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SOLID WASTE DEPARTMENT
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BUTNER LANDFILL
PERMIT NO. 39-02

CORRECTIVE ACTION EVALUATION REPORT

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Butner Landfill, Permit No. 39-02

EXECUTIVE SUMMARY

On behalf of Granville County, Joyce Engineering (JOYCE) prepared this Corrective Action Evaluation Report (CAER) for the Butner Landfill. This CAER has been prepared in accordance with 15A NCAC 13B.1636 of the North Carolina Solid Waste Management Rules (NCSWMR) and in response to the Groundwater Protection Standard (GPS) exceedances of benzene in groundwater monitoring well MW-2R at the facility.

In May 2013, Granville County submitted an *Assessment of Corrective Measures* (ACM) for the Butner Landfill. The County selected Monitored Natural Attenuation (MNA) plus Phytoremediation as the groundwater remedy and an application for a Corrective Action Permit Amendment was submitted to North Carolina Department of Environment and Natural Resources (NCDENR) [now the Department of Environmental Quality (NCDEQ)] Solid Waste Section (SWS). The SWS approved the amendment and the selected remedy in a letter dated October 30, 2013. A Corrective Action Plan (CAP) was submitted in May 2014 and approved by the SWS on June 18, 2014.

Historically and during this CAER period, benzene in MW-2R has been the only constituent consistently in exceedance of GPS as defined in 15A NCAC 13B.1634.g, and is the only constituent of concern for this facility. The benzene concentrations in MW-2R have fluctuated between 1.2 and 1.9, but show no discernable trend. The benzene plume is well constrained within the facility property and is stable, with no indication of significant migration toward the property boundary.

Four baseline MNA sampling events have been completed, including events in May 2013, August 2014, March 2015, and August 2015 and the data has been evaluated. The data indicate that MNA is an effective on-going process that is remediating the benzene plume at the facility. Based on review of the MNA data, JOYCE recommends and requests that the following parameters be removed from the MNA analytical requirements for this facility: dissolved hydrogen, sulfide, volatile fatty acids, dissolved CO_2, ethene, and ethane.

A tree survey to evaluate phytoremediation at the facility was conducted in April 2015, and it determined that the existing flora was healthy and sufficient to sustain phytoremediation.

This CAER concludes that the current remedy is sufficient for remediating the groundwater at the Butner landfill facility and recommends no changes to the CAP or the active remedy.

CORRECTIVE ACTION EVALUATION REPORT
Butner Landfill, Permit No. 39-02

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1.0 INTRODUCTION 1
1.1 Site Background 1
1.2 Aquifer Characteristics 2
1.2.1 Groundwater Flow 2
1.2.2 Vertical Gradients 3
1.3 Contaminant Distribution 3
1.4 Site Conceptual Model 4
1.4.1 Site Geology 4
1.4.2 Site Hydrogeology 5
1.5 Regulatory Status 6
2.0 CORRECTIVE ACTION SUMMARY 7
2.1 Physical and Chemical Changes in Aquifer Conditions 7
2.2 Physical and Chemical Changes in Plume Characteristics 7
2.3 Refining the Site Conceptual Model 8
2.4 Evaluation of the Impact of Corrective Actions 9
2.4.1 Contaminant Levels 9
2.4.2 Evaluation of MNA Parameters 9
2.4.3 Recommendations for MNA Parameters 13
2.4.4 Evaluation of Phytoremediation 14
2.4.5 Impacts on Hydraulic Gradients 15
2.4.6 Contaminant Removal Efficiencies and Mass of Contaminants Removed 16
2.7 Status of Impacts at the Compliance Boundary 17
2.8 Off-Site Migration Concerns 17
3.0 CONCLUSIONS 18
3.1 Modifications Needed to Selected Remedy 18
3.2 Assessment of MNA Indicator Parameters 18
3.3 Contingency Plan 19
4.4 Land Use Restrictions 19
5.0 REFERENCES 20
6.0 ACRONYMS 22

CORRECTIVE ACTION EVALUATION REPORT
Butner Landfill, Permit No. 39-02

TABLE OF CONTENTS

TABLES

Table 1	Monitoring Well Construction Data
Table 2	Historical Groundwater Elevations
Table 3	Estimated Hydraulic Gradients and Groundwater Flow Velocities
Table 4	Exceedances of Groundwater Standards (2013-2015)
Table 5	Recent and Historical MNA Parameters

CHART

Chart 1	Benzene Concentrations vs. Time

FIGURES

Figure 1	Site Location Map
Figure 2	Geologic Map

DRAWINGS

Drawing 1	Groundwater Potentiometric Surface Map (August 2015)
Drawing 2	Benzene Isoconcentration Map (August 2015)
Drawing 3	Cross-sections A-A' and B-B' (August 2015)
Drawing 4	Tree Survey Results (April 2015)

APPENDICES

Appendix A	Historical Detected Groundwater Constituents
Appendix B	Historical Detected Surface Water Constituents
Appendix C	Annual Tree Survey Log (April 2015)
Appendix D	BIOSCREEN Modeling Input & Output

1.0 INTRODUCTION

On behalf of Granville County, Joyce Engineering (JOYCE) prepared this *Corrective Action Evaluation Report* (CAER) for the Butner Landfill (facility). This CAER has been prepared in accordance with 15A NCAC 13B.1636 of the North Carolina Solid Waste Management Rules (NCSWMR) and in response to the Groundwater Protection Standard (GPS) exceedances of benzene in groundwater monitoring well MW-2R at the facility.

1.1 Site Background

The Butner Landfill is a closed municipal solid waste (MSW) landfill, located off State Route 1004 near the town of Butner, in Granville County, North Carolina (Figure 1). The Butner facility started receiving waste prior to May 1973. Permit Number 39-02 was issued from the State of North Carolina on March 3, 1982. The facility stopped receiving waste in August 1998. A small recycling center and transfer station are operated by the County of Granville at the entrance of the closed landfill.

The facility's monitoring well network was upgraded in 1994 when the site's existing up-gradient and down-gradient wells were replaced and three more down-gradient wells were added. The current compliance network consists of the following six monitoring wells: MW-1R (facility background well), MW-2R, MW-3R, MW-4, MW-5, and MW-6. An additional well, NES-1, was installed as part of a Nature and Extent Study on November 14, 2007. Monitoring well construction details are summarized in Table 1, and the well locations are shown on Drawing 1.

In accordance with the NCSWMR, the Butner Landfill entered an Assessment Monitoring Program in December of 1997 as a result of detections of volatile organic compounds and pesticides above NC-2L Groundwater Standards. An *Assessment of Corrective Measures* (ACM) was initiated in 2003 and then suspended by North Carolina Department of Environment and Natural Resources (NCDENR) [now known as the Department of Environmental Quality – NCDEQ], Solid Waste Section (SWS) because there had been no more NC-2L exceedances. The *Nature and Extent Study* (NES) and ACM recommenced in 2007, when apparent volatile organic compound (VOC) exceedances of the NC-2L Standards began to appear; however, they were again suspended when it was determined that the apparent exceedances were not statistically significant increases (SSIs) above background.

Due to detections of benzene above its GPS during the December 2012 semiannual sampling event and subsequent verification sampling events, Granville County completed and submitted an ACM in May 2013. A public meeting to present the results of the ACM was conducted in Oxford, North Carolina on September 3rd, 2013, and the County selected *Monitored Natural Attenuation* (MNA) plus Phytoremediation as the groundwater remedy for the Butner Landfill. An application for a Corrective Action Permit Amendment was submitted to SWS, and the Section approved the amendment and the selected remedy in a letter dated October 30, 2013. A Corrective

Action Plan (CAP) was submitted to the SWS in May 2014 and was approved by the SWS in a letter dated June 18, 2014.

1.2 Aquifer Characteristics

The water table under the area of investigation was encountered in the unconfined aquifer that is mostly in the transition zone that consists of saprolite and highly fractured bedrock. The saturated portion of the uppermost aquifer beneath the study area is vertically continuous to bedrock. Groundwater in the saprolite feeds the fractures in the bedrock and is discharged into creeks south of the landfill. Groundwater flow at deeper levels within the fractured bedrock is controlled by fracture orientation and connectivity. This unconfined aquifer is pervasive across the site and the water table generally mimics the surface topography.

Depth to groundwater is measured in all compliance monitoring wells at the site prior to each sampling event. Depth to water typically ranges from 2 to 3 feet below top of casing (ft-toc) in wells MW-2R and MW-3R; 8-14 ft-toc in MW-4, MW-5, and MW-6; and 42-48 ft-toc in MW-1R. Historical water level data are presented in Table 2. The groundwater potentiometric surface contours shown in Drawing 1 are based on data from the August 2015 sampling event. Groundwater flow beneath the facility is predominantly to the south and southeast.

1.2.1 Groundwater Flow

Aquifer hydraulic properties and groundwater flow velocity calculations are included in Table 3. Horizontal gradients for the flow paths shown on Drawing 1 ranged from 0.0491 to 0.0558 ft/ft, with an average of approximately 0.0513 ft/ft. This value is consistent with previous estimates.

Linear groundwater flow velocities were computed using the modified Darcy equation: $\boldsymbol{V = Ki/n_e}$, where **V** = average linear velocity (feet/day), $\boldsymbol{K}$ = hydraulic conductivity (feet/day), $\boldsymbol{i}$ = horizontal hydraulic gradient, and $\boldsymbol{n_e}$ = effective porosity. The average of hydraulic conductivities ($\boldsymbol{K}$ = 2.18×10^{-05} cm/sec = 6.18×10^{-02} feet/day) from slug-tests conducted in 1994 (GAI, 1994) was used in these calculations (Table 3). The average effective porosity ($\boldsymbol{n_e}$ = 18%) based on 90% of reported total porosity for soils (GAI, 1994) (Table 3). Although the regolith and bedrock are hydraulically connected, the effective porosity generally decreases with depth into the underlying fractured bedrock. The modified Darcy equation makes the simplifying assumption of a homogeneous and isotropic aquifer. The calculated linear groundwater velocities range from approximately 6.1 to 7.0 feet/year, and the average estimated linear groundwater flow velocity under the facility was calculated at approximately 6.4 feet/year.

Because of our conservative estimate of effective porosity, actual groundwater velocities may be significantly less than those calculated. Also, the linear velocity equation and resulting rates make the simplified assumptions of a homogeneous and isotropic aquifer. Actual velocities may vary significantly in the heterogeneous, anisotropic conditions believed to exist at this site.

1.2.2 Vertical Gradients

Monitoring wells MW-2R and MW-3R represent a nested pair of wells set 20 feet apart with different screened intervals. MW-2R is screened from 1.5-16.5 feet below ground surface (ft-bgs), and MW-3R is screened from 23.65-33.65 ft-bgs, giving a vertical distance between screen midpoints of 19.64 feet. The groundwater elevation is typically higher in MW-2R than in MW-3R, indicating a downward vertical hydraulic gradient. The August 17, 2015 water level measurements indicated a groundwater elevation of 328.65 feet above mean sea level (ft-amsl) in MW-2R, and 327.81 ft-amsl in MW-3R. This gives us a calculated downward gradient of 0.043 feet/foot between these two wells, indicating a weak downward component to groundwater flow.

1.3 Contaminant Distribution

Based on recent groundwater sampling at the facility, there appears to be one plume and associated area of concern (AOC) for the Butner Landfill. The AOC is located hydraulically downgradient of the waste disposal area in the vicinity of MW-2R. Drawing 2 presents an isoconcentration map for the benzene plume based on the August 2015 sample event data. The groundwater surface contours shown on Drawing 1 indicate that groundwater flow from this area is south toward drainage features located along the southern edge of the site. Surface water drainage from the site is predominately to an unnamed tributary of Picture Creek, which is also considered a groundwater discharge feature. Flow in the unnamed tributary along the southern edge of the site is to the west.

Table 4 presents a summary of NC Appendix I and II constituents that have been detected above The groundwater standards promulgated under 15A NCAC 2L.0202 (NC 2L) or the NC Solid Waste Section Groundwater Protection Standards (GWPS - established for constituents with no NC 2L) since August 2013. Complete historical data for detected constituents in groundwater and surface water are presented in Appendices A and B, respectively. The laboratory analytical reports and field data logs have been submitted in the corresponding Semiannual Water Quality Monitoring Reports (WQMRs) for the facility. The laboratory reports and field logs for the August 2015 sampling event are presented in the Second Semiannual WQMR of 2015, which will be submitted concurrently with this CAER.

Only benzene in MW-2R has been consistently detected at concentrations greater than the regulatory Groundwater Protection Standard (GPS) as defined in NCSWMR §.1634.g in the last several years. The GPS for benzene is equal to the NC 2L standard, 1.0 µg/L. Benzene was detected at 1.5 µg/L in the August 2015 sampling event. Benzene was also detected in MW-3R and MW-4 at estimated concentrations (below the SWSL) of 0.66 and 0.32 µg/L, respectively, in the August 2015 event.

Cobalt and antimony have been detected above their respective GWPS; however, neither cobalt nor antimony has been detected above the statistical background for the facility; therefore, they are not considered exceedances of the regulatory GPS as defined in 15A NCAC 13B.1634.g.

Chart 1 presents a plot of the benzene concentrations versus time in all monitoring wells where it has been detected (MW-2R, MW-3R, and MW-4). There were no benzene detections prior to December 2006, possibly due to a higher quantitation limit and the fact that estimated detections below the quantitation limit were not reported prior to December 2006. From December 2006 to present, benzene in MW-2R has fluctuated between 1µg/L and 2 µg/L with no clear trend. From December 2007 to present, benzene in MW-3R has fluctuated between 0.3 µg/L and 0.7 µg/L, and benzene in MW-4 has fluctuated between non-detect and 0.4 µg/L. These data indicate that the geometric distribution of the plume and the concentrations in the plume are stable.

An isoconcentration map for benzene based on data from the August 2015 sampling event is included as Drawing 2. Drawing 3 shows two orthogonal cross-sections through the plume. The plume is limited and contained within the facility boundary. The downgradient horizontal extent of the plume is controlled by sentinel well NES-1. The vertical extent of the plume is defined by well MW-3R, which is located near to MW-2R, but with a deeper screened interval. MW-2R is screened from 3.85 to 18.85 feet below ground surface (ft-bgs), and MW-3R is screened from 25.83 to 35.83 ft-bgs. Benzene has not been detected above its NC 2L standard in MW-3R; therefore, the vertical extent of the exceedance is constrained above bedrock to the zone above the screened interval of MW-3R; that is to say, to about 20 ft-bgs.

Surface water samples SW-1 and SW-2 have shown no detections of VOCs (except for some blank-qualified detections of acetone), including benzene, in the last five years of semiannual sampling, and there has never been an exceedance of NC 2B surface water standards. This adds further control for the downgradient extent of the plume. Furthermore, since the creek is considered a groundwater discharge feature, it is expected to act as a natural barrier to southward migration of the plume. SW-1 and SW-2 were both dry during the most recent (August 2015) sampling event and could not be sampled.

1.4 Site Conceptual Model

1.4.1 Site Geology

The Butner Landfill is located in the Carolina Slate Belt of the Piedmont Physiographic Province of North Carolina, near the northern edge of the Triassic Durham Basin. The Carolina Slate Belt geologic province is characterized by a rolling topography with a thick mantle of saprolite overlying Late Proterozoic and Paleozoic igneous and metamorphic bedrock. The Carolina Slate Belt is comprised of 550 to 650 million year old, metamorphosed sedimentary and volcanic rocks, intruded by granitic rocks. Granitic and felsic metavolcanic rocks have been observed in float and borings. Jurassic age diabase dikes have also been observed in the vicinity of the site and diabase outcrops in the creek along the southeastern portion of the site.

A geologic map of the area has been included as Figure 2 (Rhodes, et al, 2012). The geologic map indicates that the Butner Landfill is located in an area mapped as “Zfgms/Zgms – Granodiorite Tonalite of the Stem and Moriah plutons,” the description of which is given below:

Zgms – Granodiorite Tonalite of the Stem and Moriah plutons: Leucocratic (CI=5-15), light tan gray white, bluish-gray white, or pinkish-white, medium to coarse phaneritic, hypidiomorphic to xenomorphic granular granodiorite and tonalite. This unit combines the previously mapped Zstg unit in the Stem (Blake and others, 2009) and eastern Lake Michie Quadrangles and the Moriah pluton of McConnell (1974) in the western portion of the Lake Michie Quadrangle. Major minerals include plagioclase, alkali feldspar, and quartz with lesser amounts of biotite and amphibole, interpreted to be hornblende. Plagioclase is highly sericitized and in lesser amount saussuritized, especially in calcic-rich phenocryst cores. Alkali feldspar typically displays granophyric texture in thin section. If present, biotite is commonly recrystallized to chlorite while hornblende may be recrystallized to chlorite, epidote, and actinolite-opaque mineral. Metamorphosed trondhjemite and monzonite pods are present and may represent dikes or differentiated portions of the pluton. Locally becomes granitic in the western portion surrounding Lake Michie. Outcrops locally contain enclaves of microdiorite of the Zdim and Zdib units. Locally, mm- to cm-scale granite dikes crosscut granodiorite. Wortman et al. (2000) report a 613.4 +2.8/-2 Ma U-Pb zircon date from granite and a 613.9 +1.6/-1.5 Ma U-Pb zircon date from diorite sampled from the Moriah pluton in the western portion of the Lake Michie Quadrangle. Aggregates of white mica, quartz, plagioclase, and orthoclase highlight steeply dipping foliation and dip-parallel lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (Zfgms). This unit is correlative to the Zmpf unit of Bradley and others (2011) in the adjacent Rougemont 7.5-minute Quadrangle.

In addition, the geologic map (Rhodes, et al, 2012) indicates a diabase (Jd) intrusion under the southeastern corner of the facility, described as follows:

Jd – Diabase: Black to greenish black, fine to medium phaneritic or aphanitic, dense, consists primarily of plagioclase, augite and may contain olivine. Occurs as dikes and sills and is typically seen as spheriodally weathered stream boulders and cobbles. Weathered surfaces are generally brownish to grayish in color. Red station location indicates outcrop or boulders of diabase.

1.4.2 Site Hydrogeology

The depth to groundwater in the Piedmont is highly variable depending on soil thickness and subsurface fractures. Groundwater can occur in substantial volumes where soils are very thick, but typically groundwater is found in minimal volumes in bedrock, primarily restricted to fractures. The water table under the area of investigation was encountered in the unconfined aquifer that is mostly in the transition zone that consists of saprolite and highly fractured bedrock. Groundwater in the saprolite feeds the fractures in the bedrock and is discharged into creeks south of the landfill. Although the regolith and bedrock are hydraulically connected, the effective porosity generally decreases with depth into the underlying fractured bedrock. Groundwater flow at deeper levels within the fractured bedrock is controlled by fracture orientation and connectivity. This unconfined aquifer is pervasive across the site and the water table generally mimics the surface topography.

Historical water level data are presented in Table 2, and aquifer hydraulic properties and groundwater flow velocity calculations are presented in Table 3. A groundwater potentiometric surface map based on water levels obtained during the August 2015 sampling event is presented in Drawing 1. Depth to the groundwater table ranges from near the ground surface at MW-2R and MW-3R to greater than 40 feet near MW-1R. Groundwater flow beneath the facility is predominantly to the south and southeast. The average estimated linear groundwater flow

velocity under the facility was calculated at approximately 6.4 feet/year based on a modified Darcy equation (see Section 1.2 for a more detailed discussion).

Based on the above-described geologic and hydrogeologic information, the groundwater flow regime on this site is well-constrained and predictable. Migration of groundwater contaminants are expected to follow the general groundwater flow paths shown on Drawing 1. The creek which crosses the southern corner of the facility property, downgradient of the plume, is a groundwater discharge feature and, therefore, a hydrologic divide that should prevent migration of the plume beyond it. Also, there is a diabase dike roughly coinciding with the creek which could also act as a barrier to groundwater flow off of the property. There are no known preferred pathways that could significantly affect plume migration or the effectiveness of the groundwater monitoring network to monitoring plume migration.

1.5 Regulatory Status

In accordance with NCSWMR, the Butner Landfill entered an Assessment Monitoring Program in December of 1997 as a result of detections of volatile organic compounds and pesticides above NC-2L Groundwater Standards. In accordance with 15A NCAC 13B.1635, Granville County submitted an *Assessment of Corrective Measures* (ACM) for the Butner Landfill in May 2013. Based on the ACM, Granville County selected the following remedial alternatives for further evaluation:

- Monitored Natural Attenuation (MNA);
- Phytoremediation;
- Constructed Wetlands;
- Air Sparging;
- Permeable Reactive Barrier;
- Enhanced Bioremediation;
- Landfill Gas Control; and
- Pump and Treat.

In accordance with 15A NCAC 13B.1635(4)(d), Granville County held a public meeting on September 3, 2013, to discuss the results of the ACM. After further evaluation of the above potential remedial strategies, the County selected MNA plus Phytoremediation as the most cost-effective groundwater remedy for the Butner Landfill. An application for a Corrective Action Permit Amendment was submitted to NCDENR (now NCDEQ) SWS, and the SWS approved the amendment and the selected remedy in a letter dated October 30, 2013. The County submitted a CAP in May 2014, and the SWS approved the CAP on June 18, 2014.

2.0 CORRECTIVE ACTION SUMMARY

2.1 Physical and Chemical Changes in Aquifer Conditions

Data obtained from the August 2015 semiannual sampling event, including groundwater elevation and flow, groundwater field parameters, MNA parameters, and constituent concentrations have been evaluated with regard to the physical and chemical conditions in the uppermost aquifer at the site. Table 5 presents the recent and historical MNA data for the facility. The laboratory analytical reports for the MNA data have been submitted in the corresponding Semiannual WQMRs for the facility. The laboratory report for the August 2015 MNA data are presented in the Second Semiannual WQMR of 2015, which will be submitted concurrently with this CAER.

Temperature, pH, specific conductance, oxidation-reduction potential, turbidity, dissolved oxygen, dissolved carbon dioxide, and ferrous iron fluctuate within normal ranges for groundwater in saprolite and partly weathered bedrock of the Piedmont physiographic province. No significant difference is noted between the field parameters from the upgradient wells to downgradient wells of the landfill other than the redox potential (ORP) and conductivity, which are attributed to the presence of the plume and the natural attenuation process. We have observed no significant changes in any of these parameters since the 2013 ACM and the 2014 CAP.

MNA parameters dissolved hydrogen, volatile fatty acids, dissolved methane, ethane, ethane, alkalinity, sulfide, sulfate, nitrate, chloride, biological oxygen demand (BOD), chemical oxygen demand (COD), and total organic carbon (TOC) have also remained relatively stable. There have been no significant trends or major changes in any of these parameters that suggest a significant change in the aquifer. In addition, we have observed no significant change or variation in groundwater elevation and flow, or constituent concentrations during the August 2015 semiannual monitoring event. These data do not indicate any significant changes in the physical or chemical characteristics of the aquifer since the ACM and CAP.

2.2 Physical and Chemical Changes in Plume Characteristics

Data obtained from the performance and sentinel wells is used annually to re-evaluate the risk posed by the contaminant plume. Evaluation of the analytical results from the sentinel well will be used to determine the need for additional sentinel wells or for implementation of an alternative remedy.

Currently, the only contaminant of concern (COC) is benzene, which has been detected in exceedance of its GPS in MW-2R. No other constituents have been detected above their respective GPS. An isoconcentration map of the benzene plume based on data from the August 2015 sampling event is provided in Drawing 2, and orthogonal cross-sections through the plume are presented in Drawing 3. Chart 1 presents a graph of benzene concentrations versus time in

the wells where benzene has been detected. There has been no detection of benzene, or any other VOC, in the sentinel well, NES-1.

Antimony in MW-2R and cobalt in MW-5 were detected above their respective GWPS in the August 2015 semiannual monitoring event; however, neither was found above the calculated background concentration. Since antimony and cobalt detections were below the site specific calculated background values, there were no exceedances of the GPS as defined by rule .1634.g.

The plume shown in the benzene isoconcentration map and cross sections (Drawings 2 and 3) remains unchanged from the ACM of 2013 or the CAP of 2014. In addition, the data presented in Chart 1 indicates no apparent trend in benzene concentrations. These data indicate that there have been no significant changes in the chemical or physical characteristics of the contaminant plume since 2013.

2.3 Refining the Site Conceptual Model

Any new information that comes to the attention of the facility, either from the data collected on site or other sources, which impact the site conceptual model will be reported and evaluated. This includes data on site or regional geology, hydrogeology, or other aspects of the site conceptual model. The site conceptual model will be refined in response to the new information as needed and appropriate.

The landfill is bound to the south by an unnamed tributary of the Picture Creek. The landfill is bound to the west by a man-made drainage ditch that runs along the side of Butner Road. All of the drainages on the site eventually flow into the unnamed tributary of the Picture Creek.

Historically, two surface water points [SW-1 (upgradient) and SW-2 (downgradient)] have been sampled semiannually in conjunction with the groundwater sampling at the Butner Landfill. Historical surface water sampling data indicate that groundwater discharge into the creek has not impacted the surface water; therefore, the surface water does not constitute a sensitive receptor pathway risk. If the plume migrated to impact the surface water, dilution would quickly reduce the concentrations to below detectable levels.

Flora and fauna on or above the ground surface are at minimal risk, because there have been no confirmed detections of the COC in the downstream surface water samples. Organisms suspected to be living in the subsurface at the site are at potential risk; however, soil microorganisms are known to use the organic acids and by-products of the degradation process of the groundwater plumes as a food source; therefore, the potential risk to the environment from the impacted groundwater is considered to be low. JOYCE conducted a tree survey in April 2015 and no evidence of distressed vegetation or obvious impacts to wildlife were observed as a result of exposure to the contaminant plume associated with the AOC.

As noted above, the benzene plume remains unchanged, and there is no data indicating a need to modify the site conceptual model at this time.

2.4 Evaluation of the Impact of Corrective Actions

2.4.1 Contaminant Levels

Chart 1 shows benzene concentrations versus time for all the facility monitoring wells between June 2006 and August 2015. In June 2006 and earlier, there were no reported detections of benzene; however, that is likely due to the fact the prior to December 2006, there was a higher reporting limit and no estimated results below the reporting limit were reported.

Since December 2006, excluding anomalous non-detect values, the concentrations of benzene in MW-2R have averaged 1.51 µg/L with a standard deviation of ±0.26. The benzene concentrations in MW-3R have averaged 0.56 µg/L with a standard deviation of ±0.095. The benzene concentrations in MW-4 have averaged 0.32 µg/L with a standard deviation of ±0.051. The data since December 2006 show no obvious trends in benzene concentrations in any of the wells. This indicates that the plume is stable and natural attenuation and phytoremediation are reducing the benzene a concentration at a rate roughly equal to the rate benzene is being released from the landfill.

2.4.2 Evaluation of MNA Parameters

Samples from the key wells (MW-1R, MW-2R, MW-3R, and NES-1) were analyzed for MNA parameters during the semiannual compliance sampling events conducted in May 2013, August 2014, March 2015, and August 2014. These data comprise the baseline sampling data for MNA parameters at this facility. Some MNA data has also been collected from other wells at the site during these events, and some MNA data was collected in December 2003 and in December 2007. These data are supplemental to the baseline data. Table 5 summarizes all of the MNA parameter data for this facility. Following are discussion of the results from each MNA parameter as they related to evaluation of MNA as the remedy for this facility.

Standard MNA Parameters:

- Temperature of groundwater is used to help assess the representativeness of water samples, and to correct temperature sensitive parameters/measuring devices. Microorganisms are active over a wide temperature range, although some may become more active with increasing temperature. Temperature measurements for groundwater samples have fluctuated between 11.1ºC and 19.4ºC, with some seasonal variation.

- pH is an indication of the suitability of environment to support wide range of microbial species. Activity tends to be reduced outside of pH range of 5 to 9, and anaerobic microorganisms are typically more sensitive to pH extremes. pH is also used to help assess the representativeness of the water sample taken during purging of wells. All pH

measurements of groundwater at the site have been within the 5-8 range, and most have been between 6.0 and 7.5.

- Conductivity or specific conductance of groundwater is a measure of its ability to conduct electricity. The standard unit of conductivity is micro-Siemens per centimeter (µS/cm). Conductivity measurements are used in environmental applications as a way of measuring the ionic content in water. Conductivity in facility wells has been fairly consistent with time for each well. The conductivity in MW-2R, MW-3R, and MW-4 (wells within the plume) has ranged from 996 to 1,964 µS/cm during this CAER period. The conductivity in MW-1R (background well) and NES-1 (sentinel well) ranged from 69.6 to 231 µS/cm during this CAER period. The higher conductivity values in the area of the plume may be due to higher dissolved ions in the groundwater either due to the presence of contaminants or due to biological activity, or both.

- Oxidation-Reduction Potential (ORP), also referred at as redox potential or Eh, measures whether the environment is reducing or oxidizing. Ranges from 0 to +500 mV indicate oxidizing (aerobic) environments, and ranges from -500 mV to 0 indicate reducing (anaerobic) environments. The ORP measurements at the MW-2R have fluctuated between -96.3 and +76.2 mV, indicating a weakly aerobic to weakly anaerobic environment. ORP in MW-3R was measured -46.8 during the August 2015 event, but all earlier readings during the CAER period have been aerobic ranging from 55.2 to 207.6. All other wells (MW-1R, MW-4, MW-5, MW-6, and NES-1) have been entirely aerobic with measurements ranging from 44.8 to 257. The ORP data shows a fluctuating anaerobic/aerobic environment around MW-2R and a clear difference between wells inside and outside of the plume. Biological activity associated with natural attenuation is expected to reduce the ORP.

- Dissolved Oxygen (DO) is an indicator of aerobic versus anaerobic environments. The availability of oxygen is essential for aerobic microbes to metabolize organic contaminants, but DO > 5 mg/L is detrimental to the ability of anaerobic microbes to metabolize organic contaminants. Groundwater at all wells showed fluctuations in DO concentrations over time, ranging from low 1.37 to 5.75 mg/L. It should be noted that some of early (2003) DO measurements that are >10 mg/L may exceed the solubility, which indicates probable measurement errors. There are no clear trends in DO concentrations with time; however, the DO in MW-2R (inside the plume) is generally lower than in MW-1 (background well). In the August 2015 event, for example, the DO in MW-1 and MW-2R were 4.95 mg/L and 5.75 mg/L, respectively. In comparison, the DO in MW-3R and NES-1 were 1.30 mg/L and 1.77 mg/L, respectively. The key observation is that there is sufficient oxygen in the plume area to facilitate aerobic biodegradation of benzene.

