PHASE II REMEDIAL INVESTIGATION WORK PLAN
FORMER APAC - ATLANTIC, INC., CASTLE HAYNE ASPHALT PLANT
Castle Hayne, New Hanover County, North Carolina

ESI Project ER08-136.07
June 2010

FOR

APAC Atlantic, Inc.
604 East New Bern Road
Kinston, NC 28504

BY

ENVIRONMENTAL SERVICES, INC.
524 S. New Hope Road
Raleigh, North Carolina, 27610
(919) 212-1760 and (919) 212-1707 (fax)
www.environmentalservicesinc.com

ENVIRONMENTAL SERVICES, INC.
524 S. NEW HOPE ROAD
RALEIGH, NORTH CAROLINA 27610
919-212-1760 • FAX 919-212-1707
www.environmentalservicesinc.com

June 18, 2010

Ms. Ginny Henderson, P.G.
NCDENR – Inactive Hazardous Sites Branch
127 Cardinal Drive Extension
Wilmington, NC 28403

RE **Phase II Remedial Investigation Work Plan**
Former APAC-Atlantic, Inc., Castle Hayne Asphalt Plant
Castle Hayne, New Hanover County, North Carolina
ESI Project ER08-136.07

Dear Ms. Henderson:

Environmental Services, Inc. (ESI), on behalf of APAC-Atlantic, Inc., is pleased to submit this Phase II Remedial Investigation Work Plan for the referenced property. The Phase II Remedial Investigation Work Plan was requested by the NCDENR in a letter dated April 27, 2010. A copy of this report in PDF format is also included. The information related to the laboratory detection limits for Item #7 in the April 27, 2010 letter is provided within the work plan and not as a separate document.

If you have any questions or comments, please contact me at (919) 212-1760.

Sincerely,

ENVIRONMENTAL SERVICES, INC.

Michael J. Burns, P.G.
VP, Division Director
Site Assessment and Remediation

RECEIVED
JUN 21 2010
SUPERFUND SECTION

ER08-136.07
Enclosure

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ACRONYMS

AC	Asphalt Concrete/Liquid Asphalt
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
BGS	Below the Ground Surface
CESQG	Conditionally Exempt Small Quantity Generator
CORRACTS	Corrective Action Report (RCRA)
DENR	Department of Environment and Natural Resources
DOT	Department of Transportation
DRO	Diesel Range Organic
DWM	Division of Waste Management
ECHO	Enforcement and Compliance History Online
EDR	Environmental Data Resources, Inc.
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ESI	Environmental Services, Inc.
GRO	Gasoline Range Organic
HBRG	Health Based Remedial Goal
IHSB	Inactive Hazardous Sites Branch
LUST	Leaking Underground Storage Tank
MDL	Method Detection Limit
MEK	2-Butanone
MSCC	Maximum Soil Contaminant Concentrations
NC 2L	North Carolina Groundwater Quality Standards
NCDENR	North Carolina Department of Environmental and Natural Resources
NPDES	National Pollution Discharge Elimination System
PAH	Polycyclic Aromatic Hydrocarbon
PRG	Protection of Groundwater Remedial Goal
RAP	Recycled Asphalt
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
REC	Registered Environmental Consultant
RSM	Registered Site Manager
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WSW	Water Supply Well

1.0 INTRODUCTION

Environmental Services, Inc., (ESI) has completed the authorized Phase II Remedial Investigation Plan (hereafter referred to as the "*RIP2*") at the former APAC-Atlantic, Inc., Castle Hayne Asphalt Plant (hereafter referred to as the *property*) located at 4909 N. College Road in Castle Hayne, New Hanover County, North Carolina **(Figure 1 in Appendix 1)**. The purpose of the *RIP2* is to evaluate areas identified in the April 27, 2010 Remedial Investigation Report Approval and Phase II Remedial Investigation Plan Request (letter) issued by the North Carolina Department of Environment and Natural Resources (NCDENR), Inactive Hazardous Sites Branch (IHSB). The scope of work for this site assessment was developed using the NCDENR, IHSB Guidelines for Assessment and Cleanup document dated October 2009. This *RIP2* has been prepared to provide details of the proposed methods and procedures for evaluating the items listed in the April 27, 2010 IHSB letter. Tabulated summaries of information and data, as well as appropriate figures, have been provided.

2.0 STANDARD OPERATING PROCEDURES

2.1 Sampling Locations, Methods and Procedures

ESI proposes to evaluate soil and groundwater conditions at areas on the *property* specified in the April 27, 2010 IHSB letter. The items that are requested in the IHSB letter for additional assessment are described per the corresponding item numbers and include item numbers 1, 7, 11, 13, 14, 15, 16 and 17. This section describes the sample locations, sample collection methods and procedures.

2.1.1 Item 1 – Antimony Rinsate

The IHSB letter indicated that the antimony concentration detected from in the April and June 2009 equipment rinsate sample was above the proposed North Carolina Groundwater Quality Standard (NC 2L standard). There was no background antimony data available for groundwater. To address the presence of antimony in the equipment rinsate sample collected in April and June 2009, ESI proposes to collect groundwater samples from the three existing background monitoring wells (BG-3, BG-4 and BG-6). The monitoring wells are to be sampled using a peristaltic pump until the groundwater contains <20 NTU. Measurements of pH, specific conductivity, temperature, dissolved oxygen, and turbidity are to be performed following each purged well volume until there are three (3) consecutive stabilized readings of each parameter. Once the parameters have

stabilized, groundwater samples are to be collected for laboratory analysis for antimony per EPA Method 6010B.

2.1.2 Item 7 – Arsenic Concentrations DP-7 and DP-9A

ESI contacted the laboratory that performed the analyses for the Phase I Remedial Investigation (RI), ENCO, about the analysis of TCLP arsenic for samples DP-7 and DP-9A where the method detection limits (MDL) exceeded the NC 2L standard for arsenic. Per the IHSB letter, ESI inquired whether the MDL for the TCLP arsenic results completed for the Phase I RI were the lowest attainable at that time of the analysis. ESI received information from ENCO that states that the MDL for TCLP arsenic was the lowest attainable at that time along with supporting documentation. The information received from ENCO is provided in **Appendix 2**. Based on the information received from ENCO and the IHSB letter, it appears that additional assessment is not necessary for the arsenic Protection of Groundwater (PRG) concentrations. The IHSB letter also stated that arsenic health-based remedial goals were exceeded at Phase I RI soil borings DP-7 and DP-9A.

To evaluate the extent of arsenic impact in the soil at boring DP-7, ESI proposes to advance a soil boring as close as possible to the former DP-7 soil boring location. The soil boring is proposed to be advanced using a direct-push drill rig. Soil samples are proposed to be collected using four (4) foot long disposable macrocore samplers. The soil within the boring is proposed to be classified in the field by an environmental scientist and soil samples extracted from the sampler. Soil samples are proposed to be collected for laboratory analysis beginning at one (1) foot below the ground surface (bgs) to the top of the local groundwater table (assumed to be 8 feet), based on the original DP-7 sample collection of 0.5 foot bgs. In addition, ESI proposes to advance soil borings in a grid pattern 10 feet to the north, south, east and west of soil boring DP-7. Soil samples are proposed to be collected from these soil borings beginning at 0.5 foot bgs, one (1) foot bgs, and then at one (1) foot intervals thereafter to the top of the local groundwater table. The soil samples from all of the borings are proposed to be submitted for laboratory analysis for arsenic per EPA Method 6010B. Upon receipt and evaluation of the laboratory analytical results, additional sampling locations may be necessary to define the extent of arsenic concentrations that clearly exceed the HBRG.

To evaluate the extent of arsenic soil impacts at soil boring DP-9A, ESI proposes to advance a soil boring as close as possible to the former DP-9A soil boring location. The soil borings are proposed to be advanced using a direct-push drill rig. The soil samples are proposed to be collected using four (4) foot long disposable macrocore samplers. The soil within the soil boring is proposed to be classified in the field by an environmental scientist and soil samples extracted from the sampler. Soil samples are proposed to be collected for laboratory analysis beginning at six (6) feet bgs and then at one foot intervals to the top of the local groundwater table (assumed 8 feet), based on the original DP-9A sample collection depth of 5 feet bgs and sample DP-9 (3.5 feet bgs), which indicated concentrations that exceeded the HBRG for arsenic. In addition, ESI proposes to advance soil borings in a grid pattern 10 feet to the north, south and east of soil boring DP-9. Please note a soil boring cannot be advanced to the west of soil boring DP-9 due to the presence of the aboveground storage tank (AST) secondary containment structure. Soil samples collected from these soil borings beginning at 0.5 foot bgs, one (1) foot bgs, and then at one (1) foot intervals to the top of the local groundwater table. Soil samples from all of the borings are proposed to be submitted for laboratory analysis for arsenic per EPA Method 6010B. Upon receipt and evaluation of the laboratory analytical results, additional sampling locations may be necessary to define the extent of arsenic concentrations that clearly exceed the HBRG.

2.1.3 Item 11 - Selenium DP-9A

Based on the IHSB letter, the selenium concentration detected in soil sample DP-9A exceeded the PRG. In addition, there is no background data for selenium and no TCLP data for selenium from the DP-9A sample location. To address this item, ESI proposes to advance a soil boring as close as possible to the DP-9 location and collect a soil sample at the same depth as DP-9A (5 feet bgs) for analysis of TCLP selenium by EPA Method 6010C.

ESI also proposes to advance soil borings as close as possible to the background sample locations (BG-3, BG-4, BG-5, BG-6 and BG-7) from the Phase I RI. The soil borings are proposed to be advanced using a direct-push drill rig to the water table and soil samples be collected at 0.5 foot, one (1) foot and then at one (1) foot intervals to the water table

for analysis for selenium by EPA Method 6010B. The sample results are proposed to be used to establish background concentrations for selenium.

The background results are proposed to be compared to the selenium concentration detected in sample DP-9A. If the selenium concentration detected at soil sample DP-9A clearly exceeds the background concentrations reported, ESI proposes to evaluate selenium during the arsenic investigation described in Section 2.1.2. for DP-9A. If the TCLP result clearly exceeds the NC 2L standard, groundwater sampling may be necessary to evaluate selenium concentrations in groundwater above the NC 2L standard.

2.1.4 Item 13 - Site Plan

The IHSB letter requested that former sampling locations be included on future site plans (assumed to refer to Withers & Ravenel Phase II ESA). ESI proposes to include the sample locations from previous assessments on the site plan included in the Phase II Remedial Investigation (RI2) report. After the sampling is complete for the work proposed in the RIP2, ESI proposes to have the new sample locations surveyed by a Professional Land Surveyor and also included on the RI2 site plan.

2.1.5 Item 14 - Thallium in Groundwater

The IHSB letter indicates that the groundwater sample collected from water supply well 1 (WSW-1) and temporary monitoring well BG-1 indicated concentrations that exceeded the proposed NC 2L standard for thallium. The thallium concentration detected in monitoring well BG-1 also exceeded the only background groundwater sample analyzed for thallium (BG-3). To further define the thallium background concentrations for the *property*, ESI proposes to collect groundwater samples from background wells BG-4 and BG-6. The groundwater samples collected from monitoring wells BG-4 and BG-6 are proposed to be submitted for laboratory analyses per EPA Method 6010B for thallium. The background sample laboratory results are proposed to be used to determine the range of thallium background concentrations on the *property*.

If the concentration of thallium from BG-1 is determined to clearly be above the measured background concentrations for the *property*, an evaluation of thallium concentrations above background is proposed in the area of BG-1. ESI proposes to

perform the assessment by installing a shallow permanent monitoring well using a hollow stem auger drill rig in the location of former temporary monitoring well BG-1. The shallow permanent monitoring well is proposed to consist of 10 feet of two-inch diameter slotted PVC well screen and five (5) feet of solid PVC riser to the ground surface. The PVC well sections are proposed to be attached using threaded joints; no PVC glue or solvents are proposed to be used in the monitoring well construction. A 20/30 sand pack is proposed to be placed within the soil boring to one foot above the well screen interval. A one (1) foot thick layer of bentonite is proposed to be placed above the sand pack to seal the monitoring well and prevent surface water infiltration. The monitoring well is proposed to be constructed as a flush-mount well with locking well cap. The monitoring well is proposed to be developed using a peristaltic pump until the groundwater is mostly free of sediment. Measurements of pH, specific conductivity, temperature, dissolved oxygen, and turbidity are proposed to be performed following each purged well volume until there are three (3) consecutive stabilized readings of each parameter. Once the parameters have stabilized, groundwater samples are proposed to be collected for laboratory analysis for thallium by EPA Method 6010B. The results of the groundwater laboratory analyses are proposed to be compared to the NC 2L standards. Based on the laboratory results, additional assessment may be necessary to further evaluate thallium concentrations in the area of BG-1.

