BBJ GROUP

April 5, 2017

Jason Metzger, Unit Manager
Georgia Environmental Protection Division
Response & Remediation Program
4244 International Parkway, Suite 104
Atlanta, GA 30354

Re: Compliance Status Report
Birdsong Peanut Plant
608 E Main Street (Hwy 91)
Colquitt, GA
Project No. R1507990
HSI Site No. 10710

Dear Mr. Metzger:

BBJ Group, LLC (BBJ Group), on behalf of Man Investments Holdings Inc. (Man), respectfully submits this *Compliance Status Report* to the Georgia Voluntary Remediation Program (VRP) for the Birdsong Peanut Plant located at 608 East Main Street (Highway 91) in Colquitt, Georgia (Subject Property).

If you have any questions regarding this submittal please contact Ms. Leah Gies at (312) 219-7778.

Sincerely,

BBJ GROUP, LLC

Leah Gies

Leah Gies
Project Manager

Andrew Bajorat, CHMM
Principal

J. Tim Bradburne, P.G.
Georgia Professional Geologist, No. 698

cc: Nancy J. Rich, Esq., Katten Muchin Rosenman LLP

Enclosures: CSR (hard copy)
CSR (electronic copies)

COMPLIANCE STATUS REPORT

Birdsong Peanut Plant
608 East Main Street (Highway 91)
Colquitt, Georgia
HSI Site No. 10710

Submitted to:

Georgia Environmental Protection Division
Atlanta, Georgia

Prepared by:
BBJ Group, LLC
Chicago, Illinois

April 5, 2017

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STATEMENT OF FINDINGS AND CERTIFICATION

Statement of Findings

BBJ Group, LLC (BBJ Group) prepared this Compliance Status Report (CSR) on behalf of Man Investments Holdings Inc. (Man). Man engaged BBJ Group to prepare this Compliance Status Report (CSR) for the Birdsong Peanut Plant (Birdsong) located at 608 East Main Street (Highway 91) in Colquitt, Georgia (Subject Property). The Georgia Environmental Protection Division (EPD) listed the Subject Property on the Georgia Hazardous Site Inventory (HSI) as Site Number 10710 due to a release of tetrachloroethene (PCE) in groundwater in December 2001. For the purposes of this report, the "Site" consists of a limited area within southwestern portion of the Subject Property where the groundwater was historically affected by PCE. Remediation of the release under the Georgia EPD Hazardous Site Response Act (HSRA) Program included in-situ chemical oxidation beginning in May 2002, which oxidized trivalent chromium (Cr^{+3}) present in the groundwater into hexavalent chromium (Cr^{+6}), thereby creating groundwater exceedances of Cr^{+6} in several on-site monitoring wells. These monitoring wells are located in the southwestern portion of the Subject Property in the former chemical injection area.

Subsequent sampling indicated that PCE in groundwater had been remediated to concentrations below the laboratory's reporting limits. However, chromium was detected in several monitoring wells in exceedance of Type 1 and 4 RRSs. Cadmium and/or selenium were detected in monitoring wells MW-6 and MW-10, above the Type 1 RRS but below the Type 4 RRS.

Based on a statistical Mann-Kendall analysis of the groundwater data collected, BBJ Group found that the plume was stable given that (1) all speciated chromium concentration trends identified at the Subject Property were decreasing or stable, and (2) the source material for the Cr^{+6} (i.e. the potassium permanganate injections) has been removed. A groundwater use restriction will be instituted at a portion of the Subject Property in the form of a Uniform Environmental Covenant (UEC) to restrict the use of groundwater at the Subject Property for potable purposes within the area of the existing groundwater plume.

Outside of the UEC area, all other groundwater concentrations are in compliance with the Type 1 and Type 4 RRS.

Certification

I certify under penalty of law that this report and all attachments were prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Based on my review of the findings of this report with respect to the risk reduction standards of the Rules for Hazardous Site Response, Rule 391319. 07 and the implementation of the UEC included in Appendix F, I have determined that the Subject Property (i.e., Parcel No. C014-027000) is in compliance with the Type 4 RRS.

MAN INVESTMENTS HOLDINGS INC.

Date: April 5, 2017 By: ______________________

Name: ERIC BURL
Title: PRESIDENT

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1.0 INTRODUCTION

Man Investments Holdings Inc. (Man) engaged BBJ Group, LLC (BBJ Group) to prepare this Compliance Status Report (CSR) for the Birdsong Peanut Plant (Birdsong) located at 608 East Main Street (Highway 91) in Colquitt, Georgia (Subject Property). The Subject Property is bounded by East Main Street to the south, railroad tracks to the west, Farmers Avenue to the east, and East Pine Street to the north.

The Georgia Environmental Protection Division (EPD) listed the Subject Property on the Georgia Hazardous Site Inventory (HSI) as Site Number 10710 in December 2001 due to a release of tetrachloroethene (PCE) in groundwater. For the purposes of this report, the "Site" consists of a limited area in the southwestern portion of the Subject Property where the groundwater was historically affected by PCE. Remediation of the release under the Georgia EPD Hazardous Site Response Act (HSRA) Program included in-situ chemical oxidation, which oxidized trivalent chromium (Cr^{+3}) present in the groundwater into hexavalent chromium (Cr^{+6}), thereby creating groundwater exceedances of Cr^{+6} in several on-site monitoring wells. These monitoring wells are located in the Site in the southwestern portion of the Subject Property in the former chemical injection area. A Site Location Map is provided as Figure 1 and a Site Plan is provided as Figure 2.

1.1 Objective

The purpose of this CSR is to demonstrate that the Subject Property meets the Type 1 and Type 4 Risk Reduction Standards (RRS)[1] in groundwater. This CSR presents the following:

- Background summary of historical response actions and/or investigations;
- A plume stability statistical demonstration; and,
- A presentation of the Uniform Environmental Covenant (UEC) that covers the groundwater plume at the Site in the southwest portion of the Subject Property to ensure the Subject Property meets the Type 1 and Type 4 RRS.

2.0 BACKGROUND

2.1 Site Description

The Subject Property consists of one parcel of land, totaling approximately 10.89 acres[2], located at 608 East Main Street (Highway 91) in Colquitt, Georgia. The parcel identification number is C014-027000 and is owned by the Birdsong Corporation. The Subject Property is improved with eleven structures used for agricultural chemical and fertilizer storage and office space. The Subject Property is adjoined by East Main Street to the south, railroad tracks to the west, a stand of trees and Farmers

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[1] Georgia Department of Natural Resources, Environmental Protection Division, Chapter 391-3-19-.07 Risk Reduction Standards.

[2] Per the Miller County Assessor's webpage: http://qpublic7.qpublic.net/qpmap4/map.php?county=ga_miller&parcel=C014+027000&extent=2121496+425735+2124020+428431&layers=parcels+streetnum+roads+parcel_sales

Avenue to the east, and East Pine Street to the north. A legal description for the Subject Property is included in Appendix A.

2.2 Site History

Based on BBJ Group's review of historical documents[3], the Subject Property previously consisted of a residential and agricultural property owned by Farmer's Feed and Milling Company (FFM) and a lumber mill until the early 1950s. In the late 1950s, the Subject Property was used for the production of fertilizer. In the early 1960s, peanut plant operations began at the Subject Property, including peanut shelling and distributing. United Agricultural Products (UAP) leases a fertilizer storage building in the southwest portion of the Subject Property. The remainder of the Subject Property is operated by Birdsong Peanut Plant.

The Subject Property has been the subject of several environmental assessments, remedial activities and groundwater monitoring events. These investigations were performed during past HSRA activities to assess impacts at the Subject Property due to a historical PCE release and are summarized in the VRP Remediation Plan, prepared by BBJ Group, dated August 31, 2015. The GAEPD approved the VRP Remediation Plan in a letter dated May 27, 2016. Tables of historical soil and groundwater laboratory analytical results are provided as Tables 1 through 3. A Site Plan with Sample Locations is provided as Figure 3.

2.3 Site Setting

2.3.1 Site Geology

Based on the data collected during the monitoring well installations and soil boring advancements at the Subject Property, the primary subsurface soil type is silt-clay-sand mixtures from the ground surface to depths of 24 to 32 feet below ground surface (bgs) with clay and sandy clay at depth. There are also isolated lenses of the weathered limestone bedrock at the Subject Property. Specifically, two discontinuous weathered limestone layers have been identified at the Subject Property. The first shallow, limestone layer was identified at depths from 14 to 20 feet bgs, and the second layer was encountered from 40 to 55 feet bgs. Competent bedrock was not encountered during investigations to a depth of 80 feet bgs.

2.3.2 Site Hydrogeology

The weathered limestone lenses at the Subject Property appear to limit groundwater flow rather than provide preferential pathways. Consequently, groundwater at the Subject Property exists in somewhat isolated perched zones, rather than a continuous layer. Groundwater encountered during investigations at the Subject Property seem to be located in two isolated, confined water bearing units. The shallow and deep water bearing units were intersected at depths of approximately 20 and 40 feet

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[3] 2005 CRA HSRA Compliance Status Report (CSR), dated September 2005 and a Revised Corrective Action Plan prepared by CRA, dated August 2011

bgs, respectively. Both units were characterized by brown, sandy clay. The water bearing units are separated by an impermeable limestone layer[4].

Depth to groundwater at the Subject Property ranges from 0.5 to 25 feet bgs depending on the depth of the saturated horizon. Conestoga-Rovers & Associates (CRA) performed slug tests and calculated hydraulic conductivities using AQTESOLV. Specifically, CRA utilized the Bouwer and Rice method, modified for confined aquifers. Hydraulic conductivity values were calculated at MW-8 and MW-9 which yielded hydraulic conductivity values of 4.0 x 10^{-5} centimeters per second (cm/s) and 3.1 x 10^{-7} cm/s, respectively. The Georgia EPD recommended that additional slug tests be performed at the Subject Property. Therefore, CRA performed additional slug tests at MW-5, MW-7D, MW-15, and MW-17D. The results were provided in the CAP Addendum prepared by CRA and dated June 6, 2006, and are as follows:

Monitoring Well	Hydraulic Conductivity (cm/s)
MW-5	6.3 x 10^{-2}
MW-7D	4.5 x 10^{-3}
MW-15	6.6 x 10^{-6}
MW-17D	7.8 x 10^{-2}

Based on the results of a groundwater modeling program (i.e., SURFER 10) using the most recent groundwater gauging data from 2014, the interpreted groundwater flow direction is to the south. This is consistent with historical groundwater flow studies at the Subject Property. The hydraulic gradient for the saturated zone of approximately 20 feet, was calculated to be 0.022. A potentiometric surface map is provided as Figure 4.

2.4 Contact Information

The Subject Property is owned and operated as follows:

Birdsong Corporation
P.O. Box 565
Colquitt, GA 39837
Phone: (229)758-1110

Contact information for the Responsible Party (RP) is as follows:

Man Investments Holdings Inc.
452 Fifth Avenue, 27th Floor
New York, NY 10018
Contact: Mr. Solomon Kuckelman
Phone: 212-649-6600

The Georgia Certified Professional Geologist overseeing the cleanup is as follows:

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[4] The Ocala Limestone is mostly clay-filled making it impermeable.

J. Tim Bradburne, P.G.
BBJ Group, LLC
500 North Dearborn Street, Suite 712
Chicago, Illinois 60654
Phone: 312-219-7769
Fax: 312-644-8555
tbradburne@bbjgroup.com

The Georgia EPD Project Manager overseeing the project is as follows:

Kevin Collins
Georgia Environmental Protection Division
Land Protection Branch
4244 International Parkway, Suite 104
Atlanta, Georgia 30354
Phone: 404-657-8610

A legal description for the Subject Property is provided as Appendix A.

3.0 NATURE AND EXTENT OF CONTAMINATION

The Subject Property was listed on the HSI as Site Number 10710 due to a release of PCE in groundwater. PCE and its daughter products were targeted by an injection of potassium permanganate beginning in May 2002 and extending through May 2004. Subsequent sampling indicated that PCE in groundwater had been remediated to non-detect concentrations. However, chromium was detected in several monitoring wells at the Site in exceedance of Type 1 and 4 RRSs. Cadmium and/or selenium were detected in monitoring wells MW-6 and MW-10, above the Type 1 RRS but below the Type 4 RRS. In the most recent sampling event from these wells, only cadmium in MW-6 was detected above the Type 1 RRS. The following subsections outline the nature and extent of the contamination. A Conceptual Site Model Diagram and a Conceptual Site Model are provided as Figures 5 and 6, respectively.

3.1 Soil

VOCs, herbicides, pesticides, nitrate-nitrogen, and arsenic have not been detected in soil in exceedance of Georgia EPD Notification Soil Concentrations (NCs) or the Type 1 RRSs. PCE was detected in two soil samples in exceedance of the HSRA Soil NC at 21 and 25.5 feet bgs in the west-central portion of the Subject Property. However, CRA stated that this was a result of dissolved PCE migration from shallow groundwater or shallow vapors and was not indicative of soil impacts. Additionally, groundwater at the Subject Property ranges from 0.5 to 25 feet bgs. The soil samples collected from 21 and 25.5 feet bgs may also be more indicative of groundwater conditions if CRA collected them from beneath the groundwater interface. For these reasons, the nature and extent of contamination at the Subject Property appear to be limited to groundwater. A summary of historical soil laboratory analytical results is provided as Table 1.

3.2 Groundwater

Groundwater previously impacted with PCE above Type 1 and 4 RRSs has since been remediated to below the Type 1 RRS. Groundwater sampling at the Subject Property since 2009 has revealed that total Cr^{+3} is decreasing within the Site and the former PCE groundwater plume. Additionally, total chromium in MW-6, downgradient from the source area, is decreasing and reached a historical low concentration in 2014. Total chromium, Cr^{+3}, and Cr^{+6} in the deeper water bearing unit are below Type 1 and Type 4 RRSs, with the exception of Cr^{+3} in MW-7D, which was marginally above the Type 1 RRS for Cr^{+3} in 2014. Selenium and cadmium were also detected marginally above the Type 1 RRS and below the Type 4 RRS.

During the most recent groundwater sampling event, BBJ Group collected groundwater samples from MW-6, MW-7D, MW-10, and MW-17D[5]. Samples from the monitoring wells were submitted for laboratory analysis of total and dissolved chromium and speciated chromium in 2013 and total chromium and speciated chromium in 2014. Laboratory analytical results from both events indicated that Cr^{+6} was detected at concentrations exceeding the Type 1 and Type 4 RRS in MW-6 and MW-10. No dissolved total chromium or Cr^{+6} was detected in deep wells (i.e. MW-7D and MW-17D) in exceedance of the Type 1 or Type 4 RRS. However, Cr^{+3} was detected above the Type 1 RRS in MW-7D in 2014. No dissolved Cr^{+3} was detected in concentrations exceeding the Type 1 or Type 4 RRS in any of the groundwater samples in 2013. Figure 7 summarizes the most recent groundwater sampling event.

The exceedances of Cr^{+6} in groundwater appear to be limited within the former chemical injection area at the Site and within the shallow water-bearing unit. A summary of historical groundwater laboratory analytical results is provided as Table 2. Groundwater laboratory analytical results for total and speciated chromium, from June 2007 to April 2014 are provided in Table 3. Trends of the groundwater plume are further discussed in Section 4.0.

3.2.1 Analytical Data

Given that the oxidized Cr^{+3} into Cr^{+6} resulted from the potassium permanganate injections, groundwater samples have been collected and analyzed for total chromium using United States Environmental Protection Agency (USEPA) Method 6010C and speciated chromium using USEPA Method 7196A during the most recent sampling events.

3.2.2 Monitoring Well Construction and Development

The existing monitoring well network is shown in Figure 3 and a monitoring well construction and elevation table is provided as Table 4. Monitoring well construction diagrams are presented in Appendix B. Monitoring wells were developed by CRA in accordance with the United States Environmental Protection Agency (USEPA) November 2001 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). Specifically, the monitoring wells

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[5] MW-11 could not be located during the 2013 or 2014 annual sampling events. No sampling events have been conducted since that time. BBJ Group will make another attempt to locate MW-11 along with MW-12, MW-14, and MW-16 in order to abandon the wells.

were developed using a submersible pump. Water was purged until at least 5 well volumes had been removed, a maximum of 50 gallons had been removed, or turbidity had minimized.

3.2.3 Monitoring Well Gauging Sampling Methodology

Monitoring wells at the Site were gauged prior to sampling. Prior to gauging, the monitoring well caps on all of the on-site monitoring wells were opened for at least 5 minutes to allow the monitoring well to equilibrate. The depth to bottom and depth to water measurements were recorded from the top of the PVC casing for each monitoring well.

During sampling, monitoring wells were purged using low-flow methods via a submersible pump until turbidity, pH, dissolved oxygen (DO), temperature, specific conductance (SC) and turbidity have stabilized (3-5 minutes between readings, using a YSI 556 multi-parameter water meter and LaMotte 2020 turbidity meter) as follows:

- Turbidity (less than 10 NTU);
- DO (+ or – 0.2 milligrams per liter);
- SC (+ or - 5%); and
- pH + or – 0.1 units.

Unless a monitoring well was not recovering, each well was purged until at least one well volume had been removed from the well. Specifically, monitoring wells were sampled in accordance with BBJ Group's Field Procedures summarized in Appendix C. Laboratory QA/QC procedures are included in Appendix D.

4.0 PLUME STABILITY

Given the historic variability in sampling intervals and the lack of apparent seasonal variation in concentrations[6] (Table 3), BBJ Group chose to utilize the Mann-Kendall statistical analysis to analyze trends over time. Specifically, the GSI Environmental Inc. Mann-Kendall Toolkit for Constituent Trend Analysis[7] was used to determine the trends of the chromium and speciated chromium concentrations at the Site. Trends were analyzed using data collected from 2007 through 2014. The Mann-Kendall results are included as Appendix E and discussed below.

Total Chromium

Total chromium concentrations in MW-6 were identified as decreasing[8], while chromium concentrations in MW-11 were identified as stable[9]. No trends[10] were identified for MW-7D, MW-10,

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[6] https://www.epa.gov/sites/production/files/2016-05/documents/tech_notes_6_dec2013_trend.pdf
[7] http://www.gsi-net.com/en/software/free-software/gsi-mann-kendall-toolkit.html
[8] "Decreasing" is used to describe trends that are decreasing at a 95% or greater confidence range.
[9] "Stable" is used to describe trends that are not increasing or decreasing by a 90% or more confidence range and have a coefficient of variation less than 1.
[10] "No trend" is used to describe trends that are not increasing or decreasing by a 90% or more confidence range and have a coefficient of variation greater than or equal to 1.

and MW-17D; however chromium concentrations in these wells are below the Type 1 RRS[11] with the exception of MW-10 in 2014 which was above the Type 1 RRS by 0.001 mg/L. Dissolved chromium concentrations again identified a decreasing trend in MW-6. Additionally, a decreasing trend was identified in MW-11, and stable trends were identified in MW-7D, MW-10, and MW-17D.

Trivalent Chromium

Over the sampling period, Cr^{+3} concentrations were identified as decreasing in MW-10 and stable in MW-17D. No trend was able to be identified in monitoring wells MW-6, MW-7D, and MW-11. Cr^{+3} concentrations in these three wells were always below the Type 4 RRS. Dissolved Cr^{+3} concentration trends were identified as stable for MW-6, MW-7D, MW-11, and MW-17D. The dissolved Cr^{+3} concentration trend for MW-10 was identified as a probably decreasing[12].

Hexavalent Chromium

Cr^{+6} concentrations were identified as stable in monitoring wells MW-6, MW-7D, MW-11, and MW-17D. No trend was able to be identified in MW-10. Dissolved Cr^{+6} trends were the same as the total Cr^{+6} trends with the exception that MW-11 did not show a trend with respect to the dissolved Cr^{+6} concentrations.

Given that (1) all concentration trends that were identified at the Site were decreasing or stable, and (2) the source material for the Cr^{+6} (i.e. the potassium permanganate injections) has been removed, BBJ Group believes that the plume at the Site is stable. Therefore, a groundwater use restriction will be instituted for the Site, located in the southwest portion of the Subject Property. It will be in the form of a UEC to restrict the use of groundwater at the Site for potable purposes within the area of the existing groundwater plume. See Section 6.0 for additional details.

5.0 EXPOSURE ASSESSMENT

5.1 Contaminant Sources and Release Mechanisms

Neither the historical owner, FEM, nor Birdsong reportedly used PCE as part of regular site operations. Historical site investigations did not detect a source area for the PCE. The configuration of the dissolved PCE plume centered on MW-10 suggests that this area could have been the original release area. CRA had conversations with employees on the Subject Property wherein it was suggested a small parts repair shed formerly located in the vicinity of boring BH-3 and MW-10 had been used for limited equipment and/or vehicle maintenance, and could have used degreasing agents. A specific release was never identified, nor have any activities reportedly been conducted at that location in the past 30 years. The location of the former parts repair shed is shown on figures provided within this report.

CRA conducted in-situ chemical oxidation (ISCO) using injections of potassium permanganate beginning in May 2002 and extending through November 2006 which successfully remediated

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[11] There is no Type 4 RRS for total chromium.
[12] "Probably decreasing" is used to describe trends that are decreasing at a 90-95% confidence range.

concentrations of PCE to below applicable RRSs. However, the remediation process oxidized Cr^{+3} present in the groundwater into Cr^{+6}.

In May 2011, a treatability study and bench scale test was conducted to evaluate several options to remediate the metals at the Site. The results indicated that a dose of 0.24 grams per liter (g/L) sodium thiosulfate and 0.24 g/L ferrous sulfate effectively removed dissolved chromium and residual potassium permanganate from the groundwater samples. CRA prepared a Status Update – Pilot Injection and Performance Monitoring and Annual Groundwater Monitoring and Reporting Letter on June 27, 2012 (2012 CRA Status Update Letter) that outlined a pilot scale injection of sodium thiosulfate and ferrous sulfate solution at the Site. Specifically, 55 temporary injection points were advanced to a maximum depth of 40 feet bgs in a grid covering a 75-foot by 215-foot area. Two post-injection groundwater sampling events (November and December 2011) were conducted and results were compared to pre-injection "baseline" values. Total chromium and Cr^{+6} concentrations were below the pre-injection baseline values in most monitoring wells, with the exception of MW-11 which exceeded the baseline concentrations and the Type 1 and 4 RRS. Cr^{+3} was also reported above the baseline values and the Type 1 RRS in MW-10 but below the Type 4 RRS. CRA attributed the inconclusive success of the injections to a 3 to 4.5 foot increase in groundwater elevation since March 2011 which may have increased metals concentrations in monitoring wells at the Site.

5.2 Potential Receptors and Exposure Routes

The Subject Property is currently used for commercial/industrial purposes. Historically, data has been compared to multiple RRSs and standards. Going forward, soil and groundwater data collected at the Subject Property will be compared to the Type 1 and Type 4 RRSs. Based on the data and results presented in historical investigation reports, the potential exposure routes are summarized as follows.

5.2.1 Soil

No analyzed parameters were detected in any soil samples above the Type 1 RRSs. PCE, a historical COC, ranged from 3.2 micrograms per kilogram (µg/kg) to 29 µg/kg; however, these concentrations are well below the Type 1 RRS of 500 µg/kg. Therefore, there are no potential soil receptors for the Subject Property.

5.2.2 Groundwater

Data from the most recent groundwater sampling events in 2013 and 2014, revealed Cr^{+6} above the Type 4 RRS in MW-6 and MW-10. Additionally, the most recent data collected from MW-11 in 2012 revealed Cr^{+6} above the Type 4 RRS[13].

Construction worker notification is necessary to ensure that construction workers are notified of the potential health hazards and that proper industrial hygiene practices are observed in the area surrounding MW-6, MW-10, and MW-11 where Cr^{+6} was identified in excess of the Type 4 RRS.

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[13] Monitoring well MW-11 could not be located during the April 16-17, 2013 or March 31-April 1, 2014 groundwater monitoring events. No other sampling events have been conducted since that time. However, BBJ Group will attempt to locate MW-11 along with MW-12, MW-14, and MW-16 with a metal detector and shovel for well abandonment to be conducted at each location.

Although MW-11 was unable to be located by BBJ Group during the 2013 and 2014 groundwater monitoring events, vicinity downgradient well MW-10 identified Cr^{+6} in excess of the Type 4 RRS and therefore MW-11 is presumed to still contain concentrations of Cr^{+6} in excess of the Type 4 RRS.

A City of Colquitt Public Water Supply Well (Well #3) is located to the west (sidegradient) that is drilled to a depth of 210 feet bgs and cased for 150 feet[14]. According to the Georgia Geologic Survey, the City of Colquitt, including the Subject Property and vicinity properties, receives its water supply solely from Well #3 which is screened in the Ocala Limestone. The Ocala Limestone is located at depths of 90 or more feet bgs in the Colquitt area. According to the City of Colquitt Code of Ordinances[15], the wellhead protection radius for a city water supply well is 5,280 feet.

Well management zones are defined in the Georgia Rules for Safe Drinking Water Chapter 391-3-5-.40 as follows:

- The Control Zone: A zone in the immediate vicinity of the well in which activities must be controlled so as to produce the minimum amount of potential pollutants;
- The Inner Management Zone (IMZ): The IMZ covers a 500 foot radius from the well in wells that draw water from unconfined aquifers and springs in areas of karst; and,
- The Outer Management Zone (OMZ): The OMZ extends from the edge of the IMZ to an area determined by hydrogeologic mapping or until the edge of the Wellhead Protection radius.

Additionally, in Project Report 28, the Georgia Geologic Survey defines the Zone of High Vulnerability (ZHV) as a subpart of the OMZ in areas where contaminants can travel rapidly to reach the well.

The portion of the land under the UEC (i.e. the Site) that is the closest to Well #3 is 505 feet away, locating the Subject Property within the Outer Management Zone (OMZ). However, the Subject Property is not believed to lie within the ZHV, the groundwater flow does not appear to be towards Well #3 and the area does not appear to be concentrated in "landform features indicative of enhanced recharge.[16]" In the 2005 CRA HSRA CSR, CRA calculated that it would take 300 years for groundwater to flow from the wellhead cone of depression (located 450 feet west of the UEC boundary) to the screened portion of Well #3. Consequently, BBJ Group does not regard Well #3 as a receptor. Further, concentrations of Cr^{+6} in the shallow water bearing unit above Type 4 RRS appear to be (1) isolated to a small, discrete area onsite and (2) present at depths less than 55 feet bgs (Well #3 is cased to a depth of 150 feet bgs). Additionally, Cr^{+3} was only detected in two monitoring wells above the Type 1 RRS. Those two wells are located approximately 620 feet southwest (sidegradient) of Well #3.

5.3 Summary of Potentially Complete Exposure Pathways and CSM

Per the findings of the historical investigations at the Subject Property, construction worker ingestion and dermal contact with groundwater around MW-6, MW-10, and MW-11 are the only potential

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[14] https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/PR-28.pdf
[15] https://www.municode.com/library/ga/colquitt/codes/code_of_ordinances?nodeId=PTIICOOR_CH34EN_ARTVIIWEPR
[16] https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/PR-28.pdf

receptors to COCs from the Subject Property. A Conceptual Site Model (CSM) Flow Diagram and CSM Cross Section are provided as Figures 5 and 6, respectively.

6.0 INSTITUTIONAL CONTROLS

A UEC is proposed for the Subject Property in accordance with the Georgia Universal Environmental Covenants Act. The UEC will restrict the use or extraction of groundwater for drinking water purposes at the Site, in the portion of the Subject Property identified in Figure 8. A copy of the draft UEC is provided as Appendix F. BBJ Group and Man have contacted Birdsong, the Subject Property owner, regarding the implementation of the UEC. Birdsong has granted verbal approval of the UEC and understands that groundwater beneath the Subject Property is not to be used for potable purposes.

7.0 CONCLUSIONS

The Subject Property was listed on the HSI due to a historical release of PCE in the parts repair shed. The PCE impacts at the Subject Property appeared to be limited to groundwater at the Site, the southwestern portion of the Subject Property. While remediating the PCE exceedances, injections of potassium permanganate oxidized Cr^{+3} present in the groundwater into Cr^{+6}. The most recent groundwater sampling data indicate that Cr^{+6} concentrations are above the Type 4 RRSs in two limited areas of the Site. These distinct areas have been delineated horizontally and vertically at the Site and contaminants are not migrating off-site. Using the Mann-Kendall analysis, the groundwater plume at the Subject Property appears to be stable. With the use of an institutional control covering the remaining groundwater contamination at the Site, no further investigation with respect to the Subject Property is warranted.

8.0 SCHEDULE

Within 7 days of submittal of this CSR, BBJ Group, on behalf of the RP, will publish a notice in a major local newspaper of general circulation and the legal organ for Miller County, announcing that the CSR is available for inspection by the general public under a 30-day comment period. The announcement will include the location where the CSR may be viewed or copied and the name, address, and phone number of the Georgia EPD project manager to whom written or oral comments may be made.

TABLES

TABLE 1

SUMMARY OF SOIL ANALYTICAL DATA

TABLE
Summary of Soil Analytical Data

Well I.D.	Volatile Organics	Organo-chlorine Pesticides (mg/kg)	Chlorinated Herbicides (mg/kg)	Nitrate-Nitrogen (mg/kg)	Total Arsenic (mg/kg)	RCRA Total Metals (mg/kg)		
	Carbon Disulfide (mg/kg)					Barium	Chromium	Lead
MW-4 (8.5-10')	BDL	BDL	BDL	14.8	NA	NA	NA	NA
MW-5 (3.5-5')	BDL	BDL	BDL	125	BDL	NA	NA	NA
MW-5 (18.5-20')	0.008	BDL	BDL	72.1	BDL	NA	NA	NA
MW-6 (18.5-20')	BDL	BDL	BDL	130	BDL	NA	NA	NA
Welding Shop (1.5-2')	BDL	NA	NA	NA	NA	19.7	30.0	11.8
Evaporation Area (1.5-2')	BDL	NA	NA	NA	NA	NA	NA	NA
Lab Detection Limit	0.005	.005-0.10	.005-1.0	5.0-20.0	5.0	10.0	5.0	5.0
HSRA NC	0.005	Varies with Pesticide	Varies with Herbicide	NE	41.0	500	1200	300

NA = Not Analyzed
HSRA NC = Notification Requirements under Hazardous Site Response Act (Appendix I)
NE = Not Established
BDL = Below Lab Detection Limit
MCL = Maximum Contaminant Level
* Tetrachloroethene = Perchloroethylene or PCE

TABLE
Summary of Soil Analytical Data
FFM Main Facility

Well I.D.	Carbon Disulfide (mg/kg)
SB-1 (18.5-20')	BDL
SB-1 (41.5-42')	BDL
SB-2 (18.5-20')	BDL
SB-2 (41.5-42')	BDL
Lab Detection Limit	0.005
HSRA NC	0.005

HSRA NC = Notification Requirements under Hazardous Site Response Act (Appendix I)
NE = Not Established
BDL = Below Laboratory Detection Limit
MCL = Maximum Contaminant Level
* Tetrachloroethene = Perchloroethylene or PCE

TABLE
SUMMARY OF DPT SOIL SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

DPT Boring	Sample Depth (ft)	DCA (ug/kg)	DCE (ug/kg)	TCE (ug/kg)	PCE (ug/kg)	VC (ug/kg)
BH-1	2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	21	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-2	4	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	21	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-3	2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	21	ND (5)	ND (5)	ND (5)	28	ND (5)
BH-4	1.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-5	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	7.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	22	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-6	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	19.5	ND (5)	ND (5)	ND (5)	7.5	ND (5)
BH-7	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	15	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-8	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	25.5	ND (5)	ND (5)	ND (5)	21.3	ND (5)
BH-9	1.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	17.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-10	2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	27	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
NCs		3	360	130	18	40

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
NC = Notification Concentrations (from GA391-3-19 Appendix I Soil Concentrations that Trigger Notification)

TABLE
SUMMARY OF SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Soil

Sample Location	Sample Depth	DCE	TCE	PCE	VC
BH-11	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-12	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-13	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-14	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-15	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-16	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)
BH-17	3 - 4 ft	ND (5)	ND (5)	ND (5)	ND (5)
	7 - 8 ft	ND (5)	ND (5)	ND (5)	ND (5)

Note:

Concentrations in μg/kg (soil), μg/L (water)
ND = Not Detected @ (Reported Detection Limit)
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
GC = Groundwater Criteria (HSRA Appendix III Table 1)

No VOCs were detected in any of the soil samples collected. PCE (only) was detected in five of the six groundwater samples. Only two of the groundwater samples contained PCE at concentrations above the Groundwater Criteria of 5 μg/L. The highest detection of PCE at 48.7 μg/L was collected from BH-17, located to the south of MW-10 within the area that has shown the highest impact from PCE.

TABLE
SUMMARY OF DPT SOIL SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

DPT Boring	Sample Date	Sample Depth (ft)	DCA (ug/kg) *CAS#75343*	DCE (ug/kg) *CAS#75354*	TCE (ug/kg) *CAS#79016*	PCE (ug/kg) *CAS#127184*	VC (ug/kg) *CAS#75014*
BH-1	7/16/2001	2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		21	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-2	7/16/2001	4	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		21	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-3	7/16/2001	2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		21	ND (5)	ND (5)	ND (5)	**28**	ND (5)
BH-4	7/17/2001	1.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-5	7/17/2001	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		22	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-6	7/17/2001	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		19.5	ND (5)	ND (5)	ND (5)	**7.5**	ND (5)
BH-6 offset	8/10/2005	3.5	ND (3)	ND (3)	ND (3)	**29**	ND (6)
BH-7	7/17/2001	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		15	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-8	7/18/2001	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		25.5	ND (5)	ND (5)	ND (5)	**21.3**	ND (5)
BH-8 offset	8/10/2005	2.5	ND (2.9)	ND (2.9)	ND (2.9)	**3.2**	ND (5.9)
BH-9	7/18/2001	1.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		17.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-10	7/18/2001	1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		25.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-11	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-12	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-13	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-14	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-15	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-16	4/24/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-17	4/25/2003	3	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
		7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-18	8/10/2005	4	ND (3.6)	ND (3.6)	ND (3.6)	**4.7**	ND (7.2)
		7	ND (3.6)	ND (3.6)	ND (3.6)	**11**	ND (7.2)
BH-19	8/10/2005	4	ND (3.4)	ND (3.4)	ND (3.4)	**6.4**	ND (6.7)
		7	ND (3.2)	ND (3.2)	ND (3.2)	**4.8**	ND (6.3)
BH-20	8/10/2005	4	ND (3.3)	ND (3.3)	ND (3.3)	**10**	ND (6.6)
		7	ND (2.9)	ND (2.9)	ND (2.9)	**13**	ND (5.9)
BH-21	8/10/2005	4	ND (3.6)	ND (3.6)	ND (3.6)	ND (3.6)	ND (7.2)
BH-22	8/10/2005	4	ND (3.1)	ND (3.1)	ND (3.1)	ND (3.1)	ND (6.3)
BH-23	8/12/2005	1	ND (2.5)	ND (2.5)	ND (2.5)	**8**	ND (5.1)
Type 1 RRS			**500**	**700**	**500**	**500**	**200**

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1 RRS (Rule 391-3-19) = 100 x Appendix III Table 1 Groundwater Criteria

TABLE 2

SUMMARY OF GROUNDWATER DATA

TABLE
Summary of Well Installation and Groundwater Depth Data

Well No.	Date Installed	Well Depth (ft)	Depth to Top of Bentonite Seal (ft)	Depth to Top of Sand Pack (ft)	Depth to Top of Screen (ft)	Length of Screen (ft)	Depth to Water September 5, 2000 (ft)
MW-4	8/28/00	17.5	4.1	5.9	7.5	10.0	9.58
MW-5	8/29/00	45.0	34.7	37.5	40.0	5.0	29.80
MW-6	8/30/00	55.0	45.1	47.3	50.0	5.0	28.46

TABLE
Summary of Groundwater Analytical Data

Well I.D.	Volatile Organics	Organochlorine Pesticides (ug/L)	Chlorinated Herbicides (ug/L)	Nitrate-Nitrogen (mg/L)	Total Arsenic (mg/L)	PAHs (ug/L
	Tetrachloroethene* (ug/L)					
MW-4	BDL	BDL	BDL	78.0	NA	NA
MW-5	BDL	BDL	BDL	20.9	BDL	BDL
MW-6	28	BDL	BDL	58.6	BDL	BDL
Lab Detection Limit	5	Varies with Pesticide	Varies with Herbicide	1.0-5.0	0.03	10
MCL	5	Varies with Pesticide	Varies with Herbicide	10	0.05	Varies with Constituent

NA = Not Analyzed
HSRA NC = Notification Requirements under Hazardous Site Response Act (Appendix I)
NE = Not Established
BDL = Below Lab Detection Limit
MCL = Maximum Contaminant Level
* Tetrachloroethene = Perchloroethylene or PCE

TABLE
Summary of Groundwater Analytical Data
FFM Main Facility

Well I.D.	Tetrachloroethene* (ug/L)
Equip. Blank	BDL
Trip Blank	BDL
MW-6	18
Lab Detection Limit	5
MCL	5

HSRA NC = Notification Requirements under Hazardous Site Response Act (Appendix I)
NE = Not Established
BDL = Below Laboratory Detection Limit
MCL = Maximum Contaminant Level
* Tetrachloroethene = Perchloroethylene or PCE

TABLE
UMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULT
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	DCA (ug/L)	DCE (ug/L)	TCE (ug/L)	PCE (ug/L)	VC (ug/L)
BH-1	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-2	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-3	ND (5)	ND (5)	ND (5)	108	ND (5)
BH-5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-6	ND (5)	ND (5)	ND (5)	23	ND (5)
BH-7	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-8	ND (5)	ND (5)	ND (5)	118	ND (5)
BH-9	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-4	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-5	ND (5)	ND (5)	ND (5)	8.8	ND (5)
MW-6	ND (5)	ND (5)	ND (5)	23	ND (5)
MW-7D	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-8	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-9	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
GC	4000	7	5	5	2

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
GC = Groundwater Criteria (HSRA default cleanup standards for groundwater, Appendix III Table 1)

TABLE 1
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L)	DCE (ug/L)	TCE (ug/L)	PCE (ug/L)	VC (ug/L)
BH-1	7/16/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-2	7/16/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-3	7/16/01	ND (5)	ND (5)	ND (5)	108	ND (5)
BH-5	7/17/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-6	7/17/01	ND (5)	ND (5)	ND (5)	23	ND (5)
BH-7	7/17/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-8	7/17/01	ND (5)	ND (5)	ND (5)	118	ND (5)
BH-9	7/18/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-10	7/18/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-4	8/2/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-5	8/2/01	ND (5)	ND (5)	ND (5)	8.8	ND (5)
	7/9/02	ND (5)	ND (5)	ND (5)	8	ND (5)
	10/29/02	ND (5)	ND (5)	ND (5)	9.1	ND (5)
	2/11/03	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-6	8/2/01	ND (5)	ND (5)	ND (5)	23	ND (5)
	7/9/02	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10/29/02	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/03	ND (5)	ND (5)	ND (5)	8.9	ND (5)
MW-7D	8/2/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	7/9/02	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10/29/02	ND (5)	ND (5)	ND (5)	6.1	ND (5)
	2/11/03	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-8	8/2/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-9	8/2/01	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-10	9/4/02	ND (5)	ND (5)	ND (5)	130	ND (5)
	10/29/02	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/03	ND (5)	ND (5)	ND (5)	120	ND (5)
GC		4000	7	5	5	2

14 type 2

Note:

MW-10 is located near BH-3
DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
GC = Groundwater Criteria (HSRA default cleanup standards for groundwater, Appendix III Table 1)

TABLE
SUMMARY OF SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Groundwater

BH-11		ND (1)	ND (1)	ND (1)	ND (1)
BH-12		ND (1)	ND (1)	8.8	ND (1)
BH-13		ND (1)	ND (1)	1.2	ND (1)
BH-14		ND (1)	ND (1)	1.8	ND (1)
BH-16		ND (1)	ND (1)	4.2	ND (1)
BH-17		ND (1)	ND (1)	48.7	ND (1)
GC		**7**	**5**	**5**	**2**

Note:
Concentrations in µg/kg (soil), µg/L (water)   ND = Not Detected @ (Reported Detection Limit)
DCE = 1,1-dichloroethene (total)   TCE = trichloroethene
PCE = tetrachloroethene   VC = vinyl chloride
GC = Groundwater Criteria (HSRA Appendix III Table 1)

No VOCs were detected in any of the soil samples collected. PCE (only) was detected in five of the six groundwater samples. Only two of the groundwater samples contained PCE at concentrations above the Groundwater Criteria of 5 µg/L. The highest detection of PCE at 48.7 µg/L was collected from BH-17, located to the south of MW-10 within the area that has shown the highest impact from PCE.

The results of the sampling demonstrate that the extent of PCE, is in fact, limited to the immediate vicinity of MW-10 and to the south. This suggests that there is no undetected source area adjacent to, or

TABLE
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L)	DCE (ug/L)	TCE (ug/L)	PCE (ug/L)	VC (ug/L)
BH-1	7/16/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-2	7/16/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-3	7/16/2001	ND (5)	ND (5)	ND (5)	**108**	ND (5)
BH-5	7/17/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-6	7/17/2001	ND (5)	ND (5)	ND (5)	**23**	ND (5)
BH-7	7/17/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-8	7/17/2001	ND (5)	ND (5)	ND (5)	**118**	ND (5)
BH-9	7/18/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-10	7/18/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-11	4/24/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-12	4/24/2003	ND (5)	ND (5)	ND (5)	**8.8**	ND (5)
BH-13	4/24/2003	ND (5)	ND (5)	ND (5)	1.2	ND (5)
BH-14	4/24/2003	ND (5)	ND (5)	ND (5)	1.8	ND (5)
BH-16	4/24/2003	ND (5)	ND (5)	ND (5)	4.2	ND (5)
BH-17	4/25/2003	ND (5)	ND (5)	ND (5)	**48.7**	ND (5)
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	**8.8**	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	**8**	ND (5)
	########	ND (5)	ND (5)	ND (5)	**9.1**	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	**8**	ND (5)
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	**23**	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	########	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	**8.9**	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	**20**	ND (5)
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	########	ND (5)	ND (5)	ND (5)	**6.1**	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	**130**	ND (5)
	########	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	**120**	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-11	9/30/2003	ND (5)	ND (5)	ND (5)	**430**	ND (5)
GC		**4000**	**7**	**5**	**5**	**2**

Consistent

Consistent

inconsistent

14 type 2

18283-Oake12-tbl.xls

Note:

MW-10 is located near BH-3
DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
GC = Groundwater Criteria (HSRA default cleanup standards for groundwater, Appendix III Table 1)

TABLE
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	**8.8**	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	**8**	ND (5)
	10/29/2002	ND (5)	ND (5)	ND (5)	**9.1**	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	**8**	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	**5.5**	ND (5)
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	**23**	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	**8.9**	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	**20**	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	**29**	ND (5)
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	6/23/2004	ND (5)	ND (5)	ND (5)	**20**	ND (5)
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	10/29/2002	ND (5)	ND (5)	ND (5)	**6.1**	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	**130**	ND (5)
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	2/11/2003	ND (5)	ND (5)	ND (5)	**120**	ND (5)
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-11	9/30/2003	ND (5)	ND (5)	ND (5)	**430**	ND (5)
	11/7/2003	ND (5)	ND (5)	ND (5)	**180**	ND (5)
	4/14/2004	ND (5)	ND (5)	ND (5)	**460**	ND (5)
	6/23/2004	ND (5)	ND (5)	ND (5)	**41**	ND (5)
MW-12	6/23/2004	ND (5)	ND (5)	ND (5)	**19**	ND (5)
Type 1 RRS		**4000**	**7**	**5**	**5**	**2**
Type 4 RRS		**4000**	**525**	**40**	**55**	**5**

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene

VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1 RRS = Groundwater Criteria (Appendix III Table 1)
Type 4 RRS = Groundwater Criteria (generic assumptions)

TABLE
SUMMARY OF DPT GROUNDWATER SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	Sample Depth (ft)	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L)
BH-1	7/16/2001	26	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-2	7/16/2001	24	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-3	7/16/2001	23	ND (5)	ND (5)	ND (5)	108	ND (5)	NA
BH-5	7/17/2001	32	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-6	7/17/2001	22	ND (5)	ND (5)	ND (5)	23	ND (5)	NA
BH-7	7/17/2001	14	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-8	7/17/2001	27	ND (5)	ND (5)	ND (5)	118	ND (5)	NA
BH-9	7/18/2001	18	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-10	7/18/2001	52	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
BH-11	4/24/2003	46	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
BH-12	4/24/2003	16	ND (1)	ND (1)	ND (1)	8.8	ND (1)	ND (1)
BH-13	4/24/2003	46	ND (1)	ND (1)	ND (1)	1.2	ND (1)	ND (1)
BH-14	4/24/2003	43	ND (1)	ND (1)	ND (1)	1.8	ND (1)	ND (1)
BH-16	4/24/2003	40	ND (1)	ND (1)	ND (1)	4.2	ND (1)	ND (1)
BH-17	4/25/2003	40	ND (1)	ND (1)	ND (1)	48.7	ND (1)	ND (1)
BH-18	8/10/2005	17	ND (5)	ND (5)	ND (5)	18	ND (5)	ND (5)
BH-19	8/10/2005	20	ND (5)	ND (5)	ND (5)	70	ND (5)	ND (5)
BH-20	8/10/2005	12.5	ND (5)	ND (5)	ND (5)	24	ND (5)	5.1
BH-21	8/10/2005	7.5	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-22	8/11/2005	11	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
BH-23	8/12/2005	10	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Type 1/3 RRS			4,000	7	5	5	2	1,000

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1/3 RRS = Groundwater Criteria (Appendix III Table 1)

TABLE
SUMMARY OF MONITORING WELL SAMPLE ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L)
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	14
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	8.8	ND (5)	NA
	7/9/2002	ND (5)	ND (5)	ND (5)	8	ND (5)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	9.1	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	9/30/2003	ND (5)	ND (5)	ND (5)	8	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	5.5	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	23	ND (5)	NA
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	8.9	ND (5)	NA
	9/30/2003	ND (5)	ND (5)	ND (5)	20	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	29	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/23/2004	ND (5)	ND (5)	ND (5)	20	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	25	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	53	ND (5)	NA
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	6.1	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	130	ND (5)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	120	ND (5)	NA
	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	8.6	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-11	9/30/2003	ND (5)	ND (5)	ND (5)	430	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	180	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	460	ND (5)	NA
	6/23/2004	ND (5)	ND (5)	ND (5)	41	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	57	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	180	ND (5)	NA
MW-12	6/23/2004	ND (5)	ND (5)	ND (5)	19	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	17	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	13	ND (5)	NA
MW-13	8/19/2005	ND (5)	ND (5)	ND (5)	11	ND (5)	ND (5)
MW-14	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-15	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-16	8/19/2005	ND (5)	ND (5)	ND (5)	6.3	ND (5)	6.3
MW-17D	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	5.2
Type 1/3 RRS		4,000	7	5	5	2	1,000

Note:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1/3 RRS = Groundwater Criteria (Appendix III Table 1)

TABLE
COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L) *CAS#108883*
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	14
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	8.8	ND (5)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	8	ND (5)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	9.1	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	8	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	5.5	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	23	ND (5)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	8.9	ND (5)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	20	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	29	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	20	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	25	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	53	ND (5)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	10	ND (5)	NA
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	6.1	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA

TABLE
COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
FARMER'S FEED AND MILLING, COLQUIT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L) *CAS#108883*
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	130	ND (5)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	120	ND (5)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	8.6	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-11 Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	430	ND (5)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	180	ND (5)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	460	ND (5)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	41	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	57	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	180	ND (5)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-12 Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	19	ND (5)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	17	ND (5)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	13	ND (5)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-13	8/19/2005	ND (5)	ND (5)	ND (5)	11	ND (5)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-14	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-15	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
MW-16	8/19/2005	ND (5)	ND (5)	ND (5)	6.3	ND (5)	6.3
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-17D	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	5.2
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
Type 1/3 RRS		4,000	7	5	5	2	1,000

Notes:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1/3 RRS = Groundwater Criteria (Appendix III Table 1)

MW-10 12/19/06 sample had a suspect detection of methylene chloride (5.6 ug/L).