- Chloride is an ultimate daughter product of reductive dehalogenation, and is usually an indicator of anaerobic degradation of chlorinated hydrocarbons; however, chloride production has been documented to occur also in association with biodegradation of benzene. Chloride concentrations within the plume in MW-2R have consistently been a magnitude

greater than in background well MW-1R, with concentrations ranging from 264-280 mg/L and 3.50-3.80 mg/L, respectively during this CAER period. The same results are seen in MW-3R with chloride concentrations ranging from 144 to 297 and NES-1 ranging from 3.90 to 7.90 mg/L. This is a strong indication that natural attenuation is occurring.

- Nitrate and Sulfate compounds can be used as electron acceptors by reducing bacteria. Changes in concentrations may provide evidence of biological activity. At high concentrations, they may interfere with reductive pathways. In general, one would expect concentrations of nitrate and sulfate to decrease if active biodegradation is occurring. Concentrations of nitrate and sulfate have been low across the site and they have been either estimated or non-detected in MW-2R and MW-3R. The low background concentrations make it difficult to tell whether there is a significant decrease in the area of the plume.

Extended MNA Parameters:

- Dissolved Hydrogen (DH) concentrations in anaerobic environments can be correlated with types of anaerobic activities. DH may be the limiting factor for complete dechlorination of chlorinated hydrocarbons. A concentration of >1 nM in considered necessary for effective reductive dehalogenation. Concentrations of DH have little impact on the aerobic degradation, such is expected for benzene. In general, the measured DH concentrations have been greater than 1.0 nM in most wells, and the DH has been slightly higher in MW-2R and MW-3R than in the background well MW-1R or sentinel well NES-1. DH ranged from 1.2 to 1.7 nM in MW-1R, and from 1.4 to 2.2 nM in MW-2R and from 1.4 to 5.4 in MW-3R during this CAER period. In comparison, NES-1 range from 0.47 to 1.5 nM. Since there are no chlorinated hydrocarbon COCs, the relevance of these data is limited.

- Sulfide presence may provide evidence of sulfate reduction; however, it may not be detected even if sulfate-reducing bacteria are active because it can react with various oxygenated chemical species and metals. Sulfide has not been detected in any wells at this site during this CAER period.

- Alkalinity level increase may be indicative of carbon dioxide production and mineralization of organic compounds. Alkalinity has ranged from 744 to 800 mg/L in MW-2R and from 653 to 726 mg/L in MW-3R during this CAER period, and has been consistently higher than in MW-1R, which ranged from 37 to 43.3 or NES-1 witch has ranged from 8.8 to 190. This is a strong sign that natural attenuation is occurring.

- Total Organic Carbon (TOC) in significant concentrations indicates the availability of general growth substrates for microorganisms. One would expect TOC to also be higher inside the plume than outside of it. During the August 2015 event, MW-1R showed an estimated TOC concentration of 0.91 mg/L, whereas MW-2R and MW-3R had 32.9 and 9.86 mg/L, respectively. This indicates that there is sufficient organic matter in the plume area to sustain biological activity.

- BTEX (the sum of benzene, toluene, ethylbenzene, and xylenes) in significant concentrations indicate the availability of general growth substrates for microorganisms. There have been no detections of toluene, ethylbenzene, or xylenes in any well in the last 2 years (four sampling events), so the BTEX is simply the benzene concentration, which is our COC.

- Biological Oxygen Demand (BOD) is based on the activities of bacteria and aerobic microorganisms which feed on organic matter in presence of oxygen. The result of a BOD test indicates the amount of water-dissolved oxygen (mg/L) consumed by microbes. In general, the higher the BOD, the higher the amount of pollution in the test sample. Typical values for pristine rivers will have BOD below 1 mg/L. Moderately polluted rivers may have a BOD value in the range of 2 to 8 mg/L. The BOD values in the background well, MW-1R, ranged from no detect (ND) to 2.55 mg/L. In MW-2R, the BOD values ranged from 10.6 to 83.4 mg/L; and in MW-3R, the BOD values ranged from 2.0 to 2.49 mg/L. The BOD values in the sentinel well, NES-1, ranged from ND to 2.0 mg/L. This is an indication of heightened biological activity within the plume, which implies significant biodegradation of the COC is occurring.

- Chemical Oxygen Demand (COD) tells how much oxygen is needed to fully oxidize compounds containing carbon, hydrogen or both. As an indicator of the amount of organic pollutants found in groundwater, COD indicates the mass of oxygen consumed per liter (mg/L). The COD values in the background well, MW-1R, ranged from ND to 25.0 mg/L. In MW-2R, the values ranged from 110 to 235 mg/L; and in MW-3R, they ranged from 96 to 756 mg/L. The NES-1 COD values ranged from ND to 50 mg/L. This is an indication of heightened biological activity within the plume, which implies significant biodegradation of the COC is occurring.

- Dissolved Methane, Ethane, Ethene in groundwater can provide evidence of dechlorination of chlorinated hydrocarbons; however, methane may also indicate activity of methanogenic bacteria. Methane produced by methanogenic bacteria decomposing organic waste is common and expected in an MSW landfill. Dissolved methane has been detected consistently in MW-2R and MW-3R, but is most likely generated directly from the landfill waste rather than by degradation of groundwater contaminants. The concentrations of methane in MW-2R and MW-3R have been significantly higher than in the background well MW-1R or the sentinel well NES-1. The higher methane in MW-2R and MW-3R may indicate impact by landfill gas. Low concentrations of ethane and ethene have been detected in groundwater samples sporadically, but have usually been ND.

- Volatile Fatty Acids (VFAs) include pyruvic acid, lactic acid, acetic acid, propionic acid, and butyric acid. Analysis of VFAs can provide insight into the types of microbial activity that are occurring. VFAs can also serve as electron donors. A few VFAs have been detected sporadically, and they have not been consistent enough to evaluate natural attenuation

processes at the facility. The recorded values appear to be same or similar between the background well, and the wells within the plume, and the sentinel well.

- Carbon Dioxide (CO_2) is an ultimate oxidative daughter product of the biodegradation of hydrocarbons; however, carbon dioxide is also a principal constituent of landfill gas, and when landfill gas is in contact with the water table CO_2 will partition into the groundwater. CO_2 concentrations have been consistently higher in MW-2R and MW-3R than in MW-1R or NES-1. CO_2 in the background well, MW-1R, has ranged from 25 to 60 mg/L; and in the NES-1, CO2 has ranged from 45 to 60 mg/L. CO2 in the wells within the plume, MW-2R and MW-3R, has ranged from 110 to 390 mg/L and from 75 to 185 mg/L, respectively. The higher CO_2 in MW-2R and MW-3R may also be indicative of impact by landfill gas.

- Ferrous Iron (Fe^{2+}) (the soluble reduced form of iron) is a nutrient and indicates the activity of iron reducing bacteria. Fe^{2+} is used as electron acceptor. Fe^{2+} has been detected consistently in the MW-2R (in the upper aquifer) in range of 1.0 to 7.2 mg/L during the CAER period, but has not been detected in the background well MW-1R, and only once in MW-3R (1 mg/L), MW-5 (0.22 mg/L), and NES-1 (0.2 mg/L). There have been no detections of Fe^{2+} in either MW-4 or MW-6 during this CAER period. These data indicate that biodegradation is occurring within the plume.

2.4.3 Recommendations for MNA Parameters

Several of the extended MNA parameters described above show limited usefulness in evaluating natural attenuation at this site. Several of these parameters are important for evaluating anaerobic degradation of chlorinated hydrocarbons; however, we have no chlorinated hydrocarbons that are COCs for this facility, so these parameters are not relevant for this site. Benzene is the only COC, and benzene is primarily degraded aerobically, so only those MNA parameters with significance for aerobic degradation of benzene are needed for this site.

On behalf of Granville County, JOYCE recommends and requests that the following parameters be removed from the MNA analytical requirements for this facility:

- Dissolved Hydrogen (important of dehalogenation of chlorinated hydrocarbons, but not for aerobic degradation of benzene);
- Sulfide (has not been detected at this site);
- Volatile Fatty Acids (very few sporadic detections, insufficient detections to assess);
- Dissolved CO_2 (product of anaerobic degradation of chlorinated hydrocarbons, not relevant to aerobic degradation of benzene) ; and
- Ethene/Ethane (product of anaerobic degradation of chlorinated hydrocarbons, not relevant to aerobic degradation of benzene). [Note – methane will continue to be monitored to track impact of landfill gas on the groundwater.]

2.4.4 Evaluation of Phytoremediation

Phytoremediation is the use of plants to remove, transfer or stabilize contaminants in soil or groundwater. Plants may remove contaminants from groundwater from either direct plant uptake and metabolization or by microbial degradation in the root zone. Contaminants in groundwater can be removed when plant-produced enzymes break down contaminants that enter the plant during transpiration (phytodegredation). Another method by which plants can enhance groundwater quality is by phytoaccumulation, which is the process of uptake and storage of contaminants in the root systems. Plants may also uptake contaminants and transpire them through the leaves (phytovolatization). Finally, plants can provide secretions that enhance microbial activity in the root zone that aid in the breakdown of contaminants (ITRC, 1999). Phytoremediation via direct uptake of groundwater contaminants has been demonstrated to be a very efficient removal mechanism for aromatic hydrocarbons, such as those observed at the site.

Generally the octanol-water partition coefficient (log Kow) of organic contaminants must be between 1.0 and 3.5 (moderately hydrophobic organic chemicals) to be susceptible to uptake by plants. Hydrophobic chemicals (log Kow>3.5) are bound too strongly to roots and soil to be translocated within the plants. Water-soluble chemicals (log Kow<1.0) are neither sufficiently sorbed to roots nor actively transported through plant membranes (Briggs, et. al., 1982). The log Kow of benzene is 2.13, within the range to be susceptible to phytoremediation.

Root contact is a primary limitation on phytoremediation applicability. Remediation via plants requires that the contaminants be in contact with the root zone of the plants. Either the plants must be able to extend roots to the contaminants, or the contaminated media must be moved to within range of the plants. Rhizodegradation, which is the breakdown of an organic contaminant in soil through microbial activity that is enhanced by the presence of the root zone, is the most effective mode of phytoremediation for petroleum hydrocarbons (US-EPA, 2000).

The groundwater is extremely shallow (1-3 feet, or less) in the vicinity of MW-2R and in most of the area of the plume, and GPS exceedances of benzene are constrained to approximately the upper 20 feet of the aquifer. This puts most if not all of the plume within reach of the root systems of large trees, like poplars and sweet gums, and the shallower parts of the plume will be within reach of even the shallower root systems of grasses and shrubs. Typically, phytoremediation as a remedial technology includes selection of a plant species, planting the selected species, and possibly harvesting the plants at some time in the future; however, at this site, we believe that phytoremediation is already taking place with existing flora and site conditions.

A survey of tree species, health, and maturity already present within the plume area was conducted on April 16, 2015. The tree survey covered the south side of the landfill between the edge of waste and the creek. Drawing 4 shows the results of the tree survey, and a survey log is included in Appendix C. Some of the areas downgradient of the landfill were logged in 2010, and these areas are collectively labeled “Area 1” on Drawing 4. The logged areas were reportedly replanted with pines after logging. At the time of the tree survey, the impact of

logging was still evident; however, new growth had progressed well and there were numerous sweet gum saplings observed, as well as pine saplings that could have been from the reported re-planting.

There are still areas of mature trees downgradient of the landfill. Most importantly, the main area of the plume between MW-2R and the creek was not logged in 2010 and is still well-wooded with many mature trees. This area is labeled "Area 2" on Drawing 4. The tree survey found that approximately 70% of the mature trees in Area 2 were American sweet gums (Liquidambar styraciflua), with about 10% tulip poplars (Liriodendron tulipifera) and 10% blue beech (Carpinus caroliniana). The remaining 10% included black maple, white cedar, and loblolly pine. Area 3 on Drawing 4 is another area that was not logged and which contains mature trees. Area 3 contains approximately 50% tulip poplars, 20% American sweet gum, and 15% each of black maple and loblolly pine. There were also abundant herbaceous plants observed in Areas 2 and 3.

There were several areas of apparent wetlands observed in the area between the landfill and the creek at the time of the tree survey. Some apparent wetlands in the logged areas (Area 1) appeared to be recently developed as a result of water accumulating in ruts and low areas left after the logging; however, there were also apparent wetland areas observed in Area 2 between MW-2R and the creek. The apparent wetlands in Area 2 appear to be natural and more mature than those in Area 1.

The trees and other plants present on site are expected to effectively metabolize and/or transpire observed groundwater contamination, and rhizodegradation in the root zone is expected to further remediate the groundwater. Poplars have been well-studied in phytoremediation applications (Gordon, et al, 1997; Ferro, et al, 1999), and are one of the most commonly recommended trees for phytoremediation of VOCs, metals, and radionuclides. Sweet gum trees have less documentation; however, they have also been used successfully in similar phytoremediation applications (Negri and Hinchman, 2000). Other trees and herbaceous plants in and downgradient of the plume are also likely to contribute to phytoremediation. Furthermore, wetlands are among the most biologically active ecosystems, and are considered to have high potential for phytoremediation of VOCs and other contaminants (Williams, 2002). The presence of wetlands downgradient of the plume is expected to enhance phytoremediation at this site.

2.4.5 Impacts on Hydraulic Gradients

Based on historic groundwater elevations at this site, the average hydraulic gradient has been 0.05 ft/ft toward the south and southeast, with horizontal flow velocities approximately 6 feet per year. The most recent estimate of hydraulic gradients and groundwater flow velocities are provided in Table 3 of this report and are discussed in Section 1.2.1. Since there is no pumping or injection associated with the corrective action at this facility, there is no impact on hydraulic gradients.

2.4.6 Contaminant Removal Efficiencies and Mass of Contaminants Removed

Natural attenuation for benzene was modeled using EPA Bioscreen Version 1.4 (Newell, 1996 & 1997). Bioscreen offers multiple kinetic model options, including no degradation, first-order decay, and instantaneous reaction. Bioscreen automatically selects the correct source half-life value depending on which kinetic model is being used.

The *First-order Decay* model assumes biodegradation starts immediately downgradient of the source, and that the rate of dissolution is reflected by the concentration of dissolved organics actually measured in monitoring wells. In other words, the first-order decay model assumes C_0 (concentration before biodegradation) is equal to the observed source concentration. Since the landfill is considered an ongoing source, the First-Order Decay model is the most appropriate for this site.

The *Instantaneous Reaction* model assumes biodegradation is occurring directly in the source zone, and that the **effective** source zone concentration C_0 is equal to the measured concentration in the source zone plus any "missing" concentration due to biodegradation. For example, if the source zone concentration in monitoring wells is 5 mg/L, and the biodegradation capacity is 10 mg/L, the effective source concentration C_0 is 15 mg/L. In other words, C_0 is equal to the measured source concentration plus the biodegradation capacity provided by the electron acceptor concentration. This means use of the instantaneous reaction assumption will result in higher dissolution rates and shorter source lifetimes.

Bioscreen was set up to model hydrogeology, dispersion, adsorption, and biodegradation along a flow line running northeast-southeast direction from the waste unit through MW-2R, surface water point SW-2 and NES-1. The source is considered the edge of waste. Distances were selected from the source to MW-2R (140 feet), SW-2 (400 feet), and NES-1 (535 feet). The plume is estimated to be at most approximately 350 feet long and 800 feet wide. The concentration in the source area (beneath the landfill) was set equal 2.5 µg/L (assuming the source concentration is higher than the downgradient well). The Bioscreen modeling simulation time was set to 30 years based on the site history (assuming the source started about 12 years after the facility began receiving waste). Hydrogeology parameters used as input values were based on the groundwater flow rate calculations of the August 2015 semiannual sampling event presented in Table 3 of this report.

Bioscreen modeling was performed for *benzene* with the first-order decay assumption that the total biodegradation capacity be reduced to account for electron acceptor utilization by other constituents present in plume. Since no toluene, ethylbenzene and xylenes are present, there was no need to reduce the amount of oxygen, nitrate, sulfate, iron, and methane to account for utilization of those electron-receptors by other BTEX constituents. The modeling was found to fit the field data fairly well assuming a 1st order decay coefficient of 10^{-2} per year. The input and output of the Bioscreen modeling are presented in Appendix D.

The plume and source mass calculations from Bioscreen are summarized below. In the natural attenuation of the *First-order Decay* model the biodegradation starts downgradient of the source and the rate of dissolution is reflected by the concentration of dissolved organics measured in monitoring well MW-2R. Based on the modeling approximately .0019 kg of the plume mass (benzene) has been removed by biodegradation during the modeling period of 30 years. To estimate the mass removed during this CAER period (the last 2 years), we backed the model up to see the results after only 28 years. The results indicate that approximately .0002 kg of plume mass has been removed during the CAER period.

Plume Parameter	**First Order Decay (28 yrs.)**	**First Order Decay (30 yrs.)**
Plume volume/mass if no biodegradation (kg)	.0138	.0148
Actual plume volume/mass (kg)	.0121	.0128
Plume volume/mass removed by biodegradation (kg / %)	.0017 / 12%	.0019 / 13%

Please note that many assumptions are made in the Bioscreen modeling. These results are based on the limited data available and professional judgement where detailed data were unavailable; therefore, these results should only be considered estimates.

2.7 Status of Impacts at the Compliance Boundary

No detection has been recorded in the surface water samples collected from the monitoring point SW-2 approximately 400 feet away from the edge of limits of waste. Sentinel well NES-1, adjacent to the facility's compliance boundary, has not been impacted with any of the Appendix I constituents VOCs, including benzene.

2.8 Off-Site Migration Concerns

The landfill is bordered to the east and southeast by an unnamed tributary to the Picture Creek, which is classified "C", for waters protected for secondary recreation, aquatic life, and wildlife. To date, there have been no SWQS exceedances for this site.

Benzene has been detected in MW-2R at the landfill groundwater. Groundwater beneath the landfill property appears to have been impacted by leachate that originates from the unlined landfill and/or by the migration of landfill gas.

Surface water samples are collected semiannually, downgradient from the waste cell, from an unnamed tributary of the Picture Creek to the southeast and southwest of the disposal area. These surface water samples have not contained concentrations of benzene or other VOCs above regulatory detection limits.

At this time there is no evidence that the contaminant plume extends up to the surface water monitoring point SW-2 or beyond the tributary. There have not been any exceedances of NC-2L standards of the sentinel well NES-1. The current COC plume is concentrated around MW-2R and is stable, with no indication that it is expanding.

3.0 CONCLUSIONS

3.1 Modifications Needed to Selected Remedy

Natural attenuation and phytoremediation will not prevent further releases of COCs from the waste unit; however, natural attenuation and phytoremediation appear to be occurring beneath the facility at a rate that will prevent migration of the COCs beyond the property boundary at concentrations exceeding their respective GPS.

The evaluation of indicator parameter data and historical observations of the plume indicate that biodegradation is occurring beneath the facility at a rate that will prevent additional migration of contaminants beyond the property line and will reduce concentrations of constituents-of-concern to concentrations below GPS within the delineated plume with time. An evaluation of the risks posed to human health and the environment suggests that there is low risk due to the fact that groundwater contamination is contained within the facility property boundary, the adjoining property downgradient of the plume is all state-owned undeveloped land, and there are no known receptors. We conclude that MNA plus phytoremediation remains an appropriate and effective remedy for the Butner Landfill facility. No changes to the CAP are recommended.

3.2 Assessment of MNA Indicator Parameters

Under an MNA remedial alternative, a site is monitored at regular intervals to demonstrate that biodegradation and demobilization processes (or indicators thereof) are occurring at a rate sufficient to prevent potential exposures, and that the dissolved-phase contaminants are not migrating to a receptor. After the four baseline sampling events have been completed, the MNA data will be evaluated to determine the effectiveness of each of the MNA parameters in evaluating the MNA process on this site. If, after the baseline period, it is determined that some of MNA parameters are not needed to adequately characterize and evaluate the MNA process, the County may petition the NCDENR to cease or reduce the frequency of analyses for those MNA parameters. At a minimum, the performance wells will continue to be sampled semiannually for temperature, pH, specific conductance, oxidation reduction potential, dissolved oxygen, nitrate, sulfate, and chloride for as long as the CAP is in effect.

The results of the four baseline MNA sampling events conducted in May 2013, August 2014, March 2015, and August 2014 have been reviewed in detail in Section 2.4.2, and conclusions on the relevance of the various MNA parameters are presented in Section 2.4.3. On behalf of

Granville County, JOYCE recommends and requests that the following parameters be removed from the MNA analytical requirements for this facility:

- Dissolved Hydrogen (important of dehalogenation of chlorinated hydrocarbons, but not for aerobic degradation of benzene);
- Sulfide (has not been detected at this site);
- Volatile Fatty Acids (very few sporadic detections, insufficient detections to assess);
- Dissolved CO_2 (product of anaerobic degradation of chlorinated hydrocarbons, not relevant to aerobic degradation of benzene) ; and
- Ethene/Ethane (product of anaerobic degradation of chlorinated hydrocarbons, not relevant to aerobic degradation of benzene). [Note – methane will continue to be monitored to track impact of landfill gas on the groundwater.]

After the baseline period, the site background well, MW-1R, may be analyzed for only those MNA parameters that require comparison to a background value for evaluation (dissolved oxygen, nitrate, sulfate, ferrous iron, and alkalinity). The sentinel well, NES-1, will function to monitor for migration of the contaminant plume off of the subject property, rather than for evaluation of MNA parameters; therefore, after the baseline period, the sentinel well will no longer be sampled for MNA performance parameters. The sentinel well will be sampled for the facility's COCs, which currently includes only benzene. If, in the future, new exceedances result in additional COCs, the additional COCs will be added to the analytes list for the sentinel well.

3.3 Contingency Plan

The CAP included a contingency plan in the event that MNA plus phytoremediation is shown to be ineffective at controlling migration of the contaminant plume. The contingency plan consists of in-situ or ex-situ treatment of the groundwater to enhance biodegradation and to prevent or remediate the off-site migration of impacted groundwater with GPS exceedances. If required, the contingency remedies may include one or more of the following:

- Construction of a man-made wetland area downgradient of MW-2R;
- Installation of an air-sparging system in the vicinity of MW-2R; and/or
- Additional active remedies, with approval of NCDEQ.

At this time, MNA plus phytoremediation remains an appropriate and effective remedy for the Butner Landfill facility. No contingency remedies are recommended.

4.4 Land Use Restrictions

Groundwater beneath the landfill property appears to have been impacted by leachate that originates from the unlined landfill and/or by the migration of landfill gas and benzene has been detected in MW-2R during recent semiannual monitoring events. There is no evidence that the contaminant plume extends up to the surface water monitoring point SW-2 or beyond the tributary. There have not been any exceedances of NC-2L standards of the Sentinel NES-1. The current COC plume is concentrated around the MW-2R and is stable.

Based on the semiannual groundwater and surface water monitoring and the annual tree survey, MNA and Phytoremediation appear to be effectively controlling the contaminant plume. The plume appears stable and is not migrating toward the property boundary. At this time there is no need to impose land use restrictions on the landfill or adjoining property.

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6.0 ACRONYMS

ACM	Assessment of Corrective Measures (report)
AOC	Area of Concern
C&D	Construction and Demolition Waste
CAP	Corrective Action Plan (report)
CAER	Corrective Action Evaluation Report (report)
CPVC	Chlorinated Poly Vinyl Chloride
COC	Contaminant of Concern
DENR	See NCDENR
DL	Detection Limit (for laboratory data)
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
GEU	Gas Extraction Unit
GPS	Groundwater Protection Standards (per 15A NCAC 13B.1634.g)
GWPS	SWS Groundwater protection Standards (for constituents with no NC 2L)
HASP	Site-specific Health and Safety Plan
HDPE	High-density Polyethylene
JOYCE	Joyce Engineering, Inc.
LFG	Landfill Gas
LEL	Lower Explosive Limit
MNA	Monitored Natural Attenuation
MSW	Municipal Solid Waste
MW	Monitoring Well

NC 2B	North Carolina Surface Water Standards found in 15A NCAC 2B.0101
NC 2L	North Carolina Groundwater Standards found in 15A NCAC 2L.0202
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources (now NCDEQ)
NCDEQ	North Carolina Department of Environmental Quality (formerly NCDENR)
NCSWMR	North Carolina Solid Waste Management Regulations (15A NCAC 13B.1600)
ND	Not Detected (for laboratory data)
NES	Nature and Extent Study (report)
O&M	Operations and Maintenance
OSHA	Occupational Health and Safety Association
PVC	Poly Vinyl Chloride
QL	Quantitation Limit (for laboratory data)
QRA	Quantitative Risk Assessment (report)
RA	Risk Assessment (report)
RL	Reporting Limit (for laboratory data)
SWQS	Surface Water Quality Standards
SWS	NCDENR/NCDEQ Division of Waste Management, Solid Waste Section
SWSL	North Carolina Solid Waste Section Reporting Limits (for laboratory data)
VOC	Volatile Organic Compound
WQMP	Water Quality Monitoring Plan (report)

TABLES

Table 1	Monitoring Well Construction Data
Table 2	Historical Groundwater Elevations
Table 3	Estimated Hydraulic Gradients and Groundwater Flow Velocities
Table 4	Exceedances of Groundwater Standards (2013-2015)
Table 5	Recent and Historical MNA Parameters

TABLE 1: Monitoring Well Construction Data

WELL ID		[1]LOCATION		[1]Elevation (Ft-AMSL)								Other Information			
Permit #	Well ID	Lat.	Long.	Surface Elevation	Top of Casing	Top of Screen	Bottom of Screen	Total Depth	[2]WL-24	[3]WL 8/17/2015	Depth to Bedrock	[4]Geologic Unit	Construction Date	Driller's Reg. #	Comments
39-02	MW-1R	N36º 09' 55.49"	W78º 45' 37.80"	461.01	461.01	420.01	405.01	405.01	420.01	417.71	431.01	Fractured Bedrock	4/21/1994	446	background well replacement
39-02	MW-2R	N36º 09' 38.57"	W78º 45' 34.97"	326.60	328.94	322.75	307.75	307.75	324.00	328.65	313.60	Weathered Bedrock	4/12/1994	446	compliance well replacement
39-02	MW-3R	N36º 09' 38.58"	W78º 45' 34.85"	328.77	330.95	302.94	292.94	292.94	325.77	327.81	315.77	Fractured Bedrock	4/14/1994	446	compliance well replacement
39-02	MW-4	N36º 09' 38.93"	W78º 45' 30.15"	338.97	340.92	322.54	307.54	307.54	329.17	331.05	325.97	Fractured Bedrock	4/18/1994	446	compliance well
39-02	MW-5	N36º 09' 39.35"	W78º 45' 23.77"	341.88	344.00	333.36	318.36	318.36	329.08	327.73	324.88	Fractured Bedrock	4/18/1994	446	compliance well
39-02	MW-6	N36º 09' 47.00"	W78º 45' 25.47"	360.80	362.80	343.17	328.17	328.17	349.10	347.63	339.60	Fractured Bedrock	4/19/1994	446	compliance well
39-02	NES-1	N36º 09' 35.65"	W78º 45' 31.59"	326.22	328.72	311.22	296.22	296.22	304.22	308.80	300.22	Fractured Bedrock	11/14/2007	2675	sentinel well

Notes:

1. Locations & Elevations based on March 2013 survey. Ft-AMSL = Feet above mean sea level.
2. WL-24 = Water Levels approx. 24 hours after well installation.
3. WL = Water Levels measured on 8/17/2015.
4. Geology where well bore ends, documented as fractured metavolcanic bedrock of Carolina slate belt.

Typical Montoring Well Construction, materials are 2 inch SCH40 PVC casing and screen with 0.010 inch slot, sand pack, bentonite seal, grout pad, & steel outer casing.
Montoring Well Summary data is from well construction records, GAI Consultants June 1994, & Joyce Engineering November 2007, and field observations.

TABLE 2: HISTORICAL GROUNDWATER ELEVATION DATA

	Background	Downgradient					
Well ID:	**MW-1R**	**MW-2R**	**MW-3R**	**MW-4**	**MW-5**	**MW-6**	**NES-1**
Well TOC Elev.:	460.51	331.60	330.96	340.80	343.88	362.53	328.40
Well Depth:	56.00	18.85	35.83	31.43	23.52	32.63	32.80
21-Aug-99	418.68	329.13	328.06	330.50	330.83	352.10	NI
16-Nov-99	419.75	325.38	324.51	331.53	334.33	352.97	NI
10-May-00	424.53	329.60	328.83	334.15	334.49	355.72	NI
26-Oct-00	419.21	329.26	328.15	331.33	330.94	352.78	NI
18-Apr-01	418.76	329.42	328.63	333.57	334.36	354.22	NI
26-Oct-01	412.53	329.04	327.94	330.57	330.23	350.92	NI
13-Jun-02	413.70	328.38	327.41	330.21	330.29	351.04	NI
19-Nov-02	413.40	329.25	328.35	331.57	337.17	350.94	NI
27-Jun-03	423.61	329.57	328.93	334.24	333.99	355.21	NI
29-Dec-03	420.23	329.70	329.11	334.49	334.78	354.92	NI
30-Jun-04	418.81	329.38	328.48	332.26	331.39	353.10	NI
28-Dec-04	418.02	329.50	328.91	333.45	334.14	355.14	NI
29-Jun-05	418.81	329.10	329.26	331.62	330.90	352.76	NI
29-Dec-05	413.38	329.29	328.71	332.78	334.27	351.52	NI
27-Jun-06	414.75	329.17	328.40	332.18	333.56	353.43	NI
28-Dec-06	415.54	329.40	328.86	333.57	335.24	354.02	NI
12-Jul-07	438.64	328.69	327.97	331.31	330.52	352.30	NI
18-Dec-07	412.59	328.94	328.08	330.32	327.92	347.90	306.54
8-Jul-08	414.52	329.20	326.00	331.46	330.85	351.03	NM
17-Dec-08	412.79	329.39	328.84	333.15	335.03	350.82	NM
9-Jul-09	417.16	329.17	329.48	332.30	331.36	352.17	310.12
16-Dec-09	418.11	329.55	329.09	334.57	336.94	352.87	NM
24-Jun-10	422.42	329.41	328.77	333.65	333.15	353.62	NM
13-Dec-10	415.96	329.49	328.85	332.81	330.34	350.08	NM
20-Jun-11	416.00	328.95	328.18	336.77	331.38	351.83	NM
5-Dec-11	412.94	329.31	328.65	332.32	329.51	349.87	NM
11-Jun-12	414.56	329.10	328.35	332.52	331.33	351.75	312.50
12-Dec-12	412.83	329.19	328.36	331.67	330.35	349.48	NM
1-May-13	415.69	329.65	329.13	334.49	335.15	353.63	317.11
5-Aug-13	417.97	329.02	328.41	333.32	332.83	353.01	NM
24-Feb-14	415.81	329.68	329.17	334.48	331.63	351.78	316.15
11-Aug-14	416.23	329.38	328.48	332.04	329.08	350.08	310.93
10-Mar-15	417.09	329.87	329.45	335.07	336.42	353.13	317.55
17-Aug-15	417.71	328.65	327.81	331.05	327.73	347.63	308.80

Notes: TOC = Top of casing. Groundwater levels and well depth are measured from TOC
NM = Water level not measured. Groundwater elevations in feet above mean sea level.
NI = Well not yet installed.