2.1.6 Item 15 - Thallium in Soil

Based on the IHSB letter, thallium concentrations detected in soil samples DP-1, DP-2, DP-2A and DP-4 exceeded the PRG. In addition, there is no background data for thallium and no TCLP data for thallium from the aforementioned samples. To address this item, ESI proposes to advance a soil boring using a direct-push drill rig as close as possible to the DP-1, DP-2 and DP-4 locations and collect a soil sample at the same depth of DP-1 (5 feet bgs), DP-2 (0.5 foot), DP-2A (5 feet), and DP-4 (4 feet) for analysis for TCLP thallium per EPA Method 6010C.

Additionally, ESI also proposes to advance soil borings as close as possible to the background sample locations for the Phase I RI (BG-3, BG-4, BG-5, BG-6 and BG-7). The soil borings are proposed to be advanced continuously from the ground surface to boring termination using four (4) feet long, disposable macrocore samplers. Soil samples

are proposed to be extracted from the macrocore for laboratory analysis at 0.5 foot, one (1) foot, and then at one (1) foot intervals to the water table for analysis for thallium by EPA Method 6010B. The sample results are proposed to be used to establish background concentrations for thallium.

The background results are proposed to be compared to the thallium concentration detected in sample DP-1, DP-2, DP-2A and DP-4. If the thallium concentrations detected at the soil sample locations clearly exceed the background concentrations reported, ESI proposes to evaluate the horizontal and vertical extent of thallium concentrations above the PRG. The soil assessment is proposed to consist of collecting soil samples from soil borings DP-1, DP-2 and DP-4 to evaluate the vertical extent of impact. Then, soil borings are proposed to be advanced in a grid pattern 10 feet in each direction from the original soil boring location and an additional grid pattern of 10 foot intervals, as needed. Soil samples are proposed to be collected beginning at 0.5 foot and then continuously beginning at one (1) foot to the top of the local groundwater table for laboratory analyses. The soil samples are proposed to be submitted for laboratory analyses of thallium per EPA Method 6010B.

If the TCLP result clearly exceeds the NC 2L standard, a separate work plan may be necessary to define the extent of thallium concentrations above the NC 2L standard in this area.

2.1.7 Item 16 - Chromium in Groundwater

The IHSB letter indicates that the groundwater sample collected from former temporary monitoring well BG-2 indicated concentrations that exceeded the NC 2L standard for chromium. The chromium concentration detected in former temporary monitoring well BG-2 also exceeded the only background groundwater sample analyzed for chromium (BG-3). To further define the background chromium concentrations for the *property*, ESI proposes to collect groundwater samples from background wells BG-4 and BG-6. The groundwater samples collected from monitoring wells BG-4 and BG-6 are proposed to be submitted for laboratory analyses of chromium per EPA Method 6010B. The background sample laboratory results are proposed to be used to determine the range of chromium background concentrations on the *property*.

If the concentration of chromium from BG-2 is determined to clearly be above the measured background concentrations for the *property*, chromium concentrations above the NC 2L standard may need to be evaluated in the area of BG-2. ESI proposes to perform the assessment by installing a shallow permanent monitoring well in the location of former temporary monitoring well BG-2 using a hollow stem auger drill rig. The shallow permanent monitoring well is proposed to consist of 10 feet of two-inch diameter slotted PVC well screen and five (5) feet of solid PVC riser to the ground surface. The PVC well sections are proposed to be attached using threaded joints; no PVC glue or solvents are proposed to be used in the monitoring well construction. A 20/30 sand pack is proposed to be placed within the soil boring to one foot above the well screen interval. A one (1) foot thick layer of bentonite is proposed to be placed above the sand pack to seal the monitoring well and prevent surface water infiltration. The monitoring well is proposed to be constructed as flush-mount monitoring well with a locking well cap. The monitoring well is proposed to be developed using a peristaltic pump until the groundwater is mostly free of sediment. Measurements of pH, specific conductivity, temperature, dissolved oxygen, and turbidity are proposed to be performed following each purged well volume until there are three (3) consecutive stabilized readings of each parameter. Once the parameters have stabilized, groundwater samples are proposed to be collected for laboratory analysis for chromium per EPA Method 6010B. The results of the groundwater laboratory analyses are proposed to be compared to the NC 2L standard. If the concentrations from the permanent monitoring well are determined to clearly exceed the NC 2L standard, a separate work plan may be necessary to define the extent of chromium concentrations above the NC 2L standard in this area.

2.1.8 Item 17 - Cadmium in Groundwater

The IHSB letter indicates that the groundwater sample collected from former temporary monitoring well BG-2 indicated concentrations that exceeded the NC 2L standard for cadmium. The cadmium concentration detected in former temporary monitoring well BG-2 also exceeded the only background groundwater sample analyzed for cadmium (BG-3). To evaluate the background cadmium concentrations for the *property*, ESI proposes to collect groundwater samples from background wells BG-4 and BG-6. The groundwater samples collected from monitoring wells BG-4 and BG-6 are proposed to be

submitted for laboratory analyses of cadmium per EPA Method 6010B. The background sample laboratory results are proposed to be used to determine the range of cadmium background concentrations on the *property*.

If the concentration of cadmium from BG-2 is determined to clearly be above the measured background concentrations for the *property*, the cadmium concentrations above the NC 2L standard are proposed to evaluated in the area of BG-2. ESI proposes to begin the assessment by installing a shallow permanent monitoring well using a hollow stem auger drill rig in the location of former temporary monitoring well BG-2. The shallow permanent monitoring well is proposed to consist of 10 feet of two-inch diameter slotted PVC well screen and five (5) feet of solid PVC riser to the ground surface. The PVC well sections are proposed to be attached using threaded joints; no PVC glue or solvents are proposed to be used in the monitoring well construction. A 20/30 sand pack is proposed to be placed within the soil boring to one foot above the well screen interval. A one (1) foot thick layer of bentonite is proposed to be placed above the sand pack to seal the monitoring well and prevent surface water infiltration. The monitoring well is proposed to be constructed as a flush-mount well with locking well cap. The monitoring well is proposed to be developed using a peristaltic pump until the groundwater is mostly free of sediment. Measurements of pH, specific conductivity, temperature, dissolved oxygen, and turbidity are proposed to be performed following each purged well volume until there are three (3) consecutive stabilized readings of each parameter. Once the parameters have stabilized, groundwater samples are proposed to be collected for laboratory analysis for cadmium per EPA Method 6010B. The results of the groundwater laboratory analyses are proposed to be compared to the NC 2L standard. If the concentrations from the permanent monitoring well clearly exceed the NC 2L standard, a separate work plan may be necessary to define the extent of cadmium concentrations above the NC 2L standard in this area.

2.2 Equipment and Personnel Decontamination Procedures

To prevent cross contamination in the field that could result in inaccurate analytical data, ESI requires that subcontracted firms and field personnel observe very strict decontamination procedures. The decontamination procedures are briefly described below.

2.2.1 Drilling Equipment Decontamination Procedures

The drilling contractor is proposed to be required to setup a decontamination pad away from the assessment area. The decontamination pad is proposed to consist of several layers (at least 3) of plastic sheeting of sufficient length and width for the drill rig to fit onto with at least a five (5) foot space between the drill rig and the ground surface on all sides. The base of the decontamination pad is proposed to be constructed in a way so that the decontamination water is proposed to drain to a location where it can be collected into 55-gallon drums for storage until laboratory results are evaluated. If laboratory results indicate potential contamination, the drummed decontamination water is proposed to be transported to an approved treatment facility for disposal. The drill rig and drilling equipment is proposed to be decontaminated using a high pressure steam cleaner. The drill rig and drilling equipment is proposed to be steam cleaned upon arrival to the *property*, between each soil boring, and prior to leaving the *property*. Any hand drilling equipment used is proposed to be steam cleaned prior to, between soil borings, and after any drilling activities. The effectiveness of the decontamination process is proposed to be evaluated by collecting equipment rinsate blanks for laboratory analyses.

2.2.2 Personnel Decontamination Procedures

All field personnel are required to wear disposable nitrile gloves during sampling activities. The gloves are stored in a new Ziploc plastic bag between project locations to prevent cross-contamination. The gloves are proposed to be changed and discarded after collection of each sample. The gloves are proposed to be changed and discarded if they are damaged during sampling.

2.2.3 Field Instrument Decontamination Procedures

Field instruments such as groundwater probes and water quality probes are proposed to be decontaminated in a three (3) step process prior to each sample location. The decontamination steps are as follows:

- Step 1: Spray instrument with liquinox/deionized water to wash
- Step 2: Spray with clean deionized water to rinse
- Step 3: Spray with isopropyl alcohol/deionized water

Following decontamination, the instruments are proposed to be allowed to air dry, then wrapped in aluminum foil to protect them from coming into contact with potential sources of contamination, and stored in a sealed container.

2.3 Field and Laboratory QA/QC

2.3.1 Samples

Each type of site assessment sample has a unique label. The following table represents the type of sample and its denoted symbol:

Table - Sample Identification Symbols

Soil boring	SB
Sediment	SED
Surface water	SW
Soil sample	SS
Direct push	DP
Temporary monitoring well	TMW
Permanent monitoring well	MW
Intermediate monitoring well	IMW
Deep monitoring well	DMW

For the RI2 of the *property*, all samples are labeled sequentially starting at the last sample number from the RI. For samples that are collected at a specific depth from a soil boring, the depth is also incorporated into the sample identification (DP-1 @ 5'). On occasion, deviations from this symbol procedure may occur. Deviations from this standardized nomenclature are proposed to be defined within the scope of the contract for each individual project. With additional sampling events, the technician assigned to sample

performs an initial check with a quality control officer to determine the identification of the previous sample so that no sample receives the same identification. The technician also checks previous chain of custodies prior to sampling to determine the identification of previous samples, if any.

2.3.2 Laboratory Blanks

There are several types of field-generated quality controls utilized by ESI. These controls are pre-cleaned and field-cleaned equipment blanks, trip blanks and duplicate blanks. ESI proposes to collect a trip blank and a duplicate blank. A duplicate blank is proposed to be collected for each sample matrix. All pertinent documentation of each field quality control measure is recorded in the permanent field records.

2.3.3 Laboratory QA/QC

All sample bottles, vials and jars are received by the subcontracted laboratory already pre-cleaned and contain the proper preservative, if needed, for the appropriate EPA Method. A clean insulated cooler is provided as well to hold sample containers. Prior to sampling, the ESI technician fills the cooler with ice. The cooler is kept isolated away from possible contamination, like other equipment and containers, during the entire sampling event (from the laboratory to the site and back to the laboratory). All equipment and containers are also organized into sections of clean vs. dirty. Container types, preservation techniques, holding times, and transport methods are as specified for the appropriate EPA Methods.

Chain-of-custody documentation is implemented in the field and accompanies the samples to the laboratory. A state-certified, subcontracted laboratory analyzes all samples using approved EPA analytical methods.

2.4 Analytical Methods

Per the IHSB guidance document, ESI proposes to perform laboratory analyses to evaluate the RI2 samples as follows:

Soil and Groundwater Analytical Methods

- Metals (SW-846 Method-EPA Method 6010B): antimony, arsenic, cadmium, chromium selenium, and thallium
- TCLP Metals (EPA Method 6010C): selenium and thallium

2.5 Schedule

The proposed schedule for the scope of work is as follows:

• Schedule Drillers and project preparation	July 2010
• Field work	August 2010-September 2010
• Laboratory Analyses	August 2010-September 2010
• Report Preparation and submittal to NCDENR	November 2010

2.6 Qualifications

Resumes of those that are proposed to be involved with the project are included in **Appendix 3**. The senior project manager is proposed to be Michael Burns, P.G. who is a registered site manager (RSM) under the NCDENR Inactive Hazardous Sites Branch (IHSB), Registered Environmental Consultant (REC) program. Mr. Burns was required to submit his qualifications regarding hazardous waste site assessment and remediation experience to the NCDENR IHSB prior to being approved as an RSM. ESI is an approved REC. In addition to Mr. Burns, the following personnel are proposed to also be involved in the project:

- Mr. Thomas Morgan, Field Environmental Scientist

ESI proposes to use the following subcontractors for this project:

- ENCO Laboratories
- Quantex Drilling

The qualifications of each of the subcontractors are included in **Appendix 3**.

3.0 CERTIFICATIONS

3.1 Remediating Party

Remediating Party Certification Statement

After first being duly sworn or affirmed, I, WILLIAM B. MILLER, hereby state that: I am over the age of eighteen, I am competent to make this certification based upon my own personal knowledge and belief, and, to the best of my knowledge and belief, after thorough investigation, the information contained herein is accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information.

(Signature of Remediating Party Representative) JUNE 16, 2010 (Date)

W.B. Miller, Executing Solely in the Capacity of Vice President
(Printed Name and Title of Remediating Party Representative)

APAC-Atlantic, Inc.
(Printed Name of Company)

STATE OF GEORGIA

COUNTY OF FULTON

I, JANICE C. HEATHCOCK, a Notary Public of said County and State, do hereby certify that WILLIAM B. MILLER personally appeared before me this day, produced proper identification in the form of PERSONALLY KNOWN, was duly sworn and/or affirmed, and declared that he or she is the owner of the property referenced above or is a duly authorized agent of said owner and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is accurate and complete, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal the 16TH day of JUNE, 2010.