[redacted]

TABLE

COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) CAS#75343	DCE (ug/L) CAS#75354	TCE (ug/L) CAS#79016	PCE (ug/L) CAS#127184	VC (ug/L) CAS#75014	Toluene (ug/L) CAS#108883
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	14
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	8.8	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	8	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	9.1	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	8	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	5.5	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	23	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	8.9	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	20	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	29	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	20	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	25	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	53	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	10	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	6.1	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA

TABLE

COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L) *CAS#108883*
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	130	ND (2)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	120	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	8.6	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-11 Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	430	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	180	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	460	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	41	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	57	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	180	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-12 Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	19	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	17	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	13	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-13	8/19/2005	ND (5)	ND (5)	ND (5)	11	ND (2)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-14	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-15	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	ND (5)
MW-16	8/19/2005	ND (5)	ND (5)	ND (5)	6.3	ND (2)	6.3
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-17D	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	5.2
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Type 1/3 RRS		4,000	7	5	5	2	1,000

Notes:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1/3 RRS = Groundwater Criteria (Appendix III Table 1)
MW-10 12/19/06 sample had a suspect detection of methylene chloride (5.6 ug/L).

TABLE

SELECT METALS AND IONS GROUNDWATER RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Date	Calcium	Iron	Manganese	Potassium	Sodium	Chloride	Sulfate
MW-5	4/10/2007	89.4	0.274	0.41	6.19	23.9	6.1	44
MW-6	4/10/2007	177	0.188	68.7	89.5	9.19	160	BRL
MW-10	4/10/2007	157	1.91	323	1070	43.8	840	940
MW-11	4/10/2007	72.4	0.778	17.5	104	9.7	150	230
MW-12	4/10/2007	56.1	BRL	2.73	17.4	3.32	BRL	BRL
MW-13	4/10/2007	14.1	0.448	5.22	42.4	5.31	24	44
MW-16	4/10/2007	22.7	BRL	0.195	18.9	1.91	13	12

Notes:

BRL = Below Reporting Limit
All units are represented in mg/L

TABLE

COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	**Sample Date**	**DCA (ug/L)** *CAS#75343*	**DCE (ug/L)** *CAS#75354*	**TCE (ug/L)** *CAS#79016*	**PCE (ug/L)** *CAS#127184*	**VC (ug/L)** *CAS#75014*	**Toluene (ug/L)** *CAS#108883*
MW-4	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	14
MW-5	8/2/2001	ND (5)	ND (5)	ND (5)	8.8	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	8	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	9.1	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	8	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	5.5	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-6	8/2/2001	ND (5)	ND (5)	ND (5)	23	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	8.9	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	20	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	29	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	20	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	25	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	53	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	10	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA

TABLE

COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Date	DCA (ug/L) *CAS#75343*	DCE (ug/L) *CAS#75354*	TCE (ug/L) *CAS#79016*	PCE (ug/L) *CAS#127184*	VC (ug/L) *CAS#75014*	Toluene (ug/L) *CAS#108883*
MW-7D	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 1	7/9/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 2	10/29/2002	ND (5)	ND (5)	ND (5)	6.1	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007 & Duplicate	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
		ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-8	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-9	8/2/2001	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-10	9/4/2002	ND (5)	ND (5)	ND (5)	130	ND (2)	NA
	10/29/2002	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	2/11/2003	ND (5)	ND (5)	ND (5)	120	ND (2)	NA
Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	8.6	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA

TABLE

COMPARISON OF GROUNDWATER ANALYTICAL RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	**Sample Date**	**DCA (ug/L)** *CAS#75343*	**DCE (ug/L)** *CAS#75354*	**TCE (ug/L)** *CAS#79016*	**PCE (ug/L)** *CAS#127184*	**VC (ug/L)** *CAS#75014*	**Toluene (ug/L)** *CAS#108883*
MW-11 Post Pilot Injection 3	9/30/2003	ND (5)	ND (5)	ND (5)	430	ND (2)	NA
	11/7/2003	ND (5)	ND (5)	ND (5)	180	ND (2)	NA
	4/14/2004	ND (5)	ND (5)	ND (5)	460	ND (2)	NA
Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	41	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	57	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	180	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-12 Post Pilot Injection 4	6/23/2004	ND (5)	ND (5)	ND (5)	19	ND (2)	NA
	10/20/2004	ND (5)	ND (5)	ND (5)	17	ND (2)	NA
	6/15/2005	ND (5)	ND (5)	ND (5)	13	ND (2)	NA
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	NA
MW-13	8/19/2005	ND (5)	ND (5)	ND (5)	11	ND (2)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-14	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	ND (5)
Post Full Scale Injection	12/20/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-15	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	ND (5)
MW-16	8/19/2005	ND (5)	ND (5)	ND (5)	6.3	ND (2)	6.3
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	4/10/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
MW-17D	8/19/2005	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	5.2
Post Full Scale Injection	12/19/2006	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
	6/27/2007	ND (5)	ND (5)	ND (5)	ND (5)	ND (2)	NA
Type 1/3 RRS		4,000	7	5	5	2	1,000

Notes:

DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene (total)
TCE = trichloroethene
PCE = tetrachloroethene
VC = vinyl chloride
ND = Not Detected @ (Reported Detection Limit)
Type 1/3 RRS = Groundwater Criteria (Appendix III Table 1)
MW-10 12/19/06 sample had a suspect detection of methylene chloride (5.6 ug/L).

TABLE

SELECT METALS AND IONS GROUNDWATER RESULTS
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Date	Calcium	Iron	Manganese	Potassium	Sodium	Chloride	Sulfate
MW-5	4/10/2007	89.4	0.274	0.41	6.19	23.9	6.1	44
	6/27/2007	459	24.3	2320	2340	16.9	BLR	BLR
MW-6	4/10/2007	177	0.188	68.7	89.5	9.19	160	BRL
	6/27/2007	101	BLR	37.5	69.2	6.68	75	21
MW-7D	6/27/2007 & Duplicate	52.5	BLR	5.80	6.67	2.34	6.5	2.2
		54.3	BLR	5.79	6.87	2.46	7	2.4
MW-10	4/10/2007	157	1.91	323	1070	43.8	840	940
	6/27/2007	196	15.6	218	1280	39.6	670	750
MW-11	4/10/2007	72.4	0.778	17.5	104	9.7	150	230
	6/27/2007	74.1	12.1	17.8	120	8.45	110	160
MW-12	4/10/2007	56.1	BRL	2.73	17.4	3.32	BRL	BRL
	6/27/2007	55.2	1.92	3.55	15.4	3.13	27	30
MW-13	4/10/2007	14.1	0.448	5.22	42.4	5.31	24	44
	6/27/2007	7.53	30.8	2.14	37.8	4.47	37	47
MW-16	4/10/2007	22.7	BRL	0.195	18.9	1.91	13	12
MW17-D	6/27/2007	92.2	0.965	1.26	55.4	6.02	71	47

Notes:

BRL = Below Reporting Limit
All units are represented in mg/L

TABLE

COMPARISON OF RCRA METALS IN GROUNDWATER
BIRDSONG PEANUT
FARMER'S FEED AND MILLING
COLQUITT, GEORGIA

Sample Location	Sample Type	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver
MW-6	Total (1)	BRL (2)	0.0844	BRL	0.701	BRL	0.0242	BRL
6/27/2007	Dissolved (1)	BRL	0.0621	BRL	0.563	BRL	0.0333	BRL
Type 4 RRS		0.05	7.15	.05	.31/153 (3)	0.015	.51	.51

Notes:
1. All units are represented in mg/L
2. BRL = Below Reporting Limit
3. Type 4 RRS for Chromium VI is 0.31 mg/L and for Chromium III is 153 mg/L

TABLE 1

ANALYTICAL RESULTS SUMMARY
BIRDSONG PEANUT
COLQUITT, GEORGIA
MARCH 2009

	Location ID:	Risk Reduction Standards		*MW-6*	*MW-6*	*MW-10*	*MW-11*	*MW-5*
	Sample Name:	Type 1	Type 4	*GW-030509-DJB-001*	*GW-030509-DJB-002*	*GW-030509-DJB-003*	*GW-030509-DJB-004*	*GW-030509-DJB-005*
	Sample Date:			*3/5/2009*	*3/5/2009*	*3/5/2009*	*3/5/2009*	*3/5/2009*
					Duplicate			
Parameters	*Units*							
Metals								
Arsenic	mg/L	0.05	0.05	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Cadmium	mg/L	0.005	0.051	0.0004 J	0.0007 J	0.0014 J	0.0050 U	0.0050 U
Chromium Total	mg/L	0.1	0.307	0.298	0.294	0.0760	0.279	0.0057 J
Lead	mg/L	0.015	0.015	0.0100 U	0.0100 U	0.0077 J	0.0038 J	0.0100 U
Manganese	mg/L	NV	NV	4.05	4.07	1.31	3.94	0.175 J
Potassium	mg/L	NV	NV	51.4	53.2	788	129	6.09
Selenium	mg/L	0.05	0.511	0.0140 J	0.0156 J	0.0586	0.0151 J	0.0200 U
Silver	mg/L	0.1	0.511	0.0100 U	0.0009 J	0.0100 U	0.0100 U	0.0004 J
Metals (Dissolved)								
Arsenic (Dissolved)	mg/L	0.05	0.05	0.0500 U	--	0.0500 U	0.0500 U	0.0500 U
Cadmium (Dissolved)	mg/L	0.005	0.051	0.0050 U	--	0.0011 J	0.0050 U	0.0050 U
Chromium Total (Dissolved)	mg/L	0.1	0.307	0.298	--	0.0805	0.292	0.0056 J
Lead (Dissolved)	mg/L	0.015	0.015	0.0100 U	--	0.0031 J	0.0100 U	0.0100 U
Manganese (Dissolved)	mg/L	NV	NV	3.42	--	0.880	2.22	0.376 J
Potassium (Dissolved)	mg/L	NV	NV	60.6	--	712	123	8.52
Selenium (Dissolved)	mg/L	0.05	0.511	0.0200 U	--	0.0527	0.0200 U	0.0200 U
Silver (Dissolved)	mg/L	0.1	0.511	0.0007 J	--	0.0100 U	0.0100 U	0.0005 J

Notes:

-	Not analyzed.
J	Estimated.
U	Not detected.
NV	No Value

TABLE 2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (MARCH 2010)
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-5*	*MW-6*	*MW-6*	*MW-10*	*MW-11*
			Sample ID:	*GW-032410-DJB-001*	*GW-032410-DJB-004*	*GW-032410-DJB-005*	*GW-032410-DJB-002*	*GW-032410-DJB-003*
			Sample Date:	*3/24/2010*	*3/24/2010*	*3/24/2010* *Duplicate*	*3/24/2010*	*3/24/2010*
		Criteria						
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.000126 J	0.000692 J	0.00126	**0.00938[a]**	0.00144
Chromium	mg/L	NC	NC	0.0267	0.172	0.172	0.0866	0.266
Copper	mg/L	1.3	4.09	0.000288 J	0.000176 J	0.000229 J	0.00572	0.00908
Lead	mg/L	0.015	0.015	0.001 U	0.001 U	0.00018 J	0.00125	0.00144
Manganese	mg/L	NC	NC	2.23	0.473	0.483	4.01	2.93
Potassium	mg/L	NC	NC	29.6	58.1	65.3	737	140
Selenium	mg/L	0.05	0.511	0.005 U	0.005 U	0.000922 J	**0.0592[a]**	0.00658
Silver	mg/L	0.1	0.511	0.001 U	0.000219 J	0.000014 J	0.000729 J	0.000031 J
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.00748 J	0.005 U	0.005 U	0.00251 J	0.05 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.007 U	0.000444 J	0.000391 J	0.00489 J	0.007 U
Chromium Total (dissolved)	mg/L	NC	NC	0.0286 J	0.16	0.165	0.0923	0.217
Copper (dissolved)	mg/L	1.3	4.09	0.02 U	0.002 U	0.002 U	0.02 U	0.02 U
Lead (dissolved)	mg/L	0.015	0.015	0.01 U	0.001 U	0.001 U	0.01 U	0.01 U
Manganese (dissolved)	mg/L	NC	NC	1.46	0.526	0.522	1.34	0.346
Potassium (dissolved)	mg/L	NC	NC	27.4	56.7	55.7	702	127
Selenium (dissolved)	mg/L	0.05	0.511	0.05 U	0.005 U	0.005 U	**0.0673[a]**	0.05 U
Silver (dissolved)	mg/L	0.1	0.511	0.01 U	0.001 U	0.001 U	0.01 U	0.01 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	0.0100 U	0.0100 U	0.0100 U	0.0262	0.0100 U
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	0.00740 J	0.0100 U	0.0100 U	0.0205	0.0222
Chromium VI (hexavalent)	mg/L	0.01	0.0572	**0.0246[a]**	**0.170[ab]**	**0.174[ab]**	**0.0605[ab]**	**0.265[ab]**
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.0572	**0.0212[a]**	**0.172[ab]**	**0.178[ab]**	**0.0718[ab]**	**0.195[ab]**

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript(s).

TABLE 3

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-5*	*MW-5*	*MW-6*	*MW-6*	*MW-6*
			Sample ID:	*GW-030509-DJB-005*	*GW-032410-DJB-001*	*GW-030509-DJB-001*	*GW-030509-DJB-002*	*GW-032410-DJB-004*
			Sample Date:	*3/5/2009*	*3/24/2010*	*3/5/2009*	*3/5/2009* *Duplicate*	*3/24/2010*
		Criteria						
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.0500 U	0.005 U	0.0500 U	0.0500 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.0050 U	0.000126 J	0.0004 J	0.0007 J	0.000692 J
Chromium	mg/L	NC	NC	0.0057 J	0.0267	0.298	0.294	0.172
Copper	mg/L	1.3	4.09	-	0.000288 J	-	-	0.000176 J
Lead	mg/L	0.015	0.015	0.0100 U	0.001 U	0.0100 U	0.0100 U	0.001 U
Manganese	mg/L	NC	NC	0.175 J	2.23	4.05	4.07	0.473
Potassium	mg/L	NC	NC	6.09	29.6	51.4	53.2	58.1
Selenium	mg/L	0.05	0.511	0.0200 U	0.005 U	0.0140 J	0.0156 J	0.005 U
Silver	mg/L	0.1	0.511	0.0004 J	0.001 U	0.0100 U	0.0009 J	0.000219 J
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.0500 U	0.00748 J	0.0500 U	-	0.005 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.0050 U	0.007 U	0.0050 U	-	0.000444 J
Chromium Total (dissolved)	mg/L	NC	NC	0.0056 J	0.0286 J	0.298	-	0.16
Copper (dissolved)	mg/L	1.3	4.09	-	0.02 U	-	-	0.002 U
Lead (dissolved)	mg/L	0.015	0.015	0.0100 U	0.01 U	0.0100 U	-	0.001 U
Manganese (dissolved)	mg/L	NC	NC	0.376 J	1.46	3.42	-	0.526
Potassium (dissolved)	mg/L	NC	NC	8.52	27.4	60.6	-	56.7
Selenium (dissolved)	mg/L	0.05	0.511	0.0200 U	0.05 U	0.0200 U	-	0.005 U
Silver (dissolved)	mg/L	0.1	0.511	0.0005 J	0.01 U	0.0007 J	-	0.001 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	-	0.0100 U	-	-	0.0100 U
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	-	0.00740 J	-	-	0.0100 U
Chromium VI (hexavalent)	mg/L	0.01	0.0572	-	**0.0246**[a]	-	-	**0.170**[ab]
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.0572	-	**0.0212**[a]	-	-	**0.172**[ab]

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE 3

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

		Criteria		*Sample Location:* *MW-6*	*MW-10*	*MW-10*	*MW-11*	*MW-11*
			Sample ID:	*GW-032410-DJB-005*	*GW-030509-DJB-003*	*GW-032410-DJB-002*	*GW-030509-DJB-004*	*GW-032410-DJB-003*
			Sample Date:	*3/24/2010* *Duplicate*	*3/5/2009*	*3/24/2010*	*3/5/2009*	*3/24/2010*
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.005 U	0.0500 U	0.005 U	0.0500 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.00126	0.0014 J	**0.00938[a]**	0.0050 U	0.00144
Chromium	mg/L	NC	NC	0.172	0.0760	0.0866	0.279	0.266
Copper	mg/L	1.3	4.09	0.000229 J	-	0.00572	-	0.00908
Lead	mg/L	0.015	0.015	0.00018 J	0.0077 J	0.00125	0.0038 J	0.00144
Manganese	mg/L	NC	NC	0.483	1.31	4.01	3.94	2.93
Potassium	mg/L	NC	NC	65.3	788	737	129	140
Selenium	mg/L	0.05	0.511	0.000922 J	**0.0586[a]**	**0.0592[a]**	0.0151 J	0.00658
Silver	mg/L	0.1	0.511	0.000014 J	0.0100 U	0.000729 J	0.0100 U	0.000031 J
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.005 U	0.0500 U	0.00251 J	0.0500 U	0.05 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.000391 J	0.0011 J	0.00489 J	0.0050 U	0.007 U
Chromium Total (dissolved)	mg/L	NC	NC	0.165	0.0805	0.0923	0.292	0.217
Copper (dissolved)	mg/L	1.3	4.09	0.002 U	-	0.02 U	-	0.02 U
Lead (dissolved)	mg/L	0.015	0.015	0.001 U	0.0031 J	0.01 U	0.0100 U	0.01 U
Manganese (dissolved)	mg/L	NC	NC	0.522	0.880	1.34	2.22	0.346
Potassium (dissolved)	mg/L	NC	NC	55.7	712	702	123	127
Selenium (dissolved)	mg/L	0.05	0.511	0.005 U	**0.0527[a]**	**0.0673[a]**	0.0200 U	0.05 U
Silver (dissolved)	mg/L	0.1	0.511	0.001 U	0.0100 U	0.01 U	0.0100 U	0.01 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	0.0100 U	-	**0.0262[a]**	-	0.0100 U
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	0.0100 U	-	**0.0205[a]**	-	**0.0222[a]**
Chromium VI (hexavalent)	mg/L	0.01	0.0572	**0.174[ab]**	-	**0.0605[ab]**	-	**0.265[ab]**
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.0572	**0.178[ab]**	-	**0.0718[ab]**	-	**0.195[ab]**

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-5*	*MW-5*	*MW-5*	*MW-5*	*MW-6*
			Sample ID:	*GW-030509-DJB-005*	*GW-032410-DJB-001*	*GW-032911-DJB-001*	*GW-032911-DJB-002*	*GW-030509-DJB-001*
			Sample Date:	*3/5/2009*	*3/24/2010*	*3/29/2011*	*3/29/2011* *Duplicate*	*3/5/2009*
		Criteria						
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.0500 U	0.005 U	0.005 U	0.005 U	0.0500 U
Cadmium	mg/L	0.005	0.0511	0.0050 U	0.000126 J	0.0007 U	0.0007 U	0.0004 J
Chromium	mg/L	0.1	NC	0.0057 J	0.0267	0.005 U	0.005 U	**0.298**
Copper	mg/L	1.3	4.09	-	0.000288 J	0.002 U	0.002 U	-
Lead	mg/L	0.015	0.015	0.0100 U	0.001 U	0.001 U	0.001 U	0.0100 U
Manganese	mg/L	NC	NC	0.175 J	2.23	0.0502	0.0517	4.05
Potassium	mg/L	NC	NC	6.09	29.6	3.7	3.65	51.4
Selenium	mg/L	0.05	0.511	0.0200 U	0.005 U	0.005 U	0.005 U	0.0140 J
Silver	mg/L	0.1	0.511	0.0004 J	0.001 U	0.001 U	0.001 U	0.0100 U
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.0500 U	0.00748 J	0.005 U	0.005 U	0.0500 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.0050 U	0.0007 U	0.0007 U	0.0007 U	0.0050 U
Chromium Total (dissolved)	mg/L	0.1	NC	0.0056 J	0.0286 J	0.005 U	0.005 U	**0.298**
Copper (dissolved)	mg/L	1.3	4.09	-	0.02 U	0.002 U	0.002 U	-
Lead (dissolved)	mg/L	0.015	0.015	0.0100 U	0.01 U	0.001 U	0.001 U	0.0100 U
Manganese (dissolved)	mg/L	NC	NC	0.376 J	1.46	0.005 U	0.005 U	3.42
Potassium (dissolved)	mg/L	NC	NC	8.52	27.4	3.72	3.57	60.6
Selenium (dissolved)	mg/L	0.05	0.511	0.0200 U	0.05 U	0.005 U	0.005 U	0.0200 U
Silver (dissolved)	mg/L	0.1	0.511	0.0005 J	0.01 U	0.001 U	0.001 U	0.0007 J
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	-	0.0100 U	0.0100 U	0.0100 U	-
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	-	0.00740 J	0.0100 U	0.0100 U	-
Chromium VI (hexavalent)	mg/L	0.01	0.01	-	**0.0246**^{ab}	0.0100 U	0.0100 U	-
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	-	**0.0212**^{ab}	0.0100 U	0.0100 U	-

Notes:

J - Estimated concentration.

NC - No criteria.

U - Not present at or above the associated value.

1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-6*	*MW-6*	*MW-6*	*MW-6*	*MW-10*
			Sample ID:	*GW-030509-DJB-002*	*GW-032410-DJB-004*	*GW-032410-DJB-005*	*GW-032911-DJB-005*	*GW-030509-DJB-003*
			Sample Date:	*3/5/2009*	*3/24/2010*	*3/24/2010*	*3/29/2011*	*3/5/2009*
				Duplicate		*Duplicate*		
		Criteria						
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.0500 U	0.005 U	0.005 U	0.005 U	0.0500 U
Cadmium	mg/L	0.005	0.0511	0.0007 J	0.000692 J	0.00126	0.00223	0.0014 J
Chromium	mg/L	0.1	NC	**0.294**	**0.172**	**0.172**	**0.217**	0.0760
Copper	mg/L	1.3	4.09	-	0.000176 J	0.000229 J	0.002 U	-
Lead	mg/L	0.015	0.015	0.0100 U	0.001 U	0.00018 J	0.001 U	0.0077 J
Manganese	mg/L	NC	NC	4.07	0.473	0.483	0.0718	1.31
Potassium	mg/L	NC	NC	53.2	58.1	65.3	70.6	788
Selenium	mg/L	0.05	0.511	0.0156 J	0.005 U	0.000922 J	0.005 U	**0.0586[a]**
Silver	mg/L	0.1	0.511	0.0009 J	0.000219 J	0.000014 J	0.001 U	0.0100 U
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	-	0.005 U	0.005 U	0.005 U	0.0500 U
Cadmium (dissolved)	mg/L	0.005	0.0511	-	0.000444 J	0.000391 J	0.00133	0.0011 J
Chromium Total (dissolved)	mg/L	0.1	NC	-	**0.16**	**0.165**	**0.209**	0.0805
Copper (dissolved)	mg/L	1.3	4.09	-	0.002 U	0.002 U	0.00504	-
Lead (dissolved)	mg/L	0.015	0.015	-	0.001 U	0.001 U	0.001 U	0.0031 J
Manganese (dissolved)	mg/L	NC	NC	-	0.526	0.522	0.0213	0.880
Potassium (dissolved)	mg/L	NC	NC	-	56.7	55.7	64.8	712
Selenium (dissolved)	mg/L	0.05	0.511	-	0.005 U	0.005 U	0.005 U	**0.0527[a]**
Silver (dissolved)	mg/L	0.1	0.511	-	0.001 U	0.001 U	0.001 U	0.0100 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	-	0.0100 U	0.0100 U	**0.0248[a]**	-
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	-	0.0100 U	0.0100 U	**0.0178[a]**	-
Chromium VI (hexavalent)	mg/L	0.01	0.01	-	**0.170[ab]**	**0.174[ab]**	**0.192[ab]**	-
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	-	**0.172[ab]**	**0.178[ab]**	**0.191[ab]**	-

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-10*	*MW-10*	*MW-11*	*MW-11*	*MW-11*
			Sample ID:	*GW-032410-DJB-002*	*GW-032911-DJB-003*	*GW-030509-DJB-004*	*GW-032410-DJB-003*	*GW-032911-DJB-004*
			Sample Date:	*3/24/2010*	*3/29/2011*	*3/5/2009*	*3/24/2010*	*3/29/2011*
		Criteria						
Parameters	*Units*	*Type 1 RRS*	*Type 4 RRS*					
		a	b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.0500 U	0.005 U	0.005 U
Cadmium	mg/L	0.005	0.0511	**0.00938**^{a}	0.00387	0.0050 U	0.00144	0.00366
Chromium	mg/L	0.1	NC	0.0866	**0.113**	**0.279**	**0.266**	**0.163**
Copper	mg/L	1.3	4.09	0.00572	0.00701	-	0.00908	0.00303
Lead	mg/L	0.015	0.015	0.00125	0.001 U	0.0038 J	0.00144	0.001 U
Manganese	mg/L	NC	NC	4.01	4.78	3.94	2.93	0.564
Potassium	mg/L	NC	NC	737	638	129	140	151
Selenium	mg/L	0.05	0.511	**0.0592**^{a}	0.0441	0.0151 J	0.00658	0.005 U
Silver	mg/L	0.1	0.511	0.000729 J	0.001 U	0.0100 U	0.000031 J	0.001 U
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.00251 J	0.005 U	0.0500 U	0.05 U	0.005 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.00489 J	0.00361	0.0050 U	0.007 U	0.00148
Chromium Total (dissolved)	mg/L	0.1	NC	0.0923	**0.102**	**0.292**	**0.217**	**0.179**
Copper (dissolved)	mg/L	1.3	4.09	0.02 U	0.00827	-	0.02 U	0.00697
Lead (dissolved)	mg/L	0.015	0.015	0.01 U	0.001 U	0.0100 U	0.01 U	0.001 U
Manganese (dissolved)	mg/L	NC	NC	1.34	5.19	2.22	0.346	0.591
Potassium (dissolved)	mg/L	NC	NC	702	559	123	127	115
Selenium (dissolved)	mg/L	0.05	0.511	**0.0673**^{a}	0.0433	0.0200 U	0.05 U	0.005 U
Silver (dissolved)	mg/L	0.1	0.511	0.01 U	0.001 U	0.0100 U	0.01 U	0.001 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	**0.0262**^{a}	**0.0218**^{a}	-	0.0100 U	**0.0105**^{a}
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	**0.0205**^{a}	**0.0145**^{a}	-	**0.0222**^{a}	**0.0276**^{a}
Chromium VI (hexavalent)	mg/L	0.01	0.01	**0.0605**^{ab}	**0.0909**^{ab}	-	**0.265**^{ab}	**0.152**^{ab}
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	**0.0718**^{ab}	**0.0874**^{ab}	-	**0.195**^{ab}	**0.151**^{ab}

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

PRE- AND POST-INJECTION PERFORMANCE MONITORING
ANALYTICAL RESULTS SUMMARY - OCTOBER - DECEMBER 2011
BIRDSONG PEANUT PROPERTY
COLQUITT, GEORGIA

Location ID:				MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-7D	MW-7D	MW-7D
Sample Name:				GW-100511-SAG-005	GW-100511-SAG-006	GW-112911-SAG-001	GW-122911-SAG-001	GW-122911-SAG-002	GW-031312-DJB-004	GW-031312-DJB-005	GW-100511-SAG-004	GW-112911-SAG-002	GW-122911-SAG-003
Sample Date:				10/5/2011	10/5/2011	11/29/11	12/29/2011	12/29/2011	3/13/2012	3/13/2012	10/5/2011	11/29/11	12/29/2011
		Georgia HSRA RRS			Duplicate			Duplicate		Duplicate			
Parameters	*Units*	*Type 1*	*Type 4*										
		a	*b*										
Metals(Total)													
Chromium	mg/L	0.1	NC	0.191[a]	0.193[a]	0.199[a]	0.11[a]	0.111[a]	0.189[a]	0.192[a]	0.00658	0.005 U	0.005 U
Chromium III (trivalent)	mg/L	0.01	153.3	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Chromium VI (hexavalent)	mg/L	0.01	0.01	0.193[ab]	0.199[ab]	0.125[ab]	0.110[ab]	0.113[ab]	0.193[ab]	0.202[ab]	0.0100 U	0.0100 U	0.0100 U
Metals (Dissolved)													
Chromium (dissolved)	mg/L	0.1	NC	0.19[a]	0.192[a]	0.117[a]	0.11[a]	0.117[a]	0.186[a]	0.186[a]	0.00642	0.005 U	0.005 U
Chromium III (trivalent) (dissolved)	mg/L	0.01	153.3	0.0100 U	0.0100 U	0.0100 U	0.0100 U	-	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	0.192[ab]	0.194[ab]	0.126[ab]	0.104[ab]	-	0.193[ab]	0.199[ab]	0.0100 U	0.0100 U	0.0100 U
Residual KMNO3	mg/L	NC	NC	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)			ND (0.25)	ND (0.25)	ND (0.25)

Notes:

Injection started on October 26 and completed on November 18, 2011.
0.5% concentrated sodium thiosulfate and ferrous sulfate solution was injected in 56 DPT points
mg/L - milligram per liter
U - Non-detect at the associated value.
NC - No established Criteria
0.193[a] - exceeds Type 1 Risk Reduction Standard (RRS)
0.193[b] - exceeds Type 4 Risk Reduction Standard (RRS)

TABLE

PRE- AND POST-INJECTION PERFORMANCE MONITORING
ANALYTICAL RESULTS SUMMARY - OCTOBER - DECEMBER 2011
BIRDSONG PEANUT PROPERTY
COLQUITT, GEORGIA

Location ID:				MW-10	MW-10	MW-10	MW-10	MW-11	MW-11	MW-11	MW-11	MW-17D	MW-17D	MW-17D	MW-17D
Sample Name:				GW-100511-SAG-001	GW-112911-SAG-003	GW-122911-SAG-004	GW-031312-DJB-001	GW-100511-SAG-003	GW-112911-SAG-006	GW-122911-SAG-006	GW-031312-DJB-002	GW-100511-SAG-002	GW-112911-SAG-004	GW-112911-SAG-005	GW-122911-SAG-005
Sample Date:				10/5/2011	11/29/11	12/29/2011	3/13/2012	10/5/2011	11/29/11	12/29/2011	3/13/2012	10/5/2011	11/29/11	11/29/11	12/29/2011
		Georgia HSRA RRS													
Parameters	*Units*	*Type 1* *a*	*Type 4* *b*												
Metals(Total)															
Chromium	mg/L	0.1	NC	0.118^{a}	0.099	0.0884	0.0928	0.199^{a}	0.211^{a}	0.204^{a}	0.207^{a}	0.005 U	0.005 U	0.005 U	0.005 U
Chromium III (trivalent)	mg/L	0.01	153.3	0.0162^{a}	0.0100 U	0.0184^{a}	0.0128^{a}	0.0100 U	0.0433^{a}	0.0100 U	0.0433^{a}	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Chromium VI (hexavalent)	mg/L	0.01	0.01	0.102^{ab}	0.0943^{ab}	0.0700^{ab}	0.080^{ab}	0.215^{ab}	0.168^{ab}	0.240^{ab}	0.163 J^{ab}	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Metals (Dissolved)															
Chromium (dissolved)	mg/L	0.1	NC	0.0988	0.0875	0.0792	0.0891	0.174^{a}	0.194^{a}	0.187^{a}	0.146^{a}	0.005 U	0.005 U	0.005 U	0.005 U
Chromium III (trivalent) (dissolved)	mg/L	0.01	153.3	0.0140^{a}	0.0100 U	0.0180^{a}	0.0100 U	0.0100 U	0.0259^{a}	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	0.0848^{ab}	0.0932^{ab}	0.0612^{ab}	0.080^{ab}	0.184^{ab}	0.168^{ab}	0.178^{ab}	0.217 J^{ab}	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Residual KMNO3	mg/L	NC	NC	ND (0.25)	ND (0.25)	ND (0.25)		ND (0.25)	ND (0.25)	ND (0.25)		ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)

Notes:

Injection started on October 26 and completed on November 18, 2011.
0.5% concentrated sodium thiosulfate and ferrous sulfate solution was injected i
mg/L - milligram per liter
U - Non-detect at the associated value.
NC - No established Criteria
0.193^{a} - exceeds Type 1 Risk Reduction Standard (RRS)
0.193^{b} - exceeds Type 4 Risk Reduction Standard (RRS)

TABLE

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS (MARCH 2012)
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-5*	*MW-6*	*MW-6*	*MW-10*	*MW-11*
			Sample ID:	*GW-031312-DJB-003*	*GW-031312-DJB-004*	*GW-031312-DJB-005*	*GW-031312-DJB-001*	*GW-031312-DJB-002*
			Sample Date:	*3/13/2012*	*3/13/2012*	*3/13/2012* *Duplicate*	*3/13/2012*	*3/13/2012*
		Criteria						
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b					
Total Metals								
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.0007 U	**0.00951[a]**	**0.00964[a]**	0.00405	0.00112
Chromium	mg/L	0.1	NC	0.005 U	**0.189[a]**	**0.192[a]**	0.0928	**0.207[a]**
Copper	mg/L	1.3	4.09	0.002 U	0.00252	0.00265	0.0266	0.0053
Lead	mg/L	0.015	0.015	0.001 U	0.001 U	0.001 U	0.00118	0.00127
Manganese	mg/L	NC	NC	0.0408	0.212	0.216	14.5	0.685 J
Potassium	mg/L	NC	NC	1.22	56.5	57.7	475	121
Selenium	mg/L	0.05	0.511	0.005 U	0.005 U	0.005 U	0.0457	0.005 U
Silver	mg/L	0.1	0.511	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dissolved Metals								
Arsenic (dissolved)	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.0007 U	**0.00889[a]**	**0.00862[a]**	0.00384	0.00102
Chromium Total (dissolved)	mg/L	0.1	NC	0.005 U	**0.186[a]**	**0.186[a]**	0.0891	**0.146[a]**
Copper (dissolved)	mg/L	1.3	4.09	0.002 U	0.00203	0.002 U	0.023	0.00304
Lead (dissolved)	mg/L	0.015	0.015	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Manganese (dissolved)	mg/L	NC	NC	0.017	0.198	0.194	15	1.43 J
Potassium (dissolved)	mg/L	NC	NC	1.29	55.3	55.1	487	108
Selenium (dissolved)	mg/L	0.05	0.511	0.005 U	0.005 U	0.005 U	0.0389	0.005 U
Silver (dissolved)	mg/L	0.1	0.511	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Speciated Chromium								
Chromium III (trivalent)	mg/L	0.01	153	0.0100 U	0.0100 U	0.0100 U	**0.0128[a]**	**0.0433[a]**
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	0.0100 U	0.0100 U	0.0100 U	0.0100 U	0.0100 U
Chromium VI (hexavalent)	mg/L	0.01	0.01	0.0100 U	**0.193[ab]**	**0.202[ab]**	**0.0800[ab]**	**0.163 J[ab]**
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	0.0100 U	**0.193[ab]**	**0.199[ab]**	**0.0800[ab]**	**0.217 J[ab]**

Notes:
J - Estimated concentration.
NC - No criteria.
U - Not present at or above the associated value.
1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript(s).

018283-TBL3

Conestoga-Rovers & Associates: Status Update- Pilot Injection and Performance Monitoring; and Annual Groundwater Monitoring and Reporting

Report Date: 06-27-2012

TABLE

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-5*	*MW-5*	*MW-5*	*MW-5*	*MW-5*	*MW-6*	*MW-6*
			Sample ID:	*GW-030509-DJB-005*	*GW-032410-DJB-001*	*GW-032911-DJB-001*	*GW-032911-DJB-002*	*GW-031312-DJB-003*	*GW-030509-DJB-001*	*GW-030509-DJB-002*
			Sample Date:	*3/5/2009*	*3/24/2010*	*3/29/2011*	*3/29/2011* *Duplicate*	*3/13/2012*	*3/5/2009*	*3/5/2009* *Duplicate*
		Criteria								
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b							
Total Metals										
Arsenic	mg/L	0.01	0.01	0.0500 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0500 U	0.0500 U
Cadmium	mg/L	0.005	0.0511	0.0050 U	0.000126 J	0.0007 U	0.0007 U	0.0007 U	0.0004 J	0.0007 J
Chromium	mg/L	0.1	NC	0.0057 J	0.0267	0.005 U	0.005 U	0.005 U	**0.298**[a]	**0.294**[a]
Copper	mg/L	1.3	4.09	-	0.000288 J	0.002 U	0.002 U	0.002 U	-	-
Lead	mg/L	0.015	0.015	0.0100 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0100 U	0.0100 U
Manganese	mg/L	NC	NC	0.175 J	2.23	0.0502	0.0517	0.0408	4.05	4.07
Potassium	mg/L	NC	NC	6.09	29.6	3.7	3.65	1.22	51.4	53.2
Selenium	mg/L	0.05	0.511	0.0200 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0140 J	0.0156 J
Silver	mg/L	0.1	0.511	0.0004 J	0.001 U	0.001 U	0.001 U	0.001 U	0.0100 U	0.0009 J
Dissolved Metals										
Arsenic (dissolved)	mg/L	0.01	0.01	0.0500 U	0.00748 J	0.005 U	0.005 U	0.005 U	0.0500 U	-
Cadmium (dissolved)	mg/L	0.005	0.0511	0.0050 U	0.0007 U	0.0007 U	0.0007 U	0.0007 U	0.0050 U	-
Chromium Total (dissolved)	mg/L	0.1	NC	0.0056 J	0.0286 J	0.005 U	0.005 U	0.005 U	**0.298**[a]	-
Copper (dissolved)	mg/L	1.3	4.09	-	0.02 U	0.002 U	0.002 U	0.002 U	-	-
Lead (dissolved)	mg/L	0.015	0.015	0.0100 U	0.01 U	0.001 U	0.001 U	0.001 U	0.0100 U	-
Manganese (dissolved)	mg/L	NC	NC	0.376 J	1.46	0.005 U	0.005 U	0.017	3.42	-
Potassium (dissolved)	mg/L	NC	NC	8.52	27.4	3.72	3.57	1.29	60.6	-
Selenium (dissolved)	mg/L	0.05	0.511	0.0200 U	0.05 U	0.005 U	0.005 U	0.005 U	0.0200 U	-
Silver (dissolved)	mg/L	0.1	0.511	0.0005 J	0.01 U	0.001 U	0.001 U	0.001 U	0.0007 J	-
Speciated Chromium										
Chromium III (trivalent)	mg/L	0.01	153	-	0.0100 U	0.0100 U	0.0100 U	0.0100 U	-	-
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	-	0.00740 J	0.0100 U	0.0100 U	0.0100 U	-	-
Chromium VI (hexavalent)	mg/L	0.01	0.01	-	**0.0246**[ab]	0.0100 U	0.0100 U	0.0100 U	-	-
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	-	**0.0212**[ab]	0.0100 U	0.0100 U	0.0100 U	-	-

Notes:

J - Estimated concentration.

NC - No criteria.

U - Not present at or above the associated value.

1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

Parameters	*Units*	*Criteria* *Type 1 RRS* a	 *Type 4 RRS* b	*MW-6* *GW-032410-DJB-004* *3/24/2010*	*MW-6* *GW-032410-DJB-005* *3/24/2010* *Duplicate*	*MW-6* *GW-032911-DJB-005* *3/29/2011*	*MW-6* *GW-031312-DJB-004* *3/13/2012*	*MW-6* *GW-031312-DJB-005* *3/13/2012* *Duplicate*	*MW-10* *GW-030509-DJB-003* *3/5/2009*	*MW-10* *GW-032410-DJB-002* *3/24/2010*
				Sample Location: / *Sample ID:* / *Sample Date:*						
Total Metals										
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0500 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.000692 J	0.00126	0.00223	**0.00951**[a]	**0.00964**[a]	0.0014 J	**0.00938**[a]
Chromium	mg/L	0.1	NC	**0.172**[a]	**0.172**[a]	**0.217**[a]	**0.189**[a]	**0.192**[a]	0.0760	0.0866
Copper	mg/L	1.3	4.09	0.000176 J	0.000229 J	0.002 U	0.00252	0.00265	-	0.00572
Lead	mg/L	0.015	0.015	0.001 U	0.00018 J	0.001 U	0.001 U	0.001 U	0.0077 J	0.00125
Manganese	mg/L	NC	NC	0.473	0.483	0.0718	0.212	0.216	1.31	4.01
Potassium	mg/L	NC	NC	58.1	65.3	70.6	56.5	57.7	788	737
Selenium	mg/L	0.05	0.511	0.005 U	0.000922 J	0.005 U	0.005 U	0.005 U	**0.0586**[a]	**0.0592**[a]
Silver	mg/L	0.1	0.511	0.000219 J	0.000014 J	0.001 U	0.001 U	0.001 U	0.0100 U	0.000729 J
Dissolved Metals										
Arsenic (dissolved)	mg/L	0.01	0.01	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0500 U	0.00251 J
Cadmium (dissolved)	mg/L	0.005	0.0511	0.000444 J	0.000391 J	0.00133	**0.00889**[a]	**0.00862**[a]	0.0011 J	0.00489 J
Chromium Total (dissolved)	mg/L	0.1	NC	**0.16**[a]	**0.165**[a]	**0.209**[a]	**0.186**[a]	**0.186**[a]	0.0805	0.0923
Copper (dissolved)	mg/L	1.3	4.09	0.002 U	0.002 U	0.00504	0.00203	0.002 U	-	0.02 U
Lead (dissolved)	mg/L	0.015	0.015	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0031 J	0.01 U
Manganese (dissolved)	mg/L	NC	NC	0.526	0.522	0.0213	0.198	0.194	0.880	1.34
Potassium (dissolved)	mg/L	NC	NC	56.7	55.7	64.8	55.3	55.1	712	702
Selenium (dissolved)	mg/L	0.05	0.511	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**0.0527**[a]	**0.0673**[a]
Silver (dissolved)	mg/L	0.1	0.511	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0100 U	0.01 U
Speciated Chromium										
Chromium III (trivalent)	mg/L	0.01	153	0.0100 U	0.0100 U	**0.0248**[a]	0.0100 U	0.0100 U	-	**0.0262**[a]
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	0.0100 U	0.0100 U	**0.0178**[a]	0.0100 U	0.0100 U	-	**0.0205**[a]
Chromium VI (hexavalent)	mg/L	0.01	0.01	**0.170**[ab]	**0.174**[ab]	**0.192**[ab]	**0.193**[ab]	**0.202**[ab]	-	**0.0605**[ab]
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	**0.172**[ab]	**0.178**[ab]	**0.191**[ab]	**0.193**[ab]	**0.199**[ab]	-	**0.0718**[ab]

Notes:

J - Estimated concentration.

NC - No criteria.

U - Not present at or above the associated value.