TABLE 3: ESTIMATED HYDRAULIC GRADIENTS AND GROUNDWATER FLOW VELOCITIES

Based on Water Level Data obtained on:	**August 17, 2015**						
GRADIENT CALCULATION SEGMENT	FLOW LINE LENGTH (feet)	FLOW DIRECTION	GROUND-WATER ELEVATION (feet)	HORIZ. GRADIENT, **i** (ft/ft)	HYDRAULIC CONDUCTIVITY, **K** (ft/day)	EFFECTIVE POROSITY $\mathbf{n_e}$	LINEAR VELOCITY, **V** (ft/year)
i_1	1426	ESE	410 340	0.0491	6.18E-02	0.18	6.16
i_2	1633	SE	400 320	0.0490	6.18E-02	0.18	6.14
i_3	1612	SSE	410 320	0.0558	6.18E-02	0.18	7.00
			Average	0.0513		Average	6.43

Notes:
Hydraulic conductivity (K) value is the average of results from slug-tests conducted in 1994 (GAI, 1994).
Effective Porosity based on average of 90% of reported Total Porosity (GAI, 1995) for soils, or 10% (estimated) for fractured rock.
Linear flow velocity = Ki/n (modified Darcy equation).

TABLE 4: Exceedances of Groundwater Standards (Aug. 2013 - Aug. 2015)

WELL ID	PARAMETER	RESULT	UNITS	METHOD	SWSL	NC2L/*GWPS	GPS	DATE
3902-MW2R	Cobalt	24.7	ug/L	EPA 6010	10	1	130	8/5/2013
	Benzene	**1.6**	ug/L	EPA 8260	1	1	1	8/5/2013
3902-MW5	Cobalt	50.9	ug/L	EPA 6010	10	1	130	8/5/2013
3902-MW1R	Antimony	8.8	µg/L	EPA 6010	6	1	59	2/24/2014
3902-MW2R	Cobalt	18.4	µg/L	EPA 6010	10	1	130	2/24/2014
	Benzene	**1.4**	µg/L	EPA 8260	1	1	1	2/24/2014
3902-MW2R	Antimony	10.5	µg/L	EPA 6010	6	1	59	8/14/2014
	Benzene	**1.7**	µg/L	EPA 8260	1	1	1	8/14/2014
3902-MW3R	Antimony	8.0	µg/L	EPA 6010	6	1	59	8/14/2014
3902-MW5	Cobalt	46.3	µg/L	EPA 6010	10	1	130	8/14/2014
3902-MW2R	Antimony	7.1	µg/L	EPA 6010	6	1	58	3/10/2015
	Benzene	**1.3**	µg/L	EPA 8260	1	1	1	3/10/2015
3902-MW3R	Antimony	6.5	µg/L	EPA 6010	6	1	58	3/10/2015
3902-MW5	Cobalt	39.2	µg/L	EPA 6010	10	1	130	3/10/2015
3902-MW2R	Antimony	6.2	µg/L	EPA 6010	6	1	56	8/17/2015
	Benzene	**1.5**	µg/L	EPA 8260	1	1	1	8/17/2015
3902-MW5	Cobalt	116	µg/L	EPA 6010	10	1	130	8/18/2015

NOTES: All Results in micorgrams per liter (µg/L)
SWSL = NC Soild Waste Section Reporting Limit
NC2L = NC Groundwater Standard from 15A NCAC 2L.0202
GWPS = NC Solid Waste Section Groundwater Protection Standard (for constituents with no NC2L)
GPS = Groundwater Protection Standard as defined by 15A NCAC 13B.1634(g)
GPS for antimony and cobalt are based on the statistical backgound for the facility.
Bold = GPS Exceedance.

TABLE 5: MONITORED NATURAL ATTENUATION PARAMETERS

					Background	Downgradient					Sentinel
Parameter	**Date**	**Units**	**DL**	**RL**	**MW-1R**	**MW-2R**	**MW-3R**	**MW-4**	**MW-5**	**MW-6**	**NES-1**
Temperature	12/30/03	ºC	-	-	15.4	11.1	11.2	12.5	13.6	14.2	-
(FP)	12/19/07	ºC	-	-	12.3	12.5	13.1	14.4	14.9	14.4	13.3
	05/01/13	ºC	-	-	15.7	13.7	15.1	14.4	14.2	14.2	12.5
	08/14/14	ºC	-	-	17.8	18.0	19.2	19.4	16.8	17.2	16.0
	03/10/15	ºC	-	-	17.3	16.0	15.9	13.8	13.3	13.7	16.1
	08/18/15	ºC	-	-	16.4	17.8	17.8	17.3	16.5	16.6	16.1
pH	12/30/03	SU	-	-	7.31	6.54	6.81	6.90	7.24	7.29	-
(FP)	12/19/07	SU	-	-	6.89	6.90	7.07	6.87	7.39	6.67	7.64
	05/01/13	SU	-	-	7.32	6.37	6.61	6.42	6.92	7.13	6.10
	08/14/14	SU	-	-	5.84	6.36	6.96	6.79	7.00	6.48	5.59
	03/10/15	SU	-	-	6.11	6.37	6.56	6.30	6.25	6.55	5.68
	08/18/15	SU	-	-	5.12	6.68	6.48	6.76	7.03	6.78	4.94
Conductivity	12/19/07	µS/cm	-	-	96	1,964	1,591	1,245	-	-	510
(FP)	05/01/13	µS/cm	-	-	111	1,587	1,357	1,150	195	594	69.6
	08/14/14	µS/cm	-	-	231	1,897	1,534	1,413	522	565	172.6
	03/10/15	µS/cm	-	-	90	996	1,277	1,186	106	504	114
	08/18/15	µS/cm	-	-	134	1,630	1,680	1,244	617	534	83
Redox Potential	12/30/03	mV	-	-	257.2	76.2	207.6	212.7	187.3	123.6	-
ORP	12/19/07	mV	-	-	146	45.0	142	134	-	-	138
(FP)	05/01/13	mV	-	-	111.7	-26.7	55.2	120.5	-	-	227.1
	08/14/14	mV	-	-	115.8	-37.2	86.9	-	-	-	-
	03/10/15	mV	-	-	87.0	0.8	56.3	-	-	-	96.7
	08/18/15	mV	-	-	134.7	-96.3	-68.8	-33.9	-49.9	-	182.8
Dissolved Oxygen	12/30/03	mg/L	-	-	9.49	4.84	26.19	24.19	15.31	20.17	-
DO	12/19/07	mg/L	-	-	-	1.88	1.44	3.21	-	-	0.70
(FP)	05/01/13	mg/L	-	-	4.40	1.37	1.79	4.65	-	-	2.90
	08/14/14	mg/L	-	-	4.44	3.26	2.48	-	-	-	2.80
	03/10/15	mg/L	-	-	3.84	1.47	1.80	-	-	-	1.85
	08/18/15	mg/L	-	-	4.95	5.75	1.30	-	3.79	-	1.77
Dissolved CO_2	12/19/07	mg/L	-	-	25	365	175	295	-	-	60
(FP)	05/01/13	mg/L	-	-	30.0	245	125	225	-	-	45
	08/14/14	mg/L	-	-	60.0	390	185	-	-	-	75
	03/10/15	mg/L	-	-	50.0	110	75	-	-	-	50
	08/18/15	mg/L	-	-	30.0	275	125	-	-	-	60
Fe, Ferrous (+2)	12/30/03	mg/L	-	-	ND	1.5	ND	ND	0.22	ND	-
(FP)	12/19/07	mg/L	-	-	ND	7.2	ND	ND	-	-	0.2
	05/01/13	mg/L	-	-	0.0	1.0	0.0	0.0	-	-	0.0
	08/14/14	mg/L	-	-	0.0	2.5	0	-	-	-	0.0
	03/10/15	mg/L	-	-	0.0	5.3	0	-	-	-	0.0
	08/18/15	mg/L	-	-	0.0	4.5	1	-	-	-	0.0
Alkalinity (as CaCO3)	12/30/03	mg/L	9.00	10.0	37.0	800	690	640	68.0	350	-
	12/19/07	mg/L	-	5.00	39.0	763	726	619	-	-	190
	05/01/13	mg/L	1.00	5.00	43.4	757	660.0	645.0	-	-	10.4
	08/14/14	mg/L	1.00	5.00	41.1	784.0	661.0	-	-	-	14.5
	03/10/15	mg/L	1.00	5.00	38.0	744.0	653.0	-	-	-	8.8
	08/18/15	mg/L	1.00	5.00	37.8	772.0	664.0	-	-	-	10.3
Chloride	12/30/03	mg/L	0.200	1.00	3.50	280	170	82.0	13.0	44.0	-
	12/19/07	mg/L	-	5.00	ND	13.1	297	89.1	-	-	7.90
	05/01/13	mg/L	0.5	1.00	3.54	258	180	123	-	-	2.85
	08/14/14	mg/L	0.5	1.00	5.53	264	144	-	-	-	5.00
	03/10/15	mg/L	0.5	1.00	3.80	266	194	-	-	-	4.09
	08/18/15	mg/L	0.5	1.00	4.69	267	178	-	-	-	3.90

TABLE 5: MONITORED NATURAL ATTENUATION PARAMETERS

					Background	Downgradient					Sentinel
Parameter	**Date**	**Units**	**DL**	**RL**	**MW-1R**	**MW-2R**	**MW-3R**	**MW-4**	**MW-5**	**MW-6**	**NES-1**
Dissolved Hydrogen	05/01/13	nM	0.074	0.60	0.400	0.630	0.610	0.500	-	-	0.470
	08/14/14	nM	0.13	0.60	1.4	1.6	5.4	-	-	-	1.4
	03/10/15	nM	0.13	0.60	1.2	1.4	1.4	1.0	-	-	1.4
	08/18/15	nM	0.13	0.60	1.7	2.2	1.7	-	-	-	1.5
Nitrate-N	12/30/03	mg/L	0.0200	0.0500	0.120	ND	ND	ND	ND	0.13	-
	12/19/07	mg/L	-	0.100	ND	ND	ND	ND	-	-	13.0
	05/01/13	mg/L	0.001	10.0	0.163	ND	ND	ND	-	-	3.58
	08/14/14	mg/L	0.001	10.0	0.115 J	ND	ND	-	-	-	2.02 J
	03/10/15	mg/L	0.001	10.0	0.252 J	ND	ND	-	-	-	2.56 J
	08/18/15	mg/L	0.001	10.0	.124 J	ND	ND	-	-	-	3.27 J
Sulfate	12/30/03	mg/L	0.0600	2.00	ND	ND	ND	2.60	9.60	9.00	-
	12/19/07	mg/L	-	5.00	ND	ND	ND	ND	-	-	36.8
	05/01/13	mg/L	1	250	ND	ND	ND	4.69	-	-	10.7
	08/14/14	mg/L	1	250	1.08 J	1.2 J	ND	-	-	-	5.84 J
	03/10/15	mg/L	1	250	1.52 J	1.13 J	1.52 J	-	-	-	7.04 J
	08/18/15	mg/L	1	250	1.56 J	1.31 J	2.49 J	-	-	-	524 J
Sulfide	08/14/14	mg/L	0.05	1.00	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.05	1.00	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.05	1.00	ND	ND	ND	-	-	-	1.0
Total Organic Carbon	12/19/07	mg/L	-	1.0 *	2.9	54.3	23.2	17.2	-	-	7.20
	05/01/13	mg/L	0.5	1.00	2.24	29.5	30.0	19.4	-	-	5.74
	08/14/14	mg/L	0.5	1.00	ND	229.00	25.5	-	-	-	8.39
	03/10/15	mg/L	0.5	1.00	.781J	34.8	9.5	-	-	-	1.88
	08/18/15	mg/L	0.5	1.00	0.917J	32.9	9.86	-	-	-	27.80
Biochemical Oxygen Demand BOD	08/14/14	mg/L	2.0	2.00	ND	83.4	2.49	-	-	-	-
	03/10/15	mg/L	2.0	2.00	2.55	10.6	ND	-	-	-	ND
	08/18/15	mg/L	2.0	2.00	2.22	11.8	2.0	-	-	-	2.00
Chemical Oxygen Demand COD	08/14/14	mg/L	12.5	25.0	ND	132.0	ND	-	-	-	50.00
	03/10/15	mg/L	12.5	25.00	15.0J	235.0	96.0	-	-	-	ND
	08/18/15	mg/L	12.5	25.00	25.00	110.0	756.0	-	-	-	25.00
Dissolved Ethane	12/30/03	mg/L	0.0002	0.0010	ND	ND	ND	ND	ND	ND	-
	12/19/07	mg/L	-	20.0	ND	ND	ND	ND	-	-	ND
	05/01/13	mg/L	0.0031	0.0062	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	0.0031	0.0062	ND	ND	0.0036 J	-	-	-	ND
	03/10/15	mg/L	0.0031	0.0062	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.0031	0.0062	0.01	0.01	0.01	-	-	-	0.01
Dissolved Ethene	12/01/03	mg/L	0.0003	0.0010	ND	ND	ND	ND	ND	ND	-
	12/19/07	mg/L	-	20.0	ND	ND	ND	ND	-	-	ND
	05/01/13	mg/L	0.0031	0.0062	ND	ND	0.0017	ND	-	-	ND
	08/14/14	mg/L	0.0031	0.0062	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.0031	0.0062	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.0031	0.0062	0.01	0.01	0.01	-	-	-	0.01
Dissolved Methane	12/30/03	mg/L	0.0002	0.0010	ND	0.660	0.130	0.0099	0.0010	ND	-
	12/19/07	mg/L	-	10.0	ND	0.116	0.186	ND	-	-	ND
	05/01/13	mg/L	0.0033	0.0066	ND	0.0379	0.100	0.0337	-	-	ND
	08/14/14	mg/L	0.0033	0.0066	ND	1.2900	0.284	-	-	-	ND
	03/10/15	mg/L	0.0033	0.0066	0.0072	0.9960	0.158	-	-	-	ND
	08/18/15	mg/L	0.0033	0.0066	0.0027	2.16	0.316	-	-	-	0.0013

TABLE 5: MONITORED NATURAL ATTENUATION PARAMETERS

					Background	Downgradient					Sentinel
Parameter	**Date**	**Units**	**DL**	**RL**	**MW-1R**	**MW-2R**	**MW-3R**	**MW-4**	**MW-5**	**MW-6**	**NES-1**
Pyruvic Acid	12/19/07	mg/L			2.50	ND	1.50	2.00	-	-	1.20
	05/01/13	mg/L	2	10	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	0.77	10	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.77	10	0.41J	0.41J	0.41J	-	-	-	0.41J
	08/18/15	mg/L	0.77	10	ND	ND	ND	-	-	-	ND
Lactic Acid	12/19/07	mg/L			ND	5.40	11.9	3.10	-	-	ND
	05/01/13	mg/L	2.3	25	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	2.5	25	4.2 J	ND	ND	-	-	-	ND
	03/10/15	mg/L	2.5	25	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	2.5	25	ND	ND	ND	-	-	-	ND
Acetic Acid	12/19/07	mg/L			ND	ND	ND	ND	-	-	ND
	05/01/13	mg/L	1.8	5	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	0.81	5.0	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.81	5.0	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.81	5.0	ND	ND	0.97 J	-	-	-	ND
Propionic Acid	12/19/07	mg/L			ND	63.7	38.3	12.8	-	-	ND
	05/01/13	mg/L	1	5	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	0.66	5.0	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.66	5.0	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.66	5.0	ND	ND	ND	-	-	-	ND
Butyric Acid	12/19/07	mg/L			ND	ND	ND	ND	-	-	ND
	05/01/13	mg/L	0.87	5	ND	ND	ND	ND	-	-	ND
	08/14/14	mg/L	0.70	5.0	ND	ND	ND	-	-	-	ND
	03/10/15	mg/L	0.70	5.0	ND	ND	ND	-	-	-	ND
	08/18/15	mg/L	0.70	5.0	ND	ND	ND	-	-	-	ND
Total Volatile Fatty Acids	12/19/07	mg/L			2.50	69.10	51.70	17.90	-	-	1.20
(sum of above 5 acids)	05/01/13	mg/L			ND	ND	ND	-	-	-	ND
	08/14/14	mg/L			4.2 J	ND	ND	-	-	-	ND
	03/10/15	mg/L			ND	ND	ND	-	-	-	ND
	08/18/15	mg/L			ND	ND	0.97 J	-	-	-	ND

NOTES:

DL = laboratory detection limit.
RL = laboratory reporting limit.
ND = not detected above detection limit.
J = estimated concentration between the DL and the RL.
- = not analyzed.

mg/L = milligrams per liter
mV = millivolt
SU = standard unit
nM = nano-Molar

ºC = degress Celcius
µS/cm = micro-Siemen per centimeter
ntu = nephelometric turbidity units

DL and QL for Alkalinity for Dec. 03 event was 1 and 2 respectively for wells MW-2R, -3R, and -4 due to different methods used by the labrotory.
* = RL for MW-1R - 1.0, MW-2R - 5.0, MW-3R - 5.0, MW-4 - 2.0, NES-1 - 5.0.
Methane in December 2007 was out of hold time for MW-2R, MW-3R, MW-4, and NES-1.

CHART

Chart 1 Benzene Concentrations vs. Time

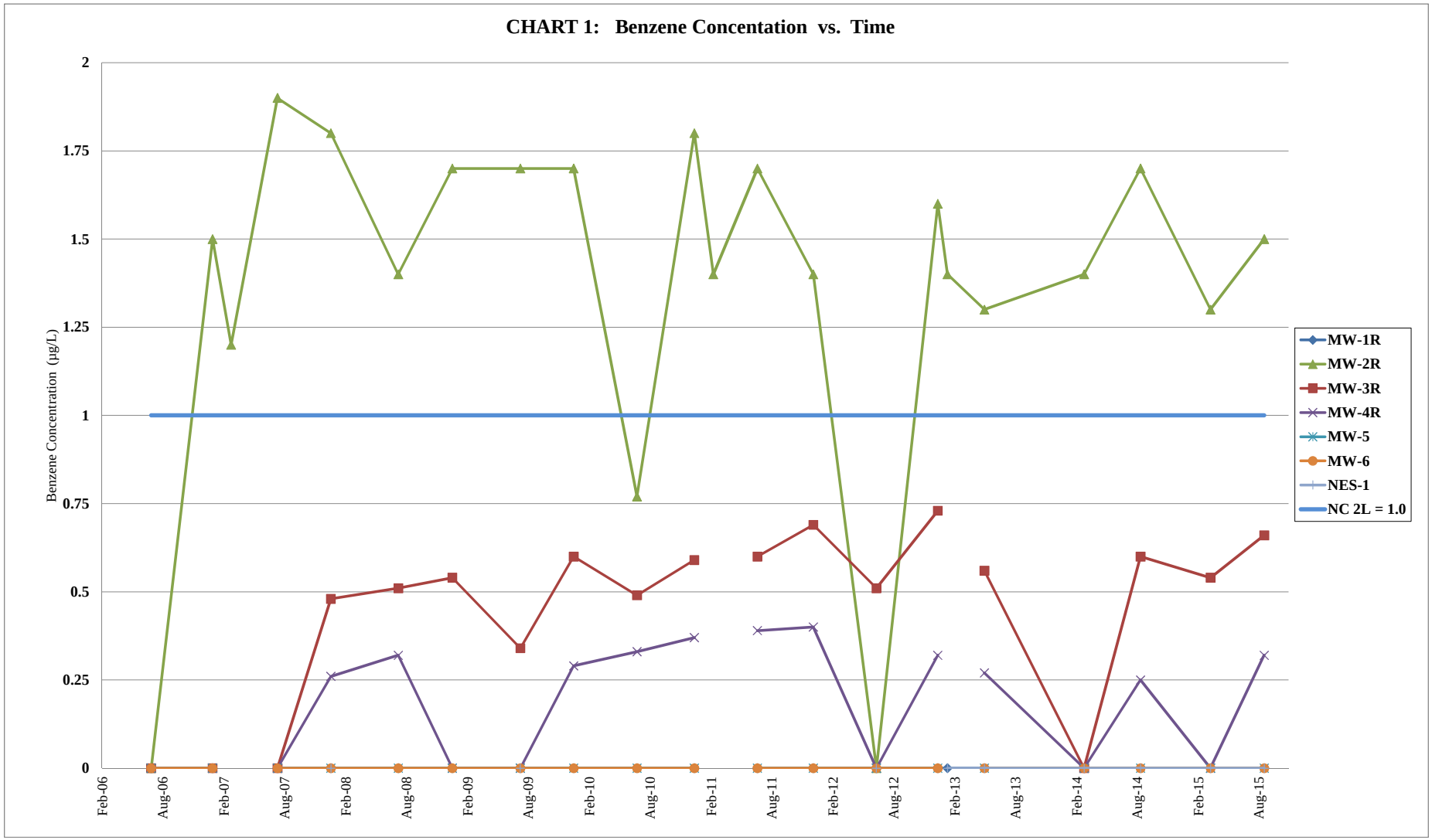
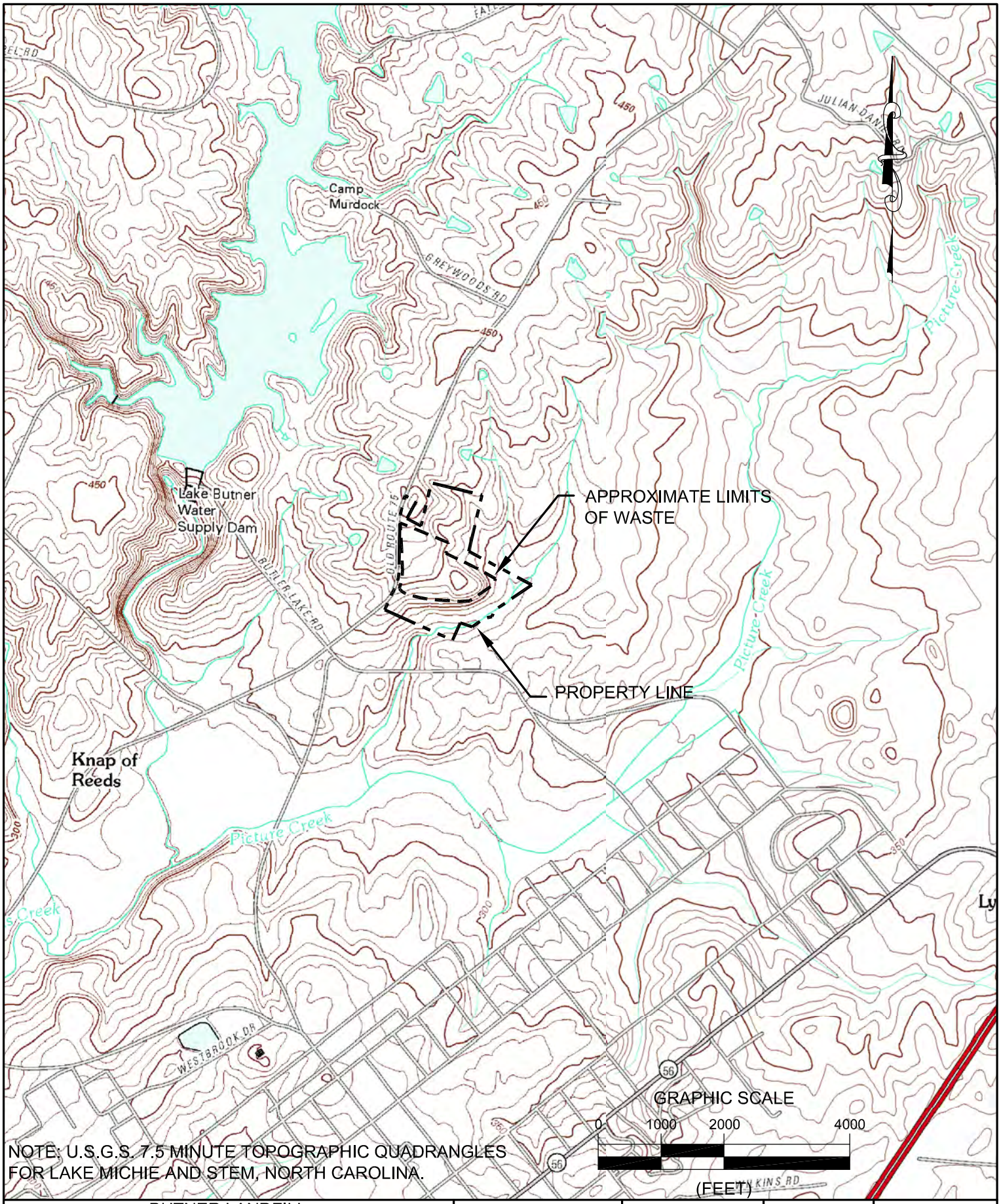


CHART 1: Benzene Concentation vs. Time
Benzene Concentration (µg/L)
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
Feb-06
Aug-06
Feb-07
Aug-07
Feb-08
Aug-08
Feb-09
Aug-09
Feb-10
Aug-10
Feb-11
Aug-11
Feb-12
Aug-12
Feb-13
Aug-13
Feb-14
Aug-14
Feb-15
Aug-15
MW-1R
MW-2R
MW-3R
MW-4R
MW-5
MW-6
NES-1
NC 2L = 1.0

FIGURES

Figure 1 Site Location Map
Figure 2 Geologic Map



NOTE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES FOR LAKE MICHIE AND STEM, NORTH CAROLINA.

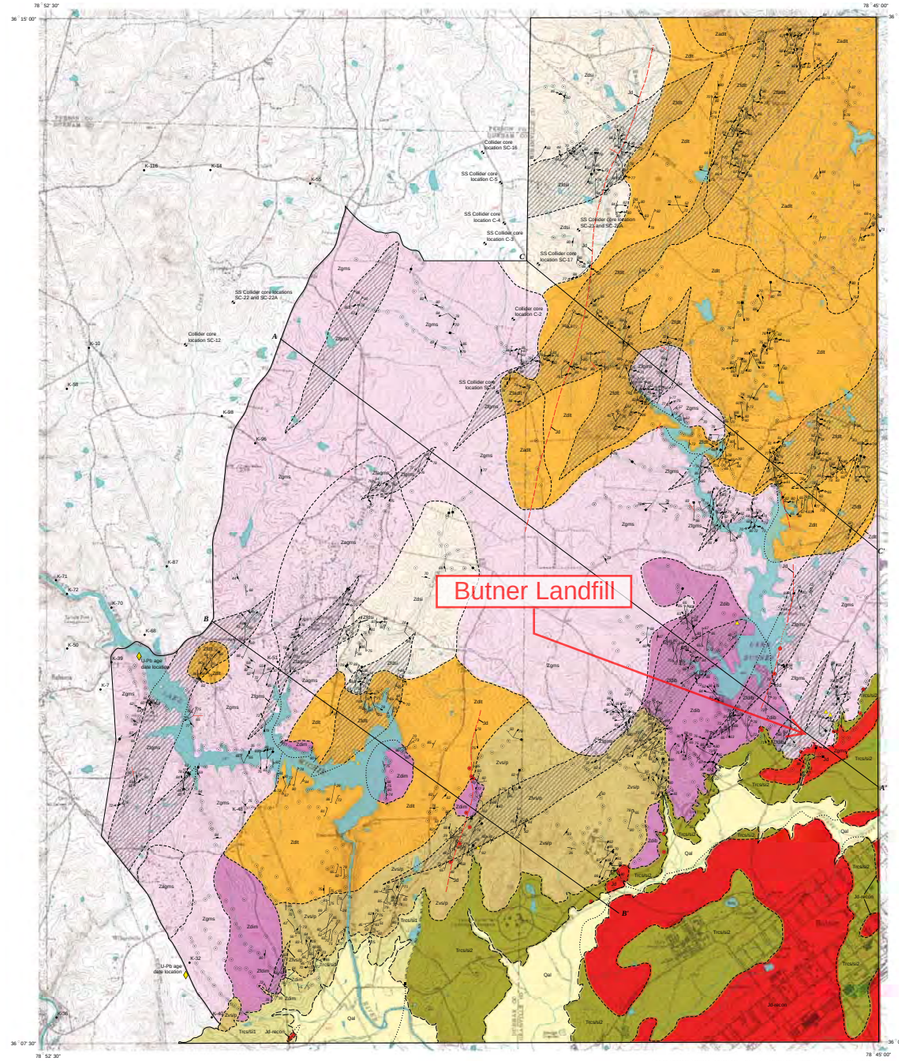
BUTNER LANDFILL GRANVILLE COUNTY, NORTH CAROLINA	JOYCE ENGINEERING 2211 W. MEADOWVIEW ROAD GREENSBORO, NC 27407 PHONE: (336) 323-0092	DESIGNED HRW DRAWN HRW CHECKED ACE APPROVED GVB DATE 11/04/14	SCALE 1" = 2000'	PROJECT NO. 660
SITE LOCATION MAP		© 2014 Joyce Engineering, Inc. All rights reserved.	NC CORP LIC: C-0782	FIGURE NO. 1

L:\Granville\dwg\Butner\, Site Location Maps.dwg

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES
TRACY E. DAVIS, DIRECTOR
KENNETH B. TAYLOR, STATE GEOLOGIST

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

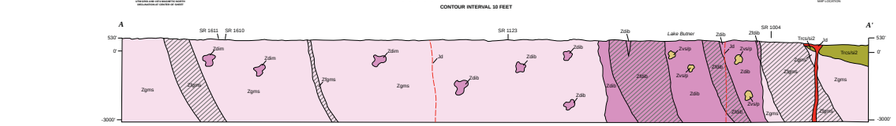
NORTH CAROLINA GEOLOGICAL SURVEY
OPEN FILE REPORT 2012-01



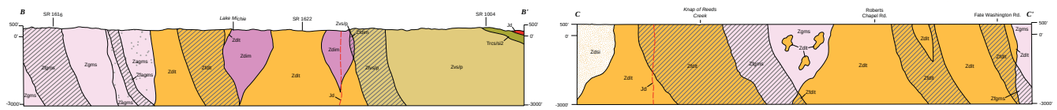
Geology mapped between January and May, 2010; January and August, 2011; January and August 2012.
This map supersedes NCGS Open File Report 2012-09.

