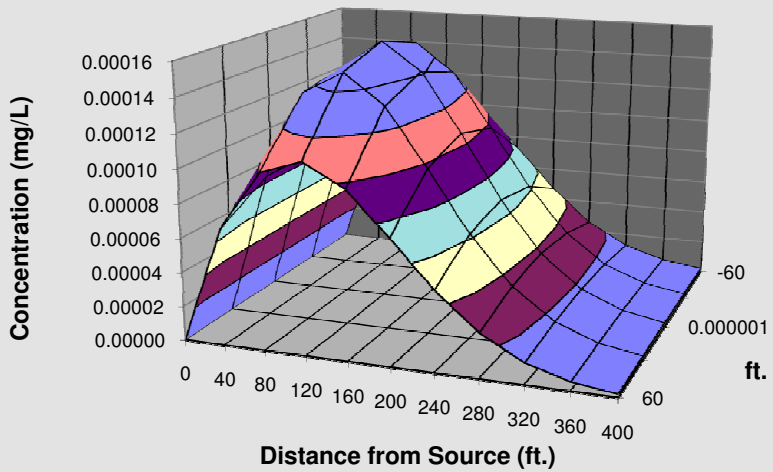
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	2.360E-11	6.786E-05	1.021E-04	1.102E-04	9.728E-05	7.277E-05	4.672E-05	2.587E-05	1.238E-05	5.119E-06	1.830E-06
30	2.360E-11	8.441E-05	1.359E-04	1.489E-04	1.313E-04	9.751E-05	6.198E-05	3.393E-05	1.604E-05	6.557E-06	2.318E-06
0	2.360E-11	8.491E-05	1.407E-04	1.582E-04	1.416E-04	1.058E-04	6.740E-05	3.688E-05	1.741E-05	7.098E-06	2.502E-06
-30	2.360E-11	8.441E-05	1.359E-04	1.489E-04	1.313E-04	9.751E-05	6.198E-05	3.393E-05	1.604E-05	6.557E-06	2.318E-06
-60	2.360E-11	6.786E-05	1.021E-04	1.102E-04	9.728E-05	7.277E-05	4.672E-05	2.587E-05	1.238E-05	5.119E-06	1.830E-06
MASS RATE (mg/day)	3.4E-8	1.1E-1	1.8E-1	2.0E-1	1.7E-1	1.3E-1	8.2E-2	4.5E-2	2.1E-2	8.8E-3	3.1E-3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	5.228E-04	(Kg)
Mass Removed	-5.228E-04	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = -9152133.4 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

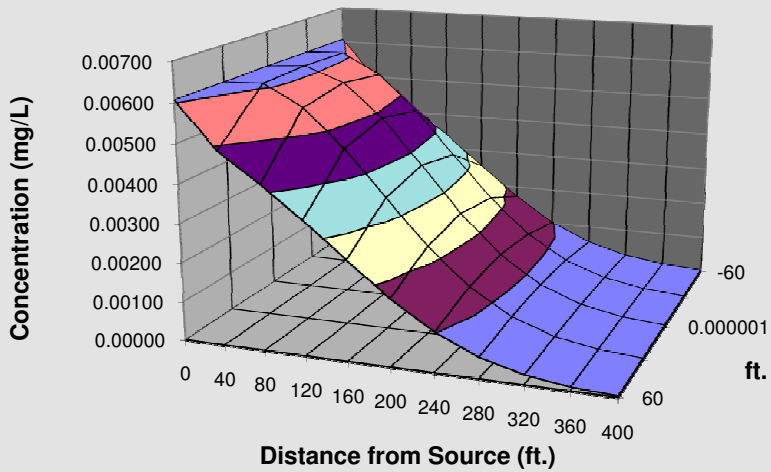
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	4.906E-03	4.177E-03	3.402E-03	2.541E-03	1.706E-03	1.018E-03	5.348E-04	2.463E-04	9.897E-05	3.461E-05
30	6.065E-03	6.103E-03	5.557E-03	4.595E-03	3.429E-03	2.286E-03	1.350E-03	7.013E-04	3.192E-04	1.268E-04	4.385E-05
0	6.065E-03	6.139E-03	5.757E-03	4.883E-03	3.697E-03	2.481E-03	1.468E-03	7.624E-04	3.463E-04	1.372E-04	4.733E-05
-30	6.065E-03	6.103E-03	5.557E-03	4.595E-03	3.429E-03	2.286E-03	1.350E-03	7.013E-04	3.192E-04	1.268E-04	4.385E-05
-60	6.065E-03	4.906E-03	4.177E-03	3.402E-03	2.541E-03	1.706E-03	1.018E-03	5.348E-04	2.463E-04	9.897E-05	3.461E-05
MASS RATE (mg/day)	8.8E+0	8.1E+0	7.3E+0	6.0E+0	4.5E+0	3.0E+0	1.8E+0	9.3E-1	4.3E-1	1.7E-1	5.9E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.025E-02	(Kg)
Mass Removed	1.768E-03	(Kg)
% Biotransformed =	**+8.0%**	
% Change in Mass Rate =	**99.3 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	1.481E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

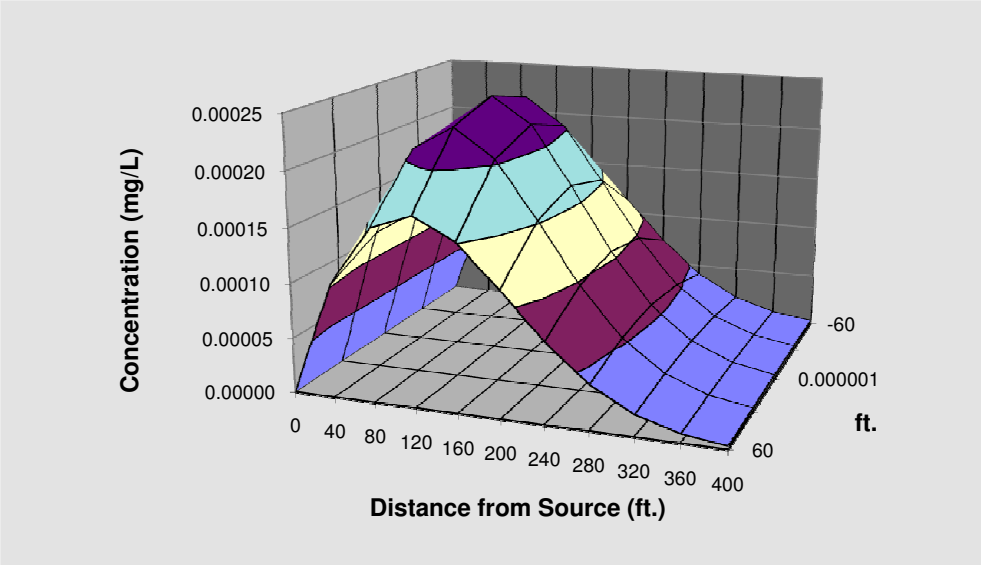
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	3.537E-11	1.030E-04	1.567E-04	1.704E-04	1.513E-04	1.137E-04	7.329E-05	4.070E-05	1.951E-05	8.084E-06	2.894E-06
30	3.537E-11	1.282E-04	2.084E-04	2.302E-04	2.042E-04	1.524E-04	9.721E-05	5.337E-05	2.529E-05	1.036E-05	3.666E-06
0	3.537E-11	1.289E-04	2.159E-04	2.446E-04	2.202E-04	1.654E-04	1.057E-04	5.802E-05	2.744E-05	1.121E-05	3.958E-06
-30	3.537E-11	1.282E-04	2.084E-04	2.302E-04	2.042E-04	1.524E-04	9.721E-05	5.337E-05	2.529E-05	1.036E-05	3.666E-06
-60	3.537E-11	1.030E-04	1.567E-04	1.704E-04	1.513E-04	1.137E-04	7.329E-05	4.070E-05	1.951E-05	8.084E-06	2.894E-06
MASS RATE (mg/day)	5.1E-8	1.7E-1	2.7E-1	3.0E-1	2.7E-1	2.0E-1	1.3E-1	7.1E-2	3.4E-2	1.4E-2	4.9E-3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: [ ] mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	8.098E-04	(Kg)
Mass Removed	-8.098E-04	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed = [ ]