Janice C. Heathcock
Notary Public (signature)

JANICE C. HEATHCOCK
MY COMMISSION EXPIRES
NOTARY PUBLIC
APRIL 11, 2011
FULTON COUNTY, GEORGIA
(OFFICIAL SEAL)

My commission expires: 4-11-2011

3.2 Environmental Consultant

Environmental Consultant Certification Statement

After first being duly sworn or affirmed, I, Michael Burns, hereby state that: I am over the age of eighteen, I am competent to make this certification based upon my own personal knowledge and belief, and, to the best of my knowledge and belief, after thorough investigation, the information contained herein is accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information.

Michael Burns
(Signature)

6-18-10
(Date)

Michael Burns
(Printed Name)

Environmental Services, Inc.
(Printed Name of Environmental Consultant)

STATE OF North Carolina

COUNTY OF Wake

I, Bre-Ann Rygelski, a Notary Public of said County and State, do hereby certify that Michael Burns personally appeared before me this day, produced proper identification in the form of North Carolina Drivers license, was duly sworn and/or affirmed, and declared that he or she is an environmental consultant for the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is accurate and complete, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal the 18 day of June, 2010.

Bre-Ann Rygelski
Notary Public (signature)

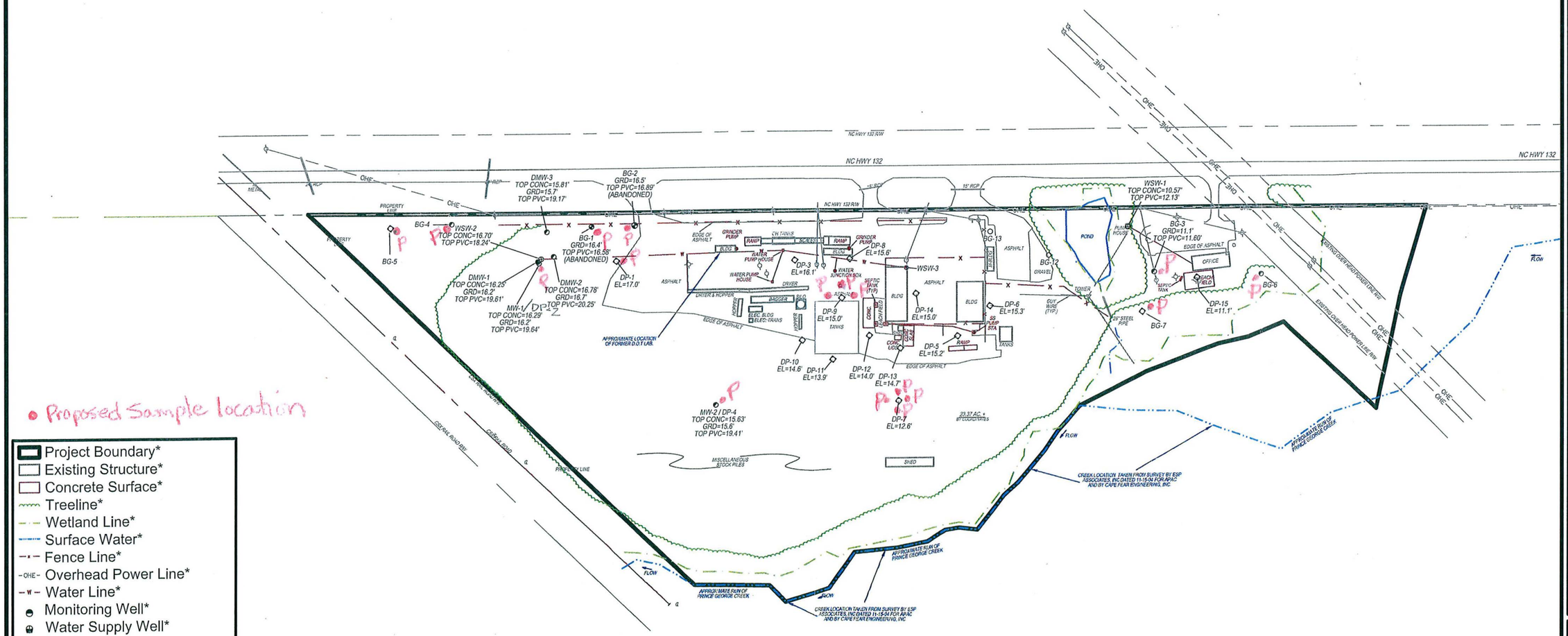
(OFFICIAL SEAL)

BRE-ANN RYGELSKI
NOTARY
PUBLIC
WAKE COUNTY, N.C.

My commission expires: May 14, 2011

ATTACHMENTS

FIGURES



• Proposed Sample location

- Project Boundary*
- Existing Structure*
- Concrete Surface*
- Treeline*
- Wetland Line*
- Surface Water*
- Fence Line*
- Overhead Power Line*
- Water Line*
- Monitoring Well*
- Water Supply Well*
- Soil Boring*

*Location and extent is approximate.

0 100 200

Feet

Source: Project boundary provided by Cape Fear Engineering, Inc. and New Hanover County GIS; Site plan provided by Cape Fear Engineering, Inc.

Disclaimer: The information depicted on this figure is for informational purposes only and was not prepared for, and is not suitable for legal or engineering purposes.

Project:	ER08136.04
Date:	Sep 2009
Drwn/Chkd:	AJS/MB
Figure:	2

Site Plan

Former APAC Asphalt Plant

Castle Hayne, New Hanover County, North Carolina

ENVIRONMENTAL SERVICES, INC.
524 S. New Hope Road
Raleigh, North Carolina 27610
(919) 212-1760
(919) 212-1707 FAX
www.environmentalservicesinc.com

ENCO MDL INFORMATION

Michael Burns

From: Chuck Smith [csmith@encolabs.com]
Sent: Wednesday, May 19, 2010 7:53 AM
To: Michael Burns
Subject: FW: TCLP MDLs for arsenic
Attachments: C900907 (arsenic) Approved MDL Study 11 Feb 09 0921.xls; WETS-39 Rev 4 TCLP.pdf; QA-013 Rev 0 Detection limits.pdf

Mike,

I'm forwarding a response from our QA person. Let me know if this addresses your questions and needs.

Chuck

From: Rachel Anderson [mailto:randerson@encolabs.com]
Sent: Tuesday, May 18, 2010 2:37 PM
To: csmith@encolabs.com
Subject: TCLP MDLs for arsenic

I have enclosed our TCLP SOP and Detection Limit policy to assist your client with the extraction/calculation of TCLP samples and how our MDLs are performed.
TCLP samples are extracted by SW846 1311.

Our MDLs are performed and calculated according to 40CFR136. A second source low-level standard is spiked into 10 replicate samples of soil (clean sand or Teflon chips may be used as a matrix) or water, extracted via the prescribed method and are evaluated. The spike-to-MDL ratio must be less than 10, the MDL must be equal to or less than the regulatory limit, and the average recovery must fall into normal control limits for that method. Other considerations for acceptance are discussed in detail in the policy (attached).

In this case, the MDLs were performed via normal EPA 3005A extraction procedures for water and analyzed via EPA 6010C on the ICP. The arsenic MDL was 0.0028 mg/L for water samples. TCLP samples are leachates and are treated as waters, and there is a 10X prep factor- thus, TCLP samples have MDLs set at 0.0280 mg/L. This is the lowest achievable MDL and is well below the regulatory limit listed for arsenic TCLP samples of 5mg/L.

Rachel Anderson
QA Manager
Environmental Conservation Laboratories, Inc.
102-A Woodwinds Industrial Court
Cary, NC 27511
(919) 467-3090 ph
(919) 467-3515 fax
randerson@encolabs.com

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MDL Study

QA Date Approved: 2/11/2009

QA Approved By: Rachel Anderson

MDL Study Group: ICP Metals 6010_200.7-Water

Analysts: Prepared By - Nicole L Humphreys : Analyzed By - John Halpin

Analysis Dates: 2/10/2009

Matrix: Water

Location: ENCO Cary

Instrument: RMICP2

Concentration units: ug/L

Parameter:	Spike Amt	Replicate 1	2	3	4	5	6	7	8	9	10	Average	StdDev	MDL	Adjusted MDL	MRL	Spike/MDL	%R	MRL>MDL
Arsenic	5	5.2	4.3	2.9	3.4	4.2	5.9	3.6	3	4.2	3.1	3.98	0.986	2.8	-	10	Ck Spk (1.8)	79.6	PASS

QA Observations: Accepted.

LIMS Updated: 2/11/2009

Environmental Conservation Laboratories Inc.
STANDARD OPERATING PROCEDURE

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)

Signed for:

Corporate	Digitally signed by Matthew Foti, Ph.D. Reason: I am approving this document Date: 2009.12.31 16:42:33 -05'00'	Digitally signed by Mark E. Inman, Ph.D. Reason: I am approving this document Date: 2010.01.04 10:08:17 -05'00'
	Operations	QA
Cary	Digitally signed by Rich Detar Reason: I am approving this document Date: 2009.12.31 17:11:56 -05'00'	Digitally signed by Rachel Anderson Reason: I am approving this document Date: 2010.01.04 12:49:20 -05'00'
	Operations	QA
Jacksonville	Digitally signed by Scott D. Martin Reason: I am approving this document Date: 2009.12.31 17:27:30 -05'00'	Digitally signed by Jamin Bergeron Reason: I am approving this document Date: 2009.12.31 16:38:33 -05'00'
	Operations	QA
Orlando	Digitally signed by Matthew Foti, Ph.D. Reason: I am approving this document Date: 2009.12.31 16:42:50 -05'00'	Digitally signed by Dorian Pearson-Shaver Reason: I am approving this document Date: 2010.01.04 11:45:17 -05'00'
	Operations	QA

Each approved signatory will electronically sign with a facsimile of signature and the date of signing.

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1. METHOD

SW-846 1311

2. MATRIX

Solid/ Aqueous

3. DETECTION LIMITS

Method detection limits (MDLs) and method reporting limits (MRLs) are maintained in LIMS. The regulatory limits for the tests are listed in Table 1.

4. SCOPE

4.1. The TCLP is designed to simulate the leaching a waste will undergo if disposed of in a sanitary landfill. The TCLP is suitable for determining the mobility of both organic and inorganic compounds present in liquid, solid, and multiphase wastes.

4.2. If a total analysis of the waste demonstrates that individual analytes are not present in the waste at concentrations that could exceed the appropriate regulatory level, TCLP analysis need not be performed.

4.3. If the analysis of any regulatory parameter in a TCLP leachate, allowing for dilution by other liquid fractions, indicates that the concentration for that parameter will meet or the regulatory level for that parameter, then the waste is considered to be hazardous and no other analysis need be performed on that waste.

5. SUMMARY

5.1. For liquid wastes containing less than 0.5% solids, the sample is filtered through a 0.6-0.8 um glass fiber filter. The filtrate is the TCLP extract.

5.2. If the waste that appears to be a liquid cannot be filtered, it is considered a solid and is subject to leachate generation.

5.3. For wastes containing greater than 0.5% solids (5% for volatile parameters), the sample is filtered through 0.6-0.8 um glass fiber filter. The liquid phase, if any, is separated from the solid phase and stored for later analysis. The particle size of the solid phase is reduced (if necessary), weighed, and extracted with an amount of extraction fluid equal to 20 times the weight of the solid portion. The sample is rotated in a borosilicate glass bottle for 18 hours +/- 2 hours and then filtered. A special extractor vessel is used when volatile are constituents of concern. Following extraction, the liquid extract is separated for the solid phase by filtration.

5.4. If compatible, the initial liquid phase of the waster is added to the liquid extract and analyzed following filtration. If incompatible, the liquid are analyzed separately and mathematically combined to yield a weighted average concentration.

6. DEFINITIONS

6.1. Extraction Blank - An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with other samples. The extraction blank is used to determine if method analytes or other interferences are present in the laboratory environment, reagents, or apparatus.

6.2. Zero-Headspace Extraction Vessel (ZHE)- A vessel used when evaluating for volatile compounds.

6.3. Teflon coated filter Holder- A Hazardous Waste Filtration System used to filter samples not involving volatile components.

6.4. Tedlar bags- Bags used for collecting the initial liquid phase from the ZHE. This is an alternative collection method if the more convenient PTFE gas tight syringes are not available.

6.5. Pressure supply- Industrial grade nitrogen gas is used for pressurization and filtration.

6.6. Reagent water- Standard Methods (18th Ed) Type II de-ionized water that is free from all analytes.

7. INTERFERENCES

Potential interferences that may be encountered during analysis are discussed in the individual analytical procedures.

8. SAFETY

Lab coats, safety glasses, and latex, nitrile or vinyl gloves are required to perform this analysis. Environmental samples are to be considered biological and chemical unknowns.

9. EQUIPMENT AND SUPPLIES

9.1. 1 Liter glass bottles with Teflon caps, Daniels Scientific, cat. # APC 1213 certified pre-cleaned, or equivalent.