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET



cross section scale: 1:24 000 elevation in feet no vertical exaggeration



Base topographic map is a digital raster graphic image of the Lake Michie 7.5-minute quadrangle (1977), Lambert Conformal Conic projection.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, award numbers G10AC00425 and G11AC20296. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Disclaimer:
This Open-File report is preliminary and has been reviewed internally for conformity with the North Carolina Geological Survey editorial standards and in accordance with the North American Stratigraphic Code. There may be further revisions or corrections to this preliminary map.

INTRODUCTION

The pre-Mesozoic crystalline rocks of the Lake Michie 7.5-minute Quadrangle are part of the Virgilina sequence of the Carolina terrane, specifically the upper portion (ca. 615 Ma) of the Hyco Formation (Wortman and others, 2001; Hibbard and others 2002; Bradley and Miller, 2011). These rocks are metamorphosed to the chlorite zone of the lower greenschist facies during Late Precambrian and Paleozoic tectonothermal activity. Only Late Triassic sedimentary rocks and Jurassic diabase are not regionally metamorphosed, although contact metamorphic effects occur locally where diabase intrudes sedimentary rocks. While subjected to this low-grade metamorphism and locally displaying fracture, foliation, and lineation, most crystalline rocks preserve relict plutonic, volcanic, or volcanogenic sedimentary textures, which when combined with bulk rock compositions, allow for protolith identification. Therefore, the prefix "meta" is not included in the nomenclature of the pre-Mesozoic rocks described in the quadrangle. In some exposures, especially adjacent to the western boundary of the Deep River Mesozoic rift basin, highly partitioned strain produces either variably fractured, phyllonitic, or protomylonitic and mylonitic rocks of meta-igneous origin. Local outcrops of highly silicified, epidotized, and/or sericitized, or silicified-epidotized cataclasite rock have unclear protolith affinity. All sedimentary rocks of Mesozoic and Cenozoic age have a detrital origin involving mud- to gravel-sized clasts.

The classification and naming of metaigneous rocks in the Lake Michie 7.5-minute Quadrangle uses the nomenclature of the International Union of Geological Sciences (IUGS) subcommission on the systematics of igneous rocks after Le Maitre (2002). Relict igneous textures, modal mineral assemblages, or normalized mineral assemblages when whole-rock geochemical data are available, provide the basis for naming meta-igneous lithodemes. A preliminary lithodemic designation is developed here following Articles 31-42 of the North American Stratigraphic Code. These rock units, which lack in geochronologic data and stratigraphic facing directions, warrant such a designation. Past maps and lithologic descriptions of McConnell and Glover (1982), Blake and others (2009), and Bradley and others (2011) assisted the development of the current U.S. Geological Survey STATEMAP mapping results.

SEDIMENTARY UNITS

Qal – **alluvium**: Tannish-yellow to gray to reddish-brown, unconsolidated, and poorly sorted and stratified deposits of angular to subrounded clay, silt, sand and gravel- to cobble-sized clasts. Deposits generally occur in major stream drainages and around the shorelines of Lake Michie and Lake Butner.

Trcsa1 – **sandstone with interbedded siltstone and conglomerate of the Chatham Group Lithofacies Association 1**: Pinkish-gray, light gray, and light tan; fine- to coarse-grained, micaceous, slightly clayey, moderately poor to moderately well sorted, subangular to subrounded arkose and lithic arkose; maroon, very silty, micaceous, moderately well sorted, fine-grained sandstone; maroon, massive, and thickly laminated, micaceous to very micaceous siltstone and mudstone; and poorly sorted, angular to subrounded metavolcanic- and metaplutonic -clasts conglomerate derived from surrounding meso-igneous crystalline rocks that may be clast or matrix supported with reddish-brown to tannish-brown to pinkish-brown, medium- to coarse-grained, poorly to well sorted sandstone, micaceous siltstone or mudstone. Beds are massive or locally thinly bedded, wacy, or cross bedded. Rocks are assigned to the Lithofacies Association 1 of Hoffman and Gallagher (1989) and have been extended into the Michie Quadrangle to edge-match with the Northeast Durham Geologic map (Phillips et al., 2004 (revised 2010)).

Trcsa2 – **sandstone with interbedded siltstone of the Chatham Group Lithofacies Association II**: Cyclical depositional sequences of whitish-yellow to grayish-pink to pale red, coarse- to very coarse-grained, trough cross-bedded lithic arkose that fines upward through yellow to reddish-brown, medium- to fine-grained sandstone, to reddish-brown, burrowed and rooted siltstone. Bioturbation is usually surrounded by greenish-blue to gray reduction halos. Coarse-grained portions contain abundant muscovite, and basal gravel lags consist of clasts of quartz, bluish-gray quartz crystal tuff, and mudstone rip-ups. These rocks are assigned to the Lithofacies Association II of Hoffman and Gallagher (1989) and have been extended into the Lake Michie Quadrangle to edge-match with the Northeast Durham Geologic map (Phillips et al., 2004 (revised 2010)).

FAULT ZONE UNITS

PCsc – **silicified and epidotized cataclasite**: White, tan, tan-green and pale-green, silicified, epidotized, and highly fractured zones containing mm- to cm-scale, angular silicified and locally original protolith clasts. Silicified and epidotized clasts of metamophosed diorite, tonalite, granodiorite, and dacite have been observed. Extensional veins filled with syntaxial rhombohedral quartz prisms and epidote common. In many samples, silicification and epidotization is so extensive protolith relationships are completely obscured; in some samples, epidote invades and overprints the crystalline rocks as diffuse, fine-grained mineral domains reminiscent of fluid fronts. Considered to be Mesozoic or Cenozoic in age, but may also be attributed to middle or late Paleozoic deformation.

INTRUSIVE AND META-INTRUSIVE UNITS

Jd – **diabase**: Black to greenish black, fine to medium phaneritic or aphanitic, dense, consists primarily of plagioclase, augite and may contain olivine. Occurs as dikes and sills and is typically seen as spheroidally weathered stream boulders and cobbles. Weathered surfaces are generally brownish to grayish in color. Red station location indicates outcrop or boulders of diabase.

Jd-recon – **diabase reconnaissance**: Jurassic diabase from reconnaissance and geophysical data as depicted in Gottfried, et al., (1991).

Zdsi – **dacitic shallow intrusions**: Gray-green, light green to green, greenish-gray to light gray; plagioclase porphyritic aphanitic dacite, aphanitic dacite and micro-granodiorite. Plagioclase phenocrysts range from less than 1 mm to 5 mm and are commonly sassuritized. Blocky, less than 1 mm to 3mm quartz also occur as phenocrysts. Contains lesser amounts of dark gray, phenocryst poor aphanitic dacite. Leucocratic (CI=5-30) granodiorite ranges from fine to medium crystalline. Major minerals include plagioclase, alkali feldspar, quartz and lesser amounts of biotite. This unit is interpreted as shallowly emplaced dacite/granodiorite and is distinguished from Zdb by the abundance of dacitic lava/shallow intrusive and the disappearance of tuff. Silicification, sulfide mineralization, and aggregates of white mica and quartz highlight steeply dipping and plunging foliation and lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (**Zdbs**).

Zgns – **granodiorite tonalite of the Stem and Moriah plutons**: Leucocratic (CI=5-15), light tan-gray white, bluish-gray white, or pinkish-white, medium- to coarse phaneritic, hypidiomorphic to xenomorphic granular granodiorite and tonalite. This unit combines the previously mapped Zsig unit in the Stem (Blake and others, 2009) and eastern Lake Michie Quadrangles and the Moriah pluton of McConnell (1974) in the western portion of the Lake Michie Quadrangle. Major minerals include plagioclase, alkali feldspar, and quartz with lesser amounts of biotite and amphibole, interpreted to be hornblende. Plagioclase is highly sericitized and in lesser amount sassuritized, especially in calcic-rich phenocryst cores. Alkali feldspar typically displays granophyric texture in thin sections. If present, biotite is commonly recrystallized to chlorite while hornblende may be recrystallized to chlorite, epidote, and actinolite-opaque mineral. Metamorphosed trondhjemite and monzonite pods are present and may represent dikes or differentiated portions of the plutons. Locally becomes granitic in the western portion surrounding Lake Michie. Outcrops locally contain enclaves of microdiorite of the Zdim and Zdib units. Locally, mm- to cm-scale granite dikes crosscut granodiorite. Wortman et al. (2000) report a 613.4 +2.8/-2 Ma U-Pb zircon date from granite and a 613.9 +1.6/-1.5 Ma U-Pb zircon date from diorite sampled from the Moriah pluton in the western portion of the Lake Michie Quadrangle. Aggregates of white mica, quartz, plagioclase, and orthoclase highlight steeply dipping foliation and dip-parallel lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (**Zgns**). This unit is correlative to the Zmpf unit of Bradley and others (2011) in the adjacent Rougemont 7.5-minute Quadrangle.

Zgms – **altered granodiorite and granite of the Moriah pluton**: Leucocratic (CI=10-30), light pinkish gray to gray, fine- to medium-phaneritic, equigranular to porphyritic granodiorite and granite that is highly recrystallized and hydrothermally and chemically altered. Major minerals forming a relict xenomorphic granular phaneritic texture likely included plagioclase, alkali feldspar, and quartz that are now combinations of fine to medium crystalline, foliated and non-foliated domains of white mica and recrystallized feldspar and quartz. Outcrops, and more commonly float cobbles and boulders display apparent silicification, while other samples display chemical weathering that develops predominantly clay mineralization mixed with silica. Some rocks additionally display Fe-oxide-hydroxide staining. Unit interpreted to be a hydrothermally recrystallized and altered portion of Zgns. Domains of highly foliated rocks of this unit are separated as **Zlagm**.

Zdib – **diorite of the Butner pluton**: Mesocratic to melanocratic (CI=40-70), greenish-gray to grayish-green to green, fine- to medium-phaneritic diorite, microdiorite and quartz diorite. Textures range from equigranular to porphyritic with hypidiomorphic to xenomorphic granular plagioclase and hornblende phenocrysts ranging up 1-3 mm in tabular length. Major minerals include plagioclase and amphibole, interpreted to be hornblende. Plagioclase crystals are highly sassuritized and in lesser amounts sericitized. Some crystals display evidence of Ca-rich cores with Na-rich rims. Hornblende may be recrystallized to chlorite, epidote, and actinolite-opaque mineral. Locally contains 5-10% quartz classifying it as a quartz diorite. The western portion of the unit is typically fine grained, having crystal size increasing towards the east. Foliated metadacite enclaves are common within the intrusive unit. Silicification, sulfide mineralization, typically pyrite, and aggregates of white mica and quartz highlight steeply dipping and plunging foliation and lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (**Zdib**). Locally, highly leached and stained outcrops of pyrite-Fe-oxide-hydroxide mark these deformation zones. Texturally and mineralogically equivalent to Zdim.

Zdim – **diorite of the Moriah pluton**: Mesocratic to melanocratic (CI=40-70), greenish-gray to grayish-green to green, fine- to medium-phaneritic diorite, microdiorite and quartz diorite. Textures range from equigranular to slightly porphyritic with hypidiomorphic to xenomorphic granular plagioclase and hornblende phenocrysts ranging up to 1-3 mm in tabular and prismatic length, respectively. Major minerals include plagioclase and amphibole, interpreted to be hornblende. Plagioclase crystals are highly sassuritized and in lesser amounts sericitized. Hornblende may be recrystallized to chlorite, epidote, and actinolite-opaque mineral. Locally contains 5-10% quartz highlighting differentiated outcrops of quartz diorite. Foliated equivalent mapped as **Zfdim**. Texturally and mineralogically equivalent to Zdib.

METAVOLCANIC UNITS

Zvsip – **mixed volcanogenic sedimentary and pyroclastic rocks**: Grayish-green to greenish-gray, siltstone/mudstone, sandstone, and tuffaceous sandstone. Contains lesser amounts of fine- to coarse ash tuff and lapilli crystal lithic tuff. Siltstone is medium to thickly laminated (3mm-7mm) and alternate in color between greenish and greenish gray. Locally contains domains of massive magnetite rock and thinly laminated layered magnetite-enriched siltstone. Sandstone is generally massive with subangular to subrounded, moderately to well sorted quartz grains and felsic fragments. Tuffaceous sandstone is typically massive with moderately to poorly sorted, angular to subangular grains of plagioclase and quartz crystals. Pyroclastic tuff is generally massive and contains relict xenomorphic to subhidiomorphic plagioclase and quartz phenocrysts in a fine, recrystallized ash groundmass. Minor basaltic to andesitic lava/shallow intrusions occur locally in the southern portion of the mapped unit. The western and middle portion of the mapped unit is predominantly sedimentary; volcanic material occurs in the eastern portion of the unit in contact with metaplutonic rocks. Rocks are comparable to the Zvlp unit in the adjacent Rougemont Quadrangle immediately to the west (Bradley and others, 2011). Domains of highly foliated rocks of this unit are separated as **Zfvsip**.

Zdit – **dacitic lavas and tuffs**: Greenish-gray to dark gray to tannish gray, siliceous, aphanitic dacite tuff, porphyritic dacite, and flow banded dacite. Dacite is usually massive and ranges from fine ash to coarser plagioclase crystal tuff and lapilli tuff. Locally contains metalayers of immature pebbly to conglomeratic sandstone having lapilli-sized dacite clasts. Also contains outcrops of massive magnetite rock, usually found within close proximity to the contact with Zvsip. Porphyritic dacite contains plagioclase and hornblende phenocrysts ranging from 3 to 10 mm in prismatic and tabular length, respectively, set in a recrystallized aphanitic groundmass. Locally, dacite may display relict ash flow layering. Unit is correlative to the Zdb unit of Blake and others (2009) in the Stem Quadrangle and comparable to the Zdb unit of Bradley and others (2011) in the Rougemont Quadrangle. Silicification, sulfide mineralization, and aggregates of white mica and quartz highlight steeply dipping and plunging foliation and lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (**Zfdit**).

Zadit – **altered dacitic lavas and tuffs**: White to red to tan, siliceous, hydrothermally altered aphanitic dacite, porphyritic dacite, and dacite lavas of Zdit. Altered dacite is typically massive, finely crystalline and locally contains relict quartz and plagioclase phenocrysts ranging from 2 to 5 mm in size. Commonly siliceous concentrations give the rock a "chunky" appearance. Localized pyrophyllite mineralization occur as radiating crystals that range from 0.25mm to 1cm in size. Commonly Fe-oxide mineralization gives the rock a red color. Equivalent to the Zadb unit of Blake and others (2009) in the Stem Quadrangle to the East and the to the Zbat(u) unit of Bradley and others (2011) in the Rougemont Quadrangle to the West. Silicification, sulfide mineralization, and aggregates of white mica and quartz highlight steeply dipping and plunging foliation and lineation domains inferred to be highly fractured and/or phyllonitic and protomylonitic high strain zones (**Zfadit**).

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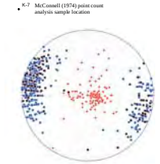
CONTACTS, FOLDS AND OTHER FEATURES

Lithologic contacts – Distribution and concentration of structural symbols indicates degree of reliability.

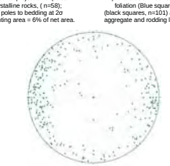
contact - location inferred
contact - location concealed
Qal contact
gradational contact
diabase contact - dashed where inferred, dotted where concealed
A A' cross section line

strike and dip of primary layering and/or bedding
strike and dip of primary layering and/or bedding (multiple observations at one locality)
strike of vertical primary layering and/or bedding
strike of vertical primary layering and/or bedding (multiple observations at one locality)
strike and dip of overprinting cleavage
strike and dip of overprinting cleavage (multiple observations at one locality)
strike of vertical overprinting cleavage (multiple observations at one locality)
strike and dip of inclined fracture surface
strike and dip of inclined fracture surface (multiple observations at one locality)
strike of vertical fracture surface
strike of vertical fracture surface (multiple observations at one locality)
strike and dip of shear fracture
strike and dip of foliation of enclave
strike of vertical foliation of enclave
strike and dip of inclined undifferentiated shear strain foliation
strike and dip of inclined undifferentiated shear strain foliation (multiple observations at one locality)
strike of vertical undifferentiated shear strain foliation
strike of vertical undifferentiated shear strain foliation (multiple observations at one locality)
Fault plane - normal
Fault plane - reverse
Fault plane - reverse (multiple observations at one locality)
strike and dip of quartz vein
strike of quartz vein
bearing and plunge of mineral rod or aggregate lineation
bearing of mineral rod or aggregate lineation
bearing and plunge of slickenline
station location
diabase station location
U-Pb age date location (Wortman and others, 2000)
Superconducting Super (SS) Collider core location (Wilson and Carpenter, 1997)
K-7 McConnell (1974) point count analysis sample location

Equal area Schmidt net projection of poles to bedding in crystalline rocks, (n=58); Kamb contour of poles to bedding at 2σ contour interval, counting area = 6% of net area.



Equal area Schmidt net projection of poles to shear foliation (Blue squares, n=435) and cleavage (black squares, n=101) and points to lines of mineral aggregate and rodding lineation (red circles, n=126).



Equal area Schmidt net of poles fractures, (n=341).

Scan with smartphone for link to GeoPDF of map. Third party App required.

GEOLOGIC MAP OF THE EASTERN AND CENTRAL PORTIONS OF THE LAKE MICHIE 7.5-MINUTE QUADRANGLE, DURHAM, GRANVILLE, AND PERSON COUNTIES, NORTH CAROLINA

By Daniel L. Rhodes, David E. Blake, Robert H. Morrow, Joshua D. April, Amy L. Gross, and Jacob M. Kendall.

Digital representation by Michael A. Medina and Philip J. Bradley

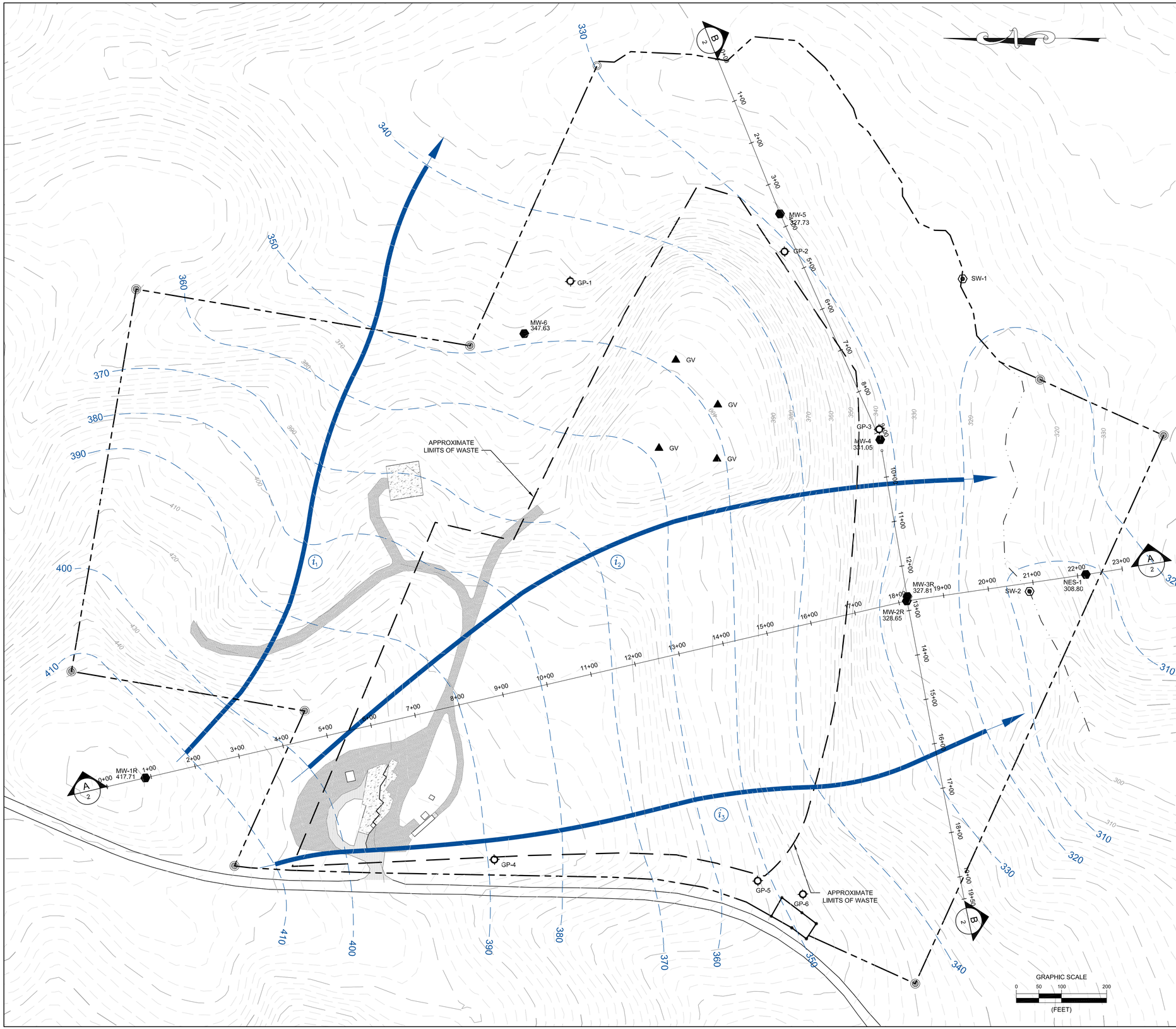
2012

Figure 2: Geologic Map

Corrective Action Plan, Butner Landfill, Permit # 39-02

DRAWINGS

Drawing 1	Groundwater Potentiometric Surface Map (August 2015)
Drawing 2	Benzene Isoconcentration Map (August 2015)
Drawing 3	Cross-sections A-A’ and B-B’ (August 2015)
Drawing 4	Tree Survey Results (April 2015)



LEGEND

130	EXISTING 25' TOPOGRAPHIC CONTOUR
	EXISTING 5' TOPOGRAPHIC CONTOUR
	PROPERTY LINE
	APPROXIMATE LIMITS OF WASTE
380	GROUNDWATER SURFACE CONTOUR (FEET ABOVE MEAN SEA LEVEL)
	GROUNDWATER FLOW DIRECTION WITH GRADIENT CALCULATION SEGMENT
	EXISTING ROAD
	CENTERLINE OF STREAM
MW-1R 417.71	GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION
i_1	SEGMENT USED FOR GRADIENT CALCULATIONS
GP-1	GAS PROBE LOCATION AND IDENTIFICATION
GV	GAS VENT
SW-1	SURFACE WATER MONITORING POINT
(NM)	NOT MEASURED

FLOW PATH LENGTH

i_1 = 1,426 LF

i_2 = 1,633 LF

i_3 = 1,612 LF

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 5 FEET
2. GROUNDWATER SURFACE CONTOUR INTERVAL = 5 FEET
3. STATIC WATER LEVELS MEASURED ON 08/18/15.
4. GROUNDWATER CONTOURS BASED ON KNOWN DATA, TOPOGRAPHIC CONTOURS, AND LINEAR INTERPOLATION AND EXTRAPOLATION FROM KNOWN FIELD CONDITIONS.
5. ELEVATION RELATIVE TO MEAN SEA LEVEL.
6. GROUNDWATER ELEVATION IS BASED ON A WELL SURVEY PERFORMED IN APRIL 2008
7. TOPOGRAPHIC CONTOURS SHOWN IN THIS MAP ARE BASED ON 2007 DATA OBTAINED FROM NCDOT WEBSITE.
8. BOUNDARY SURVEY PROVIDED BY BATEMAN CIVIL SURVEY COMPANY DATED MARCH 15, 2013.

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED VB
DRAWN RWH
CHECKED AE
APPROVED AE
DATE 09/09/15

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JOYCE ENGINEERING
2211 W. MEADOWVIEW ROAD
GREENSBORO, NC 27407
PHONE: (336) 323-0092
NC CORP LIC: C-0782

BUTNER LANDFILL
GRANVILLE COUNTY, NORTH CAROLINA

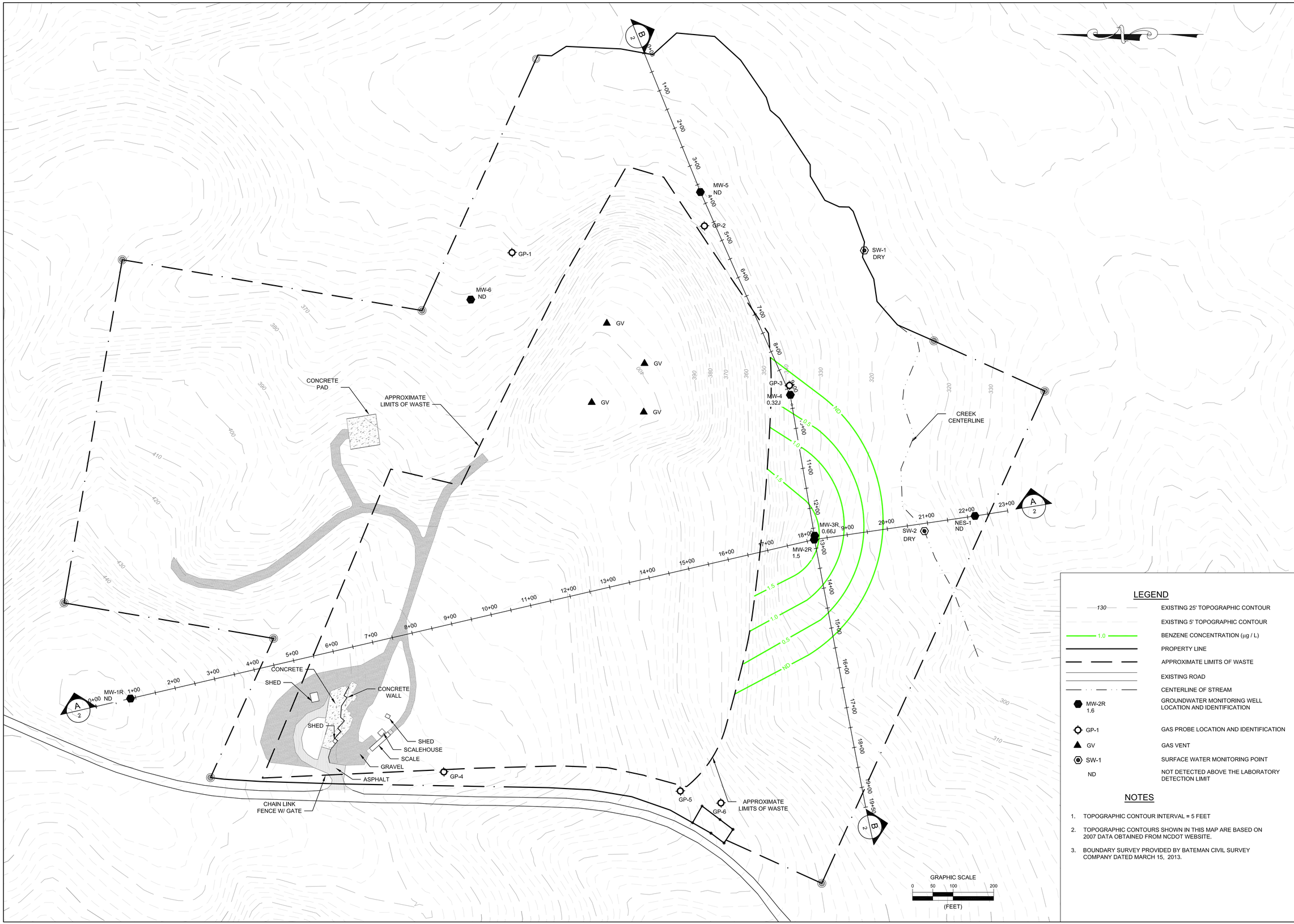
POTENTIOMETRIC SURFACE MAP
AUGUST 18, 2015

PROJECT NO. 660

SCALE AS NOTED

DRAWING NO. 1

L:\Granville\dwg\Butner\2015 CAE REPORT\1- GW Event 08-15.dwg Layout=Layout1



LEGEND

130	EXISTING 25' TOPOGRAPHIC CONTOUR
	EXISTING 5' TOPOGRAPHIC CONTOUR
1.0	BENZENE CONCENTRATION (µg / L)
	PROPERTY LINE
	APPROXIMATE LIMITS OF WASTE
	EXISTING ROAD
	CENTERLINE OF STREAM
MW-2R 1.6	GROUNDWATER MONITORING WELL LOCATION AND IDENTIFICATION
GP-1	GAS PROBE LOCATION AND IDENTIFICATION
GV	GAS VENT
SW-1	SURFACE WATER MONITORING POINT
ND	NOT DETECTED ABOVE THE LABORATORY DETECTION LIMIT

NOTES

1. TOPOGRAPHIC CONTOUR INTERVAL = 5 FEET
2. TOPOGRAPHIC CONTOURS SHOWN IN THIS MAP ARE BASED ON 2007 DATA OBTAINED FROM NCDOT WEBSITE.
3. BOUNDARY SURVEY PROVIDED BY BATEMAN CIVIL SURVEY COMPANY DATED MARCH 15, 2013.

