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ALTERNATE SOURCE DEMONSTRATION REPORT

Edgecombe County Landfill
(Permit #33-01)
Tarboro, North Carolina
S&ME Project No. 1054-07-241

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1.0 INTRODUCTION

1.1 Purpose

This Alternate Source Demonstration (ASD) was performed in response to the inorganic constituent lead being detected at a concentration in exceedance of the groundwater protection standard established by 15A North Carolina Administrative Code (NCAC), Subchapter 2L (2L Standards) in compliance groundwater monitoring well MW-7A at the Edgecombe County Landfill in Tarboro, NC. Additionally, cobalt, thallium, and vanadium which do not have a designated 2L Standard, have been reported at concentrations in exceedance of their respective North Carolina Department of the Environment and Natural Resources (NCDENR) Division of Waste Management's Groundwater Protection Standard (GWPST) in several monitoring wells.

For completeness, efficiency, and because additional metals may be detected in the future which are not currently an issue, the ASD included the entire Appendix I metals suite. The ASD attempts to demonstrate that many of the Appendix I metals are naturally occurring at the site and that the levels of these naturally occurring metals in groundwater quality results reported in the wells are due to influence from the natural occurrence of these metals in the overlying in-situ soil in the vicinity of the affected wells.

1.2 Location

The Edgecombe County Landfill is a Solid Waste Management Facility located at 2872 Colonial Road in Edgecombe County, south of Tarboro, North Carolina.

The landfill is accessed off Colonial Road, and consists of a construction and demolition (C&D) landfill operated on top of a closed municipal solid waste (MSW) landfill regulated under Permit #33-01. The facility is bounded by woodlands to the east, west, and south. Some residential single-family homes are located to the north and east. Jerry's Creek runs along the northern property boundary of the facility. A former landfill, which received waste from 1973-1979, is located adjacent to the active facility, just north of Jerry's Creek. **Figure 1** is a site map of the facility showing the location of the active C&D landfill in relation to the other components of the facility.

1.3 Background

S&ME provides Edgecombe County with environmental engineering services to meet reporting requirements for groundwater, surface water, and methane at the facility as required by the North Carolina Solid Waste Management Rules (15A NCAC 13B). Groundwater has been monitored at the landfill since 1994 in accordance with the facility's *Water Quality Monitoring Plan* (WQMP), dated September 1994. According to section .1634(a) of the Solid Waste Management Rules (15A NCAC 13B), due to monitored constituents detected in compliance groundwater monitoring samples at concentrations above the North Carolina groundwater quality standards, the landfill is currently

monitoring groundwater under the Assessment Monitoring program per 15A NCAC 13B.1636. S&ME is also assisting the county with assessing the nature and extent of groundwater contamination in the vicinity of the landfill.

On March 31, 1999, on behalf of Edgecombe County, S&ME submitted a *Work Plan for Groundwater Assessment – Edgecombe County Landfill* (Work Plan) to the Solid Waste Section (Section) of the NCDENR. The section approved the Work Plan, with comments, on May 10, 1999. Using the revised Work Plan, the County began to assess potential impacts to groundwater quality from the landfill. Since the county began to assess the nature and extent of contamination at the landfill, there have been several significant changes at the facility. Significant changes to the landfill have included: closure of the MSW landfill (1997-1999); Hurricane Floyd (1999); a revision to the WQMP groundwater sampling and analysis plan (1998), revisions to the surface water locations and monitor wells included in the water quality monitoring network (1998-2002). These events so altered the water quality observed at the facility that a re-evaluation of the site-wide water quality was performed. The results of a baseline statistical re-evaluation were reported to DENR in S&ME's report titled *January 2003 Semi-Annual Sampling/Baseline Statistical Analysis,* dated August 19, 2003. These findings indicated a release of Appendix I constituents in the area of MW-5, however, there was no statistical evidence of a release of any Appendix II constituents. Assessment monitoring continues to be conducted at the landfill.

As part of the Assessment Monitoring Program, compliance groundwater samples are analyzed for the North Carolina Appendix I metals suite. During the January 2008 groundwater monitoring event, the metal lead was detected in the groundwater sample from monitor well MW-7A at a reported concentration of 0.046 mg/L which exceeds the 2L Standard for lead of 0.015 mg/L. Additionally, three metals for which there is no corresponding 2L Standard (cobalt, thallium, and, vanadium) were detected above their GWPST during the four most recent groundwater monitoring events (July 2006, January 2007, June 2007, and January 2008). In order to examine if naturally occurring metals concentrations within the in-situ native soils onsite could be influencing groundwater quality, this Alternate Source Demonstration (ASD) for metals was undertaken.

In order to complete this ASD, in-situ soils within the boundaries of the permitted landfill property were sampled and analyzed for the full Appendix I metals suite. Next, a Dilution Attenuation Factor (DAF) was calculated for each metal based on the average concentration of the particular metal within the in-situ soils of the landfill, following the Environmental Protection Agency (EPA) *Soil Screening Guidance: Technical Background Document*, Second Edition, United States Environmental Protection Agency, EPA/540/R95/128, May 1996 *(Soil Screening Guidance 2)*. Then the historical groundwater analytical data from the four most recent groundwater monitoring events were compared to the expected concentrations of the Appendix I metals based on the DAF computations.

This Alternate Source Demonstration was prepared for, and included the closed MSW landfill (Permit #33-01) south of Jerry's Creek and the active C&D landfill (Permit #33-01) located on top of the closed MSW landfill.

2.0 GEOLOGY & HYDROGEOLOGY

2.1 Regional Geology

Edgecombe County lies within the Coastal Plain Physiographic Province of North Carolina. The Coastal Plain province is characterized by subdued topographic features and flat low-lying terrain. Literature suggests that the Coastal Plain geologic region was formed during past transgressive and regressive movements of the oceans into and out of North Carolina. These sedimentary deposits were deposited under mostly marine and near marine conditions, and rest on a foundation of crystalline bedrock. On a regional basis the sedimentary units dip eastward and the overall sedimentary package thickens eastward toward the ocean.

Water table conditions generally prevail at shallow depths in shallow aquifers of the Coastal Plain. The water table fluctuates seasonally in response to variation in the amount of precipitation and degree of evapotranspiration. The groundwater table typically mimics surface topography with depth to water from ground surface being deeper on hills and slopes than in low lying areas. Groundwater flow is typically from interstream recharge areas, with streams and flood plains serving as groundwater discharge areas.

2.2 Site Geology

In general, geologic units in the Coastal Plain Region consist of deep, unconsolidated clastic rock. The geology of Tarboro, North Carolina contains local remnants of a Tertiary fossiliferous clay within the Yorktown Formation. The age of the basement units is described as pre-Cretaceous. Other formations in this region from youngest to oldest (top to bottom) include:

- *The Surficial Deposits (Quaternary)*
- *The Yorktown Formation (Tertiary)*
- *The Upper Cape Fear Formation (Cretaceous)*

In the site vicinity, surficial sediments are comprised of the Penholoway, Wicomico, and Sunderland Formations of Pleistocene Age. These formations are generally less than 50 feet thick, with an average of 20 to 30 feet and consist of yellow silty sand and sandy clays. The Yorktown Formation lies beneath the Pleistocene sediments. The Yorktown consists of 30 to 60 feet of blue gray silty clay with sandy clay, shell beds and fine sands. The Yorktown is extensive throughout the county forming an almost continuous layer. Beneath the Yorktown are Cretaceous aged sediments of reddish brown to brown clay, sand and sandy clay with some gravel resting on the irregular bedrock surface. These sediments range in thickness from 30 to 400 feet or more in thickness in the eastern area of the county.