% Change in Mass Rate = -9656413.0 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

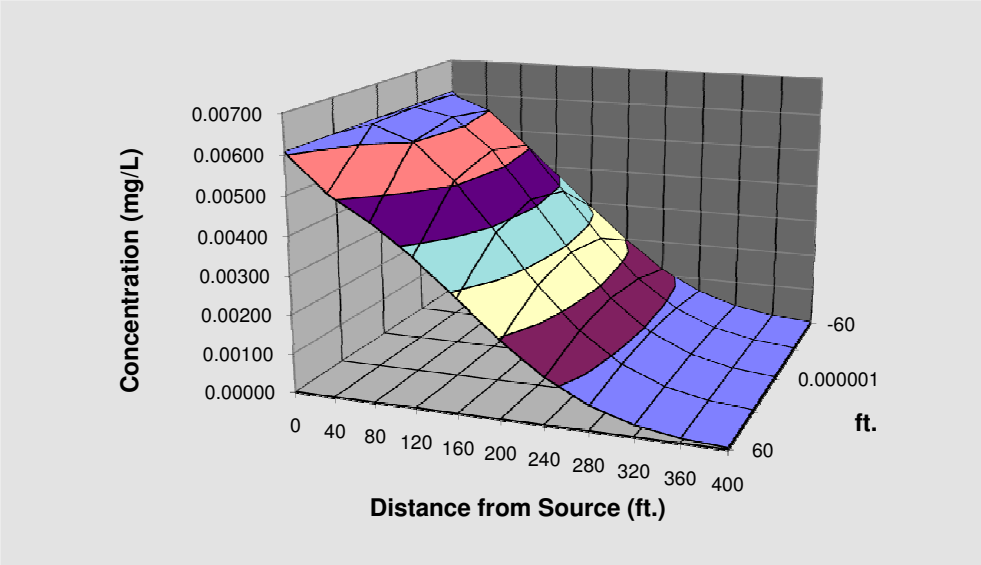
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
0	6.065E-03	6.422E-03	6.230E-03	5.417E-03	4.177E-03	2.841E-03	1.698E-03	8.884E-04	4.059E-04	1.616E-04	5.592E-05
-30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
-60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
MASS RATE (mg/day)	8.8E+0	8.5E+0	7.9E+0	6.7E+0	5.1E+0	3.5E+0	2.1E+0	1.1E+0	5.0E-1	2.0E-1	7.0E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.124E-02	(Kg)
Mass Removed	7.790E-04	(Kg)
% Biotransformed =	**+3.5%**	
% Change in Mass Rate =	**99.2 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.154E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

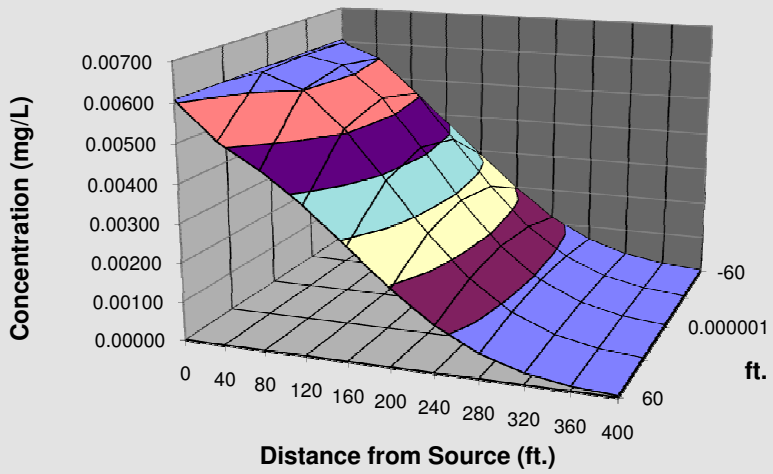
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
0	6.065E-03	6.422E-03	6.230E-03	5.417E-03	4.177E-03	2.841E-03	1.698E-03	8.884E-04	4.059E-04	1.616E-04	5.592E-05
-30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
-60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
MASS RATE (mg/day)	8.8E+0	8.5E+0	7.9E+0	6.7E+0	5.1E+0	3.5E+0	2.1E+0	1.1E+0	5.0E-1	2.0E-1	7.0E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: No Degradation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	2.025E-02	(Kg)
Mass Removed	1.768E-03	(Kg)
% Biotransformed =	**+8.0%**	
% Change in Mass Rate =	**99.2 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.154E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

BIOCHLOR Natural Attenuation Decision Support System

Version 2.2
Excel 2000

Alexnader County
MW-26 AOC
Run Name

Data Input Instructions:

115 → 1. Enter value directly....or
↑ *or* 2. Calculate by filling in gray
0.02 cells. Press Enter, then C
(To restore formulas, hit "Restore Formulas" button)
Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	82.8	(ft/yr)
or			
Hydraulic Conductivity	K	6.7E-05	(cm/sec)
Hydraulic Gradient	i	0.12	(ft/ft)
Effective Porosity	n	0.1	(-)

2. DISPERSION

Alpha x*	40	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-99	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.7	(kg/L)		
FractionOrganicCarbon, foc	1.0E-3	(-)		
Partition Coefficient	Koc			
PCE	426	(L/kg)	8.24	(-)
TCE	130	(L/kg)	3.21	(-)
DCE	125	(L/kg)	3.13	(-)
VC	30	(L/kg)	1.50	(-)
ETH	0	(L/kg)	1.00	(-)
Common R (used in model)* =			**3.13**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	1.195	0.58	0.79
TCE → DCE	0.900	0.77	0.74
DCE → VC	3.300	0.21	0.64
VC → ETH	2.567	0.27	0.45

Zone 2	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	5	(yr)
Modeled Area Width*	150	(ft)
Modeled Area Length*	400	(ft)
Zone 1 Length*	400	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

TYPE: Decaying Single Planar

Source Options

Source Thickness in Sat. Zone* 15 (ft)

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations

	Y1	k_s*
Width* (ft)	150	
Conc. (mg/L)*	C1	(1/yr)
PCE	0.00	0.1
TCE	0.01	0.1
DCE	0.00	0.1
VC	0.010	0.1
ETH	0	0.1

View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)	0.0	0.0004	0.0								
TCE Conc. (mg/L)	0.00120	0.0005	0.0								
DCE Conc. (mg/L)	0.0	0.0	0.0								
VC Conc. (mg/L)	0.00064	0.00048	0.0								
ETH Conc. (mg/L)	1.1E-03	4.2E-05	7.0E-05								
Distance from Source (ft)	0	210	255								
Date Data Collected	2010										