9.2. Rotator designed for TCLP extractions, Millipore Corp., capable of end-over-end fashion rotation at 30 +/-2 rpm, or equivalent. See Figure 1.

9.3. Zero-Headspace Extractor (ZHE), Millipore Corp., Model YT300090HW gas pressure device, or equivalent. See Figure 2.

9.4. Hazardous Waste Filtration System, Millipore Corp., Model # YT30142HW, 142 mm, or equivalent.

9.5. TCLP acid washed filter paper -

9.5.1. Environmental Express, cat. # FG77142mm @ 0.7 u pore size, or equivalent.

9.5.2. PALL Corp., cat. # 66256, 90 mm, @ 0.7u pore size or or equivalent. Used only for ZHE pressurization vessel (Refer to section 9.3).

9.6. Disposable plastic cups, VWR, or equivalent.

9.7. Class A Volumetric glassware.

9.8. Variable Auto-pipettors, for the volume ranges of 0.1 to 1.0 ml and 1.0 to 10.0 ml.

9.9. pH meter, Orion, model # 710A with accuracy to within (+/-)0.05 units at 25°C, or equivalent..

9.10. Analytical Balance, Mettler , model # PJ 3600 with accurate to within (+/-) 0.01 g, or equivalent .

9.11. Tedlar bags, Greenwood Products, Inc. , 7x7 in. w/screw cap polypropylene combo valve with septum, or equivalent..

9.12. Stir Plate

9.13. Glass Syringe, SGE, gas tight with Luer lock tip, type 50MR-LL-GT P/N # 009660, or equivalent.

9.14. Hot plate

9.15. Min – Max Thermometer, VWR brand, Traceable Sentry thermometer, cat# 15551-284 or equivalent.

10. REAGENTS AND STANDARDS

All reagents and standards are labeled with their unique ID, the name of the material, the concentration, the date prepared and the expiration date. Preparation is documented in the Element laboratory information management system. Reagents are stored according to manufacturer's recommendations.

10.1. Reagents

10.1.1. Glacial Acetic Acid , EMD, cat. # AX0073-14, 7.14 N, ACS grade or equivalent.

10.1.2. Sodium Hydroxide, Mallinckrodt, pellets, ACS grade, catalog # 7708-06, or equivalent. (NaOH)

10.1.3. Nitric Acid, concentrated, EMD, cat. # NX0407. Trace metals grade., or equivalent. (HNO_3)

10.1.4. 1 N Nitric acid - Dilute 64 ml of concentrated nitric acid (Refer to section 10.1.3) to 1000 ml with reagent grade water.

10.1.5. 1N Sodium hydroxide solution (NaOH)- Add 40 grams of NaOH pellets (Refer to section 10.1.2) to 1 liter of reagent grade water (IN SMALL INCREMENTS) in a 2-liter volumetric flask. Place on a stir plate until dissolved and solution has cooled. Dilute to volume with reagent grade water.

10.1.6. 6 N Sodium hydroxide solution – Add 240 g of 10.1.2 to 500 ml reagent grade water. Allow to cool and bring to a final volume of 1000 ml with reagent grade water.

10.1.7. Extraction Fluid #1- Slowly combine 114 ml of Glacial Acetic (Refer to section 10.1.1) acid to 10 liters of reagent grade water.To this solution add 1286 ml of1N NaOH (Refer to section 10.1.5) and dilute volume of 20 liter with reagent grade water. The pH of this fluid should be 4.93 +/- 0.05. Smaller quantities of this solution can be prepared as long as the ratios of the original chemicals to their respective volumes remain the same.

10.1.8. Extraction fluid # 2 - Dilute 5.7 mL Glacial Acetic acid (Refer to section 10.1.1) to a volume of 1000 mL with reagent grade water. The pH of this fluid should be 2.88 +/- 0.05.

10.1.9. Hydrochloric acid (HCL), concentrated, JT Baker, cat.# JT9530-33, trace metals grade, or equivalent.

10.1.10. 1 N HCL, dilute 83 ml of (Refer to section 10.1.8) to 1000 ml with reagent grade water.

11. SAMPLE COLLECTION, PRESERVATION AND STORAGE

11.1. All samples shall be collected using an appropriate sampling plan.

11.2. The TCLP may place requirements on the minimal size of the field sample, depending upon the physical state or states of the waste and the analytes of concern.

11.3. Preservatives shall not be added to samples before extraction.

11.4. Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste. If precipitation occurs, the entire sample (including precipitate) should be extracted.

11.5. When the waste is to be evaluated for volatile analytes, care shall be taken to minimize the loss of volatiles. Samples shall be collected and stored a manner intended to prevent the loss of volatile analytes (e.g., samples should be collected in Teflon-lined septum capped vials and stored at 4 C. Samples should be opened only immediately prior to extraction).

11.6. TCLP extracts should be prepared for analysis and analyzed as soon as possible following extraction. Extracts or portions of extracts for metallic analyte determinations must be acidified with 1 N nitric acid to pH <2, unless precipitation occurs. Extracts should be preserved for other analytes according to the guidance given in the individual analysis methods. Extracts or portions of extracts for organic analyte determinations shall not be allowed to come into contact with the atmosphere (i.e., no headspace) to prevent losses.

11.7. Hold time:

12. QUALITY CONTROL

12.1. Samples must be extracted with one method blank using the appropriate volumes of extraction fluid per fluid used.

13. CALIBRATION AND STANDARDIZATION

Rotation devices (Refer to sections 9.2 and 9.3) must have a rotational speed of 30 +/- 2 rpm. This shall be checked quarterly and be documented in the TCLP Log Book.

14. PROCEDURE

14.1. Preliminary evaluations are:

14.1.1. Determination of TCLP % solids

14.1.2. Determination of pH

14.1.3. Determine whether the solid portion of the waste requires particle size reduction.

14.2. The TCLP % solids is determined by using the following procedure:

14.2.1. Pre-weigh an empty borosilicate glass extraction bottle.

14.2.2. Pre-weigh the original sample container (full).

14.2.3. Place TCLP approved filter paper, smooth side down, in the TCLP pressure filtration device (Refer to section 9.4).

14.2.4. Mix the sample thoroughly and pour approximately 20 to 100 g into the TCLP pressure filtration device (Refer to section 9.4).

14.2.5. Attach the pressure filtration lid which is connected to a Nitrogen tank slowly apply pressure to 10 psi or until the nitrogen passes through the filter. This filtration MUST be conducted in the fume hood.

14.2.6. If no liquid passes through the filter in any 2 minute intervals, slowly increase the pressure, in 10 psi increments, to a maximum of 50 psi.

14.2.7. If the sample does not filter it is considered to be 100% solids.

14.2.8. If ANY of the sample passes through the filter, determine the TCLP percent solid use Equation 1 (Refer to section 15.1).

14.2.9. Weigh (Wt) the bottle and filtrate as well as the weight of the original sample bottle (empty). Note: The weight of the original sample can be obtained by subtracting the weight of the full sample container from the empty sample container.

14.3. Determination of pH and appropriate extraction fluid required for leaching test -

14.3.1. Weigh out 5.0 g of the solid portion of the waste into a 250 mL beaker.

14.3.2. Add 96.5 mL of DI water and stir for 5 minutes.

14.3.3. Use pH paper to measure the pH.

14.3.4. If pH (from section 14.3.3) is less than 5, use extraction fluid # 1. However, if the pH is > 5 go to section 14.3.5.

14.3.5. If pH >5, add 3.5 mL 1N HCL, heat to 50° C hold at that temperature and stir for 10 minutes. Cool and record pH.

14.3.6. If pH is 5.0 or greater, use extraction fluid # 2. If the pH is less than 5, use extraction fluid #1.

14.4. Determine if sample size reduction is necessary:

14.4.1. If solid sample will not pass through the 0.375 inch screen, break it up with a hammer and use that portion which passes through the screen for leaching.

14.5. Procedure for 100% solid samples for non-volatile compounds:

14.5.1. Weigh out 20-45 g into a clean borosilicate glass bottle.

14.5.2. Add 20 times the sample weight of the proper extraction fluid. Example: 20 g soil to 400 ml fluid.

14.5.3. Place the sample in the bottle with the proper fluid, cap tightly. Place the bottle on the rotator and rotate for 18 hr +/- 2 hours @ 23 °C +/- 2 °C. If temperature range of rotator environment exceeds the specified range listed for the extraction period, the entire batch of samples must be re-prepared.

14.5.4. At the conclusion of rotation, filter the extract through the pressure filtration system (Refer to section 9.4), using 142 mm (Refer to section 9.5.1) filter paper, into a clean borosilicate glass bottle. To reduce exposure to potentially hazardous vapors, this filtration MUST be conducted in a fume hood. If the TCLP filter ruptures, the sample must be re-prepared.

14.5.5. Save the filtrate, it is the final TCLP extract. Measure and record the pH of the extract. For samples requiring preservation (metals and Cyanide), preserve cyanide to a pH of > 12 with 10.1.6, and metals to a pH of < 2 with 10.1.4. Again, measure the pH of each preserved fraction and record.

14.6. Procedure for samples that are less than 100%, but >0.5% solids for nonvolatile compounds:

14.6.1. Determine how much sample to filter by using the following formula. A volume (sample + fluid) of approximately 800 mL is ideal for the 1 L extraction bottle.

14.6.2. Use Equation 2 (Refer to section 15.2) to determine the filtrate A volume. Note: Equation 3 (Refer to section 15.3) may also be used.

14.6.3. Filter the appropriate amount of sample through the pressure filtration system. Increase pressure slowly in 10 psi increments. Do not exceed 50 psi. Save this filtrate and label this initial filtrate, A. Save this solution for later compositing.

14.6.4. Use Equation 2 (Refer to section 15.2) to determine the filtrate B volume. Place the solid portion of the filtered sample plus the filter paper into an extraction bottle, add the required

fluid, based on equation 2, and rotate for 18 hours +/- 2 @ 23 ^{o}C +/- 2 ^{o}C. If temperature range of rotator environment exceeds the specified range listed for the extraction period, the entire batch of samples must be re-prepared.

14.6.5. At the end of the rotation period, filter slurry mixture through the pressure filtration system (Refer to section 9.4). This is filtrate B.

14.6.6. Combine filtrate A, obtained above (Refer to section 14.6.2) with filtrate B (Refer to section 14.6.4) if they are compatible. This is the final TCLP extract. Measure and record the pH of the final TCLP extract. For samples requiring preservation (metals and Cyanide), preserve cyanide to a pH of > 12 with 10.1.6, and metals to a pH of < 2 with 10.1.4. Again, measure the pH of each preserved fraction and record.

14.6.7. If the samples are not compatible, each fraction must be analyzed independently and mathematically combined to yield a volume-weighted average concentration.

14.7. If the sample is less than 0.5% solids for non-volatile analytes, rotation is not required. Filter only through a142 mm filter paper and treat the filtrate as final TCLP extract. Measure and record the pH of this sample.

14.7.1. The final TCLP extract shall be treated as the sample. Extracts of samples requiring metals analysis, need acidification to a pH level < 2 with 1 N HNO^3.

14.8. Procedure for multiphase samples:

14.8.1. Estimate the percent volume of each phase and separate in a separatory funnel. Treat each phase as a separate sample, and proceed as above starting at step (Refer to section 14.2).

14.9. Preliminary Steps and Set-up Procedure for ZHE volatiles compound:

14.9.1. Prior to extraction, the percent solids for your sample should be determined (Refer to section 14.2).

14.9.2. Place the ZHE cylinder (top end up) on a firm surface.

14.9.3. Place the piston (with O-ring securely attached and wiper ring facing up) into the top of the cylinder, and push the piston down into cylinder with the Teflon "pusher" until approximately 100 mL could fit on top of the piston (3-4cm should be sufficient).

14.9.4. Prepare the gas-pressurization device by connecting the nitrogen source to the Dispensing Pressure Vessel.

14.9.5. Take the cylinder/piston apparatus over to the top-loading balance, along with your sample for extraction. Refer to the following guidelines for determining the appropriate sample size to use in the ZHE.

14.9.6. Use between 6-8 grams of sample.

14.9.7. Use Table 2 to determine the amount of extraction fluid (Refer to section 10.1.7) based on the weight of waste. Note: If the waste sample has >/=0.5%, Use Table 2 to determine these weights. If the waste sample has </=0.5%, filter the waste only and no ZHE rotation is needed.

14.10. Weighing out the sample and preparing the ZHE vessel for rotation (Refer to Figure 2 where appropriate):

14.10.1. Record your projected sample/extraction fluid weight as guidelines for the actual weighing. Place the ZHE cylinder (with piston inserted) on the top-loading balance, and tare the balance.

14.10.2. Weigh out your sample into the cylinder, and record the actual weight used. Use20 grams of solid.

14.10.3. Re-calculate the weight of extraction fluid needed based on the actual weight of waste, if necessary.

14.10.4. Weigh out any remaining samples into their appropriate ZHE cylinders, then place the cylinders into their support assemblies.