1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

TABLE

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS
ANNUAL GROUNDWATER MONITORING AND SAMPLING
BIRDSONG PEANUT PROPERTY (HSI NO. 10710)
COLQUITT, GEORGIA

			Sample Location:	*MW-10*	*MW-10*	*MW-11*	*MW-11*	*MW-11*	*MW-11*
			Sample ID:	*GW-032911-DJB-003*	*GW-031312-DJB-001*	*GW-030509-DJB-004*	*GW-032410-DJB-003*	*GW-032911-DJB-004*	*GW-031312-DJB-002*
			Sample Date:	*3/29/2011*	*3/13/2012*	*3/5/2009*	*3/24/2010*	*3/29/2011*	*3/13/2012*
		Criteria							
Parameters	*Units*	*Type 1 RRS* a	*Type 4 RRS* b						
Total Metals									
Arsenic	mg/L	0.01	0.01	0.005 U	0.005 U	0.0500 U	0.005 U	0.005 U	0.005 U
Cadmium	mg/L	0.005	0.0511	0.00387	0.00405	0.0050 U	0.00144	0.00366	0.00112
Chromium	mg/L	0.1	NC	**0.113[a]**	0.0928	**0.279[a]**	**0.266[a]**	**0.163[a]**	**0.207[a]**
Copper	mg/L	1.3	4.09	0.00701	0.0266	-	0.00908	0.00303	0.0053
Lead	mg/L	0.015	0.015	0.001 U	0.00118	0.0038 J	0.00144	0.001 U	0.00127
Manganese	mg/L	NC	NC	4.78	14.5	3.94	2.93	0.564	0.685 J
Potassium	mg/L	NC	NC	638	475	129	140	151	121
Selenium	mg/L	0.05	0.511	0.0441	0.0457	0.0151 J	0.00658	0.005 U	0.005 U
Silver	mg/L	0.1	0.511	0.001 U	0.001 U	0.0100 U	0.000031 J	0.001 U	0.001 U
Dissolved Metals									
Arsenic (dissolved)	mg/L	0.01	0.01	0.005 U	0.005 U	0.0500 U	0.05 U	0.005 U	0.005 U
Cadmium (dissolved)	mg/L	0.005	0.0511	0.00361	0.00384	0.0050 U	0.007 U	0.00148	0.00102
Chromium Total (dissolved)	mg/L	0.1	NC	**0.102[a]**	0.0891	**0.292[a]**	**0.217[a]**	**0.179[a]**	**0.146[a]**
Copper (dissolved)	mg/L	1.3	4.09	0.00827	0.023	-	0.02 U	0.00697	0.00304
Lead (dissolved)	mg/L	0.015	0.015	0.001 U	0.001 U	0.0100 U	0.01 U	0.001 U	0.001 U
Manganese (dissolved)	mg/L	NC	NC	5.19	15	2.22	0.346	0.591	1.43 J
Potassium (dissolved)	mg/L	NC	NC	559	487	123	127	115	108
Selenium (dissolved)	mg/L	0.05	0.511	0.0433	0.0389	0.0200 U	0.05 U	0.005 U	0.005 U
Silver (dissolved)	mg/L	0.1	0.511	0.001 U	0.001 U	0.0100 U	0.01 U	0.001 U	0.001 U
Speciated Chromium									
Chromium III (trivalent)	mg/L	0.01	153	**0.0218[a]**	**0.0128[a]**	-	0.0100 U	**0.0105[a]**	**0.0433[a]**
Chromium III (trivalent) (dissolved)	mg/L	0.01	153	**0.0145[a]**	0.0100 U	-	**0.0222[a]**	**0.0276[a]**	0.0100 U
Chromium VI (hexavalent)	mg/L	0.01	0.01	**0.0909[ab]**	**0.0800[ab]**	-	**0.265[ab]**	**0.152[ab]**	**0.163 J[ab]**
Chromium VI (hexavalent) (dissolved)	mg/L	0.01	0.01	**0.0874[ab]**	**0.0800[ab]**	-	**0.195[ab]**	**0.151[ab]**	**0.217 J[ab]**

Notes:

J - Estimated concentration.

NC - No criteria.

U - Not present at or above the associated value.

1. Exceedences of Georgia HSRA Type 1 RRS (a) and Type 4 RRS (b) are shaded, bordered and denoted in red, bold font with the appropriate superscript.

Table 3: Summary of Historical Ground-Water Laboratory Analytical Results – June 2007 to April 2014

(Page 1 of 4)

Parameters	Date	Sample Identification (results in mg/L unless otherwise noted) [1]						GA EPD HSRA [2] RRS Type 1 / RRS Type 4
		MW-5	MW-6	MW-7D	MW-10	MW-11 [3]	MW-17D	
Chromium	06/27/07	NS	**0.701**	NS	NS	NS	NS	***0.1 / No Type 4 RRS***
(total)	03/05/09	0.0057 J	**0.298**/**0.294** D	NS	0.0760	**0.279**	NS	
	03/24/10	0.0267	**0.172**/**0.172** D	NS	0.0866	**0.266**	NS	
	03/29/11	0.005 U/D	**0.217**	NS	**0.113**	**0.163**	NS	
	10/05/11	0.005 U	**0.191**/**0.193** D	0.00658	**0.118**	**0.199**	0.005 U	
	11/29/11	NS	**0.199**	0.005 U	0.099	**0.211**	0.005 U	
	12/29/11	NS	**0.11**/**0.111** D	0.005 U	0.0884	**0.204**	0.005 U	
	03/13/12	0.005 U	**0.189**/**0.192** D	NS	0.0928	**0.207**	NS	
	04/16-17/13	NS	NS	NS	NS	NS	NS	
	04/01/14	NS	0.0472	0.0939	**0.101**	NS	0.0100 U/*D	
Chromium III (+3)	06/27/07	NS	NS	NS	NS	NS	NS	***0.01 / 153.3***
(total)	03/05/09	NS	NS	NS	NS	NS	NS	
	03/24/10	0.0100 U	0.0100 U/D	NS	**0.0262**	0.0100 U	NS	
	03/29/11	0.0100 U/D	**0.248**	NS	**0.0218**	**0.0105**	NS	
	10/05/11	NS	0.0100 U/D	0.0100 U	**0.0162**	0.0100 U	0.0100 U	
	11/29/11	NS	0.0100 U	0.0100 U	0.0100 U	**0.0433**	0.0100 U	
	12/29/11	NS	0.0100 U	0.0100 U	**0.0184**	0.0100 U	0.0100 U	
	03/13/12	0.0100 U	0.0100 U/D	NS	**0.0128**	**0.0433**	NS	
	04/16-17/13	NS	NS	NS	NS	NS	NS	
	04/01/14	NS	**0.0113**	**0.0939**	0.0100 U	NS	0.0100 U/*D	

Notes and acronym definitions are listed on page 4.

Table 3: Summary of Historical Ground-Water Laboratory Analytical Results – June 2007 to April 2014
(Page 2 of 4)

Parameters	Date	Sample Identification (results in mg/L unless otherwise noted) [1]						GA EPD HSRA [2] RRS Type 1 / RRS Type 4
		MW-5	MW-6	MW-7D	MW-10	MW-11 [3]	MW-17D	
Chromium VI (+6) (total)	06/27/07	NS	NS	NS	NS	NS	NS	***0.01 / 0.01***
	03/05/09	NS	NS	NS	NS	NS	NS	
	03/24/10	**0.246**	**0.170/0.174**	NS	**0.605**	**0.265**	NS	
	03/29/11	0.0100 U/D	**0.192**	NS	**0.0909**	**0.152**	NS	
	10/05/11	NS	**0.193/0.199** D	0.0100 U	**0.102**	**0.215**	0.0100 U	
	11/29/11	NS	**0.125**	0.0100 U	**0.0943**	**0.168**	0.0100 U	
	12/29/11	NS	**0.110/0.113** D	0.0100 U	**0.0700**	**0.240**	0.0100 U	
	03/13/12	0.0100 U	**0.193/0.202** D	NS	**0.0800**	**0.163** J	NS	
	04/16-17/13	NS	NS	NS	NS	NS	NS	
	04/01/14	NS	**0.0359**	0.0100 U	**0.104**	NS	0.0100 U/*D	
Chromium (total dissolved)	06/27/07	NS	**NS**	NS	**NS**	NS	NS	***0.1 / No Type 4 RRS***
	03/05/09	0.0056 J	**0.298**	NS	**NS**	0.292	NS	
	03/24/10	0.0286 J	**0.16/0.165 D**	NS	**NS**	0.217	NS	
	03/29/11	0.005 U/D	**0.209**	NS	**0.102**	0.179	NS	
	10/05/11	NS	**0.19/0.192 D**	0.00642	**0.0988**	0.174	0.005 U	
	11/29/11	NS	**0.117**	0.005 U	**0.0875**	0.194	0.005 U	
	12/29/11	NS	**0.11/0.117**	0.005 U	**0.0792**	0.187	0.005 U	
	03/13/12	0.005 U	**0.186/0.186 D**	NS	**0.0891**	0.146	NS	
	04/16-17/13	NS	0.0692	0.005 U	**0.114**	NS	0.005 U/D	
	04/01/14	NS	NS	NS	NS	NS	NS	

Notes and acronym definitions are listed on page 4.

Table 3: Summary of Historical Ground-Water Laboratory Analytical Results – June 2007 to April 2014
(Page 3 of 4)

		Sample Identification (results in mg/L unless otherwise noted) [1]						GA EPD HSRA [2]
Parameters	Date	MW-5	MW-6	MW-7D	MW-10	MW-11 [3]	MW-17D	RRS Type 1 / RRS Type 3
Chromium III (+3)	06/27/07	NS	NS	NS	NS	NS	NS	***0.01 / 153.3***
(dissolved)	03/05/09	NS	NS	NS	NS	NS	NS	
	03/24/10	0.00740 J	0.0100 U/D	NS	**0.0205**	**0.0222**	NS	
	03/29/11	0.0100 U/D	0.0178	NS	**0.0145**	**0.0276**	NS	
	10/05/11	NS	0.0100 U/D	0.0100 U	**0.0140**	0.0100 U	0.0100 U	
	11/29/11	NS	0.0100 U	0.0100 U	0.0100 U	**0.0259**	0.0100 U	
	12/29/11	NS	0.0100 U	0.0100 U	**0.0180**	0.0100 U	0.0100 U	
	03/13/12	0.0100 U	0.0100 U/D	NS	0.0100 U	0.0100 U	NS	
	04/16-17/13	NS	0.0100 U	0.0100 U	0.0100 U	NS	0.0010 U/D	
	04/01/14	NS	NS	NS	NS	NS	NS	
Chromium VI (+6)	06/27/07	NS	NS	NS	NS	NS	NS	***0.01 / 0.01***
(dissolved)	03/05/09	NS	NS	NS	NS	NS	NS	
	03/24/10	**0.0212**	**0.172/0.178**	NS	**0.0718**	**0.195**	NS	
	03/29/11	0.0100 U/D	**0.191**	NS	**0.0874**	**0.151**	NS	
	10/05/11	NS	**0.192/0.194 D**	0.0100 U	**0.0848**	**0.184**	0.0100 U	
	11/29/11	NS	**0.126**	0.0100 U	**0.0932**	**0.168**	0.0100 U	
	12/29/11	NS	**0.104**	0.0100 U	**0.0612**	**0.178**	0.0100 U	
	03/13/12	0.0100 U	**0.193/0.199** D	NS	**0.0800**	**0.217** J	NS	
	04/16-17/13	NS	**0.0859**	0.0010 U	**0.126**	NS	0.0010 U/D	
	04/01/14	NS	NS	NS	NS	NS	NS	

Notes and acronym definitions are listed on page 4.

Table 3: Summary of Historical Ground-Water Laboratory Analytical Results – June 2007 to April 2014
(Page 4 of 4)

Notes:

[1]: Groundwater samples were collected by Conestoga-Rovers Associates, Inc. from June 2007 through March 2012. Groundwater samples were collected by BBJ Group from April 2013 to April 2014 and submitted to Analytical Environmental Services, Inc. (AES) of Atlanta, Georgia and shipped to the laboratory for chemical analysis of total and dissolved chromium using USEPA Method 6020A and speciated chromium using USEPA Method 7196. Water quality parameter measurements (i.e., pH, temperature, DO, conductivity, and ORP) were obtained using a YSI 556 water quality meter.

[2]: GA EPD HSRA Type 1 and 4 RRS obtained from the GDNR Chapter 391-3-19-.07 Risk Reduction Standards (Appendix III Media Target Concentrations and Standard Exposure Assumptions). Type I RRS shall pose no significant risk on the basis of standardized exposure assumptions and defined risk level for residential properties. Type 4 RRS shall pose no significant risk on the basis of site-specific risk assessment for non-residential properties.

[3]: Monitoring well MW-11 could not be located during the April 16-17, 2013 or March 31-April 1, 2014 groundwater monitoring events.

Acronym Definitions:

0.126:	Value exceeds the Type 1 RRS.
0.126:	Value exceeds the Type 4 RRS.
U:	not detected at concentrations exceeding the laboratory RLs
HSRA:	Hazardous Site Response Act
USEPA:	United States Environmental Protection Agency
MW:	Monitoring Well
RL:	Reporting Limit (RL)
DO:	Dissolved Oxygen
ORP:	Oxidation-Reduction Potential (millivolts)
mg/L:	milligrams per Liter
GA EPD:	Georgia Environmental Protection Division
NS:	not sampled
RRS:	Risk Reduction Standards
D:	duplicate (sample)
J:	estimated concentration
GDNR:	Georgia Department of Natural Resources

Prepared By/Date: LML / 08.25.15
Checked By/Date: KLM / 08.25.15

Table 4: Monitoring Well and Groundwater Elevation Data – March 31, 2014 [1, 2]
(Page 1 of 2)

Monitoring Well Identification	Date Installed [4]	Well Construction Materials [4]	Depth to Bottom of Well (feet btoc) [3]	Screened Interval (feet bgs) [4]	Top of Casing Elevation (feet)	Depth to Ground Water (feet btoc) [3]	Groundwater Elevation (feet)	Comments
MW-4	08/28/00	SCH 40 PVC	15.81	7.5-17.5	92.70	0.46	92.24	Repaired Well Cap Assembly
MW-5	08/29/00	SCH 40 PVC	13.08	40-45	95.57	3.15	92.42	Replaced Bolts
MW-6	08/30/00	SCH 40 PVC	54.63	50-55	94.26	10.44	83.82	Repaired Well Cap Assembly
MW-7D	07/26/01	SCH 40 PVC	79.81	74.5-79.5	93.75	10.00	83.75	Replaced Bolts
MW-8	07/26/01	SCH 40 PVC	49.22	43-48	93.57	10.04	83.53	Replaced Bolts and Well Plug
MW-9	07/26/01	SCH 40 PVC	27.55	17.5-27.5	92.85	5.07	87.78	Good Condition
MW-10	09/04/02	SCH 40 PVC	NM	19-29	U	NM	NC	PVC Casing Cut and Repaired
MW-11	08/12/03	SCH 40 PVC	NM	20-30	94.44	NM	NC	Could Not Locate
MW-12	04/24/03	SCH 40 PVC	NM	U	95.46	NM	NC	Could Not Locate
MW-13	08/11/05	SCH 40 PVC	18.92	8-18	93.76	8.85	84.91	Repaired Well Cap Assembly
MW-14	08/11/05	SCH 40 PVC	NM	8-13	96.72	NM	NC	Could Not Locate
MW-15	08/11/05	SCH 40 PVC	19.29	10-20	93.30	5.79	87.51	Replaced Bolts and Well Plug
MW-16	08/11/05	SCH 40 PVC	NM	10-20	96.34	NM	NC	Could Not Locate
MW-17D	08/12/05	SCH 40 PVC	75.03	65-75	93.40	9.65	83.75	Replaced Well Plug

Table 4: Monitoring Well and Groundwater Elevation Data – March 31, 2014 [1, 2]
(Page 2 of 2)

Notes:

[1]: Well elevation survey data from Table 2 of *Status Update – Pilot Injection and Performance Monitoring; and Annual Groundwater Monitoring and Reporting* document prepared by Conestoga-Rovers & Associates, Inc. (dated June 27, 2012).

[2]: Monitoring wells MW-4, MW-5, MW-6, MW-7D, MW-8, MW-9, MW-1, MW-15, MW-16 and MW-17D consist of 2-inch diameter PVC and were installed with locking caps and flush-mount steel covers. Monitoring wells MW-10 and MW-11 consist of 1-inch diameter PVC and were installed with locking caps and flush-mount steel covers.

[3]: Depths to groundwater and bottom of well were recorded by BBJ Group on March 31, 2014 using a Solinst interface probe, Model No. 122.

[4]: Date of installation, screened interval and material of construction data from the *HSRA Compliance Status Report* prepared by Conestoga-Rovers & Associates, Inc. (September 2005).

Acronym Definitions:

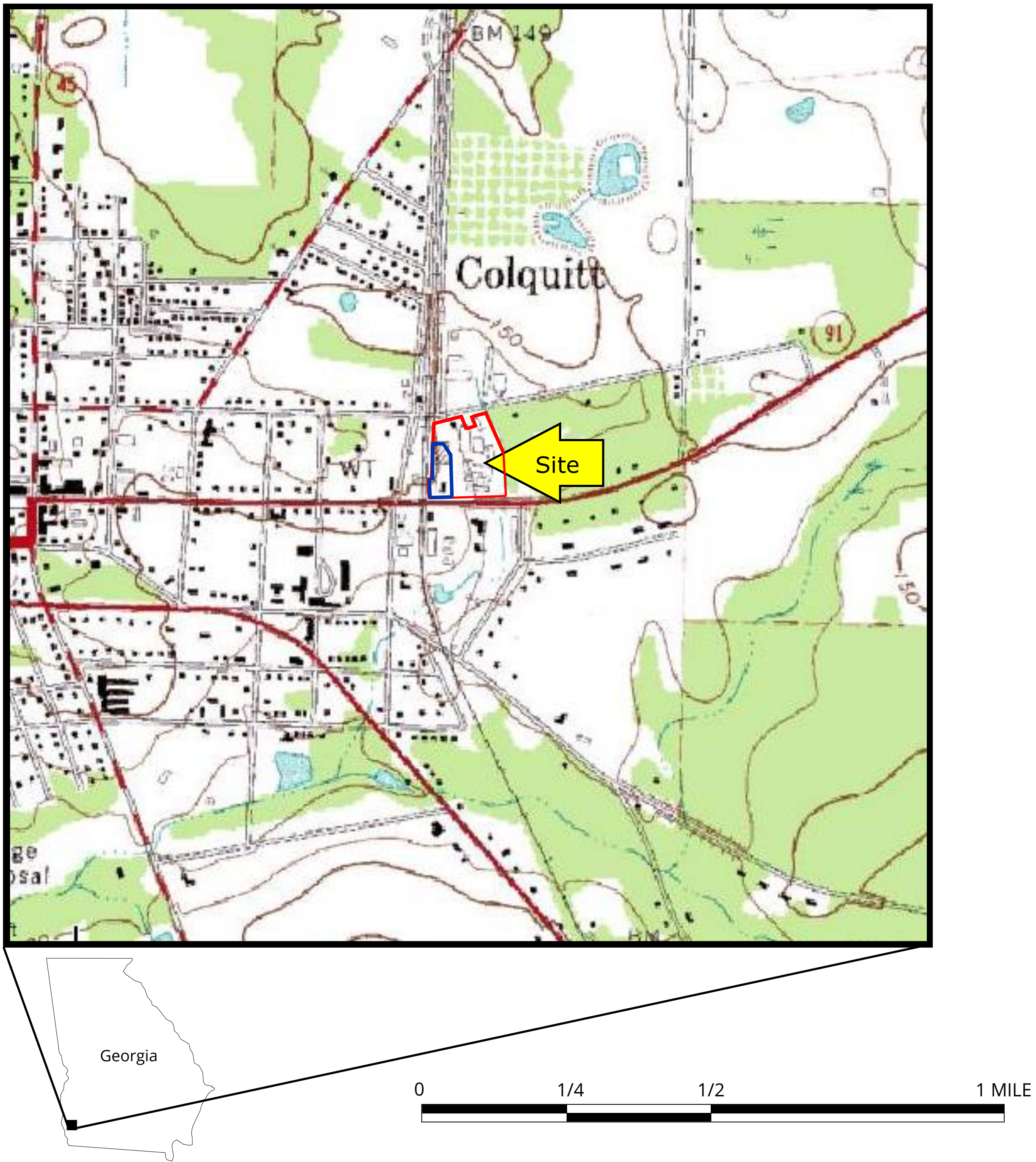
btoc:	below top of casing
MW:	monitoring well
SCH:	schedule
PVC:	polyvinyl chloride
BBJ Group:	BBJ Group, LLC
NC:	not calculated
NM:	not measured
U:	Unknown, not identified in available documentation
HSRA:	Hazardous Site Response Act

Prepared By/Date: TAD / 04.23.14
Checked By/Date: JTB / 04.23.14

FIGURES

Source: Trails.com, USGS Colquitt, Georgia Quadrangle,
7.5 Minute Series (Topographic), 1999-2013

N



Quadrangle Location

LEGEND

🟥	Approximate Subject Property Boundary
🟦	Approximate "Site" Boundary

Prepared by: LMG / Date: 07.01.15
Checked by: JCT / Date: 07.01.15

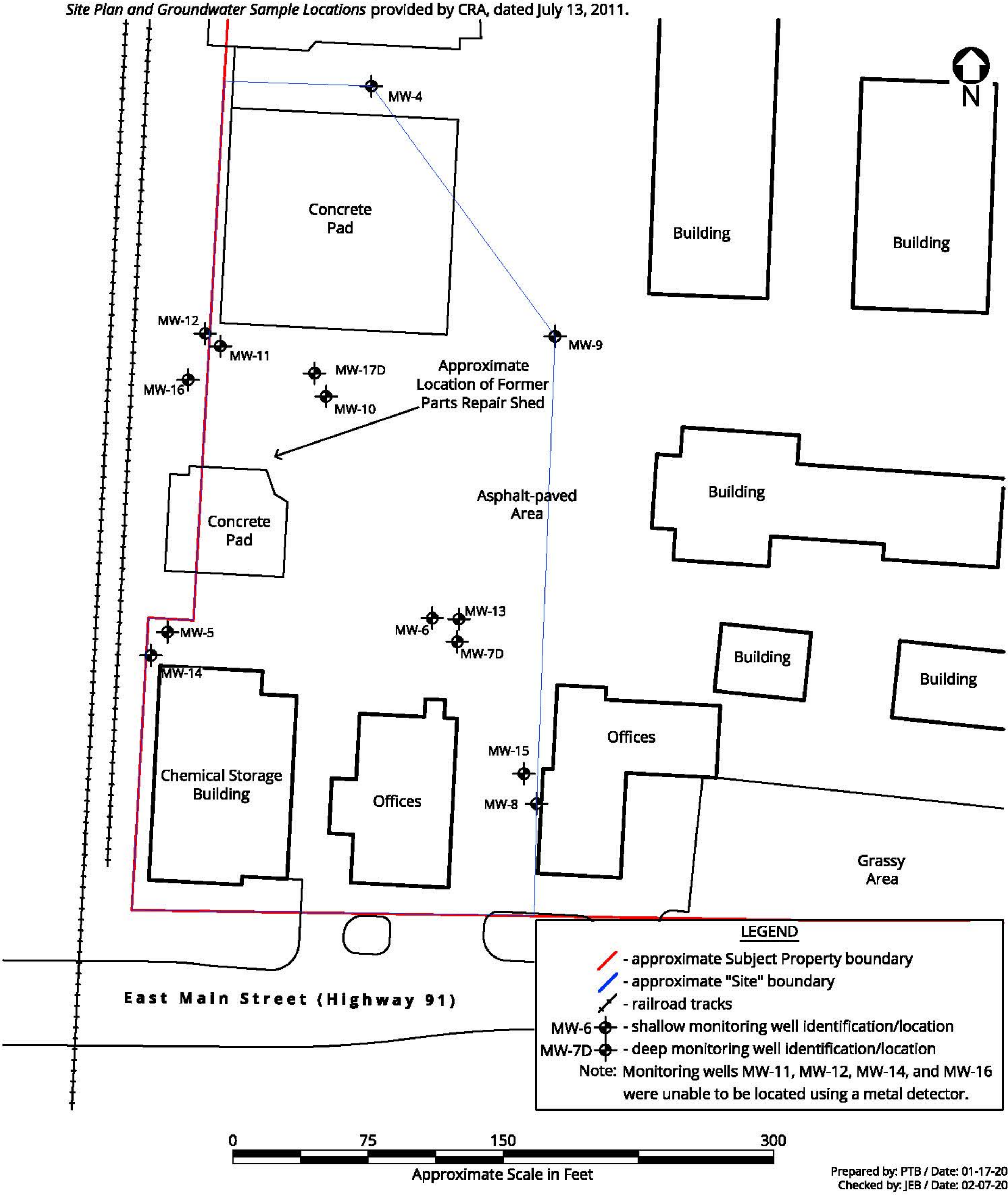
Birdsong Peanut Plant
608 East Main Street (Hwy 91)
Colquitt, Georgia

BBJ GROUP

Site Location Map

Project No. R1507990 Figure 1

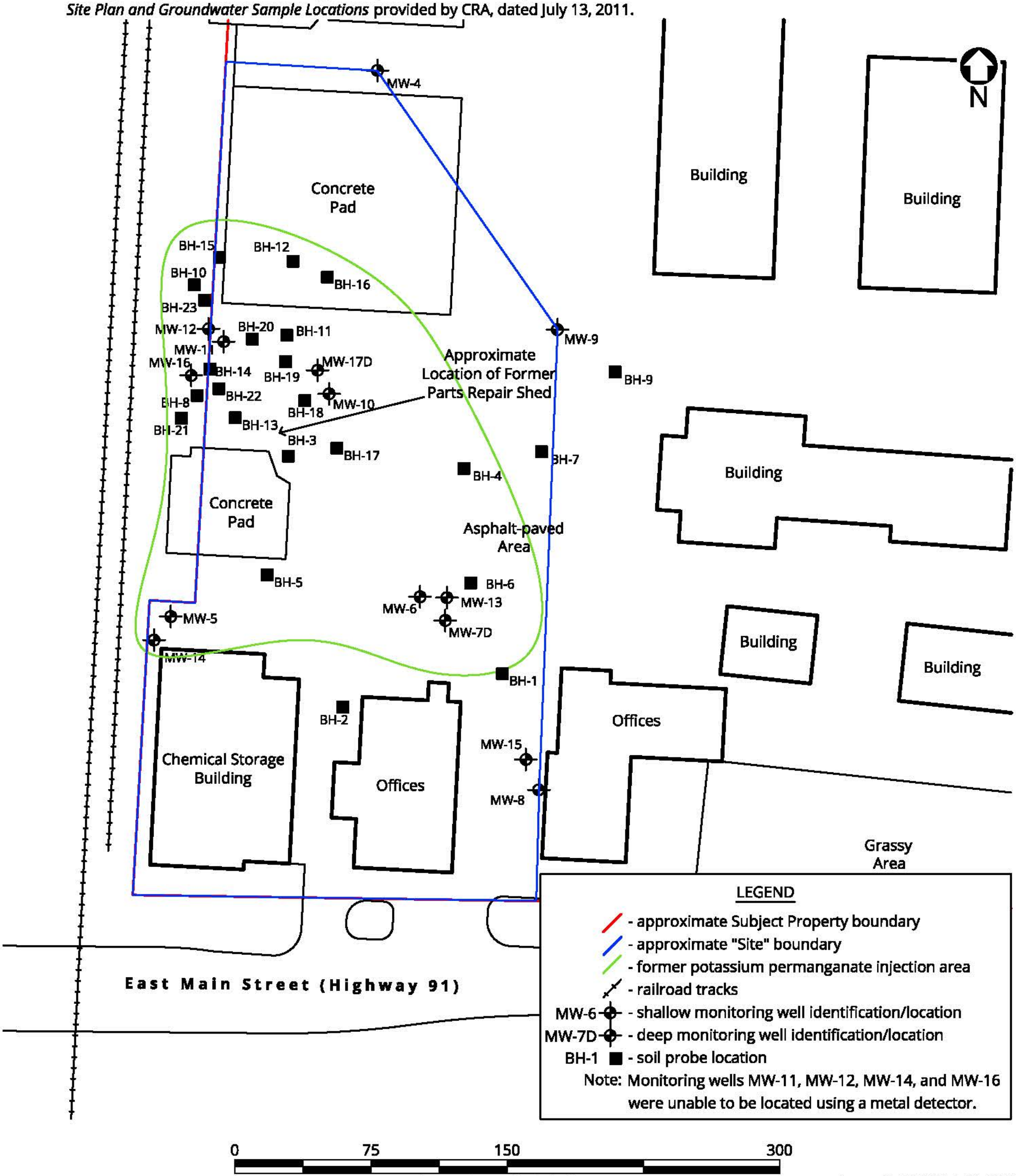
Sources: Site reconnaissance performed by Ms. Tracy Dionne of BBJ Group on March 30 and April 1, 2014.
Aerial photograph reviewed on GoogleEarth, dated November 28, 2014.
Site Plan and Groundwater Sample Locations provided by CRA, dated July 13, 2011.



Prepared by: PTB / Date: 01-17-2017
Checked by: JEB / Date: 02-07-2016

Birdsong Peanut Plant 608 E Main Street (Hwy 91) Colquitt, Georgia	BBJ GROUP	General Site Plan Project No. R1507990 Figure 2

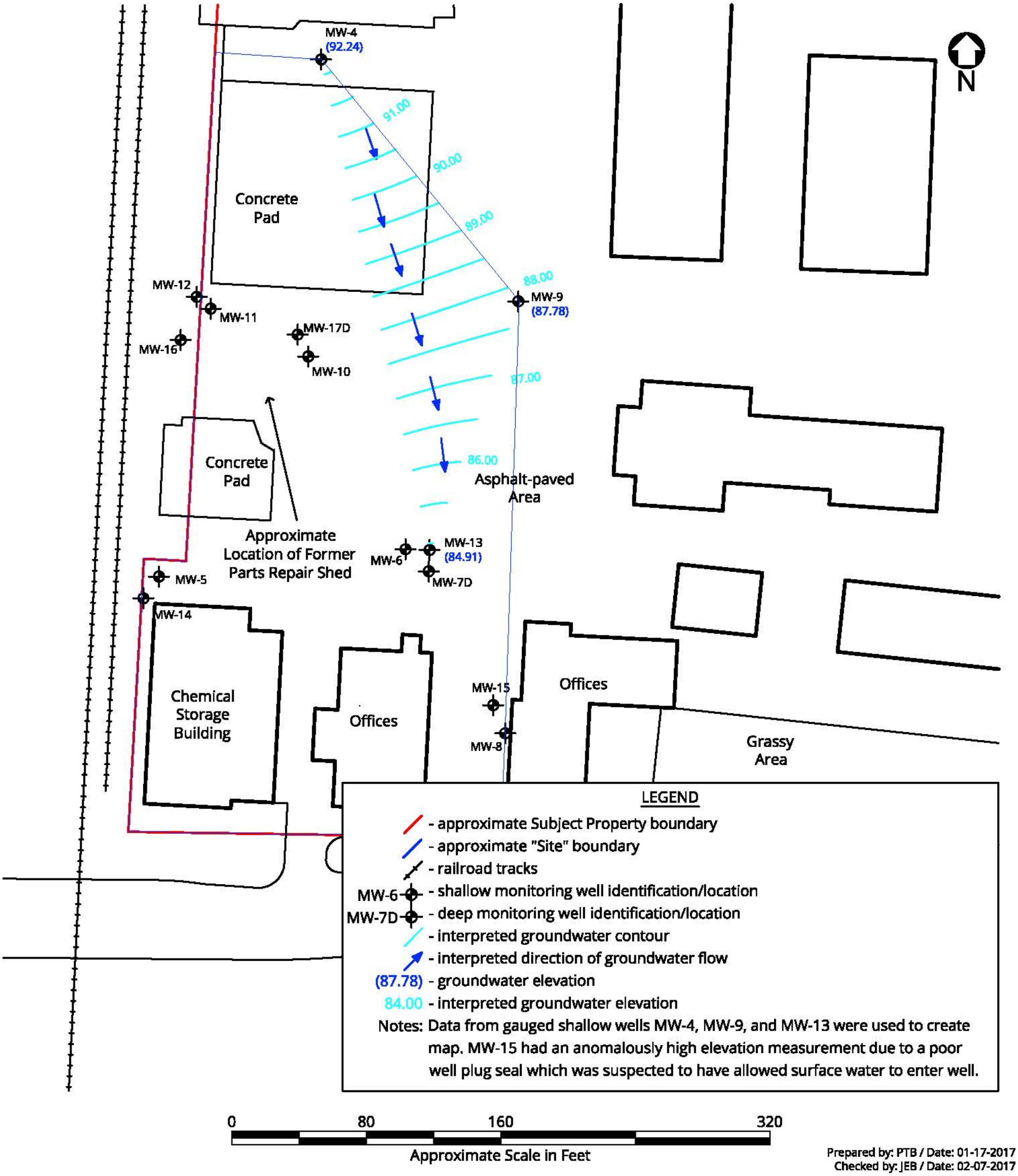
Sources: Site reconnaissance performed by Ms. Tracy Dionne of BBJ Group on March 30 and April 1, 2014.
Aerial photograph reviewed on GoogleEarth, dated November 28, 2014.
Site Plan and Groundwater Sample Locations provided by CRA, dated July 13, 2011.



Prepared by: PTB / Date: 01-17-2017
Checked by: JEB / Date: 02-07-2017

Birdsong Peanut Plant 608 E Main Street (Hwy 91) Colquitt, Georgia	BBJ GROUP	Site Plan with Sample Locations Project No. R1507990 Figure 3

Sources: Site reconnaissance performed by Ms. Tracy Dionne of BBJ Group on March 30 and April 1, 2014.
Potentiometric surface map created using Surfer Version 10.0 groundwater modeling software.



Notes: Data from gauged shallow wells MW-4, MW-9, and MW-13 were used to create map. MW-15 had an anomalously high elevation measurement due to a poor well plug seal which was suspected to have allowed surface water to enter well.

Prepared by: PTB / Date: 01-17-2017
Checked by: JEB / Date: 02-07-2017

Birdsong Peanut Plant
608 E Main Street (Hwy 91)
Colquitt, Georgia

BBJ GROUP

Groundwater Potentiometric Surface Map

Project No. R1507990

Figure 4

Source: Aerial photograph reviewed on GoogleEarth, dated November 28, 2014.

PRIMARY SOURCE	PRIMARY RELEASE MECHANISM	SECONDARY SOURCES	SECONDARY RELEASE MECHANISM	PATHWAY
Presumed Releases of Chlorinated Solvents Used in the Former Parts Repair Shed located in the southwestern portion of the Subject Property →	Potential Disposal and/or Leaching to Groundwater →	Groundwater aquifers at depths up to 80 feet below ground surface →	Potassium Permanganate Injection to groundwater in the southwestern portion of the Subject Property →	Elevated hexavalent chromium in groundwater in two limited areas on the southwestern portion of the Subject Property →

RECEPTORS

	Human		Biota
EXPOSURE ROUTE	**INDUSTRIAL WORKERS**	**CONSTRUCTION WORKERS**	**TERRESTRIAL**
INGESTION	O	P	O
DERMAL CONTACT	O	P	O

LEGEND

O	Incomplete Exposure Pathway
P	Potential Exposure Pathway
X	Complete Exposure Pathway

Prepared by: PTB / Date: 01-20-2017
Checked by: JEB / Date: 02-07-2017

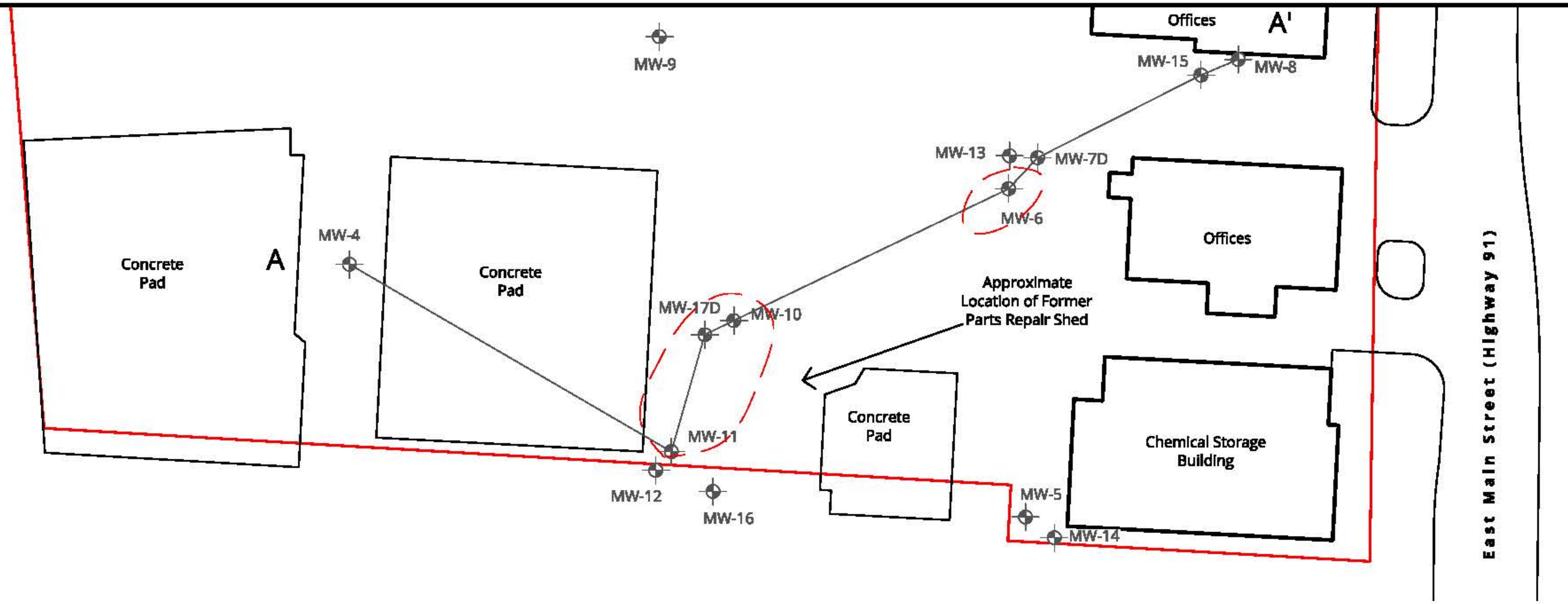
Birdsong Peanut Plan
608 East Main Street (Highway 91)
Colquitt, Georgia

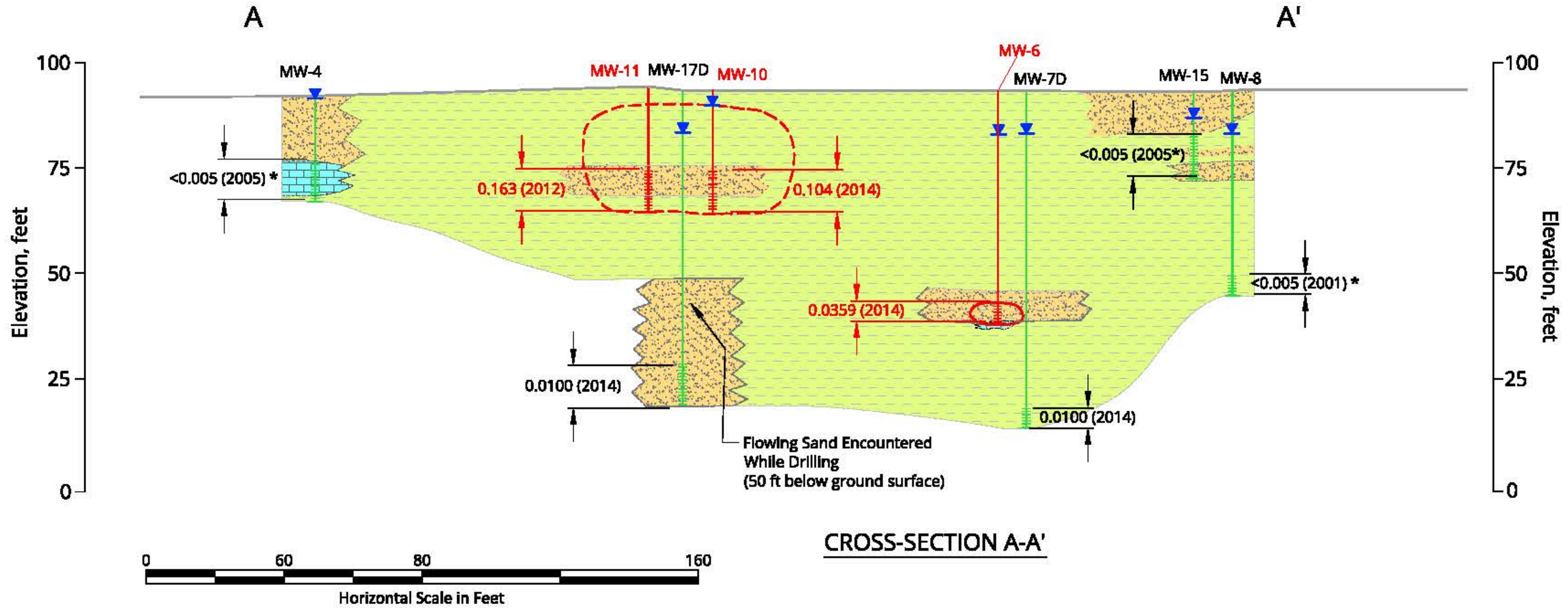
BBJ GROUP

Conceptual Site Model Flow Diagram

Project No. R1507990

Figure 5





CROSS-SECTION A-A'

LEGEND

⌖	Monitoring Well
🟩	Monitoring Well and Screened Interval with Concentrations below Risk Reduction Standards
🟥	Monitoring Well and Screened Interval with Concentrations above Risk Reduction Standards
▼	Groundwater Elevation
###	Hexavalent chromium laboratory result in interval, milligrams per liter (year sample collected)
◯	Estimated extent of hexavalent chromium above Type 4 Risk Reduction Standard (0.01 mg/L)
/	Approximate Subject Property boundary
▨	Clay
▨	Sand
▨	Weathered Limestone

Notes:

Water levels depicted from the 2014 BBJ Group Sampling Event. MW-11 was not located during this event.

* Indicates that the datum reflects a PCE concentration. Wells with PCE detections below laboratory reporting limits prior to the Full Scale Injection of potassium permanganate are assumed to be free of hexavalent chromium.

MW-11, MW-10, MW-7D, and MW-8 were drilled using a hollow stem auger or mud rotary drill rig. Soil at these locations was not logged prior to well installation. Since CRA did not log the cuttings, BBJ Group extrapolated the lithologies from vicinity monitoring wells or soil borings.

Prepared by: LMG / Date: 02.28.2017
Checked by: JTB / Date: 02.28.2017

Birdsong Peanut Plant
608 E Main Street (Hwy 91)
Colquitt, Georgia

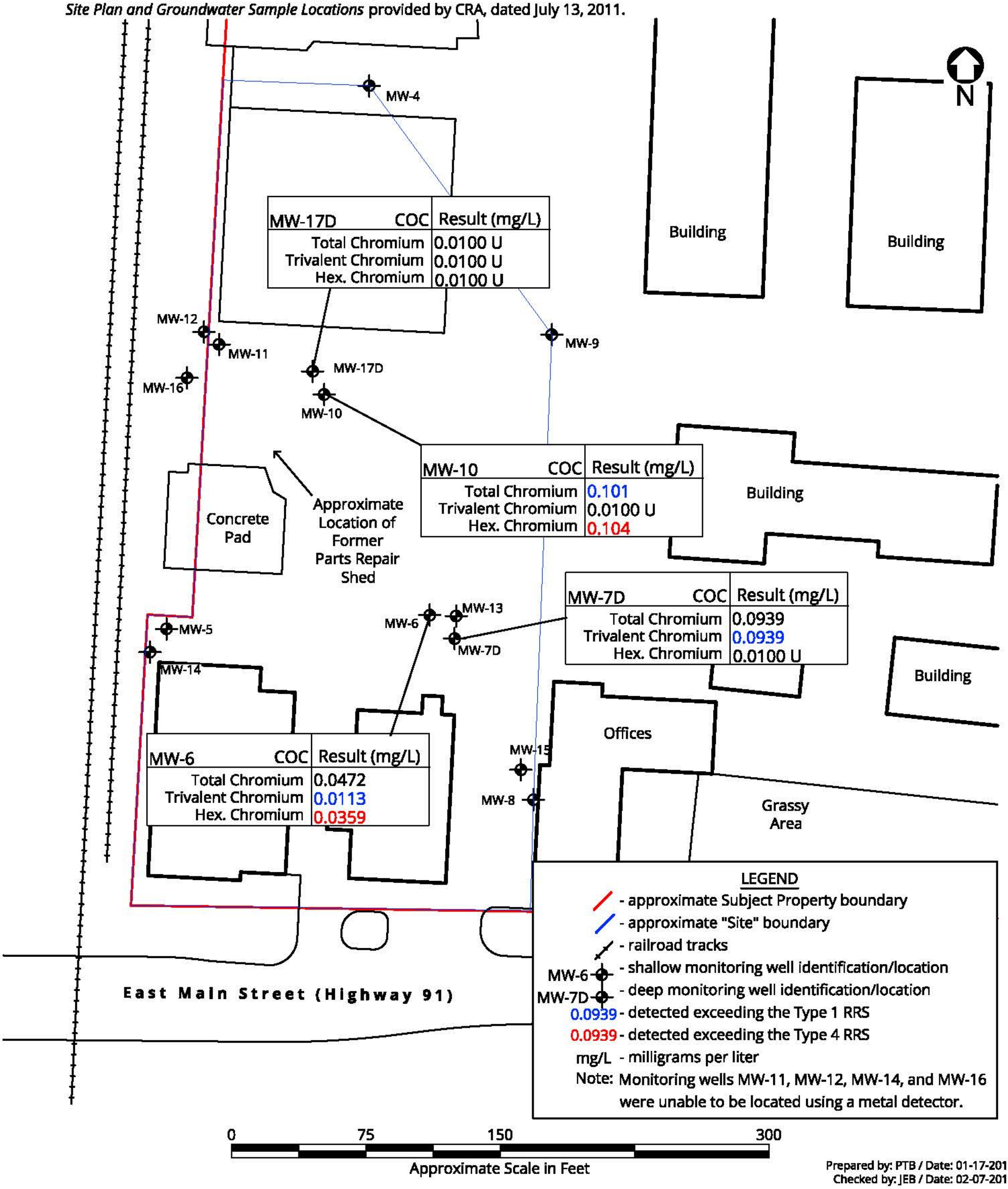
BBJ GROUP

Cross-Section A-A'

Project No. R1507990

Figure 6

Sources: Site reconnaissance performed by Ms. Tracy Dionne of BBJ Group on March 30 and April 1, 2014.
Aerial photograph reviewed on GoogleEarth, dated November 28, 2014.
Site Plan and Groundwater Sample Locations provided by CRA, dated July 13, 2011.



MW-17D COC	Result (mg/L)
Total Chromium	0.0100 U
Trivalent Chromium	0.0100 U
Hex. Chromium	0.0100 U

MW-10 COC	Result (mg/L)
Total Chromium	0.101
Trivalent Chromium	0.0100 U
Hex. Chromium	0.104

MW-7D COC	Result (mg/L)
Total Chromium	0.0939
Trivalent Chromium	0.0939
Hex. Chromium	0.0100 U

MW-6 COC	Result (mg/L)
Total Chromium	0.0472
Trivalent Chromium	0.0113
Hex. Chromium	0.0359

Prepared by: PTB / Date: 01-17-2017
Checked by: JEB / Date: 02-07-2017

Birdsong Peanut Plant
608 E Main Street (Hwy 91)
Colquitt, Georgia

BBJ GROUP

General Site Plan Showing Groundwater Laboratory Analytical Results (April 2014)

Project No. R1507990

Figure 7

Sources: Site reconnaissance performed by Ms. Tracy Dionne of BBJ Group on March 30 and April 1, 2014.