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

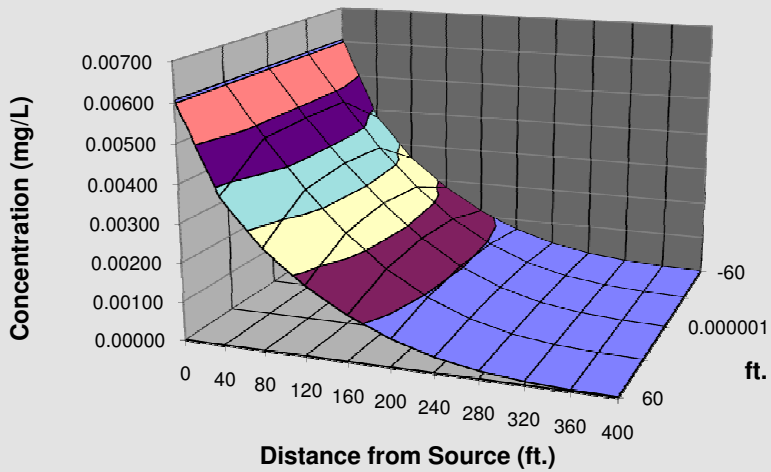
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	3.781E-03	2.596E-03	1.782E-03	1.167E-03	7.090E-04	3.922E-04	1.947E-04	8.581E-05	3.334E-05	1.136E-05
30	6.065E-03	4.703E-03	3.453E-03	2.407E-03	1.575E-03	9.501E-04	5.202E-04	2.553E-04	1.112E-04	4.271E-05	1.439E-05
0	6.065E-03	4.731E-03	3.577E-03	2.558E-03	1.698E-03	1.031E-03	5.658E-04	2.775E-04	1.207E-04	4.624E-05	1.553E-05
-30	6.065E-03	4.703E-03	3.453E-03	2.407E-03	1.575E-03	9.501E-04	5.202E-04	2.553E-04	1.112E-04	4.271E-05	1.439E-05
-60	6.065E-03	3.781E-03	2.596E-03	1.782E-03	1.167E-03	7.090E-04	3.922E-04	1.947E-04	8.581E-05	3.334E-05	1.136E-05
MASS RATE (mg/day)	8.8E+0	6.3E+0	4.5E+0	3.2E+0	2.1E+0	1.3E+0	6.9E-1	3.4E-1	1.5E-1	5.7E-2	1.9E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.263E-02	(Kg)
Mass Removed	9.390E-03	(Kg)
% Biotransformed =	+42.6%	
% Change in Mass Rate =	99.8 %	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	6.732E-02	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ◉ DCE ○ VC ○ ETH

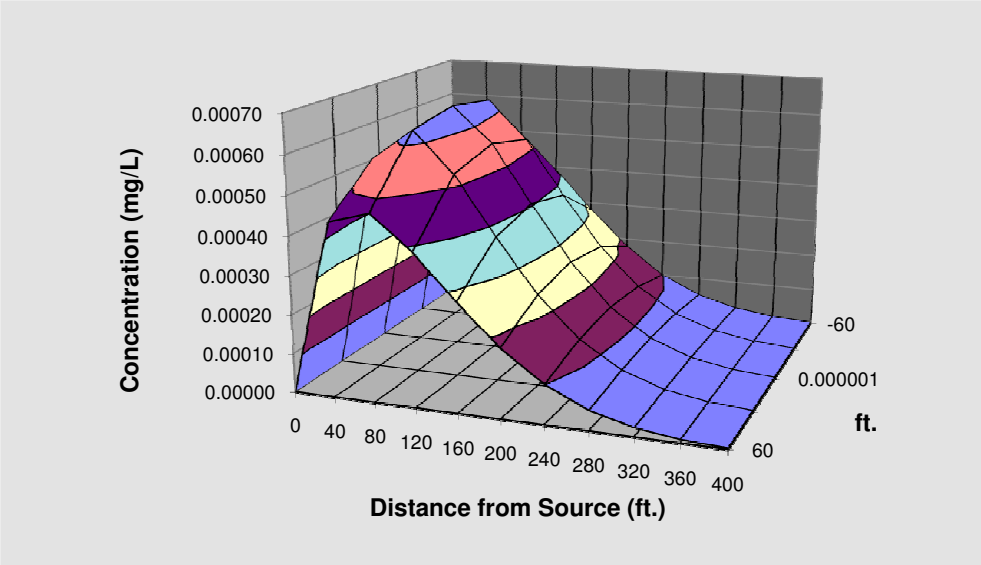
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	2.355E-10	4.441E-04	4.738E-04	3.895E-04	2.785E-04	1.774E-04	1.008E-04	5.082E-05	2.262E-05	8.848E-06	3.027E-06
30	2.355E-10	5.524E-04	6.303E-04	5.261E-04	3.759E-04	2.377E-04	1.337E-04	6.664E-05	2.932E-05	1.133E-05	3.835E-06
0	2.355E-10	5.557E-04	6.530E-04	5.591E-04	4.053E-04	2.580E-04	1.454E-04	7.244E-05	3.182E-05	1.227E-05	4.140E-06
-30	2.355E-10	5.524E-04	6.303E-04	5.261E-04	3.759E-04	2.377E-04	1.337E-04	6.664E-05	2.932E-05	1.133E-05	3.835E-06
-60	2.355E-10	4.441E-04	4.738E-04	3.895E-04	2.785E-04	1.774E-04	1.008E-04	5.082E-05	2.262E-05	8.848E-06	3.027E-06
MASS RATE (mg/day)	3.4E-7	7.4E-1	8.3E-1	6.9E-1	5.0E-1	3.1E-1	1.8E-1	8.9E-2	3.9E-2	1.5E-2	5.2E-3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.070 mg/L Displayed Model: Biotransformation Displayed Compound: DCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	1.867E-03	(Kg)
Mass Removed	-1.867E-03	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = -1517008.5 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

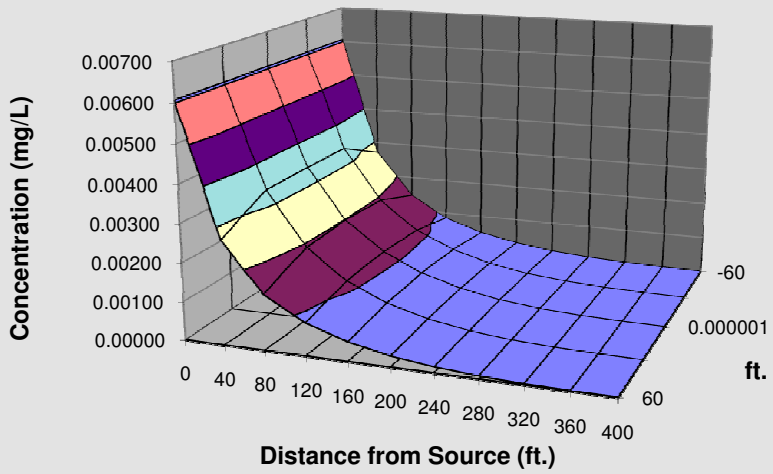
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	2.690E-03	1.442E-03	8.404E-04	4.971E-04	2.842E-04	1.515E-04	7.356E-05	3.197E-05	1.231E-05	4.167E-06
30	6.065E-03	3.346E-03	1.918E-03	1.135E-03	6.710E-04	3.808E-04	2.010E-04	9.646E-05	4.144E-05	1.577E-05	5.280E-06
0	6.065E-03	3.366E-03	1.987E-03	1.206E-03	7.234E-04	4.133E-04	2.186E-04	1.049E-04	4.496E-05	1.707E-05	5.699E-06
-30	6.065E-03	3.346E-03	1.918E-03	1.135E-03	6.710E-04	3.808E-04	2.010E-04	9.646E-05	4.144E-05	1.577E-05	5.280E-06
-60	6.065E-03	2.690E-03	1.442E-03	8.404E-04	4.971E-04	2.842E-04	1.515E-04	7.356E-05	3.197E-05	1.231E-05	4.167E-06
MASS RATE (mg/day)	8.8E+0	4.5E+0	2.5E+0	1.5E+0	8.8E-1	5.0E-1	2.7E-1	1.3E-1	5.5E-2	2.1E-2	7.1E-3

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: Biotransformation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	8.107E-03	(Kg)
Mass Removed	1.391E-02	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed = +63.2%

% Change in Mass Rate = 99.9 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	6.732E-02	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ○ VC ◉ ETH