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED GVB
DRAWN RH
CHECKED GVB
APPROVED GVB
DATE 11/11/15

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BUTNER LANDFILL
GRANVILLE COUNTY, NORTH CAROLINA

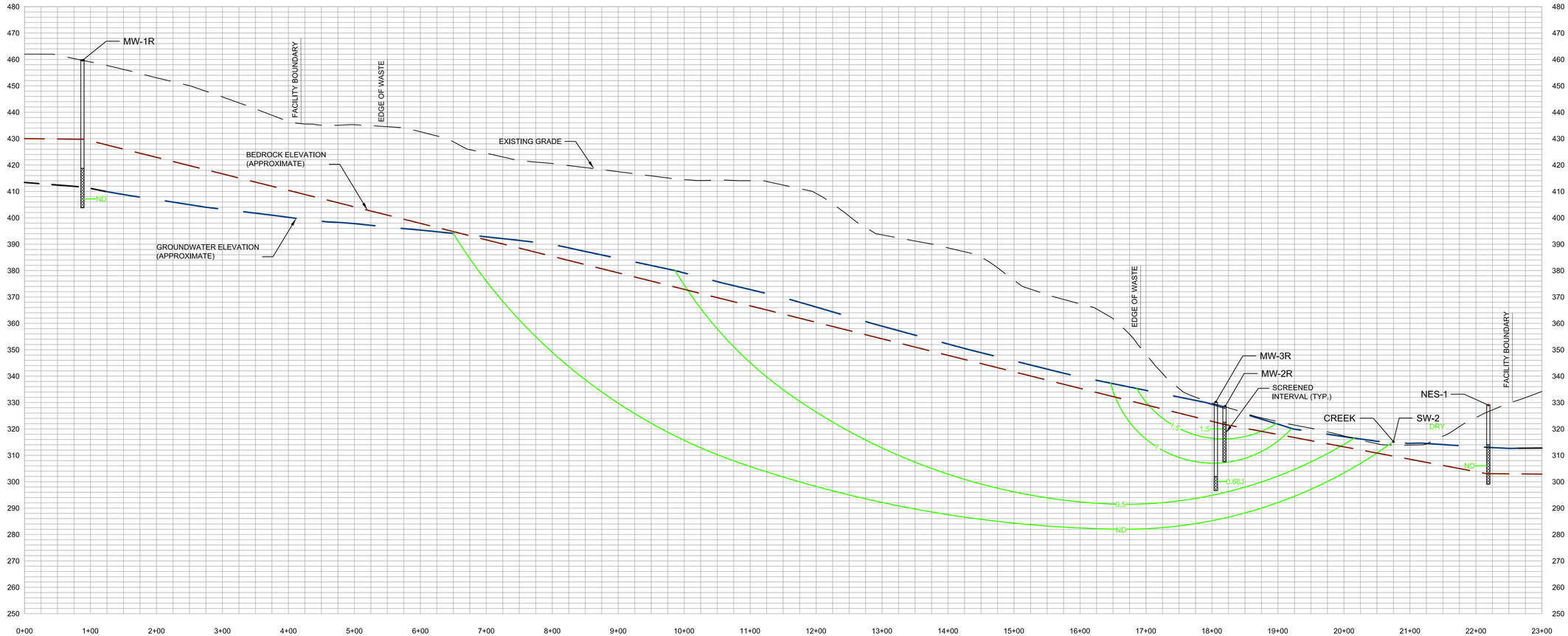
BENZENE ISOCONCENTRATION MAP
AUGUST 17-18, 2015

PROJECT NO.
660.1601.12

SCALE
AS NOTED

DRAWING NO.
2

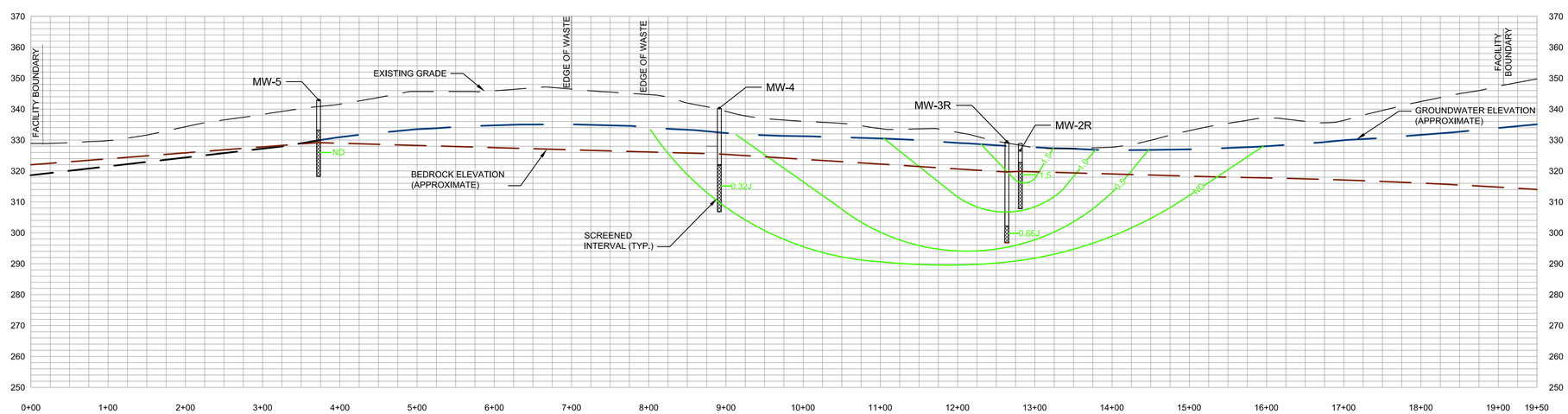
L:\Granville\dwg\Butner\2015 CAE REPORT\2- BENZENE AND 3 CROSS SECTION.dwg Layout=2 benzene



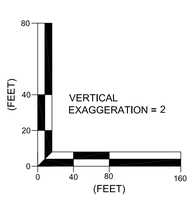
ALIGNMENT A - A' PROFILE

LEGEND

- EXISTING GROUND
- GROUNDWATER ELEVATION (AUG 2015)
- BEDROCK ELEVATION
- 1.5 BENZENE CONCENTRATION (µg / L) AUGUST 17-18, 2015
- SCREENED INTERVAL



ALIGNMENT B - B' PROFILE



GRAPHIC SCALE

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED GVB
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CHECKED GVB
APPROVED GVB
DATE 11/11/15

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BUTNER LANDFILL
GRANVILLE COUNTY, NORTH CAROLINA

CROSS SECTIONS A - A' & B - B'

PROJECT NO.
660.1601.12

SCALE
AS NOTED

DRAWING NO.
3

L:\Granville\dwg\Butner\2015 CAE REPORT\2- BENZENE AND 3 CROSS SECTION.dwg Layout=3-sections

APPENDICES

Appendix A

Historical Detected Groundwater Constituents

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
INORGANICS												
Antimony	8-Sep-94		---	30	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	30	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	30	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	30	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	30	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	30	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	30	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	30	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-97		---	30	ND	ND	ND	ND	ND	ND	---	---
	20-May-98		---	30	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	30	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	30	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	30	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	30	ND	80.0	38.0	32.0	33.0	31.0	---	---
	26-Oct-00		---	30	30.0	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	30	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	30	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	30	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	30	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	30	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	30	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	30	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	30	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	30	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	30	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	30	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	6	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	6	ND	ND	ND	ND	ND	ND	---	ND
GWPS = 1.4 µg/L (10/23/07)	19-Dec-07		---	6	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	6	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		2.6	6.0	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		2.6	6.0	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		2.6	6.0	ND	ND	ND	ND	ND	ND	---	ND
NC 2B = NE (03/24/10)	24-Jun-10		2.6	6.0	ND	ND	ND	2.9 J	ND	ND	---	ND
GWPS = 1 µg/L (8/1/10)	13-Dec-10		2.6	6.0	ND	ND	3.0 J	ND	2.8 J	ND	---	ND
	20-Jun-11		5.0	6.0	ND	ND	ND	ND	**6.0**	ND	---	ND
	5-Dec-11		5.0	6.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.0	6.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.0	6.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		5.0	6.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.0	6.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		5.0	6.0	**8.8**	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	6.0	ND	**10.5**	**8.0**	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	3.8	6.0	ND	**7.1**	**6.5**	3.9 J	ND	ND	---	ND
	18-Aug-15	EPA 6010	3.8	6.0	ND	**6.2**	4.8 J	4.1 J	ND	ND	---	ND
Arsenic	8-Sep-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	10	6.0 J	15.0	ND	ND	ND	ND	---	---
	1-Dec-97		---	10	ND	5.0 J	ND	ND	ND	ND	---	---
	20-May-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	2.0 J	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 50 µg/L (10/23/07)	19-Dec-07		---	10	ND	4.1 J	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	10	ND	4.9 J	ND	ND	ND	ND	---	ND
	17-Dec-08		2.7	10.0	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		2.7	10.0	ND	13.5	10.9	5.6 J	ND	4.0 J	ND	ND
	16-Dec-09		2.7	10.0	ND	10.6	6.4 J	5.0 J	ND	3.6 J	---	ND
NC 2L = 10 µg/L (02/05/10)	24-Jun-10		2.7	10.0	ND	**11.8**	8.1 J	8.2 J	3.3 J	3.1 J	---	ND
Resample >	12-Aug-10		2.7	10.0	---	---	7.2 J	---	---	---	---	ND
Resample >	31-Aug-10		2.7	10.0	---	**15.4**	---	---	---	---	---	ND
	13-Dec-10		2.7	10.0	ND	4.9 J	2.7 J	5.4 J	ND	ND	---	ND
	20-Jun-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.0	10.0	ND	5.4 J	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	ND	5.6 J	ND	ND	ND	---	ND
	24-Feb-14		5.0	10.0	ND	6.4 J	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	4.1 J	5.4 J	ND	ND	3.1 J	3.2 J	---	3.0 J
	18-Aug-15	EPA 6011	2.5	10.0	ND	5.1 J	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Barium	8-Sep-94		---	500	ND	270	ND	ND	830	860	---	---
	1-Dec-94		---	500	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	500	ND	ND	ND	ND	510	ND	---	---
	2-Mar-95		---	500	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	500	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	500	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	500	ND	82.0	30.0	ND	15.0	ND	---	---
	17-Jun-97		---	500	200	320	37.0	17.0	210	31.0	---	---
	1-Dec-97		---	500	61.0	180	43.0	46.0	220	33.0	---	---
	20-May-98		---	500	30.0	150	45.0	13.0	180	22.0	---	---
	19-Nov-98		---	500	48.0	120	42.0	ND	380	12.0	---	---
	21-Jul-99		---	500	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	500	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	500	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	500	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	500	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	500	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	500	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	500	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	500	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	500	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	500	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	500	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	500	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	500	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	500	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	500	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	100	5.2 J	120	64.9	1.5 J	64.1	1.8 J	---	0.20 J
	12-Jul-07		---	100	2.5 J	129	65.7 J	1.1 J	77.0 J	1.3 J	---	ND
NC 2L = 2,000 µg/L (10/23/07)	19-Dec-07		---	100	2.8 B	99.2	50.0 B	1.4 B	49.6 B	1.7 B	87.8	11.7
	8-Jul-08		---	100	5.8 J	102	58.4 J	1.1 B	57.9 J	1.2 B	---	0.29 J
	17-Dec-08		0.20	100	2.7 B	92.9 J	53.1 B	1.2 B	55.5 J	1.1 B	---	10.7 J
	9-Jul-09		0.20	100	4.6 B	121	63.4 B	0.37 B	81.4 B	0.94 B	72.4 B	17.6 J
	16-Dec-09		0.20	100	2.9 B	108	62.8 B	0.61 B	56.8 B	0.87 B	---	17.1 J
NC 2L = 700 µg/L (02/05/10)	24-Jun-10		0.20	100	2.5 B	115 B	61.1 B	1.6 B	93.5 B	1.4 B	---	27.3 J
	13-Dec-10		0.20	100	4.3 B	122	67.9 J	1.3 B	90.6 J	1.5 B	---	12.1 J
	20-Jun-11		5.0	100	ND	108	70.7 J	ND	84.7 J	ND	---	ND
	5-Dec-11		5.0	100	ND	118	73.0 J	ND	90.6 J	ND	---	ND
	11-Jun-12		5.0	100	ND	138	65.2 J	ND	76.4 J	ND	61.3 J	ND
	12-Dec-12		5.0	100	ND	113	64.7 J	ND	73.6 J	ND	---	ND
	1-May-13		5.0	100	ND	118	69.1 J	ND	84.2 J	ND	81.2 J	ND
	5-Aug-13		5.0	100	ND	111	65.1 J	ND	95.6 J	ND	---	ND
	24-Feb-14		5.0	100	ND	93.8 J	44.8 J	ND	139	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	100	ND	125	66.4 J	ND	121	ND	---	ND
	10-Mar-15	EPA 6010	2.5	100	3.0 J	109	61.8 J	ND	116	ND	---	ND
	18-Aug-15	EPA 6010	2.5	100	4.4 J	119	63.1 J	ND	81.3 J	ND	---	ND
Beryllium	8-Sep-94		---	2	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	2	ND	ND	ND	ND	4.0	ND	---	---
	9-Feb-95		---	2	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	2	ND	ND	ND	ND	2.0	ND	---	---
	15-Nov-95		---	2	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	2	ND	ND	ND	ND	6.0	ND	---	---
	22-Nov-96		---	2	ND	ND	ND	ND	3.0	ND	---	---
	17-Jun-97		---	2	2.0	3.0	ND	ND	1.0	ND	---	---
	1-Dec-97		---	2	ND	ND	ND	ND	ND	ND	---	---
	20-May-98		---	2	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	2	ND	ND	ND	ND	2.0	ND	---	---
	21-Jul-99		---	2	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	2	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	2	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	2	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	2	ND	12.0	ND	ND	ND	ND	---	---
	27-Oct-01		---	2	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	2	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	2	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	2	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	2	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	2	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	1	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	1	ND	ND	ND	ND	ND	ND	---	ND
GWPS = 4 µg/L (10/23/07)	19-Dec-07		---	1	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	1	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		0.10	1.0	ND	ND	ND	ND	0.14 J	ND	---	ND
	9-Jul-09		0.10	1.0	ND	0.18 J	0.22 J	0.17 J	ND	ND	0.23 J	ND
	16-Dec-09		0.10	1.0	ND	0.15 J	0.17 J	0.15 J	0.25 J	ND	---	ND
NC 2B = 6.5 µg/L (02/05/10)	24-Jun-10		0.10	1.0	ND	ND	0.27 J	0.16 J	ND	ND	---	ND
	13-Dec-10		0.10	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	0.5	1.0	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	0.5	1.0	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Cadmium	8-Sep-94		---	1	ND	ND	ND	ND	ND	4.0	---	---
	1-Dec-94		---	1	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	1	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	1	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	1	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	1	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	1	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	1	ND	3.0	1.0	ND	ND	ND	---	---
	1-Dec-97		---	1	ND	2.0	ND	ND	ND	ND	---	---
	20-May-98		---	1	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	1	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	1	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	1	ND	3.0	3.0	ND	2.0	ND	---	---
	10-May-00		---	1	5.0	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	1	ND	2.0	ND	ND	ND	ND	---	---
	18-Apr-01		---	1	ND	11.0	ND	ND	ND	ND	---	---
	27-Oct-01		---	1	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	1	ND	2.0	ND	ND	ND	ND	---	---
	19-Nov-02		---	1	2.0	2.0	ND	ND	2.0	ND	---	---
	27-Jun-03		---	1	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	1	ND	1.0	ND	ND	ND	ND	---	ND
	30-Jun-04		---	1	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	1	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	1	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	1	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	1	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	1	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	1	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 1.75 µg/L (10/23/07)	19-Dec-07		---	1	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	1	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		0.50	1.0	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		0.50	1.0	ND	1.4	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.50	1.0	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 2 µg/L (02/05/10)	24-Jun-10		0.50	1.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.50	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		1.0	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	1.0	1.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	0.5	1.0	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	0.5	1.0	ND	ND	ND	ND	ND	ND	---	ND
Chromium	8-Sep-94		---	10	8.0	44.0	ND	6.0	48.0	80.0	---	---
	1-Dec-94		---	10	14.0	ND	ND	ND	18.0	ND	---	---
	9-Feb-95		---	10	14.0	ND	ND	10.0	ND	ND	---	---
	2-Mar-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	10	13.0	13.0	ND	ND	ND	ND	---	---
	28-May-96		---	10	33.0	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	10	3.0	ND	ND	ND	ND	3.0	---	---
	17-Jun-97		---	10	57.0	43.0	ND	3.0	2.0	6.0	---	---
	1-Dec-97		---	10	29.0	ND	ND	ND	ND	ND	---	---
	20-May-98		---	10	10.0	3.0	ND	ND	12.0	ND	---	---
	19-Nov-98		---	10	17.0	3.0	ND	ND	5.0	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	12.0	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 50 µg/L (10/23/07)	19-Dec-07		---	10	ND	2.0 B	ND	ND	ND	ND	1.1 B	1.4 J
	8-Jul-08		---	10	ND	0.54 J	0.58 J	ND	ND	ND	---	ND
	17-Dec-08		0.40	10.0	0.73 J	1.8 J	0.96 J	ND	0.96 J	0.70 J	---	ND
	9-Jul-09		0.40	10.0	1.2 J	2.4 J	1.1 J	1.6 J	0.68 J	0.53 J	4.8 J	ND
	16-Dec-09		0.40	10.0	1.3 J	ND	ND	ND	0.95 J	ND	---	ND
NC 2L = 10 µg/L (02/05/10)	24-Jun-10		0.40	10.0	1.1 B	3.5 B	2.8 B	2.4 B	1.2 B	1.4 B	---	0.71 J
	13-Dec-10		0.40	10.0	2.5 J	1.3 J	1.8 J	0.69 J	0.57 J	1.2 J	---	ND
	20-Jun-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.0	10.0	ND	8.6 J	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	5.2 J	ND	ND	ND	ND	---	ND
	1-May-13		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	2.5	10.0	ND	2.7 J	ND	ND	ND	6.7 J	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Cobalt	8-Sep-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	10	11.0	ND	13.0	16.0	22.0	ND	---	---
	9-Feb-95		---	10	20.0	14.0	ND	48.0	39.0	ND	---	---
	2-Mar-95		---	10	16.0	21.0	ND	29.0	121.0	ND	---	---
	15-Nov-95		---	10	20.0	21.0	ND	ND	27.0	ND	---	---
	28-May-96		---	10	30.0	16.0	ND	ND	122	ND	---	---
	22-Nov-96		---	10	6.0	13.0	ND	4.7	93.0	ND	---	---
	17-Jun-97		---	10	130	38.0	ND	6.0	45.0	3.0	---	---
	1-Dec-97		---	10	32.0	21.0	ND	12.0	36.0	4.0	---	---
	20-May-98		---	10	15.0	16.0	2.0	9.0	100	3.0	---	---
	19-Nov-98		---	10	21.0	16.0	2.0	7.0	180	3.0	---	---
	21-Jul-99		---	10	ND	16.0	ND	ND	100	ND	---	---
	16-Nov-99		---	10	ND	15.0	ND	ND	38.0	ND	---	---
	10-May-00		---	10	ND	17.0	ND	ND	61.0	ND	---	---
	26-Oct-00		---	10	ND	15.0	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	27.0	ND	ND	74.0	ND	---	---
	27-Oct-01		---	10	ND	12.0	ND	ND	47.0	ND	---	---
	13-Jun-02		---	10	ND	14.0	ND	ND	251	ND	---	---
	19-Nov-02		---	10	ND	10.0	ND	ND	57.0	ND	---	---
	27-Jun-03		---	10	ND	15.0	ND	ND	75.0	ND	---	---
	30-Dec-03		---	10	ND	17.0	ND	ND	52.0	ND	---	ND
	30-Jun-04		---	10	ND	16.0	ND	ND	31.0	ND	---	ND
	29-Dec-04		---	10	ND	11.0	ND	ND	46.0	ND	---	ND
	29-Jun-05		---	10	ND	11.0	ND	ND	43.0	ND	---	ND
	29-Dec-05		---	10	ND	12.0	ND	ND	30.0	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	72.5	ND	---	ND
	29-Dec-06		---	10	ND	11.4	ND	ND	37.5	ND	---	ND
	12-Jul-07		---	10	ND	11.8	ND	2.7	58.4	ND	---	ND
GWPS = 70 µg/L (10/23/07)	19-Dec-07		---	10	2.5 B	ND	ND	2.0 B	**103**	2.6 B	8.0 B	1.8 J
	8-Jul-08		---	10	10.3 B	12.1 B	2.0 B	9.0 B	**130**	4.8 B	---	6.2 J
	17-Dec-08		0.60	10.0	2.1 B	11.8 B	2.3 B	3.6 B	43.7	1.6 B	---	2.5 J
	9-Jul-09		0.60	10.0	ND	6.2 J	ND	ND	**100**	ND	2.2 J	ND
	16-Dec-09		0.60	10.0	ND	4.7 J	ND	ND	6.6 J	ND	---	ND
	24-Jun-10		0.60	10.0	ND	16.3	ND	ND	25.0	ND	---	ND
GWPS = 1 µg/L (2/05/10)	13-Dec-10		0.60	10.0	2.5 B	**15.5**	ND	ND	**{129}**	{ND}	---	1.6 {1.0 J} J
	20-Jun-11		5.0	10.0	ND	**14.2**	ND	ND	**81.8**	ND	---	ND
	5-Dec-11		5.0	10.0	ND	**12.7**	ND	ND	**146**	ND	---	ND
Resample >	25-Jan-12		5.0	10.0	---	---	---	---	**47.5**	---	---	ND
	11-Jun-12		5.0	10.0	ND	**14.2**	ND	ND	**101**	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	**11.3**	ND	ND	**113**	ND	---	ND
	1-May-13		5.0	10.0	ND	**24.3**	ND	ND	**34.0**	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	**24.7**	ND	ND	**50.9**	ND	---	ND
	24-Feb-14		5.0	10.0	ND	**18.4**	ND	ND	9.6 J	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	9.4 J	ND	ND	**46.3**	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	ND	8.7 J	ND	ND	**39.2**	ND	---	ND
	18-Aug-15	EPA 6010	2.5	10.0	ND	9.3 J	ND	ND	**116**	ND	---	ND
Copper	8-Sep-94		---	200	ND	ND	ND	ND	ND	660	---	---
	1-Dec-94		---	200	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	200	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	200	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	200	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	200	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	200	ND	ND	32.0	13.0	100	ND	---	---
	17-Jun-97		---	200	34.0	350	13.0	37.0	28.0	77.0	---	---
	1-Dec-97		---	200	19.0	72.0	14.0	88.0	15.0	34.0	---	---
	20-May-98		---	200	12.0	48.0	380	41.0	53.0	28.0	---	---
	19-Nov-98		---	200	10.0	ND	410	28.0	53.0	14.0	---	---
	21-Jul-99		---	200	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	200	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	200	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	200	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	200	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	200	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	200	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	200	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	200	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	200	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	200	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	200	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	200	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	200	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	200	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	ND	11.3	5.50 J	10.4	1.90 B	---	0.60 J
	12-Jul-07		---	10	ND	ND	13.4	7.90	2.6 J	ND	---	ND
NC 2L = 1,000 µg/L (10/23/07)	19-Dec-07		---	10	2.0 B	ND	8.6 B	3.8 B	7.0 B	0.73 B	5.8 B	9.8
	8-Jul-08		---	10	0.64 J	ND	12.1	3.7 J	8.5 J	ND	---	ND
	17-Dec-08		0.30	10.0	0.80 J	13.6	10.2	3.9 J	11.9	0.37 J	---	ND
	9-Jul-09		0.30	10.0	ND	ND	6.3 J	ND	5.7 J	ND	8.8 J	ND
	16-Dec-09		0.30	10.0	ND	ND	9.2 J	1.6 J	5.7 J	ND	---	ND
	24-Jun-10		0.30	10.0	ND	ND	10	1.2 J	5.1 J	ND	---	ND
	13-Dec-10		0.30	10.0	1.1 B	ND	13.6	5.8 J	5.6 J	0.59 B	---	0.49 J
	20-Jun-11		5.0	10.0	ND	ND	15.3	8.1 J	8.7 J	ND	---	ND
	5-Dec-11		5.0	10.0	ND	ND	16.9	10.0 J	7.6 J	ND	---	ND
	11-Jun-12		5.0	10.0	ND	10.7	12.2	6.3 J	7.4 J	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	ND	11.6	8.5 J	10.4	ND	---	ND
	1-May-13		5.0	10.0	ND	ND	13.6	5.8 J	9.6 J	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	ND	14.3	ND	10.2	ND	---	ND
	24-Feb-14		5.0	10.0	ND	ND	12.2	ND	5.1 J	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	ND	10.5	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	ND	ND	8.7 J	ND	15.5	ND	---	ND
	18-Aug-15	EPA 6010	2.5	10.0	ND	ND	6.7 J	5.6 J	10.1	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Lead	8-Sep-94		---	10	ND	13.0	ND	ND	30.0	36.0	---	---
	1-Dec-94		---	10	11.0	ND	ND	ND	36.0	ND	---	---
	9-Feb-95		---	10	ND	ND	ND	10.0	37.0	ND	---	---
	2-Mar-95		---	10	ND	ND	ND	ND	44.0	ND	---	---
	15-Nov-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	10	ND	ND	ND	ND	42.0	ND	---	---
	22-Nov-96		---	10	ND	ND	ND	ND	13.0	ND	---	---
	17-Jun-97		---	10	20.0	29.0	ND	ND	13.0	ND	---	---
	1-Dec-97		---	10	8.0	14.0	ND	5.0	14.0	ND	---	---
	20-May-98		---	10	ND	6.0	ND	6.0	21.0	ND	---	---
	19-Nov-98		---	10	5.0	ND	ND	ND	58.0	ND	---	---
	21-Jul-99		---	10	ND	12.0	14.0	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	11.0	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	12.0	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	ND	ND	ND	ND	2.1 J	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 15 µg/L (10/23/07)	19-Dec-07		---	10	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	10	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		4.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		4.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		4.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		4.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		4.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	2.5	10.0	ND	ND	ND	ND	ND	ND	---	ND
Mercury	1-Dec-97		---	0.5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	0.5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	0.5	ND	0.59	0.65	0.65	0.76	ND	---	---
	10-May-00		---	0.5	---	ND	ND	ND	ND	---	---	---
	26-Oct-00		---	0.5	---	ND	ND	ND	ND	---	---	---
	18-Apr-01		---	0.5	---	ND	ND	ND	ND	---	---	---
	13-Jun-02		---	0.5	---	ND	ND	ND	ND	---	---	---
	27-Jun-03		---	0.5	---	ND	ND	ND	ND	---	---	---
	30-Dec-03		---	0.5	---	---	---	---	---	---	---	---
	30-Jun-04		---	0.5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	---	---	---	---	---	---	---	---	---
	29-Jun-05		---	0.5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	---	---	---	---	---	---	---	---	---
	28-Jun-06		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	---	---	---	---	---	---	---	---	---
	12-Jul-07		---	0.2	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 1.05 µg/L (10/23/07)	19-Dec-07		---	---	---	---	---	---	---	---	ND	---
	8-Jul-08		---	0.2	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		---	---	---	---	---	---	---	---	---	---
	9-Jul-09		0.070	0.2	ND	ND	ND	ND	ND	ND	---	ND
	16-Dec-09		---	---	---	---	---	---	---	---	---	---
NC 2L = 1 µg/L (02/05/10)	24-Jun-10		0.070	0.20	ND	ND	ND	ND	ND	0.098 J	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		0.10	0.20	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.10	0.20	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.10	0.20	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.10	0.20	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 7470	0.10	0.20	ND	ND	ND	---	---	---	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Nickel	8-Sep-94		---	50	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	50	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	50	ND	72	ND	ND	ND	ND	---	---
	2-Mar-95		---	50	ND	100	ND	ND	ND	ND	---	---
	15-Nov-95		---	50	ND	61.0	ND	ND	ND	ND	---	---
	28-May-96		---	50	ND	85.0	ND	ND	ND	ND	---	---
	22-Nov-96		---	50	ND	72.0	ND	ND	ND	ND	---	---
	17-Jun-97		---	50	75	98.0	ND	ND	ND	ND	---	---
	1-Dec-97		---	50	ND	89.0	ND	ND	ND	ND	---	---
	20-May-98		---	50	ND	91.0	ND	ND	ND	ND	---	---
	19-Nov-98		---	50	ND	83.0	ND	ND	ND	ND	---	---
	21-Jul-99		---	50	ND	109	ND	ND	ND	ND	---	---
	16-Nov-99		---	50	ND	122	ND	ND	ND	ND	---	---
	10-May-00		---	50	ND	104	ND	ND	ND	ND	---	---
	26-Oct-00		---	50	ND	93.0	ND	ND	ND	ND	---	---
	18-Apr-01		---	50	ND	107	ND	ND	ND	ND	---	---
	27-Oct-01		---	50	ND	92.0	ND	ND	ND	ND	---	---
	13-Jun-02		---	50	ND	98.0	ND	ND	ND	ND	---	---
	19-Nov-02		---	50	ND	74.0	ND	ND	ND	ND	---	---
	27-Jun-03		---	50	ND	85.0	ND	ND	ND	ND	---	---
	30-Dec-03		---	50	ND	100	ND	ND	ND	ND	---	ND
	30-Jun-04		---	50	ND	120 (81.0)	ND	ND	ND	ND	---	ND
	29-Dec-04		---	50	ND	100	ND	ND	ND	ND	---	ND
	29-Jun-05		---	50	ND	150 (92.0)	ND	ND	ND	ND	---	ND
	29-Dec-05		---	50	ND	96.0	ND	ND	ND	ND	---	ND
	28-Jun-06		---	50	ND	88.7	ND	ND	ND	ND	---	ND
	29-Dec-06		---	50	ND	94.7	30.1	14.2	8.9 J	ND	---	ND
	12-Jul-07		---	50	ND	99.0	30.6 J	13.9 J	13.7 J	ND	---	ND
NC 2L = 100 µg/L (10/23/07)	19-Dec-07		---	50	ND	83.4	23.7	11.0	18.3	ND	11.4	ND
	8-Jul-08		---	50	ND	76.0	28.1 J	11.5 J	27.0 J	ND	---	ND
	17-Dec-08		1.7	50.0	ND	75.5	27.8 J	12.2 J	11.0 B	ND	---	2.4 J
	9-Jul-09		1.7	50.0	2.2 J	93.5	29.4 J	11.7 J	23.2 J	ND	13.1 J	ND
	16-Dec-09		1.7	50.0	ND	81.2	28.2 J	11.8 B	2.6 B	ND	---	3.0 J
	24-Jun-10		1.7	50.0	ND	76.3	19.7 J	9.0 J	7.0 J	4.5 J	---	ND
	13-Dec-10		1.7	50.0	ND	83.0	23.5 J	6.8 B	20.7 J	ND	---	2.7 J
	20-Jun-11		5.0	50.0	ND	78.8	30.1 J	11.2 J	15.3 J	ND	---	ND
	5-Dec-11		5.0	50.0	ND	89.1	32.8 J	11.7 J	24.3 J	ND	---	ND
	11-Jun-12		5.0	50.0	ND	91.8	28.9 J	10.0 J	17.3 J	ND	ND	ND
	12-Dec-12		5.0	50.0	ND	91.8	29.2 J	9.3 J	21.1 J	ND	---	ND
	1-May-13		5.0	50.0	ND	89.6	31.9 J	10.4 J	5.7 J	ND	ND	ND
	5-Aug-13		5.0	50.0	ND	87.9	28.1 J	9.0 J	8.4 J	ND	---	ND
	24-Feb-14		5.0	50.0	ND	83.1	16.7 J	10.4 J	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	50.0	ND	97.9	29 J	12.9 J	13.2 J	ND	---	ND
	10-Mar-15	EPA 6010	2.5	50.0	ND	91.9	32.9 J	12.3 J	8.2 J	ND	---	ND
	18-Aug-15	EPA 6010	2.5	50.0	ND	98.0	28.0 J	11.9 J	26.2 J	5.4 J	---	ND
Selenium	8-Sep-94		---	20	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	20	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	20	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	20	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	20	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	20	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	20	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	20	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-97		---	20	ND	ND	ND	ND	ND	ND	---	---
	20-May-98		---	20	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	20	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	20	ND	ND	ND	ND	36.0	ND	---	---
	16-Nov-99		---	20	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	20	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	20	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	20	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	20	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	20	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	20	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	20	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	20	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	20	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	20	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	20	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	20	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	20	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 50 µg/L (10/23/07)	19-Dec-07		---	10	ND	11.5	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	10	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		3.8	10	4.8 B	5.1 B	4.8 B	ND	ND	ND	---	4.9 J
	9-Jul-09		3.8	10	ND	ND	4.2 J	ND	ND	ND	ND	ND
	16-Dec-09		3.8	10	ND	ND	ND	5.1 J	ND	ND	---	ND
NC 2L = 20 µg/L (02/05/10)	24-Jun-10		3.8	10	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		3.8	10	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		10.0	10	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		10.0	10	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		10.0	10	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		10.0	10	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		10.0	10	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		10.0	10	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		10.0	10	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	10.0	10	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	5.0	10	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	5.0	10	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Silver	8-Sep-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-97		---	10	ND	8.0	ND	ND	ND	3	---	---
	20-May-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	15.0	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 17.5 µg/L (10/23/07)	19-Dec-07		---	10	ND	0.57 J	0.60 J	0.55 J	ND	0.33 J	ND	ND
	8-Jul-08		---	10	ND	2.7 J	2.3 J	1.1 J	0.22 J	0.69 J	---	0.12 J
	17-Dec-08		0.10	10.0	0.13 J	1.8 J	1.4 J	0.85 J	0.12 J	0.51 J	---	ND
	9-Jul-09		0.10	10.0	ND	0.84 J	0.63 J	0.45 J	ND	0.11 J	ND	ND
	16-Dec-09		0.10	10.0	0.12 J	2.0 J	1.6 J	1.0 J	0.12 J	0.52 J	---	ND
NC 2L = 20 µg/L (02/05/10)	24-Jun-10		0.10	10.0	ND	0.38 J	0.33 J	0.35 J	ND	ND	---	ND
	13-Dec-10		0.10	10.0	0.15 B	1.3 J	0.99 J	0.45 B	{ND}	{ND}	---	0.21 {0.19 J} J
	20-Jun-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	10.0	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	2.5	10.0	ND	ND	ND	ND	ND	ND	---	ND
Thallium	8-Sep-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	10	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	10	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	10	ND	3.0	ND	ND	ND	ND	---	---
	1-Dec-97		---	10	ND	ND	ND	ND	ND	ND	---	---
	20-May-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	10 J (ND)	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	22.0 (30.0)	13.0 (24.0)	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	23.0	20.0	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	25.7	12.6	ND	ND	ND	---	ND
	29-Dec-06		---	6	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	5.5	ND	ND	ND	ND	ND	ND	---	ND
GWPS = 0.28 µg/L (10/23/07)	19-Dec-07		---	5.5	ND	4.0 J	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	5.5	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		3.0	5.5	ND	3.2 J	3.2 J	ND	ND	ND	---	ND
	9-Jul-09		3.0	5.5	ND	ND	ND	4.1 J	ND	ND	ND	ND
	16-Dec-09		3.0	5.5	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		3.0	5.5	ND	ND	5.2 J	3.1 J	ND	ND	---	ND
GWPS = 0.2 µg/L (10/1/10)	13-Dec-10		3.0	5.5	ND	ND	**7.7**	ND	ND	ND	---	ND
	20-Jun-11		5.4	5.5	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		5.4	5.5	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		5.4	5.5	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		5.4	5.5	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		5.4	5.5	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		5.4	5.5	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		5.4	5.5	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.4	5.5	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	5.0	5.5	ND	ND	ND	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	5.0	5.5	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Tin	1-Dec-97		---	100	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	100	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	100	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	100	---	ND	ND	ND	ND	---	---	---
	18-Apr-01		---	100	---	ND	ND	ND	ND	---	---	---
	27-Oct-01		---	100	---	---	---	---	---	---	---	---
	13-Jun-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	100	---	---	---	---	---	---	---	---
	27-Jun-03		---	100	ND	149	127	ND	ND	ND	---	---
	30-Dec-03		---	100	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	100	ND	41.1	14.4	3.2 J	ND	ND	---	ND
	12-Jul-07		---	100	ND	35.2 J	13.9 J	5.2 J	ND	ND	---	ND
NC 2L = NE µg/L (10/23/07)	19-Dec-07		---	100	ND	33.6	7.4	ND	ND	ND	ND	ND
	8-Jul-08		---	100	4.4 J	28.6 J	15.1 J	5.4 J	3.0 J	3.6 J	---	ND
	17-Dec-08		1.8	100	ND	22.5 J	9.2 J	ND	ND	ND	---	ND
	9-Jul-09		1.8	100	ND	21.4 J	8.6 J	ND	ND	ND	---	ND
	16-Dec-09		1.8	100	ND	26.3 J	10.7 J	ND	ND	ND	---	ND
GWPS = 2100 µg/L (02/05/10)	24-Jun-10		1.8	100	ND	23.4 J	10.7 J	3.2 J	2.2 J	1.9 J	---	ND
	13-Dec-10		1.8	100	ND	30.3 J	12.1 J	5.8 J	ND	ND	---	ND
	20-Jun-11		5.0	100	ND	26.8 J	13.8 J	ND	ND	ND	---	ND
	5-Dec-11		5.0	100	ND	25.8 J	13.9 J	ND	ND	ND	---	ND
	11-Jun-12		5.0	100	ND	22.2 J	9.0 J	ND	ND	ND	ND	ND
	12-Dec-12		5.0	100	ND	30.0 J	13.2 J	ND	ND	ND	---	ND
	1-May-13		5.0	100	ND	25.8 J	12.2 J	ND	ND	ND	---	ND
	5-Aug-13		5.0	100	ND	22.7 J	12.5 J	ND	ND	ND	---	ND
	24-Feb-14		5.0	100	ND	26.7 J	11.7 J	9.8 J	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	100	ND	30.7 J	8.2 J	ND	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	100	ND	28.7 J	11.1 J	ND	ND	ND	---	ND
	18-Aug-15	EPA 6010	2.5	100	ND	27.7 J	7.5 J	ND	ND	ND	---	ND
Vanadium	8-Sep-94		---	40	ND	ND	ND	ND	ND	130	---	---
	1-Dec-94		---	40	63.0	ND	ND	45.0	ND	ND	---	---
	9-Feb-95		---	40	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	40	41.0	ND	ND	45.0	ND	ND	---	---
	15-Nov-95		---	40	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	40	83.0	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	40	7.0	17	ND	21.0	ND	ND	---	---
	17-Jun-97		---	40	450	560	ND	19.0	ND	ND	---	---
	1-Dec-97		---	40	62.0	88.0	ND	41.0	ND	10.0	---	---
	20-May-98		---	40	25.0	15.0	ND	10.0	5.0	ND	---	---
	19-Nov-98		---	40	33.0	29.0	5.0	16.0	9.0	5.0	---	---
	21-Jul-99		---	40	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	40	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	40	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	40	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	40	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	40	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	40	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	40	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	40	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	40	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	40	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	40	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	40	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	40	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	40	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	25	2.7 J	ND	ND	14.5	ND	1.0 J	---	ND
	12-Jul-07		---	25	ND	ND	ND	19.4 J	ND	ND	---	ND
GWPS = 3.5 µg/L (10/23/07)	19-Dec-07		---	25	2.2 B	2.2 B	ND	15.7 J	3.0 B	1.2 B	4.0 J	0.62 J
	8-Jul-08		---	25	2.6 J	2.4 J	ND	14.6 J	1.4 J	1.2 J	---	0.20 J
	17-Dec-08		0.20	25.0	1.9 B	2.3 B	ND	13.9 J	2.5 B	1.2 B	---	0.76 J
	9-Jul-09		0.20	25.0	3.9 B	9.7 J	2.5 B	18.4 J	2.9 B	2.2 B	8.5 J	1.30 J
	16-Dec-09		0.20	25.0	2.0 B	4.4 J	1.3 B	14.0 J	2.2 B	1.5 B	---	0.53 J
	24-Jun-10		0.20	25.0	1.8 J	4.4 J	1.5 J	13.3 J	2.2 J	1.3 J	---	ND
GWPS = 0.3 µg/L (10/1/10)	13-Dec-10		0.20	25.0	3.2 J	3.6 J	0.35 B	16.6 J	1.8 B	1.0 B	---	0.36 J
	20-Jun-11		5.0	25.0	ND	ND	ND	14.5 J	ND	ND	---	ND
	5-Dec-11		5.0	25.0	ND	ND	ND	13.5 J	ND	ND	---	ND
	11-Jun-12		5.0	25.0	ND	18.0 J	ND	12.3 J	ND	ND	ND	ND
	12-Dec-12		5.0	25.0	ND	ND	ND	13.6 J	ND	ND	---	ND
	1-May-13		5.0	25.0	ND	ND	ND	6.3 J	ND	ND	ND	ND
	5-Aug-13		5.0	25.0	ND	ND	ND	10.2 J	ND	ND	---	ND
	24-Feb-14		5.0	25.0	ND	ND	ND	12.9 J	ND	ND	ND	ND
	12-Aug-14	EPA 6010	5.0	25.0	ND	ND	ND	18.6 J	ND	ND	---	ND
	10-Mar-15	EPA 6010	2.5	25.0	3.1 J	11.6 J	6.2 J	13.4 J	ND	ND	---	ND
	18-Aug-15	EPA 6010	2.5	25.0	3.4 J	6.8 J	3.6 J	19.6 J	2.8 J	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Zinc	8-Sep-94		---	50	110	160	ND	ND	320	430	---	---
	1-Dec-94		---	50	132	ND	ND	70	164	ND	---	---
	9-Feb-95		---	50	144	89	ND	91	79	74	---	---
	2-Mar-95		---	50	67	ND	ND	ND	111	ND	---	---
	15-Nov-95		---	50	ND	50	ND	ND	ND	ND	---	---
	28-May-96		---	50	136	ND	ND	ND	122	ND	---	---
	22-Nov-96		---	50	79.0	48.0	28.0	ND	38.0	ND	---	---
	17-Jun-97		---	50	370	410	33.0	39.0	36.0	69.0	---	---
	1-Dec-97		---	50	140	110	11.0	45.0	34.0	30.0	---	---
	20-May-98		---	50	70.0	63.0	23.0	31.0	47.0	34.0	---	---
	19-Nov-98		---	50	61.0	33.0	21.0	17.0	53.0	10.0	---	---
	21-Jul-99		---	50	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	50	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	50	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	50	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	50	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	50	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	50	ND	ND	ND	ND	382	ND	---	---
	19-Nov-02		---	50	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	50	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	50	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	50	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	50	ND	ND	ND	66.0	ND	ND	---	ND
	29-Jun-05		---	50	ND	54.0	56.0	ND	ND	ND	---	ND
	29-Dec-05		---	50	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	50	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	50	8.0 J	ND	ND	4.1 J	4.3 J	4.1 J	---	ND
	12-Jul-07		---	10	9.6 J	ND	ND	ND	ND	ND	---	ND
NC 2L = 1,050 µg/L (10/23/07)	19-Dec-07		---	10	4.3 B	14.3 B	6.3 B	ND	ND	ND	2.4 B	102
	8-Jul-08		---	10	5.9 B	ND	ND	ND	4.1 B	ND	---	1.2 J
	17-Dec-08		0.40	10.0	2.4 B	6.3 J	ND	ND	4.6 J	0.60 B	---	0.49 J
	9-Jul-09		0.40	10.0	3.4 B	ND	ND	ND	ND	ND	6.1 B	1.6 J
	16-Dec-09		0.40	10.0	4.6 B	ND	ND	ND	7.4 B	ND	---	7.7 J
NC 2L = 1,000 µg/L (02/05/10)	24-Jun-10		0.40	10.0	0.58 J	ND	ND	ND	ND	1.3 J	---	ND
	13-Dec-10		0.40	10.0	4.5 B	ND	ND	ND	ND	ND	---	6.7 J
	20-Jun-11		10.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		10.0	10.0	ND	ND	ND	ND	ND	ND	---	12.4
	11-Jun-12		10.0	10.0	ND	20.9	ND	ND	ND	ND	ND	ND
	12-Dec-12		10.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		10.0	10.0	ND	ND	ND	ND	11.8	ND	10.0	ND
	5-Aug-13		10.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		10.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14	EPA 6010	10.0	10.0	ND	ND	ND	ND	16.9	ND	---	ND
	18-Aug-15	EPA 6010	5.0	10.0	7.4 J	ND	ND	ND	5.2 J	ND	---	ND
Cyanide	9-Jul-09		5.0	10	ND	ND	ND	ND	46.9	ND	ND	ND
Resample >	28-Sep-09		5.0	10	---	---	---	---	ND	---	---	ND
NC 2L = 70 µg/L (10/23/07)	16-Dec-09		---	---	---	---	---	---	---	---	---	---
	24-Jun-10		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
Resample >	20-Jun-11		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		5.0	10.0	ND	6.4 J	ND	ND	8.7 J	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		5.0	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	5.5 J
	12-Aug-14		5.0	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 6010	5.0	10.0	9.5 B	7.5 B	8.5 B	8.8 B	11.8 B	6.6 B	---	5.6 J