14.10.5. Make sure that the correct O-ring is placed in the base of support.

14.10.6. Assemble the filter with the support screens by placing a ZHE filter paper between two clean filter screens and placing the "sandwich" in the ZHE's top plate.

14.10.7. Place the appropriate O-ring against the screen, so that the filter assembly is held into the top plate by the O-ring. Now place the plate assembly onto the support base posts and secure with four wheel knobs (hand tighten at first, then tighten with the wheel wrench).

14.10.8. Turn on your pressurizing gas to approximately 55 psi.

14.10.9. Connect the ZHE vessel to the Pressure Dispensing Vessel with quick lock fittings.

14.10.10. Close all the valves on the unit. 1) the inlet/outlet sample valve on top, 2) the pressure release valve on the bottom, and 3) the pressure release on the Dispensing Vessel.

14.10.11. Slowly turn the blue stopcock on the Dispensing Vessel to bring the pressure in the ZHE to 15 psi. During this initial pressurization step, the piston may "kick" or "pop" up into the cylinder body as the pressure increases in ZHE. This is normal for this operation.

14.10.12. Place the 50 mL syringe (Refer to section 9.13) into the Luer tip of the inlet/outlet valve, and open the valve to expel pressurized headspace in the ZHE.

14.10.13. Allow the escaping air to enter the syringe, but be careful of sudden force of pressure in the syringe. Pull off all the headspace, leaving only compressed sample in the ZHE.

14.10.14. Increase the pressure in 10 psi increments, taking off headspace as you go, until 50 psi is reached in the ZHE. Open the pressure release valve under the ZHE and on the Dispensing Vessel, but make sure the inlet/outlet valve on the top remains closed.

14.10.15. Introduce the correct amount of extraction fluid through the inlet/outlet valve. Take care not to introduce air into the ZHE during this procedure.

14.11. Rotating the ZHE Vessel:

14.11.1. Secure the ZHE vessel(s) onto the rotating device

14.11.2. Balance the vessels on the rotating device.

14.11.3. Close the lid on the rotator and rotate for 18 hours +/- 2 hours@ 23 ^{o}C +/- 2 ^{o}C. If temperature range of rotator environment exceeds the specified range listed for the extraction period, the entire batch of samples must be re-prepared.

14.12. Collecting the Sample after Rotation:

14.12.1. After the rotation period is over, turn off the rotator and remove the ZHE(s) from the rotator arm.

14.12.2. Using gas tight syringe (Refer to section 9.13), remove the sample, but discard the first 5mL of sample.

14.12.3. Store all volatile TCLP-ZHE samples in the appropriate refrigerator in the Volatiles room.

14.13. Care and Cleaning Procedure for gas tight syringe: See TECH-09.

14.14. Care and Use of Gastight Syringe for ZHE: Failure to follow these instructions may result in damage to the syringe and its components. .

14.14.1. Make sure plunger and barrel are absolutely clean before re-assembly.

14.14.2. Slightly wet plunger with reagent water before inserting into barrel. Push in slowly. Plunger must be straight and not at an angle.

14.14.3. Do not use hot water to clean syringe. Use warm water and detergent. If using ultrasonic cleaning, do not leave in bath more than 5 minutes. Rinse with DI water.

14.14.4. Plunger and barrel must be at room temperature before assembly. The plunger expands more than the barrel when warm and this could cause cracking of the barrel.

14.14.5. Slowly screw syringe into the ZHE; 1 or 2 turns is enough. Do not over tighten.

14.14.6. Do not press down on the syringe when injecting fluid into the ZHE. This could break the Teflon tip. Hold the bottom of the syringe and press down on the plunger with the same hand to avoid undo pressure on the tip of the syringe.

14.14.7. The syringe must be vertical when injecting the fluid. If it is at a slight angle, the Teflon tip will break.

14.14.8. To make it easier to inject fluid into the ZHE, wet the O-rings of the piston before assembly.

14.14.9. HANDLE SYRINGE WITH EXTREME CARE!

15. DATA ANALYSIS AND CALCULATIONS

15.1. Equation1: *TCLP Percent Solid*

$$\text{TCLP \% solid} = \frac{[\text{Wt. original sample} - (\text{Wt. bottle} + \text{filtrate} - \text{Wt. empty bottle})] \times 100}{(\text{Wt. sample bottle full} - \text{Wt. sample bottle empty})}$$

15.2. Equation2: *Filtrate Volume Determination*

$$\text{Fluid (mL desired)} = \frac{[\text{sample wt. x TCLP \% solids x 20}]}{(100)}$$

15.3. Equation3: *Sample Weight based on Filtrate Volume*

$$\text{Sample Wt.} = \frac{[\text{Fluid (mL desired)} \times 100]}{(\text{TCLP \% solids} \times 20)}$$

15.4. Because sample results are not generated by this procedure there are no calculations inherent in it. However, any factor that might affect the outcome of analytical results, must be correctly entered into the appropriate digestion Logbook and into LIMS.

16. ASSESSMENT AND ACCEPTANCE CRITERIA FOR QUALITY CONTROL MEASURES.

NA

17. CORRECTIVE ACTIONS FOR OUT-OF-CONTROL DATA

NA

18. CONTINGENCIES FOR HANDLING OUT-OF-CONTROL OR UNACCEPTABLE DATA

NA

19. METHOD PERFORMANCE

19.1. Preparation of method blanks (one per twenty samples) from the appropriate extraction fluid (Refer to section 10.1.6) or (Refer to section 10.1.7) shall accompany each batch.

20. POLLUTION PREVENTION

In no case should a sample or unknown (such as a waste generated to perform preliminary tests) be allowed to enter any municipal drain prior to the hazardous waste characterization having been completed. All sample containers and their previous contents must be disposed of in a safe and proper manner.

21. WASTE MANAGEMENT

Samples must be held for 45 days (60 days for all DoD projects) before disposal. Refer to ADMIN 14 for additional information.

22. REFERENCES

22.1. Environmental Conservation Laboratories, Inc., Quality Systems Manual.

22.2. ENCO SOP QAQC-32, "Corrective actions for out-of-control data"

22.3. U.S. EPA Manual for the Certification of Laboratories Analyzing Drinking Water, Criteria and Procedures, Quality Assurance, EPA 814B-92-002, Sept. 92

22.4. SW846 Update IV, Method 1311, Revision 0, July, 1992

23. MISCELLANEOUS

23.1. Revision Summary

Rev. No	Date Revised	Revision Summary
4	12/6/2009	Complete SOP re-write

23.2. Method modifications, enhancements and clarifications

23.3. Environmental Conservation laboratories uses 20-45 g of sample for a standard TCLP extraction.

23.4. Navy clients must be informed of the method modification in advance.

Table 1. Regulatory Limits.

EPA HW No. \1\	Contaminant	CAS No. \2\	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	110.0
D018	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019	Carbon Tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol \4\	95-48-7	200.0
D024	m-Cresol \4\	108-39-4	200.0
D025	p-Cresol \4\	106-44-5	200.0
D026	Cresol \4\		200.0
D016	2,4-D	94-75-7	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichlorothylene	75-35-4	0.7
D030	2,4-Dintrotoluene \3\	121-14-2	0.13
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its Epoxide)	76-44-8	0.008
D032	Hexachlorobenzene \3\	118-74-1	0.13
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine \3\	110-86-1	5.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D043	Vinyl Chloride	75-01-4	0.2

\1\ Hazardous waste number.

\2\ Chemical abstracts service number.

\3\ Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

\4\ If o-, m-, and p-Cresol concentrations cannot be differentiated, the total Cresol (D026) concentration is used. The regulatory level of total Cresol is 200 mg/L

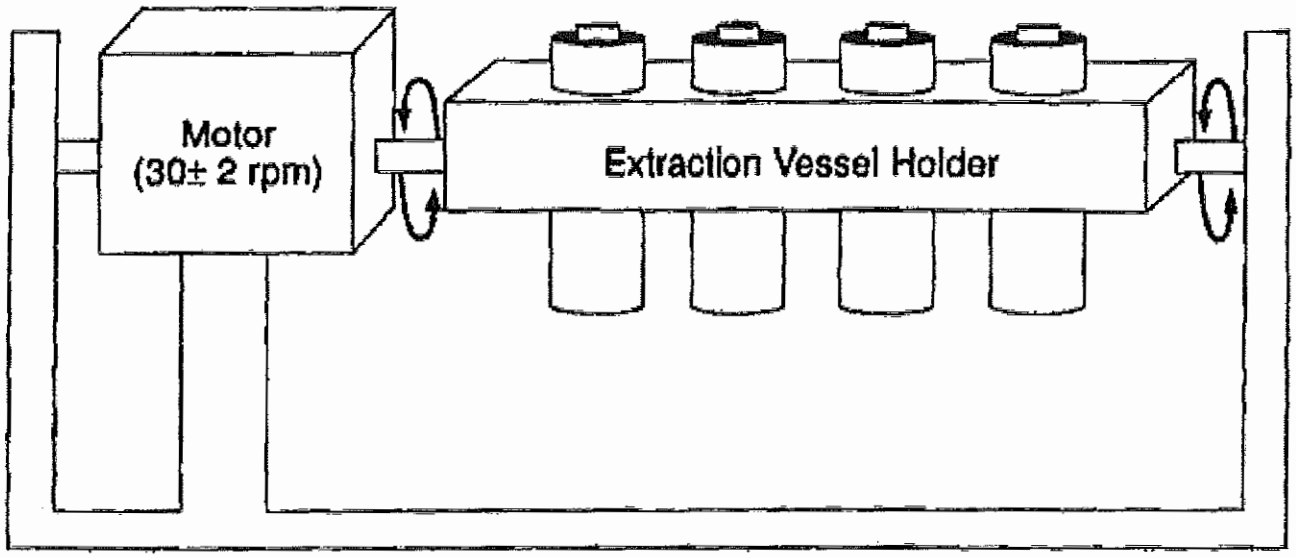

Figure 1. Rotary Agitation Apparatus

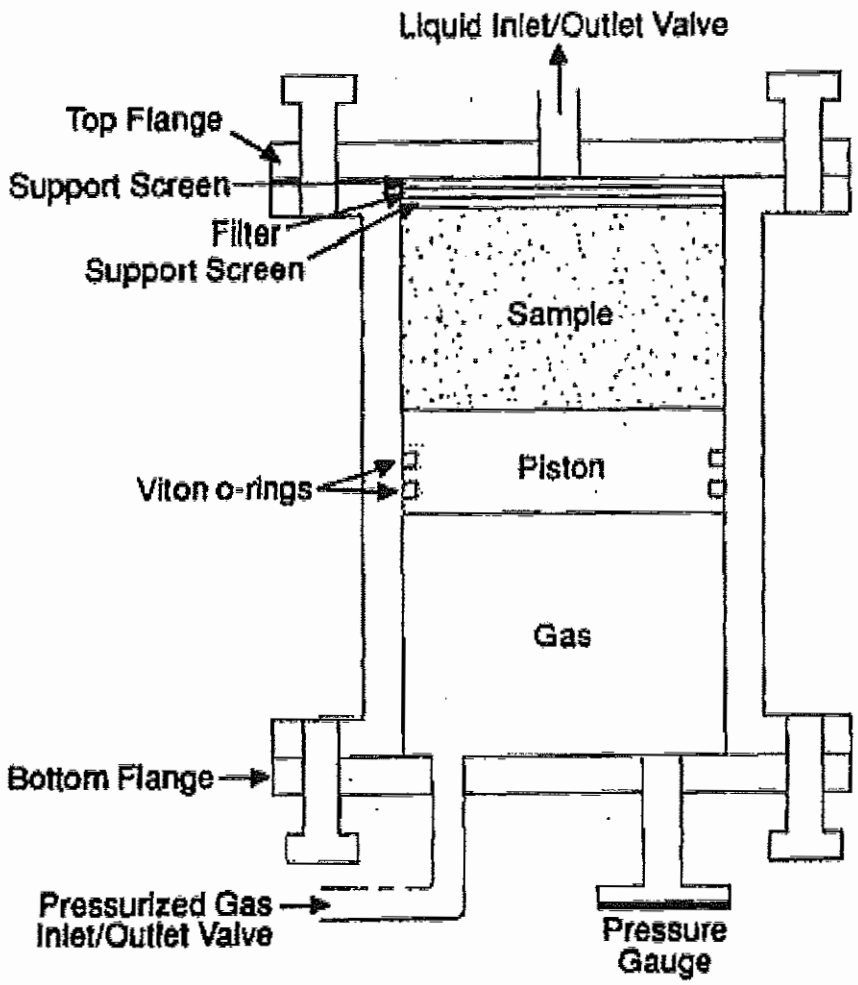

Figure 2. Zero-Headspace Extractor (ZHE)

Environmental Conservation Laboratories Inc.
COMPANY-WIDE POLICY

DETECTION LIMITS

Corporate Operations: Digitally signed by Rick Camp
Reason: I am approving this document
Date: 2008.11.24 11:14:31 -05'00'

Corporate QA: Digitally signed by Andres Romeu, PhD
Reason: I am approving this document
Date: 2008.11.24 11:32:22 -05'00'

Proprietary Information Statement:

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OBJECTIVE:

This policy describes Environmental Conservation Laboratories, Inc. requirements for the determination and use of method detection limits (MDL) and instrument detection limits (IDL). The objective is to ensure technical correctness and uniformity throughout ENCO in the establishment of these parameters.