0 75 150 300

Approximate Scale in Feet

Prepared by: PTB / Date: 01-17-2017
Checked by: JEB / Date: 02-07-2017

Birdsong Peanut Plant
608 E Main Street (Hwy 91)
Colquitt, Georgia

BBJ GROUP

Generalized Site Plan Showing Approximate Location of Proposed Uniform Environmental Covenant

Project No. R1507990

Figure 8

APPENDIX A

LEGAL DESCRIPTION OF SUBJECT PROPERTY

STATE OF GEORGIA, MILLER COUNTY
Clerk's Office S. C.
Filed for record at 9:35 A. M
the 5th day of April 2000
and recorded in Book 150 Page 133-137
this 5th day of April 2000
Clerk, S. C.

Miller County, Georgia
Real Estate Transfer Tax
Paid $ 4,361.10
Date 4-5-2000
Clerk of Superior Court

AFTER RECORDING RETURN TO:
EVANS J. PLOWDEN, III
WATSON, SPENCE, LOWE AND CHAMBLESS
POST OFFICE BOX 2008
ALBANY, GEORGIA 31702-2008

LIMITED WARRANTY DEED

GEORGIA, DOUGHERTY COUNTY

THIS INDENTURE, made the 31st day of March, 2000, between FARMERS FERTILIZER & MILLING COMPANY, a Georgia corporation of the County of Miller and State of Georgia, as party or parties of the first part, hereinafter called "Grantor", and BIRDSONG CORPORATION, a Virginia corporation, as party or parties of the second part, hereinafter called "Grantee" (the words "Grantor" and "Grantee" to include their respective heirs, personal representatives, successors and assigns where the context requires or permits).

WITNESSETH THAT: Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other valuable considerations in hand paid at and before the sealing and delivery of these presents, the receipt whereof is hereby acknowledged, has granted, bargained, sold, aliened, conveyed and confirmed, and by these presents does grant, bargain, sell, alien, convey and confirm unto the said Grantee, the following described property:

> All that tract or parcel of land lying and being in the Twelfth and Thirteenth Land Districts of Miller County, Georgia, being more particularly described in Exhibit "A" attached hereto and made a part hereof.

TO HAVE AND TO HOLD the said tract or parcel of land, with all and singular the rights, members and appurtenances thereof, to the same being, belonging, or in anywise appertaining to the only proper use, benefit and behoof of the said Grantee forever in FEE SIMPLE.

this document continues on page 134

AND except for all matters of record as of the date hereof, all matters that would be disclosed by a current survey and the lien of real estates taxes not yet due and payable, the said Grantor will warrant and forever defend the right and title to the above described property unto the said Grantee against all acts of Grantor and the lawful claims of all persons claiming by, through or under Grantor.

IN WITNESS WHEREOF, the Grantor has caused this instrument to be executed by its duly authorized officers and its corporate seal hereunto affixed, the day and year above written.

FARMERS FERTILIZER & MILLING COMPANY

By:____________________
President

Attest: Sally T. Tabb
Secretary
(AFFIX CORPORATE SEAL HERE)

Signed, sealed and delivered
in the presence of:

____
Unofficial Witness

Dawn E. Wellborne
Notary Public
My Commission Expires: 4/7/03
(Affix Notary Seal Here)

G:\R-ESTATE\Ejpiii\2000\DEEDS\FFMMILLER.LWD

This instrument continues on page 135

Exhibit "A"

FFM MAIN SHELLING PLANT

All that tract or parcel of land lying and being in Land Lot 152 of the Thirteenth Land District and being more particularly described in that certain plat of survey entitled "Plat of FFM MAIN SHELLING PLANT", dated March 20, 2000 and prepared by G. L. Holman, Georgia Registered Land Surveyor No. 2033, as the same is recorded in Plat Cabinet "B", Slide 24-B, in the office of the Clerk of Superior Court of Miller County, Georgia.

FUDGE SHELLING PLANT

All that tract or parcel of land lying and being in Land Lot 209 of the Thirteenth Land District and being more particularly described in that certain plat of survey entitled "Plat of Fudge Shelling Plat", dated March 27, 2000 and prepared by G. L. Holman, Georgia Registered Land Surveyor No. 2033, as same is recorded in Plat Cabinet "B", Slide 24-C, in the office of the Clerk of Superior Court of Miller County, Georgia.

FUDGE DOWNTOWN

All that tract or parcel of land lying and being in the City of Colquitt, in Land Lot 169 of the Thirteenth Land District of Miller County, Georgia, and being more particularly described as follows:

Beginning at the intersection of the north margin line of Main Street (60 foot right of way) with the east margin line of Second Street (40 foot right of way), which point of beginning is marked by an iron pin set, run thence north 01 degree 23 minutes 08 seconds east along the east margin line of Second Street for a distance of 649.24 feet to the point of intersection of the east margin line of Second Street with the south margin line of Pine Street (50 foot right of way), which intersection is marked by an iron pin set; run thence south 89 degrees 22 minutes 57 seconds east along the south margin line of Pine Street for a distance of 210.44 feet to a point marked by an iron pin set; run thence south 01 degree 00 minutes 00 seconds west along the west side of the Bush House Lot for a distance of 188.2 feet to a point; continue thence south 01 degree 00 minutes 00 seconds west along the west side of the First Baptist Church Lot for a distance of 214.00 feet to a point marked by an iron pin set; continue thence south 01 degree 00 minutes 00 seconds west along the west side of the property of Fudge Gin Company, Inc. (1.96 acres) for a distance of 242.00 feet to a point on the north margin line of Main Street as evidenced by a mark on concrete; run thence south 89 degrees 17 minutes 08 seconds west along the north margin line of Main Street for a distance of 214.90 feet to the point of beginning. This property contains 3.16 acres and is more particularly described according to a plat of land surveyed for Fudge Gin Company, dated June 28, 1993, as prepared by Grady Lodge Holman, Georgia Registered Land Surveyor.

This instrument continues on page 136

COOKTOWN - TRACT 1

All that tract or parcel of land lying and being in Land Lot No. 332 in the 12th District of Miller County, Georgia, and being more particularly described as follows:

BEGINNING at a point where the west land lot line of said Land Lot No. 332 intersects the north right of way of State Highway No. 91 and from said beginning point run thence in a northerly direction along the west land lot line of said Land Lot No. 332 a distance of 581 feet to a point; run thence in an easterly direction and parallel with the north right of way line of said State Highway No. 91 for a distance of 450 feet to a point; run thence in a southerly direction and parallel to the west land lot line of said Land Lot No. 332 for a distance of 581 feet to a point on the north right of way of said State Highway No. 91; run thence in a westerly direction along the north right of way of said State Highway No. 91 for a distance of 450 feet to the point of beginning, consisting of six (6) acres, more or less.

COOKTOWN - TRACT 2

All that tract or parcel of land lying and being in Land Lot No. 357 in the 12th Land District of Miller County, Georgia, and being more particularly described as follows:

BEGINNING at a point where the east land lot line of said Land Lot No. 357 intersects the north right of way of State Highway No. 91 and run thence in a northerly direction along the east land lot line of said Land Lot No. 357 for a distance of 1626.2 feet to a point; run thence in a westerly direction and parallel to the north right of way of State Highway No. 91 for a distance of 216 feet to a point; run thence in a southerly direction and parallel to the east land lot line of said Land Lot No. 357 for a distance of 1626.2 feet to a point on the North right of way of Georgia State Highway No. 91; run thence in an easterly direction along the north right of way of Georgia State Highway No. 91 for a distance of 216 feet to the point of beginning, consisting of 8.87 acres, more or less.

WACASER

All that tract or parcel of land lying and being in Land Lot 246 in the Twelfth Land District of Miller County, Georgia, and being more particularly described as follows: Commencing at the southeast corner of said Land Lot 246, said corner being the intersection of the centerline of Georgia Route 91 with the centerline of a county road, and from said point run thence north 1 degree west along the centerline of said county road for a distance of 297 feet to a point; run thence north 89 degrees west for a distance of 924 feet to the POINT OF BEGINNING of the tract conveyed herein; from said beginning point run thence north 1 degree west for a distance of 231 feet; run thence north 89 degrees west for a distance of 726 feet to a point; run thence south 1 degree east for a distance of 528 feet to the centerline of Georgia Highway 91; run thence south 89 degrees east along the centerline of Georgia Highway 91 for a distance of 726 feet to a point;

This instrument continues on page 137

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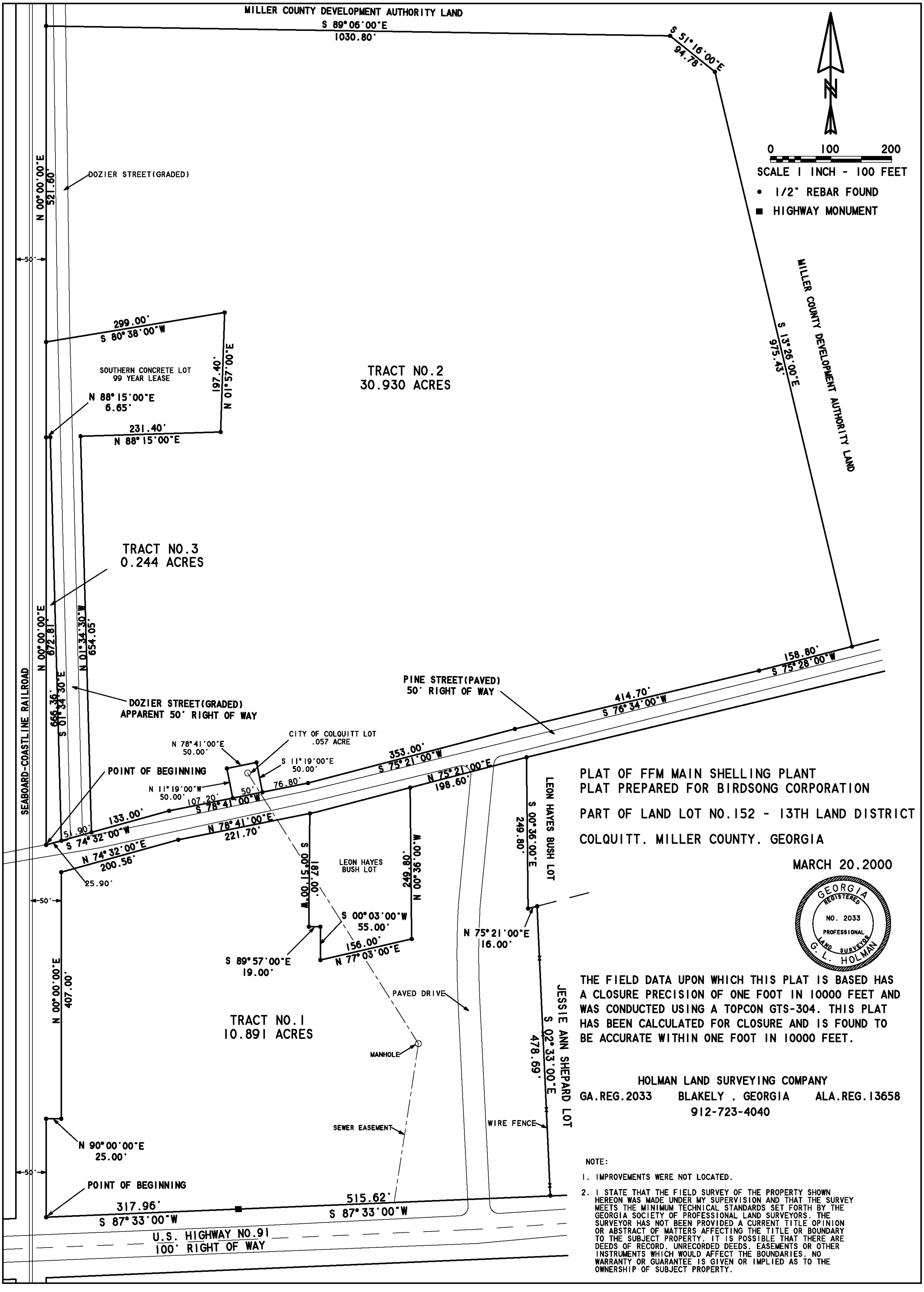

PLAT OF FFM MAIN SHELLING PLANT
PLAT PREPARED FOR BIRDSONG CORPORATION

PART OF LAND LOT NO.152 - 13TH LAND DISTRICT

COLQUITT. MILLER COUNTY. GEORGIA

MARCH 20.2000

GEORGIA REGISTERED NO. 2033 PROFESSIONAL LAND SURVEYOR G. L. HOLMAN

THE FIELD DATA UPON WHICH THIS PLAT IS BASED HAS A CLOSURE PRECISION OF ONE FOOT IN 10000 FEET AND WAS CONDUCTED USING A TOPCON GTS-304. THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND IS FOUND TO BE ACCURATE WITHIN ONE FOOT IN 10000 FEET.

HOLMAN LAND SURVEYING COMPANY
GA.REG.2033 BLAKELY . GEORGIA ALA.REG.13658
912-723-4040

NOTE:

1. IMPROVEMENTS WERE NOT LOCATED.
2. I STATE THAT THE FIELD SURVEY OF THE PROPERTY SHOWN HEREON WAS MADE UNDER MY SUPERVISION AND THAT THE SURVEY MEETS THE MINIMUM TECHNICAL STANDARDS SET FORTH BY THE GEORGIA SOCIETY OF PROFESSIONAL LAND SURVEYORS. THE SURVEYOR HAS NOT BEEN PROVIDED A CURRENT TITLE OPINION OR ABSTRACT OF MATTERS AFFECTING THE TITLE OR BOUNDARY TO THE SUBJECT PROPERTY. IT IS POSSIBLE THAT THERE ARE DEEDS OF RECORD. UNRECORDED DEEDS. EASEMENTS OR OTHER INSTRUMENTS WHICH WOULD AFFECT THE BOUNDARIES. NO WARRANTY OR GUARANTEE IS GIVEN OR IMPLIED AS TO THE OWNERSHIP OF SUBJECT PROPERTY.

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APPENDIX B

MONITORING WELL CONSTRUCTION DIAGRAMS

Geosciences Inc.

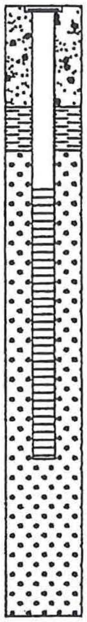
SUBSURFACE DRILL LOG

PROJECT NAME FFM Main Facility
FIELD ENG/GEO Alison Long
RIG TYPE CME-55
PROJECT NUMBER ALE-00-335A
GROUND ELEVATION (ft)
DRILLING METHOD HSA

PAGE 1 OF 1
BORING NO: MW-4
DATE: 8/28/00

DEPTH	SOIL/MATERIAL DESCRIPTION	ELEVATION (feet)	LITHOLOGY	SPT BLOWS	SAMPLES	WATER LEVEL
0	Topsoil and grass					
	White to 10YR 6/8 brownish-yellow, fine-grained sand and silt			27	◪	
8	5Y 7/1 light gray, dry, fine-grained, consolidated sand and silt			67	◪	▽
	2.5Y 4/1 dark gray sand and silt in top 5" White, weathered limestone in bottom 3"			50/4	◪	
16						
	Same strata as above			15	◪	
24	Same as above strata in top 4" 10YR 5/8 yellowish-brown and light gray mottled clay			17	◪	
	Boring Terminated at 25 feet. GW Enc. at 9.58 feet 24 hours after drilling					
32						
40						
48						
56						

COMMENTS

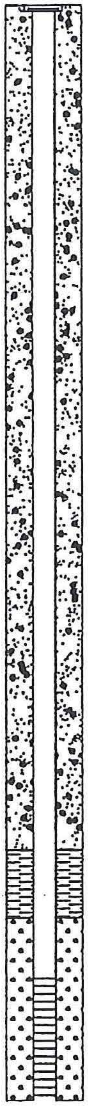


Flush mount 8" diameter manhole cover and vault.
8.5 feet of 2" diameter PVC riser
Borehole annular space grouted with portland cement/3-5% bentonite powder slurry
3/8" bentonite pellets at 4.1' bls
10/30 sand at 5.9' bls
10 feet of 2" diameter 0.01"machine-slotted PVC screen (at 7.5' bls)
Well set at 17.5' bls

Geosciences Inc.

SUBSURFACE DRILL LOG

PROJECT NAME FFM Main Facility
FIELD ENG/GEO Alison Long
RIG TYPE CME-55
PROJECT NUMBER ALE-00-335A
GROUND ELEVATION (ft)
DRILLING METHOD HSA
PAGE 1 OF 1
BORING NO: MW-5
DATE: 8/29/00

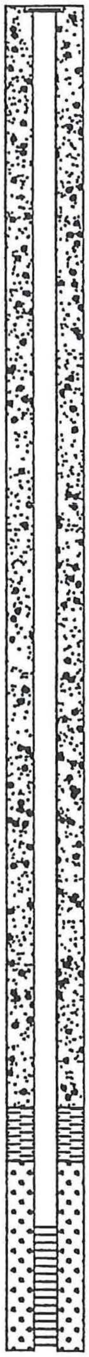
DEPTH	SOIL/MATERIAL DESCRIPTION	ELEVATION (feet)	LITHOLOGY	SPT BLOWS	SAMPLES	WATER LEVEL	COMMENTS
0	Topsoil and grass						 Flush mount 8" diameter manhole cover and vault
	10R 6/8 brownish-yellow, light gray, and 2.5YR 4/4 reddish-brown, mottled, very stiff, sandy clay		▨	23	◩		Borehole annular space grouted with portland cement/3-5% bentonite powder slurry
8	Same strata as above except contains more light gray, very stiff		▨	30	◩		
16	Dry, same strata as above; 5Y 8/1 white mottles dominant		▨	29	◩		40' of 2" diameter PVC riser
	Same as above mottled, tricolor clay		▨	27	◩		
24	Same as above strata, moist		▨	27	◩		
32	Same strata as above, predominantly reddish-brown and brownish-yellow mottles with little white		▨	21	◩	▽	
	10YR 5/8 yellowish-brown clay; bottom 2" contains dark yellowish-brown 10YR 4/4 clasts		▨	29	◩		3/8" bentonite pellets at 34.7' bls 10/30 sand at 37.5' bls
40	Same clast-containing clay as above; moist		▨	15	◩		
	Same strata as above in top 4"; saturated Friable, white limestone and clay in bottom 14"		▨	40	◩		5' of 2" diameter 0.01" machine-slotted PVC screen (to 40' bls) Well set at 45' bls
48	Boring Terminated at 45 feet. GW Enc. at 29.80 feet 24 hours after drilling						
56							

Geosciences Inc.

SUBSURFACE DRILL LOG

PROJECT NAME FFM Main Facility
FIELD ENG/GEO Alison Long
RIG TYPE CME-55
PROJECT NUMBER ALE-00-335A
GROUND ELEVATION (ft)
DRILLING METHOD HSA

PAGE 1 OF 1
BORING NO: MW-6
DATE: 8/29/00



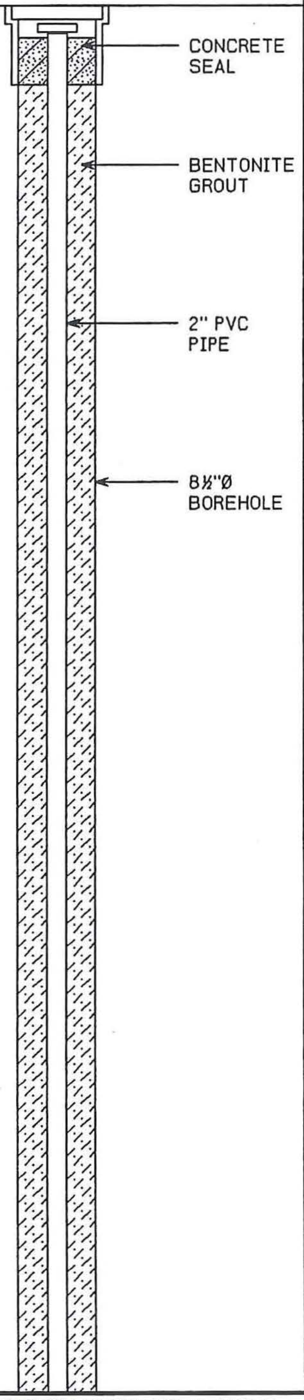
DEPTH	SOIL/MATERIAL DESCRIPTION	ELEVATION (feet)	LITHOLOGY	SPT BLOWS	SAMPLES	WATER LEVEL	COMMENTS
0	Asphalt Very stiff, 7.5YR 5/8 strong brown sandy clay		▨	9	◩		Flush mount 8" diameter manhole cover and vault Borehole annular space grouted with portland cement/3-5% bentonite powder slurry
	Same as above clay except lighter in color 10YR 7/4 very pale brown		▨	14	◩		
8	Dry, light gray and 10YR 6/8 brownish-yellow mottled, sandy clay		▨	14	◩		
16	Very stiff, same as above sandy clay, prdominantly light gray		▨	18	◩		50' of 2" diameter PVC riser
	Moist, same strata as above		▨	15	◩		
24	Top same as above strata; bottom 7" has more sand and water content and is 7.5YR 7/8 reddish-yellow in color		▨	15	◩		
32	Moist, 10YR 5/6 to 5/8 yellowish-brown sandy clay		▨	13	◩	▽	
	Moist, same as above in top 6" Bottom 12" Very Stiff, 10YR 8/6 yellow, light gray, and 10R 6/3 pale red, mottled, fine-grained clay		▨	9	◩		
40	Same strata as above		▨	10	◩		
	Same strata as above becoming darker and more uniform in color. 10YR 5/6 yellowish-brown in bottom 7" of spoon.		▨	4	◩		3/8" bentonite pellets at 45.1' bls
48	Same strata as above in top 10"; sandy clay containing clasts in bottom 3"		▨	WOR	◩		10/30 sand at 47.3' bls 5' of 2" diameter 0.01" machine-slotted PVC screen (at 50' bls)
56	Same clay containing clasts n top 4" of sample Friable, white limestone in bottom 5" of sample		▨	19	◩		Well set at 55' bls
	Boring Terminated at 55 feet.						
	GW Enc. at 28.46 feet 24 hours after drilling						

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-11)
Page 1 of 3

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-7D
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA/MUD ROTARY
CRA SUPERVISOR: DAVID BRYTOWSKI

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Riser)	*94.0* *93.75*					
							
2.5							
5.0							
7.5							
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

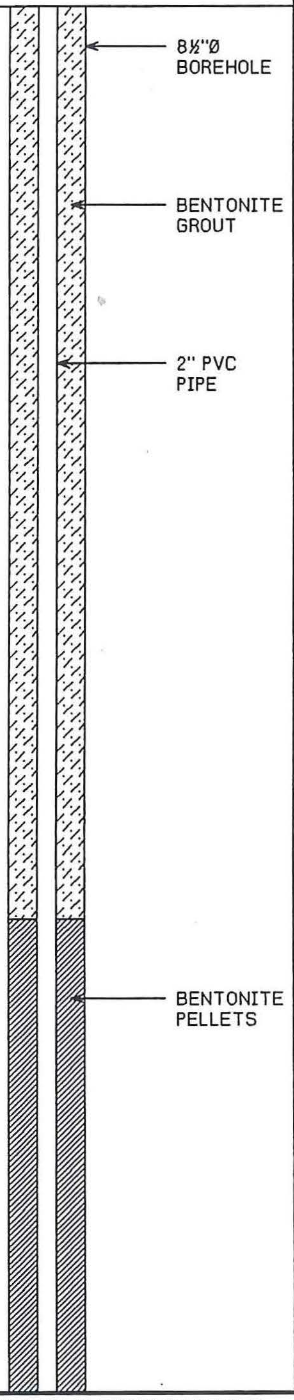
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ⊻ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-11)
Page 2 of 3

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-7D
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA/MUD ROTARY
CRA SUPERVISOR: DAVID BRYTOWSKI



DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
37.5							
40.0							
42.5							
45.0							
47.5							
50.0							
52.5							
55.0							
57.5							
60.0							
62.5							
65.0							
67.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

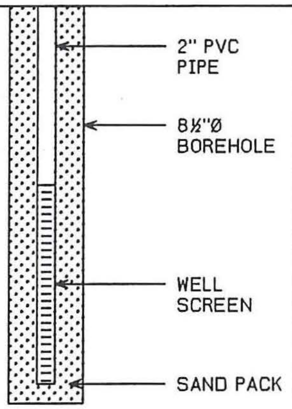
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-11)
Page 3 of 3

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-7D
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA/MUD ROTARY
CRA SUPERVISOR: DAVID BRYTOWSKI

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
72.5							
75.0							
77.5							
80.0	END OF HOLE @ 80.0ft BGS	14.0					
82.5							
85.0							
87.5							
90.0							
92.5							
95.0							
97.5							
100.0							
102.5							



SCREEN DETAILS
Screened interval:
74.5 to 79.5ft BGS
Length: 5.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
70.0 to 80.0ft BGS
Material: #10/30 Sand and Natural Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

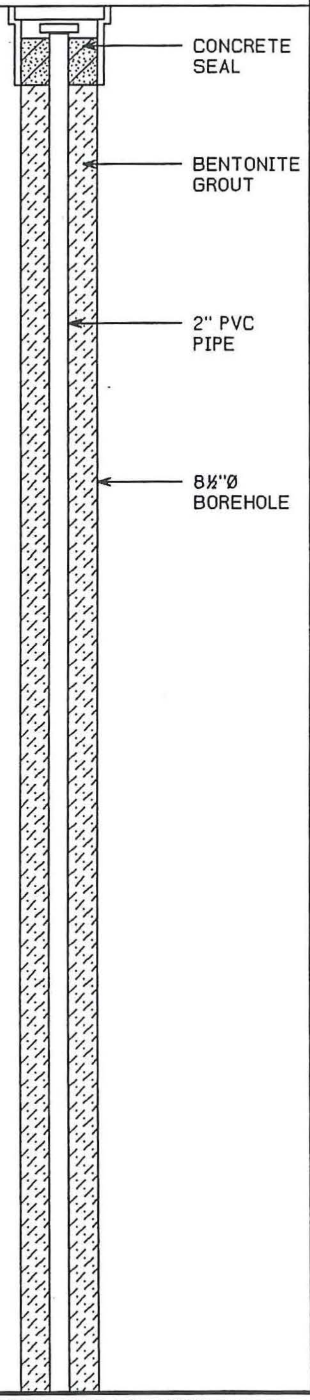
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-12)
Page 1 of 2

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-8
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA
CRA SUPERVISOR: DAVID BRYTOWSKI

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Riser)	*93.8* *93.57*					
-2.5							
-5.0							
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

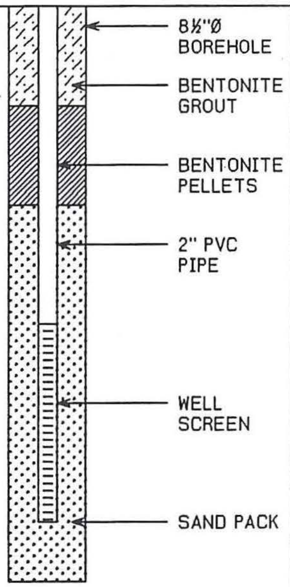
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-12)
Page 2 of 2

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-8
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA
CRA SUPERVISOR: DAVID BRYTOWSKI

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
-37.5							
-40.0							
-42.5							
-45.0							
-47.5							
-50.0							
-52.5							
-55.0							
-57.5							
-60.0							
-62.5							
-65.0							
-67.5							



SCREEN DETAILS
Screened interval:
43.0 to 48.0ft BGS
Length: 5.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
40.0 to 49.5ft BGS
Material: #10/30 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ⊻ STATIC WATER LEVEL ▼

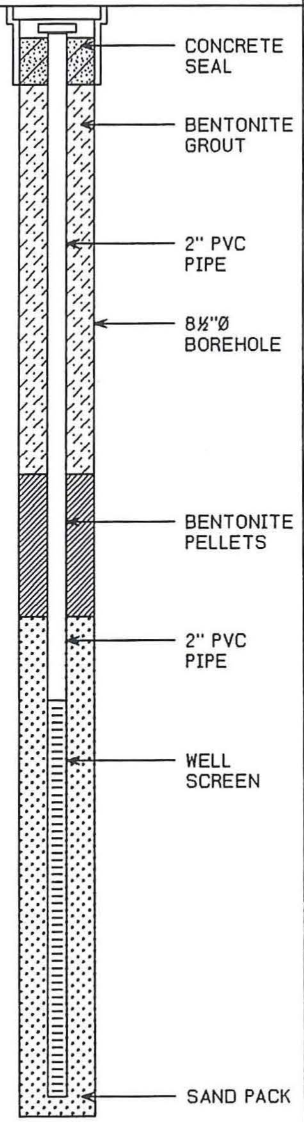
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(AL-13)
Page 1 of 1

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FFM
LOCATION: COLQUITT, GEORGIA

HOLE DESIGNATION: MW-9
DATE COMPLETED: JULY 26, 2001
DRILLING METHOD: 4¼"Ø HSA
CRA SUPERVISOR: DAVID BRYTOWSKI

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Riser)	*93.1* *92.85*					
-2.5							
-5.0							
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							



SCREEN DETAILS
Screened interval:
17.5 to 27.5ft BGS
Length: 10.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
15.4 to 28.0ft BGS
Material: #10/30 Sand

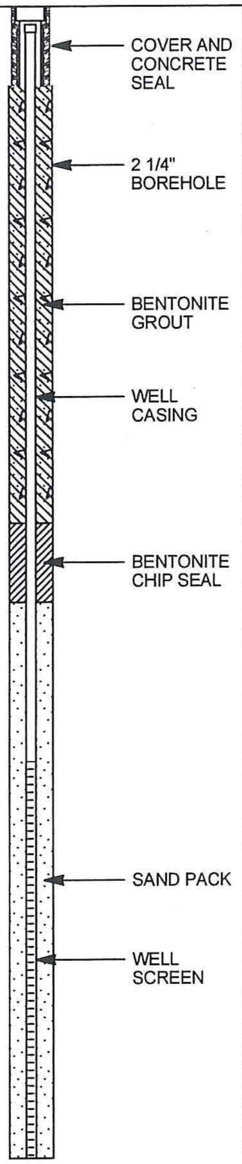
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ⊻ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-10
DATE COMPLETED: September 4, 2002
DRILLING METHOD: DIRECT PUSH TECHNOLOGY
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE			
				NUMBER	INTERVAL	REC (%)	Tons/SF
	TOP OF CASING	93.41					
2							
4							
6							
8							
10							
12							
14							
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							



WELL DETAILS
Screened interval:
19.00 to 29.00ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 10
Material: SCH. 40 PVC
Seal:
13.00 to 15.00ft BGS

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

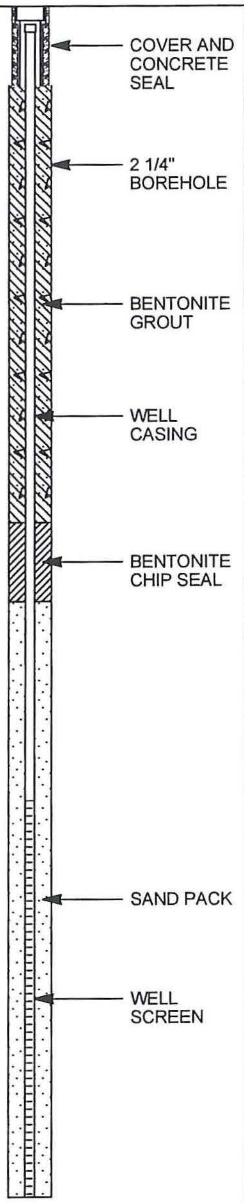
HOLE DESIGNATION: MW-10
DATE COMPLETED: September 4, 2002
DRILLING METHOD: DIRECT PUSH TECHNOLOGY
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE			
				NUMBER	INTERVAL	REC (%)	Tons/SF
36			Material: BENTONITE CHIPS Sand Pack: 15.00 to 29.00ft BGS Material: FILTER SAND				
38							
40							
42							
44							
46							
48							
50							
52							
54							
56							
58							
60							
62							
64							
66							
68							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA
HOLE DESIGNATION: MW-11
DATE COMPLETED: August 12, 2003
DRILLING METHOD: DIRECT PUCH TECHNOLOGY
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	Tons/SF	
	TOP OF CASING	94.44						
2								
4								
6								
8								
10								
12								
14								
16								
18								
20								
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
20.00 to 30.00ft BGS
Length: 10ft
Diameter: 1in
Slot Size: 10
Material: SCH. 40 PVC
Seal:

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-11
DATE COMPLETED: August 12, 2003
DRILLING METHOD: DIRECT PUCH TECHNOLOGY
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	Tons/SF	
36			13.00 to 15.00ft BGS Material: BENTONITE CHIPS Sand Pack: 15.00 to 30.00ft BGS Material: FILTER SAND					
38								
40								
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

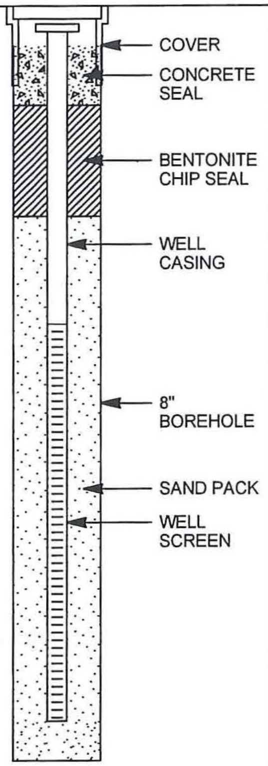
STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

Page 1 of 1

PROJECT NAME: BIRDSONG PEANUT PLANT	HOLE DESIGNATION: MW-13
PROJECT NUMBER: 18283-01	DATE COMPLETED: August 11, 2005
CLIENT: FARMERS FEED AND MILLING	DRILLING METHOD: 4 1/4" I.D. HSA
LOCATION: ATLANTA, GEORGIA	FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	Hand augered to 3.5ft BGS	
2		
4	CL-CLAY and SAND (RESIDUUM), soft, gray/yellowbrown mottled, moist	3.50
	- some black coloring at 5.0ft BGS	
6		
8	CL-CLAY and SAND (RESIDUUM), stiff, gray/yellow brown/red brown mottled, moist	7.50
10	- moisture increasing slightly at 10.0ft BGS	
12		
14		
16		
18		17.50
20	END OF BOREHOLE @ 19.0ft BGS	
22		
24		
26		
28		
30		
32		
34		

MONITORING WELL



WELL DETAILS

Screened interval:
8.00 to 18.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: .010
Material: SCH. 40 PVC
Seal:
2.50 to 5.30ft BGS
Material: BENTONITE CHIPS
Sand Pack:
5.30 to 19.00ft BGS
Material: 10/30 SAND

SAMPLE

NUMBER	INTERVAL	REC (%)	Tons/SF	PID (ppm)
1	☒	1		358
2	☒	0.42		60
3	☒	2	2.3	7.8
4	☒	1.9	2.2	1.3
5	☒	2.5	1.8	5.4
6	☒	2.5	2.0	N/A

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

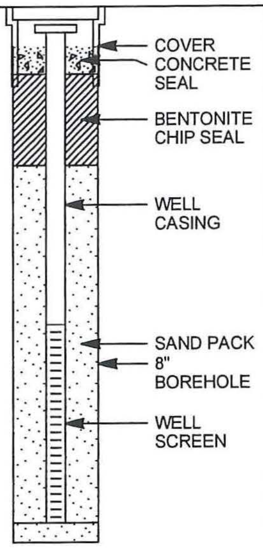
Page 1 of 1

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-14
DATE COMPLETED: August 11, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
0–5.0	CL-CLAY, saturated at 4.0ft BGS, hand augered to 5.0ft BGS	
5.0–7.5	CL-CLAY, trace sand, orange/red mottled	5.00
7.5–15.0	CL-CLAY and SAND (RESIDUUM), yellow brown/light gray mottled, low moisture - some chert fragments at 10.0ft BGS - very moist at 12.5ft BGS - WEATHERED ROCK, very hard, low moisture, water in cuttings at 13.0ft BGS END OF BOREHOLE @ 13.5ft BGS	7.50
		15.00

MONITORING WELL



WELL DETAILS
Screened interval:
8.00 to 13.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: .010
Material: SCH. 40 PVC
Seal:
1.70 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 13.50ft BGS
Material: 10/30 SAND

SAMPLE			
NUMBER	INTERVAL	REC (%)	Tons/SF
1	☒		1.75
2	☒		3.0
3	☒		--
4	☒		--

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

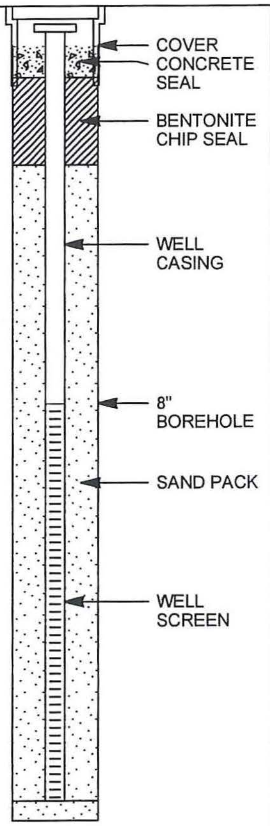
Page 1 of 1

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-15
DATE COMPLETED: August 11, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
2 4	Hand augered to 5.0ft BGS	
6 8	SM-SAND and SILT (FILL), loose, saturated, burnt wood fragments	5.00
10 12	CL-CLAY and SAND (RESIDUUM), stiff to very stiff	8.50
14	SP-SAND (RESIDUUM), some rock fragments, loose	12.50
16	CL-CLAY and SAND (RESIDUUM), stiff, light gray, very moist	15.00
18 20	SP-SAND (RESIDUUM), trace clay, loose, saturated	16.50
22 24 26 28 30 32 34	END OF BOREHOLE @ 20.5ft BGS	20.50

MONITORING WELL



WELL DETAILS
Screened interval:
10.00 to 20.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: .010
Material: SCH. 40 PVC
Seal:
1.80 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.50ft BGS
Material: 10/30 SAND

SAMPLE			
NUMBER	INTERVAL	REC (%)	Tons/SF
1		1.5	--
2		2	1.5
3		2.5	3.75
4		1.3	N/A
5		2	2.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

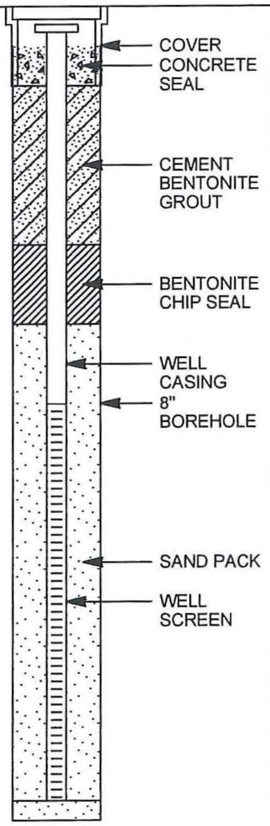
Page 1 of 1

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-16
DATE COMPLETED: August 11, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
2 4	Hand augered to 5.0ft BGS	
6 8 10 12	CL-CLAY (RESIDUUM), very stiff, red/tan/white mottled - trace sand at 7.5ft BGS	5.00
14 16 18	CL-CLAY and SAND (RESIDUUM), soft, saturated	13.00
20 22 24 26 28 30 32 34	END OF BOREHOLE @ 20.5ft BGS	20.00

MONITORING WELL



WELL DETAILS
Screened interval:
10.00 to 20.00ft BGS
Length: 10ft
Diameter: 2in
Slot Size: .010
Material: SCH. 40 PVC
Seal:
6.00 to 8.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
8.00 to 20.50ft BGS
Material: 10/30 SAND

SAMPLE

NUMBER	INTERVAL	REC (%)	Tons/SF
1	☒		74.5
2	☒		74.5
3	☒		3.5
4	☒		2.75
5	☒		1.75
6	☒		2.5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

Page 1 of 3

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-17D
DATE COMPLETED: August 12, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	Hand augered to 3ft BGS	
2		
4	CL-CLAY (RESIDUUM), some sand, firm to stiff, yellow brown	3.00
6		
8		
10		
12		
14		
16		
18	CL-CLAY and SAND (RESIDUUM), soft, moist	18.00
20		
22	- saturated at 23.0ft BGS	
24		
26		
28		
30		
32	CH-CLAY, soft, plastic	31.00
34	- 1" sand seam, saturated at 34.2ft BGS	

MONITORING WELL

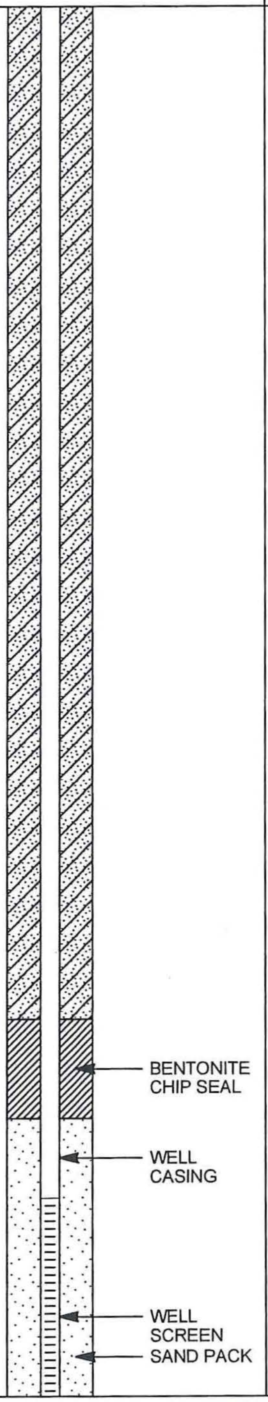
SAMPLE				
NUMBER	INTERVAL	REC (%)	Tons/SF	PID (ppm)
1	☒		2.5	0.0
2	☒		3.5	0.0
3	☒		74.5	0.0
4	☒		2.75	0.0
5	☒		3.75	0.0
6	☒			
7	☒		0.25	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-17D
DATE COMPLETED: August 12, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI



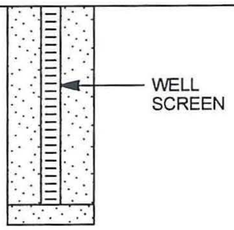
DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	Tons/SF	PID (ppm)
36								
38								
				8	⊠	2.5	1.0	0.0
40								
42								
44				9	⊠	2.5	0.5	0.0
	- sandstone rock fragments at 44.5ft BGS							
46								
48								
				10	⊠	1	N/A	0.0
50	After 50ft BGS flowing sands prevented split spoon sampling	50.00						
52								
54								
56								
58								
60								
62			BENTONITE CHIP SEAL					
64			WELL CASING					
66								
68			WELL SCREEN SAND PACK					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: BIRDSONG PEANUT PLANT
PROJECT NUMBER: 18283-01
CLIENT: FARMERS FEED AND MILLING
LOCATION: ATLANTA, GEORGIA

HOLE DESIGNATION: MW-17D
DATE COMPLETED: August 12, 2005
DRILLING METHOD: 4 1/4" I.D. HSA
FIELD PERSONNEL: D. BRYTOWSKI

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE Tons/SF	SAMPLE PID (ppm)
72								
74								
76	END OF BOREHOLE @ 75.5ft BGS	75.50	WELL DETAILS Screened interval: 65.00 to 75.00ft BGS Length: 10ft Diameter: 2in Slot Size: .010 Material: SCH. 40 PVC Seal: 60.50 to 63.00ft BGS Material: BENTONITE CHIPS Sand Pack: 63.00 to 75.50ft BGS Material: 10/30 SAND					
78								
80								
82								
84								
86								
88								
90								
92								
94								
96								
98								
100								
102								
104								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

APPENDIX C

BBJ GROUP FIELD PROCEDURES

BBJ GROUP FIELD PROCEDURES

The media targeted by this subsurface assessment and the sampling methods and protocol are described in this appendix.

C.1 Sampling Equipment

The following sampling equipment was used during field activities at the Subject Property:

- A track mounted drilling rig equipped with hollow stem augers;
- Geoprobe® direct-push technology (DPT) and hollow-stem auger (HSA) sampling equipment;
- A photoionization detector (PID) equipped with a 10.2 electron-Volt lamp for field screening soil samples and health and safety monitoring;
- Clean, plastic "Ziplock" bags for use in describing soil samples and for field screening purposes;
- Laboratory-supplied containers for the collection of soil samples targeted for laboratory analyses;
- Phosphate-free soap, potable water and distilled water for equipment cleaning;
- Water level indicator;
- Variable speed two-inch diameter submergible Monsoon® pump;
- Phosphate-free soap, potable water and distilled water for equipment cleaning;
- Laboratory-supplied deionized water (purge water) for the preparation of quality assurance/quality control (QA/QC) samples;
- Disposable latex and/or nitrile gloves;
- Sample shipping containers (e.g., coolers); and,
- Sealed trip blanks, prepared by the laboratory using deionized water and shipped with the sample coolers.

C.2 Soil Probe/Boring Advancement and Soil Sampling Procedures

This section and section A.3 describe the various types of soil probe and boring techniques that were used, as well as specific soil sample collection procedures.

C.2.1 DPT Advancement Procedures

A Geoprobe® direct-push type sampling machine was used to collect soil samples from the soil borings. The machine advanced a soil probe by means of a hydraulic hammer that drove the sampler vertically into the ground. Soil samples were collected using a 1.5-inch diameter, 48-inch or 60-inch long sampling tube with dedicated, disposable acetate liners. Use of a releasable plunger inside the tube allowed the sampler to be advanced to the desired depth and a discrete sample to be collected.

C.2.2 DPT Soil Sample Collection and Classification Procedures

Upon retrieval, the soil sample was removed from the sampler and visually classified by field personnel. Each soil sample was split into two portions and placed in re-sealable plastic bags. One bag was placed into a cooler with ice, and the other was kept in a warm environment (approximately 70 degrees Fahrenheit or greater) for approximately 10 minutes in an effort to promote volatilization of potential organic vapors within the soil.