The Cretaceous sediments are underlain by crystalline igneous and metamorphic rocks, with an irregular surface that dips gently to the east. The depth to the bedrock is approximately 300 feet below NGVD (approximately 240 to 400 feet below land surface).

2.3 Soil Description

According to the *Soil Survey of Edgecombe County, North Carolina*, prepared by the United States Department of Agriculture and the Soil Conservation Service (1979), soils in the vicinity of the site are classified as the Norfolk-Aycock-Wagram association. This association is comprised of nearly level to strongly sloping, well-drained soils. The surface layer is loamy sand to fine sandy loam with clay loam to sandy clay loam subsoil. The Norfolk-Aycok-Wagram association is usually found on uplands. The soils in this association are in broad, slightly convex areas that are rounded along the drainageways. They are dissected by many drainageways that have short side slopes and narrow to wide flood plains. The Bibb-Johnston soils are in the drainageways that dissect the association.

Soils in the vicinity of Jerry's Creek and Wright's Creek are classified as the Bibb-Johnston association. These soils are usually found on flood plains in narrow to moderately broad areas along major streams. The Bibb-Johnston association is comprised of nearly level, poorly-drained and very poorly-drained soils that have loamy and sandy underlying material. The surface layer is mucky loam to fine sandy loam. The underlying material is loamy sand to sandy loam.

2.4 Groundwater Hydrogeology

The Coastal Plain Physiographic Region of North Carolina is located between the uplands of the Piedmont and the Atlantic Ocean. Investigations of the Coastal Plain Region have identified as many as 10 aquifers separated by 9 confining units. However, these aquifers can basically be divided into three major deep aquifer systems in North Carolina: the Quaternary Aquifer System, the Tertiary Aquifer System, and the Cretaceous Aquifer System. The Quaternary Aquifer is composed of surficial deposits of sandy silt and clay. The Tertiary Aquifer is composed of glauconitic sands, clayey sands, and limestone. The Cretaceous Aquifer is composed of sand, silty and clayey sand, and clay separated by confining units of clay and silt.

The uppermost aquifer at the site is unconfined and is found in the silty sands of the Sunderland formation. This aquifer is recharged by inflow from upgradient areas and by infiltration of precipitation. The marine clay layer (Yorktown Formation) encountered at 13 to 24 feet below the original ground surface may be acting as a confining layer below the landfill.

Depths to static water levels have been historically measured semi-annually in several monitor wells located at the landfill. Based upon the water table elevations and the resulting potentiometric gradients, groundwater flow direction within the surficial water bearing zone underlying the site is generally to the north-northeast toward the southern tributary of Jerry's Creek at the existing C&D landfill. Groundwater flow direction at the closed landfill north of the C&D landfill is generally to the northeast and south at the property north of the closed landfill, towards Jerry's Creek and Wright's Creek.

3.0 ALTERNATE SOURCE DEMONSTRATION

3.1 Soil Sampling

Soil samples were collected at the facility on June 28, 2007. Six separate sample locations were chosen in native, residual soil within the facility permit boundaries. Two samples were taken at each location, at different depths. From these 12 samples, 7 were chosen for analysis. BKGD-1 and 1A were collected at the southeastern perimeter of the landfill property; BKGD-2 and 2A were collected along the northeastern perimeter on the eastern side of Colonial Road. The remaining soil samples (BKGD-3A, 4A and 5A) were collected along the southern perimeter of the landfill property on the western side of Colonial Road. Soil sample locations are shown on **Figure 1**. The soil samples were collected generally following guidance set forth in EPA's Resource Conservation and Recovery Act (RCRA) Technical Enforcement Guidance Document (SW-846). The collected samples were analyzed for the Appendix I metals suite. **Table 1** summarizes the analytical results of the soil sampling event. The complete Laboratory Analytical Report of the soil sampling results in included in **Attachment A**.

3.2 DAF Computation Methodology

According to the EPA's Soil Screening Guidance: Technical Background Document Second Edition, "As contaminants in soil leach and move through soil and groundwater, they are subjected to physical, chemical, and biological processes that tend to reduce the eventual contaminant concentration at the receptor point" (i.e., groundwater monitoring well). This reduction or attenuation in the concentration of parameters as they percolate through the soils to a ground water aquifer is governed by a variety of processes, the sum of which, are referred to as a Dilution/Attenuation Factor. The Dilution/Attenuation Factor (DAF) is defined as "the ratio of contaminant concentration in soil leachate to the concentration in ground-water at the receptor point. EPA has selected a default DAF of 20 to account for contaminant (parameter) dilution and attenuation during transport through the saturated zone to a compliance point (i.e., a receptor well).

Therefore, if we apply EPA's standard DAF factor of 20 to the overall average concentration of naturally occurring metals in soil samples, we can calculate a DAF for the influence of the overlying soils to groundwater in the subsurface Hydrogeologic Regime. Then we can compute the expected concentration of the particular metal in groundwater at that point source based on the DAF calculations.

The DAF is calculated from the analytical results of the collected soil samples utilizing the following equation:

Soil Concentration milligrams per kilograms (mg/kg) (total metal in soil) ÷ 20 (DAF) ⇒ Groundwater Concentration milligrams per liter (mg/L) (total metal concentration in ground water).

Concentration mg/L X 1,000⇒ Concentration micrograms per liter (µg/L) = expected groundwater concentration.

The DAF concentration is the expected total metals concentration in the groundwater based on the average concentration of the metal in the natural soil. This result is obtained if we assume that the extraction efficiency is 100%. If we assume that the extraction efficiency is only 15% which is conservative according to the *Soil Screening Guidance 2*, we get the following result:

Total Expected Groundwater Concentration µg/L x 15% = Reasonable Expected Groundwater Concentration of Constituent µg/L in groundwater.

For the constituents arsenic and barium, an extraction efficiency of 20% was used which was based on research conducted by S&ME of several case studies in similar soil types to the Edgecombe County Landfill site. **Table 1** illustrates the DAF calculations based on the average concentration of each inorganic constituent from the analytical results of soil samples collected on June 28, 2007.

3.3 Comparison of Metals within Ground-water to Soil Samples

Table 2 summarizes the historical groundwater quality results from the last two years of groundwater monitoring data (July 2006, January 2007, June 2007, and January 2008) as they pertain to Appendix I metals concentrations. **Table 1** illustrates the DAF calculated concentration expected in groundwater for the analyzed Appendix I metals based on the results of this ASD. The expected metals concentrations in groundwater are also compared to the highest historical detection from Table 2 and their respective 2L Standard or GWPST. The DAF calculations suggest that the groundwater concentrations of all Appendix I metals with the exception of antimony and silver are being influenced by the presence of these naturally occurring metals in the overlying in-situ soils.

Comparison of the expected groundwater concentrations from the DAF calculations to the reported concentrations in the last four groundwater monitoring events in the compliance groundwater monitoring network indicate barium, cobalt, nickel, and thallium were found to be at higher concentrations in the compliance monitoring data than would be expected for these metals in groundwater based on the concentrations of these constituents in the in-situ soil samples collected and analyzed for this ASD. It should be noted that neither barium or nickel have been detected at a concentration higher than their respective 2L Standards during the past four groundwater monitoring events.

For cadmium, chromium, lead, selenium, thallium, and vanadium the expected groundwater concentrations from the DAF calculations are higher then their respective 2L Standards or GWPSTs. It should be noted that neither cadmium, chromium, or selenium has been detected at concentrations higher than their respective 2L Standards during the past four groundwater monitoring events. Also, the detections of thallium and vanadium above their respective GWPST were considered estimated values (“B” and “J” designations) less than their respective Solid Waste Section Limits (SWSLs).