SCOPE:

This policy is to be enforced and followed throughout the company.

POLICY:

1. Definitions:
   - 1.1. Method detection limit (MDL): the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, determined per the procedure described in 40CFR136, Appendix B. A minimum of seven replicate low-level spikes are prepared and analyzed, and the variability of the results used to calculate the MDL.
   - 1.2. Instrument detection limit (IDL): the minimum concentration of a substance that can be distinguished from instrument noise. It consists of the analysis of multiple blanks analyzed on each of three, non-consecutive days. The results are used to calculate daily variability, and each day's variability results are combined to calculate the IDL.
2. Requirements
   - 2.1. All methods performed by ENCO laboratories must have an MDL study, except as noted elsewhere in this policy.
   - 2.2. The MDL is established by performing an annual MDL study.
     - 2.2.1. Every instrument used for a procedure must be qualified through an MDL study before it can be used for that procedure. If more than one instrument is available to perform a procedure, MDL studies cannot be repeated on one instrument in consecutive years, or until an MDL is completed on the other instruments available for that procedure.

2.2.2. The MDL study is performed according to a schedule published by management.

2.2.3. Where applicable, the MDL should be equal to or less than the regulatory limit it supports.

2.2.3.1. Instruments that do not meet this requirement may not be used for the procedure for which samples are analyzed to determine whether they violate regulatory requirements.

2.2.3.2. Procedures that do not meet this requirement on a consistent basis, or whose MDL is different from the regulatory value by less than a factor of two must be modified or made unavailable for use in support of that regulation.

2.2.4. MDL studies must be determined each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis

2.2.5. The relationship between the MDL and the limit of quantitation (LOQ), expressed at ENCO as method reporting limit (MRL), is such that the MDL must be equal to or less than the MRL.

2.2.6. MDL studies shall include all individual analytes that can be spiked. For multi-analyte parameters which are mixtures of the same isomers (*e.g.,* Aroclors), representative MDLs may be determined.

2.2.6.1. Due to their unique nature, Aroclor 1016 and 1260 will be used to establish the MDL of all PCB formulations.

2.2.6.2. The MDL individually determined for Aroclor 1016 and 1260 will be applied to those analytes.

2.2.6.3. The higher of the two MDLs will be applied to the other Aroclor formulation analytes (e.g., PCB-1221, PCB-1232, PCB-1248, etc.).

2.2.7. All MDL studies must be spiked with second source standards. MDL studies spiked with standards from the same source as calibration standards do not meet certification requirements.

2.2.8. All MDL studies must include sample preparation procedures that are routinely used during analysis of field samples.

2.2.9. Methods which use the same sample preparation and analysis techniques (e.g., EPA 624 and SW-846 8260x) can share the results of MDL studies.

2.2.10. Deionized water, clean sand, Teflon chips, or other appropriate materials are used as the matrix for MDL studies. The matrix must match that used for method blanks and LCSs in the appropriate procedures.

2.2.11. The procedures described in this policy and in related standard operating procedures (SOPs) must be used to determine the MDLs for all tests performed at ENCO laboratories with the following exceptions:

2.2.11.1. Methods described in the USEPA SOWs for CLP do not require MDLs.

2.2.11.2. Calculated analytes (e.g., Total xylenes) must follow the requirements set forth in policy QA-002, *Calculated analytes*. If the calculated analyte is not covered under that policy, the MDL is set to equal the method reporting limit.

2.2.11.3. MDLs are not required for any method that incorporates the following parameters or any parameter for which spiking solutions or quality control samples are not readily available, or for tests that are qualitative (e.g., microbiology).

- pH
- Biological oxygen demands
- Salinity
- Color
- Temperature
- Microbiology

- Transparency
- Ignitability
- Titrimetric tests
- Organoleptic tests (odor, taste)
- Turbidimetric tests
- Gravimetric tests (ie. TSS, TDS, Volatile Solids, Settleable Solids)
- Specific Conductance
- Dissolved Oxygen
- Oxygen Reduction Potential
- Paint Filter Liquids
- Chlorophyll a

2.2.12. MDLs for soils using methods that are designated for water samples use the MDL determined for aqueous samples, adjusted for the sample preparation factor used in the leaching procedure to mobilize the analytes into an aqueous matrix.

2.2.13. Other documented deviations from this policy (including use of alternate procedures), based on specific regulatory, method or client requirements may be made as approved by the ENCO Director of Quality Assurance (or designee).

2.2.14. The analytical procedure must not be altered during the process of determining the MDL. If an analytical procedure is subsequently altered, a new MDL must be established.

2.3. IDL studies are required for ICP (ICP-AES and ICP-MS) techniques and must be performed on a quarterly basis. All new analytical instruments require an instrument detection limit that is outside the scope of this policy.

2.3.1. There are several method-specific definitions of IDL and IDL study requirements. ENCO uses the approach described in SW-846 6020, as it is the strictest of all available.

2.3.1.1. SW-846, Chapter 3, defines IDL as the concentration equivalent to a signal due to the analyte which is equal to three times the standard deviation of a series of at least 7 replicate measurements of a reagent blank's signal at the same wavelength.

2.3.1.2. SW-846 Method 6020 (EPA 6020) describes a procedure for deriving the IDLs, which can be estimated by calculating the average of the standard deviations of the analysis results of seven consecutive reagent blanks on three non-consecutive days. Each measurement must be performed as though it were a separate analytical sample (i.e., each measurement must be followed by a rinse and/or any other procedure normally performed between the analysis of separate samples).

2.3.1.3. EPA 200.7 and 200.8 define IDL as the concentration equivalent to the analyte signal equal to three times the standard deviation of a series of 10 replicate measurements of the calibration blank signal.

2.3.2. IDL studies are performed independently and are the responsibility of the metals production area. Results are kept in the metals area.

2.3.3. If the MDL is lower than the IDL by a factor of two or more, the MDL study is suspect and must be repeated. If the MDL is within a factor of two lower than the IDL, the MDL is adjusted upwards to reflect the IDL.

2.4. The QA Manager and senior technical staff at the facility must be consulted if there are questions regarding the procedure or data interpretation. If resolution cannot be achieved at this level, the Director of QA or Technical Director must be consulted.

2.5. MDL study records shall be retained in the laboratory's QA files as part of the laboratory's Quality Records. MDL study raw data are to be retained for the same period as analytical data.

3. Procedure

3.1. MDL studies are performed using the guidance provided in 40CFR136, Appendix B.

3.1.1. If the MDL study for a procedure is due but not logged in because it is not on the schedule, the group leader for the affected area requests that logins create a work order for the MDL study.

3.1.2. Following the posted annual MDL study schedule, the logins department creates a work order in LIMS for ten replicate MDL samples for the scheduled test. The due date for the test is the last business day of the month.

3.1.3. The MDL replicates are prepared and analyzed according to the appropriate standard operating procedure. The spike level can be derived from previous, successful MDL studies. Spike levels must be reviewed and approved in advance by the Quality Assurance Group. In the absence of any such information, the spike should not exceed the low standard of the calibration curve for the procedure.

3.1.4. Results are uploaded into LIMS, which has functionality to create an MDL study report (Figure 1).

3.1.5. The MDL study spike concentrations are entered into the designated spaces to allow calculation of spike-to-MDL ratios.

3.2. MDL study data evaluation

3.2.1. MDL study validity is determined by the QA manager or designee.

3.2.2. Spike-to-MDL ratios between 3 and 10 result in acceptable MDLs.

3.2.2.1. Ratios between 1 and 3 are acceptable, but may result in high-biased MDLs.

3.2.2.2. Ratios above 10 result in a low-biased MDL and are not acceptable with the following exception.

3.2.2.3. If the ratio is above 10 but less than 20, the MDL can be adjusted upwards by dividing the spike by 10. This new value is entered as the Adjusted MDL, and comments are added to the report. This exception is incorporated into the policy in the interest of making it practical. If more than 10% of the analytes in the study exceed a spike-to-LOD ratio, the exception may not be used and the MDL study is repeated.

3.2.3. The MDL must be equal to or less than the MRL. Not meeting this criterion results in rejection of the MDL study for that analyte.

3.2.4. The average recovery of the MDL replicates should be within laboratory control limits, and are presented to allow another level of evaluation. If the average recoveries are not within control limits, there may be an indication of a problem in the study. The reviewer must consider that at the low-spiking levels used for MDL studies, the analytical results are often below the low point of the calibration curve, and are considered to be estimates. Recoveries that are outside control limits do not invalidate the study.

3.2.5. The MDL must be compared to regulatory limits; if the MDL is higher than the regulatory limit, the analyst must consider re-analysis of the MDL replicates after performing instrument maintenance, including, but not limited to changing GC column, cleaning MS source, and replacing sample introduction hardware and tubing, where applicable. MDL studies that result in an LOD that is higher than regulatory limits may be rejected.

3.2.6. Sometimes the spike-to-MDL ratio is within requirements, but the resulting MDL does not meet the other criteria presented above. This can be related to the spike, which if not within a factor of two of the low point of the calibration curve, can result in what can be considered "valid" MDLs by the objective measures presented here.

3.2.7. Ten replicates should be run for an MDL study. A minimum of seven replicates are required for a valid MDL study. If there is reason to suspect one of the replicates, the QA manager can reject all results for that replicate, provided no fewer than seven are included in the study. The reason for rejection must be documented in the comments section. Rejecting individual analyte results while accepting other results from any replicate (chery-picking) is prohibited.

4. References

4.1. 40 CFR 136, Part A, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit

4.2. Environmental Conservation Laboratories, Inc. Quality Systems Manual.

4.3. Department of Defense, DoD Quality Systems Manual, Version 3, June, 2003

MDL Study

QA Date Approved: 4/9/2008
QA Approved By: Andres Romeu
MDL Study Group: BNA, GC-MS-SIM, 625_8270-Water
Analysts: Prepared By - Danielle Miller : Analyzed By - John Ilemsky
Analysis Dates: 4/8/2008
Matrix: Water
Location: ENCO Orlando
Instrument: OSVGCMS2
Concentration units: ug/L

Parameter	Spike Amt	Replicate 1	2	3	4	5	6	7	8	9	10	Average	StdDev	MDL	MRL	Spike/MDL	%R	MRL>MDL
Naphthalene	0.2	0.2	0.18	0.17	0.16	0.13	0.14	0.12	0.14	0.13	0.14	0.151	0.0256	0.072	0.1	Ok Spk (2.8)	75.5	PASS
2-Methylnaphthalene	0.2	0.19	0.17	0.17	0.15	0.12	0.14	0.12	0.14	0.13	0.14	0.147	0.0231	0.065	0.1	3.1 Pass	73.5	PASS
1-Methylnaphthalene	0.2	0.17	0.16	0.16	0.14	0.12	0.13	0.12	0.13	0.12	0.13	0.138	0.0187	0.053	0.1	3.8 Pass	69.0	PASS
Acenaphthylene	0.2	0.18	0.16	0.17	0.15	0.13	0.15	0.13	0.15	0.14	0.16	0.152	0.0152	0.045	0.1	4.3 Pass	76.0	PASS
Acenaphthene	0.2	0.17	0.17	0.16	0.15	0.12	0.15	0.13	0.15	0.14	0.15	0.149	0.016	0.045	0.1	4.4 Pass	74.5	PASS
Fluorene	0.2	0.18	0.18	0.18	0.17	0.13	0.16	0.14	0.16	0.15	0.17	0.162	0.0175	0.049	0.1	4.1 Pass	81.0	PASS
Phenanthrene	0.2	0.18	0.17	0.18	0.17	0.14	0.16	0.15	0.17	0.16	0.18	0.166	0.0135	0.038	0.1	5.3 Pass	83.0	PASS
Anthracene	0.2	0.17	0.16	0.17	0.16	0.13	0.16	0.14	0.16	0.15	0.16	0.156	0.0126	0.036	0.1	5.6 Pass	78.0	PASS
Fluoranthene	0.2	0.22	0.21	0.22	0.21	0.18	0.2	0.18	0.2	0.2	0.22	0.204	0.0151	0.043	0.1	4.7 Pass	102.0	PASS
Pyrene	0.2	0.21	0.2	0.22	0.2	0.17	0.2	0.18	0.2	0.19	0.21	0.198	0.0148	0.043	0.1	4.8 Pass	99.0	PASS
Benzo(a)anthracene	0.2	0.19	0.19	0.2	0.19	0.17	0.18	0.17	0.19	0.18	0.2	0.186	0.0107	0.03	0.1	6.7 Pass	93.0	PASS
Chrysene	0.2	0.16	0.16	0.17	0.16	0.14	0.16	0.14	0.16	0.15	0.17	0.157	0.0106	0.03	0.1	6.7 Pass	78.5	PASS
Benzo(b)fluoranthene	0.2	0.17	0.16	0.18	0.17	0.14	0.16	0.14	0.16	0.16	0.17	0.161	0.0129	0.036	0.1	5.6 Pass	80.5	PASS
Benzo(k)fluoranthene	0.2	0.17	0.17	0.18	0.17	0.15	0.16	0.15	0.17	0.16	0.18	0.166	0.0107	0.03	0.1	6.7 Pass	83.0	PASS
Benzo(a)pyrene	0.2	0.18	0.18	0.18	0.18	0.15	0.17	0.15	0.17	0.16	0.18	0.17	0.0125	0.035	0.1	5.7 Pass	85.0	PASS
Indeno(1,2,3-cd)pyrene	0.2	0.2	0.2	0.21	0.2	0.17	0.19	0.17	0.19	0.19	0.2	0.192	0.0132	0.037	0.1	5.4 Pass	96.0	PASS
Dibenzo(a,h)anthracene	0.2	0.19	0.18	0.19	0.18	0.16	0.18	0.16	0.18	0.17	0.19	0.178	0.0114	0.032	0.1	6.3 Pass	89.0	PASS
Benzo(g,h,i)perylene	0.2	0.19	0.19	0.2	0.19	0.16	0.18	0.16	0.18	0.18	0.19	0.182	0.0132	0.037	0.1	5.4 Pass	91.0	PASS

QA Observations

LIMS Updated

Figure 1. MDL study report.