After approximately 10 minutes, headspace screening using a PID was performed on the soil sample kept in the warm environment. The PID was calibrated daily in accordance with the manufacturer's directions. After a minimum of 10 minutes within a warm environment, the probe on the PID was inserted into the soil bag, and a sample of headspace air was withdrawn. The maximum reading was recorded in the field book and/or on the soil boring log. Readings were recorded in parts per million, referencing the calibration gas used.

Based on field screening and visual observations, field personnel selected a "worst case" soil sample from each location generally based on the following criteria:

- The soil sample that exhibited the highest PID screening results; and/or,
- Appeared to exhibit the most prominent staining; and/or,
- Exhibited the strongest potential chemical odor (or, in the absence of an apparent chemical odor, the strongest anomalous odor, as noted).

The selected soil sample's corresponding soil bag contained in the cooler on ice was used to prepare a soil sample for laboratory analysis. The soil contained in the soil bag used for field screening also was used for classification. The soil was visually classified by the on-site field personnel in accordance with ASTM International (ASTM) D 2488-93 and described on the appropriate field sampling form(s).

C.3 Soil Boring Abandonment Procedures

Following advancement of the probes and collection of soil gas samples, the probes were abandoned by back-filling them with sand and/or bentonite chips. If the boring was located in an area covered by asphalt or concrete, the boring was back-filled to approximately 3 to 4 inches below grade, and the remainder of the boring filled to match the existing surface [i.e., with asphalt (cold-patch) or concrete] unless otherwise instructed by the client.

C.4 Groundwater Monitoring Well Development and Sampling Procedures

C.4.1 Monitoring Well Development Techniques

Prior to well development, the monitoring wells will be gauged using an electronic interface probe to measure the depth to groundwater, and the amount of water within the well is then calculated. The electronic interface probe will also be used to check for, and measure the thickness of, potential non-aqueous phase liquids [(NAPLs) i.e., free product], especially product floating on the groundwater table. The groundwater monitoring wells will be developed manually using a volume-averaged purge technique. Each well is developed in order to bring a representative formation of water into the zone of interest and to reduce the turbidity in each monitoring well.

Development will continue until approximately five well casing volumes of water are removed. If the monitoring well is a "low-yield well" (i.e., incapable of yielding at least three well casing volumes of water over an 8-hour period), the well will then be evacuated to dryness one to five times over an 8-hour period. Monitoring well development will be performed using a PVC bailer, Peristaltic pump or positive displacement submersible pump (Monsoon®).

C.4.2 Groundwater Sampling Techniques

Groundwater samples will be collected using low-flow sampling methods and a peristaltic pump or a positive displacement submersible pump (Monsoon®). The peristaltic pump tubing or Monsoon pump will be lowered gently into the monitoring well when obtaining the sample. Upon collection, the groundwater samples will be placed into pre-cleaned, laboratory-supplied containers with the proper preservative(s) and shipped to the laboratory. Upon arriving at the laboratory, the samples will be tested for the constituents specified in the scope of work. Sampling will be performed wearing clean, disposable latex or nitrile gloves, one pair per sampling location. After sampling, the tubing or bailers and gloves will be placed into a designated on-site dumpster for disposal and the pump is decontaminated with non-phosphate soap and deionized water.

C.5 Disposal of Investigation-Derived Wastes (IDW)

Cleaning/decontamination procedures will be employed to minimize the potential for cross-contamination, off-site migration of potential COCs, and personal exposure to COCs. Installation and sampling activities associated with the monitoring wells will generate fluid materials. Purge water from well sampling and spent decontamination fluids will be designated as IDW. The IDW will be contained in 55-gallon drums; solids and fluids will be drummed separately for ease of handling. All drums will be placed in a predetermined location on the Subject Property; BBJ Group will not stage IDW in a right of way. If possible, the drums are stored in an area where they will remain dry. Each drum will be initially labeled using an indelible marker on the top of the drum. Upon receipt of the laboratory analytical data, with regards to disposal, final labeling of drums is conducted to include the following information:

- Site name and drum log number;
- Material description;
- Generator's name and address;

- Generator's identification number;
- Date generated; and
- Manifest number (if known).

C.6 Quality Assurance/Quality Control

The following sections outline QA/QC protocol, sample containers, sample preservation, sample identification and chain-of-custody procedures implemented during sampling activities.

C.6.1 QA/QC Samples

Trip Blanks

Trip blank samples consisting of de-ionized water, provided by the analytical laboratory, will accompany the cooler(s) containing the samples from the laboratory, to the field and back to the laboratory. The trip blanks will be used to assess potential cross-contamination from the cooler and handling practices, in addition to assessing potential cross-contamination between samples. Trip blanks will be analyzed for VOCs only. One trip blank will be analyzed per cooler.

Equipment Rinsates

Equipment rinsates will be collected to evaluate potential cross-contamination of samples during equipment cleaning procedures. The equipment rinsates will be collected by pouring deionized water provided by the laboratory over the sampling equipment and into sample containers. The equipment rinsates will be shipped with the soil and/or groundwater samples collected that day and will be analyzed for the same suite of potential COCs as the environmental samples.

C.6.2 Sample Containers and Preservation

Sample containers prepared by a commercial vendor were provided by the laboratory.

C.6.3 Sample Identification

Prior to sample collection, the appropriate container (with preservative, if applicable) was labeled with the following information:

- Sample identification;
- Initials of collector;
- Date and time of collection;
- Analytical parameters requested; and,
- Preservative used.

Samples were packed in coolers (with containerized ice) complete with custody seals and transported via overnight courier to the laboratory. Chain-of-custody documentation outlined as follows accompanied each shipment of samples to the laboratory.

C.6.4 Chain-of-Custody Procedures

Chain-of-custody began when the pre-cleaned sample containers arrived in the field in coolers with signed and dated custody seals. At the time of sample collection, the labeled samples were placed into an iced cooler. A line-item chain-of-custody form was then completed by the sampler. Chain-of-custody allowed the samples to be traced from the time of collection to their receipt in the laboratory. Upon completion of all line items, the sampler signed, dated, listed the time, and checked the completeness of all descriptive information contained on the form. One copy of the completed chain-of-custody was retained by the sampler. Each individual who subsequently assumed responsibility for the samples signed the chain-of-custody record. The following items were included on the chain-of-custody form:

- Sample identification;
- Signature of sampler;
- Date and time of collection;
- Sample type (i.e., aqueous or soil);
- Sample location;
- Number, size, and type of containers;
- Analytical parameters requested;
- Preservative (where applicable);
- Signatures of personnel involved in the chain of possession; and,
- Dates and times of relinquishment and receipt.

C.7 Cleaning Procedures

Cleaning procedures were employed to minimize the potential for cross-contamination, off-site migration of potential COCs, and personal exposure to COCs. Equipment involved in field sampling activities was decontaminated prior to drilling, sampling, or leaving the Subject Property. Also, between the advancement of individual boreholes, equipment involved in sampling (e.g., augers and drill rods) was decontaminated. During soil sampling, decontamination of the sampling equipment was conducted between each sample interval and include the following:

- The removal of visible sediment using a brush and non-phosphate soap and potable water mixture; and,
- Potable water rinse.

The electronic interface probe was decontaminated using the following steps:

- Rinse with a non-phosphate soap and potable water mixture;
- Allow to air dry; and
- Rinse with potable water.

C.8 Record Keeping

BBJ Group field personnel documented the field activities (with corresponding times) and pertinent information in a dedicated project field logbook. Information that was recorded included: the names and companies of on-site personnel (BBJ Group, client, subcontractors, etc.), weather conditions, and the purpose of activities and details of the fieldwork (e.g., soil conditions, sampling depths, etc.).

APPENDIX D

LABORATORY QA/QC PROCEDURES

General Information

"To not only meet, but exceed the needs and expectations of both our customers and our employees."

INTRODUCTION

First Environmental Laboratories, Inc. is an independent environmental laboratory dedicated to providing industry, government, and consultants with timely and accurate chemical analyses of a wide variety of sample matrices in support of various federal, state, and local regulations, while providing a level of customer service unequaled in our industry.

Incorporated in 1993, and located in Naperville Illinois, *First Environmental Laboratories, Inc.* was formed with a simple, yet extremely important objective: **To not only meet, but exceed the needs and expectations of both our customers and our employees.** As such, the company's management, organization, and recruitment policies all reflect this single operating philosophy.

The core management of the company consists of a team of carefully selected environmental professionals with extensive experience in the environmental laboratory field. Each member of the management team brings with them a unique blend of working knowledge and experience covering all areas of the business.

We at *First Environmental Laboratories, Inc.* firmly believe that our focus on exceeding our customer's expectations, whether it is in the area of data quality, technical assistance, or meeting commitments, separates us from our competition, and will allow us to set the standard against which all environmental laboratories will be measured.

HIGHEST LEVEL OF DATA QUALITY

First Environmental's Quality Assurance Plan is designed to ensure that we maintain our position as the quality provider of analytical services in the environmental lab industry. *First Environmental's* commitment to providing our customers with consistently high quality data is evidenced in the resources we have established to support our QA program.

Some of the key elements of our program include:

A Quality Assurance Plan (QAP) describing capabilities, quality assurance objectives and the system for meeting those objectives.

Standard Operating Procedures (SOPs) for instrumentation, field services, analytical services and applicable administrative systems.

A consistent quality control program which includes the analysis of blanks, spikes, duplicates and the use of calibration standards.

Dedication and commitment to the Quality Assurance process is one of the fundamental principles upon which *First Environmental Laboratories* was built.

PROFESSIONAL SERVICES

Chemical Analysis

First Environmental Laboratories, Inc. provides a wide variety of organic and inorganic analyses in support of a number of regulatory programs. Where applicable, *First Environmental* either maintains or is pending certification in the various programs. Major environmental programs for which we provide analytical services are:

- **Safe Drinking Water Act (SDWA)** - EPA 200, 300, and 500 Series Methods
- **National Pollution Discharge Elimination System (NPDES)** - EPA 200, 300, 400, and 600 Series Methods.
- **Leaking Underground Storage Tank (LUST)** - EPA 6000, 7000, 8000, and 9000 Series Methods (SW-846)
- **Resource Conservation and Recovery Act (RCRA) -** Includes: Landfill Monitoring, Waste Characterization, Site Assessments, and Corrective Actions - EPA 6000, 7000, 8000 and 9000 Series Methods (SW-846)
- **IEPA Site Remediation Program** according to protocols detailed in the reference document titled: "Analytical Quality Assurance Plan for the Illinois Environmental Protection Agency Bureau of Land Site Remediation Program," Revision 2, April 1, 1996.

Customer Support Services

Our emphasis is on establishing a one-on-one relationship with each of our customers. We accomplish this by identifying all project requirements prior to sample receipt, closely monitoring the project as it moves through the lab, and pro-actively keeping you informed of the status of your project.

TURNAROUND TIMES

First Environmental Laboratories, Inc. prices are based on a 5-7 working day turnaround time. Samples are logged in by the laboratory at the time they are received, unless they are received after 5:00 pm, in which case they are logged in at 8:00 am the following morning. Results are reported via FAX or e-mail by the Project Manager as soon as they are available. Final reports for all samples are mailed within one working day after the results are reported.

SAMPLE RETENTION

Samples will be held for thirty days from the date of report. Exceptions can be requested in writing prior to sample submission. All hazardous samples will be returned. Samples submitted and placed on “hold” will be held for 90 days unless other arrangements are made.

CONFIDENTIALITY

Confidentiality of all customer information and data is strictly maintained by *First Environmental Laboratories, Inc*. Confidentiality agreements are accepted and signed routinely. In the event of a subpoena, or an audit by the appropriate regulatory agency, the customer will be notified when data must be released. Requests for data or additional lab deliverables after a project is complete must be made in writing by the client.

SAMPLE CONTAINERS & SAMPLE DELIVERY

Clients may order a set of properly prepared sample bottles with preservatives, sample bottle labels, sampling instructions, and chain-of-custody forms at no extra charge. *First Environmental Laboratories, Inc.* provides a courier service to deliver and pick-up samples.

LABORATORY HOURS

Normal laboratory hours are 8 A.M. - 5 P.M., Monday through Friday. Arrangements can be made for after hour pick-up or drop off of samples.

WORK ORDER INFORMATION

To expedite both analysis and reporting, *First Environmental Laboratories, Inc.* provides Chain-of-Custody forms. Clients submitting their own documentation must include at least the following information:

Complete client identification
Sample description (including date/time of collection)
Analyses requested
Expected turnaround time (expedited services require lab approval)
Billing information (P.O. number or other authorization)

Facilities and Equipment

*“**First** In Quality.*
***First** In Service.*
***First** In Value.”*

FACILITIES AND EQUIPMENT

Facilities

First Environmental Laboratories, Inc. is based in a state-of-the-art facility specifically designed for the chemical analysis of environmental samples. Our laboratory is housed in approximately 8,000 square feet of space, located in Naperville Illinois, approximately 25 miles southwest of Chicago's O'Hare airport just off I-88.

Equipment

Our laboratory is equipped with state-of-the-art instrumentation capable of providing a full range of analytical services utilizing EPA approved procedures, and allows us to meet the diverse needs of our clients. The equipment and instrumentation used to produce our product - analytical results - are the single most important tools we use to provide our clients with timely and accurate data, and therefore, represent the single largest area of capital investment.

Critical to our ability to consistently provide our clients with timely and accurate results, is the reliability of our equipment. To ensure reliability and minimize instrument down time, we have developed and implemented a detailed in-house maintenance program for all of our equipment.

Below is a partial listing of our equipment and instrumentation:

Volatiles Analyses

- Agilent 5975B GC/MS with EST Centurion/Dual EnCon Purge & Trap Autosampler.
- Agilent 5973 GC/MS with EST Centurion/Dual Encon Purge & Trap Autosampler.
- Agilent 5972 GC/MS with EST 8100/Dual Encon Purge & Trap Autosampler.
- Agilent 5972 GC/MS with Tekmar 2000/ Varian Archon Purge & Trap Autosampler.
- Agilent 5972 GC/MS with Tekmar 2000/ Varian Archon Purge & Trap Autosampler.

These systems represent state-of-the-art in environmental volatiles analysis. The improved EST, Varian and Agilent systems are designed for the additional analytes and lower detection limits being required by USEPA protocols. Additional features added to this system allow for more accurate, automated and rapid determinations. The PC based computer control allows us to integrate data into widely used programs for further data analysis and reduction (e.g. spreadsheet software).

Semi-Volatiles and Pesticides/PCBs Analyses

- Agilent 5975 GC/MS with 7683 Autosampler. This is Agilent's most recent benchtop GC/MS model combined with the 7890A gas chromatograph.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5972 GC/MS with 7673 Autosampler.

Recent technological advancements in this most recent bench-top GC/MS has resulted in vastly improved (lower) detection limits as compared to the older models. We have further optimized the equipment and methodology to allow us to provide our clients with more reliable GC/MS methods in place of the less reliable GC and HPLC methods in a cost-effective manner.

- Agilent 6890 GC with Dual Electron Capture Detectors. Hewlett Packard's latest Gas Chromatograph allows easier operation and automatic data reduction for our pesticides, PCB, EDB and DBCP analyses.
- Agilent 6890N with dual micro electron capture detectors.
- Branson 450 Sonic Disrupter
- Horizon SPE-DEX 3000XL "Oil and Grease Machine" with Speed-Vap III concentrator

Metals Analyses

- Thermo Jarrell Ash ICAP 61E Trace Analyzer: This state-of-the-art instrument combines the speed and power of simultaneous ICP spectroscopy with the ability to reach part per billion and part per trillion detection levels previously only available through the more costly and time consuming graphite furnace methods.
- Coleman 50B Mercury Analyzer System
- Perkin-Elmer ELAN 9000 ICP-MS. For ultra-low detection limits of metals at the parts per trillion level and lower. The SimulScan dual-stage detector measures both high and low level analytes simultaneously.

Wet Chemical Analyses

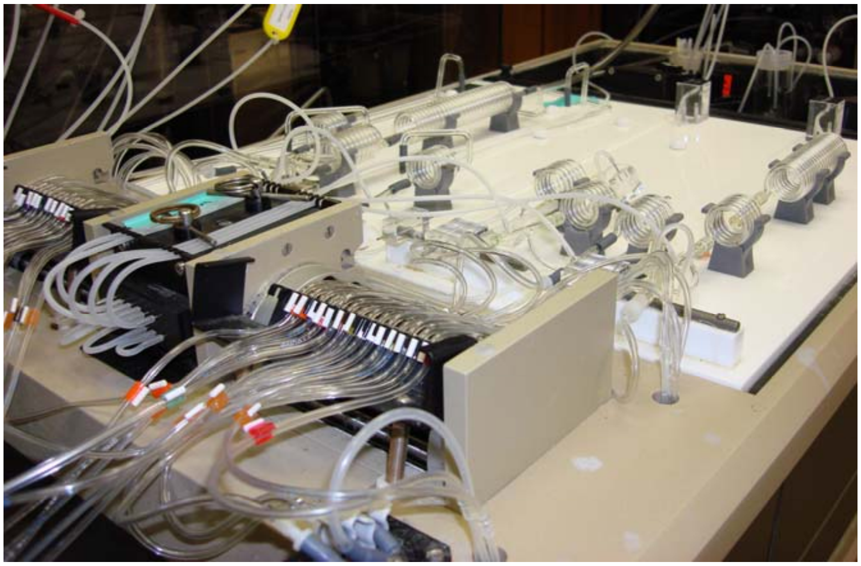
First Environmental Laboratories, Inc. operates a fully equipped wet chemistry laboratory, capable of performing a wide variety of classical analyses. A partial list of the equipment used to perform these analyses are:

Conventionals / Wastewater Analyses

- Milton-Roy 401 Spectrophotometer
- Hach 2100N Turbidimeter
- Symphony Model SB70C Conductivity Meter
- YSI 5000 Oxygen Meter
- Pensky-Martens Closed Cup Flash Point Tester
- Lab Crest Cyanide Midi Distillation System
- Orion 710A Ion Selective Electrode Meter
- Skalar SANPlus Analyzer (Cyanide, Phenol, TOC)
- Skalar SANPlus Analyzer ((Nitrate, Ammonia, Sulfate, Chloride)
- Westco Scientific EASYdist
- Oil & Grease Machine SPE-DEX3000 Horizon Technology

Support Equipment

- Drying Oven (4)
- Lindberg Blue M 794 Muffle Furnace
- Refrigerators, Freezers, and Incubators
- Top Pan Balances
- Analytical Balances
- Pipettes & Syringes
- Thermometers
- DI Water Sources – General Lab
- Barnstead E Pure DI Water Source for Volatiles Lab
- Glassware



Quality Assurance Program

*“**First** In Quality.*
***First** In Service.*
***First** In Value.”*

QUALITY ASSURANCE PROGRAM

One of the fundamental responsibilities of the management of *First Environmental Laboratories* is the establishment and implementation of continuing programs to insure the reliability and validity of our product - analytical data. Realizing the important role our data plays in your decision making process, we have developed an extensive Quality Assurance (QA) Program to ensure that all data produced is legally defensible and of consistently known and proven quality. A copy of our detailed Quality Assurance Manual is available upon request.

Our program has been designed to generate data that is in compliance with federal and state regulatory requirements as specified under the following programs: Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), and the IEPA Site Remediation Program.

The following summarizes our QA Program:

Method Validation

Prior to performing an analysis, each method is completely validated. Validation includes:

- Initial Demonstration of Capability (IDC)
- Method Detection Limit (MDL) Study
- Establishment of linear range of method
- Establishment of precision and accuracy criteria
- Documentation of the method in an SOP
- Successful analysis of single blind Performance Evaluation Samples (PES)

All method validation data is placed in a permanent file for future reference.

Sample Custody

Upon receipt by *First Environmental Laboratories,* samples proceed through a process specifically designed to ensure the integrity of both the samples and any corresponding documentation.

Once received, the condition of all samples and shipping materials are carefully inspected to verify compliance with appropriate NELAC requirements. Additionally, sample labels are compared to the corresponding Chain-of-Custody records. Any discrepancies are documented on the Chain-of-Custody form, and the client is informed.

Once sample receipt is verified, each sample is assigned a unique laboratory identification number, logged into the Laboratory Information Management System (LIMS) and released to the laboratory for analysis. All project and sample documentation is placed in an active job file and forwarded to Project Management personnel for review.

Internal chain-of-custody procedures track the sample from receipt, through the analytical process and to final sample disposition. Access to the laboratory is restricted to authorized personnel only.

Standard Operating Procedures (SOPs)

Complete and accurate documentation of analytical and procedural information is an important part of our QA Program. SOPs detailing analytical and Quality Control (QC) protocols have been prepared for all routine analyses, and are in strict adherence to accepted EPA methodology. In addition to the analytical SOPs, we have developed SOPs detailing non-analytical lab operations such as:

- Statistical Control Charting
- Balance Maintenance & Calibration
- Pipet Maintenance & Calibration
- Thermometer Maintenance & Calibration
- LIMS Data Entry and Reporting
- Corrective action

The Director of Data Quality controls the distribution of current SOPs and the archiving of outdated ones.

Quality Control Indicators

Analytical performance is monitored on a continuous basis through the use of Quality Control Indicators (QCIs). QCIs provide us with immediate feedback on analytical variables such as method performance, systems performance, matrix effects, and precision & accuracy. Statistical analysis and control charting of the various QCIs allows us to identify trends in the performance of a given method, and perform corrective action before a method produces unacceptable results.

Key Quality Control Indicators routinely implemented by *First Environmental Laboratories* include:

- **Multi-Point Initial Calibration** – a plot of concentration of known analyte standards verses the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce standards, which cover the working range of the instrument.

- **Initial Calibration Verification Standard** – a standard from a source different than that used to prepare standards for the multi-point calibration used to verify that the material was of sufficient purity and that the standards were properly prepared.

- **Continuing Calibration Verification Standard** – a standard which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify the initial calibration.

- **Procedure Blank -** prepared with each analytical batch and consists of reagents specific to the method. The procedure blank is carried through the entire analytical procedure and is used to assess the level of contamination inherent in the procedure.

- **Laboratory Control Sample (LCS) -** prepared with each analytical batch and consists of a procedure blank fortified with analytes of interest. The LCS is carried through the entire analytical procedure, and is used to measure overall method performance.

- **Matrix Duplicate -** a sample divided into separate aliquots and processed separately. Used to monitor the precision of the analysis.

- **Matrix Spike -** a sample fortified with known concentrations of analytes of interest. Used to evaluate the effect of the sample matrix on the accuracy of the analysis.

- **Matrix Spike Duplicate -** a sample divided into separate aliquots, with each aliquot fortified with known concentrations of analytes of interest. The results of the two analyses are compared and evaluated to determine the effect of the sample matrix on the precision and accuracy of the method

- **Surrogate Spike -** system monitoring compounds that are similar to the analytes of interest, but are not commonly found in environmental samples. Surrogate spikes are added to each sample for organics analysis, and are used to monitor the effect of the sample matrix on the accuracy of the method.

Performance and Systems Audits

First Environmental Laboratories routinely participated in the WP and WS Programs, which consisted of the analysis of single-blind performance evaluation samples provided by the U.S. EPA. Upon discontinuation of the U.S. EPA program, *First Environmental Laboratories* enrolled in NSI Solutions, Inc. Laboratory Proficiency Testing Program (LPTP^{TM}). Performance Evaluation (PE) samples for both drinking water and wastewater fields of testing will be received biannually. A single set of PE samples will be received each quarter starting in January of 1999.

In addition to audits performed by certifying agencies and clients, the Director of Data Quality conducts internal audits on a regular basis.

Analyst Training

An analyst who is known to be proficient and experienced at performing the analysis/instrument operation will coach analysts who are learning how to perform an analysis or operate an instrument.

The “coach” or trainer will be responsible for reviewing all data produced by the new analyst until successful completion of initial demonstration of capability.

Demonstrating proficiency at performing an analysis or a given suite of analyses will include the following:

- Performing, calculating, and interpreting a Method Detection Limit (MDL) study.
- Performing, calculating, and interpreting an Initial Demonstration of Capability (IDC) consisting of four replicate standards prepared at a known concentration.
- Successful analysis of blind performance evaluation sample(s). PE samples may be blind standards prepared by a different analyst or purchased from APG.
- Demonstrating knowledge of the method references and supporting SOPs and/or bench references.

Reporting Results

"To not only meet, but exceed the needs and expectations of both our customers and our employees."

ANALYTICAL REPORTS

Analytical reports are the means by which analytical data results are communicated. Results of analyses need to be reported objectively, accurately, and unambiguously and in accordance with internally established rules and conventions that meet method requirements. The content of the *Analytical Report* or *Certificate of Analysis* includes all information requested that is necessary for the interpretation of the analytical results, as well as, information required by the method and/or the NELAC accreditation standard.

The supporting quality control data is normally retained at the laboratory for reference. Different levels of quality control data packages can be prepared at the client request.

Analytical Reports are generated from the laboratory information management system (LIMS) once all of the test data entry is complete. The analytical report includes the vital sample information input at sample login along with the test results inputted for the requested analytes.

First Environmental Laboratories, Inc. has several reporting formats to suite the individual needs of the client and to present the requested results in an easy to understand way. Our standard report formats include these basic elements: a cover letter describing the job, a case narrative describing any analytical issues with the analyses and the main body of the report which details the analyte results. The hardcopy report will be sent to the appropriate contact named on the chain of custody form along with the original COC form and any associated paperwork.

Sample Collection and Preservation Requirements

*“**First Environmental** will assist in assuring that proper sample collection and preservation requirements are met.”*

SAMPLE BOTTLE PRESERVATIVES AND HOLDING TIMES FOR AQUEOUS SAMPLES

METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
General, dissolved	Plastic	Filtered on site, HNO_3 to pH<2	6 months
General, total	Plastic	HNO_3 to pH<2	6 months
Chromium, hexavalent	Plastic	Cool 4° C	24 hours
Mercury	Plastic	HNO_3 to pH<2	28 days

INORGANIC NON-METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Acidity	Plastic	Cool 4° C	14 days
Alkalinity	Plastic	Cool 4° C	14 days
Ammonia	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
BOD	Plastic	Cool 4° C	48 hours
Bromide	Plastic	None	28 days
Chloride	Plastic	None	28 days
Chlorine	Plastic	Cool 4° C	Analyze Immediately
Chromium, +6	Plastic	Cool 4° C	24 hours
COD	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Color	Plastic	Cool 4° C	48 hours
Conductivity	Plastic	Cool 4° C	28 days
Cyanide, Total or Amenable	Plastic	NaOH to pH>12, Cool 4° C	14 days
Cyanide, Reactive, pH 2	Plastic	NaOH to pH>12, Cool 4° C	14 days
Flash Point, Closed Cup	Glass	Cool 4° C	-
Fluoride	Plastic	None	28 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Hardness, Total	Plastic	HNO_3 to pH<2	6 months
Nitrite	Plastic	Cool 4^o C	48 hours
Nitrate/Nitrite (waste water, chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4^o C	28 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4^o C	14 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	Cool 4^o C	48 hours
Nitrate/Nitrite (chlorinated drinking water)	Plastic	Cool 4^o C	28 days
Oil & Grease	Glass	H_2SO_4 to pH<2, Cool 4^o C	28 days
pH	Plastic	None	Analyze Immediately
Phenols	Glass	H_2SO_4 to pH<2, Cool 4^o C	28 days
Phosphorus, Ortho	Plastic	Cool 4^o C	48 hours
Phosphorus, Total	Plastic	H_2SO_4 to pH<2, Cool 4^o C	28 days
Silica	Plastic	Cool 4^o C	28 days
Solids, Dissolved	Plastic	Cool 4^o C	7 days
Solids, Suspended	Plastic	Cool 4^o C	7 days
Solids, Total	Plastic	Cool 4^o C	7 days
Solids, Settleable	Plastic	Cool 4^o C	48 hours
Solids, Volatile	Plastic	Cool 4^o C	7 days
Sulfate	Plastic	Cool 4^o C	28 days
Sulfide	Plastic	ZnOAc + NaOH to pH>9 Cool 4^o C	7 days
Sulfide, Reactive pH 2	Plastic	ZnOAc + NaOH to pH>9 Cool 4^o C	7 days
Sulfite	Plastic	None	Analyze Immediately
Surfactants, MBAS	Plastic	Cool 4^o C	48 hours

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Turbidity	Plastic	Cool 4^o C	48 hours

ORGANIC PARAMETERS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
HPLC Pesticides (Aldicarb / Carbonfuran)	Glass vial	1.2 mL Chloroacetic acid / vial, Cool 4^o C	28 Days
EDB/DBCP	Glass vial	Cool 4^o C	28 Days
Endothall	Glass	Cool 4^o C	7 days extraction 1 day - analysis
Pesticides and PCBs	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis
PCBs (only)	Glass	Unpreserved Cool 4^o C	None
Petroleum Hydrocarbons, IR	Glass	H_2SO_4 to pH<2, Cool 4^o C	28 days
Phenoxyacid Herbicides	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis
Phthalate Esters	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis
Polynuclear Aromatic Hydrocarbons	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days analysis
GC/MS Semivolatiles	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days analysis
Total Organic Carbon (TOC)	Plastic	H_2SO_4 to pH<2, Cool 4^o C	28 days
Total Organic Halogens (TOX)	Glass	H_2SO_4 to pH<2, Cool 4^o C $Na_2S_2O_3$ if Cl_2 is present	28 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Total Petroleum Hydrocarbons	Glass	Cool 4° C	7 days extraction 40 days - analysis
Volatile Organics	Glass vial	HCl to $pH<2$ Cool 4° C $Na_2S_2O_3$ if Cl_2 is present,	14 days
Volatile Aromatic Organics	Glass vial	$Na_2S_2O_3$ if Cl_2 is present, HCl to $pH<2$	14 days

General Note: Glass bottles used for most organic analyses should be amber in color.

SAMPLE BOTTLE PRESERVATIVES AND HOLDING TIMES FOR SOILS & SEDIMENT SAMPLES

METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
General, total	4oz. Jar	None	6 months
Chromium, hexavalent	4oz. Jar	None	30 days –extraction 7 days - analysis
Mercury	4oz. Jar	None	28 days

ORGANIC PARAMETERS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Pesticides and PCBs	Glass	Unpreserved Cool 4° C	14 days – extraction 40 days - analysis
GC/MS Semivolatiles (including PNAs)	Glass	Unpreserved Cool 4° C	14 days – extraction 40 days - analysis
Volatile Organics	Glass	Method 5035 sampling Cool 4° C	14 days

Sampling Instructions

- The sampling containers provided to you may contain small amounts of required preservative. The preservatives in common use are: 1 + 1 sulfuric acid, 1 + 2.5 nitric acid, 1 + 1 hydrochloric acid, and sodium hydroxide pellets. These preservatives are strong acids and bases, and can cause burns. Use caution at all times. Please refer to the Material Safety Data Sheets enclosed for additional information. (Note: 1 + 2.5 translates to 1 part acid to 2.5 parts deionized water).

- Do not rinse the sample containers prior to use.

- Fill plastic and glass containers to approximately one inch from the top and cap tightly.

- Aqueous Samples Requiring Volatile Analysis: Fill volatile vials full (reverse meniscus) and carefully slide the septum onto the vial. Screw on the cap and check the vial for air bubbles. A properly filled vial will contain no air bubbles.

- Soil Samples: 4 oz. jars are used for the collection of soil samples. Special procedures and sampling materials are required for the collection of volatile samples.

- The temperature within the cooler must be maintained at $4^{o}C$ during transit to the laboratory. Please ensure that appropriate quantities of ice / ice packs are enclosed within the cooler to maintain this temperature.

- Please complete the enclosed chain of custody. This is an integral component of documentation supporting any analysis performed for regulatory compliance.

- Seal the cooler with the enclosed custody seal. The custody seal demonstrates to laboratory personnel the maintenance of sample integrity during sample transportation to the laboratory.

- Although each sampling event is unique, remember to get as representative of a sample as possible. This might mean running the water for two minutes; mixing the sample prior to filling the containers; etc.

If you have any questions, please feel free to contact the lab at (630) 778-1200.

Method 5035: Field Preservation, Collection and Handling Instructions for Vials

Materials

- 2 sodium bisulfate preserved, pre-weighed vials for low level analysis. These vials will also contain a small magnetic stir bar.
- 1 methanol preserved, pre-weighed vial for medium-high level analysis
- 1 non-preserved container for percent total solids determination
- 1 syringe
- 1 Power Handle for collecting samples with syringe

Instructions for Sample Collection

1. The blue plate should be in place on the Power Handle (flanges should be pointing to the round end of the handle). A 5g sample will be collected when the plate is in place.
2. Clip syringe into the Power Handle
3. Using the Power Handle, push the syringe into the soil to collect 5g sample.
4. Un-clip syringe from Power Handle and extrude 5g sample into vial.
5. Repeat process for each additional vial.
6. A single syringe can be used to collect sample aliquots for each of the three vials.
7. Mark each sample container with your sample identification. <u>Do not add any additional labels or tape to the pre-tared vials.</u> Store samples at 4°C. The holding time for VOC analysis is two weeks.
8. A fourth container needs to be submitted to the laboratory for percent total solids determination. Fill the container provided to capacity. If extractable organic analyses, i.e., semi-volatiles, PNAs, or pesticides/PCBs will be performed, the fourth container should be a 4-oz. glass jar.

Note: Methanol is a flammable substance. If samples will be shipped to the laboratory via couriers such as UPS or Federal Express, DOT labeling requirements must be met.

Sample Acceptance Policy

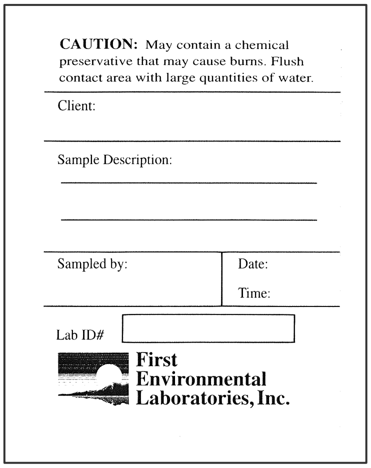
The regulations guiding laboratory certification requires that our laboratory have a written sample acceptance policy available to sample collectors. Exceptions will be noted on the chain of custody and in the Analytical Report.

The sample collector must document the following information on the Chain of Custody:

- Your company's name, address, phone, fax number and e-mail address.
- Identity of person receiving report
- Sampler or collector's name
- Project identity / location
- Date / time of sample collection
- Sample identification, description, or location
- Matrix type
- Analyses required or reference to quote/order detailing required analyses
- Signatures of persons involved in the chain of possession, including collector's
- Comments / special instructions

Laboratory personnel must document the following on the Chain of Custody:

- Condition of sample shipper and containers upon receipt
- Preservation type
- Temperature of cooler upon receipt
- Date and time of sample receipt
- Signatures of persons involved in the chain of possession, including receiving personnel
- Lab sample ID number



CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description:

Sampled by:

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

Sample bottles provided by the laboratory are pre-labeled with water resistant labels that are color coded to indicate the type of preservative present in the container.

Red = Nitric Acid
Yellow = Sulfuric Acid
Light Blue = Sodium Hydroxide
Deep Blue = Hydrochloric Acid
Teal = No Treat (No preservative)

Sample bottles need to be labeled using indelible ink. Adequate sample volume must be provided for the analyses requested. The COC must document the use of preservation and sample containers as required by the approved test methods. If preserved bottles have been obtained from the laboratory the "Preserved in Field" box should be checked.

Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

Please contact us for further information.

First Environmental Laboratories, Inc.

1600 Shore Road
Naperville Illinois 60563
Phone 630-778-1200
Fax 630-778-1233

www.firstenv.com

CHAIN OF CUSTODY RECORD

Page____ of ____ pgs

First Environmental Laboratories, Inc.

First Environmental Laboratories
1600 Shore Road, Suite D
Naperville, Illinois 60563
Phone: (630) 778-1200 • Fax: (630) 778-1233
E-mail: firstinfo@firstenv.com
IEPA Certification #100292

Company Name:
Street Address:
City: State: Zip:
Phone: Fax: e-mail:
Send Report To: Via: Fax ☐ e-mail ☐
Sampled By:

Analyses

Project I.D.:______________________________
P.O. #.:______________________________

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	**Sample Description**	**Matrix**									**Comments**	**Lab I.D.**

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6ºC Yes__ No.__ ___________ºC
Received within 6 hrs. of collection:______
Ice Present: Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature:_______ºC
5035 Vials Frozen: Yes__ No__
Freezer Temperature:______ºC

Containers Received Preserved: ☐ Yes ☐ No

Need to meet: IL. TACO ☐ IN. RISC ☐

Notes and Special Instructions: ____

____

____

Relinquished By: ______________________ Date/Time ______________ Received By: ______________________ Date/Time ______________
Relinquished By: ______________________ Date/Time ______________ Received By: ______________________ Date/Time ______________

Rev. 9/08

First Environmental Laboratories, Inc.

Quality Assurance Manual

Start Date: 11/28/11
End Date:

Quality Assurance Program Plan

for

First Environmental Laboratories, Inc.

1600 Shore Road
Naperville Illinois 60563
Phone 630-778-1200
Fax 630-778-1233

Stan Zaworski – Laboratory Director (Owner) — Date 11/28/11

Reviewed by Lorrie Franklin - Director of Data Quality (Owner) — Date 11/28/11

Willian H. Mottashed – VP Operation (Owner) — Date 11/28/11

Scott Gerrick – VP Marketing (Owner) — Date 11/28/11

Neal Cleghorn – Technical Director — Date 11/28/11

Effective Date (Beginning) 11/15/11 (End) ________________

This QAPP is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes.

Table Of Contents

Note: this document includes a total of seven attachments and they are found in the various sections as indicated in the table of contents detailed below.

3. Laboratory Organization

3.1. Introduction

Although this Quality Assurance plan is enforced under the guidance and supervision of the Director of Data Quality, the primary responsibility for data integrity and quality rests with each and every employee involved in the generation of analytical data. In the event that changes occur within the management team or within the analytical team, transition plans and/or training plans are developed to ensure that the quality of the analytical tests and services are not impaired.

3.2. Ensuring the Integrity and Confidentiality of Data

3.2.1. Integrity

3.2.1.1. Our laboratory has managerial and technical personnel with the authority and resources needed to identify the occurrence of departures from the quality system or from the Standard Operating Procedures (SOPs) and to initiate actions to prevent or minimize departures.

3.2.1.2. If internal pressures, such as, turn-around-time, client demands, management demands, or performance demands, or external pressures, such as commercial or financial, are identified as adversely affecting the quality of data, then appropriate action is taken to remedy the situation.

3.2.1.3. Owners, managers and employees of *First Environmental Laboratories, Inc.* must be free and clear of organizational and personal conflict of interest. The laboratory and laboratory personnel actively avoid involvement in activities that could be construed as a conflict of interest, and thereby diminish confidence in its competence, impartiality, judgment or operational integrity.

3.2.1.4. First Environmental Laboratories, Inc. conducts initial and annual training to ensure communication of our Code of Ethics. Details regarding the training program are found in SOP #127, titled "Data Integrity & Ethics".

3.2.2. Confidentiality

3.2.2.1. All information and records pertaining to client samples and analyses conducted on client samples are confidential.

3.2.2.2. Data and information pertaining to data produced for a client will not be released to any other source by telephone, facsimile or other electronic means without the express permission of the client. When feasible, permission will be obtained in writing. If not feasible, the date verbal permission was obtained and the initials or signature of the person obtaining permission will be noted on the data file.

3.2.2.3. Facsimiles and E-mail documents will contain the following qualifier:
"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

3.3. Laboratory Organization & Responsibilities:

3.3.1. Laboratory Director:

- Ensures compliance with the current TNI Standard.
- Oversees all analytical and operational activities of the laboratory including but not limited to the following:
  - sample acceptance, receipt, log-in, and storage,
  - production,
  - quality control activities, and
  - supervision of laboratory personnel.
- Designates laboratory supervisors, the quality assurance officer, and the technical director.
- Nominates deputies in case of absence of quality assurance officer or technical director.
- Ensures that the Quality System is documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned.
- Implements and enforces adherence to company policies and procedures.
- Approves all documents prepared to support and guide laboratory operations.

3.3.2. Director of Data Quality:

- Ensures compliance with the current TNI Standard.
- Ensures that all personnel are properly trained in quality assurance policies and procedures, and that all quality assurance objectives are being met.
- Coordinates training of analysts and ensures appropriate documentation of training is maintained.
- Conducts an objective internal audit of quality systems and technical operation annually without outside influence. Prepares Quality Report to Management annually in conjunction with internal audit.

- Coordinates QA/QC procedures and analytical data review procedures.
- Evaluates data objectively and performs assessment without outside managerial influence.
- Notifies laboratory management of deficiencies in the quality system.
- Revises procedures and updates quality manual as required.
- Pursues and maintains appropriate certifications and contracts.
- Approves Standard Operating Procedures (SOPs).
- Coordinates document control of all documents supporting laboratory operations.
- Possesses general knowledge of the analytical methods performed by the laboratory and quality systems.

3.3.3. Technical Director:

- Ensures compliance with the current TNI Standard.
- Oversees function of LIMS and internal computer networks.
- Monitors standards of performance in Quality Control & Quality Assurance.
- Monitors validity of the analyses performed and data generated to assure reliable data.
- Coordinates technical operations of laboratory including development of new capabilities.
- Oversees provision of resources needed to ensure requirements of quality system are met.

3.3.4. Project Manager:

- Interfaces with client to define Data Quality Objectives (DQO) for a given project. This includes accreditation status, analytical methods, detection limit requirements, QA/QC requirements, turn-around time, and deliverables.
- Accepts / coordinates requests from clients for sampling supplies, delivery and pickup.
- Coordinates lab activities to ensure that the client defined DQOs are being met.
- Reviews all data generated by the lab and assembles final report for the client. All questions related to the final report are directed to the Project Manager.
- Forwards reports to client in desired format via e-mail or facsimile.
- Prepares invoices for projects.
- Coordinates requests for QA packages and/or electronic deliverables
- Fields all questions from client relating to the project.

3.3.5. Senior Analyst:

A senior analyst has the following additional responsibilities. All the responsibilities detailed for an Analyst also apply.

- Responsible for scheduling instrument/method validation and maintenance of periodic studies, e.g., MDL studies, per method requirements.
- Trains new analysts, analyst-in-training and technicians in their area of analytical responsibility. The training effort is coordinated with the Director of Quality Assurance and/or the Technical Director.
- Performs SOP review whenever a new analyst is trained to perform the analysis.
- Performs method reviews whenever a revised method is issued by regulatory source.
- Reviews analytical data produced by analyst-in-training or technician.

3.3.6. Analyst:

- Schedules sample analyses to meet all holding times and due dates
- Responsible for the analysis of samples in accordance with approved methods and SOPs, the QAP and/or client defined protocols.
- Reviews analytical data and ensures all Quality Control indicators are within acceptance criteria. Performs and documents corrective action when necessary. Informs Project Manager of any out of control situation. Flags data appropriately using current laboratory guidelines.
- Enters data in LIMS
- Maintains appropriate log books for accuracy and completeness.
- Performs routine periodic maintenance on instrumentation.
- QA Support
  - Ensures the procedures used in the laboratory comply with SOP.
  - Maintains control charts as required by specific method SOPs
  - Prepares data packages as required to meet project requirements.

3.3.7. Analyst-in-training:

An Analyst-in-training analyst has the following responsibilities. All the responsibilities detailed for an Analyst apply.

- Responsible for working closely with the senior analyst to ensure that data quality is not compromised during training.
- Responsible for ensuring that all analytical data is reviewed by an analyst or supervisor authorized to perform data review.

3.3.8. Laboratory Assistants

- Maintains inventory and stock of sampling supplies.
- Fulfills requests for sampling supplies per client’s specifications.
- Distributes laboratory supplies received from various vendors.

- Cleans laboratory glassware in accordance with established procedures.
- Provides courier services to clients requesting sample pickup or delivery of sampling supplies.
- Assists with filing.
- Manages sample storage and disposal for routine samples.

3.3.9. Administrative Assistants :

- Receives all samples, inspects and documents condition of shipping and sample containers.
- Verifies chain of custody against samples and/or associated paperwork. Records any discrepancies and notifies Project Manager of same for communication to client.
- Logs samples into the Laboratory Information Management System.
- Places samples in secured refrigerated area for storage.
- Mails completed reports and invoices.
- Files completed reports.
- Responsible for shipping and receiving.

3.3.10. Information Technology Specialists:

- Customizes and maintains the Laboratory Information Management System (LIMS).
- Ensures that appropriate hardware exists to enable effective use of the LIMS at all levels of laboratory operations.
- Implements and maintains any software required for the production of analytical data and reports. This includes programs or routines for electronic data deliverables.
- Implements and maintains the laboratory’s internal computer networking hardware and software.
- Implements and maintains the laboratory’s external internet presence (web site) and communications (e-mail).
- Maintains documentation in support of the activities listed above.

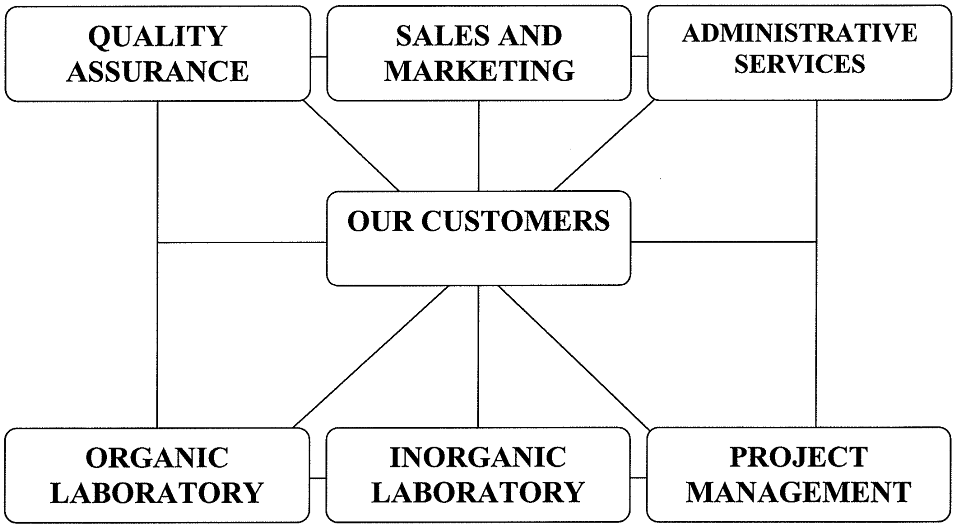
3.3.11. Marketing Director:

- Identifies potential clients and initiates contact.
- Maintains relationship with current clients.
- Coordinates sample bottle deliveries and sample pickup.