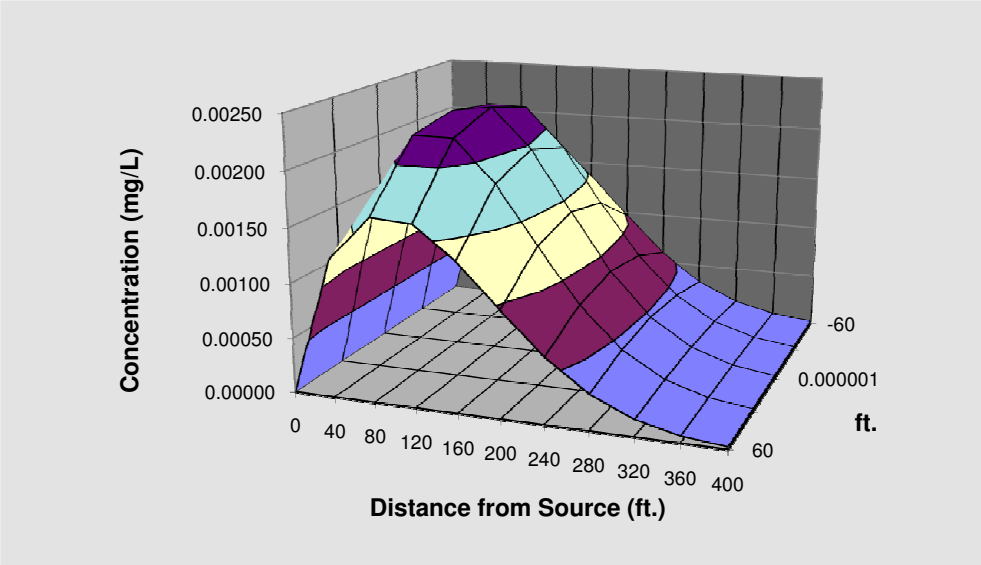
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	5.298E-10	1.258E-03	1.658E-03	1.632E-03	1.351E-03	9.653E-04	5.996E-04	3.240E-04	1.522E-04	6.207E-05	2.195E-05
30	5.298E-10	1.565E-03	2.206E-03	2.204E-03	1.823E-03	1.293E-03	7.954E-04	4.249E-04	1.973E-04	7.952E-05	2.781E-05
0	5.298E-10	1.575E-03	2.285E-03	2.343E-03	1.965E-03	1.404E-03	8.650E-04	4.619E-04	2.141E-04	8.607E-05	3.001E-05
-30	5.298E-10	1.565E-03	2.206E-03	2.204E-03	1.823E-03	1.293E-03	7.954E-04	4.249E-04	1.973E-04	7.952E-05	2.781E-05
-60	5.298E-10	1.258E-03	1.658E-03	1.632E-03	1.351E-03	9.653E-04	5.996E-04	3.240E-04	1.522E-04	6.207E-05	2.195E-05
MASS RATE (mg/day)	7.7E-7	2.1E+0	2.9E+0	2.9E+0	2.4E+0	1.7E+0	1.1E+0	5.7E-1	2.6E-1	1.1E-1	3.7E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: mg/L Displayed Model: Biotransformation Displayed Compound: ETH



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.000E+00	(Kg)
- Plume Mass If Biotransformation/Production	7.722E-03	(Kg)
Mass Removed	-7.722E-03	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed =

% Change in Mass Rate = -4889373.4 % (source to edge)

See acre-ft

Current Volume of Ground Water in Plume	0.000E+00	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	#DIV/0!	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

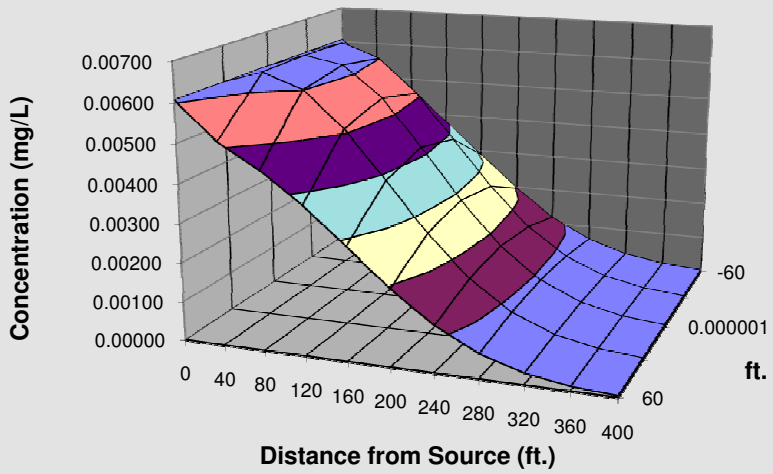
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
0	6.065E-03	6.422E-03	6.230E-03	5.417E-03	4.177E-03	2.841E-03	1.698E-03	8.884E-04	4.059E-04	1.616E-04	5.592E-05
-30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
-60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
MASS RATE (mg/day)	8.8E+0	8.5E+0	7.9E+0	6.7E+0	5.1E+0	3.5E+0	2.1E+0	1.1E+0	5.0E-1	2.0E-1	7.0E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.005 mg/L Displayed Model: No Degradation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	1.263E-02	(Kg)
Mass Removed	9.390E-03	(Kg)
% Biotransformed =	**+42.6%**	
% Change in Mass Rate =	**99.2 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

Current Volume of Ground Water in Plume	2.154E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

Start Here → ○ PCE ○ TCE ○ DCE ◉ VC ○ ETH

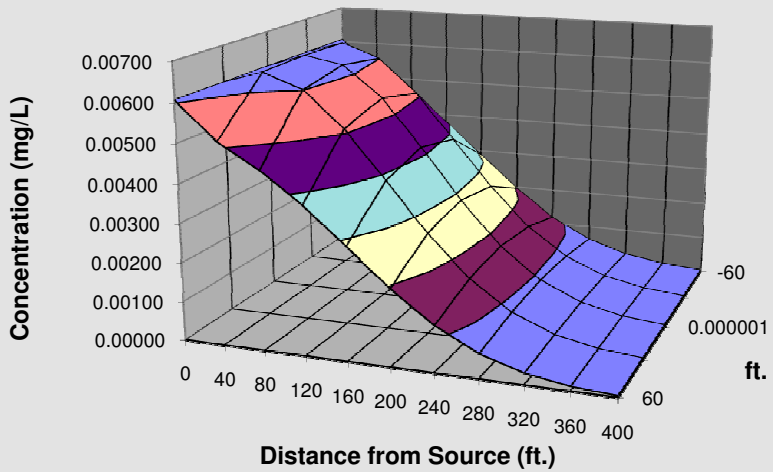
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓ / Distance from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
0	6.065E-03	6.422E-03	6.230E-03	5.417E-03	4.177E-03	2.841E-03	1.698E-03	8.884E-04	4.059E-04	1.616E-04	5.592E-05
-30	6.065E-03	6.384E-03	6.014E-03	5.098E-03	3.874E-03	2.618E-03	1.561E-03	8.173E-04	3.741E-04	1.493E-04	5.180E-05
-60	6.065E-03	5.132E-03	4.520E-03	3.774E-03	2.870E-03	1.954E-03	1.177E-03	6.232E-04	2.886E-04	1.165E-04	4.089E-05
MASS RATE (mg/day)	8.8E+0	8.5E+0	7.9E+0	6.7E+0	5.1E+0	3.5E+0	2.1E+0	1.1E+0	5.0E-1	2.0E-1	7.0E-2

Show No Degradation

Show Biotransformation

Time: 5 yr Target Level: 0.002 mg/L Displayed Model: No Degradation Displayed Compound: VC



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	2.202E-02	(Kg)
- Plume Mass If Biotransformation/Production	8.107E-03	(Kg)
Mass Removed	1.391E-02	(Kg)
% Biotransformed =	**+63.2%**	
% Change in Mass Rate =	**99.2 %**	(source to edge)