RESUMES AND SUBCONTRACTOR QUALIFICATIONS

ENVIRONMENTAL SERVICES, INC.

Michael J. Burns, P.G./Vice President & Site Assessment and Remediation Division Director

Education Level:
M.B.A. Master of Business Administration Campbell University.

B.S. Geology North Carolina State University.

Years Experience:
18

ESI Office:
Raleigh

PROFESSIONAL EXPERIENCE SUMMARY

Mr. Burns is a Division Director and hydrogeologist with experience conducting Phase I and Phase II Environmental Site Assessments, Hydrogeological Site Assessments, Comprehensive Site Assessments, and Corrective Action Plans. His background is primarily in Geology and groundwater Hydrogeology. He is familiar with all aspects of groundwater assessment and remediation from delineating the extent of contamination, if present, to designing and installing successful remediation systems. He has conducted assessments and remedial actions in the Piedmont, Blue Ridge and Coastal Plain provinces of the Carolinas. He has been actively involved in and responsible for all phases of investigation from well site selection and installation to sampling, aquifer testing, initiating recovery, and reporting to the client and regulatory agencies. As a hydrogeologist, Mr. Burns actively performs groundwater modeling and subsurface aquifer studies.

RESPONSIBILITIES WITH ENVIRONMENTAL SERVICES, INC.

Site Assessment and Remediation Division Director for offices in the Carolinas and northern Georgia. As a Division Director, he coordinates efforts among Division Managers and oversees Division operations. Also functions as Senior Project Manager with primary responsibility for technical oversight and QA/QC on projects. Responsibilities also include environmental documentation, coordination with regulatory agencies, permit preparation, and document preparation.

PRIOR EXPERIENCE

2005-Present:	ENVIRONMENTAL SERVICES, INC.
2002-2005:	ENVIROSOUTH, INC.
1998-2002:	QORE, INC.
1990-1998:	FROEHLING & ROBERTSON, INC.
1988-1990:	LOTUS CONSULTING ENGINEERS, INC.

PROFESSIONAL AFFILIATIONS

Ground Water Professionals in North Carolina

CERTIFICATIONS

Licensed Geologist in North Carolina, License Number 1645
Registered Professional Geologist in South Carolina, Registration Number 2408
Registered Professional Geologist in Florida, Registration Number 2431
Registered Professional Geologist in Georgia, Registration Number 1949
NCDENR IHSB, Registered Site Manager

PROJECT EXPERIENCE

RCRA site remediation, monitoring and site closure at manufacturing facility in Apex, NC. Provided management, supervision and monitoring of closure of four solid waste management units and the eventual closure (delisting) of the facility.

Superfund site investigation related to former landfill operations which included contaminated soil, groundwater, surface water and stream sediment at facility in Charleston, South Carolina. Provided management oversight of drilling operations which included installation of several monitoring wells and numerous soil sampling points. Collected soil, surface water, sediment and groundwater samples and assisted in the preparation of a focused site inspection report for the facility.

UST removal, Comprehensive Site Assessment and Corrective Action Plans at over 100 facilities for the North Carolina Department of Forest Resources. Provided project management, oversight and monitoring of the removal of USTs at all NC Forest Resources facilities in North Carolina. Provided drilling oversight of the installation of groundwater monitoring wells and soil borings for over 40 facilities and prepared and specified corrective actions at over 20 of the facilities.

Monitoring, sampling and oversight for the removal of 57 USTs at the Cherry Point Marine Corp. Air Station in Havelock, NC. Provided oversight and monitoring of the UST removals as well as report preparation.

Performed Phase II assessment, limited site assessment, comprehensive site assessment and free product recovery at retail gas station facility in Johnston County NC. Managed and provided oversight of drilling operations for a Phase II assessment where leaks were discovered at the fuel dispensers. A comprehensive site assessment was performed to evaluate the horizontal and vertical extent of soil and groundwater impacted by petroleum hydrocarbons. Free product was detected in monitoring wells and discharging into an adjacent stream. Free product recovery via aggressive fluid vapor recovery was performed to reduce the free product thickness in the monitoring wells and prevent further migration into the stream.

Management of 20 aggressive fluid vapor recovery events to reduce free product levels in monitoring wells in Greensboro NC. Provided management and oversight of 20 free product recovery events at a retail gasoline station in Greensboro, NC. The free product was recovered using aggressive fluid vapor recovery.

Soil vapor extraction and air sparging pilot testing in Pender, Guilford, Mecklenburg and New Hanover County, NC. Conducted pilot testing to evaluate the effectiveness and well spacing at several facilities in North Carolina. Provided data reduction and recommendations for the use of air sparging and soil vapor extraction given the results of the pilot testing.

Performed numerous vapor intrusion studies at retail gasoline stations, industrial facilities and residential homes to evaluate whether vapors from subsurface petroleum release and remedial technologies were causing the migration of petroleum vapors into structures at the facility that could cause explosive hazards or health problems.

Design and implementation of HRC® remediation pilot test, including the preparation of an injection permit at a manufacturing facility in Winston-Salem NC. Managed and supervised the injection of HRC® for the remediation of chlorinated solvents released into the subsurface. The injection consisted of over 20 injection points within the manufacturing facility and collection of data for a 6 month period. The data from the pilot test was provided to the North Carolina Department of Environment and Natural Resources.

Preparation of a Storm Water Pollution Prevention Plan for a manufacturing plant in Wake County, North Carolina. Performed site visits and meetings with management for the preparation of the Storm Water Pollution Prevention Plan which included recommendations of best management practices, site inspection schedules and personnel training.

Phase II ESA for PCB contaminated power substation in Buncombe County NC. Managed and supervised soil boring activities to evaluate for PCB impact at the facility. In addition, a report of finding and recommendation was prepared for the facility.

Phase II ESA at numerous retail gasoline station facilities in NC, SC and VA.

Numerous projects involving the removal of USTs at manufacturing, governmental and residential properties.

Groundwater modeling to evaluate the potential for success of natural attenuation for numerous facilities.

Preparation of numerous corrective action plans recommending the use of standard and innovative technologies.

Phase I ESA for a property that included a 20-story building in Washington, DC.

Phase I ESAs at 20 multifamily housing complex properties in Richmond, Virginia.

ENVIRONMENTAL SERVICES, INC.

Joshua T. Patterson, P.G., CHMM
QA/QC Manager

Education Level:
M.B.A. Environmental Business Management
Florida Atlantic University,

B.S. Marine Biology
Florida Atlantic University,

Geology, hydrogeology, and hydrogeochemistry graduate studies
University of Florida

Years Experience:
10

ESI Office:
SE Region

PROFESSIONAL EXPERIENCE SUMMARY

Mr. Patterson is a North Carolina Licensed Professional Geologist, a Certified Hazardous Materials Manager (CHMM No. 012520), and QA/QC Manager with the Site Assessment and Remediation Division of ESI. Mr. Patterson has extensive experience in conducting Phase I and II Environmental Site Assessments (ESAs), Site Screening Evaluations, Contamination Assessment and Site Assessment Reports, QA/QC of asbestos survey reports, drycleaner compliance and cleanup, and Underground Storage Tank (UST) and Aboveground Storage Tank (AST) closures. Additionally, he has been responsible for management of non-compliance environmental department projects, research and development of technical reports, oversight of subcontractor activities, and development and implementation of compliance-related environmental projects. Mr. Patterson has been involved in all aspects of Phase II ESAs, Contamination Assessments, and Remedial Action Implementation, including soil boring and monitoring well installation and development, multi-parameter soil, groundwater and surface water sampling, interpretation of analytical data, technical report preparation, and complete project management. He has limited experience performing Endangered and Threatened Species Surveys, wetland flagging and delineation, and other biological surveys. His past field experiences have been primarily throughout Southeast US.

RESPONSIBILITIES WITH ENVIRONMENTAL SERVICES, INC.

Involved in all phases of project management with ESI's Site Assessment and Remediation Division, Southeast Region. Oversight of the Division's Southern Region quality control. Coordinates with and maintains effective working relationships with clients, environmental regulatory agencies, subcontractors, staff, operations managers, and corporate officers.

PRIOR EXPERIENCE

2003-present: Environmental Services, Inc.
2002-2003: EMS – Scientists, Engineers, Planners, Inc.
2000-2002: GFA International, Inc.
1998-2000: South Florida Water Management District

PROJECT EXPERIENCE

Numerous Transaction Screening Process Reports and Phase I ESAs of undeveloped, commercial and residential parcels for private sector clients throughout Florida and Georgia.

Comprehensive Regional Study of contaminated facilities within the Boca Raton municipal boundaries for City Manager.

Series of Phase I and Phase II ESAs, and Risk Assessments conducted on historical agricultural parcels with pesticide, herbicide, and fungicide contamination in Alachua, Lee, Collier, Martin, Palm Beach, Putnam, St. Johns, and St. Lucie Counties, Florida.

Numerous site assessments performed for Lee County Conservation 2020 land acquisition and conservation program, Lee County, Florida.

Phase I and II ESAs, Contamination Assessment, and Remedial Action Plan implementation, including active in-situ bioremediation and monitoring for a former petroleum tank farm facility, Port Everglades, Florida.

Multi-year groundwater study at Florida Inland Navigation District (FIND) dredge management sites, Palm Beach County, St. Johns County, and Duval County, Florida.

Phase I and II ESAs, Contamination Assessment, Source Removal, and Natural Attenuation Monitoring for a former chemical manufacturing and supply facility in Dade County, Florida.

South Florida Water Management District (SFWMD), multi-year, multi-parameter hydrological study of artesian well water use in conjunction with citrus groves in Martin, St. Lucie, and Palm Beach Counties, Florida.

Series of Phase II ESAs conducted for commercial transaction of a regional trucking company and its facilities.

Assessment and remediation of arsenic impacted soils at Southeast Florida Lumber Yard facility.

Dewatering compliance program design and monitoring for numerous construction projects in Broward County, Florida.

Endangered and threatened species survey, including Florida Scrub Jay and Gopher Tortoise Surveys and mitigation reporting, St. Johns County, Florida.

Phase I and II ESAs, extensive soil, groundwater, and sediment analysis, and Best Management Practice (BMP) design for marina facilities in Flagler County, Florida.

Complete soil and groundwater remediation of chlorinated solvent and arsenical pesticide-impacted cattle dipping vat sites in St. Johns County and northern Clay County, Florida.

Interim Remedial Action including excavation of DNAPL in soil source material and in-situ reductive dechlorination of chlorinated drycleaner compounds in groundwater at a drycleaner facility in Duval County, Florida.

Interim Remedial Action of petroleum impacted soils and groundwater, and fuel system closure and upgrade oversight of Sea Island Company facility, Sea Island, Georgia.

Site assessment, tank closure, soil and groundwater remediation, and No Further Action achieved for a former gas station and future Starbucks Store in Green Cove Springs, Clay County, Florida.

Decommissioning environmental studies for Marco Island and Gulf Gate, Sarasota Waste Water Treatment Plants.

Oversight of post-hurricane moisture assessment and remediation, underground storage tank (UST) closure and removal assessment, asbestos containing materials (ACM) survey, abatement and air monitoring for a comprehensive renovation of the Daytona Beach Hilton, Volusia County, Florida.

Contamination Assessment and Remediation of organochlorine pesticide-impacted soils and groundwater at numerous agricultural parcels in St. Johns, Putnam, and Clay Counties, Florida.

Contract management and oversight of Phase I ESAs, Phase II ESAs, Storage Tank Removal and Closure Assessments, Interim Remedial Action, and Natural Attenuation Monitoring for multiple public sector facilities in St. Johns County, Florida for St. Johns County Real Estate Division ongoing services contract.