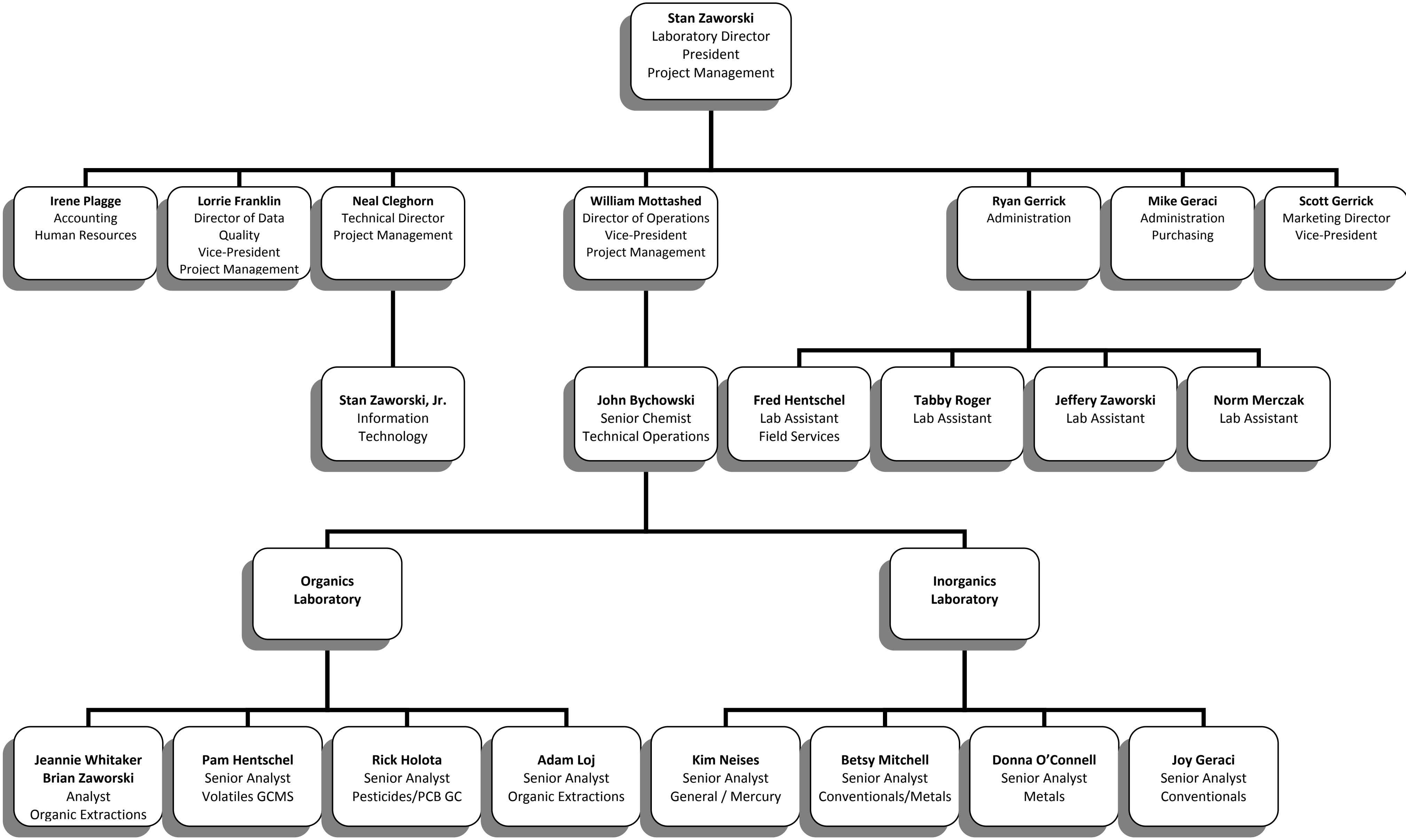
3.4. Managing for Our Customers

First Environmental Laboratories, Inc.

MANAGING FOR OUR CUSTOMERS



First Environmental Laboratories, Inc.



- **Stan Zaworski** Laboratory Director, President, Project Management
  - **Irene Plagge** Accounting, Human Resources
  - **Lorrie Franklin** Director of Data Quality, Vice-President, Project Management
  - **Neal Cleghorn** Technical Director, Project Management
    - **Stan Zaworski, Jr.** Information Technology
  - **William Mottashed** Director of Operations, Vice-President, Project Management
    - **John Bychowski** Senior Chemist, Technical Operations
      - **Organics Laboratory**
        - **Jeannie Whitaker**, **Brian Zaworski** Analyst, Organic Extractions
        - **Pam Hentschel** Senior Analyst, Volatiles GCMS
        - **Rick Holota** Senior Analyst, Pesticides/PCB GC
        - **Adam Loj** Senior Analyst, Organic Extractions
      - **Inorganics Laboratory**
        - **Kim Neises** Senior Analyst, General / Mercury
        - **Betsy Mitchell** Senior Analyst, Conventionals/Metals
        - **Donna O'Connell** Senior Analyst, Metals
        - **Joy Geraci** Senior Analyst, Conventionals
  - **Ryan Gerrick** Administration
    - **Fred Hentschel** Lab Assistant, Field Services
    - **Tabby Roger** Lab Assistant
    - **Jeffery Zaworski** Lab Assistant
    - **Norm Merczak** Lab Assistant
  - **Mike Geraci** Administration, Purchasing
  - **Scott Gerrick** Marketing Director, Vice-President

3.5. Key Staff / Area of Responsibility

Key Staff	**Area of Responsibility**
Stan Zaworski	Laboratory Director / Project Manager
Lorrie Franklin	Director of Data Quality
Neal Cleghorn	Technical Director / Project Manager
Bill Mottashed	Project Manager
John Bychowski	Senior Analyst – Organics / volatiles
Pam Kyncl-Hentschel	Analyst – Organics / volatiles
Adam Loj	Senior Analyst – Organics / semi- volatiles
Rick Holota	Senior Analyst – Organics / pesticides & PCBs
Kim Nieses	Senior Analyst – Inorganics / general/mercury
Donna O'Connell	Senior Analyst – Inorganics / metals
Betsy Ann Mitchell	Senior Analyst - Inorganics / conventionals & metals
Joy Geraci	Senior Analyst – Inorganics / conventionals
Jeannie Whittaker	Analyst – Organics / organic extraction
Brian Zaworski	Analyst – Organics / organic extraction
Fred Hentschel	Laboratory Assistant/Field
Norm Merczak	Laboratory Assistant
Katie Pilmer	Laboratory Assistant
Jeff Zaworski	Laboratory Assistant
Mike Geraci	Administrative Assistant
Irene Plagge	Administrative Assistant
Ryan Gerrick	Administrative Assistant
Stan Zaworski, Jr.	Information Technology Specialist
Scott Gerrick	Marketing Director

4. Quality Systems Program Description

4.1. Introduction

Quality Systems include all Quality Assurance (QA) policies and Quality Control (QC) procedures developed and followed by our laboratory to ensure and document the quality of the analytical data. Data integrity and ethics is inherent to the success of our business and adherence to the established procedures is vital.

4.2. Quality Systems

4.2.1. Many QA/QC policies and procedures are documented in this manual. These policies and procedures were developed to meet Quality Systems of 2009 TNI Standard: Volume 1: Management and Technical Requirements for Laboratories Performing Environmental Analysis. This standard is required to be implemented by July 1, 2011. This standard has incorporated the current version of ISO/IEC 17025. If the test method or regulatory program specifies more stringent standards or requirements, they will be met. If it is not clear which requirements are more stringent, the method or regulatory program requirements will be met. This manual is organized as a living document and will be revised periodically to meet the current standard.

4.2.2. *First Environmental Laboratories, Inc.* is an independent environmental laboratory dedicated to providing industry, government, and consultants with timely and accurate chemical analyses. A wide variety of sample matrices can be analyzed in support of various federal, state, and local regulations, while providing a level of customer service unequaled in our industry.

4.2.3. *First Environmental Laboratories, Inc.* is accredited by Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) in accordance with the TNI standards. Our objective is to establish and implement a compliant Quality Systems Program that ensures all personnel involved in the generation of analytical data are trained to produce data of known and consistently high quality. Adherence to this program will ensure our data is accurate and complete, and consistently meets criteria as defined by our clients and/or the regulatory agencies.

4.2.4. The responsibility for the successful implementation of this program lies with each employee, and all levels of management strictly enforce its implementation.

4.2.5. The program utilizes the following internal documents:

- Quality Assurance Manual (QAM)
- Standard Operating Procedures (SOPs)
- Chemical Hygiene and Safety Plan (CHSP)

These documents detail the policies and procedures developed by *First Environmental Laboratories, Inc*. to ensure the production of high quality, legally defensible data. All laboratory personnel are required to understand and implement the policies and procedures described in these documents. The laboratory director must approve departures from documented policies and procedures.

4.2.6. Periodic review of our QAM, SOPs, and supporting documents ensures continuous improvement of the laboratory and continued compliance with the effective TNI Standard.

4.3. Data Integrity Systems

4.3.1. The laboratory has developed a Code of Ethics and a Data Integrity and Ethics training program. The data integrity system includes:

- Initial and refresher data integrity training,
- signed data integrity documentation for all lab employees,
- periodic monitoring of data integrity, and
- data integrity procedures documentation.

4.3.2. A mechanism exists for confidential reporting of data integrity issues in the laboratory. Management is committed to fostering a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern.

4.3.3. The procedures and documentation, and overall effectiveness of the program are reviewed and if needed, updated, by management annually.

4.3.4. Data integrity records are available for inspection by client or primary accrediting body assessor.

5. Document Control

5.1. Introduction

Document control procedures are established to ensure that a historical record of all SOPs, manuals, or documents is maintained. The record needs to clearly indicate the time period during which the procedure or document was in force. Proper maintenance of the historical records and the record keeping procedures used by the laboratory ensures the ability to legally defend the data.

5.2. Document Approval and Issue

5.2.1. All documents issued to personnel in the laboratory as part of the quality system are reviewed and approved for use by authorized personnel prior to issue.

5.2.2. SOPs and other documents, such as the QAM and CHSP, are available to all personnel in support of their assigned analytical responsibilities. Distribution logs are retained that provide a record of document distribution. The Director of Data Quality coordinates the distribution and collection of controlled documents. Document control ensures that pertinent issue of appropriate documents is available at the point of use. Documents are periodically reviewed and revised to ensure continuing compliance with the regulatory and accreditation sources. Document control ensures that obsolete documents are removed from all points of use. An electronic copy of obsolete revisions of a document is maintained as a part of the permanent historical record.

5.2.3. Controlled documents are uniquely identified including revision number, date of issue, page number and total number of pages, implementation / end use date, and signature of person(s) responsible for document approval.

5.3. Document Changes

5.3.1. Changes to documents shall be reviewed and approved by the same function originally responsible for document preparation and approval. Designated representatives will have access to the historical record in order to assess the change prior to approval.

5.3.2. Changes to documents may be made by hand pending the re-issue of the document. The change will be clearly marked, initialed and dated by the Director of Data Quality or designated representative. Re-issuance of a revised document will occur within a reasonable time frame.

5.4. SOPs.

5.4.1.
Each SOP contains the following information within the header:

> *Filename: \\madre\company\word files\sop\conv\ammonia.doc*
> *Revision No.: 2 Date of Last Revision: 6/13/96*
> *Page 2 of 3*

Each SOP contains the following information on the last page:

> Approvals
>
> Reviewed for Technical Accuracy by: ______________________
>
> Reviewed for Quality Assurance Compliance by: ________________________
>
> Implementation Date: ______________
>
> End Use Date: ____________________

5.4.2. SOPs are maintained to accurately reflect all phases of current laboratory activities.

5.4.3. SOPs are reviewed for accuracy prior to initiating training of a new analyst, or if the method source is updated. At a minimum, SOPs are reviewed every five years. If the review is performed and the SOP does not require revision, the SOP will still be re-issued with a new revision number thereby initiating the next five year cycle. A continuous log is kept that summarizes the dates of revision, associated revision number, and why the revision was performed.

5.5. Quality Assurance Program Plan

5.5.1. The Quality Assurance Program Plan (QAPP) is reviewed for compliance with part 186, <u>Accreditation of Laboratories for Drinking Water, Wastewater and Hazardous Waste Analyses</u>, bi-annually. The title page lists the effective date (beginning & end).

5.5.2. The QAPP is reviewed bi-annually for accuracy and compliance with TNI quality systems.

5.6. Obsolete DocumentS and Maintenance of the Historical Record

5.6.1. Obsolete versions of the document are removed from distribution. Removal from use is documented on the distribution form.

5.6.2. The laboratory maintains an archive of all obsolete or replaced procedures, documents, or records, for a minimum of seven years.

5.7. Electronic Copies of Documents

All documents are prepared and maintained electronically. Revisions to SOPs and the QAM are made by copying the document to a new file prior to beginning the revision. Obsolete documents are moved to subdirectories labeled “obsolete”.

6. Project Review & Management

6.1. Introduction

Thorough project review prior to sample receipt is inherent to the success of the laboratory. Procedures for subcontracting samples, and purchasing supplies and services are developed to ensure that client requirements are met. In the event that work does not conform with client requirements and/or internal procedures, action will be taken to investigate and resolve the issue in a timely manner. Procedures for resolving client concerns and complaints are established to ensure client satisfaction.

6.2. Review of Requests and Contracts

6.2.1. Contracts may be any written or oral agreement to provide a client with environmental testing services.

6.2.2. Project Managers have the responsibility of working with the client to define Data Quality Objectives (DQO) including: appropriate analytical methods to meet client needs, detection limit requirements, QA/QC requirements, deliverables, accreditation status, turn-around time and subcontracted analyses. The Project Manager informs the client of any potential conflict, lack of accreditation status, subcontracted analytes, or inability to complete the work in accordance with the request. Issues are resolved before samples are received.

6.2.3. Routine requests for analytical services are documented using an internal workorder. An example of the form is included at the end of this section.

6.2.4. Contracts requiring acceptance signatures are reviewed by the Project Manager and if necessary, the Director of Data Quality and accounting representative prior to signing. The contract will be acceptable both to the laboratory and the client. The reverse side of the workorder provides documentation regarding Project / Contract Review and New Client Checklist. An example of the form is included at the end of this section.

6.2.5. Appropriate notations are made to the bid/contract or internal workorder documenting decisions. The client is informed of deviations from the contract.

6.2.6. In the event that a contract changes after work commences, changes will be documented and communicated to affected personnel.

6.2.7. Suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation must be reported to the client.

6.2.8. Non-routine requests for analyses of unusual matrices, non-routine analytes, non-routine reporting limits are carefully assessed prior to accepting samples for analysis. Appropriate data qualifiers are used to flag data and the data flags are defined in the case narrative. Non-routine requests for analytical services are documented using an internal assessment form. An example of the form is included at the end of this section.

6.3. Subcontracting of Analyses

6.3.1. The following analytes are routinely subcontracted.

% Sulfur
%Chlorine
Alcohols
Asbestos Bulk (PLM)
Asbestos Water (TEM)
BTU
Dioxin & Furans
EOX
Ethylene Glycol
Herbicides
MBAS
Microbiological Testing
Radiologicals
TOX

6.3.2. The above list appears in *First Environmental's* Service Brochure. Subcontracted analytes are identified when verbal or written quotations are provided.

6.3.3. Samples are subcontracted to a certified laboratory. Subcontracted laboratories are expected to adhere to the requirements of their respective accreditations/certifications and the method. Additionally, subcontracted laboratories are expected to meet project specific requirements as established and communicated by *First Environmental Laboratories, Inc.*

6.3.4. The laboratory is responsible to the client for the subcontractor's work, except in the case where the client or a regulatory authority specifies which subcontractor is to be used.

6.3.5. A master list of laboratories that receive subcontracted analyses is maintained. Copies of applicable accreditations/certifications are on file for reference.

6.3.6. The final Analytical Report identifies subcontracted analytes by flagging the analyte with an "S" If the analysis is not accredited, an "N" flag will also appear on the report. The data flags are defined in the case narrative included in the final Analytical Report.

6.4. Purchasing Supplies and Services

6.4.1. The laboratory uses various support services such as instrument manufacturer's technical services, general scientific supply houses, specialty chemical supply houses, specialty gas suppliers, deionized water suppliers, and other laboratories.

6.4.2. The laboratory uses only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's ability to continue to produce quality data and provide the highest level of service to our clients.

6.4.3. A vendor master list is maintained and utilized.

6.4.4. Similarly, an item master list for routinely purchased supplies is maintained and utilized. Items on the master list, such as, standards, reagents, sample bottles, and other consumables known to possibly affect the quality of the data have been carefully chosen to meet the specification defined in the methods. The historical successful performance of the method confirms the adequacy of the purchased supplies. The use of the master list ensures continuity of consumable supplies. Changes are initiated with the approval of either the Laboratory Director, Director of Quality or the Technical Director. Any change relating to a critical consumable, e.g., standards, reagents or sample bottles is carefully monitored to ensure that the quality systems are not compromised.

6.4.5. Laboratory personnel are also responsible for monitoring and maintaining an adequate inventory of consumables, reagents and standards necessary to perform requested tests.

6.4.6. Consumables, reagents and standards received by the laboratory are distributed to appropriate laboratory personnel. Laboratory personnel are responsible for inspecting, properly labeling, and storing all consumables, reagents and standards.

6.4.7. Sample bottles are monitored for cleanliness on a semi-annual basis. Container blanks are analyzed for Volatile, Semi-volatile, Pesticide/PCBs, metals, and cyanide. The analysis is performed at the time WP performance samples are analyzed. The data is filed with the WP results.

6.4.8. If an item is rejected, the purchasing coordinator is notified. Depending on the scope of the problem, the purchasing coordinator will contact the appropriate manager or director, such as the Technical Director, Director of Quality Assurance, or Laboratory Director, to obtain assistance in resolving the issue. Documentation regarding actions taken and resolution of the problem will be maintained.

6.5. Client Concerns / Complaints and Feedback

6.5.1. Issues raised by auditors, employees, or clients will be discussed and resolved at the weekly meeting held with all staff.

6.5.2. If an issue requires investigation, the Laboratory Director will assign the task to a Senior Analyst, Project Manager, the Director of Data Quality or the Technical Director. The level of documentation associated with this investigation will be appropriate to the seriousness of the issue. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned.

6.5.3. The Laboratory Director, Project Manager assigned to client, and Director of Data Quality will determine when a complaint justifies written documentation. The form titled, Resolution of Complaint / Concern will be used to document the complaint / concern and the steps taken to resolve the issue. An example of the form is included at the end of this section.

6.5.4. All documentation relating to the issue, the actions taken, and final resolution will be retained as part of the record. The Laboratory Director will review all documentation and approve the final actions taken to resolve the issue. The need for follow-up will be evaluated and if necessary assigned.

6.5.5. If a complaint raises doubt concerning the laboratory's compliance with documented policies and procedures, or with the requirements of accreditation the laboratory will audit the area(s) in question.

6.5.6. Clients always have the right to inspect the work performed, including the supporting quality assurance data and documentation of quality assurance activities. They also have the right to inspect corrective action documentation relating to the resolution of a complaint or concern.

6.5.7. Annually, clients are surveyed for positive and negative feedback regarding the quality of analytical testing and services provided by *First Environmental Laboratories, Inc*. The results of the survey are assessed by management and used to continually improve our services and quality.

6.6. Control of Nonconforming Environmental Testing

6.6.1. Non-conforming work is work that does not meet acceptance criteria or requirements. Non-conformances can include unacceptable quality control results or departures from standard operating procedures or test methods.

6.6.2. Nonconformance of work with established procedures or agreed requirements of the client will be investigated immediately upon identification.

6.6.3. The laboratory director will assign the task to a Senior Analyst, Project Manager, or Director of Data Quality, or Technical Director. The level of action resulting from this investigation will be appropriate to the significance of the issue. If necessary, work will be halted until the issue is resolved. Test reports may be withheld until the issue is resolved. Previously released data will be assessed for impact and, where necessary, the client will be notified and work recalled. All appropriate steps will be taken to resolve the issue to the satisfaction of all concerned. If work is halted, the Laboratory Director is responsible for authorizing the resumption of work.

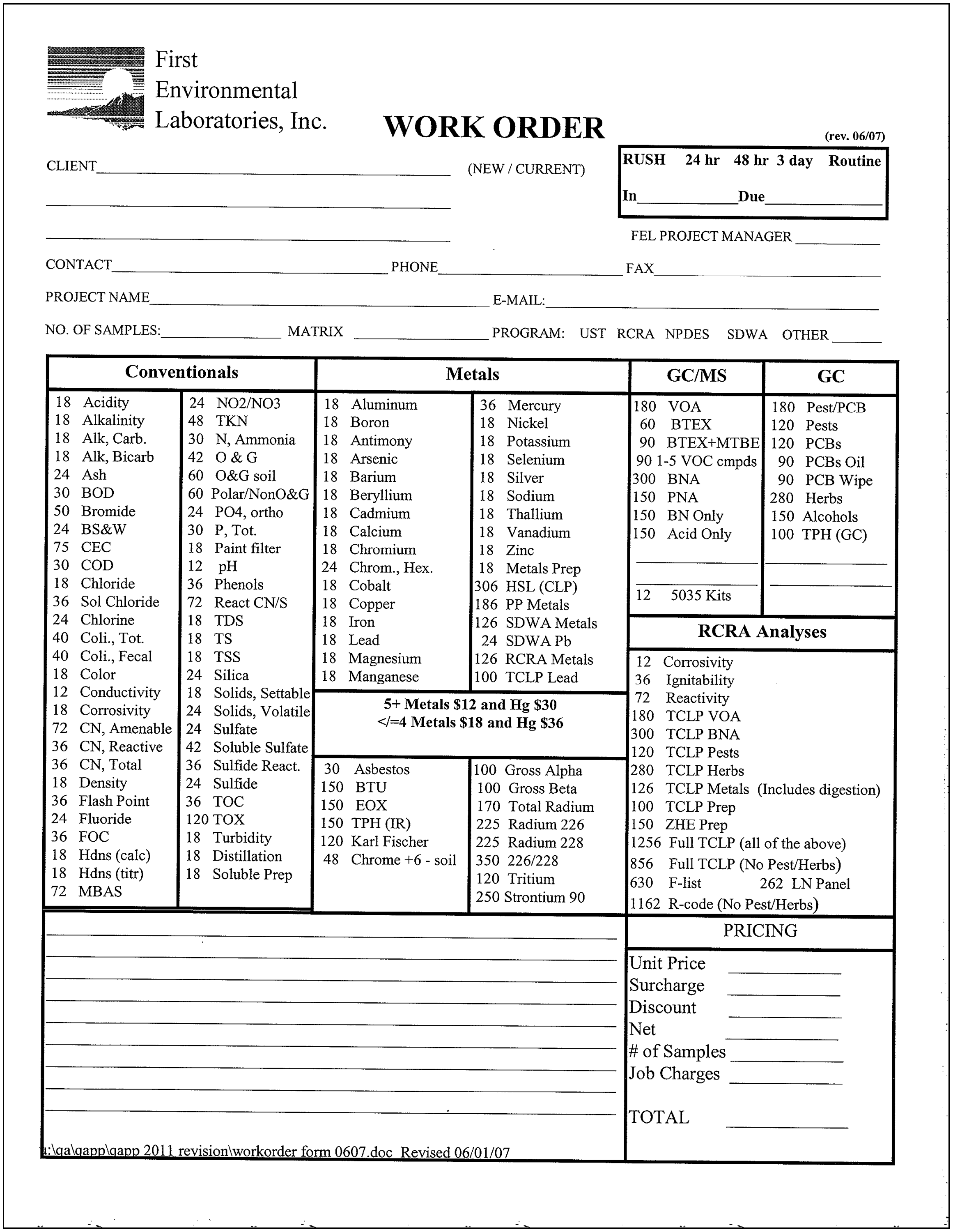
6.6.4. Where the evaluation indicates that the nonconforming work could recur or that there is doubt about the compliance of the laboratory's operations with its own policies and procedures the laboratory will audit the area(s) in question.

6.7. Accreditation Status

If accreditation status changes for either the primary laboratory (First Environmental Laboratories, Inc.) or the subcontract laboratory during the course of a project and the change affects the contract, the laboratory is responsible for notifying the client of any suspensions, revocations, or voluntary withdrawal of accreditation.

6.8. References

SOP #122 titled, "Subcontracting"



First
Environmental
Laboratories, Inc.

WORK ORDER

(rev. 06/07)

CLIENT____________________________ (NEW / CURRENT)

RUSH	**24 hr**	**48 hr**	**3 day**	**Routine**
In________		**Due**________		

FEL PROJECT MANAGER ________

CONTACT________________ PHONE______________ FAX______________

PROJECT NAME____________________ E-MAIL:____________________

NO. OF SAMPLES:________ MATRIX ________ PROGRAM: UST RCRA NPDES SDWA OTHER ______

Conventionals

18	Acidity
18	Alkalinity
18	Alk, Carb.
18	Alk, Bicarb
24	Ash
30	BOD
50	Bromide
24	BS&W
75	CEC
30	COD
18	Chloride
36	Sol Chloride
24	Chlorine
40	Coli., Tot.
40	Coli., Fecal
18	Color
12	Conductivity
18	Corrosivity
72	CN, Amenable
36	CN, Reactive
36	CN, Total
18	Density
36	Flash Point
24	Fluoride
36	FOC
18	Hdns (calc)
18	Hdns (titr)
72	MBAS

24	NO2/NO3
48	TKN
30	N, Ammonia
42	O & G
60	O&G soil
60	Polar/NonO&G
24	PO4, ortho
30	P, Tot.
18	Paint filter
12	pH
36	Phenols
72	React CN/S
18	TDS
18	TS
18	TSS
24	Silica
18	Solids, Settable
24	Solids, Volatile
24	Sulfate
42	Soluble Sulfate
36	Sulfide React.
24	Sulfide
36	TOC
120	TOX
18	Turbidity
18	Distillation
18	Soluble Prep

Metals

18	Aluminum
18	Boron
18	Antimony
18	Arsenic
18	Barium
18	Beryllium
18	Cadmium
18	Calcium
18	Chromium
24	Chrom., Hex.
18	Cobalt
18	Copper
18	Iron
18	Lead
18	Magnesium
18	Manganese

36	Mercury
18	Nickel
18	Potassium
18	Selenium
18	Silver
18	Sodium
18	Thallium
18	Vanadium
18	Zinc
18	Metals Prep
306	HSL (CLP)
186	PP Metals
126	SDWA Metals
24	SDWA Pb
126	RCRA Metals
100	TCLP Lead

5+ Metals $12 and Hg $30
</=4 Metals $18 and Hg $36

30	Asbestos
150	BTU
150	EOX
150	TPH (IR)
120	Karl Fischer
48	Chrome +6 - soil

100	Gross Alpha
100	Gross Beta
170	Total Radium
225	Radium 226
225	Radium 228
350	226/228
120	Tritium
250	Strontium 90

GC/MS

180	VOA
60	BTEX
90	BTEX+MTBE
90	1-5 VOC cmpds
300	BNA
150	PNA
150	BN Only
150	Acid Only
12	5035 Kits

GC

180	Pest/PCB
120	Pests
120	PCBs
90	PCBs Oil
90	PCB Wipe
280	Herbs
150	Alcohols
100	TPH (GC)

RCRA Analyses

12	Corrosivity
36	Ignitability
72	Reactivity
180	TCLP VOA
300	TCLP BNA
120	TCLP Pests
280	TCLP Herbs
126	TCLP Metals (Includes digestion)
100	TCLP Prep
150	ZHE Prep
1256	Full TCLP (all of the above)
856	Full TCLP (No Pest/Herbs)
630	F-list
262	LN Panel
1162	R-code (No Pest/Herbs)

PRICING

Unit Price ________
Surcharge ________
Discount ________
Net ________
# of Samples ________
Job Charges ________

TOTAL ________

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Route: SSZ, SCG, WHM, NEC, LF, IRP (IRP to retain file)

New Client Account Checklist

☐ **Aspen submitter library account created**
(*attach submitter proofer report; verify all fields,(i.e. discount, PM, report details), are accurate)*

☐ **Peachtree account created**
(account name is same as Aspen client ID)

☐ **Sentry file ID created**

☐ **Credit check complete and terms extended**
(attach supporting documentation)

☐ **Follow-up / welcome letter sent**
(attach copy)

☐ **Work order complete**
(attach copy)

Project / Contract Review

Project Managers have the responsibility of working with the client to define Data Quality Objectivie (DQO) including: appropriate analytical method to meet client needs, reporting requirements and deliverables, accreditation status QA/QC requirements, TAT, and notification of subcontracted analyses.

The Project Manager resolves all issues regarding the project requirements prior to sample receipt.

Project Manage Review
Signature / Date:____

The Director of Data Quality will address unique QA/QC requirements.

Director of Data Quality Review
Signature / Date:____

The Accounting Representative will address insurance and payment concerns.

Accounting Representative Review
Signature / Date:____

Notes:____

New Work – Assessment / Contract Review

New Work – Assessment: non-routine request for analysis of unusual matrices, non-routine analytes, non-routine reporting limits are carefully assessed prior to accepting samples for analysis.

If a new test group needs to be added to the LIMs, then a thorough assessment is required.

Matrix:____

Analyte(s):____

Method & Reference:____

Reporting Limit:____

Is an MDL available for the analyte(s)? yes no
If no, what will define the lower reporting limit and how will the data be flagged?

____

Is a calibration curve available for the analyte? yes no
If no, what will define the upper level of the analysis and how will the data be flagged?

____

Is the analyte NELAC certified? yes no
If no, how will the data be flagged?

Does analyte need to be added to our scope of accreditation? yes no

Does an SOP or bench reference need to be prepared? yes no

Describe the scope of work (no. of samples, duration…)

____

____

Signature Director of Data Quality__________________________Date________

Signature Laboratory Director ____________________________Date_________

Additional Notes:

Does the test or test group need to be created in LIMS? yes no

Test ID_______________

Sort No. _______________

Units_______________

RDL_______________

Format_______________

Sig Figs_______________

Break Value_______________

Weight_______________

Volume_______________

Dilution_______________

Solids %_______________

Low Limit_______________

High Limit (blank)

CAS #_______________

Numeric Result (0)

Alpha Result (usually blank)

Reported Result (blank)

Test Name (as it appears on report)____

Storet_______________

File ID_______________

IES ORIG_______________

PF_Code T = Total, D = Dissolved, C = TCLP

Remarks_______________

Replicate_______________

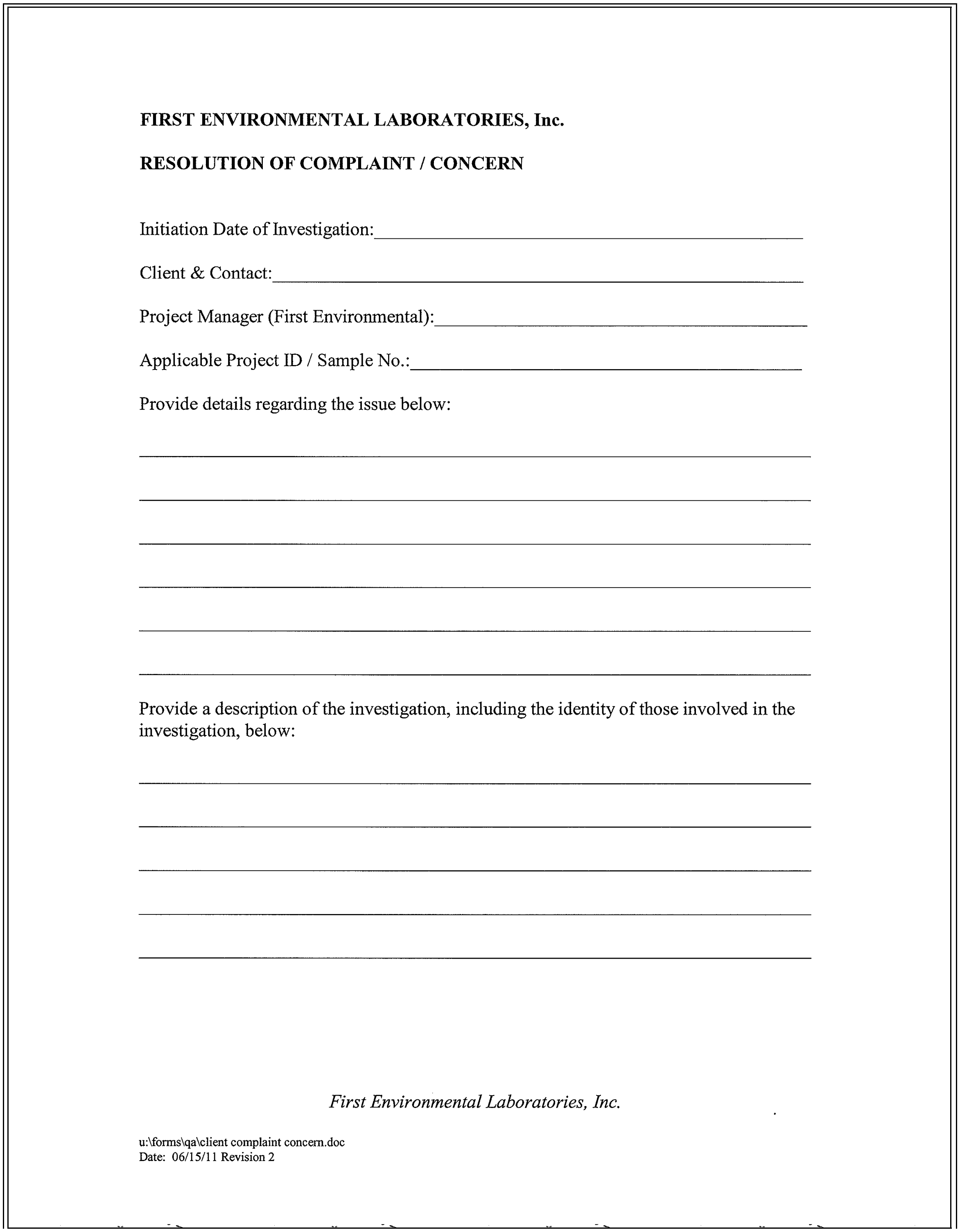
RDL2 (RDL as it appears on report)__________

NELAC? (if not NELAC accredited, insert "N"
if subcontract,, insert "S")

HAZ Limit_______________

lblT Misc 10 (blank)

Instrument Test Name_______________



FIRST ENVIRONMENTAL LABORATORIES, Inc.

RESOLUTION OF COMPLAINT / CONCERN

Initiation Date of Investigation:______________________________

Client & Contact:______________________________

Project Manager (First Environmental):______________________________

Applicable Project ID / Sample No.:______________________________

Provide details regarding the issue below:

Provide a description of the investigation, including the identity of those involved in the investigation, below:

First Environmental Laboratories, Inc.

u:\forms\qa\client complaint concern.doc
Date: 06/15/11 Revision 2

Describe the final actions taken below:

____

____

____

____

____

____

____

Date Accepted:_______________

Signature Laboratory Director:____

Signature Project Manager:____

Signature (Director of Quality Assurance):_____________________________________

Note: A copy of this form should be retained in the appropriate project file and in the QA file as part of the historical record.

First Environmental Laboratories, Inc.

u:\forms\qa\client complaint concern.doc
Date: 06/15/11 Revision 2

7. Corrective Action

7.1. Introduction

An integral part of our Quality Assurance Program includes a mechanism for identifying and correcting quality problems when they occur and documenting the action taken, thereby eliminating a re-occurrence of the problem in the future.

7.2. Corrective Action Investigation

7.2.1. When a problem cannot be solved by immediate corrective action, a more detailed process is necessary. The need for a more detailed corrective action investigation may be identified from repeated QCI failures, control charts, system audits, or performance audits. Critical to its success and effectiveness is the involvement of the analyst, supervisor (if applicable) and/or Project Manager, and Director of Data Quality. The following lists the steps involved in this detailed process.

- Identifying a problem.
- Assigning a person responsible for the investigation.
- Uncovering the most likelycause(es) of the problem.
- Correcting the problem.
- Monitoring the effectiveness of the corrective action.
- Documenting the corrective action taken. A copy of the form used to document corrective action is included at the end of this section. The form needs to be signed by the Director of Quality Assurance and if applicable, the supervisor.

7.2.2. Any analyst or member of management recognizing that an issue warrants investigation may initiate corrective action. The Director of Data Quality will coordinate corrective action investigation. Appropriate personnel will be involved in the investigation as determined by the Director of Data Quality.

7.3. Follow-up to Corrective Action Investigation

7.3.1. If an audits finding or the findings of a corrective action investigation cast doubt on the correctness or validity of data reported, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

7.3.2. The Director of Data Quality is responsible for ensuring that corrective action has actually been performed.

7.3.3. The Director of Data Quality will monitor audits and their findings for the presence of reoccurring problems or patterns.

7.3.4. If it is suspected that the laboratory is not in compliance with it's own policies and procedures or with the TNI standard, the Director of Data Quality will schedule an internal audit of the appropriate areas.

7.4. Technical Corrective Action (Quality Control Indicators)

7.4.1. Throughout this manual, specific indicators are described that help the analysts assess whether a situation is in control. When any of these quality control indicators are outside the acceptable limits, immediate corrective action is required prior to proceeding with the analysis. The corrective action associated with a failed quality control indicator may be a simple process, such as re-preparing a reagent or standard that has deteriorated and documenting such in the lab book or it may be much more complex. If necessary, samples are reanalyzed. Appropriate documentation of actions taken at the bench during analysis are made in the analytical log book.

7.4.2. The individual method SOPs each have a QC table that details the frequency of analysis, acceptance criteria, initial corrective action for QCI failure, and data flagging instructions associated with each QCI. The SOP titled, "Summary of Quality Control Indicators – Inorganics & Organics" (#129) also provide details guiding the appropriate steps to follow in the event a QCI has failed. Corrective action may be multi-tiered proceeding from the simplest procedure to more complex procedures.

7.4.3. The analyst is responsible for assessing QCIs and compliance with method requirements.

7.4.4. The analyst is responsible for initiating corrective action when a QCI does not meet method specified acceptance criteria.

7.4.5. If the corrective action procedures recommended within the method and supporting Inorganic and Organic QC SOPs do not resolve the problem, then the analyst will seek the guidance of the area supervisor and/or Director of Data Quality. A more formal corrective action investigation may need to occur in order to resolve the problem.

7.4.6. If any QCI does not meet acceptance criteria, the data will be flagged in the data base and/or a case narrative will be placed in the project file for the affected samples. The Project Manager is responsible for providing appropriate qualifying information in the case narrative included in the final Analytical Report.

7.4.7. If a problem is observed to be recurring, the Analyst and/or Project Manager(s) are responsible for informing the Director of Data Quality. The Director of Data Quality will initiate a corrective action investigation.

7.5. Preventive Action / Continuous Improvement

TNI defines preventive action as “pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.” Following the submission of the annual internal audit and QRM, the management team will review and discuss the adequacy of the quality system, technical operations, and laboratory manuals, (e.g. Quality Assurance Manual, Chemical Hygiene Plan, and Statement of Qualifications), to ensure their continuing suitability and effectiveness. If preventive or corrective action is required, action plans will be developed, implemented and monitored. The purpose of an action plan is to track the activity and ensure that followup is performed to verify closure. The plan needs to:

- identify the preventive / corrective action or project,
- summarize the goal,
- summarize the action to be taken,
- identify the responsible person(s),
- establish a target deadline,
- establish followup, and finalization or closure of the activity.

All of the activities detailed above lead to a system of continuous improvement that is an inherent part of the quality systems used within the laboratory.

7.6. Departures from Documented Policies and Procedures

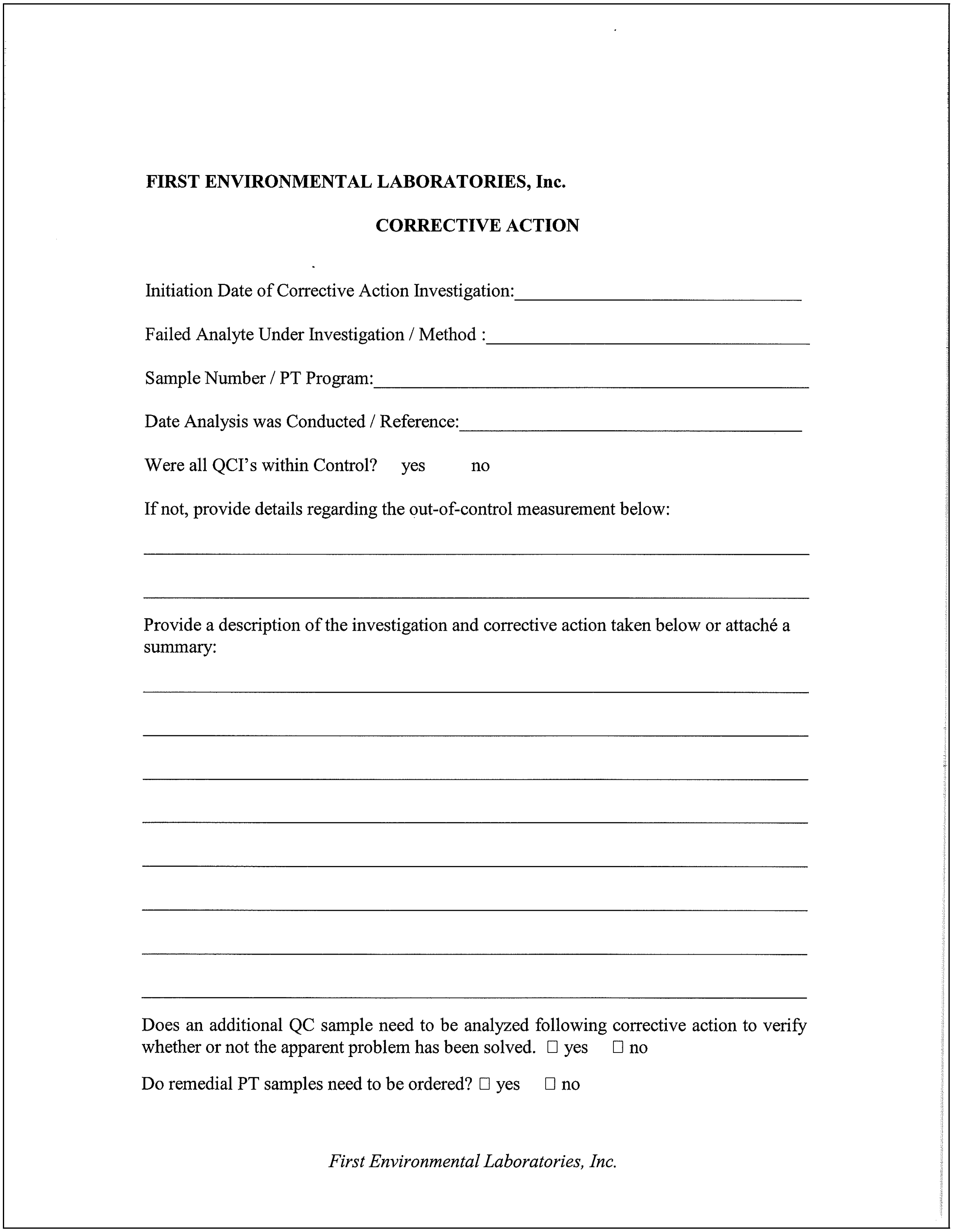
7.6.1. The Laboratory Director must approve departures from documented policies and procedures.

7.6.2. The departure must be documented in the project file. The Project Manager will cite the departure from documented policies and procedures in the case narrative accompanying the final Analytical Report when appropriate.

7.6.3. Any analyst or member of management recognizing that a departure from the quality systems or from standard operating procedures has occurred may initiate corrective action.

7.7. References

SOP #121 titled, “Audit”
SOP #129 titled, “Summary of Quality Control Indicators – Inorganic & Organics”



FIRST ENVIRONMENTAL LABORATORIES, Inc.