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
ORGANICS												
Acetone	27-Oct-01		---	100	244 B	109 B	ND	130 B	128 B	476 B	---	479
	13-Jun-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	100	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	100	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	100	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 700 µg/L (10/23/07)	19-Dec-07		---	100	ND	ND	ND	ND	ND	ND	ND	4.5 J
	8-Jul-08		---	100	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		20.0	100	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		20.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		2.2	100	ND	ND	ND	ND	ND	ND	---	2.8 J
NC 2L = 6,000 µg/L (02/05/10)	24-Jun-10		2.2	100	ND	18.5 B	6.5 B	ND	2.2 B	ND	---	7.7 J
	13-Dec-10		2.2	100	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		2.2	100	ND	ND	ND	ND	ND	2.4 B	---	3.9 J
	5-Dec-11		2.2	100	ND	2.3 B	ND	ND	ND	ND	---	8.8 J
	11-Jun-12		2.2	100	ND	3.5 B	ND	ND	ND	ND	ND	4.7 J
	12-Dec-12		10.0	100	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		10.0	100	ND	ND	ND	ND	ND	ND	ND	14.6 J
	5-Aug-13		10.0	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		10.0	100	ND	ND	ND	ND	ND	ND	ND	25.7 J
*	12-Aug-14	EPA 8260	10.0	100	ND	ND	ND	ND	ND	ND	ND	22.0 J
	10-Mar-15	EPA 8260	10.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	10.0	100	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	8-Sep-94		---	5	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-94		---	5	ND	ND	ND	ND	ND	ND	---	---
	9-Feb-95		---	5	ND	ND	ND	ND	ND	ND	---	---
	2-Mar-95		---	5	ND	ND	ND	ND	ND	ND	---	---
	15-Nov-95		---	5	ND	ND	ND	ND	ND	ND	---	---
	28-May-96		---	5	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	5	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	5	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-97		---	5	ND	ND	ND	ND	ND	ND	---	---
	20-May-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	3	ND	**1.5**	ND	ND	ND	ND	---	ND
Resample >	23-Feb-07		---	3	---	**1.2**	---	---	---	---	---	ND
	12-Jul-07		---	1	ND	**1.9**	ND	ND	ND	ND	---	ND
NC 2L = 1 µg/L (10/23/07)	19-Dec-07		---	1	ND	**1.8**	0.48 J	0.26 J	ND	ND	ND	ND
	8-Jul-08		---	1	ND	**1.4**	0.51 J	0.32 J	ND	ND	---	ND
	17-Dec-08		0.25	1.0	ND	**1.7**	0.54 J	ND	ND	ND	---	ND
	9-Jul-09		0.25	1.0	ND	**1.7**	0.34 J	ND	ND	ND	ND	ND
	16-Dec-09		0.25	1.0	ND	**1.7**	0.60 J	0.29 J	ND	ND	---	ND
	24-Jun-10		0.25	1.0	ND	0.77 J	0.49 J	0.33 J	ND	ND	---	ND
	13-Dec-10		0.25	1.0	ND	**1.8**	0.59 J	0.37 J	ND	ND	---	ND
Resample >	8-Feb-11		0.25	1.0	---	**1.4**	---	---	---	---	---	ND
	20-Jun-11		0.25	1.0	ND	**1.7**	0.60 J	0.39 J	ND	ND	---	ND
	5-Dec-11		0.25	1.0	ND	**1.4**	0.69 J	0.40 J	ND	ND	---	ND
	11-Jun-12		0.25	1.0	ND	ND	0.51 J	ND	ND	ND	ND	ND
	12-Dec-12		0.25	1.0	ND	**1.6**	0.73 J	0.32 J	ND	ND	---	ND
Resample >	10-Jan-13		0.25	1.0	ND	**1.4**	---	---	---	---	ND	ND
	1-May-13		0.25	1.0	ND	**1.3**	0.56 J	0.27 J	ND	ND	ND	ND
	5-Aug-13		0.25	1.0	ND	**1.6**	0.64 J	0.44 J	ND	ND	---	ND
	24-Feb-14		0.25	1.0	ND	**1.4**	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.25	1.0	ND	**1.7**	0.61 J	0.25 J	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.25	1.0	ND	**1.3**	0.54 J	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.25	1.0	ND	**1.5**	0.66 J	0.32 J	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Bromomethane	17-Dec-08		0.29	10.0	ND	ND	0.58 J	ND	ND	ND	---	ND
NC 2L = NE µg/L (10/23/07)	9-Jul-09		0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
GWPS = 10 µg/L (8/1/10)	13-Dec-10		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	11-Jun-12		0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.29	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
2-Butanone (MEK)	17-Dec-08		0.96	100	ND	ND	ND	ND	1.2 J	ND	---	ND
NC 2L = 4,200 µg/L (10/23/07)	9-Jul-09		0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 4,000 µg/L (02/05/10)	24-Jun-10		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
	8-May-13		0.96	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14		0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.96	100	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.96	100	ND	ND	ND	ND	ND	ND	---	ND
Carbon Disulfide	17-Jun-97		---	100	ND	64.0	ND	ND	ND	ND	---	---
	1-Dec-97		---	100	ND	5.0	8.0	ND	ND	ND	---	---
	20-May-98		---	100	ND	7.5	6.2	ND	ND	ND	---	---
	19-Nov-98		---	100	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	100	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	100	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	100	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	100	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	100	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	100	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	100	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	100	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	100	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 700 µg/L (10/23/07)	19-Dec-07		---	100	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	100	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		1.2	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	1.2	100	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	1.2	100	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Chlorobenzene	8-Sep-94		---	5	ND	10.0	7.0	ND	ND	ND	---	---
	1-Dec-94		---	5	ND	ND	7.0	ND	ND	ND	---	---
	9-Feb-95		---	5	ND	13.0	8.0	6.0	ND	ND	---	---
	2-Mar-95		---	5	ND	12.0	9.0	ND	ND	ND	---	---
	15-Nov-95		---	5	ND	14.0	8.0	9.0	ND	ND	---	---
	28-May-96		---	5	ND	15.0	9.0	10.0	ND	ND	---	---
	22-Nov-96		---	5	ND	15.0	ND	11.0	ND	ND	---	---
	17-Jun-97		---	5	ND	19.0	11.0	14.0	ND	ND	---	---
	1-Dec-97		---	5	ND	17.0	9.0	14.0	ND	ND	---	---
	20-May-98		---	5	ND	20.0	8.6	12.0	ND	ND	---	---
	19-Nov-98		---	5	ND	17.2	9.2	10.0	ND	ND	---	---
	21-Jul-99		---	5	ND	14.0	10.0	11.0	ND	ND	---	---
	16-Nov-99		---	5	ND	16.0	10.0	8.0	ND	ND	---	---
	10-May-00		---	5	ND	17.0	11.0	10.0	ND	ND	---	---
	26-Oct-00		---	5	ND	16.0	12.0	9.0	ND	ND	---	---
	18-Apr-01		---	5	ND	16.0	13.0	6.0	ND	ND	---	---
	27-Oct-01		---	0.5	ND	17.0	12.0	9.0	ND	ND	---	---
	13-Jun-02		---	0.5	ND	16.0	11.0	8.0	ND	ND	---	---
	19-Nov-02		---	0.5	ND	18.0	15.0	9.0	ND	ND	---	---
	27-Jun-03		---	0.5	ND	17.7	13.3	7.4	ND	ND	---	ND
	30-Dec-03		---	5	ND	20.0	15.0	6.1	ND	ND	---	ND
	30-Jun-04		---	5	ND	18.0	15.0	9.9	ND	ND	---	ND
	29-Dec-04		---	5	ND	19.0	16.0	9.4	ND	ND	---	ND
	29-Jun-05		---	5	ND	15.0	13.0	8.0	ND	ND	---	ND
	29-Dec-05		---	5	ND	18.0	16.0	5.0	ND	ND	---	ND
	28-Jun-06		---	5	ND	16.5	10.8	7.8	ND	ND	---	ND
	29-Dec-06		---	3	ND	17.0	17.0	4.2	ND	ND	---	ND
	12-Jul-07		---	3	ND	17.0	16.0	ND	ND	ND	---	ND
NC 2L = 50 µg/L (10/23/07)	19-Dec-07		---	3	ND	17.3	16.9	4.7	ND	ND	ND	ND
	8-Jul-08		---	3	ND	17.2	17.4	6.5	ND	ND	---	ND
	17-Dec-08		0.23	3.0	ND	15.9	15.6	2.6 J	ND	ND	---	ND
	9-Jul-09		0.23	3.0	ND	16.1	17.2	6.1	ND	ND	ND	ND
	16-Dec-09		0.23	3.0	ND	15.5	17.7	4.8	ND	ND	---	ND
	24-Jun-10		0.23	3.0	ND	8.3	15.7	6.3	ND	ND	---	ND
	13-Dec-10		0.23	3.0	ND	17.7	18.2	6.4	ND	ND	---	0.28 J
	20-Jun-11		0.23	3.0	ND	16.3	17.2	6.7	ND	ND	---	ND
	5-Dec-11		0.23	3.0	ND	14.2	17.0	5.8	ND	ND	---	ND
	11-Jun-12		0.23	3.0	ND	12	14.8	4.4	ND	ND	ND	ND
	12-Dec-12		0.23	3.0	ND	15.8	17.9	4.5	ND	ND	---	ND
	1-May-13		0.23	3.0	ND	14.0	16.6	3.0 J	ND	ND	ND	ND
	5-Aug-13		0.23	3.0	ND	14.4	15.9	4.6	ND	ND	---	ND
	24-Feb-14		0.23	3.0	ND	16.3	2.5 J	1.4 J	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.23	3.0	ND	15.6	18.3	3.6	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.23	3.0	ND	16.0	17.0	2.1 J	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.23	3.0	ND	12.8	17.6	4.3	ND	ND	---	ND
Chloroethane	1-Dec-97		---	10	ND	5.0	2.0	2.0	ND	ND	---	---
	20-May-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	10	ND	2.2	1.9	ND	ND	ND	---	ND
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 2,800 µg/L (10/23/07)	19-Dec-07		---	10	ND	1.9	1.9	1.5	ND	ND	ND	ND
	8-Jul-08		---	10	ND	2.2 J	2.5 J	1.8 J	ND	ND	---	ND
	17-Dec-08		0.54	10.0	ND	1.6 J	ND	ND	ND	ND	---	ND
	9-Jul-09		0.54	10.0	ND	ND	ND	3.8 J	ND	ND	ND	ND
	16-Dec-09		0.54	10.0	ND	ND	2.2 J	2.0 J	ND	ND	---	ND
NC 2L = 3,000 µg/L (02/05/10)	24-Jun-10		0.54	10.0	ND	ND	2.1 J	2.0 J	ND	ND	---	ND
	13-Dec-10		0.54	10.0	ND	1.8 J	2.0 J	1.7 J	ND	ND	---	ND
	20-Jun-11		0.54	10.0	ND	1.2 J	2.2 J	2.0 J	ND	ND	---	ND
	5-Dec-11		0.54	10.0	ND	1.3 J	2.0 J	1.7 J	ND	ND	---	ND
	11-Jun-12		0.54	10.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.54	10.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.54	10.0	ND	ND	1.9 J	2.7 J	ND	ND	ND	ND
	5-Aug-13		0.54	10.0	ND	ND	2.0 J	2.2 J	ND	ND	---	ND
	24-Feb-14		0.54	10.0	ND	1.1 J	0.82 J	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.54	10.0	ND	1.1 J	1.50 J	1.1 J	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.54	10.0	ND	1.0 J	1.80 J	0.81 J	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.54	10.0	ND	1.2 J	2.0 J	3.7 J	ND	ND	---	ND
Chloromethane	9-Jul-09		0.11	1.0	ND	ND	ND	ND	ND	ND	ND	ND
NC 2L = 2.6 µg/L (10/23/07)	16-Dec-09		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		0.11	1.0	ND	ND	ND	ND	ND	0.11 J	---	ND
NC 2L = 3 µg/L (02/05/10)	13-Dec-10		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.11	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.11	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.11	1.0	ND	ND	ND	ND	ND	ND	ND	0.25 J
	12-Aug-14	EPA 8260	0.11	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.11	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.11	1.0	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
1,2-Dichlorobenzene	1-Dec-97		---	5	ND	3.0	2.0	1.0	ND	ND	---	---
	20-May-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	5	ND	2.4	2.3	ND	ND	ND	---	---
	21-Jul-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	5	ND	1.5	2.3	ND	ND	ND	---	ND
	12-Jul-07		---	5	ND	1.4 J	1.7 J	0.31 J	ND	ND	---	ND
NC 2L = 24 µg/L (10/23/07)	19-Dec-07		---	5	ND	1.6	2.0	0.37 J	ND	ND	ND	ND
	8-Jul-08		---	5	ND	1.6 J	2.0 J	0.39 J	ND	ND	---	ND
	17-Dec-08		0.30	5.0	ND	1.4 J	1.9 J	ND	ND	ND	---	ND
	9-Jul-09		0.30	5.0	ND	1.6 J	2.0 J	0.36 J	ND	ND	ND	ND
	16-Dec-09		0.30	5.0	ND	1.6 J	2.0 J	0.33 J	ND	ND	---	ND
NC 2L = 20 µg/L (02/05/10)	24-Jun-10		0.30	5.0	ND	0.96 J	1.7 J	0.31 J	ND	ND	---	ND
	13-Dec-10		0.30	5.0	ND	1.9 J	1.9 J	0.43 J	ND	ND	---	ND
	20-Jun-11		0.30	5.0	ND	1.5 J	1.7 J	0.37 J	ND	ND	---	ND
	5-Dec-11		0.30	5.0	ND	1.3 J	1.6 J	ND	ND	ND	---	ND
	11-Jun-12		0.30	5.0	ND	1.0 J	1.5 J	ND	ND	ND	ND	ND
	12-Dec-12		0.30	5.0	ND	1.3 J	1.7 J	ND	ND	ND	---	ND
	1-May-13		0.30	5.0	ND	1.2 J	1.6 J	ND	ND	ND	ND	ND
	5-Aug-13		0.30	5.0	ND	1.2 J	1.6 J	0.30 J	ND	ND	---	ND
	24-Feb-14		0.30	5.0	ND	1.4 J	0.64 J	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.30	5.0	ND	1.2 J	1.5 J	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.30	5.0	ND	1.1 J	1.1 J	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.30	5.0	ND	0.88 J	1.3 J	ND	ND	ND	---	ND
1,4-Dichlorobenzene	8-Sep-94		---	5	ND	ND	5.0	ND	ND	ND	---	---
	1-Dec-94		---	5	ND	ND	5.0	ND	ND	ND	---	---
	9-Feb-95		---	5	ND	8.0	6.0	ND	ND	ND	---	---
	2-Mar-95		---	5	ND	7.0	6.0	ND	ND	ND	---	---
	15-Nov-95		---	5	ND	7.0	6.0	ND	ND	ND	---	---
	28-May-96		---	5	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	5	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	5	ND	7.6	6.2	ND	ND	ND	---	---
	1-Dec-97		---	5	ND	6.0	5.0	4.0	ND	ND	---	---
	20-May-98		---	5	ND	7.6	ND	ND	ND	ND	---	---
	19-Nov-98		---	5	ND	3.7	2.8	ND	ND	ND	---	---
	21-Jul-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	5	ND	5.0	6.0	ND	ND	ND	---	---
	18-Apr-01		---	5	ND	ND	5.0	6.0	ND	ND	---	---
	27-Oct-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	3	ND	3.0	3.3	ND	ND	ND	---	ND
Resample >	23-Feb-07		---	3	---	3.2	3.3	---	---	---	---	ND
	12-Jul-07		---	1	ND	3.3	2.9	0.31 J	ND	ND	---	ND
NC 2L = 1.4 µg/L (10/23/07)	19-Dec-07		---	1	ND	**3.0**	**2.7**	ND	ND	ND	ND	ND
	8-Jul-08		---	1	ND	**3.0**	**2.4**	ND	ND	ND	---	ND
	17-Dec-08		0.33	1.0	ND	**2.9**	**2.5**	ND	ND	ND	---	ND
	9-Jul-09		0.33	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.33	1.0	ND	**2.8**	**2.2**	ND	ND	ND	---	ND
NC 2L = 6 µg/L (02/05/10)	24-Jun-10		0.33	1.0	ND	1.6	ND	ND	ND	ND	---	ND
	13-Dec-10		0.33	1.0	ND	3.1	1.9	ND	ND	ND	---	ND
	20-Jun-11		0.33	1.0	ND	2.7	1.6	ND	ND	ND	---	ND
	5-Dec-11		0.33	1.0	ND	2.2	1.4	ND	ND	ND	---	ND
	11-Jun-12		0.33	1.0	ND	1.8	1.4	ND	ND	ND	ND	ND
	12-Dec-12		0.33	1.0	ND	2.4	1.3	ND	ND	ND	---	ND
	1-May-13		0.33	1.0	ND	2.1	1.2	ND	ND	ND	ND	ND
	5-Aug-13		0.33	1.0	ND	2.0	1.3	ND	ND	ND	---	ND
	24-Feb-14		0.33	1.0	ND	2.2	1.8	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.33	1.0	ND	2.4	1.3	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.33	1.0	ND	2.2	1.1	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.33	1.0	ND	1.5	1.1	ND	ND	ND	---	ND
Trans-1,4-Dichloro-2-Butene	20-May-98		---	100	ND	ND	5.1	ND	ND	ND	---	---
	19-Nov-98		---	100	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	100	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	100	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	100	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	100	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	100	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	100	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	100	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	100	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	100	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	100	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	100	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	100	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = NE µg/L (10/23/07)	19-Dec-07		---	100	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	100	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		1.0	100	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	1.0	100	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	1.0	100	ND	ND	ND	ND	ND	ND	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
1,1-Dichloroethane	1-Dec-97		---	5	ND	ND	1.0	ND	ND	ND	---	---
	20-May-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	5	ND	ND	0.36 J	0.52 J	ND	ND	---	ND
NC 2L = 70 µg/L (10/23/07)	19-Dec-07		---	5	ND	ND	ND	0.57 J	ND	ND	ND	ND
	8-Jul-08		---	5	ND	ND	ND	0.60 J	ND	ND	---	ND
	17-Dec-08		0.32	5.0	ND	ND	ND	0.51 J	ND	ND	---	ND
	9-Jul-09		0.32	5.0	ND	ND	ND	0.84 J	ND	ND	ND	ND
	16-Dec-09		0.32	5.0	ND	ND	ND	0.73 J	ND	ND	---	ND
NC 2L = 6 µg/L (02/05/10)	24-Jun-10		0.32	5.0	ND	ND	ND	0.53 J	ND	ND	---	ND
	13-Dec-10		0.32	5.0	ND	ND	ND	0.60 J	ND	ND	---	ND
	20-Jun-11		0.32	5.0	ND	ND	ND	0.63 J	ND	ND	---	ND
	5-Dec-11		0.32	5.0	ND	ND	ND	0.67 J	ND	ND	---	ND
	11-Jun-12		0.32	5.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.32	5.0	ND	ND	ND	0.61 J	ND	ND	---	ND
	1-May-13		0.32	5.0	ND	ND	ND	0.62 J	ND	ND	ND	ND
	8-May-13		0.32	5.0	ND	ND	ND	0.53 J	ND	ND	---	ND
	24-Feb-14		0.32	5.0	ND	ND	ND	0.50 J	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.32	5.0	ND	ND	ND	0.47 J	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.32	5.0	ND	ND	ND	0.50 J	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.32	5.0	ND	ND	ND	0.49 J	ND	ND	---	ND
1,2-Dichloroethane	17-Dec-08		0.12	1.0	ND	ND	0.15 J	ND	ND	ND	---	ND
NC 2L = 0.38 µg/L (10/23/07)	9-Jul-09		0.12	1.0	ND	ND	ND	ND	ND	ND	ND	0.19 J
	16-Dec-09		0.12	1.0	ND	ND	0.14 J	ND	ND	ND	---	ND
NC 2L = 0.4 µg/L (02/05/10)	24-Jun-10		0.12	1.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.12	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.12	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.12	1.0	ND	ND	ND	ND	0.18 J	ND	---	ND
	11-Jun-12		0.12	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.12	1.0	ND	ND	ND	ND	-0.20 J	ND	---	0.20 (ND) J
	1-May-13		0.12	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.12	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.12	1.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.12	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.12	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.24	1.0	ND	ND	0.33 J	0.29 J	0.36 J	ND	---	---
Ethylbenzene	17-Dec-08		0.30	1.0	ND	0.31 J	ND	ND	ND	ND	---	ND
NC 2L = 550 µg/L (10/23/07)	9-Jul-09		0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 600 µg/L (02/05/10)	24-Jun-10		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.30	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.30	1.0	ND	ND	ND	ND	ND	ND	---	ND
Isobutanol	24-Jun-10		35.0	100	ND	59.0 J	ND	ND	ND	ND	---	ND
NC 2L = NE µg/L (02/05/10)	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		35.0	100	ND	39.5 J	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		35.0	100.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		35.0	100	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		35.0	100	ND	ND	ND	ND	ND	ND	---	ND
*	12-Aug-14		35.0	100	ND	ND	ND	ND	ND	ND	---	ND
	10-Mar-15	EPA 8260	35.0	100	ND	ND	ND	---	---	---	---	ND
Methylene Chloride	9-Jul-09		0.97	2.0	ND	ND	ND	ND	ND	ND	ND	9.6
NC 2L = 4.3 µg/L (10/23/07)	16-Dec-09		0.97	2.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		0.97	1.0	ND	**19.0**	ND	ND	ND	ND	---	ND
NC 2L = 5 µg/L (02/05/10) Resample >	12-Aug-10		0.97	1.0	---	ND	---	---	---	---	---	ND
	13-Dec-10		0.97	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.97	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.97	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.97	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.97	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.97	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.97	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.97	1.0	1.0	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.97	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.97	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.97	1.0	1.3	1.1	1.6	ND	ND	ND	ND	ND
Naphthalene	8-Jul-08		---	10	ND	3.8 J	ND	ND	ND	ND	---	ND
NC 2L = 21 µg/L (10/23/07)	17-Dec-08		---	---	---	---	---	---	---	---	---	---
	9-Jul-09		0.24	10.0	ND	2.4 J	ND	ND	ND	ND	---	ND
	16-Dec-09		---	---	---	---	---	---	---	---	---	---
NC 2L = 6 µg/L (02/05/10)	24-Jun-10		0.24	10.0	ND	7.4 J	ND	ND	ND	ND	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		0.24	10.0	ND	4.6 J	ND	ND	ND	ND	---	0.39 J
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.2	10.0	ND	4.6 J	ND	ND	ND	ND	ND	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.24	10.0	ND	5.1 J	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.24	10.0	ND	5.8 J	ND	ND	ND	ND	---	ND
*	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8260	0.2	10	ND	5.4 J	ND	---	---	---	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Toluene	20-May-98		---	5	ND	ND	8.1	ND	ND	ND	---	---
	19-Nov-98		---	5	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	5	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	5	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	-
	30-Dec-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	5	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	5	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	1	ND	0.49 B	ND	ND	ND	ND	---	0.34 J
NC 2L = 1,000 µg/L (10/23/07)	19-Dec-07		---	1	ND	0.51 J	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	1	ND	0.39 J	ND	ND	1.3	ND	---	ND
	17-Dec-08		0.26	1.0	1.4	1.6	ND	ND	11.7	ND	---	ND
	9-Jul-09		0.26	1.0	ND	0.46 J	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.26	1.0	ND	0.42 J	ND	ND	ND	ND	---	ND
NC 2L = 600 µg/L (02/05/10)	24-Jun-10		0.26	1.0	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.26	1.0	ND	0.54 J	ND	ND	ND	ND	---	ND
	20-Jun-11		0.26	1.0	ND	0.34 J	ND	ND	ND	ND	---	ND
	5-Dec-11		0.26	1.0	ND	0.28 J	ND	ND	0.30 J	ND	---	ND
	11-Jun-12		0.26	1.0	ND	0.28 J	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.26	1.0	ND	0.29 J	ND	ND	0.36 J	ND	---	ND
	1-May-13		0.26	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.26	1.0	ND	0.29 J	ND	ND	ND	ND	---	ND
	24-Feb-14		0.26	1.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.26	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.26	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.26	1.0	ND	ND	ND	ND	ND	ND	---	ND
Vinyl Chloride	8-Sep-94		---	10	ND	ND	12.0	ND	ND	ND	---	---
	1-Dec-94		---	10	ND	ND	13.0	ND	ND	ND	---	---
	9-Feb-95		---	10	ND	ND	15.0	ND	ND	ND	---	---
	2-Mar-95		---	10	ND	ND	14.0	ND	ND	ND	---	---
	15-Nov-95		---	10	ND	ND	11.0	ND	ND	ND	---	---
	28-May-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	22-Nov-96		---	10	ND	ND	ND	ND	ND	ND	---	---
	17-Jun-97		---	10	ND	ND	ND	ND	ND	ND	---	---
	1-Dec-97		---	10	ND	ND	7.0	4.0	ND	ND	---	---
	20-May-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-98		---	10	ND	ND	ND	ND	ND	ND	---	---
	21-Jul-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	16-Nov-99		---	10	ND	ND	ND	ND	ND	ND	---	---
	10-May-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	26-Oct-00		---	10	ND	ND	ND	ND	ND	ND	---	---
	18-Apr-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Oct-01		---	10	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	19-Nov-02		---	10	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	10	ND	ND	ND	ND	ND	ND	---	---
	30-Dec-03		---	10	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	5.5	ND	ND	0.98 J	ND	ND	ND	---	ND
Resample >	23-Feb-07		---	5.5	---	---	1.0	---	---	---	---	ND
	12-Jul-07		---	1	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 0.015 µg/L (10/23/07)	19-Dec-07		---	1	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	1	ND	ND	0.76 J	ND	ND	ND	---	ND
	17-Dec-08		0.62	1.0	ND	ND	0.76 J	ND	ND	ND	---	ND
	9-Jul-09		0.62	1.0	ND	ND	0.99 J	ND	ND	ND	ND	ND
	16-Dec-09		0.62	1.0	ND	ND	0.81 J	ND	ND	ND	---	ND
NC 2L = 0.03 µg/L (02/05/10)	24-Jun-10		0.62	1.0	ND	ND	0.77 J	ND	ND	ND	---	ND
	13-Dec-10		0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.62	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.62	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.62	1.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14	EPA 8260	0.62	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.62	1.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.62	1.0	ND	ND	ND	ND	ND	ND	---	ND
Xylene (Total)	29-Dec-06		---	5	ND	1.4	ND	ND	ND	ND	---	ND
	12-Jul-07		---	4	ND	1.2 J	ND	ND	ND	ND	---	ND
NC 2L = 530 µg/L (10/23/07)	19-Dec-07		---	4	ND	2.0	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	4	ND	1.1 J	ND	ND	ND	ND	---	ND
	17-Dec-08		0.66	2.0	1.4 J	2.7	ND	ND	ND	ND	---	ND
	9-Jul-09		0.66	2.0	ND	1.5 J	ND	ND	ND	ND	ND	ND
	16-Dec-09		0.66	2.0	ND	2.2	ND	ND	ND	ND	---	ND
NC 2L = 500 µg/L (02/05/10)	24-Jun-10		0.66	2.0	ND	0.73 J	ND	ND	ND	ND	---	ND
	13-Dec-10		0.66	2.0	ND	2.0	ND	ND	ND	ND	---	ND
	20-Jun-11		0.66	2.0	ND	1.4 J	ND	ND	ND	ND	---	ND
	5-Dec-11		0.66	2.0	ND	1.1 J	ND	ND	ND	ND	---	ND
	11-Jun-12		0.66	2.0	ND	0.91 J	ND	ND	ND	ND	ND	ND
	12-Dec-12		0.66	5.0	ND	0.97 J	ND	ND	ND	ND	---	ND
	1-May-13		0.66	5.0	ND	0.68 J	ND	ND	ND	ND	ND	ND
	5-Aug-13		0.66	5.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.66	5.0	ND	ND	ND	ND	ND	ND	ND	ND
*	12-Aug-14		0.66	5.0	ND	ND	ND	ND	ND	ND	ND	ND
	10-Mar-15	EPA 8260	0.66	5.0	ND	ND	ND	ND	ND	ND	ND	ND
	18-Aug-15	EPA 8260	0.66	5.0	ND	ND	ND	ND	ND	ND	---	ND
Bis(2-Ethylhexyl)phthalate	24-Feb-14		0.79	15.0	2.6 J	ND	ND	ND	ND	ND	ND	ND
NC 2L = 3 µg/L (2/5/10)	15-Apr-14		0.79	15.0	ND	ND	ND	ND	ND	ND	ND	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	0.5	15	ND	ND	ND	---	---	---	---	ND
N-Nitroso-di-n-butylamine	24-Feb-14		7.5	10.0	ND	ND	ND	8.6 J	ND	ND	ND	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	1.3	10	ND	ND	ND	---	---	---	---	ND
Benzo(g,h,i)perylene	20-Jun-11		0.4	10.0	ND	ND	ND	ND	ND	1.4 J	---	ND
NC 2L = 200 µg/L (2/5/10)	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.38	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.38	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.38	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	0.5	10.0	ND	ND	ND	---	---	---	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
Dibenz(a,h)anthracene	20-Jun-11		0.55	10.0	ND	ND	ND	ND	ND	1.5 J	---	ND
NC 2L = 0.005 µg/L (2/5/10)	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.55	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.55	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.55	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	0.5	10.0	ND	ND	ND	---	---	---	---	ND
Fluorene	24-Jun-10		3.8	12.2	ND	4.3 J	ND	ND	ND	ND	---	ND
NC 2L = 300 µg/L (2/5/10) Resample >	12-Aug-10		3.1	10.0	---	ND	---	---	---	---	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		0.2	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.21	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.21	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.21	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	1.0	10.0	ND	ND	ND	---	---	---	---	ND
Indeno(1,2,3-cd)pyrene	20-Jun-11		0.29	10.0	ND	ND	ND	ND	ND	1.3 J	---	ND
NC 2L = 0.05 µg/L (2/5/10)	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.29	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	0.5	10.0	ND	ND	ND	---	---	---	---	ND
2-Methylnaphthalene	24-Jun-10		5.1	12.2	ND	**38.9**	ND	ND	ND	ND	---	ND
NC 2L = 30 µg/L (02/05/10) Resample>	12-Aug-10		4.2	10	---	ND	---	---	---	---	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		0.3	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		0.28	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.28	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.28	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	1.0	10.0	ND	ND	ND	---	---	---	---	ND
Phorate	18-Apr-01		---	10	---	3.2	ND	ND	ND	---	---	---
	27-Oct-01		---	5	ND	8.1	ND	ND	ND	ND	---	---
	27-Oct-01		---	0.5	---	8.1	1.3	ND	ND	---	---	---
	13-Jun-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	13-Jun-02		---	0.5	---	ND	ND	ND	ND	---	---	---
	19-Nov-02		---	5	ND	ND	ND	ND	ND	ND	---	---
	27-Jun-03		---	5	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	---	---	---	---	---	---	---	---	---
	28-Jun-06		---	10	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	---	---	---	---	---	---	---	---	---
	12-Jul-07		---	10	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 1.4 µg/L (10/23/07)	19-Dec-07		---	---	---	---	---	---	---	---	ND	---
	8-Jul-08		---	10	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		---	---	---	---	---	---	---	---	---	---
	9-Jul-09		6.6	22.2	ND	ND	ND	ND	ND	ND	---	ND
	16-Dec-09		---	---	---	---	---	---	---	---	---	---
NC 2L = 1 µg/L (02/05/10)	24-Jun-10		6.5	24.1	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		---	---	---	---	---	---	---	---	---	---
	20-Jun-11		5.4	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		---	---	---	---	---	---	---	---	---	---
	11-Jun-12		5.4	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		5.4	10.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		5.4	10.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8270	0.8	10.0	ND	ND	ND	---	---	---	---	ND
Beta-BHC	11-Jun-12		0.050	0.050	ND	ND	**0.16**	ND	ND	ND	---	ND
NC 2L = 0.019 µg/L (10/23/07)	19-Jul-12		0.050	0.050	---	---	ND	---	---	---	---	---
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.050	0.050	ND	**0.052**	ND	ND	ND	ND	---	ND
Resample >	15-Apr-14		0.050	0.050	---	ND	---	---	---	---	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8081	0.1	0.1	ND	ND	ND	---	---	---	---	ND
Delta-BHC	11-Jun-12		0.050	0.050	ND	ND	**0.090**	ND	ND	ND	---	ND
NC 2L = 0.019 µg/L (10/23/07)	19-Jul-12		0.050	0.050	---	---	ND	---	---	---	---	---
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8081	0.1	0.1	ND	ND	ND	---	---	---	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
gamma-BHC (Lindane)	27-Jun-03		---	1.05	ND	0.085	ND	ND	ND	ND	---	ND
	30-Dec-03		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 0.2 µg/L (10/23/07)	19-Dec-07		---	0.05	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	0.50	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	16-Dec-09		0.01	0.1	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 0.03 µg/L (02/05/10)	24-Jun-10		0.00021	0.010	ND	ND	**0.052**	ND	ND	ND	---	ND
Resample >	12-Aug-10		0.00020	0.010	---	---	ND	---	---	---	---	ND
	13-Dec-10		0.00020	0.050	ND	ND	0.013 J	ND	ND	ND	---	ND
	20-Jun-11		0.00020	0.050	ND	ND	**0.066**	ND	ND	ND	---	ND
Resample >	28-Jul-11		0.00020	0.010	---	---	ND	---	---	---	---	ND
	5-Dec-11		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		0.050	0.050	ND	ND	ND	---	---	---	---	ND
	10-Mar-15	EPA 8081	0.050	0.050	ND	ND	ND	---	---	---	---	ND
	18-Aug-15	EPA 8081	0.050	0.050	ND	ND	ND	---	---	---	---	ND
Heptachlor	27-Jun-03		---	1.05	ND	0.03	0.17	ND	ND	ND	---	ND
	30-Dec-03		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 0.0078 µg/L (10/23/07)	19-Dec-07		---	0.05	ND	ND	ND	ND	ND	ND	ND	ND
	8-Jul-08		---	0.05	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	16-Dec-09		0.02	0.1	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 0.008 µg/L (02/05/10)	24-Jun-10		0.0015	0.010	ND	ND	ND	ND	ND	ND	---	ND
	13-Dec-10		0.0500	0.0015	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.050	0.0015	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.050	0.056	ND	**0.062**	ND	ND	ND	ND	---	ND
Resample >	25-Jan-12		0.050	0.0500	---	ND	---	---	---	---	---	ND
	11-Jun-12		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.050	0.050	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		0.050	0.050	ND	ND	ND	---	---	---	---	ND
	10-Mar-15	EPA 8081	0.050	0.050	ND	ND	ND	---	---	---	---	ND
	18-Aug-15	EPA 8081	0.050	0.050	ND	ND	ND	---	---	---	---	ND
2,4-D	27-Jun-03		---	3	---	5.9	ND	ND	ND	---	---	---
	30-Dec-03		---	2	ND	ND	ND	ND	ND	ND	---	ND
	30-Jun-04		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-04		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Jun-05		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-05		---	2	ND	ND	ND	ND	ND	ND	---	ND
	28-Jun-06		---	2	ND	ND	ND	ND	ND	ND	---	ND
	29-Dec-06		---	2	ND	ND	ND	ND	ND	ND	---	ND
	12-Jul-07		---	2	ND	ND	ND	ND	ND	ND	---	ND
NC 2L = 70 µg/L (10/23/07)	19-Dec-07		---	2	ND	ND	ND	ND	ND	ND	ND	ND
	8-Apr-08		---	2	ND	ND	ND	ND	ND	ND	---	ND
	17-Dec-08		---	2.0	ND	ND	ND	ND	ND	ND	---	ND
	9-Jul-09		---	2.0	ND	ND	ND	ND	ND	ND	---	ND
	16-Dec-09		0.11	5.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Jun-10		0.23	2.1	ND	ND	ND	ND	ND	ND	---	ND
	10-Dec-10		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	20-Jun-11		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Dec-11		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	11-Jun-12		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Dec-12		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	1-May-13		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.22	2.0	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14	EPA 8151	0.22	2.0	ND	ND	ND	---	---	---	---	ND
	10-Mar-15	EPA 8151	0.24	2.1	ND	ND	ND	---	---	---	---	ND
	18-Aug-15	EPA 8151	0.24	2.1	ND	ND	ND	---	---	---	---	ND
4,4'-DDD	11-Jun-12		0.05	0.05	ND	ND	**0.13**	ND	ND	ND	---	ND
NC 2L = 0.1 µg/L (2/5/10) *Resample>*	19-Jul-12		0.05	0.10	---	---	ND	---	---	---	---	---
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8081	0.1	0.1	ND	ND	ND	---	---	---	---	ND