3.4 Camparism to Statistical Evaluation Results

A statistical evaluation of the laboratory analytical data from the historical groundwater monitoring data set was last performed as part of the *July 2006 Semi-Annual Groundwater and Surface Water Sampling Event* for the *Edgecombe County Landfill*. The historical data pool has been updated and included in the subsequent sampling events, however, no statistical analysis was performed due to the changes in sample analytical methods. The change in sample analytical methods was due to the NCDENR DWM revision of the permissible quantitation limit (PQL) to the Solid Waste Section Limit (SWSL). The SWSL was defined by the Solid Waste Section as the lowest amount of analyte in a sample that can be quantitatively determined with suitable precision and accuracy. In addition, the Section also required that laboratories report analytical results to the method detection limits (MDLs) rather than the PQL. Several constituents that have not been reported as detected during sampling events prior to 2007 were detected in the January 2007, June 2007, and January 2008 sampling events due to the fact that the new SWSLs and MDLs are lower than the previous PQLs. In our opinion, these findings generally are not indicative of an increase in the presence of these constituents in the groundwater but rather due to changes in the reporting and evaluation standards. A new baseline sampling event using the lower SWSLs and MDLs is being conducted to “re-establish” background water quality at the facility. In accordance with Section .1634(b) it is recommended that a minimum of four independent samples be collected from each well (background and downgradient) to establish background for the newly detected constituents for statistical analysis. At least one additional sampling event is recommended to evaluate the statistical significance of these low-level detections and “re-establish” background conditions.

In the *July 2006 Semi-Annual Groundwater and Surface Water Sampling Event* for the Edgecombe County Landfill, a statistical evaluation of the entire Appendix I Metals suite was completed. This statistical evaluation also included metals detected at concentrations too low in the in-situ soil samples to be sufficient to influence groundwater quality. In order to complete the statistical evaluation, data from the upgradient background wells was pooled to form a background data set. Next the data distribution of the background data set was evaluated to test for a parametric or non-parametric distribution. Due to the large number of non-detects in the background data set the Wilcoxon Rank-Sum Test, a non-parametric statistical analysis, was used to compare individual down-gradient or compliance wells to the up-gradient or background well group for the purpose of evaluating the compliance data for suspected statistically significant increases above background values. Then a non-parametric Upper Prediction Limit was calculated from the background data set. If the downgradient compliance well data exceed the statistically computed non-parametric Upper Prediction Limit, then there is evidence that a statistically significant increase has occurred.

According to the *July 2006 Semi-Annual Groundwater and Surface Water Sampling Event*, the comparison of the downgradient compliance data to the statistically computed background non-parametric Upper Prediction Limits indicate that the concentrations of thallium and vanadium in groundwater samples collected from the downgradient compliance monitoring wells does not represent statistically significant increases over background values. Therefore, it is reasonable to conclude that the exceedances of thallium and vanadium above their respective groundwater quality standard are not indicative of a

release from the facility, but rather from naturally occurring background values of these constituents within the monitored portion of the aquifer.

4.0 CONCLUSIONS

The concentrations of the naturally occurring metals arsenic, beryllium, cadmium, chromium, copper, lead, selenium, vanadium, and zinc within the in-situ soil at the facility are sufficient to influence the concentrations of these metals in ground-water samples collected during the last four groundwater monitoring events from the downgradient compliance monitoring wells. Based upon these results, the historical exceedance of lead above its respective 2L Standard and vanadium above its respective GWPST is not due to a release by the Facility, but instead can be the result of the natural occurrence of these metals in the native, residual soil.

Additionally, the reported concentrations of thallium and vanadium above their respective GWPST do not represent a statistically significant increase (SSI) above background values. Therefore, the elevated concentrations of these two constituents could be attributed to naturally occurring background values of these metals within the hydrogeologic regime.

The concentrations of Cobalt detected in the background soil samples do not support influence to groundwater quality from the natural occurrence of the metal cobalt because, while cobalt was detected in the in-situ soils at the Facility, the naturally occurring levels of cobalt in the soil are not sufficient to attribute the high levels of cobalt detected in the groundwater samples from monitoring well MW-5 solely to its natural occurrence in the overlying soils. Cobalt is the remaining inorganic constituent of concern at the Facility.

5.0 REFERENCES

January 2008 Semi-Annual Groundwater and Surface Water Sampling Event, Edgecombe County Landfill, Tarboro, North Carolina, March 13, 2008, S&ME Job No. 1054-07-241.

Soil Screening Guidance: Technical Background Document, Second Edition, May 1996, United States Environmental Protection Agency (EPA), EPA/540/R95/128, OSWER-9355.4-17A.

RCRA Groundwater Monitoring Technical Enforcement Guidance Document, U.S. Environmental Protection Agency, September 1986.

United States Department of Agriculture and Soil Conservation Service, Soil Survey of Edgecombe County, North Carolina, 1979.

TABLES

Table 1
Alternate Source Demonstration Report
Dilution/Attenuation Factor Calculation Table
Edgecombe County Landfill
Tarboro, North Carolina
S&ME Project No. 1054-07-241

Appendix I Inorganic Compounds EPA Method 6010B/6020	EPA Region III RBC Industrial Standard	Soil Analytical Results by Sampling Point (mg/kg dry)							MEAN	DAF COMPUTATION	EXPECTED GROUNDWATER CONCENTRATION mg/L	Highest Historical Detection**		GWPST / 2L Standard
		BKGD 1	BKGD 1A	BKGD 2	BKGD 2A	BKGD 3A	BKGD 4A	BKGD 5A				Value (mg/L)	Monitor Well Identification	
Antimony	820	<0.419	<0.385	<0.355	<0.482	<0.385	<0.475	<0.433	N/A	N/A	N/A	0.0013	MW-4	0.0014*
Arsenic	3.8	**5.76**	1.17	0.834	**12.6**	1.46	2.9	2.92	3.95	0.20	0.030	0.027	MW-7A	0.05
Barium	140,000	44.3	62.7	1.64	24	5.93	18.8	8.45	23.69	1.18	0.178	0.322	MW-9	2
Beryllium	4100	0.307	<0.0442	<0.0408	<0.0554	<0.0442	0.511	0.182	0.33	0.017	0.003	0.0025J	MW-3B	0.004*
Cadmium	2000	0.645	<0.00769	<0.00710	0.0367	<0.0077	<0.00949	<0.00866	0.34	0.02	0.003	0.001	MW-3B	0.002
Chromium	6100	22.2	2.14	1.81	32	8.37	17	5.4	12.70	0.64	0.095	0.0031J	MW1A	0.05
Cobalt	120000	0.836	<0.210	<0.194	15.4	<0.210	<0.259	<0.236	8.12	0.41	0.061	0.13	MW-5	0.070*
Copper	82,000	2.66	3.37	0.6	16.8	1.26	2.51	2	4.17	0.21	0.031	0.0054	MW-1A	1
Lead	800	3.65	1.98	2.39	20.1	6.75	10.4	5.43	7.24	0.36	0.054	0.046	MW-7A	0.015
Nickel	41000	3.99	1.56J	0.455	19.3	1.14	1.5	0.652	4.51	0.23	0.034	0.043	MW-5	0.1
Selenium	10000	1.3	1.76	1.5	1.7	1.35	1.21	1.94	1.54	0.08	0.012	0.0031	MW-1A	0.05
Silver	10000	<0.0874	<0.0802	<0.0740	<0.100	<0.0802	<0.0989	<0.0902	N/A	N/A	N/A	0.00676J	MW-5	0.018
Thallium	140	0.152	0.0355	0.0154	0.327	0.0554	0.0709	0.0129	0.10	0.005	0.001	0.0735	MW-5	0.00028*
Vanadium	14000	19	1.6	3.81	25.5	8.19	18.3	17.1	13.36	0.67	0.100	0.0058J	MW-3B	0.0035*
Zinc	610,000	16.4	2.44	1.15	26.6	3.02	6.73	3.38	8.53	0.43	0.064	0.058	MW-5	1.05
SAMPLE DEPTH (ft-bgs)		2.0-2.5'	4.0-4.5'	3.0-3.5'	6.5-7.0'	8.0-10.0'	7.5-8.0'	9.5-10'						
SOIL LITHOLOGY		Gray-white to red-brown silty SAND	Black-gray sandy CLAY	Gray silty medium-coarse SAND	Black gray silty CLAY	Lt. gray w/red clayey SAND	Lt. gray brown sandy CLAY	Gray red brown med-coarse SAND						