CORRECTIVE ACTION

Initiation Date of Corrective Action Investigation:______________________________

Failed Analyte Under Investigation / Method :__________________________________

Sample Number / PT Program:____

Date Analysis was Conducted / Reference:___________________________________

Were all QCI's within Control? yes no

If not, provide details regarding the out-of-control measurement below:

____

____

Provide a description of the investigation and corrective action taken below or attaché a summary:

____

____

____

____

____

____

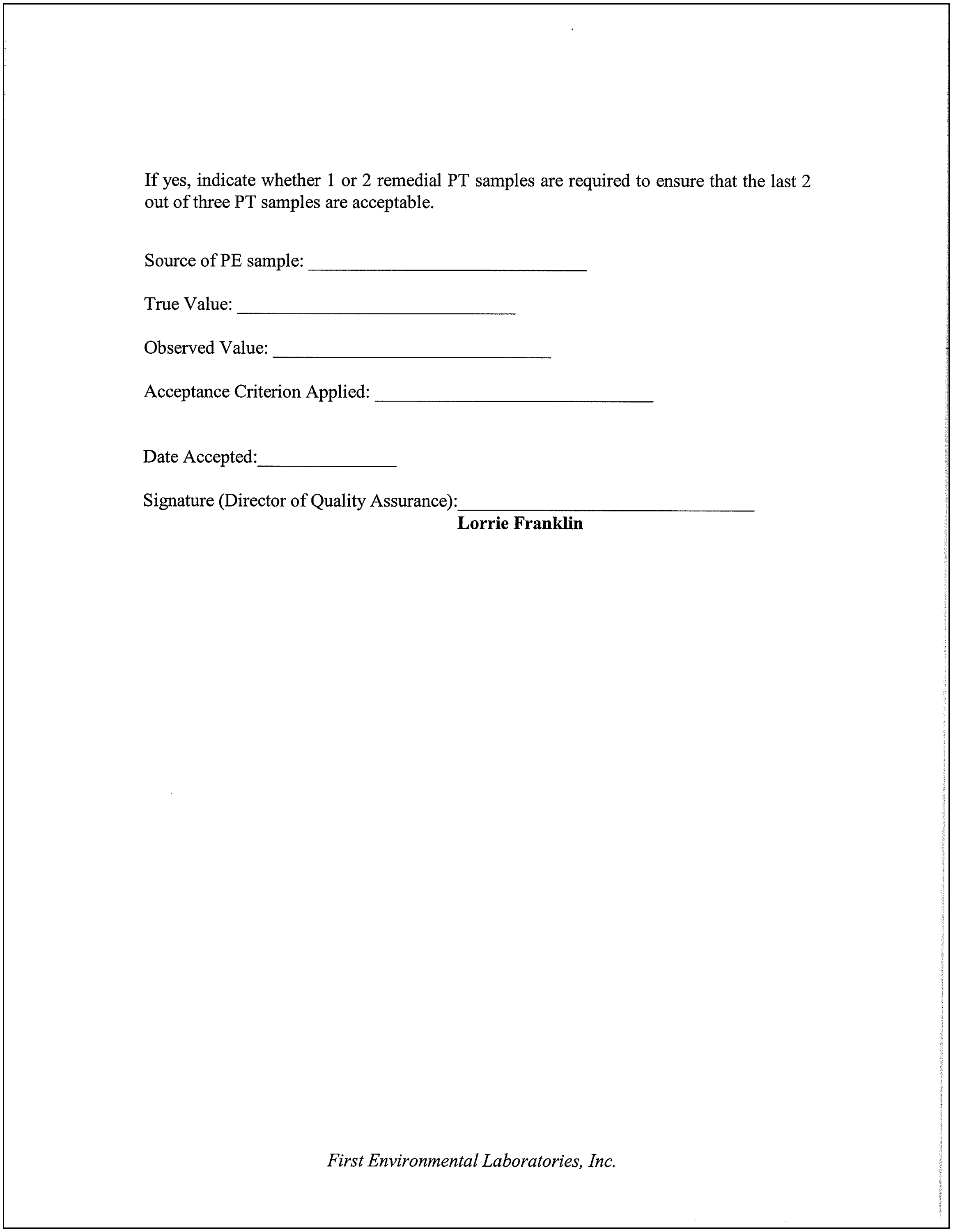
____

____

Does an additional QC sample need to be analyzed following corrective action to verify whether or not the apparent problem has been solved. ☐ yes ☐ no

Do remedial PT samples need to be ordered? ☐ yes ☐ no

First Environmental Laboratories, Inc.



If yes, indicate whether 1 or 2 remedial PT samples are required to ensure that the last 2 out of three PT samples are acceptable.

Source of PE sample: ______________________________

True Value: ______________________________

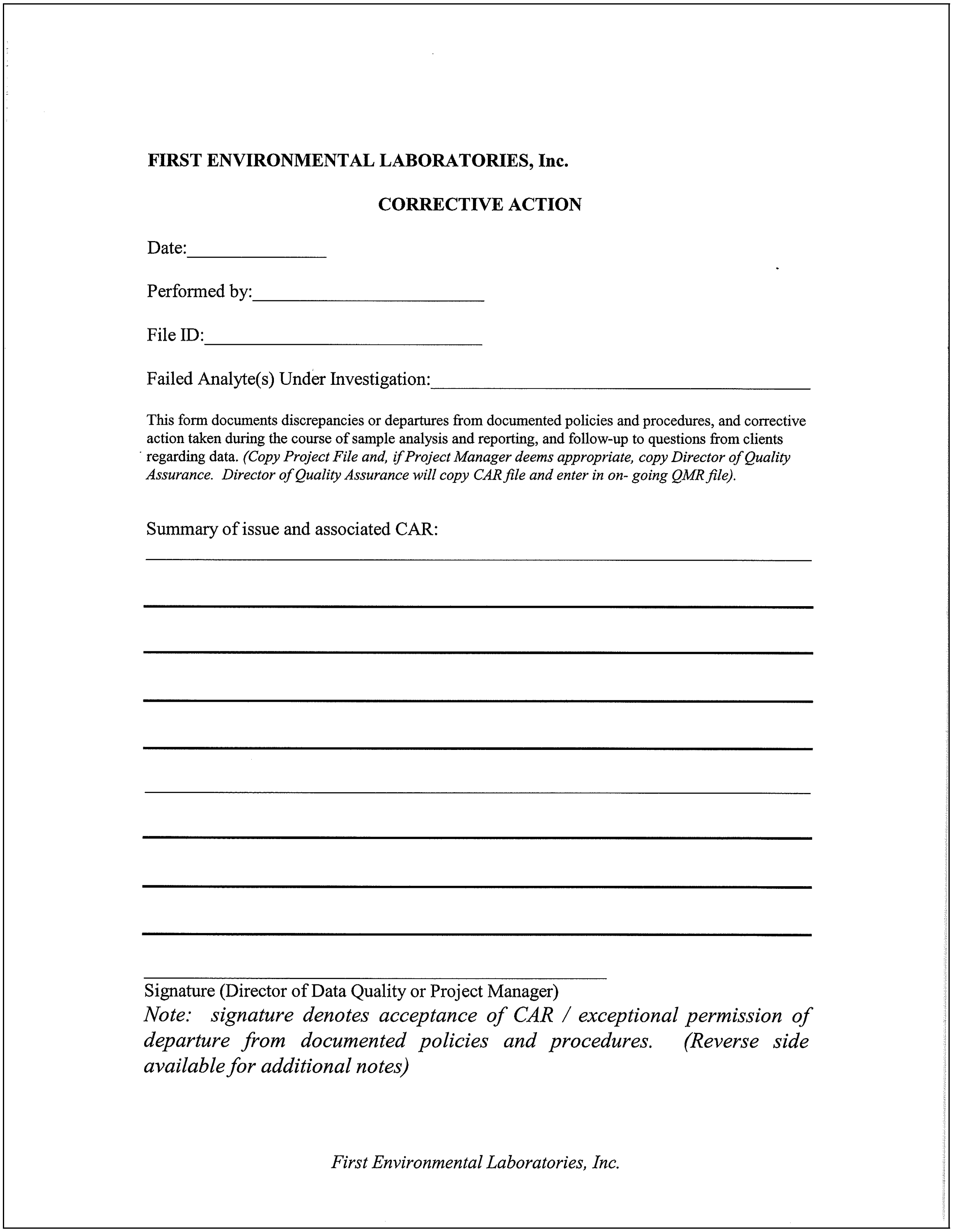
Observed Value: ______________________________

Acceptance Criterion Applied: ______________________________

Date Accepted:_______________

Signature (Director of Quality Assurance):________________________________
Lorrie Franklin

First Environmental Laboratories, Inc.



FIRST ENVIRONMENTAL LABORATORIES, Inc.

CORRECTIVE ACTION

Date:_______________

Performed by:_________________________

File ID:______________________________

Failed Analyte(s) Under Investigation:____

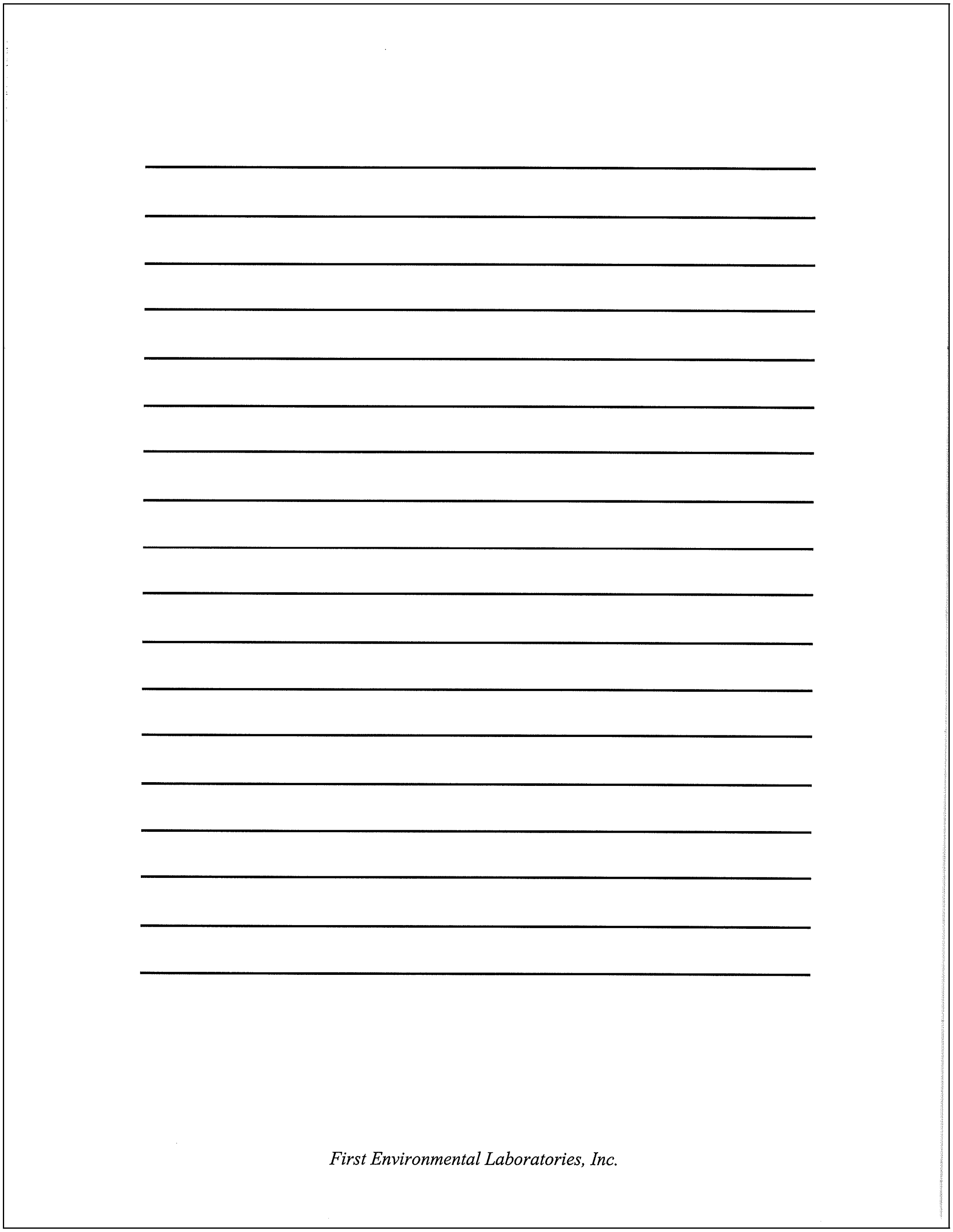
This form documents discrepancies or departures from documented policies and procedures, and corrective action taken during the course of sample analysis and reporting, and follow-up to questions from clients regarding data. *(Copy Project File and, if Project Manager deems appropriate, copy Director of Quality Assurance. Director of Quality Assurance will copy CAR file and enter in on- going QMR file).*

Summary of issue and associated CAR:

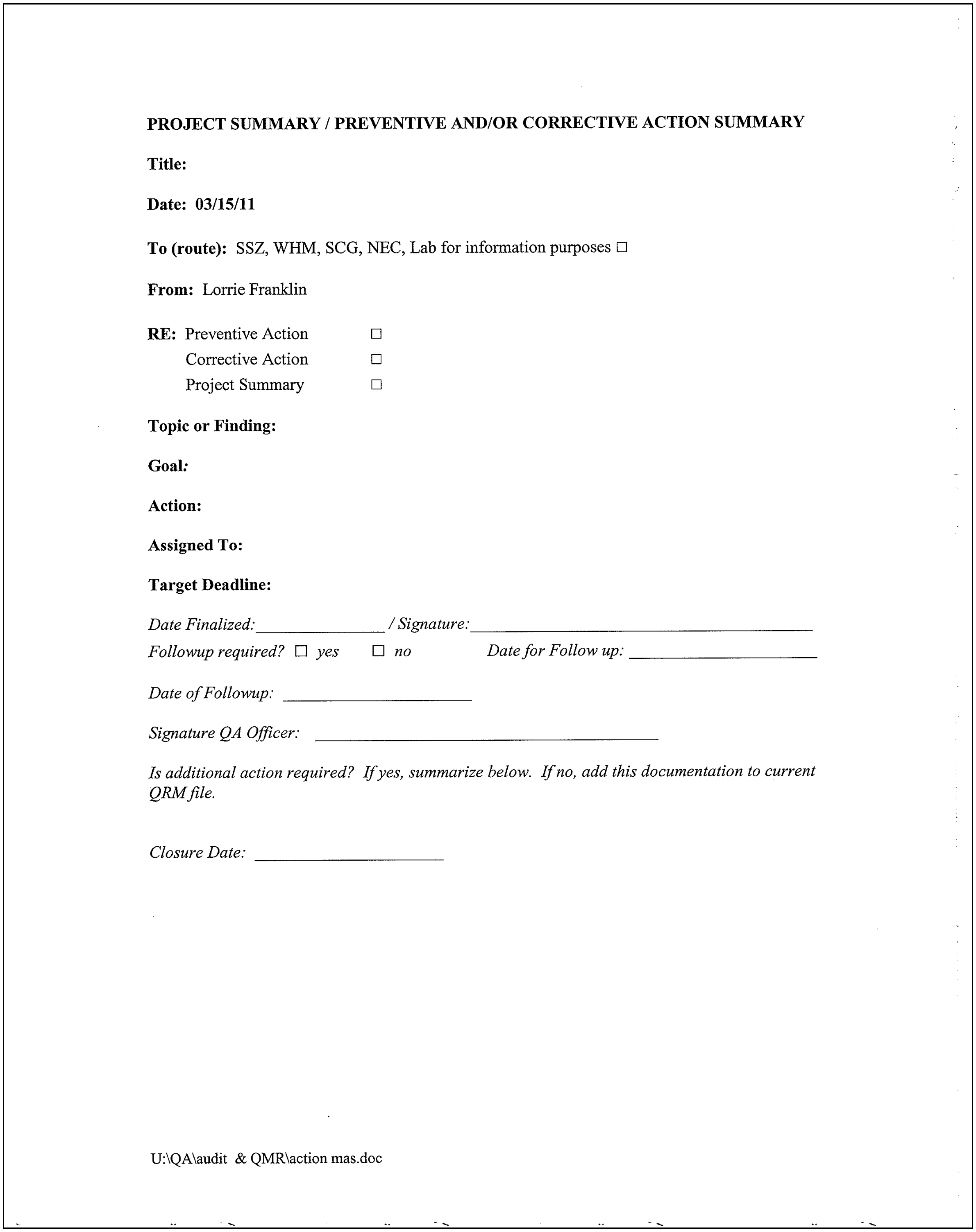
Signature (Director of Data Quality or Project Manager)

Note: signature denotes acceptance of CAR / exceptional permission of departure from documented policies and procedures. (Reverse side available for additional notes)

First Environmental Laboratories, Inc.



First Environmental Laboratories, Inc.



PROJECT SUMMARY / PREVENTIVE AND/OR CORRECTIVE ACTION SUMMARY

Title:

Date: 03/15/11

To (route): SSZ, WHM, SCG, NEC, Lab for information purposes ☐

From: Lorrie Franklin

RE: Preventive Action ☐
Corrective Action ☐
Project Summary ☐

Topic or Finding:

Goal*:*

Action:

Assigned To:

Target Deadline:

*Date Finalized:*_______________ */ Signature:*____
Followup required? ☐ *yes* ☐ *no* *Date for Follow up:* ______________________

Date of Followup: ______________________

Signature QA Officer: ____

Is additional action required? If yes, summarize below. If no, add this documentation to current QRM file.

Closure Date: ______________________

U:\QA\audit & QMR\action mas.doc

8. Instrument & Equipment Maintenance

8.1. Introduction

Proper maintenance of instruments and equipment and it's software used to perform analytical procedures is critical to *First Environmental Laboratories'* ability to produce data of the highest quality. Improperly maintained equipment can lead to costly repairs and increased instrument down time. All equipment is properly cleaned, maintained and operated by authorized and trained analysts. The exact requirements are dependent upon the instrument or piece of equipment, and may range from simple cleaning procedures to more complex routines.

8.2. Establishing Maintenance Requirements

8.2.1. The instrument and equipment manuals are reviewed for specific information regarding the manufacturer's recommended maintenance procedures.

8.2.2. The frequency for performing preventive maintenance is determined. The requirements may be yearly, monthly, weekly, or daily. Forms are prepared to document routine and non-routine maintenance procedures.

8.2.3. Equipment requiring calibration is labeled to indicate date of calibration and a system is in place to trigger recalibration prior to the expiration date.

8.2.4. The location of manufacturer's instructions is referenced if kept separate from the forms used to document these requirements.

8.3. Documentation and Record Keeping

8.3.1. Bound maintenance logbooks are established for instruments and pieces of equipment and its software whose improper functioning could impair *First Environmental Laboratories'* ability to produce data of the highest quality.
Rule of Thumb: If the instrument or piece of equipment requires periodic calibration, then a bound maintenance logbook will be established.

8.3.2. The logbooks are assigned a tracking number and the binder is labeled with the name / number of the logbook, the beginning date of use, and the ending date of use.

8.3.3. The record keeping form(s) must include the following:

- unique identity of equipement and it's software used for testing if significant to the results,
- name of the instrument or item of equipment,
- manufacturer's name, model no. and serial number or other unique identification,

- date received,
- date placed in service,
- date taken out of service,
- current location (where appropriate),
- condition received, e.g., new, used, reconditioned,
- maintenance requirements,
- documentation of routine maintenance performed,
- documentation of non-routine maintenance performed,
- dates and results of calibrations and/or verifications, certificates, and date of the next calibration, and/or verification, where applicable, and
- a copy of manufacturer's instructions or reference to their location

8.3.4. A separate file may be retained that includes:
- operating instructions,
- warranties,
- paperwork related to service provided by a third party,
- maintenance contracts / service agreements.

8.3.5. Also included is information pertaining to a maintenance contract (if applicable) including:
- company carrying the contract
- contract no. / purchase order no.
- cost of contract
- start and end date of contract
- service personnel
- telephone number for contacting service personnel
- copy of the service agreement

8.3.6. The documentation for a malfunctioning instrument or piece of equipment should clearly state the following:
- the problem
- the corrective action taken
- whether or not the problem was resolved
- down time resulting from the problem
- the cost associated with resolving the problem
- analyst's initials
- date

8.3.7. The following forms are included in this section as examples:
- Maintenance Record - Routine (Monthly and Weekly Requirements)
- Maintenance Record - Routine (Daily)
- Maintenance Record - Non-Routine

8.4. Identification of Malfunctioning Instruments / Equipment

8.4.1. If any instrument or piece of equipment is shown to be defective, the unit will be taken out of service. It will be clearly identified and if possible stored at a specified place until it has been repaired and shown by calibration, verification or test to perform satisfactorily.

8.4.2. The Quality Assurance officer will determine the effect the malfunctioning unit may have had on data previously released. If it is determined that reported data was affected, the Project Manager(s) will be notified and they will contact the client(s) affected. If necessary, corrected Analytical Reports will be submitted.

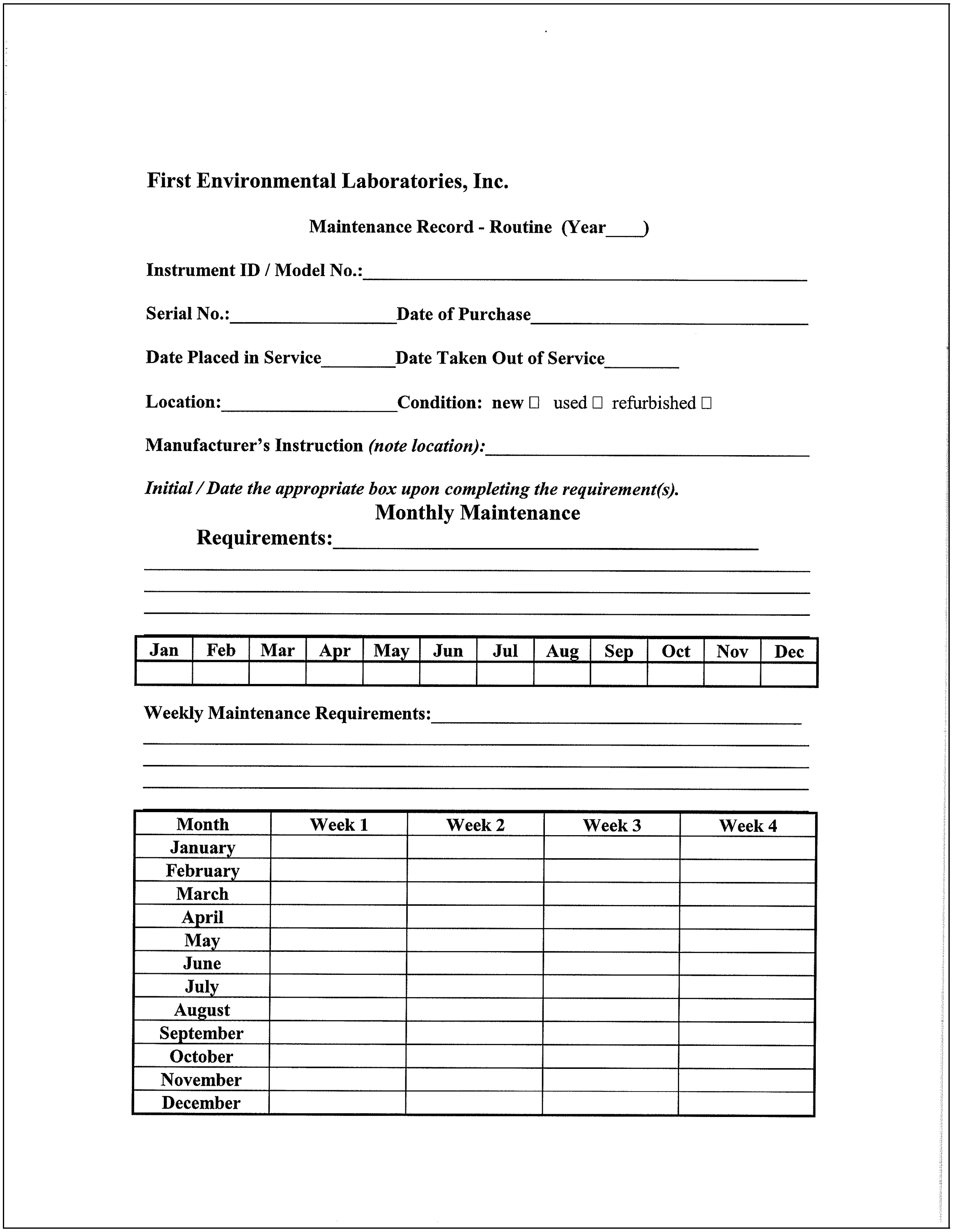
8.4.3. Calibration and function of equipment that goes outside direct control of laboratory is verified prior to returning equipment to service.

8.5. “Loaner” or Temporary Instrument / Equipment

8.5.1. In the event the laboratory uses instrumentation or equipment outside its permanent control, a “loaner” or temporary replacement, the laboratory will ensure that the relevant requirement of the TNI standard and of the analytical procedure are met.

8.6. References

SOP #108 titled, “ Instrument / Equipment Maintenance & Record Keeping”.



First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:____

Serial No.:__________________**Date of Purchase**______________________________

Date Placed in Service________**Date Taken Out of Service**________

Location:___________________**Condition: new** ☐ used ☐ refurbished ☐

Manufacturer's Instruction ***(note location):***___________________________________

Initial / Date the appropriate box upon completing the requirement(s).

Monthly Maintenance

Requirements:____

____

____

____

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

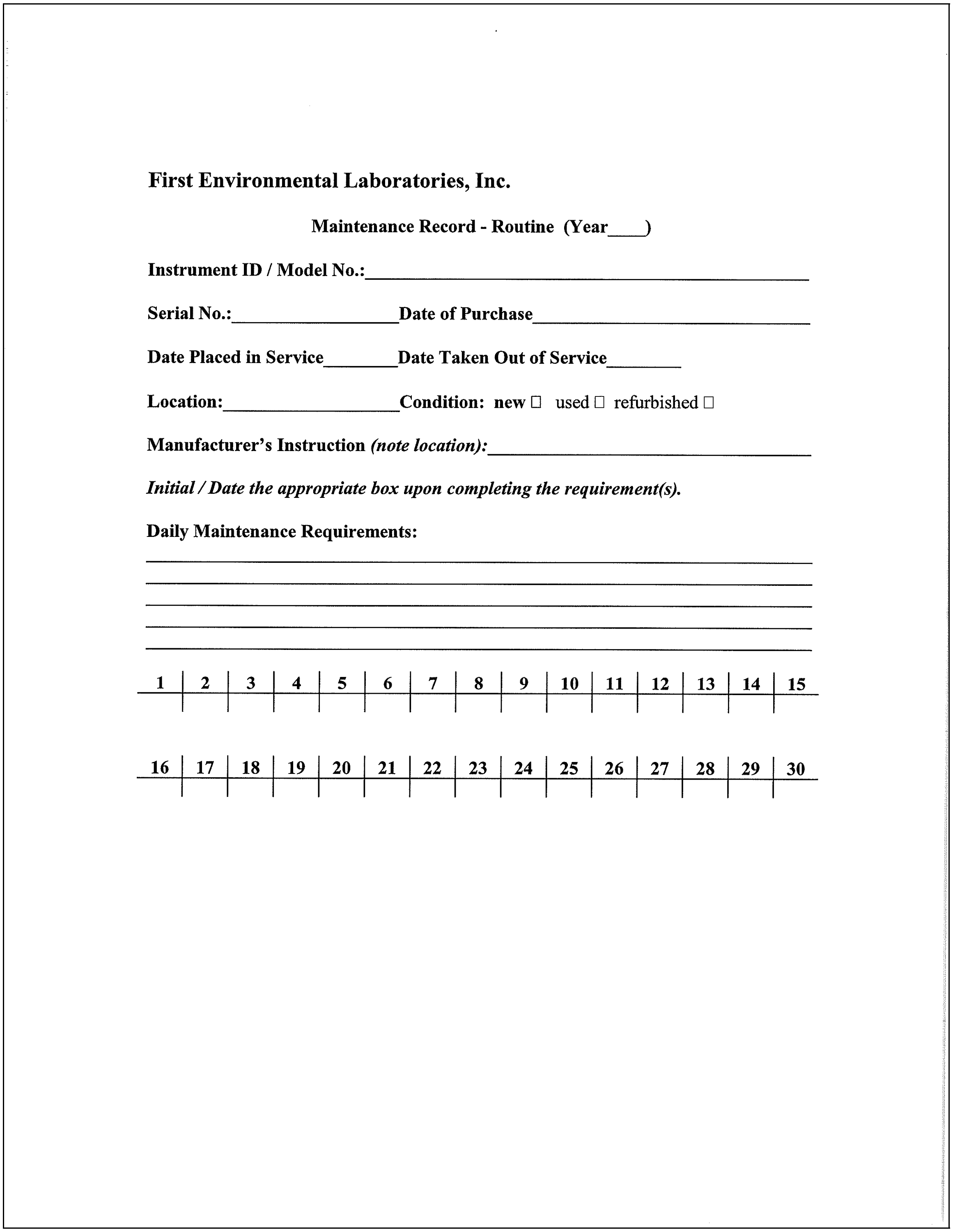
Weekly Maintenance Requirements:____

____

____

____

Month	Week 1	Week 2	Week 3	Week 4
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				



First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:______________________________

Serial No.:____________**Date of Purchase**____________________

Date Placed in Service________**Date Taken Out of Service**________

Location:____________**Condition: new** ☐ used ☐ refurbished ☐

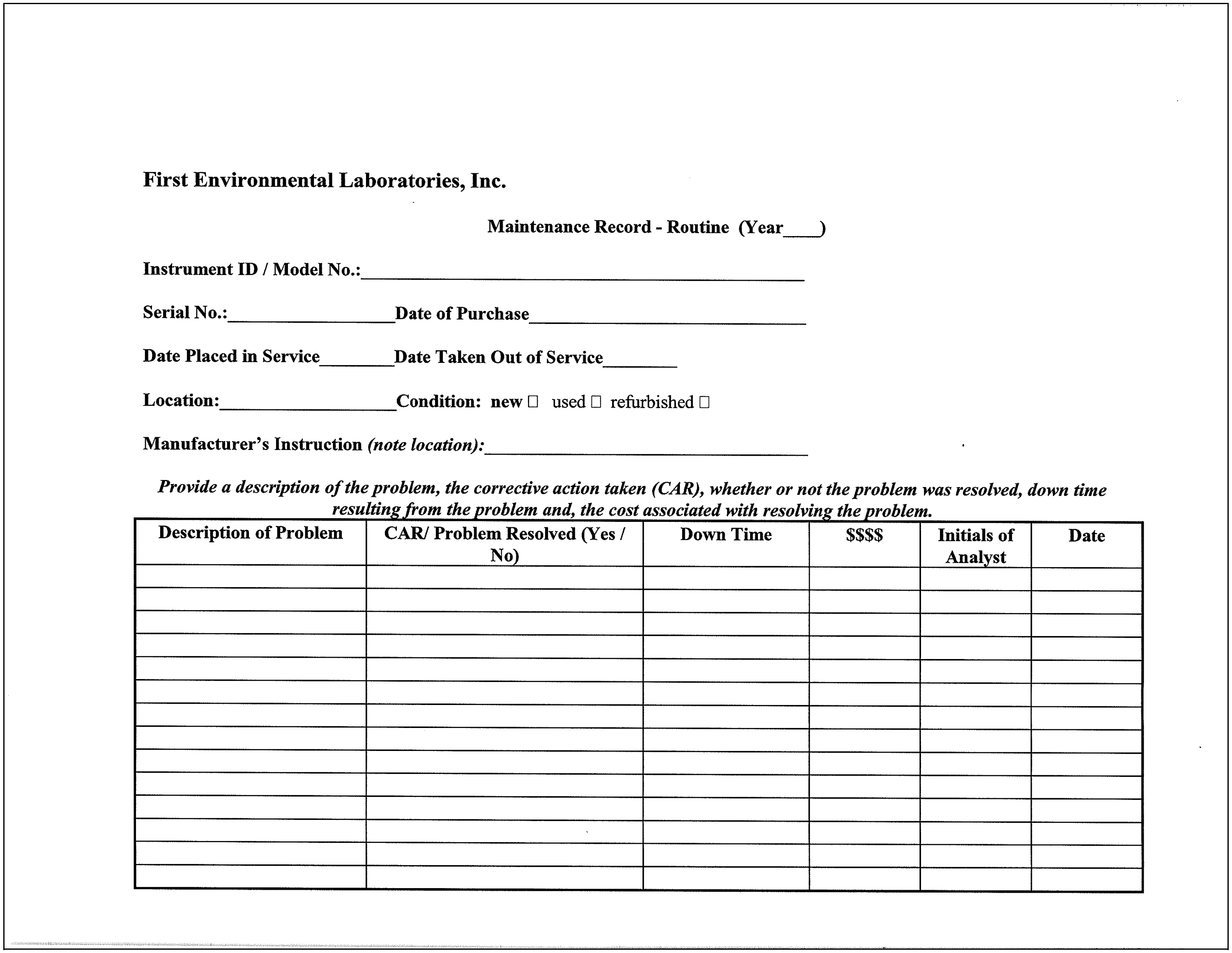
Manufacturer's Instruction ***(note location):***____________________

Initial / Date the appropriate box upon completing the requirement(s).

Daily Maintenance Requirements:

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**

16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**



First Environmental Laboratories, Inc.

Maintenance Record - Routine (Year____)

Instrument ID / Model No.:______________________________

Serial No.:____________**Date of Purchase**____________________

Date Placed in Service________**Date Taken Out of Service**________

Location:____________**Condition: new** ☐ used ☐ refurbished ☐

Manufacturer's Instruction ***(note location):***____________________

Provide a description of the problem, the corrective action taken (CAR), whether or not the problem was resolved, down time resulting from the problem and, the cost associated with resolving the problem.

Description of Problem	CAR/ Problem Resolved (Yes / No)	Down Time	$$$$	Initials of Analyst	Date

First Environmental Laboratories, Inc.

List of Maintenance Files

Filename	Logbook No.	Description
421 ammonia ise meter	**421**	**Ammonia Probe**
421 burettes	**421**	**Burettes**
421 cod block dig	**421**	**COD Block Digestor Techne DB3A**
421 conductivity	**421**	**Conductivity meter – SB70C**
421 cyanide dist	**421**	**Cyanide distiller - Andrews Glass**
421 east dist westco	**421**	**EASYdist unit by Westco Scientific**
421 fluoride ise meter	**421**	**Fluoride Probe**
421 milton roy spec	**421**	**Spectrophotometer - Milton Roy 401**
421 ph ise meter 037445	**421**	**pH / ISE meter - Orion 710A Wet Chem bench**
421 ph ise meter SB80PI	**421**	**pH / ISE meter – Symphony SB80PI TCLP bench**
421 turbidimeter	**421**	**Turbidimeter - HACH 2100N**
brinkmann		**Brinkmann digital dispensette pipets – per area**
422 chiller	**422**	**Chiller – VWR 1175MD**
422 chiller	**422**	**Chiller – VWR 1175P**
422 do meter 072007	**422**	**D.O. Meter YSI 5000**
422 hg analyzer	**422**	**Hg Analyzer - Bacharach**
422 hot plates / water baths	**422**	**Various**
422 BOD incubator	**422**	**BOD incubator – VWR 2020**
422 muffle furnace	**422**	**Muffle Furnace - Lindberg/Blue M 51700/51800**
422 oven 45EG 1	**422**	**Gravity Oven - 45EG Precision Scientific (#1)**
422 oven 45EG 2	**422**	**Gravity Oven - 45EG Precision Scientific (#2)**
422 oven 1305U	**422**	**Gravity Oven - 1305U VWR Brand**
422 oven 1325	**422**	**Gravity Oven – 1325 Sheldon**
422 pensky marten fp	**422**	**Flash Point Tester - Pensky Martens**
422 refrigerator / freezers	**422**	**Various**
422 shaker	**422**	**Eberbach**
422 tclp extractors	**422**	**TCLP Extractors**
423 org instrumentation_"D"	**423**	**Pesticides / PCBs - instrument "D"**
425 org instrumentation "E"	**425**	**SVOA GCMS – instrument "E"**

Filename	Logbook No.	Description
426 org instrumentation “G”	426	SVOA GCMS – instrument “G”
428 org instrumentation “H”	428	VOA GCMS – instrument “H”
430 org instrumentation “F”	430	VOA GCMS – instrument “F”
432 eyewash stations	432	Eye Wash Stations
432 extinguishers	432	Fire Extinguishers
432 fumehood	432	Fumehood
432 safety shower	432	Safety Shower
434 m skalar sansplus	434	Skalar Sans Plus $^{\text{TM}}$ 1
436 icpmaint	436	TJA Trace 61E ICP
475 skalar sansplus 2004	475	Skalar Sans Plus $^{\text{TM}}$ 2
536 icipmsmaint	536	PE Elan 9000
537 org instrumentation “J”	537	Pesticides / PCBs - instrument “J”
561 conductivity portable	561	Portable conductivity meter for DI water monitoring
631 ref frez incu	631	refrigerators, freezers, incubators
649 org instrumentation “L”	649	SVOA GCMS – instrument “L”
654 oil & grease	654	Horizon SPE DEX3000
654 oil & grease	654	Speed-Vap III
mr ohaus as200s abal		analytical balance – per balance
mr top pan balances		top pan balance – per balance
1036 org instrumentation “M”	1036	VOA soil GCMS – instrument “M”
Retired Instruments / Equipment		
SVOA	424	SVOA GCMS – instrument “B”
433 m skalar aquapro	433	Skalar AQUA$^{\text{Pro TM}}$
turbidimeter	421	turbidimeter - HACH 2100A out of service 2005
427 org instrumentation “A”	427	VOA GCMS – instrument “A”
429 org instrumentation “C”	429	VOA GCMS – instrument “C”

9. Control of Records

9.1. Introduction

The record system is designed to produce unequivocal, accurate records that document all laboratory activities. It must allow historical reconstruction of all laboratory activities that produced the analytical data. Records are stored either electronically on external hard drive devices, CD, electronically using a web-based online filing system, or off site as hard copy files. The off site facility used for records storage has an established retrieval system. The facility is secure and it takes measures to prevent damage or deterioration and to prevent loss, including fire, theft, vermin and electronic or magnetic sources. Procedures exist to ensure that electronic records are secure and back-up routines are utilized. When not in use, external hard drive devices and CDs are stored in a fire-proof box in a safe location. All records are retained in confidence to the client. The storage time is dependent on the type of data and is specified in this document.

9.2. Technical Records

9.2.1. The laboratory records provide an audit trail and are designed to enable accurate reconstruction of the procedures / test methods.

9.2.2. The records include the identity of personnel responsible for performing each of the procedures / test method and checking of results. All data and calculations are recorded at the time they are made and are identifiable to the specific procedure / method.

9.3. Record Keeping Practices

9.3.1. All generated data, except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent ink. Observations, data, and calculations are recorded at the time they are made.

9.3.2. Corrections to entries are made by striking the entry with a single line. All corrections are initialed and dated by the person making the correction. The correct value should appear alongside the original entry. In the event that the cause for the correction is not obvious, the reason for the correction will be documented.

9.3.3. Obliterating, erasing, or whiting out the original entry is prohibited.

9.3.4. The records allow historical reconstruction of all lab activities that produced the data. This includes sample receipt, preparation, analysis, data reduction, and QC activities supporting the analysis procedures. The information will be such that the factors affecting the uncertainty of the test are identifiable and the test conditions could be reproduced and understood.

9.3.5. The records will be sufficient to establish an audit trail including calibration records and training records.

9.3.6. Laboratory personnel signature or initials must be on all records including sampled by, prepared by, reviewed by. The reason for the signature or initials will be clearly indicated in the record.

9.4. Records Management & Storage

9.4.1. Archived information is protected against fire, theft loss, environmental deterioration, vermin and, in the case of electronic records, electronic or magnetic source.

9.4.2. The laboratory allows the Agency (IEPA) access to archived information.

9.4.3. Records that are stored only on electronic media are supported by the hardware and software necessary for their retrieval.

9.4.4. Records that are stored or generated by computers have hardcopy or write protected backup copies. If a document revision is required, a new electronic version will be created. The original electronic document will be archived. A revision number and date is assigned to differentiate the two documents. The original file is not overwritten. The individual making the change should be identified on the document.

9.4.5. Records are retrievable for inspection and verification purposes.

9.4.6. Access to archived information is documented with an access log.

9.4.7. In the event that records have met the established retention time, the records will be destroyed prior to disposal.

9.5. Laboratory Sample Tracking

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained. This includes documentation of the following:

- sample preservation / container;
- compliance with holding times;
- sample identification, receipt, acceptance, rejection and log in;
- sample storage and disposal;
- sample transmittal forms.

9.6. Laboratory Support Activities

A record of the following supporting activities is retained:

- All original raw data for calibration, sample analysis, and quality control measures;
- results of secondary data review;
- copies of final reports;
- archived SOPs detailing the methods used to perform analyses;
- correspondence relating to specific projects;
- all corrective action reports, audits and audit responses; and
- proficiency test results.

9.7. Analytical Records

9.7.1. Analytical Reports

9.7.1.1. Each sample submission results in the creation of a project file for retention of all correspondence related to the project and a copy of the final analytical report and invoice. Reports are archived by year and by client. Until 2007, analytical records were stored off site, except for the current year and the previous year. The storage facility uses a bar coding system for the storage and retrieval of archival records. Beginning in 2007, records have been stored electronically using a web-based online filing system

9.7.1.2. All analytical reports pertaining to environmental analyses that are associated with the laboratory's accreditation are retained for seven years

9.7.2. Raw Data

9.7.2.1. All original raw data for calibrations, samples and QC measures is retained. Data is archived by analyte group, e.g., semi-volatiles, volatiles, metals, automated wet chemistry, and non-automated wet chemistry. The details regarding the procedures used for the various analyte groups are found in SOP #822 titled, "Back-up and Archival of Electronic Document and Raw Data."

9.7.2.2. All raw data associated with sample analyses include the following information:

- laboratory sample identification code;
- date of analysis;
- instrumentation identification and instrument operating conditions or reference to such information;
- analysis type;
- calculations;
- analyst's and technician's initials or signature;
- sample preparation;
- sample analysis;
- standard and reagent receipt, preparation and use;

- calibration criteria;
- quality control protocols and assessment; and
- method performance criteria.

9.7.2.3. Appropriate information (as detailed above) must also be included on calibration curves, strip charts, computer data files, analytical labbooks, and run logs.

9.7.2.4. The raw data on external hard drive or CDs are retained for seven years.

9.8. QA/QC Records

9.8.1. Performance Evaluation (PE) Sample Records

The receipt of PE sample(s) generates a project file. The project file contains all instructions pertaining to the analysis and reporting of the PE sample, the reported results, the final results report sent by the PE provider, and any associated corrective action reports.

9.8.2. All records pertaining to the analysis of PE samples are retained for seven years.

9.8.3. Standards and Reagents

9.8.3.1 Standards logs are maintained documenting the preparation of working standards, including preparation date, concentrations and preparer's initials.

- Organics: All purchased stocks, prepared intermediate, and working standards must be entered in standards log. The number assigned the standard is listed on the standard. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.

- Inorganics: All purchased stocks, prepared stocks, and prepared intermediate standards must be entered in the standards log. The number assigned the standard is listed on the standard. The date of preparation, date of expiration, and preparer's initials will be listed on the sample container. The standard number can be used to verify preparation date, preparer's initials, and concentrations of the standard.

9.8.3.2. Standards and reagents are labeled with date of receipt, date of opening, expiration date, and storage requirements.

9.8 3.3. Certificates of analysis providing traceability to national standards are retained.

9.8.3.4. All records pertaining to all suppliers from whom the laboratory obtains support services or supplies required for analyses are retained for seven years.

9.9. Lab Notebooks / Log Books

9.9.1. Laboratory notebooks, instrument logbooks, and standards logbooks are assigned a unique number. A record of the assigned logbook numbers, including description of use and date, is retained. The details regarding the procedures used for the various analyte groups are found in SOP #822 titled, "<u>Back-up and Archival of Electronic Document and Raw Data.</u>"

9.9.2. All laboratory notebooks, instrument logbooks, and standards logbooks are retained for seven years.

9.10. Corrective Action Reports, Audits, and Audit Responses

9.10.1. All records pertaining to corrective action reports, audits and audit responses are retained for seven years.

9.11. Administrative Records

9.11.1. Training Records

9.11.1.1. A copy of each analyst's resume and where applicable, diploma, is retained on file. A summary of each analyst's education, experience, and training is also retained.

9.11.1.2. Analytical training frequently requires the analysis of a series of performance evaluation samples to fulfill "Initial Demonstration of Capability". The results of IDC studies are retained on file. Each analyst has established a training file for the retention of information associated with analytical training.

9.11.1.3. All records pertaining to training are retained for a minimum of seven years.

9.12. Signatories

A record of signatures of all employees responsible for accepting samples, performing analyses, and data is retained. A copy of the current list appears at the end of this section.

9.13. Transfer of Records

In the event the laboratory transfers ownership, records would be transferred to the new owner. Clients would be notified and provided the option of having records transferred per their instruction. In the event the laboratory goes out of business, clients would be notified and records transferred to originating source where ever possible.

9.14. Electronic Data Management

9.14.1. The laboratory maintains a Laboratory Information Management System (LIMS) that is a Microsoft SQL Server based database. The LIMS is accessible throughout the lab through the local computer network. The LIMS is used to track vital information concerning samples, provide a means for data entry and generate analytical reports for our clients.

9.14..2 The LIMS software is documented through the User and Administrator Reference Manuals that were supplied with the commercially created LIMS.

9.14.3. Procedures have been established to protect the integrity of the LIMS data. See SOP #115 Electronic Data Management for more details.

9.14.4. Computer and automated equipment is maintained to ensure proper functioning and provided with the environmental and operating conditions necessary to maintain the integrity of calibration and test data. A maintenance logbook is kept to document this requirement.

9.14.5. Access to the laboratory's LIMS is restricted by user name and password to authorized employees. Permissions within the LIMS for various functions are assigned by the system administrator. Changes to archived LIMS data are not permissible.

9.14.6. Any modifications made to the LIMS must be tested and documented. This documentation is kept in a logbook.

9.14.7. The laboratory will take steps to ensure that data has been regularly backed-up. The disaster recovery procedures will allow the laboratory to recover data in event of an emergency.

9.15. References

SOP #115 titled, "Electronic Data Management".

SOP #124 titled, "LIMS Raw Data Backup".

SOP #822 titled, "Back-up and Archival of Electronic Document and Raw Data."

List of Personnel (does not include part time)	**Signature**	**Initials**
Name		
Bychowski,. John	John T. Bychowski	
Cleghorn, Neal		
Franklin, Lorrie	Lorrie Franklin	
Gerrick, Ryan		RSG
Gerrick, Scott		
Geraci, Joy	Joy Geraci	
Geraci, Mike		MJG
Hentschel, Pam	Pamela Hentschel	PJH
Holota, Rick		RAH
Loj, Adam	Adam Loj	AL
Mitchell, Betsy	Betsy A Mitchell	
Mottashed, Bill Sr.		
Neises, Kim		
O'Connell, Donna	Donna O'Connell	DOC
Plagge, Irene	Irene R. Plagge	IRP
Whittaker, Jeanne		JLW
Zaworski, Brian		B. Z.
Zaworski, Stan Jr.		SZ
Zaworski, Stan (Sr.)		SZ

10. Audits & Managerial Reviews

10.1. Introduction

10.1.1. A universal component of any sample, data, system audit performed is assessment of the data for non-acceptable or fraudulent practices that would compromise data integrity. The sample analysis process can be divided into many steps. An inappropriate or fraudulent procedure used in one step will affect subsequent steps, and ultimately, the final result of sample analysis. It is necessary to assess the sample analysis process for vulnerabilities that may affect the final result. A system of continuous improvement ensures that preventive action is incorporated into daily operations.

10.1.2. Quality audits are considered an essential part of a quality assurance program. An audit may be a performance audit that quantitatively evaluates the results of analyses or it may be a system audit that qualitatively evaluates the degree of adherence to the documented quality assurance program and Standard Operating Procedures (SOPs).