If "Can't Calc.", make model area longer

See acre-ft

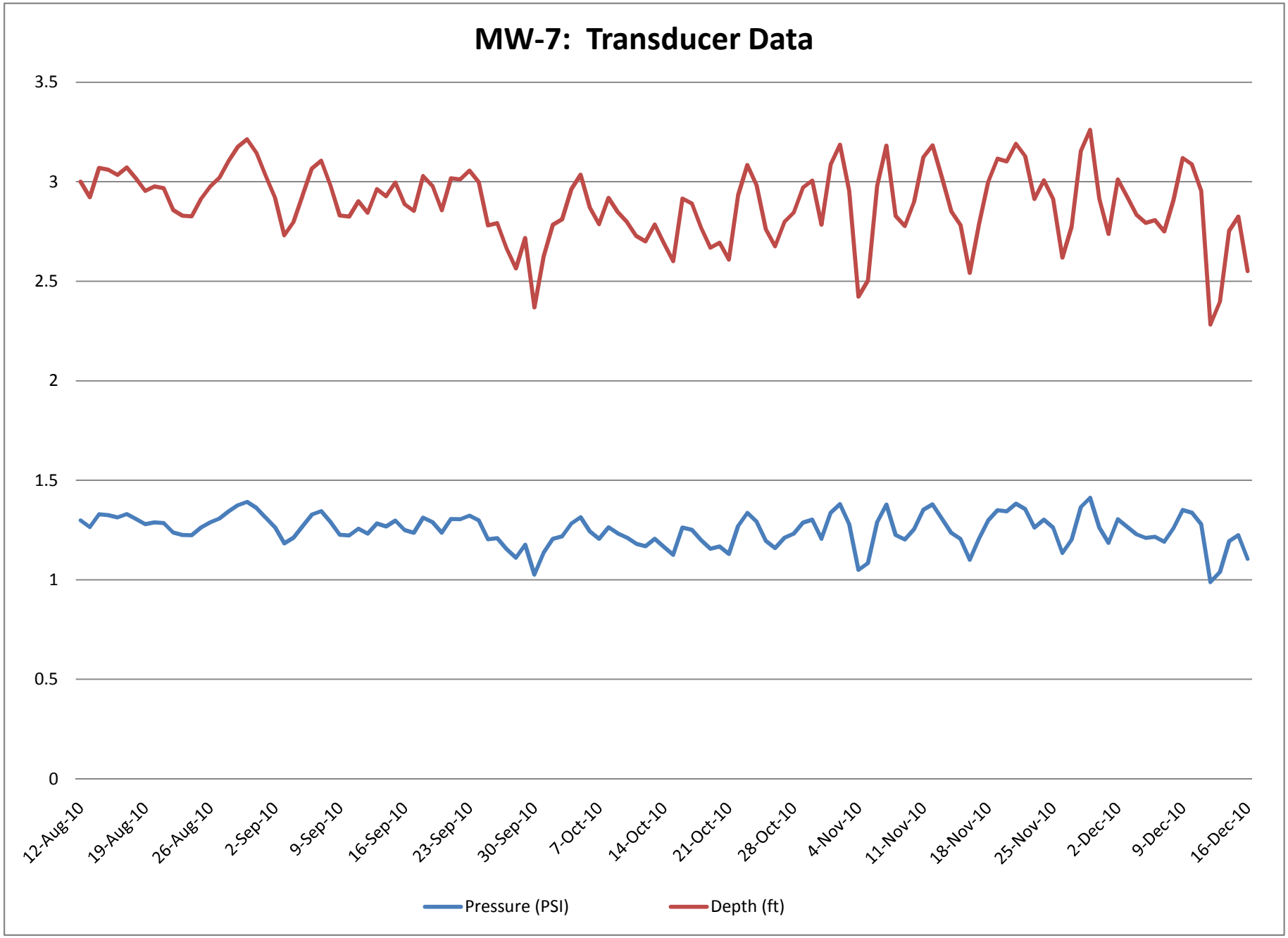
Current Volume of Ground Water in Plume	2.154E-01	MGal
Flow Rate of Water Through Source Area	3.818E-04	MGD