NOTES:
N/A = Not Analyzed
EPA Region III Industrial Standard = Environmental Protection Agency Region III Risk Based Industrial Standard
ft-bgs = Feet below ground surface
mg/Kg = Milligram Per Kilogram
mg/L = Milligram Per Liter
Values which are **BOLDED** and shaded indicate levels above their respective EPA Region III Risk Based Industrial Concentration.
Soil samples were collected on June 28, 2007 and analyzed by SGS Environmental Services Inc. (SGS). Detection limits are shown on laboratory reports.
Background soil sampling locations shown on Figure 1.
* Indicates there is currently no 2L Standard. The target analyte was compared to the Solid Waste Groundwater Protection Standard (GWPST).
** Highest detected concentration from the past four semi-annual compliance monitoring events (July 2006, January 2007, June 2007, and January 2008).
Historical groundwater detections are summarized on Table 2 and have previously been reported in semi-annual sampling reports submitted to NCDENR-DWM.

Table 2
Historical Groundwater Quality Data
Alternate Source Demonstration Report
Edgecombe County Landfill
Tarboro, North Carolina
S&ME Project No. 1054-07-241

APPENDIX I INORGANIC COMPOUNDS	GWPST / 2L STANDARD	Sample Date	Jul-06	Jan-07	Jun-07	Jan-08
ANTIMONY	0.0014*	MW-1A	<0.03	<0.58	<0.00562	0.0008J
		MW-3B	<0.03	<0.58	<0.00562	0.00053J
		MW-4	<0.03	<0.58	<0.00562	0.0013
		MW-5	<0.03	<0.58	<0.00562	0.0006J
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.03	<0.58	<0.00562	0.00071J
		MW-7A	<0.03	<0.58	<0.00562	0.00054J
		MW-9	<0.03	<0.58	<0.00562	0.00076J
		MW-10	NS	NS	NS	NS
ARSENIC	0.05	MW-1A	<0.01	0.0028J	<0.00185B	0.001
		MW-3B	<0.01	<0.002	<0.00185B	0.0051
		MW-4	<0.01	0.0025J	<0.00185B	0.00056J
		MW-5	<0.01	0.0081J	0.0241B	0.021
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.01	0.0026J	<0.00185B	0.0016
		MW-7A	<0.01	<0.002	0.00889B	0.027
		MW-9	<0.01	<0.002	<0.00185B	0.0005J
		MW-10	NS	NS	NS	NS
BARIUM	2	MW-1A	<0.500	0.0804	0.141	0.16
		MW-3B	<0.500	0.11	0.144	0.17
		MW-4	<0.500	0.0528	0.0608	0.049
		MW-5	<0.500	0.235	0.204	0.22
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.500	0.0876	0.137	0.077
		MW-7A	<0.500	0.112	0.152	0.09
		MW-9	<0.500	0.322	0.175	0.25
		MW-10	NS	NS	NS	NS
BERYLLIUM	0.004*	MW-1A	<0.002	<0.0007	<0.00247	0.0003J
		MW-3B	<0.002	<0.0007	<0.00247	0.0025J
		MW-4	<0.002	<0.0007	<0.00247	0.00029J
		MW-5	<0.002	<0.0007	<0.00247	<0.0012
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.002	<0.0007	<0.00247	0.00069J
		MW-7A	<0.002	<0.0007	<0.00247	0.00027J
		MW-9	<0.002	<0.0007	<0.00247	0.00026J
		MW-10	NS	NS	NS	NS
CADMIUM	0.00175	MW-1A	<0.001	<0.0005	<0.00033	0.00039J
		MW-3B	<0.001	<0.0005	<0.00033	0.001
		MW-4	<0.001	<0.0005	<0.00033	0.00047J
		MW-5	<0.001	<0.0005	<0.00033	0.0004J
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.001	<0.0005	<0.00033	0.00069
		MW-7A	<0.001	<0.0005	<0.00033	0.00031J
		MW-9	<0.001	<0.0005	<0.00033	0.00032J
		MW-10	NS	NS	NS	NS

Notes:

All values reported in milligrams per liter (mg/L)

2L STANDARD = North Carolina groundwater standards as promulgated by 15A North Carolina Administrative Code, Subchapter 2L.

* Indicates there is currently no 2L Standard. The target analyte was compared to the Solid Waste Groundwater Protection Standard (GWPST).

Values which are **BOLD** and shaded indicate levels greater than their respective GWPST or 2L Standard.

D = Data reported from a dilution.

NS = Not Sampled

J = Analyte detected between the laboratory method detection limit (MDL) and reporting limit (RL).

B = Amount in Prep Blank was great then the method detection limit (MDL).

Table 2 (Cont.)
Historical Groundwater Quality Data
Alternate Source Demonstration Report
Edgecombe County Landfill
Tarboro, North Carolina
S&ME Project No. 1054-07-241

APPENDIX I INORGANIC COMPOUNDS	GWPST / 2L STANDARD	Sample Date	Jul-06	Jan-07	Jun-07	Jan-08
CHROMIUM	0.05	MW-1A	<0.010	<0.002	<0.00115B	0.0031J
		MW-3B	<0.010	<0.002	<0.00115B	<0.0023
		MW-4	<0.010	<0.002	0.00117JB	<0.0023
		MW-5	<0.010	<0.002	0.0112B	<0.0023
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.010	<0.002	0.00257JB	<0.0023
		MW-7A	<0.010	<0.002	0.00197JB	<0.0023
		MW-9	<0.010	<0.002	<0.00115B	<0.0023
		MW-10	NS	NS	NS	NS
COBALT	0.07*	MW-1A	<0.010	<0.002	0.00556JB	0.0012J
		MW-3B	0.0345	0.0061J	0.0217B	0.026
		MW-4	<0.010	<0.002	0.00397JB	0.0017J
		MW-5	**0.12**	**0.0749**	**0.131B**	**0.13**
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.010	<0.002	0.00516JB	0.0066J
		MW-7A	<0.010	<0.002	0.00411JB	0.0052J
		MW-9	<0.010	<0.002	0.00352JB	<0.0011
		MW-10	NS	NS	NS	NS
COPPER	1	MW-1A	<0.2	<0.0006	0.00304J	0.0054
		MW-3B	<0.2	<0.0006	0.00209J	0.00055J
		MW-4	<0.2	<0.0006	0.00277J	0.0037
		MW-5	<0.2	<0.0006	0.00331J	0.00068J
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.2	<0.0006	0.00249J	0.0042
		MW-7A	<0.2	<0.0006	0.00339J	<0.0022
		MW-9	<0.2	<0.0006	0.00214J	<0.00045
		MW-10	NS	NS	NS	NS
LEAD	0.015	MW-1A	<0.010	<0.002	<0.00358B	<0.0024
		MW-3B	<0.010	<0.002	<0.00358B	<0.0024
		MW-4	<0.010	<0.002	<0.00358B	<0.0024
		MW-5	0.0108	<0.002	0.0121B	0.014
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.010	<0.002	<0.00358B	<0.0024
		MW-7A	0.0127	<0.002	0.0042JB	**0.046**
		MW-9	<0.010	<0.002	<0.00358B	<0.0024
		MW-10	NS	NS	NS	NS
NICKEL	0.1	MW-1A	<0.05	0.005J	0.022JB	<0.0098
		MW-3B	<0.05	0.007J	0.0234JB	0.018J
		MW-4	<0.05	<0.002	<0.00474B	<0.0098
		MW-5	<0.05	0.0227	0.0403B	0.043
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.05	<0.002	<0.00474	<0.0098
		MW-7A	<0.05	<0.002	<0.00474	0.018J
		MW-9	<0.05	<0.002	<0.00474B	<0.0098
		MW-10	NS	NS	NS	NS