APPENDIX A: HISTORICAL CONSTITUENTS IN GROUNDWATER

Analyte	Sample Date	Method	DL	RL	MW-1R	MW-2R	MW-3R	MW-4	MW-5	MW-6	NES-1	Blanks
4,4'-DDT	11-Jun-12		0.05	0.05	ND	ND	0.10	ND	ND	ND	---	ND
NC 2L = 0.1 µg/L (2/5/10) *Resample>*	19-Jul-12		0.05	0.10	---	---	0.063 J	---	---	---	---	---
	12-Dec-12		---	---	---	---	---	---	---	---	---	---
	1-May-13		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		---	---	---	---	---	---	---	---	---	---
	24-Feb-14		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14		---	---	---	---	---	---	---	---	---	---
	10-Mar-15	EPA 8081	0.1	0.1	ND	ND	ND	---	---	---	---	ND
Dinoseb	10-Mar-15	EPA 8151	0.1	1.1	ND	ND	0.11 J	---	---	---	---	ND
Endrin aldehyde	11-Jun-12		0.050	0.050	ND	ND	0.14	ND	ND	ND	---	---
NC 2L= 2 (2/5/10)	12-Dec-12		0.050	0.10	ND	ND	ND	ND	ND	ND	---	---
	1-May-13		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	5-Aug-13		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	24-Feb-14		0.050	0.10	ND	ND	ND	ND	ND	ND	---	ND
	12-Aug-14	EPA 8081	0.050	0.10	ND	ND	ND	---	---	---	---	ND
	10-Mar-15	EPA 8081	0.050	0.10	ND	ND	ND	---	---	---	---	ND
	18-Aug-15	EPA 8081	0.050	0.10	ND	ND	ND	---	---	---	---	ND

Notes:
All concentrations are in micrograms per liter (µg/L).
RL = Reporting Limit (SWSL for December 2006 - present).
DL = Laboratory detection limit.
J = Estimated value between the DL and the RL.
B = Blank-qualified data; result is expected to be biased high based on concentrations in the blanks.
ND = Not detected above laboratory reporting limit.
NC 2L = North Carolina Groundwater Standards from 15A NCAC 2L.0202.
GWPS = Groundwater Protection Standards established by the DENR Solid Waste Section (SWS).
When the NC 2L has not been established, the GWPS will be used.
Bold values for groundwater are above the NC 2L Standards or GWPS.
--- = Well was not monitored and/or not reported.