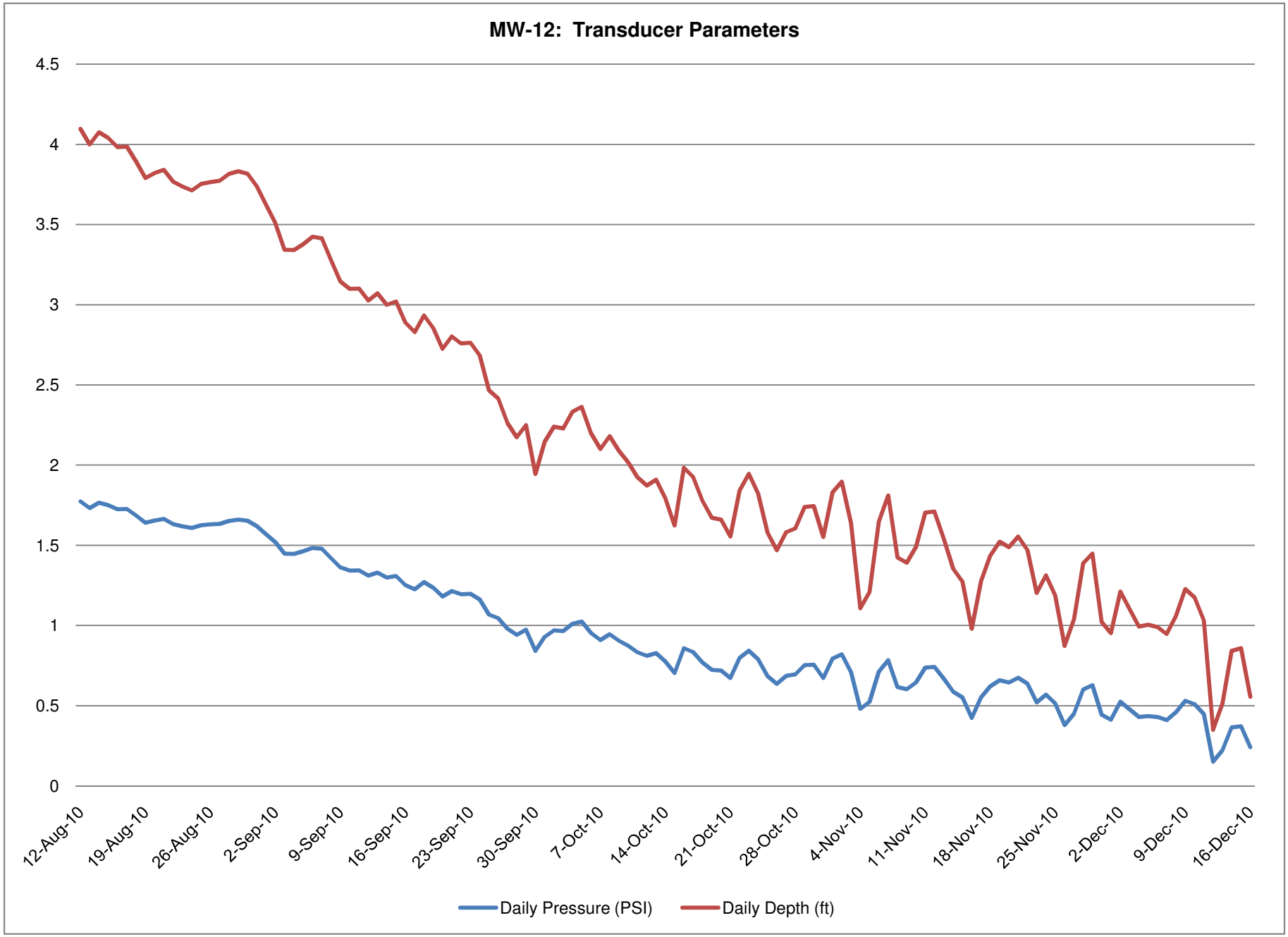
Compare to Pump and Treat

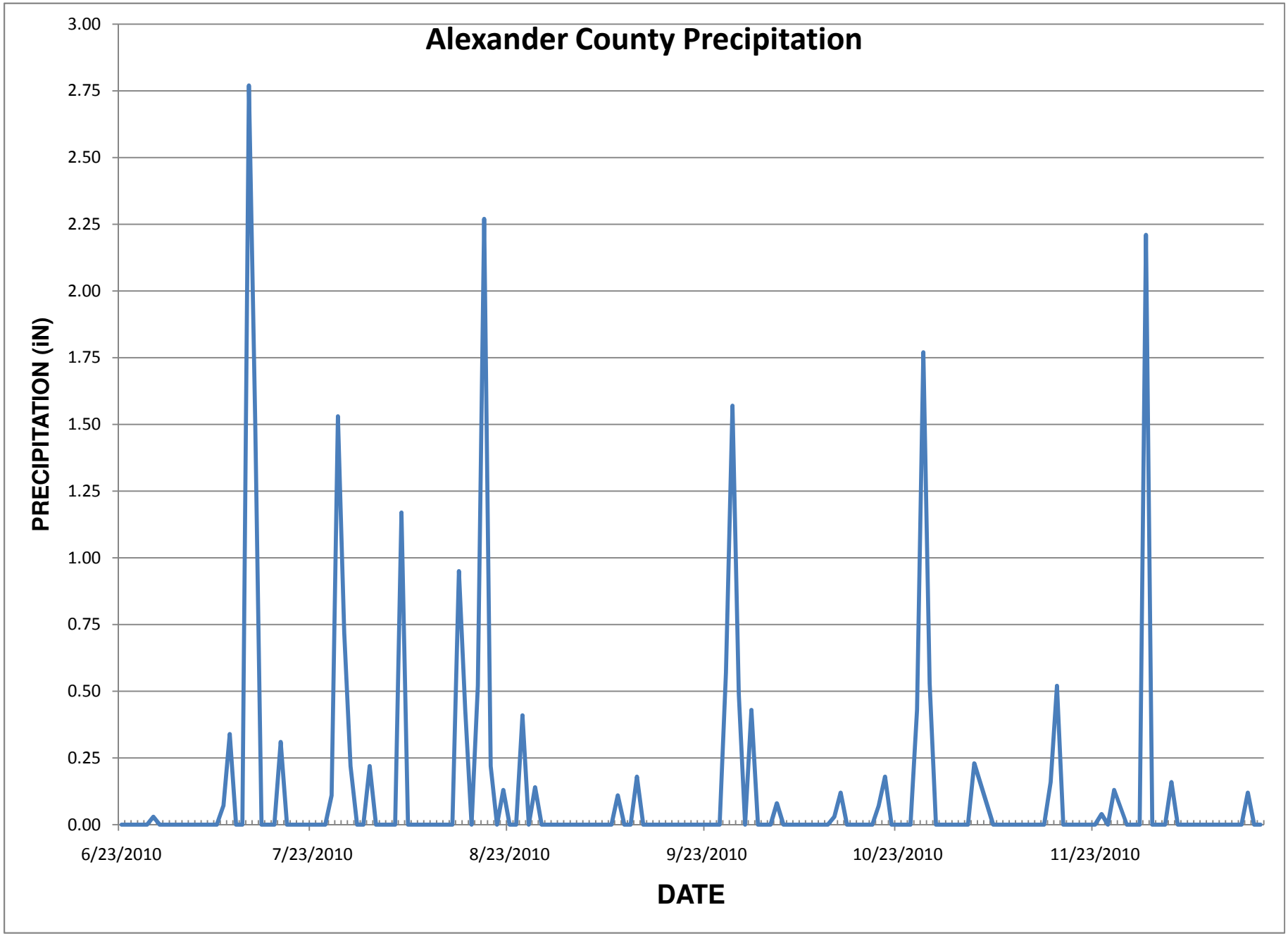
Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.00	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target Mass HELP To Centerline Return to Input

TRANSDUCER DATA


MW-7: Transducer Data
3.5
3
2.5
2
1.5
1
0.5
0
12-Aug-10
19-Aug-10
26-Aug-10
2-Sep-10
9-Sep-10
16-Sep-10
23-Sep-10
30-Sep-10
7-Oct-10
14-Oct-10
21-Oct-10
28-Oct-10
4-Nov-10
11-Nov-10
18-Nov-10
25-Nov-10
2-Dec-10
9-Dec-10
16-Dec-10
Pressure (PSI)
Depth (ft)


MW-12: Transducer Parameters
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
12-Aug-10
19-Aug-10
26-Aug-10
2-Sep-10
9-Sep-10
16-Sep-10
23-Sep-10
30-Sep-10
7-Oct-10
14-Oct-10
21-Oct-10
28-Oct-10
4-Nov-10
11-Nov-10
18-Nov-10
25-Nov-10
2-Dec-10
9-Dec-10
16-Dec-10
Daily Pressure (PSI)
Daily Depth (ft)


Alexander County Precipitation
PRECIPITATION (iN)
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
6/23/2010
7/23/2010
8/23/2010
9/23/2010
10/23/2010
11/23/2010
DATE

Raw Data from MW-7 Transducer
Precipitation Data from North Carolian State Climate Office (Station 318519)

Date and Time	Seconds	Pressure (PSI)	Temperature (F)	Depth (ft)	Precipitation
8/12/2010 14:00	1123200	1.299	60.901	3	0.00
8/13/2010 14:00	1209600	1.265	60.892	2.922	0.00
8/14/2010 14:00	1296000	1.329	60.896	3.069	0.00
8/15/2010 14:00	1382400	1.325	60.899	3.06	0.95
8/16/2010 14:00	1468800	1.314	60.897	3.034	0.43
8/17/2010 14:00	1555200	1.33	60.898	3.072	0.00
8/18/2010 14:00	1641600	1.306	60.895	3.016	0.52
8/19/2010 14:00	1728000	1.279	60.896	2.954	2.27
8/20/2010 14:00	1814400	1.289	60.892	2.976	0.22
8/21/2010 14:00	1900800	1.285	60.89	2.968	0.00
8/22/2010 14:00	1987200	1.238	60.89	2.858	0.13
8/23/2010 14:00	2073600	1.225	60.883	2.829	0.00
8/24/2010 14:00	2160000	1.224	60.881	2.826	0.00
8/25/2010 14:00	2246400	1.262	60.878	2.913	0.41
8/26/2010 14:00	2332800	1.288	60.878	2.975	0.00
8/27/2010 14:00	2419200	1.308	60.88	3.02	0.14
8/28/2010 14:00	2505600	1.344	60.875	3.104	0.00
8/29/2010 14:00	2592000	1.375	60.868	3.176	0.00
8/30/2010 14:00	2678400	1.392	60.873	3.213	0.00
8/31/2010 14:00	2764800	1.361	60.868	3.144	0.00
9/1/2010 14:00	2851200	1.312	60.871	3.029	0.00
9/2/2010 14:00	2937600	1.264	60.867	2.919	0.00
9/3/2010 14:00	3024000	1.183	60.861	2.731	0.00
9/4/2010 14:00	3110400	1.212	60.863	2.798	0.00
9/5/2010 14:00	3196800	1.27	60.854	2.932	0.00
9/6/2010 14:00	3283200	1.328	60.856	3.067	0.00
9/7/2010 14:00	3369600	1.345	60.852	3.106	0.00
9/8/2010 14:00	3456000	1.291	60.849	2.981	0.00
9/9/2010 14:00	3542400	1.226	60.849	2.83	0.11
9/10/2010 14:00	3628800	1.223	60.843	2.825	0.00
9/11/2010 14:00	3715200	1.257	60.848	2.902	0.00
9/12/2010 14:00	3801600	1.232	60.841	2.844	0.18
9/13/2010 14:00	3888000	1.283	60.844	2.963	0.00
9/14/2010 14:00	3974400	1.268	60.848	2.927	0.00
9/15/2010 14:00	4060800	1.298	60.843	2.996	0.00
9/16/2010 14:00	4147200	1.25	60.843	2.887	0.00
9/17/2010 14:00	4233600	1.236	60.831	2.853	0.00
9/18/2010 14:00	4320000	1.312	60.835	3.029	0.00
9/19/2010 14:00	4406400	1.29	60.831	2.979	0.00
9/20/2010 14:00	4492800	1.237	60.827	2.857	0.00
9/21/2010 14:00	4579200	1.306	60.826	3.017	0.00
9/22/2010 14:00	4665600	1.304	60.831	3.012	0.00
9/23/2010 14:00	4752000	1.323	60.829	3.056	0.00
9/24/2010 14:00	4838400	1.299	60.83	2.998	0.00
9/25/2010 14:00	4924800	1.204	60.822	2.781	0.00
9/26/2010 14:00	5011200	1.209	60.821	2.792	0.57
9/27/2010 14:00	5097600	1.155	60.823	2.666	1.57
9/28/2010 14:00	5184000	1.111	60.818	2.565	0.49
9/29/2010 14:00	5270400	1.177	60.815	2.717	0.00
9/30/2010 14:00	5356800	1.026	60.81	2.369	0.43
10/1/2010 14:00	5443200	1.136	60.815	2.624	0.00
10/2/2010 14:00	5529600	1.206	60.815	2.784	0.00
10/3/2010 14:00	5616000	1.218	60.814	2.811	0.08
10/4/2010 14:00	5702400	1.283	60.811	2.963	0.00
10/5/2010 14:00	5788800	1.315	60.81	3.035	0.00
10/6/2010 14:00	5875200	1.243	60.806	2.87	0.00