Oversight of a series of transformer assessment and remediation projects conducted as part of a continuing services contract for JEA, Duval County, Florida.

Contract management and oversight of continuing service contracts to conduct site assessments for Suwannee River Water Management District (SRWMD) and North West Florida Water Management District (NWFWMD) as part of District land acquisition programs.

Contract management and oversight of continuing service contract to provide environmental assessment of United States Department of Agriculture / Natural Resources Conservation Service (USDA/NRCS) conservation lands.

Contract Manager for Clay County Development Authority (CCDA) Brownfields Redevelopment Project, Clay County, Florida.

ENVIRONMENTAL SERVICES, INC.

Thomas W. Morgan/Senior Scientist I

Education Level:
B.S. in Geology, University of North Carolina at Chapel Hill, N.C. 1979

A.S. Montreat-Anderson College, Montreat, N.C.

Years Experience:
6 Months

ESI Office:
Raleigh

PROFESSIONAL EXPERIENCE SUMMARY

Mr. Morgan is a Senior scientist with experience in conducting environmental field oversight. He has experience in Phase I and II Environmental Site Assessments (ESAs) covering North Carolina. Mr. Morgan has been involved in aspects of Phase II ESAs and Contamination Assessments, including soil boring and monitoring well installation and development, multi-parameter soil, groundwater, interpretation of analytical data, and technical report preparation.

PRIOR EXPERIENCE

2010-Present ENVIRONMENTAL SERVICES, INC.

CERTIFICATIONS

None.

PROJECT EXPERIENCE

Phase I Environmental Site Assessments

350 N. Generals Blvd., Lincolnton, Lincoln County, North Carolina
Futch Brothers Tract, Onslow County, North Carolina
Folkstone Substation, Onslow County, North Carolina

Contamination Assessments

Perquimans County Marine Industrial Park, Hertford, Perquimans County, North Carolina.
Old Generating Plant, Belhaven, Beaufort County, North Carolina.
Former Deppe #2 Asphalt Plant, Maysville, Onslow County, North Carolina.
Tri-County Site, Dudley, Wayne County, North Carolina.
Former Asphalt Plant, Goldsboro, Wayne County, North Carolina.
Former APAC-Atlantic, Inc., Castle Hayne Asphalt Plant, Castle Hayne, New Hanover County, North Carolina.

DRILLING CONTRACTOR FOR FORMER CASTLE HAYNE ASPHALT PLANT PROJECT

Quantex, Inc. has the necessary equipment, trained personnel, and experience to perform various phases of environmental projects. Our company is licensed to provide probing and drilling services in North Carolina and South Carolina. We provide soil and groundwater sampling and have extensive experience in the installation of Type II and Type III monitoring wells, ranging from 1/2-inch diameter up to 4-inch diameter.

Our field personnel are highly experienced in most all types of drilling procedures and have been trained and certified in accordance with Title 29 CFR 1910.120 regulations. All field personnel are medically qualified and OSHA-certified to enter hazardous waste sites and are in compliance with overall OSHA regulations. Quantex incorporates random drug testing and is a smoke-free workplace. We will fully comply with any site-specific health and safety plan supplied by our clients.

Our number one priority at Quantex is **safety**. Accidents have always been inherent to the drilling industry; however, we are confident that with proper training, work policies, and work practices, accidents and losses can be eliminated. Our field personnel are highly experienced and knowledgeable in all drilling and probing activities, and are committed to an accident-free workplace. Quantex carries extensive insurance coverage, including general liability, pollution liability, all automobile liability, excess/umbrella liability, and workers' compensation.

The company is led by **J.D. Barker**, owner/vice president. He is a North Carolina Certified Well Driller, South Carolina Certified Well Driller, and active member of the National Groundwater Association. Barker holds a Bachelor of Science degree in Architectural Engineering with a concentration in Civil Engineering, and has more than 15 years of experience as project engineer and manager for environmental jobs related to assessment and corrective action activities.

STATE OF NORTH CAROLINA DEPARTMENT OF THE
ENVIRONMENT AND NATURAL RESOURCES

DIVISION OF WATER QUALITY
LABORATORY CERTIFICATION PROGRAM

In accordance with the provisions of N.C.G.S. 143-215.3 (a) (1), 143-215.3 (a)(10) and NCAC 2H.0800:

2010

ENVIRONMENTAL CONSERVATION LABORATORIES, INC.

Is hereby certified to perform environmental analysis as listed on Attachment I and report monitoring data to DWQ for compliance with NPDES effluent, surface water, groundwater, and pretreatment regulations.

By reference 15A NCAC 2H .0800 is made a part of this certificate.

This certificate does not guarantee validity of data generated, but indicates the methodology, equipment, quality control procedures, records, and proficiency of the laboratory have been examined and found to be acceptable.

This certificate shall be valid until December 31, 2010

Certificate N 591

Pat Donnelly

Pat Donnelly

Attachment I

North Carolina Wastewater/Groundwater Laboratory Certification

Certified Parameters Listing

Lab Name:	Environmental Conservation Laboratories, Inc.	Certificate Number:	591
Address:	102 Woodwinds Industrial Ct. Ste. A Cary, NC 27511-6204	Effective Date:	01/01/2010
		Expiration Date:	12/31/2010
		Date of Last Amendment:	04/16/2010

The above named laboratory, having duly met the requirements of 15A NCAC 2H.0800, is hereby certified for the measurement of the parameters listed below.

CERTIFIED PARAMETERS

INORGANICS

ALKALINITY
- Std Method 2320B
- EPA Method 310.2

BOD
- Std Method 5210B

COD
- Std Method 5220D
- EPA Method 410.4

CHLORIDE
- Std Method 4500 Cl E
- EPA Method 300
- SW846 Method 9056A

COLIFORM FECAL
- Std Method 9222D (MF)

COLIFORM TOTAL
- Std Method 9222B (MF)

COLOR PC
- Std Method 2120B (PtCo)

CONDUCTIVITY
- Std Method 2510B
- EPA Method 120.1

CYANIDE TOTAL
- Std Method 4500 CN E
- EPA Method 335.4
- SW846 Method 9014

DISSOLVED OXYGEN
- Std Method 4500 O G

FLUORIDE
- Std Method 4500 F C
- EPA Method 300
- SW846 Method 9056A

MBAS
- Std Method 5540C

AMMONIA NITROGEN
- Std Method 4500 NH3 F
- EPA Method 350.1

TOTAL KJELDAHL NITROGEN
- EPA Method 351.2

NO2 + NO3 NITROGEN
- Std Method 4500 NO3 F
- EPA Method 353.2
- SW846 Method 9056A

NITRATE NITROGEN
- EPA Method 353.2
- SW846 Method 9056A
- EPA Method 300

NITRITE NITROGEN
- Std Method 4500 NO2 B
- EPA Method 300
- SW846 Method 9056A
- EPA Method 353.2

TOTAL PHOSPHORUS
- EPA Method 365.4

ORTHOPHOSPHATE
- SW846 Method 9056A

pH
- Std Method 4500 H B
- SW846 Method 9040C
- SW846 Method 9045D

RESIDUE SETTLEABLE
- Std Method 2540F

RESIDUE TOTAL
- Std Method 2540B

RESIDUE DISSOLVED 180 C
- Std Method 2540C

RESIDUE SUSPENDED
- Std Method 2540D

VOLATILE RESIDUE
- EPA Method 160.4

SULFATE
- EPA Method 300
- SW846 Method 9056A

SULFIDE
- Std Method 4500 S D
- Hach Method 8131

TEMPERATURE
- Std Method 2550B

TURBIDITY
- Std Method 2130B
- EPA Method 180.1

METALS

ALUMINUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

ANTIMONY
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

ARSENIC
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

BARIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

BERYLLIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

BORON
- EPA Method 200.7
- SW846 Method 6010C

CADMIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

CALCIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

CHROMIUM TOTAL
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

COBALT
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

COPPER
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

IRON
- EPA Method 200.7
- SW846 Method 6010C
- SW846 Method 6020A
- EPA Method 200.8

LEAD
- EPA Method 200.7
- EPA Method 200.8

This certification requires maintance of an acceptable quality assurance program, use of approved methodology, and satisfactory performance on evaluation samples. Laboratories are subject to civil penalties and/or decertification for infractions as set forth in 15A NCAC 2H.0807

Attachment I

North Carolina Wastewater/Groundwater Laboratory Certification

Certified Parameters Listing

Lab Name:	Environmental Conservation Laboratories, Inc.	Certificate Number:	591
Address:	102 Woodwinds Industrial Ct. Ste. A Cary, NC 27511-6204	Effective Date:	01/01/2010
		Expiration Date:	12/31/2010
		Date of Last Amendment:	04/16/2010

The above named laboratory, having duly met the requirements of 15A NCAC 2H.0800, is hereby certified for the measurement of the parameters listed below.

CERTIFIED PARAMETERS

SW846 Method 6010C
SW846 Method 6020A

MAGNESIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

MANGANESE
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

MERCURY
- EPA Method 245.1
- SW846 Method 7470A
- SW846 Method 7471B
- EPA Method 245.5

MOLYBDENUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

NICKEL
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

POTASSIUM
- EPA Method 200.7
- SW846 Method 6010C
- EPA Method 200.8
- SW846 Method 6020A

SELENIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

SILVER
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

SODIUM
- EPA Method 200.7
- SW846 Method 6010C
- EPA Method 200.8
- SW846 Method 6020A

STRONTIUM
- EPA Method 200.7
- SW846 Method 6010C

THALLIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

TIN
- EPA Method 200.7
- SW846 Method 6010C

TITANIUM
- EPA Method 200.7
- SW846 Method 6010C
- SW846 Method 6020A

VANADIUM
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

ZINC
- EPA Method 200.7
- EPA Method 200.8
- SW846 Method 6010C
- SW846 Method 6020A

TCLP METALS
- SW846 Method 1311

SPLP METALS
- SW846 Method 1312

ORGANICS

ORGANOCHLORINE PESTICIDES & PCBs
- EPA Method 608

ORGANOCHLORINE PESTICIDES
- SW846 Method 8081B

POLYCHLORINATED BIPHENYLS (PCB's)
- SW846 Method 8082A

PURGEABLE ORGANICS
- EPA Method 624
- SW846 Method 8260B
- Std Method 6200B

BASE NEUTRAL/ACID ORGANICS
- EPA Method 625
- SW846 Method 8270D

TPH DIESEL RANGE ORGANICS
- SW846 Method 8015C

TPH GASOLINE RANGE ORGANICS
- SW846 Method 8015C

1,2, DIBROMOETHANE (EDB)
- EPA Method 504.1 (Includes DBCP & TCP)
- SW846 Method 8011 (Includes DBCP)

EXTRACTABLE PETROLEUM HYDROCARBONS
- Massachusetts Method

VOLATILE PETROLEUM HYDROCARBONS
- Massachusetts Method

This certification requires maintance of an acceptable quality assurance program, use of approved methodology, and satisfactory performance on evaluation samples. Laboratories are subject to civil penalties and/or decertification for infractions as set forth in 15A NCAC 2H.0807.

Department	Laboratory Team Member / Role	Degree(s)	Years of Laboratory Experience
Admin	Link Thrower, CSM / Project Manager	B.S. - Chemistry	19
Admin	Chuck Smith, Project Manager	B.S. - Biology	20
Admin	Stephanie Franz, Project Manager	B.S. - Chemistry	12
Admin	Bill Scott, Project Manager	B.S. - Political Science	18
Admin	Rachel Anderson, QA Manager	B.A. - Chemistry	20
Admin	Rich Detar, Lab Manager	B.S. - Chemistry	18
Organics	Ron Fertile, Organics Manager	B.A. - Microbiology	12
Organics	Justin Guenzler, Analyst	B.S. - Chemistry	7
Organics	Brian Kanupp, Analyst	B.S. - Chemistry	5
Organics	Mitch Zimmerman, Analyst	B.S. - Biology	12
Organics	Jamie Hraczo, Analyst	B.S. - Chemistry	4
Organics	David Morse, Analyst	AAS - Environmental Sci.	22
Organics	Nkem Ukpabi, Analyst	B.S. - Biology	8
Organics	Belinda Royall, Analyst	N/A	14
Metals	John Halpin, Metals Manager	B.S. - Environmental Sci.	13
Metals	Val Obremski, Analyst	B.S. - Biology	17
Metals	Nicole Humphreys, Analyst	B.S. - Environmetal Eng.	3
Wet Chem	Alicia Johnson, General Chem Manager	B.S. - Chemistry	14
Wet Chem	Freda Tursam, Analyst	B.S. - Environmental Health	5
Wet Chem	Perry Vasta, Analyst	B.A. - Biology and Ecology	4
Wet Chem	Curtis Bond	B.S. - Chemistry	2
Wet Chem	Jose Correlas	N/A	7
Sample Mgt.	Briana Gregory	B.S. - Environmental Sci.	5
Sample Mgt.	Jamie Thadani	B.S. - Biology	4
Sample Mgt.	Chris Brand	AAS - Environmental Sci.	10
Sample Mgt.	John King	N/A	2