Notes:

All values reported in micrograms per liter (mg/L)

2L STANDARD = North Carolina groundwater standards as promulgated by 15A North Carolina Administrative Code, Subchapter 2L.

* Indicates there is currently no 2L Standard. The target analyte was compared to the Solid Waste Groundwater Protection Standard (GWPST).

Values which are BOLD and shaded indicate levels greater than their respective GWPST or 2L Standard.

D = Data reported from a dilution.

NS = Not Sampled

J = Analyte detected between the laboratory method detection limit (MDL) and reporting limit (RL).

B = Amount in Prep Blank was great then the method detection limit (MDL).

Table 2 (Cont.)
Historical Groundwater Quality Data
Alternate Source Demonstration Report
Edgecombe County Landfill
Tarboro, North Carolina
S&ME Project No. 1054-07-241

APPENDIX I INORGANIC COMPOUNDS	GWPST / 2L STANDARD	Sample Date	Jul-06	Jan-07	Jun-07	Jan-08
SELENIUM	0.05	MW-1A	<0.02	<0.002	0.00814J	0.0031
		MW-3B	<0.02	<0.002	0.00858J	0.0014
		MW-4	<0.02	<0.002	0.0093J	0.0008J
		MW-5	<0.02	<0.002	0.0126	0.00051J
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.02	<0.002	<0.0073	0.00091J
		MW-7A	<0.02	<0.002	<0.0073	0.0026J
		MW-9	<0.02	<0.002	<0.0073	0.00044J
		MW-10	NS	NS	NS	NS
SILVER	0.0175	MW-1A	<0.0.1	<0.002	<0.00081B	<0.0025
		MW-3B	<0.0.1	<0.002	<0.00081B	<0.0025
		MW-4	<0.0.1	<0.002	<0.00081B	<0.0025
		MW-5	<0.0.1	<0.002	0.00676J	0.0055J
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.0.1	<0.002	<0.00081B	<0.0025
		MW-7A	<0.0.1	<0.002	<0.00081B	<0.0025
		MW-9	<0.0.1	<0.002	<0.00081	<0.0025
		MW-10	NS	NS	NS	NS
THALLIUM	0.00028*	MW-1A	<0.01	<0.000044	<0.00521	**0.00035J**
		MW-3B	<0.01	0.000139	<0.00521	**0.00036J**
		MW-4	<0.01	NS	<0.00521	**0.00034J**
		MW-5	**0.0735**	0.00006	**0.00564J**	**0.00041J**
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.01	<0.000044	<0.00521	**0.00038J**
		MW-7A	<0.01	<0.000044	<0.00521	**0.00032J**
		MW-9	<0.01	<0.000044	<0.00521	**0.00031J**
		MW-10	NS	NS	NS	NS
VANADIUM	0.0035*	MW-1A	<0.040	<0.001	**0.00622JB**	**0.0056J**
		MW-3B	<0.040	**0.0059J**	**0.0089JB**	**0.0058J**
		MW-4	<0.040	<0.001	**0.00777JB**	<0.0029
		MW-5	<0.040	<0.001	**0.00962JB**	<0.0029
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.040	<0.001	**0.0108JB**	<0.0029
		MW-7A	<0.040	<0.001	**0.00556JB**	**0.0038J**
		MW-9	<0.040	<0.001	**0.00571JB**	<0.0029
		MW-10	NS	NS	NS	NS
ZINC	1.05	MW-1A	<0.05	0.0143	0.0117	0.0096J
		MW-3B	<0.05	0.0044J	0.0233	0.055
		MW-4	<0.05	0.0042J	0.00844J	<0.003
		MW-5	0.058	0.0171	0.0557	0.058
		MW-5S	NS	NS	NS	NS
		MW-5D	NS	NS	NS	NS
		MW-6	<0.05	0.0011J	0.00655J	0.035
		MW-7A	<0.05	<0.001	<0.00399	<0.015
		MW-9	<0.05	<0.001	<0.00399	0.0078J
		MW-10	NS	NS	NS	NS

Notes:

All values reported in micrograms per liter (mg/L)

2L STANDARD = North Carolina groundwater standards as promulgated by 15A North Carolina Administrative Code, Subchapter 2L.

* Indicates there is currently no 2L Standard. The target analyte was compared to the Solid Waste Groundwater Protection Standard (GWPST).

Values which are BOLD and shaded indicate levels greater than their respective GWPST or 2L Standard.