10/7/2010 14:00	5961600	1.206	60.807	2.786	0.00
10/8/2010 14:00	6048000	1.264	60.809	2.919	0.00
10/9/2010 14:00	6134400	1.233	60.802	2.848	0.00
10/10/2010 14:00	6220800	1.212	60.801	2.798	0.00
10/11/2010 14:00	6307200	1.181	60.807	2.728	0.00
10/12/2010 14:00	6393600	1.169	60.808	2.7	0.03
10/13/2010 14:00	6480000	1.206	60.801	2.785	0.12
10/14/2010 14:00	6566400	1.165	60.8	2.69	0.00
10/15/2010 14:00	6652800	1.126	60.799	2.601	0.00
10/16/2010 14:00	6739200	1.262	60.801	2.915	0.07
10/17/2010 14:00	6825600	1.251	60.796	2.89	0.18
10/18/2010 14:00	6912000	1.199	60.804	2.768	0.00
10/19/2010 14:00	6998400	1.156	60.798	2.669	0.00
10/20/2010 14:00	7084800	1.167	60.799	2.694	0.00
10/21/2010 14:00	7171200	1.13	60.796	2.609	0.00
10/22/2010 14:00	7257600	1.27	60.801	2.932	0.43
10/23/2010 14:00	7344000	1.336	60.795	3.084	1.77
10/24/2010 14:00	7430400	1.292	60.799	2.982	0.53
10/25/2010 14:00	7516800	1.196	60.796	2.761	0.00
10/26/2010 14:00	7603200	1.159	60.79	2.675	0.00
10/27/2010 14:00	7689600	1.212	60.797	2.799	0.00
10/28/2010 14:00	7776000	1.232	60.792	2.845	0.00
10/29/2010 14:00	7862400	1.287	60.8	2.971	0.23
10/30/2010 14:00	7948800	1.302	60.797	3.006	0.00
10/31/2010 14:00	8035200	1.206	60.791	2.784	0.00
11/1/2010 14:00	8121600	1.337	60.793	3.088	0.00
11/2/2010 14:00	8208000	1.38	60.795	3.186	0.00
11/3/2010 14:00	8294400	1.279	60.79	2.954	0.00
11/4/2010 14:00	8380800	1.05	60.795	2.423	0.00
11/5/2010 14:00	8467200	1.084	60.796	2.503	0.00
11/6/2010 14:00	8553600	1.29	60.798	2.979	0.00
11/7/2010 13:00	8640000	1.378	60.793	3.181	0.00
11/8/2010 13:00	8726400	1.225	60.792	2.828	0.16
11/9/2010 13:00	8812800	1.203	60.79	2.777	0.52
11/10/2010 13:00	8899200	1.255	60.791	2.899	0.00
11/11/2010 13:00	8985600	1.352	60.793	3.123	0.00
11/12/2010 13:00	9072000	1.379	60.79	3.183	0.00
11/13/2010 13:00	9158400	1.309	60.797	3.023	0.00
11/14/2010 13:00	9244800	1.235	60.8	2.852	0.00
11/15/2010 13:00	9331200	1.205	60.796	2.783	0.00
11/16/2010 13:00	9417600	1.101	60.798	2.542	0.04
11/17/2010 13:00	9504000	1.207	60.795	2.786	0.00
11/18/2010 13:00	9590400	1.299	60.796	3	0.13
11/19/2010 13:00	9676800	1.35	60.804	3.116	0.00
11/20/2010 13:00	9763200	1.344	60.793	3.102	0.00
11/21/2010 13:00	9849600	1.382	60.8	3.19	0.00
11/22/2010 13:00	9936000	1.355	60.8	3.128	2.21
11/23/2010 13:00	10022400	1.262	60.807	2.913	0.00
11/24/2010 13:00	10108800	1.302	60.802	3.007	0.00
11/25/2010 13:00	10195200	1.262	60.806	2.913	0.00
11/26/2010 13:00	10281600	1.134	60.803	2.619	0.16
11/27/2010 13:00	10368000	1.201	60.807	2.774	0.00
11/28/2010 13:00	10454400	1.366	60.808	3.154	0.00
11/29/2010 13:00	10540800	1.412	60.808	3.261	0.00
11/30/2010 13:00	10627200	1.262	60.807	2.914	0.00
12/1/2010 13:00	10713600	1.186	60.806	2.738	0.00
12/2/2010 13:00	10800000	1.304	60.807	3.012	0.00
12/3/2010 13:00	10886400	1.266	60.814	2.923	0.00
12/4/2010 13:00	10972800	1.228	60.813	2.834	0.00
12/5/2010 13:00	11059200	1.21	60.812	2.793	0.00
12/6/2010 13:00	11145600	1.216	60.814	2.807	0.00

12/7/2010 13:00	11232000	1.191	60.819	2.75	0.12
12/8/2010 13:00	11318400	1.259	60.817	2.907	0.00
12/9/2010 13:00	11404800	1.351	60.825	3.119	0.00
12/10/2010 13:00	11491200	1.337	60.824	3.088	0.00
12/11/2010 13:00	11577600	1.28	60.822	2.956	0.00
12/12/2010 13:00	11664000	0.988	60.825	2.282	0.00
12/13/2010 13:00	11750400	1.038	60.826	2.397	0.00
12/14/2010 13:00	11836800	1.193	60.825	2.754	0.00
12/15/2010 13:00	11923200	1.224	60.827	2.825	0.00
12/16/2010 13:00	12009600	1.105	60.834	2.551	0.00

Raw Data from MW-12 Transducer
Precipitation Data from North Carolian State Climate Office (Station 318519)