Appendix B

Historical Detected Surface Water Constituents

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
INORGANICS										
Arsenic	06/24/10		2.7	10.00	4.30	J	2.90	J	ND	
NC 2B = 10 µg/L (03/28/08)	12/13/10		2.7	10.0	ND		ND		ND	
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
	06/11/12		5.0	10.0	ND		ND		ND	
	12/12/12		5.0	10.0	ND		ND		ND	
	05/01/13		5.0	10.0	ND		ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	ND		ND		3.0	J
	08/18/15		---	---	Dry		Dry		---	
Barium	11/22/96		---	500	37.0		37.0		---	
	06/17/97		---	500	37.0		62.0		---	
	12/01/97		---	500	53.0		45.0		---	
	05/20/98		---	500	24.0		69.0		---	
	11/19/98		---	500	ND		100.0		---	
	07/21/99		---	500	ND		ND		---	
	11/16/99		---	500	ND		ND		---	
	05/10/00		---	500	ND		ND		---	
	10/26/00		---	500	ND		ND		---	
	04/18/01		---	500	ND		ND		---	
	10/27/01		---	500	ND		ND		---	
	06/13/02		---	500	---		---		---	
	11/19/02		---	500	ND		ND		---	
	06/27/03		---	500	ND		ND		---	
	12/30/03		---	500	ND		ND		ND	
	06/30/04		---	500	ND		ND		ND	
	12/29/04		---	500	ND		ND		ND	
	12/29/04		---	500	ND		ND		ND	
	06/29/05		---	500	ND		ND		ND	
	12/29/05		---	500	ND		ND		ND	
	06/28/06		---	500	ND		ND		ND	
	12/29/06		---	100	37.5		40.6		0.20	J
	07/12/07		---	100	33.3	J	---		ND	
	12/19/07		---	100	52.6	B	149.0		11.7	
NC 2B = 1,000 µg/L (03/28/08)	07/08/08		---	100	33.8	J	161.0		0.3	J
	12/17/08		0.2	100	30.2	B	33.5	B	10.7	J
	07/09/09		0.2	100	36.8	B	78.4	B	17.6	J
	12/16/09		0.2	100	31.2	B	36.2	B	17.1	J
	06/24/10		0.2	100	34.5	B	71.3	B	27.3	J
	12/13/10		0.2	100	36.1	B	91.0	J	12.1	J
	06/20/11		5.0	100	40.3	J	93.0	J	ND	
	12/05/11		5.0	100	32.9	J	59.0	J	ND	
	06/11/12		5.0	100	40.0	J	95.6	J	ND	
	12/12/12		5.0	100	45.0	J	97.8	J	ND	
	05/01/13		5.0	100	32.7	J	43.1	J	ND	
	08/05/13		5.0	100	49.9	J	79.8	J	ND	
	02/24/14		5.0	100	29.0	J	30.4	J	ND	
	08/12/14	EPA 6010	5.0	100	---		121		ND	
	03/10/15	EPA 6010	2.5	100	29.0	J	32.1	J	ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
Beryllium	07/08/08		---	1.0	0.32	J	ND		ND	
	12/17/08		0.1	1.0	ND		ND		ND	
	07/09/09		0.1	1.0	ND		ND		ND	
	12/16/09		0.1	1.0	0.12	J	ND		ND	
NC 2B = 6.5 µg/L (02/05/10)	06/24/10		0.1	1.0	ND		ND		ND	
	12/13/10		0.1	1.0	ND		ND		ND	
	06/20/11		1.0	1.0	ND		ND		ND	
	12/05/11		1.0	1.0	ND		ND		ND	
	06/11/12		1.0	1.0	ND		ND		ND	
	12/12/12		1.0	1.0	ND		ND		ND	
	05/01/13		1.0	1.0	ND		ND		ND	
	08/05/13		1.0	1.0	ND		ND		ND	
	02/24/14		1.0	1.0	ND		ND		ND	
	08/12/14	EPA 6010	1.0	1.0	---		ND		ND	
	03/10/15	EPA 6010	0.5	1.0	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	
Chromium	06/17/97		---	10.0	ND		3.00		---	
	12/01/97		---	10.0	ND		ND		---	
	05/20/98		---	10.0	ND		ND		---	
	11/19/98		---	10.0	ND		ND		---	
	07/21/99		---	10.0	ND		ND		---	
	11/16/99		---	10.0	ND		ND		---	
	05/10/00		---	10.0	ND		ND		---	
	10/26/00		---	10.0	ND		ND		---	
	04/18/01		---	10.0	ND		ND		---	
	10/27/01		---	10.0	ND		ND		---	
	06/13/02		---	10.0	---		---		---	
	11/19/02		---	10.0	ND		ND		---	
	06/27/03		---	10.0	ND		ND		---	
	12/30/03		---	10.0	ND		ND		ND	
	06/30/04		---	10.0	ND		ND		ND	
	12/29/04		---	10.0	ND		ND		ND	
	06/29/05		---	10.0	ND		ND		ND	
	12/29/05		---	10.0	ND		ND		ND	
	06/28/06		---	10.0	ND		ND		ND	
	12/29/06		---	10.0	ND		ND		ND	
	07/12/07		---	10.0	ND		---		ND	
	12/19/07		---	10.0	2.20	B	2.60	B	1.40	J
NC 2B = 50 µg/L (03/28/08)	07/08/08		---	10.0	2.50	J	2.20	J	ND	
	12/17/08		0.4	10.0	1.40	J	2.60	J	ND	
	07/09/09		0.4	10.0	2.6	J	1.2	J	ND	
	12/16/09		0.4	10.0	4.1	J	3.4	J	ND	
	06/24/10		0.4	10.0	3.3	B	7.3	J	0.71	J
	12/13/10		0.4	10.0	1.4	J	1.5	J	ND	
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
	06/11/12		5.0	10.0	ND		7.2	J	ND	
	12/12/12		5.0	10.0	ND		8.2	J	ND	
	05/01/13		5.0	10.0	5.7	J	ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	4.4	J	3.6	J	ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
Cobalt	05/20/98		---	10	2.0		2.0		---	
	11/19/98		---	10	ND		3.0		---	
	07/21/99		---	10	ND		ND		---	
	11/16/99		---	10	ND		ND		---	
	05/10/00		---	10	ND		ND		---	
	10/26/00		---	10	ND		ND		---	
	04/18/01		---	10	ND		ND		---	
	10/27/01		---	10.0	ND		22.0		---	
	06/13/02		---	10.0	---		---		---	
	11/19/02		---	10.0	ND		ND		---	
	06/27/03		---	10.0	ND		10.0		---	
	12/30/03		---	10.0	ND		ND		ND	
	06/30/04		---	10.0	ND		ND		ND	
	12/29/04		---	10.0	ND		ND		ND	
	06/29/05		---	10.0	ND		ND		ND	
	12/29/05		---	10.0	ND		ND		ND	
	06/28/06		---	10.0	ND		ND		ND	
	12/29/06		---	10.0	ND		ND		ND	
	07/12/07		---	10.0	ND		---		ND	
	12/19/07		---	10.0	4.2	B	1.20	B	1.8	J
	07/08/08		---	10.0	4.80	B	10.5	B	6.20	J
	12/17/08		0.6	10.0	1.70	B	1.1	B	2.50	J
	07/09/09		0.6	10.0	ND		ND		ND	
	12/16/09		0.6	10.0	ND		1.0	J	ND	
NC 2B = NE µg/L (03/24/10)	06/24/10		0.6	10.0	ND		ND		ND	
	12/13/10		0.6	10.0	{4.4}	B	{ND}		1.6 {1.0 J}	J
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
Resample >	01/25/12		5.0	10.0	---		---		ND	
	06/11/12		5.0	10.0	ND		5.10	J	ND	
	12/12/12		5.0	10.0	ND		ND		ND	
	05/01/13		5.0	10.0	ND		ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	
Copper	12/29/06		---	10.0	1.3	B	1.10	B	0.60	J
	07/12/07		---	10.0	ND		---		ND	
	12/19/07		---	10.0	5.3	B	ND		9.8	
NC 2B = 7 µg/L (03/28/08)	07/08/08		---	10.0	1.7	J	4.20	J	ND	
	12/17/08		0.3	10.0	1.40	J	1.50	J	ND	
	07/09/09		0.3	10.0	ND		ND		ND	
	12/16/09		0.3	10.0	1.90	J	2.00	J	ND	
	06/24/10		0.3	10.0	ND		3.10	J	ND	
	12/13/10		0.3	10.0	0.31	B	ND		0.49	J
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
	06/11/12		5.0	10.0	ND		5.50	J	ND	
	12/12/12		5.0	10.0	ND		ND		ND	
	05/01/13		5.0	10.0	ND		ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
Lead	05/20/98		---	10.0	ND		8.00		---	
	11/19/98		---	10.0	ND		ND		---	
	07/21/99		---	10.0	ND		10.0		---	
	11/16/99		---	10.0	ND		ND		---	
	05/10/00		---	10.0	ND		ND		---	
	10/26/00		---	10.0	ND		ND		---	
	04/18/01		---	10.0	ND		ND		---	
	10/27/01		---	10.0	ND		ND		---	
	06/13/02		---	10.0	---		---		---	
	11/19/02		---	10.0	ND		ND		---	
	06/27/03		---	10.0	ND		ND		---	
	12/30/03		---	10.0	ND		ND		ND	
	06/30/04		---	10.0	ND		ND		ND	
	12/29/04		---	10.0	ND		ND		ND	
	06/29/05		---	10.0	ND		ND		ND	
	12/29/05		---	10.0	ND		ND		ND	
	06/28/06		---	10.0	ND		ND		ND	
	12/29/06		---	10.0	ND		ND		ND	
	07/12/07		---	10.0	ND		---		ND	
	12/19/07		---	10.0	ND		ND		ND	
NC 2B = 25 µg/L (03/28/08)	07/08/08		---	10.0	ND		ND		ND	
	12/17/08		4.0	10.0	ND		ND		ND	
	07/09/09		4.0	10.0	ND		ND		ND	
	12/16/09		4.0	10.0	ND		ND		ND	
	06/24/10		4.0	10.0	ND		ND		ND	
	12/13/10		4.0	10.0	ND		ND		ND	
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
	06/11/12		5.0	10.0	ND		ND		ND	
	12/12/12		5.0	10.0	ND		ND		ND	
	05/01/13		5.0	10.0	ND		ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	
Nickel	12/29/04		---	50.0	ND		50.0 (ND)		ND	
	06/29/05		---	50.0	ND		ND		ND	
	12/29/05		---	50.0	ND		ND		ND	
	06/28/06		---	50.0	ND		ND		ND	
	12/29/06		---	50.0	ND		2.9	J	ND	
	07/12/07		---	50.0	3.8	J	---		ND	
	12/19/07		---	50.0	6.0		31.5		ND	
NC 2B = 25 µg/L (03/28/08)	07/08/08		---	50.0	3.2	J	29.8	J	ND	
	12/17/08		1.7	50.0	2.4	B	4.0	B	2.4	J
	07/09/09		1.7	50.0	4.1	J	12.3	J	ND	
	12/16/09		1.7	50.0	3.8	B	4.4	B	3.0	J
	06/24/10		1.7	50.0	ND		2.0	J	ND	
	12/13/10		1.7	50.0	ND		14.2	J	2.7	J
	06/20/11		5.0	50.0	ND		7.8	J	ND	
	12/05/11		5.0	50.0	ND		5.3	J	ND	
	06/11/12		5.0	50.0	ND		11.0	J	ND	
	12/12/12		5.0	50.0	ND		13.8	J	ND	
	05/01/13		5.0	50.0	ND		ND		ND	
	08/05/13		5.0	50.0	ND		5.6	J	ND	
	02/24/14		5.0	50.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	50.0	---		20.3	J	ND	
	03/10/15	EPA 6010	2.5	50.0	3.0	J	3.8	J	ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
Silver	07/12/07		---	10.0	2.20	J	---		ND	
	12/19/07		---	10.0	ND		0.34	J	ND	
NC 2B = 0.06 µg/L (03/28/08)	07/08/08		---	10.0	0.35	B	1.00	J	0.12	J
	12/17/08		0.1	10.0	ND		ND		ND	
	07/09/09		0.1	10.0	ND		0.10	J	ND	
	12/16/09		0.1	10.0	ND		0.16	J	ND	
	06/24/10		0.1	10.0	ND		0.26	J	ND	
	12/13/10		0.1	10.0	{ND}		{0.28}	B	0.21 {0.19 J}	J
	06/20/11		5.0	10.0	ND		ND		ND	
	12/05/11		5.0	10.0	ND		ND		ND	
	06/11/12		5.0	10.0	ND		ND		ND	
	12/12/12		5.0	10.0	ND		ND		ND	
	05/01/13		5.0	10.0	ND		ND		ND	
	08/05/13		5.0	10.0	ND		ND		ND	
	02/24/14		5.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	10.0	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	
Thallium	12/29/04		---	10.0	ND		10.0 (ND)		ND	
	06/29/05		---	10.0	ND		ND		ND	
	12/29/05		---	10.0	ND		ND		ND	
	06/28/06		---	10.0	ND		ND		ND	
	12/29/06		---	6.00	ND		ND		ND	
	07/12/07		---	5.5	ND		---		ND	
	12/19/07		---	5.5	3.60	J	ND		ND	
	07/08/08		---	5.5	3.40	J	ND		ND	
	12/17/08		3.0	5.5	ND		ND		ND	
	07/09/09		3.0	5.5	ND		ND		ND	
	12/16/09		3.0	5.5	ND		ND		ND	
NC 2B = NE (03/24/10)	06/24/10		3.0	5.5	ND		ND		ND	
	12/13/10		3.0	5.5	3.80	J	ND		ND	
	06/20/11		5.4	5.5	ND		ND		ND	
	12/05/11		5.4	5.5	ND		ND		ND	
	06/11/12		5.4	5.5	ND		ND		ND	
	12/12/12		5.4	5.5	ND		ND		ND	
	05/01/13		5.4	5.5	ND		ND		ND	
	08/05/13		5.4	5.5	ND		ND		ND	
	02/24/14		5.4	5.5	ND		ND		ND	
	08/12/14	EPA 6010	5.4	5.5	---		ND		ND	
	03/10/15	EPA 6010	5.0	5.5	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	
Vanadium	12/29/06		---	25.0	1.60	J	2.00	J	ND	
	07/12/07		---	25.0	4.60	J	---		ND	
	12/19/07		---	25.0	3.30	J	1.40	B	0.62	J
NC 2B = NE µg/L (03/28/08)	07/08/08		---	25.0	5.20	J	2.30	J	0.20	J
	12/17/08		0.2	25.0	1.80	B	2.70	B	0.76	J
	07/09/09		0.2	25.0	5.00	B	3.40	B	1.30	J
	12/16/09		0.2	25.0	3.60	J	3.50	J	0.53	J
	06/24/10		0.2	25.0	5.80	J	2.60	J	ND	
	12/13/10		0.2	25.0	1.60	B	0.67	B	0.36	J
	06/20/11		5.0	25.0	ND		ND		ND	
	12/05/11		5.0	25.0	ND		ND		ND	
	06/11/12		5.0	25.0	ND		11.50	J	ND	
	12/12/12		5.0	25.0	ND		ND		ND	
	05/01/13		5.0	25.0	ND		ND		ND	
	08/05/13		5.0	25.0	ND		ND		ND	
	02/24/14		5.0	25.0	ND		ND		ND	
	08/12/14	EPA 6010	5.0	25.0	---		ND		ND	
	03/10/15	EPA 6010	2.5	25.0	3.9	J	4.7	J	ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1		SW-2		Blanks	
Zinc	11/22/96		---	50.0	11.0		ND		---	
	06/17/97		---	50.0	ND		ND		---	
	12/01/97		---	50.0	20.0		ND		---	
	05/20/98		---	50.0	20.0		28.0		---	
	11/19/98		---	50.0	ND		ND		---	
	07/21/99		---	50.0	ND		ND		---	
	11/16/99		---	50.0	ND		ND		---	
	05/10/00		---	50.0	ND		ND		---	
	10/26/00		---	50.0	ND		ND		---	
	04/18/01		---	50.0	ND		ND		---	
	10/27/01		---	50.0	ND		ND		---	
	06/13/02		---	50.0	---		---		---	
	11/19/02		---	50.0	ND		ND		---	
	06/27/03		---	50.0	ND		ND		---	
	12/30/03		---	50.0	ND		ND		ND	
	06/30/04		---	50.0	ND		ND		ND	
	12/29/04		---	50.0	ND		ND		ND	
	06/29/05		---	50.0	ND		ND		ND	
	12/29/05		---	50.0	ND		ND		ND	
	06/28/06		---	50.0	ND		ND		ND	
	12/29/06		---	50.0	ND		ND		ND	
	07/12/07		---	10.0	ND		---		ND	
	12/19/07		---	10.0	24.6	B	ND		102	
NC 2B = 50 µg/L (03/28/08)	07/08/08		---	10.0	ND		ND		1.20	J
	12/17/08		0.4	10.0	ND		0.89	B	0.49	J
	07/09/09		0.4	10.0	ND		4.90	B	1.60	J
	12/16/09		0.4	10.0	2.60	B	2.60	B	7.70	J
	06/24/10		0.4	10.0	ND		14.9		ND	
	12/13/10		0.4	10.0	ND		9.80	B	6.70	J
	06/20/11		10.0	10.0	ND		ND		ND	
	12/05/11		10.0	10.0	ND		ND		12.4	
	06/11/12		10.0	10.0	ND		ND		ND	
	12/12/12		10.0	10.0	ND		ND		ND	
	05/01/13		10.0	10.0	ND		16.80		ND	
	08/05/13		10.0	10.0	ND		ND		ND	
	02/24/14		10.0	10.0	ND		ND		ND	
	08/12/14	EPA 6010	10.0	10.0	---		ND		ND	
	03/10/15	EPA 6010	5.0	10.0	7.7	B	7.8	B	5.6	J
	08/18/15		---	---	Dry		Dry		---	
ORGANICS										
Acetone	10/27/01		---	100	168.0	B	337.0	B	479.0	
	06/13/02		---	100	---		---		---	
	06/13/02		---	100	---		---		---	
	11/19/02		---	100	ND		ND		---	
	06/27/03		---	100	ND		ND		---	
	12/30/03		---	100	ND		ND		ND	
	06/30/04		---	100	ND		ND		ND	
	12/29/04		---	100	ND		ND		ND	
	06/29/05		---	100	ND		ND		ND	
	12/29/05		---	100	ND		ND		ND	
	06/28/06		---	100	ND		ND		ND	
	12/29/06		---	100	ND		ND		ND	
	07/12/07		---	100	ND		---		ND	
	12/19/07		---	100	12.70	B	ND		4.50	J
NC 2B = 2,000 µg/L (03/28/08)	07/08/08		---	100	ND		ND		ND	
	12/17/08		20	100	ND		ND		ND	
	07/09/09		20	100	ND		ND		ND	
NC 2B = NE (03/24/10)	12/16/09		2.2	100	ND		ND		2.80	J
	06/24/10		2.2	100	2.80	B	ND		7.70	J
	12/13/10		2.2	100	ND		3.00	J	ND	
	06/20/11		2.2	100	ND		3.80	B	3.90	J
	12/05/11		2.2	100	ND		7.20	B	8.80	J
	06/11/12		2.2	100	ND		5.50	B	4.70	J
	12/12/12		10.0	100	ND		ND		ND	
	05/01/13		10.0	100	ND		ND		14.6	J
	08/05/13		10.0	100	ND		ND		ND	
	02/24/14		10.0	100	ND		ND		25.7	J
	08/12/14	EPA 8260	10.0	100	---		ND		22.0	J
	03/10/15	EPA 8260	10.0	100	ND		ND		ND	
	08/18/15		---	---	Dry		Dry		---	

APPENDIX B: HISTORICAL CONSTITUENTS IN SURFACE WATER

Analytes	Sample Date	Method	DL	RL	SW-1	SW-2	Blanks
Chlorobenzene	06/27/03		---	5.0	ND	7.20	ND
	12/30/03		---	5.0	ND	ND	ND
	06/30/04		---	5.0	ND	ND	ND
	12/29/04		---	5.0	ND	ND	ND
	06/29/05		---	5.0	ND	ND	ND
	12/29/05		---	5.0	ND	ND	ND
	06/28/06		---	5.0	ND	ND	ND
	12/29/06		---	3.0	ND	ND	ND
	07/12/07		---	3.0	ND	---	ND
	12/19/07		---	3.0	ND	ND	ND
NC 2B = 130 µg/L (03/28/08)	07/08/08		---	3.0	ND	ND	ND
	12/17/08		0.23	3.0	ND	ND	ND
	07/09/09		0.23	3.0	ND	ND	ND
	12/16/09		0.23	3.0	ND	ND	ND
	06/24/10		0.23	3.0	ND	ND	ND
	12/13/10		0.23	3.0	ND	ND	0.28 J
	06/20/11		0.23	3.0	ND	ND	ND
	12/05/11		0.23	3.0	ND	ND	ND
	06/11/12		0.23	3.0	ND	ND	ND
	12/12/12		0.23	3.0	ND	ND	ND
	05/01/13		0.23	3.0	ND	ND	ND
	08/05/13		0.23	3.0	ND	ND	ND
	02/24/14		0.23	3.0	ND	ND	ND
	08/12/14	EPA 8260	0.23	3.0	---	ND	ND
	03/10/15	EPA 8260	0.23	3.0	ND	ND	ND
	08/18/15		---	---	Dry	Dry	---
Chloromethane	07/09/09		0.11	1.0	ND	0.19 J	ND
	12/16/09		0.11	1.0	ND	ND	ND
NC 2B = NE (03/24/10)	06/24/10		0.11	1.0	ND	ND	ND
	12/13/10		0.11	1.0	ND	ND	ND
	06/20/11		0.11	1.0	ND	ND	ND
	12/05/11		0.11	1.0	ND	ND	ND
	06/11/12		0.11	1.0	ND	ND	ND
	12/12/12		0.11	1.0	ND	ND	ND
	05/01/13		0.11	1.0	ND	ND	ND
	08/05/13		0.11	1.0	ND	ND	ND
	02/24/14		0.11	1.0	ND	ND	0.25 J
	08/12/14	EPA 8260	0.11	1.0	---	ND	ND
	03/10/15	EPA 8260	0.11	1.0	ND	ND	ND
	08/18/15		---	---	Dry	Dry	---

Notes:
All concentrations are in micrograms per liter (µg/L).
RL = Reporting Limit (SWSL for December 2006 - present).
DL = Laboratory detection limit.
J = Estimated value between the DL and the RL.
B = Blank-qualified data; result is expected to be biased high based on concentrations in the blanks.
ND = Not detected above laboratory reporting limit.
NS = Not sampled.
NR = Not Reported.
Dry =Surface water point considered to be dry.
NC 2B = North Carolina Surface Water Standards from 15A NCAC 2B.
NE = Not established.
Shaded values for surface water are above the NC 2B.
Surface waters are classified as fresh-water aquatic life.
****SW- 1 and SW-2 were both dry and unable to be sampled on the 8/18/2015 sampling event.****

Appendix C

Annual Tree Survey Log (April 2015)

JOYCE ENGINEERING

Phytoremediation Tree and Flora Inspection Log

SITE: Butner Landfill, Granville County, NC **DATE:** 4/16/15

Personnel: Ron Heater - Haley Seaton

Weather Conditions: Partly Sunny - 70's

Description of Area: Very Gentle Sloping Area Between Toe of closed Landfill Slope + Creek. Partialy Logged in Recent Years

Has the ground surface been disturbed by rutting, erosion, tire tracks, settlement, etc.?

~~Area~~ Portions of area Logged within Last 3 years - Tire Tracks Left + Have since mostly Filled in.

Are there any indications of vandalism or trespassing:

No

Is there any ponded water in the area?

Small Puddles in Depressed areas of Wetland ~~in~~ Area 2

Has there been any change in the number of live/dead trees in the area since the last inspection?

~~No~~ Yes - Long Leaf Pine Emerging in Logged areas

Do any trees exhibit signs of disease, damage, or distress (discolored leaves, damaged bark, broken limbs, etc.)?

NO

Are there any signs of unusual animal/insect damage to the trees?

NO

Has there been any change in the type, amount, or health of undergrowth or ground cover flora?

NO

Has there been any change in the observed wetlands (size, maturity, health) in the area?

NO

Please describe the prevalent tree species and give approximate percentages in the area:

SPECIES or COMMON NAME	%	AVERAGE MATURITY	AVERAGE HEALTH
Sweet Gum	45%	15 yrs ±	Excellent
Tulip Poplar	20%	15 yrs ±	Excellent
Blue Beech	15%	10 yrs ±	Good
Loblolly Pine	10%	20 yrs ±	Good

COMMENTS:

The Area Investigated Does not Have a Large Range of Diversity. Trees Appear Healthy in General and Logged Areas are Rebounding Quickly

Signature of Inspector: Ron Heater

Appendix D

BIOSCREEN Modeling Input & Output

BIOSCREEN Natural Attenuation Decision Support System

BUTNER LANDFILL GRANVILLE COUNTY, NORTH CAROLINA VERSION 1.4

Butner LF
P1.0
Run Name

Data Input Instructions:

115 → *1. Enter value directly....or*
↑ *or* *2. Calculate by filling in grey*
0.02 → *cells below. (To restore formulas, hit button below).*

Variable* → *Data used directly in model.*
20 → *Value calculated by model. (Don't enter any data).*

1. HYDROGEOLOGY

Seepage Velocity*	*Vs*	6.4	*(ft/yr)*
or		↑ *or*	
Hydraulic Conductivity	*K*	6.2E-02	*(cm/sec)*
Hydraulic Gradient	*i*	0.0513	*(ft/ft)*
Porosity	*n*	0.18	*(-)*

2. DISPERSION

Longitudinal Dispersivity*	*alpha x*	15.0	*(ft)*
Transverse Dispersivity*	*alpha y*	1.5	*(ft)*
Vertical Dispersivity*	*alpha z*	0.0	*(ft)*
or		↑ *or*	
Estimated Plume Length	*Lp*	350	*(ft)*

3. ADSORPTION

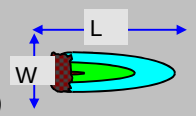
Retardation Factor*	*R*	1.0	*(-)*
or		↑ *or*	
Soil Bulk Density	*rho*	1.7	*(kg/l)*
Partition Coefficient	*Koc*	38	*(L/kg)*
FractionOrganicCarbon	*foc*	5.7E-5	*(-)*

4. BIODEGRADATION

1st Order Decay Coeff*	*lambda*	1.0E-2	*(per yr)*
or		↑ *or*	
Solute Half-Life	*t-half*	0.15	*(year)*
or Instantaneous Reaction Model			
Delta Oxygen*	*DO*	3.98	*(mg/L)*
Delta Nitrate*	*NO3*	0.124	*(mg/L)*
Observed Ferrous Iron*	*Fe2+*	4.5	*(mg/L)*
Delta Sulfate*	*SO4*	0.25	*(mg/L)*
Observed Methane*	*CH4*	2.16	*(mg/L)*

5. GENERAL

Modeled Area Length*	500	*(ft)*
Modeled Area Width*	800	*(ft)*
Simulation Time*	30	*(yr)*



6. SOURCE DATA

Source Thickness in Sat.Zone* 14 *(ft)*

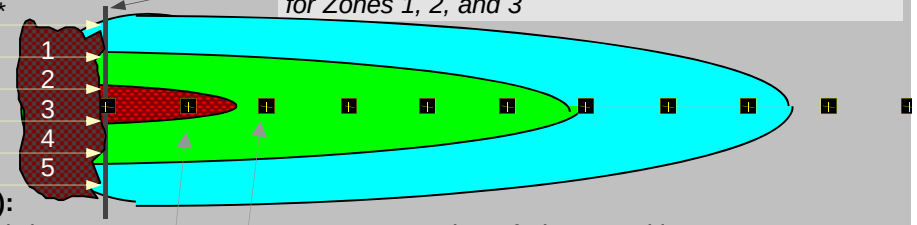
Source Zones:

Width* (ft)	Conc. (mg/L)*
125	0.00100
150	0.00150
150	0.00250
150	0.00150
125	0.00100

Source Halflife (see Help):

40	>1000	*(yr)*
Inst. React.	1st Order	
Soluble Mass	80	*(Kg)*
In Source NAPL, Soil		

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)	0.0025			0.0015					0.0000		0.0000
Dist. from Source (ft)	0	50	100	150	200	250	300	350	400	450	500

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN | **RUN ARRAY** | ***Help*** | Recalculate

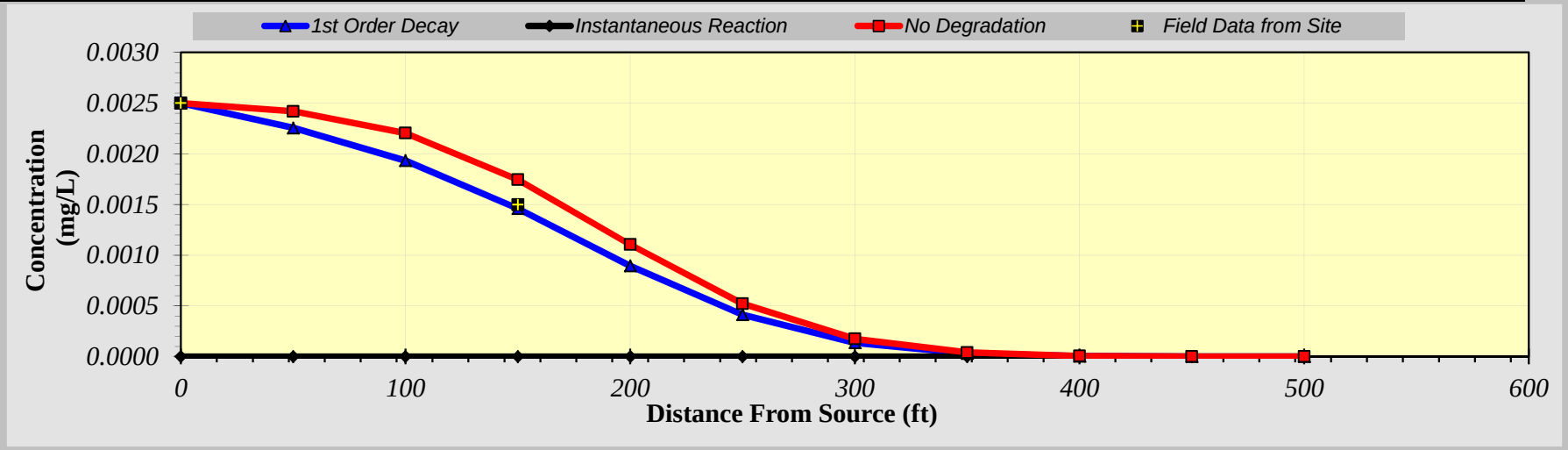
View Output | **View Output** | Paste Example Dataset

Restore Formulas for Vs,

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	50	100	150	200	250	300	350	400	450	500
No Degradation	0.002	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000
1st Order Decay	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Field Data from Site	0.00250			0.00150							



Replay

Next Timestep

Prev Timestep

Time:

30 Years

Return to

Recalculate This

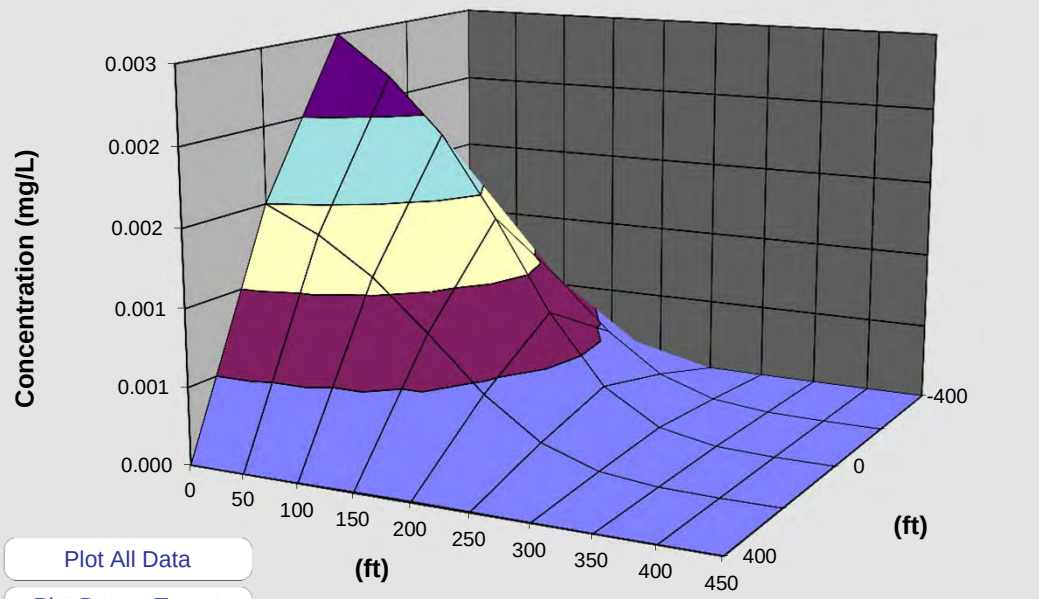
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft) →	0	50	100	150	200	250	300	350	400	450	500
400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
200	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
-200	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	1.4E+0	1.2E+0	1.0E+0	7.3E-1	4.1E-1	1.7E-1	4.8E-2	9.1E-3	1.1E-3	9.0E-5	4.6E-6

Model to Display:

- No Degradation
- 1st Order Decay
- Instantaneous

Time: **28 Years** Target Level: **0.005** mg/L Displayed Model: **1st Order Decay**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	0.0138	*(Kg)*
- Actual Plume Mass	0.0121	*(Kg)*
= Plume Mass Removed by Biodeg	**0.0017**	*(Kg)* (12 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	*Nitrate*	*Iron II*	*Sulfate*	*Methane*	
na	na	na	na	na	*(Kg)*

Contam. Mass in Source (t=0 Years)	80.5	*(Kg)*
Contam. Mass in Source Now (t=28Years)	80.5	*(Kg)*
Current Volume of Groundwater in Plume	0.000	*(ac-ft)*
Flowrate of Water Through Source Zone	0.260	*(ac-ft/yr)*

Mass HELP

Recalculat

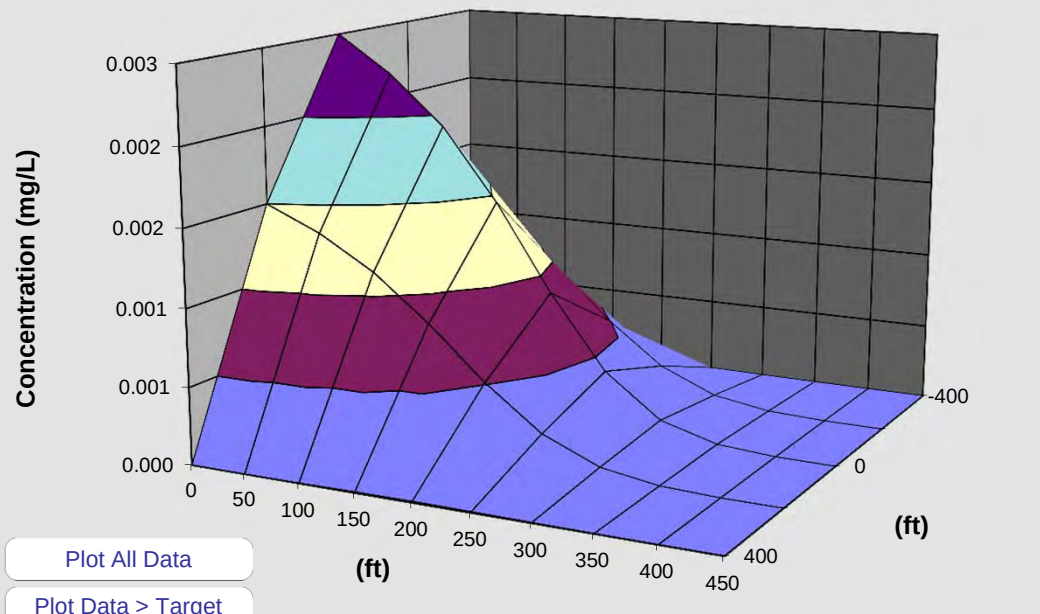
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft) →	0	50	100	150	200	250	300	350	400	450	500
400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
200	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
-200	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
-400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MASS FLUX (mg/day)	1.4E+0	1.2E+0	1.1E+0	7.9E-1	4.8E-1	2.2E-1	7.4E-2	1.7E-2	2.6E-3	2.7E-4	1.9E-5

Model to Display:

- *No Degradation*
- *1st Order Decay*
- *Instantaneous*

Time: **30 Years** Target Level: **0.005** mg/L Displayed Model: **1st Order Decay**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	0.0148	*(Kg)*
- Actual Plume Mass	0.0128	*(Kg)*
= Plume Mass Removed by Biodeg	**0.0019**	*(Kg)* (13 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	*Nitrate*	*Iron II*	*Sulfate*	*Methane*	
na	na	na	na	na	*(Kg)*

Contam. Mass in Source (t=0 Years)	80.5	*(Kg)*
Contam. Mass in Source Now (t=30Years)	80.5	*(Kg)*
Current Volume of Groundwater in Plume	0.000	*(ac-ft)*
Flowrate of Water Through Source Zone	0.260	*(ac-ft/yr)*

Mass HELP

Recalculat