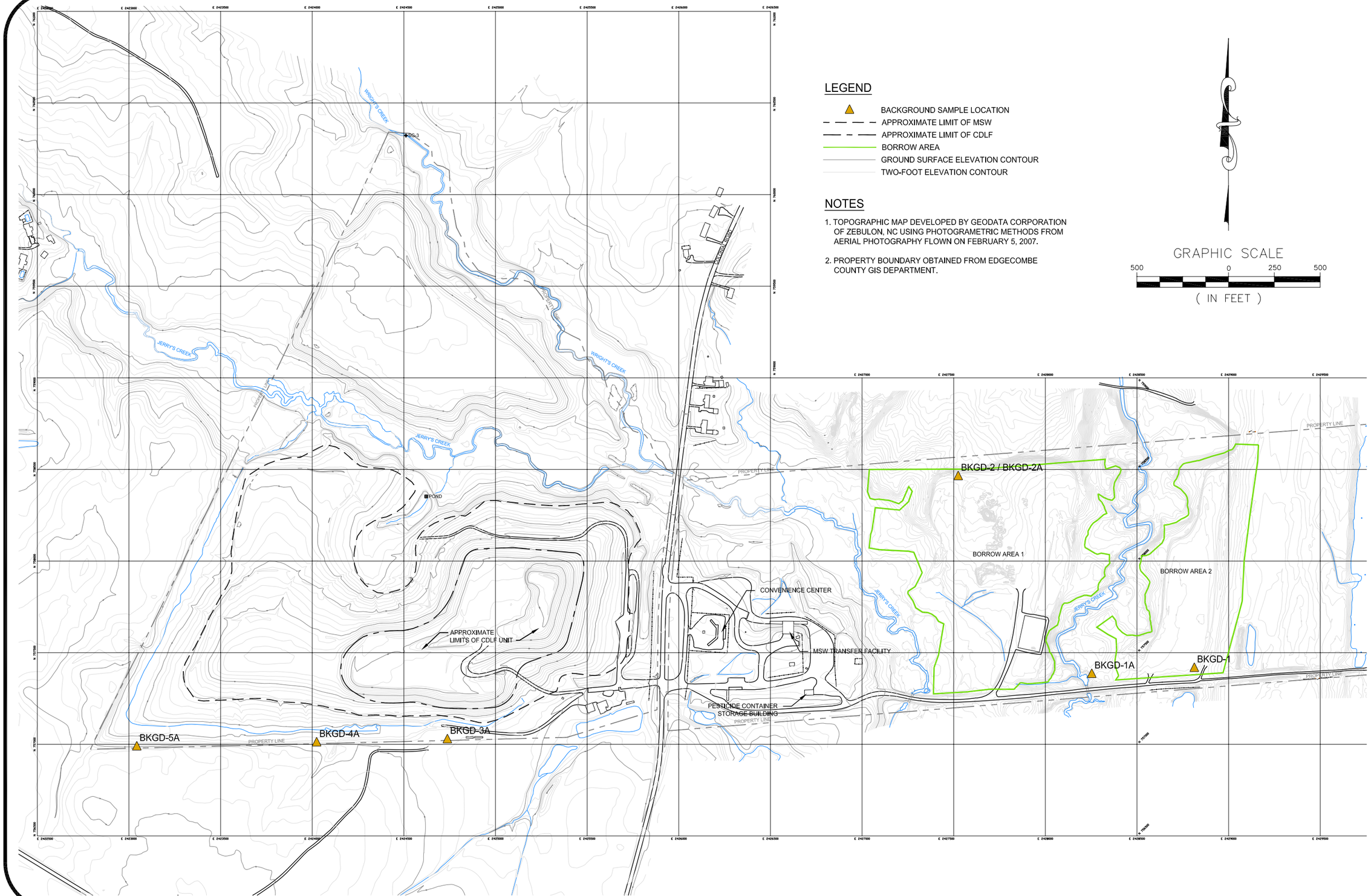
D = Data reported from a dilution.

NS = Not Sampled

J = Analyte detected between the laboratory method detection limit (MDL) and reporting limit (RL).

B = Amount in Prep Blank was great then the method detection limit (MDL).

FIGURES



LEGEND

- BACKGROUND SAMPLE LOCATION
- APPROXIMATE LIMIT OF MSW
- APPROXIMATE LIMIT OF CDLF
- BORROW AREA
- GROUND SURFACE ELEVATION CONTOUR
- TWO-FOOT ELEVATION CONTOUR

NOTES

1. TOPOGRAPHIC MAP DEVELOPED BY GEODATA CORPORATION OF ZEBULON, NC USING PHOTOGRAMETRIC METHODS FROM AERIAL PHOTOGRAPHY FLOWN ON FEBRUARY 5, 2007.
2. PROPERTY BOUNDARY OBTAINED FROM EDGECOMBE COUNTY GIS DEPARTMENT.

GRAPHIC SCALE

500 0 250 500

(IN FEET)

SCALE: 1" = 500'	PROJECT NUMBER: 1054-07-241	DRAWING NUMBER: B-1051
DATE: FEB. 2008	DRAWN BY: BTR	CHECKED BY:

S&ME
WWW.SMEINC.COM

SITE MAP
ALTERNATE SOURCE DEMONSTRATION

EDGECOMBE COUNTY LANDFILL
TARBORO, NORTH CAROLINA

FIGURE NO.

1

S:\PROJECTS\2007\07-241 Edgecombe-Assmt of Corrective Measures\CAD\B1051.dwg, B1051, 6/10/2008 8:45:42 AM, 1:1

ATTACHMENT A

Alternate Source Demonstration, Laboratory Analytical Results Report

SGS ENVIRONMENTAL SERVICES, INC.

Mr. David Wells
S&ME
3118 Spring Forest Road
Raleigh NC 27616

Report Number: G108-1770

Client Project: Edgecombe County

Dear Mr. Wells:

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call SGS/Paradigm at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS/Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS/Paradigm Analytical Laboratories, Inc.

Laboratory Director
J. Patrick Weaver

7/12/2007
Date

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL = Reporting Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% soilds = Percent Solids

Special Notes:

1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.

2) Uncertainty for all reported data is less than or equal to 30 percent.