Date and Time	Seconds	Pressure (PSI)	Temperature (F)	Depth (ft)	Precipitation
8/12/2010 14:00	1123200	1.774	59.35	4.096	0.00
8/13/2010 14:00	1209600	1.732	59.357	3.999	0.00
8/14/2010 14:00	1296000	1.765	59.36	4.076	0.00
8/15/2010 14:00	1382400	1.75	59.363	4.04	0.95
8/16/2010 14:00	1468800	1.725	59.362	3.982	0.43
8/17/2010 14:00	1555200	1.726	59.368	3.986	0.00
8/18/2010 14:00	1641600	1.686	59.366	3.893	0.52
8/19/2010 14:00	1728000	1.641	59.365	3.79	2.27
8/20/2010 14:00	1814400	1.655	59.368	3.821	0.22
8/21/2010 14:00	1900800	1.664	59.365	3.841	0.00
8/22/2010 14:00	1987200	1.632	59.368	3.767	0.13
8/23/2010 14:00	2073600	1.618	59.368	3.736	0.00
8/24/2010 14:00	2160000	1.608	59.366	3.713	0.00
8/25/2010 14:00	2246400	1.625	59.366	3.753	0.41
8/26/2010 14:00	2332800	1.631	59.367	3.765	0.00
8/27/2010 14:00	2419200	1.634	59.364	3.773	0.14
8/28/2010 14:00	2505600	1.652	59.366	3.815	0.00
8/29/2010 14:00	2592000	1.66	59.366	3.832	0.00
8/30/2010 14:00	2678400	1.653	59.366	3.816	0.00
8/31/2010 14:00	2764800	1.619	59.367	3.738	0.00
9/1/2010 14:00	2851200	1.569	59.366	3.623	0.00
9/2/2010 14:00	2937600	1.52	59.363	3.51	0.00
9/3/2010 14:00	3024000	1.448	59.365	3.343	0.00
9/4/2010 14:00	3110400	1.447	59.363	3.341	0.00
9/5/2010 14:00	3196800	1.463	59.365	3.378	0.00
9/6/2010 14:00	3283200	1.483	59.366	3.424	0.00
9/7/2010 14:00	3369600	1.479	59.36	3.414	0.00
9/8/2010 14:00	3456000	1.419	59.363	3.277	0.00
9/9/2010 14:00	3542400	1.362	59.358	3.146	0.11
9/10/2010 14:00	3628800	1.342	59.36	3.099	0.00
9/11/2010 14:00	3715200	1.343	59.363	3.1	0.00
9/12/2010 14:00	3801600	1.311	59.363	3.026	0.18
9/13/2010 14:00	3888000	1.33	59.357	3.071	0.00
9/14/2010 14:00	3974400	1.299	59.357	3	0.00
9/15/2010 14:00	4060800	1.309	59.355	3.021	0.00
9/16/2010 14:00	4147200	1.252	59.36	2.89	0.00
9/17/2010 14:00	4233600	1.225	59.358	2.829	0.00
9/18/2010 14:00	4320000	1.27	59.357	2.933	0.00
9/19/2010 14:00	4406400	1.236	59.36	2.854	0.00
9/20/2010 14:00	4492800	1.18	59.352	2.725	0.00
9/21/2010 14:00	4579200	1.214	59.356	2.802	0.00
9/22/2010 14:00	4665600	1.195	59.353	2.759	0.00
9/23/2010 14:00	4752000	1.197	59.352	2.763	0.00
9/24/2010 14:00	4838400	1.162	59.355	2.684	0.00
9/25/2010 14:00	4924800	1.068	59.351	2.466	0.00
9/26/2010 14:00	5011200	1.046	59.349	2.416	0.57
9/27/2010 14:00	5097600	0.98	59.347	2.262	1.57
9/28/2010 14:00	5184000	0.941	59.349	2.174	0.49
9/29/2010 14:00	5270400	0.974	59.348	2.25	0.00
9/30/2010 14:00	5356800	0.842	59.346	1.945	0.43
10/1/2010 14:00	5443200	0.929	59.346	2.145	0.00
10/2/2010 14:00	5529600	0.97	59.35	2.24	0.00
10/3/2010 14:00	5616000	0.965	59.344	2.228	0.08
10/4/2010 14:00	5702400	1.01	59.342	2.332	0.00
10/5/2010 14:00	5788800	1.024	59.343	2.364	0.00
10/6/2010 14:00	5875200	0.952	59.339	2.198	0.00

10/7/2010 14:00	5961600	0.909	59.341	2.1	0.00
10/8/2010 14:00	6048000	0.945	59.34	2.181	0.00
10/9/2010 14:00	6134400	0.905	59.337	2.089	0.00
10/10/2010 14:00	6220800	0.874	59.337	2.018	0.00
10/11/2010 14:00	6307200	0.833	59.335	1.924	0.00
10/12/2010 14:00	6393600	0.811	59.335	1.872	0.03
10/13/2010 14:00	6480000	0.827	59.334	1.909	0.12
10/14/2010 14:00	6566400	0.776	59.335	1.792	0.00
10/15/2010 14:00	6652800	0.703	60.12	1.624	0.00
10/16/2010 14:00	6739200	0.859	59.339	1.983	0.07
10/17/2010 14:00	6825600	0.834	59.332	1.926	0.18
10/18/2010 14:00	6912000	0.77	59.326	1.779	0.00
10/19/2010 14:00	6998400	0.724	59.327	1.671	0.00
10/20/2010 14:00	7084800	0.719	59.33	1.66	0.00
10/21/2010 14:00	7171200	0.673	59.328	1.554	0.00
10/22/2010 14:00	7257600	0.798	59.33	1.842	0.43
10/23/2010 14:00	7344000	0.843	59.326	1.946	1.77
10/24/2010 14:00	7430400	0.79	59.328	1.823	0.53
10/25/2010 14:00	7516800	0.684	59.326	1.579	0.00
10/26/2010 14:00	7603200	0.636	59.327	1.469	0.00
10/27/2010 14:00	7689600	0.685	59.326	1.581	0.00
10/28/2010 14:00	7776000	0.695	59.325	1.605	0.00
10/29/2010 14:00	7862400	0.753	59.323	1.739	0.23
10/30/2010 14:00	7948800	0.756	59.321	1.745	0.00
10/31/2010 14:00	8035200	0.672	59.32	1.552	0.00
11/1/2010 14:00	8121600	0.793	59.324	1.83	0.00
11/2/2010 14:00	8208000	0.821	59.325	1.896	0.00
11/3/2010 14:00	8294400	0.709	59.32	1.638	0.00
11/4/2010 14:00	8380800	0.48	59.32	1.108	0.00
11/5/2010 14:00	8467200	0.523	59.318	1.208	0.00
11/6/2010 14:00	8553600	0.712	59.322	1.645	0.00
11/7/2010 13:00	8640000	0.784	59.316	1.811	0.00
11/8/2010 13:00	8726400	0.617	59.312	1.424	0.16
11/9/2010 13:00	8812800	0.603	59.317	1.392	0.52
11/10/2010 13:00	8899200	0.645	59.313	1.49	0.00
11/11/2010 13:00	8985600	0.738	59.316	1.704	0.00
11/12/2010 13:00	9072000	0.741	59.319	1.711	0.00
11/13/2010 13:00	9158400	0.667	59.31	1.539	0.00
11/14/2010 13:00	9244800	0.587	59.313	1.354	0.00
11/15/2010 13:00	9331200	0.551	59.311	1.273	0.00
11/16/2010 13:00	9417600	0.424	59.311	0.979	0.04
11/17/2010 13:00	9504000	0.552	59.31	1.274	0.00
11/18/2010 13:00	9590400	0.621	59.308	1.434	0.13
11/19/2010 13:00	9676800	0.659	59.312	1.522	0.00
11/20/2010 13:00	9763200	0.645	59.308	1.489	0.00
11/21/2010 13:00	9849600	0.674	59.311	1.555	0.00
11/22/2010 13:00	9936000	0.637	59.305	1.47	2.21
11/23/2010 13:00	10022400	0.521	59.31	1.203	0.00
11/24/2010 13:00	10108800	0.569	59.31	1.313	0.00
11/25/2010 13:00	10195200	0.514	59.303	1.188	0.00
11/26/2010 13:00	10281600	0.378	59.306	0.872	0.16
11/27/2010 13:00	10368000	0.449	59.308	1.036	0.00
11/28/2010 13:00	10454400	0.601	59.303	1.387	0.00
11/29/2010 13:00	10540800	0.627	59.307	1.448	0.00
11/30/2010 13:00	10627200	0.443	59.307	1.022	0.00
12/1/2010 13:00	10713600	0.412	59.306	0.952	0.00
12/2/2010 13:00	10800000	0.525	59.303	1.212	0.00
12/3/2010 13:00	10886400	0.477	59.306	1.102	0.00
12/4/2010 13:00	10972800	0.43	59.3	0.993	0.00
12/5/2010 13:00	11059200	0.435	59.305	1.004	0.00
12/6/2010 13:00	11145600	0.429	59.303	0.991	0.00

12/7/2010 13:00	11232000	0.41	59.303	0.947	0.12
12/8/2010 13:00	11318400	0.46	59.306	1.061	0.00
12/9/2010 13:00	11404800	0.531	59.302	1.227	0.00
12/10/2010 13:00	11491200	0.509	59.299	1.175	0.00
12/11/2010 13:00	11577600	0.447	59.304	1.031	0.00
12/12/2010 13:00	11664000	0.151	59.303	0.349	0.00
12/13/2010 13:00	11750400	0.221	59.302	0.51	0.00
12/14/2010 13:00	11836800	0.364	59.301	0.841	0.00
12/15/2010 13:00	11923200	0.372	59.301	0.859	0.00
12/16/2010 13:00	12009600	0.241	59.303	0.556	0.00