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD1	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 12:45
Lab Sample ID:	G108-1770-1	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	81.26
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.741	0.419	1	MG/KG	6010B	7/10/2007	
Arsenic	**5.76**	0.855	0.657	1	MG/KG	6010B	7/10/2007	
Barium	**44.3**	6.84	0.467	1	MG/KG	6010B	7/10/2007	
Beryllium	**0.307**	0.114	0.0482	1	MG/KG	6010B	7/10/2007	
Cadmium	**0.645**	1.14	0.00839	10	MG/KG	6020	7/9/2007	J
Chromium	**22.2**	0.855	0.291	1	MG/KG	6010B	7/10/2007	
Cobalt	**0.836**	1.14	0.229	1	MG/KG	6010B	7/10/2007	J
Copper	**2.66**	0.855	0.161	1	MG/KG	6010B	7/10/2007	B
Lead	**3.65**	0.741	0.550	1	MG/KG	6010B	7/10/2007	
Nickel	**3.99**	3.42	0.391	1	MG/KG	6010B	7/10/2007	
Selenium	**1.30**	1.14	0.491	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.855	0.0874	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.152**	0.114	0.00948	10	MG/KG	6020	7/9/2007	
Vanadium	**19.0**	2.85	0.530	1	MG/KG	6010B	7/10/2007	B
Zinc	**16.4**	1.14	0.343	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_[illegible]2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD1A	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 13:30
Lab Sample ID:	G108-1770-2	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	85.43
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.679	0.385	1	MG/KG	6010B	7/10/2007	
Arsenic	**1.17**	0.784	0.603	1	MG/KG	6010B	7/10/2007	
Barium	**62.7**	6.27	0.429	1	MG/KG	6010B	7/10/2007	
Beryllium	BQL	0.105	0.0442	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	1.05	0.00769	10	MG/KG	6020	7/9/2007	
Chromium	**2.14**	0.784	0.267	1	MG/KG	6010B	7/10/2007	
Cobalt	BQL	1.05	0.210	1	MG/KG	6010B	7/10/2007	
Copper	**3.37**	0.784	0.147	1	MG/KG	6010B	7/10/2007	B
Lead	**1.98**	0.679	0.505	1	MG/KG	6010B	7/10/2007	
Nickel	**1.56**	3.14	0.358	1	MG/KG	6010B	7/10/2007	J
Selenium	**1.76**	1.05	0.450	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.784	0.0802	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.0355**	0.105	0.00870	10	MG/KG	6020	7/9/2007	J
Vanadium	**1.60**	2.61	0.486	1	MG/KG	6010B	7/10/2007	JB
Zinc	**2.44**	1.05	0.315	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_4.2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD2	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 13:45
Lab Sample ID:	G108-1770-3	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	86.35
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.627	0.355	1	MG/KG	6010B	7/10/2007	
Arsenic	**0.834**	0.724	0.557	1	MG/KG	6010B	7/10/2007	
Barium	**1.64**	5.79	0.396	1	MG/KG	6010B	7/10/2007	J
Beryllium	BQL	0.0965	0.0408	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	0.965	0.00710	10	MG/KG	6020	7/9/2007	
Chromium	**1.81**	0.724	0.246	1	MG/KG	6010B	7/10/2007	
Cobalt	BQL	0.965	0.194	1	MG/KG	6010B	7/10/2007	
Copper	**0.600**	0.724	0.136	1	MG/KG	6010B	7/10/2007	JB
Lead	**2.39**	0.627	0.466	1	MG/KG	6010B	7/10/2007	
Nickel	**0.455**	2.90	0.331	1	MG/KG	6010B	7/10/2007	J
Selenium	**1.50**	0.965	0.416	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.724	0.0740	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.0154**	0.0965	0.00803	10	MG/KG	6020	7/9/2007	J
Vanadium	**3.81**	2.41	0.449	1	MG/KG	6010B	7/10/2007	B
Zinc	**1.15**	0.965	0.290	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_4 2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD2A	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 13:50
Lab Sample ID:	G108-1770-4	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	63.65
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.851	0.482	1	MG/KG	6010B	7/10/2007	
Arsenic	**12.6**	0.982	0.755	1	MG/KG	6010B	7/10/2007	
Barium	**24.0**	7.86	0.537	1	MG/KG	6010B	7/10/2007	
Beryllium	BQL	0.131	0.0554	1	MG/KG	6010B	7/10/2007	
Cadmium	**0.0367**	1.31	0.00964	10	MG/KG	6020	7/9/2007	J
Chromium	**32.0**	0.982	0.334	1	MG/KG	6010B	7/10/2007	
Cobalt	**15.4**	1.31	0.263	1	MG/KG	6010B	7/10/2007	
Copper	**16.8**	0.982	0.185	1	MG/KG	6010B	7/10/2007	B
Lead	**20.1**	0.851	0.632	1	MG/KG	6010B	7/10/2007	
Nickel	**19.3**	3.93	0.449	1	MG/KG	6010B	7/10/2007	
Selenium	**1.70**	1.31	0.564	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.982	0.100	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.327**	0.131	0.0109	10	MG/KG	6020	7/9/2007	
Vanadium	**25.5**	3.27	0.609	1	MG/KG	6010B	7/10/2007	B
Zinc	**26.6**	1.31	0.394	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_4.2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD3A	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 14:45
Lab Sample ID:	G108-1770-6	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	83.89
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.680	0.385	1	MG/KG	6010B	7/10/2007	
Arsenic	**1.46**	0.784	0.603	1	MG/KG	6010B	7/10/2007	
Barium	**5.93**	6.27	0.429	1	MG/KG	6010B	7/10/2007	J
Beryllium	BQL	0.105	0.0442	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	1.05	0.00770	10	MG/KG	6020	7/9/2007	
Chromium	**8.37**	0.784	0.267	1	MG/KG	6010B	7/10/2007	
Cobalt	BQL	1.05	0.210	1	MG/KG	6010B	7/10/2007	
Copper	**1.26**	0.784	0.147	1	MG/KG	6010B	7/10/2007	B
Lead	**6.75**	0.680	0.505	1	MG/KG	6010B	7/10/2007	
Nickel	**1.14**	3.14	0.359	1	MG/KG	6010B	7/10/2007	J
Selenium	**1.35**	1.05	0.451	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.784	0.0802	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.0554**	0.105	0.00870	10	MG/KG	6020	7/9/2007	J
Vanadium	**8.19**	2.61	0.486	1	MG/KG	6010B	7/10/2007	B
Zinc	**3.02**	1.05	0.315	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_4.2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD4A	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 15:40
Lab Sample ID:	G108-1770-8	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	74.56
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.838	0.475	1	MG/KG	6010B	7/10/2007	
Arsenic	**2.90**	0.967	0.744	1	MG/KG	6010B	7/10/2007	
Barium	**18.8**	7.74	0.529	1	MG/KG	6010B	7/10/2007	
Beryllium	**0.511**	0.129	0.0546	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	1.29	0.00949	10	MG/KG	6020	7/9/2007	
Chromium	**17.0**	0.967	0.329	1	MG/KG	6010B	7/10/2007	
Cobalt	BQL	1.29	0.259	1	MG/KG	6010B	7/10/2007	
Copper	**2.51**	0.967	0.182	1	MG/KG	6010B	7/10/2007	B
Lead	**10.4**	0.838	0.623	1	MG/KG	6010B	7/10/2007	
Nickel	**1.50**	3.87	0.442	1	MG/KG	6010B	7/10/2007	J
Selenium	**1.21**	1.29	0.556	1	MG/KG	6010B	7/10/2007	J
Silver	BQL	0.967	0.0989	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.0709**	0.129	0.0107	10	MG/KG	6020	7/9/2007	J
Vanadium	**18.3**	3.22	0.600	1	MG/KG	6010B	7/10/2007	B
Zinc	**6.73**	1.29	0.388	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By:
MET_LIMS_4.2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	BKGD5A	Analyzed By:	AEC
Client Project ID:	Edgecombe County	Date Collected:	6/28/2007 15:50
Lab Sample ID:	G108-1770-10	Date Received:	6/30/2007
Lab Project ID:	G108-1770	Matrix:	SOIL
Batch ID:	8561	Solids	78.72
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.765	0.433	1	MG/KG	6010B	7/10/2007	
Arsenic	**2.92**	0.882	0.679	1	MG/KG	6010B	7/10/2007	
Barium	**8.45**	7.06	0.482	1	MG/KG	6010B	7/10/2007	
Beryllium	**0.182**	0.118	0.0498	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	1.18	0.00866	10	MG/KG	6020	7/9/2007	
Chromium	**5.40**	0.882	0.300	1	MG/KG	6010B	7/10/2007	
Cobalt	BQL	1.18	0.236	1	MG/KG	6010B	7/10/2007	
Copper	**2.00**	0.882	0.166	1	MG/KG	6010B	7/10/2007	B
Lead	**5.43**	0.765	0.568	1	MG/KG	6010B	7/10/2007	
Nickel	**0.652**	3.53	0.403	1	MG/KG	6010B	7/10/2007	J
Selenium	**1.94**	1.18	0.507	1	MG/KG	6010B	7/10/2007	
Silver	BQL	0.882	0.0902	1	MG/KG	6010B	7/10/2007	B
Thallium	**0.0129**	0.118	0.00979	10	MG/KG	6020	7/9/2007	J
Vanadium	**17.1**	2.94	0.547	1	MG/KG	6010B	7/10/2007	B
Zinc	**3.38**	1.18	0.354	1	MG/KG	6010B	7/10/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By: _____
MET_LIMS_4.2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

Results for Metals

Client Sample ID:	Lab Blank	Analyzed By:	PSW
Client Project ID:		Date Collected:	
Lab Sample ID:	pb8561	Date Received:	
Lab Project ID:		Matrix:	SOIL
Batch ID:	8561	Solids	100.00
Report Basis:	Dry		

Metals	Result	SWSL	MDL	DF	Units	Method	Date Analyzed	Flags
Antimony	BQL	0.650	0.368	1	MG/KG	6010B	7/4/2007	
Arsenic	BQL	0.750	0.577	1	MG/KG	6010B	7/10/2007	
Barium	BQL	6.00	0.410	1	MG/KG	6010B	7/4/2007	
Beryllium	BQL	0.100	0.0423	1	MG/KG	6010B	7/10/2007	
Cadmium	BQL	1.00	0.00736	10	MG/KG	6020	7/9/2007	
Chromium	BQL	0.750	0.255	1	MG/KG	6010B	7/4/2007	
Cobalt	BQL	1.00	0.201	1	MG/KG	6010B	7/10/2007	
Copper	**0.305**	0.750	0.141	1	MG/KG	6010B	7/10/2007	JB
Lead	BQL	0.650	0.483	1	MG/KG	6010B	7/10/2007	
Nickel	BQL	3.00	0.343	1	MG/KG	6010B	7/10/2007	
Selenium	BQL	1.00	0.431	1	MG/KG	6010B	7/4/2007	
Silver	**0.183**	0.750	0.0767	1	MG/KG	6010B	7/4/2007	JB
Thallium	BQL	0.100	0.00832	10	MG/KG	6020	7/9/2007	
Vanadium	**0.825**	2.50	0.465	1	MG/KG	6010B	7/4/2007	JB
Zinc	BQL	1.00	0.301	1	MG/KG	6010B	7/4/2007	

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
B= Amount in Prep Blank > MDL

Reviewed By:
MET_LIMS_A2.XLS

SGS ENVIRONMENTAL SERVICES, INC.

METALS Results for LCS/LCD

ICP Batch: 8561
HG Batch:
Other:

Matrix: SOIL
Units: MG/KG

Analyte	TRUE Value	LCS	LCS %REC	LCD	LCD %REC	Limit Lower	Limit Upper	RPD	RPD Limit
Antimony	4.00	3.47	86.8	3.36	84.0	80	120	3.22	20
Arsenic	4.00	3.7	92.5	3.79	94.7	80	120	2.40	20
Barium	20.0	18.7	93.5	18.1	90.5	80	120	3.26	20
Beryllium	4.00	3.84	96.0	3.62	90.5	80	120	5.90	20
Cadmium	4.00	4.12	103	4.06	102	80	120	1.47	20
Chromium	4.00	3.79	94.7	3.66	91.5	80	120	3.49	20
Cobalt	4.00	3.75	93.8	3.87	96.8	80	120	3.15	20
Copper	4.00	3.97	99.3	4.07	102	80	120	2.49	20
Lead	4.00	3.77	94.3	3.76	94.0	80	120	0.266	20
Nickel	4.00	3.78	94.5	3.91	97.8	80	120	3.38	20
Selenium	4.00	3.36	84.0	3.27	81.8	80	120	2.71	20
Silver	4.00	3.77	94.3	3.84	96.0	80	120	1.84	20
Thallium	4.00	3.94	98.5	4.00	100	80	120	1.51	20
Vanadium	4.00	3.73	93.3	3.60	90.0	80	120	3.55	20
Zinc	4.00	3.55	88.8	3.41	85.3	80	120	4.02	20

Comments

*=Out of Limits
NA = Not applicable, due to sample concentration greater than three times spike concentration

Reviewed By:

SGS ENVIRONMENTAL SERVICES, INC.

MS/MSD Results for METALS

Lab ID: G197-143-28
MS Lab ID: G197-143-28
MSD Lab ID: G197-143-28
ICP Batch: 8561
HG Batch:
Other:

Analyzed By: PSW
Matrix: Soil
Units: MG/KG
Solids: 61.12

Analyte	Sample Result	SA MS	MS Result	MS %REC		SA MSD	MSD Result	MSD %REC		Limit Lower	Limit Upper	RPD		RPD Limit
Antimony	BQL	58.4	38.7	66.2	*	59.5	32.7	55.0	*	75	125	16.8		20
Arsenic	BQL	58.4	57.6	98.6		59.5	58.1	97.6		75	125	0.864		20
Barium	271	292	396	42.8	*	297	511	80.8		75	125	25.4	*	20
Beryllium	0.604	58.4	52.7	89.2		59.5	50.0	83.0		75	125	5.26		20
Cadmium	BQL	58.4	60.8	104		59.5	61.1	103		75	125	0.492		20
Chromium	10.6	58.4	57.9	80.9		59.5	55.6	75.6		75	125	4.05		20
Cobalt	1.83	58.4	61.3	102		59.5	60.8	99.1		75	125	0.819		20
Copper	BQL	58.4	81.0	139	*	59.5	95.8	161	*	75	125	16.7		20
Lead	12.4	58.4	64.8	89.7		59.5	71.1	98.7		75	125	9.27		20
Nickel	BQL	58.4	61.3	105		59.5	61.7	104		75	125	0.650		20
Selenium	BQL	58.4	46.4	79.4		59.5	44.5	74.8	*	75	125	4.18		20
Silver	BQL	58.4	42.3	72.4	*	59.5	40.0	67.2	*	75	125	5.59		20
Thallium	BQL	58.4	58.9	101		59.5	60.1	101		75	125	2.02		20
Vanadium	8.17	58.4	57.2	83.9		59.5	55.6	79.7		75	125	2.84		20
Zinc	48.2	58.4	77.4	50.0	*	59.5	90.8	71.6	*	75	125	15.9		20

Comments

*=Out of Limits
NA = Not applicable, due to sample concentration greater than three times spike concentration

Reviewed By:

SGS

CHAIN OF CUSTODY RECORD
SGS Environmental Services Inc.

Locations Nationwide
- Alaska
- Ohio
- New Jersey
- West Virginia
- Hawaii
- Maryland
- North Carolina

www.us.sgs.com

0758

SGS

SGS ENVIRONMENTAL SERVICES, INC.

(1)

CLIENT: S&ME, INC

CONTACT: DAVID WELLS PHONE NO:(919) 872-2660

PROJECT: EDGECOMBE COUNTY SITE/PWSID# :

REPORTS TO: DAVID WELLS E-MAIL: DWELLS@SMEINC.COM

FAX NO.:(919) 876-3958

INVOICE TO: QUOTE #

P.O. NUMBER

SGS Reference: G108-1770

PAGE 1 OF

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No CONTAINERS	SAMPLE TYPE C= COMP G= GRAB	(3) Preservatives Used / Analysis Required: AP I metals	per D. Wells	LML 7/3/07							REMARKS
	BKGD 1	6/28/07	1245	S	1	G										
	BKGD 1A	↓	1330	↓	↓	↓										
	BKGD 2	↓	1345	↓	↓	↓										
	BKGD 2A	↓	1350	↓	↓	↓										
	BKGD 3	↓	1430	↓	↓	↓										HOLD
	BKGD 3A	↓	1445	↓	↓	↓										
	BKGD 4	↓	1520	↓	↓	↓										HOLD
	BKGD 4A	↓	1540	↓	↓	↓										~~HOLD~~ ML
	BKGD 5	↓	1535	↓	↓	↓										HOLD
	BKGD 5A	↓	1550	↓	↓	↓										

(5)

Collected/Relinquished By:(1)	Date	Time	Received By:	Date	Time
Michelle J. Lord	6/28/07	1500	Danielle Kes	6/29/07	13:25
Relinquished By: (2)	Date	Time	Received By:	Date	Time
Danielle M. Kes	6/29/07	14:00	L. Lockaway	6/30/07	1000
Relinquished By: (3)	Date	Time	Received By:	Date	Time
Relinquished By: (4)	Date	Time	Received By:	Date	Time

(4)

Shipping Carrier:

Shipping Ticket No:

Special Deliverable Requirements:

Samples Received Cold? (Circle) YES NO

Temperature ∫C: 2.9 ∫

Chain of Custody Seal: (Circle)

INTACT BROKEN ABSENT

Special Instructions:

Requested Turnaround Time:

☐ RUSH _____ Date Needed ☐ STD

☐ 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
☐ 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557
☐ 1270 Greenbrier Street Charleston, WV 25311 Tel: (304) 346-0725 Fax: (304) 346-0761

White - Retained by Lab
Yellow - Returned with Report
Pink - Retained by Sampler

N.C. CERTIFICATION #481