10.1.3. The Director of Data Quality will put in writing any findings from audits conducted at the lab. These will not be limited to his own audits, but will include the audits from clients and regulatory agencies. These will be shared with management and all staff, so that appropriate corrective action can be taken if necessary. Follow-up to audits verify that corrective action has actually occurred and serves the intended purpose.

10.1.4. A universal component of any of the types of audits detailed below is assessment of the data for non-acceptable practices that would compromise data integrity.

10.2. Performance Audits

10.2.1. A performance audit is a planned independent check of the operation of a measurement system to obtain a quantitative measure of the quality of the data generated. This involves the use of standard reference samples, which are certified as to their chemical composition. Two types of reference samples (performance evaluation samples) may be used: single and double blind

10.2.2. A single blind sample is known by the analyst to be a performance evaluation (PE) sample. The true values are not known.

10.2.3. A double blind sample has the appearance of a regular sample. It’s identity and it’s values are not known to the analysts.

10.2.4. A performance audit may also include the review of acceptability and frequency of analysis of all quality control indicators and associated control charts.

10.2.5. Performance audits are conducted as part of analyst training.

10.2.6. Performance audits are conducted as part of verifying the adequacy of corrective actions taken in response to a failed performance evaluation sample analysis.

10.3. PE Providers and Programs

10.3.1. First Environmental Laboratories routinely participated in WP, WS, and SW Performance Evaluation Programs, which consisted of the analysis of single-blind performance evaluation samples provided by the U.S. EPA. Upon discontinuation of the U.S. EPA program, First Environmental Laboratories enrolled in a program offered by an independent supplier of performance testing samples. Our current supplier, ERA, an accredited PT provider, provides Performance Testing (PT) samples for drinking water, wastewater, and solid waste fields. PT studies are conducted in accordance with the rules established by TNI. PT samples are received biannually for each field of testing, i.e., Water Supply (WS), Water Pollution (WP), SW (Solid Waste) Performance Samples.

10.3.2. PE samples may be purchased on an "as needed" basis from a variety of providers to aid in analyst training, method or instrument validation, and Corrective Action Investigations.

10.4. TNI Performance Testing (PT) Requirements

10.4.1. Initial accreditation requires the successful completion of two PT studies for each requested field of testing within the most recent three rounds attempted. The three rounds of testing need to have occurred within 18 months of the laboratory's application date. The last analysis must be within 6 months of application. The PT studies will be at least 15 calendar days apart.

10.4.2. Continued accreditation requires maintaining a history of continued successful completion of two PT studies for each field of testing out of the most recent three.

10.4.3. Completion dates of successive PT studies for a given PT field of testing will be approximately six months (5-7 months) apart. Failure to meet the semiannual schedule is regarded as a failed study.

10.4.4. The laboratory will analyze PT samples for analytes for which we are accredited that are included in the esperimental FoPT.

10.4.5. PT samples will be obtained from an approved PT provider.

10.4.6. The laboratory will authorize the PT provider to release all accreditation and remediation results and acceptable / not acceptable status directly to the Primary Accrediting Authority, in addition to the laboratory.

10.4.7. PT samples are entered into the LIMS in the same manner as actual samples. PT samples are prepared as instructed by the PT provider. PT samples will be handled in the same manner as actual samples using the same staff, methods, sample preparation procedure, sample analysis procedures, calibration procedures, equipment and instrumentation, facilities, and frequency of analysis. Decisions to reanalyze a sample or analyze at a dilution should be based on the same factors used to make decisions to reanalyze routine environmental samples. Additionally, the type, composition, concentration, and frequency of quality control samples analyzed with the PT samples shall be the same as with routine environmental samples. PT samples are not analyzed multiple times unless routine samples are also analyzed multiple times. Reporting of results is done through the LIMS in the same manner as actual samples using routine reporting limits.

10.4.8. The laboratory will not send any PT sample, or portion of a PT sample, to another laboratory for any analysis for which it seeks accreditation or continued accreditation.

10.4.9. The laboratory will not knowingly accept any PT sample or portion of a PT sample from another laboratory for any analysis for which the sending laboratory seeks accreditation or continued accreditation.

10.4.10. The laboratory management or staff will not attempt to obtain the assigned value of any PT sample from their PT provider.

10.4.11. The laboratory management or staff will not attempt to compare results of any PT sample with another laboratory.

10.4.12. All records associated with PT samples will be retained for 7 years. This includes a copy of the PT study report forms used by the laboratory to record PT results and a copy of the on-line data entry summary from the PT provider.

10.4.13. The final evaluation report will be sent by PT provider directly to the Primary Accrditing Body (AB). All records will be made available to the assessors of the Primary Accrediting Authority during on-site audits of the laboratory.

10.4.14. Whenever the result of the PT sample fail acceptance criteria, the laboratory will investigate the cause of the failure and perform appropriate corrective action. The corrective action taken will be appropriately documented. If required, a summary of the investigation and corrective action taken will be provided to the Primary Accrediting Authority.

10.4.15. Results for PT samples are carefully monitored. If it is suspected that the laboratory may be suspended due to failing two out of three analytes within the same field of testing, a proactive approach will be used to correct the problem and analyze remedial PT sample(s) prior to actually receiving notification of suspension.

10.5. System Audits

10.5.1. A system audit is an evaluation of the laboratory's quality assurance practices and procedures. It consists of an on-site review of the laboratory's quality assurance systems and physical facilities for sampling, calibration, and measurement. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to all staff and the management team. If appropriate, corrective action is initiated and documented.

10.5.2. A system audit may include any of the following:
- organization and management
- personnel
- training
- facilities
- equipment
- measurement traceability and calibration
- maintenance
- chain of custody procedures
- sample acceptance
- sample log-in and sample tracking
- storage conditions
- analytical procedures
- report format and contents
- subcontracting
- sample disposal
- document control
- review of past audits
- review of complaints
- electronic data management / LIMS system
- control charts
- SOP compliance

10.6. Method Audits

10.6.1. A method audit is a detailed evaluation of a specific method to verify compliance with the SOP / method source. A method audit may be performed as part of a system audit or as a follow-up to analyst training. It consists of a detailed review of method performance, SOP content, QCIs, control charts, and data handling. The Director of Data Quality, clients or regulatory agencies can perform these audits. The results of these audits are reported to the analyst(s), supervisor(s), and the management team. If appropriate, corrective action is initiated and documented.

10.6.2. Method audits are also triggered when a new revision or edition of the method becomes available through the originating source. The new revision or edition is evaluated against the current SOP. Changes are identified and a recommendation is made regarding the status of the SOP. If needed, the SOP will be revised. Documentation is retained in the SOP file summarizing the review.

10.7. SOP Audit

10.7.1. SOPs will be audited for accuracy prior to training a new analyst. The content of the SOP is compared to the procedures actually performed. If needed, the SOP will be revised. Documentation of the review will be retained. SOPs are audited at a minimum of every five years.

10.8. Sample Audit

10.8.1. A sample audit is a detailed evaluation of a specific project. It consists of a detailed review of chain of custody record(s), sample acceptance compliance, case narrative / cover letter, Analytical Report, raw data, QCIs, and method compliance. The Director of Data Quality or a Project Manager can perform these audits. The results of these audits are reported to staff, as needed, and the management team. If appropriate, corrective action is initiated and documented.

10.8.2. A sample audit should also include review of chemical relationships. A list of most common relationships follows:

Cation-Anion balance: For complete mineral analysis: (Anions)=(Cations)
Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
(Cr total) = (Cr III) + (Cr VI)
(Total Kjeldahl N) = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration ≥ Dissolved Concentration

10.9. Internal Audit

10.9.1. A comprehensive internal audit will be conducted annually to verify that the laboratories' operations continue to comply with the requirements of the quality system. Where the results of the internal audit indicate that operations or procedures are not in compliance, corrective action is taken. Where results of the internal audit indicate that the laboratory's test results are invalid, the laboratory takes immediate corrective action and immediately notifies, in writing, any clients whose data are affected. In the event that inappropriate actions violating the Code of Ethics is discovered, procedures for investigation outlined in the Data Integrity & Ethics SOP are followed.

10.9.2. Trained and qualified personnel who are, wherever resources permit, independent of the activity being audited will conduct the audit. The Director of Data Quality is responsible for coordinating the internal audit.

10.9.3. Attached to the Audit SOP (#121) is a checklist used to perform the annual internal audit. This checklist will be revised as necessary.

10.10. Managerial Review

10.10.1. Annually the Director of Quality Assurance will provide a “Quality Report to Management (QRM). The outline for this report includes but is not limited to the following issues:

- Internal Audit Results
- External Audit Results
- Summary of PT Program
- Listing of CARs PT Samples
- Listing of CARs by Analyte
- Listing of CARs by Client
- Preventive Action / Followup
- Continuous Improvement
- Customer Complaints
- Review of Customer Requests for Additional Services
- Customer Survey
- Review of Employee Complaints / CAR
- Data Integrity & Ethics
- Regulatory Review
    CCDD
    Leaking Underground Storage Tank Program
    Site Remediation Program
    Tiered Approach to Corrective Action Objectives
    RISC (Indiana)
    Ground Water Regulations
    Safe Drinking Water Act Regulations
    Wastewater Regulations
    TNI
- Method Review
    EPA Wastewater Methods
    Solid Waste Methods
    Standard Methods
    Method Audits
- MDLs
- IDCs
- STATs
- QC Module
- LIMS / Computers / Software
- Review of Laboratory Sections / Instrumentation (old / new)
    Metals
    Conventionals
    Wastewater
    Pesticides/PCBs
    Semi-volatiles

  Volatiles
- Subcontracting
- Training (Summary of Active Training)
- Document Review / Revision
  - QA Manual
  - CHP
  - Policy Manual
  - SOQ / Service Brochure
- SOP Revision
- Safety

10.10.2. The internal audit conducted in conjunction with the preparation of the Quality Report to Management (QRM).

10.10.3. The laboratory management team will review all audit findings and the associated corrective action response.

10.10.r. The management team will also consider the results of external and/or performance audits, feedback from employees and clients, changes in volume or type of work, changes in personnel requirements, and any other relevant issues.

10.10.5. The management team shall review the laboratories' overall performance with respect to maintaining data integrity. Vulnerabilities will be identified and actions taken to prevent potential issues from occurring.

10.10.6. If necessary, changes in the quality systems and/or technical operations and various manuals will be made to ensure continuous improvement of the laboratory.

10.10.7. The management team will ensure that corrective actions resulting from annual review and discussion of the quality systems, technical operations, and laboratory manuals occur within an agreed upon time frame. Followup activities need to be tracked.

10.10.8. A record will be maintained recording the results of the management team's annual review and discussion of the quality system, technical operations, and laboratory manuals. Final actions will be summarized and included in the record.

10.10.9. The finalization of the internal audit findings and QRM will include a discussion by management regarding needed improvements and potential sources of nonconformances, either technical or concerning the quality system. The objective is to proactively identify opportunities for improvement and prevent deviations from the quality systems that actively ensure the data produced by the laboratory continues to meet certification and regulatory requirements.

10.11. Quality Assurance Plan – Review

10.11.1. Biannually, the Director of Quality Assurance will review the Quality Assurance Manual (QAM) for compliance with the current rules for certification. The title page of the QAM states the following:

"This QAM is reviewed annually and if necessary a section(s) will be revised to reflect current practices and certification requirements. This QAPP establishes protocols of operation for the analysis of environmental samples. Drinking water, wastewater, groundwater, soils, sediments, and waste samples are analyzed by this laboratory for iorganic and organic analytes."

10.11.2. Obsolete versions of the QAM are retained for reference for a minimum of seven years.

10.12. Quality Assurance Discussions.

Quality Assurance topics are incorporated into the weekly meeting held with all staff. Topics discussed and documented at the meeting could include:

- Results of performance evaluation samples
- Training issues
- Analytical methods
- Results of audits
- Certification issues
- Corrective action
- SOPs

10.13. References

SOP #121 titled, "Audit".
SOP #126 titled, "PT Program"

11. Personnel

11.1. Introduction

First Environmental Laboratories, Inc. staff members are of the highest quality. Personnel are qualified on the basis of education, training, experience and/or demonstrated skills appropriate to their function in the laboratory. The laboratory environment encourages growth of the individual through cross training and, where appropriate, continued education. Potential areas for growth are identified during annual reviews based on present and anticipated needs of the laboratory. Anticipated short term and long term needs are evaluated.

All personnel are responsible for complying with quality assurance and quality control requirements established by the Quality System that pertain to their function. And all personnel must demonstrate knowledge of our operations and their specific functions.

Demonstration of method performance and analyst's capability is a vital part of the formal quality control program supporting the quality of data produced by *First Environmental Laboratories.*

11.2. Analyst Training

11.2.1. Laboratory management is responsible for defining the minimal level of qualification, experience, and skills necessary for all positions in the laboratory and ensuring that sufficient personnel having necessary knowledge and skills are employed,

11.2.2. The Director of Data Quality will coordinate training and is responsible for developing a training plan outlining the stages of training.

11.2.3. An analyst who is known to be proficient and experienced at performing the analysis/instrument operation will coach analysts who are learning how to perform an analysis or operate an instrument.

11.2.4. The coach and/or Director of Data Quality is responsible for verifying the adequacy of the trainee's basic laboratory skill such as balance use, pipet use, and general chemical handling.

11.2.5. The coach (or trainer) will be responsible for reviewing all data produced by the new analyst until successful completion of initial demonstration of capability. Normally, an analyst new to a particular area of responsibility is designated as being an "analyst-in-training" for the first year. The analyst-in-training will continue to work closely with another analyst during this period.

11.2.6. When a work cell is employed, and the members of the cell change, the new employee(s) must work with experienced members of the work cell and demonstrate acceptable performance through acceptable continuing performance checks such as Procedure Blank and Laboratory Control Standard (LCS).

11.2.7. Results of the Initial Demonstration of Capability (IDC) are retained in the analysts' training file for each test method the analyst is primarily responsible for perfoming. .

11.2.8. Each analytical area (metals, extractable, conventionals, wastewater, and volatiles) maintains a manual containing pertinent method SOPs and supporting SOPs. The analyst-in-training is responsible for reading and understanding all SOPs contained in the manual.

11.2.9. All employees receive a copy of the Quality Assurance Plan and Chemical Hygiene Plan upon hire and are responsible for reading and understanding these documents.

11.2.10. If outside training is incorporated into an analyst's training plan, appropriate documentation will be included in the analyst's training file.

11.2.11. Wherever appropriate, personnel will be cross-trained in order to provide a greater depth of knowledge to the anlayst and to provide a flexible pool of analysts capable of performing a variety of analyses.

11.3. Training Files

11.3.1. Training files are maintained by the Quality Assurance Officer

11.3.2. The file is reviewed annually by the QA Officer to ensure that documentation requirements are continuing to be met. Annual review is performed during the first quarter. A new analyst that is actively being trained will work closely with the QA officer to up date their training file as various stages of training are completed.

11.3.3. A copy of the analyst's educational and professional qualification, if applicable, summary of experience and external training is also retained in the analysts' training file.

11.3.4. Continuing Demonstation of Capability (CBC) is maintained for each test method the analyst performs.

11.3.5. Records are readily available for review.

11.4. Initial Demonstration of Proficiency

Demonstrating proficiency at performing an analysis or a given suite of analyses will include the following:

11.4.1. Performing, calculating, and interpreting a Method Detection Limit (MDL) study.

11.4.2. Performing, calculating, and interpreting an Initial Demonstration of Capability (IDC) consisting of four replicate standards prepared at a known concentration.

Perform Initial Demonstration of Capability (IDC). The source for the IDC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the IDC should ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (or reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is not required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. **Criterion**: Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 18th Edition of Standard Methods (see last page of this SOP). An excel form is available for calculating and recording results of the IDC studies.

Table 1020:I Acceptance Limits for Duplicate Samples and Known Additions to Water and Wastewater (from Standard Methods, 18th Edition – Partial Excerpt)

Analysis	Recovery of Known Additions (%) *
Metals	80-120
Volatile Organics	70-130
Base/neutrals	70-130
Acids	60-140
Organochlorine Pesticides	50-140
Endosulfans	25-140
Endrin Aldehyde	25-140
Anions	80-120
Nutrients	80-120
Other Inorganics	80-120

Additions calculated as % of the known addition recovered

11.4.3. If data collected from four QCI samples, such as the LCS, is used to calculate the IDC, then the concentration guideline may be exceeded. If a QC sample is purchased, the concentration is usually determined by the supplier and the concentration guideline may be exceeded. Evaluate the IDC carefully and determine whether the goal has been achieved. The goal is to document adequacy of training and the ability of the analyst to perform the method acceptably.

11.4.4. Successful analysis of blind performance evaluation sample(s). PE samples may be blind standards prepared by a different analyst or purchased from ERA or other supplier. In some cases, the IDC may also serve as the single blind PE.

11.4.5. Demonstrating knowledge of the method references and supporting SOPs and/or bench references.

11.5. Certification Statement (Demonstration of Capability)

11.5.1. The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and in the method / instrument validation file in order to document the initial validation effort.

11.5.2. If a work cell is employed, the performance of the group will be linked to the training record of the individual members of the work cell. The names of the analyst’s making up the work cell will appear on the documentation form.

11.5.3. Certification Statement

Attach copy of IDC if applicable.
The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee and/or in the method / instrument validation file in order to document the initial validation effort.

Date: Page 1 of 1
Laboratory Name: ***First Environmental Laboratories, Inc.***
Laboratory Address: 1600 Shore Rd. Suite D, Naperville IL 60563
Analyst(s) Name(s) or Work Cell ID:

Matrix: Aqueous Drinking Water Solids Chemical Waste

Method Number	SOP#	Revision #	Class of Analytes or Measured

We, the undersigned, CERTIFY that:
1. The analysts identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory Accreditation Program, have met the Demonstration of Capability.

2. The test method(s) was performed by the analyst(s) identified on this certification.

3. A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site.

4. The data associated with the demonstration capability are true, accurate, complete and self-explanatory (1).
5. All raw data (including a copy of this certification form necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors.

________________________________ ________________________________
Technical Director’s Name and Title Signature
Date__________

________________________________ ________________________________
Quality Assurance Officer’s Name Signature
Date__________
(1)

- True: Consistent with supporting data.
- Accurate: Based on good laboratory practices consistent with sound scientific principles/practices.
- Complete: Includes the results of all supporting performance testing.
- Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

11.6. Continuing Demonstration of Proficiency

Analysts must have on file continued documentation certifying that they have read, understood and agreed to perform the most recent version of the method and standard operating procedures AND documentation of continued proficiency by at least one of the following once per year:

- acceptable performance of a blind sample;
- another demonstration of capability;
- successful analysis of a blind performance sample on a similar test method using the same technology (e.g., GCMS volatiles by purge and trap for Methods 524.2, 624 or 5035/8260) would only require documentation for one of the test methods;
- at least four consecutive laboratory control samples with acceptable levels of precision and accuracy;
- if none of the above can be performed, analysis of authentic samples with results statistically indistinguishable from those obtained by another trained analyst.

Analyst's Name________________________________

Area of Responsibility___________________________

As part of my responsibilities, I have routinely participated in the analysis of performance evaluation samples, such as, WP, WS and ERA or equivalent as detailed above.

I have read, understood and agree to perform the most recent version of the method and/or standard operating procedure(s).

Signature_____________________________________

Date:_______________

Note: Attach appropriate documentation that proves how this requirement has been met.

11.7. Laboratory Management Responsibilities

Laboratory management is responsible for all activities ensuring the production of quality data and the continued health of the company, including the following:

- staffing;
- supervision of employees;
- training , initial and continued;
- documentation of all analytical and operational activities;
- sample management, including sample acceptance, login, storage, disposal, and tracking;
- analysis and reporting;
- report preparation;
- quality; and
- data integrity and ethics.

11.8. Data Integrity Training

Data integrity is inherently critical to the success of our laboratory. All Training is provided as part of new employee orientation and is reviewed annually with all employees. A signature attendance sheet and minutes are maintained to document annual training.

Training includes, but is not limited to the following:

- mission statement;
- ethics agreement;
- ethical behavior;
- unethical behavior;
- reporting and investigation of potentially unethical behavior;
- case narratives;
- consequences;
- initial training;
- annual refresher training; and
- documentation.

SOP #127 titled, "Data Integrity & Ethics" provide detailed discussion of each of the items listed above. It discusses the need for honesty and full disclosure in all analytical reporting, how and when to report data integrity issues, and record keeping. It also discusses the consequences associated with violating the Code of Ethics, including termination or civil/criminal prosecution.

Data integrity training communicates the importance of proper written narration on the part of the analyst with respect to those cases where analytical data may be useful, but are in one sense or another partially deficient.

11.9. Annual Refresher Training

Annually, refresher training is provided during which data integrity ethics procedures are reviewed and discussed.

11.10. References

SOP #106 titled, "IDC & IDMP"
SOP #109 titled"MDL"
SOP #117 titled "Training"
SOP #127 titled, "Data Integrity & Ethics"

12. Accomodation and Environmental Conditions

12.1. Introduction

12.1.1. *First Environmental Laboratories, Inc*. conducts metals, conventionals, GC, and GC/MS analyses on drinking water, aqueous, solid, and hazardous waste sample matrices.

12.1.2. The laboratory facilities and environmental conditions must accommodate instrumentation and analysis needs necessary to produce quality data. Environmental conditions include electrical supply, lighting, temperature, humidity, water sources, sound and vibration levels, and dust.

12.1.3. The laboratory will ensure that environmental conditions do not invalidate test results or adversely affect the required quality of any measurement.

12.1.4. If the method requires monitoring of any environmental condition, the laboratory will meet and document adherence to the specified environmental condition. If the environmental condition jeopardizes the results of the test, the analysis will be stopped until the condition is corrected.

12.2. Facilities

12.2.1. Adequate workspace must be available to provide an unencumbered work area for the performance of the various analytical procedures. This includes sample receipt and log-in, sample storage, chemical and waste storage, and data handling and storage areas.

12.2.2. Access to the laboratory is always controlled. The extent of control is based on circumstances.

12.2.3. The laboratory is designed, operated and arranged to separate incompatible analyses minimizing the potential for sample contamination.

12.2.3.1. Volatile samples are stored in an area separated from other lab activities and samples.

12.2.3.2. Volatiles analyses are conducted in a separate lab dedicated to volatile analyses.

12.2.4. Adequate measures are taken to ensure good housekeeping in the laboratory. Poor housekeeping can have an adverse affect on the quality and reliability of data being produced. Special procedures are developed and used as necessary.

- All passageways are kept clean and free from obstruction.
- Access to all exits and emergency equipment is unobstructed.
- All storage areas are kept neat and orderly.
- Floors are kept as clean and dry as possible.
- Work areas are cleaned regularly.
- All chemicals are properly labeled and stored.
- All glassware that contained hazardous chemicals is rinsed before being given to the glassware cleaning personnel.
- Sample receipt area is kept neat and orderly.
- Data handling areas are managed to meet record keeping requirements.

13. Environmental Test and Calibration Methods, and Method Validation

13.1. Introduction

The laboratory uses appropriate methods and procedures for all environmental tests within its accreditation. These methods and procedures are documented in the laboratory Standard Operating Procedures (SOPs) and this Quality Assurance Manual. Each instrument method is validated prior to institution by performing a initial demonstration of capability.

13.2. Standard Operating Procedures

13.2.1. As a supplement to the methodology provided in the actual method references, First Environmental Laboratories, Inc. has established written Standard Operating Procedures that provide detailed instructions for analysis. All employees will follow the policies and procedures detailed in the SOPs and outlined in the QAM. Laboratory management must approve deviations from documented policies and procedures. The Project Manager will approve specialized project requirements that deviate from routine procedures on an individual basis. The SOP's contain detailed information regarding the following:

- Header Information (filename, SOP#, revision #, date, pagination)
- Title
- Scope and Application
- Summary of Method
- Matrices
- Sample Collection, Preservation, and Storage
- Equipment & Supplies
- Reagents and Standards
- Interferences
- Calibration and Standardization
- Procedures
- Quality Control
- Data Assessment and Acceptance Criteria for Quality Control Measures
- Corrective Action for Out-Of-Control Data
- Contingencies for Handling Out-Of-Control Or Unacceptable Data
- Data Analysis and Calculations
- Detection Limits & Reporting Limits
- Method Performance
- Tables, Diagrams, Flowcharts, & Validation Data
- Definitions

- Safety
- Pollution Prevention
- Waste Management
- References
- Approvals
- Implementation Date
- Ending Date

13.2.2. The SOPs also provide information regarding any modifications or clarifications to the approved test method.

13.2.3. In some cases, bench references have also been prepared to complement the SOP. A bench reference is designed to be used by an experienced analyst.

13.2.4. Additional non-method SOPs have been prepared to accurately specify protocols and procedures for all phases of laboratory activity including sample acceptance, login, handling, preparation, storage, and disposal. Several SOPs support training activities and it is understood that information in an SOP used for training is more generic than a method specific SOP. Therefore, if information in the training document conflicts with information in the method SOP, the method SOP takes precedence.

13.2.5. A complete listing of current SOPs is included in this section. Each SOP is assigned a unique numeric ID.

13.2.6. Laboratory personnel have access to all SOPs.

13.3. Approved Method References

13.3.1. The laboratory cites methods from the various references listed below. The most recent valid revision is used unless it is not appropriate. In the event that the client does not specify the method to be use, the laboratory uses methods for testing that are judged appropriate and intended to meet the needs of the client. In some instances, the client may mandate or request the method to be used. If the requested method is not appropriate, the laboratory notifies the client.

13.3.2. The method references are available within the laboratory to all personnel. Methods cited by the laboratory are fully validated. Validation data and supporting documents, such as SOPs, and documentation associated with Demonstration of Capability (DOC) are available for review.

13.3.3. The method used for analysis is listed on the Analytical Report.
13.3.4. Common Method References

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater,", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998.

"Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substances in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry," EPA-821-R-98-002, Feb. 1999.

ASTM Methods – various

13.4. Methods

Matrix →		**Drinking Water and Wastewater**		**Soil, Waste, Ground Water**	
	Reporting Limit	**Method No. from Standard Methods (20th Ed.) and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
Analyte and default unit (as it appears on the report)					
Inorganics					
Acidity as $CaCO_3$ - mg/L	5	2310B	Y	----	
Alkalinity as $CaCO_3$ - mg/L	5	2320B	Y	----	
Ash - %	0.01	2540E	N	----	
BOD and CBOD – mg/L	1	5210B	Y	----	
Bottom, Sediment & Water, %	1	----		D1796	N
Chloride (automated) - mg/L	5	4500Cl$^-$-E	Y	9251	Y
Chloride (titration) - mg/L	5	4500Cl$^-$-C	Y	----	
Chlorine, free or residual - mg/L	0.05	4500Cl-G	Y	----	
Chlorine, total - mg/L	0.05	4500Cl-G	Y	----	
Chromium, hexavalent - mg/L	0.005	3500Cr-B	Y	7196A	Y
COD (low) - mg/L	10	5220D	Y	----	
COD (high)	--	5220D	Y	----	
Color, APHA	20	2120B	Y	----	
Conductivity - umhos/cm	5	2510B	Y	9050A	N
Cyanide Automated, mg/L	0.005	335.4R1.0^3	Y	----	
Cyanide, total & ammenable- mg/L	0.005 0.10 soil	4500CN-B,C,E,G	Y	9010B/9014	Y
Cyanide, reactive - mg/kg	10	----		7.3.3.2.	Y
Cyanide, weak acid dissociable – mg/L	0.005	4500CN-I	N	----	
Density, g/cc	0.01	----		D854-92	N
Fluoride - mg/L	0.50	4500F-C	Y	----	
Flash Point - ^{o}F, open cup	212^{o}F	----		1010M	N
Flash Point - ^{o}F, closed cup	212^{o}F	----		1010	Y
Ignitability of Solids	--	----		1030	N
Fractional Organic Carbon Content @ 440^{o}, %	0.01	----		D2974-87	N
Hardness (titration) - mg/L	5	2340C	Y	----	
Ammonia Nitrogen (automated) – mg/L	0.10	350.1R2.0^3	Y	----	
Ammonia Nitrogen as N (probe) -	0.10	4500NH_3-B,D	Y	----	

mg/L					
Matrix →		**Drinking Water and Wastewater**		**Soil, Waste, Ground Water**	
	Reporting Limit	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
Analyte and default unit (as it appears on the report)					
NALP (Present vs. Not Present)	--	----		----	
Nitrite Nitrogen as N - mg/L	0.01	4500NO$_2$-B	Y	----	
Nitrate + Nitrite Nitrogen (automated) as N - mg/L	0.10	353.2R2.0^3	Y	----	
Nitrate (automated) – mg/L	0.10	353.2R2.0^3	Y	----	
Nitrate – mg/L	0.10	4500NO$_3$ E modified	Y	----	
MBAS – mg/L	--	SM5540C	Y	----	
Oil & Grease - mg/L	1	1664A^1	Y	9070A	N
Oil & Grease (sludge /sediment) – %	0.01	----		9071B	Y
Moisture, %	0.01	----		D4959-89	N
Paint Filter - free liquid present or absent	--	----		9095A	Y
Phenol Automated, mg/L	0.01gw	420.4R1.0^3	Y	9066	N
Phenol (direct) - mg/L	0.05 0.01gw 2.5 soil	420.1	Y	9065	Y
Phosphorus, total - mg/L	0.01	4500P-B,E	Y	----	
Phosphate, ortho - mg/L	0.01	4500P-E	Y	----	
pH @ 25^{o}C – units (aqueous)	--	4500H$^+$-B	Y	9040B	Y
pH @ 25^{o}C, 1:10 – units (soil)	--	----		9045C	Y
Settable Solids, mg/L	1	2540F	Y	----	
Silica - mg/L	1.0	4500 -Si,C	Y	-----	
Specific Gravity	0.01	2710F	N	----	
Sulfate Automated - mg/L	15	375.2R2.0^3	Y	9036	N
Sulfate - mg/L	15	----		9038	Y
Sulfide, total colorimetric - mg/L	0.05	4500S$_2^-$C,D	Y	----	
Sulfide, total titrimetric – mg/L	5	----		9034	Y
Sulfide, reactive mg/kg	10	----		7.3.4.2.	Y
Sulfur, %	0.01	----		E775-87	N
TDS - mg/L	1	2540C	Y	----	
TSS - mg/L	1	2540D	Y	----	

TS - mg/L	1	2540B	Y	----	
TKN - mg/L	--	4500N-B	Y	----	
Matrix →		**Drinking Water and Wastewater**		**Soil, Waste, Ground Water**	
	Reporting Limit	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
Analyte and default unit (as it appears on the report)					
TOC, mg/	0.1	5310C	Y	9060	Y
Turbidity - NTU	0.01	2130B	Y	----	
Metals					
Mercury – mg/L or mg/kg	0.0005aq 0.05 soil	245.1R3.0[2]	Y	7470A	Y
ICP (aqueous) – mg/L		200.7R4.4 [2]	Y	3010A/6010B	Y
ICP (soil) – mg/kg		200.7R4.4 [2]	Y	3050B/6010B	Y
ICP – MS		200.8R5.4	Y	3010A/6020	Y
SPLP	--	----		1312	Y
TCLP / ZHE Prep	--	----		1311	Y

Organics, Analyses

Analyte Group	**Prep Method Water**	**Prep Method Soil**	**Method No. from Standard Methods and/or EPA Wastewater Method Manuals**	**Accredited**	**Method No. from SW-846 or ASTM**	**Accredited**
BTEX	5030B	5035	--		8260B	Y
EDB/DBCP	--	--	--		8011	Y
Pesticides	3510C	3540C	608	Y	8081A	Y
PCBs	3510C	3540C	608	Y	8082	Y
PNAs	3510C	3540C	625	Y	8270C	Y
Semi-volatiles	3510C	3540C	625	Y	8270C	Y
TPH	3510C	3540C	--		8015B	Y
Volatiles	5030B	5035	624	Y	8260B	Y

13.5. Custom Procedures / Non-Standard Methods

13.5.1. Custom procedures / non-standard methods may be developed by the laboratory at the request of the client. The Project Manager will ensure that the client specifications are clear and achievable. The purpose of the test will be understood prior to planning the test development. Personnel with appropriate experience and knowledge will work with the Project Manager and Director of Quality Assurance to ensure that the procedures are properly developed, validated and documented.

13.5.2. If it is necessary to use non-standard methods, the client will be notified during the project planning phase. Non-standard methods will be appropriately validated before use for precision, accuracy, and range of analysis to verify the ability to meet the intended use of the method. Validation will be as extensive as needed to meet the intended use of the method. At a minimum, the validation requirements established for routine methods will be met.

13.5.3. All documentation relating to non-standard method development and validation, and the acceptability of the method for its intended use will be retained.

13.6. Instrument / Method Validation (Demonstration of Capability)

13.6.1. Initial demonstration of method performance may include any or all of the following: defining the linear calibration range; determining the method detection limit and routine reporting limit; demonstrating the precision and accuracy of the analysis by performing an Initial Demonstration of Capability (IDC), and analysis of Performance Evaluation (PE) samples. Additional validation requirements may be established based on specific situational needs.

13.6.2. The ability to reliably produce quality data is dependent upon the maintenance and quality control monitoring routines established at the time the instrument or method is validated. For instrument and method validation to be complete, these routines must be established prior to analyzing samples submitted by clients.

13.6.3. It is understood that, in some cases, the routines initially established at the time the instrument or method is validated will need to be revised. Therefore, a follow-up date is established upon completing instrument or method validation. Follow-up includes assessing all aspects of instrument or method performance, flow of work through the lab, and the effectiveness of maintenance and quality control monitoring routines. The follow-up will also include an audit of an arbitrarily chosen set of data.

13.6.4. It is vital that the SOPs prepared to support instrument operation and method performance match procedures performed on an everyday basis. Each SOP will be reviewed for completeness and accuracy upon completion of the validation, and at the time follow-up is performed.

13.6.5. Demonstration of capability must be completed prior to the acceptance of samples and each time there is a change in instrument type, personnel, or method.

13.7. Control of Data

13.7.1. Data Review / Verification

13.7.1.1. Review of the analytical data based upon set acceptance/rejection criteria established by the analytical method is necessary to ensure the quality of the data. This process involves a critical review of the data set in order to detect questionable values. The analyst performs the initial and most critical review at the time the data is generated.

13.7.1.2. The analyst is provided with detailed method performance acceptance criteria for each analytical method. These criteria are outlined in the specific method SOPs. Data that fails to meet the criteria specified must be flagged appropriately, and the Project Manager notified. Specific information regarding the “out-of-control” QCI will be provided in the case narrative prepared by the Project Manager.

13.7.1.3. Analyst-in-Training are required to have their data reviewed by the senior anayst responsible for conducting the training or other qualified analyst. The training period normally consists of a year. When appropriate to the training effort, checklists are created to assist in the training process. These checklists are reviewed by the senior analyst as part of the review of sample results.

13.7.2. Calculations and Data Transfers

13.7.2.1. Upon completion of data entry the Project Manager reviews the data verifying the accuracy of units of measure, reporting limits, significant figures, adherence to holding times, reasonableness, and completeness. Evaluative tools, such as anion/cation balance, may be utilized to assess the data. If a questionable value is found, the raw data is reviewed and the calculations checked. If necessary, the Project Manager may request re-analysis in order to verify the questionable data. After this review is completed, the Project Manager generates the final report and case narrative. The case narrative details any deviations from routine protocols that have occurred or failures to meet data quality objectives.

13.7.2.2. Another Project Manager performs secondary review of each report.

13.7.3. Manual Calculations

Detailed formula for performing calculations are included in the method SOPs and QC SOPs.

13.7.4. Computerized Procedures & Calculations

13.7.4.1. Computer software used by the laboratory is documented and validated prior to use.

13.7.4.2. Electronic data is protected and secure.

13.7.4.3. Computers and automated equipment is maintained to ensure proper functioning.

13.7.4.4. User accounts to the LIMS are user ID and password protected to prevent unauthorized access to, and the unauthorized amendment of, computer records.

13.7.4.5.

13.8. References

SOP #106 titled, "IDC & IDMP"
SOP #115 titled, "Electronic Data Management"
SOP #125 titled, "Data Validation"
SOP #811 titled, "LIMS Sample Login"
SOP #812 titled, "LIMS Sample Worksheets"
SOP #817 titled, "LIMS Data Entry"
SOP #818 titled, "LIMS Data Reporting"

List of SOPs

R# = Revision #

QA

	#	R#	Revised
balance calibration	101	3	01/04/10
calibration curves, inorganic	102	3	02/02/06
idc & idmp	106	4	01/24/06
maintenance	108	4	02/01/06
mdl	109	2	01/18/06
pipet / syringe calibration	111	4	09/12/06
statistical control	112	4	06/14/11
thermometer	113	4	10/20/08
calibration curves, organic	114	2	02/03/06
electronic data management	115	4	02/14/06
evidentiary COC	116	2	05/27/04
training file doc prof	117	6	04/13/11
measurement traceability…	118	1	08/31/99
sample acceptance....	119	4	08/06/08
audit	121	1	09/23/99
Checklist to audit SOP	121	3	07/19/04
subcontracting	122	4	03/10/10
sampling instruction & mat.	123	3	02/03/06
data validation	125	2	04/17/01
PT samples	126	3	03/02/06
data integrity	127	2	02/07/06
sop preparation	128	2	09/10/05
QCI - Inorganics & Organics	129	1	02/02/06
Creating Control Charts Agilent	130	1	01/23/07
Manual Chromatographic Integration	131	1	09/15/08
Manual Integration Skalar	132	1	09/15/08
Reprocessing Data ICPMS	133	draft	08/16/10

GCMS

	#	R#	Revised
PNAs	201	3	03/30/10
semivolatiles	202	4	01/25/06
TPH as Gasoline, Diesel, Waste Oil	203	3	05/04/04
volatiles	204	7	09/05/08
volatiles, drinking water 524.2	205	4	04/14/04

TPH as Gasoline	**206**	**2**	**12/10/04**
Wood Samples	**207**	**3**	**08/26/03**

GC	**#**	**R#**	**Revised**
8011 edb	**301**	**2**	**02/26/08**
8081 pesticides	**302**	**5**	**07/28/10**
8082 pcb	**303**	**4**	**04/15/11**

Conventionals	**#**	**R#**	**Revised**
acidity	**401**	**5**	**02/08/11**
alkalinity	**402**	**5**	**02/08/11**
ammonia easy dist	**403**	**6**	**02/09/11**
ammonia, Skalar (automated)	**405**	**4**	**02/10/11**
chloride, Skalar (automated)	**406**	**4**	**02/10/11**
chloride, titrimetric	**407**	**5**	**02/09/11**
chlorine	**408**	**6**	**02/09/11**
chrome+6	**409**	**8**	**03/14/11**
cod	**410**	**6**	**02/09/11**
conductivity	**411**	**6**	**03/14/11**
cyanide	**412**	**7**	**02/08/11**
fluoride	**413**	**9**	**02/09/11**
hardness	**414**	**6**	**02/08/11**
nitrate, Skalar (automated)	**417**	**5**	**02/10/11**
nitrite	**418**	**7**	**03/14/11**
pH (separate SOP per meter)	**419**	**7**	**03/14/11**
phenol easy dist dc	**420**	**5**	**02/10/11**
phosphorus	**421**	**6**	**02/10/11**
reactivity s cn	**422**	**4**	**02/10/11**
silica	**423**	**5**	**02/09/11**
sulfate, skalar (automated)	**424**	**4**	**02/11/11**
sulfate, turbidimetric	**425**	**5**	**02/10/11**
sulfide colorimetric	**426**	**8**	**02/10/11**
sulfide titrimetric	**427**	**7**	**02/10/11**
cyanide, Skalar (auto.)	**429**	**3**	**02/14/11**
phenol, Skalar (auto.)	**430**	**3**	**02/14/11**
color	**431**	**2**	**02/17/11**
sulfide easy dist	**432**	**5**	**02/10/11**
TOC Skalar	**434**	**3**	**02/16/11**

ammonia probe	**435**	**2**	**02/09/11**
TKN	**436**	**2**	**02/11/11**
turbidity (HACH 2100N)	**437**	**4**	**03/15/11**
sulfite	**438**	**2**	**03/17/11**
pH (sb80pi) (separate SOP per meter)	**439**	**2**	**03/14/11**
volatile fatty acids	**440**	**2**	**03/17/11**
sans plus	**441**	**2**	**03/15/11**
ferrous iron	**442**	**1**	**03/17/11**

Metals

	#	R#	Revised
cec (bench reference only) obsolete	**501**	**X**	**04/01/95**
icproutine	**502**	**6**	**10/04/07**
icpstd (standards list)	**503**	**3**	**08/19/10**
mercury	**504**	**8**	**06/08/11**
splp zhe	**505**	**3**	**12/26/07**
tclp zhe	**506**	**3**	**01/28/08**
icpms	**507**	**2**	**01/26/09**
icpmsstd	**508**	**3**	**08/01/10**

Organic Prep

	#	R#	Revised
Sepfbna	**601**	**7**	**02/03/11**
Sepf pest pcb	**602**	**5**	**02/03/11**
Soxbna	**603**	**6**	**02/02/11**
Sox pest pcb	**604**	**4**	**02/03/11**
Sonication bna	**605**	**1**	**10/11/07**
Sonication pest	**606**	**1**	**10/22/07**

Wastewater

	#	R#	Revised
bod	**701**	**7**	**08/20/07**
flammability	**702**	**3**	**02/04/11**
flashpt	**703**	**4**	**02/04/11**
oil & grease, hexane	**704**	**6**	**01/12/11**
paintfilter	**705**	**2**	**02/04/11**
specific gravity	**706**	**2**	**02/04/11**
tds vds	**707**	**5**	**12/19/07**
ts tvs	**708**	**5**	**12/21/07**
tss vss	**709**	**6**	**02/04/11**
oil & grease, hexane / horizon	**710**	**1**	**11/05/07**

Aspen LIMS

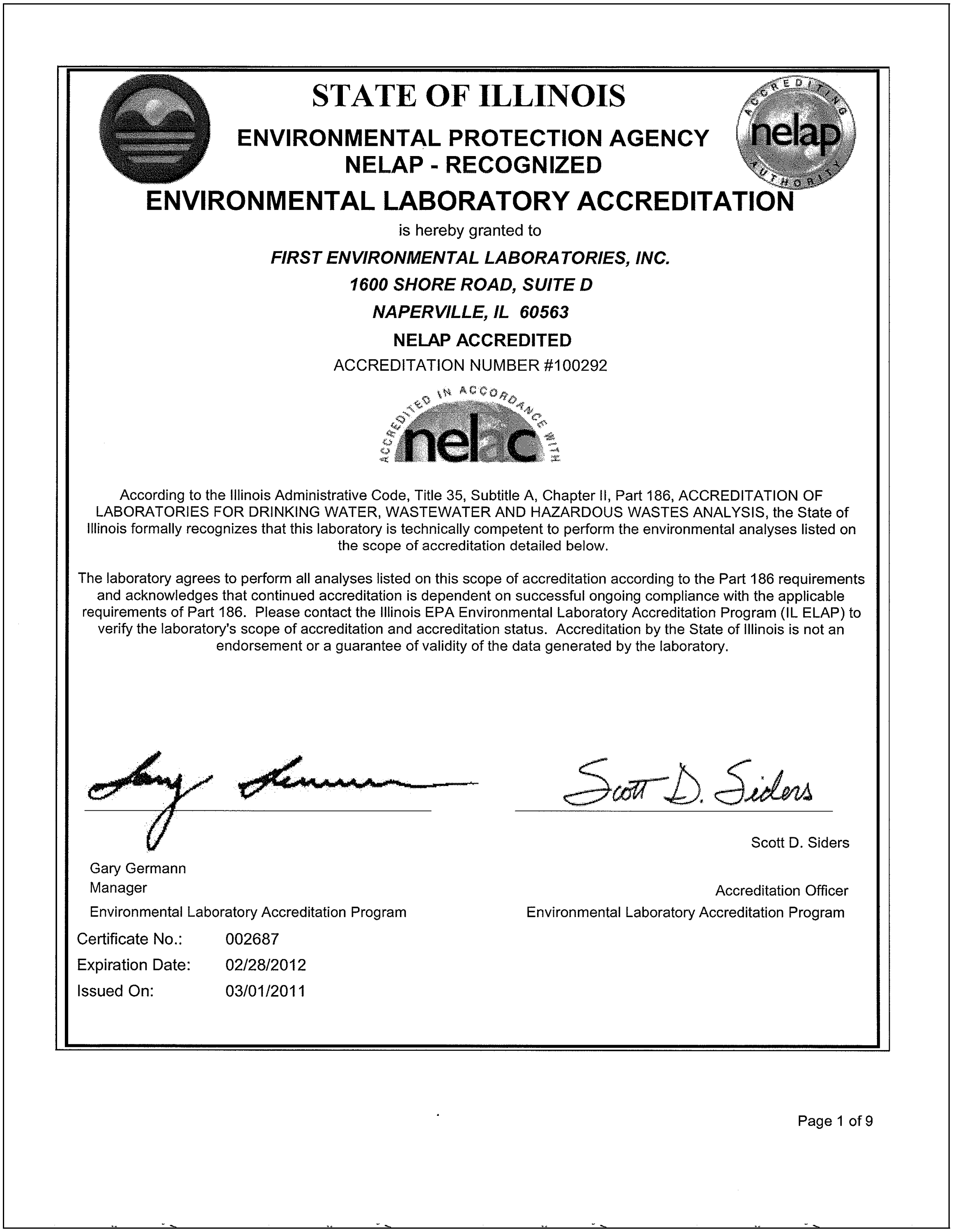
	#	R#	Revised
Install a Workstation	**801**	**1**	**02/03/05**
Install a Workstation	**801**	**2**	**03/15/11**
Procedure for Entering %TS	**802**	**4**	**05/01/07**
LIMS Creating LF EDDs	**803**	**3**	**03/02/11**
LIMS Org Prep	**804**	**4**	**02/17/10**
LIMS VOC	**805**	**1**	**02/16/10**
LIMS Create and Export EDDs	**806**	**2**	**03/01/11**
Archive LIMS Data	**807**	**2**	**03/15/11**
LIMS Aspen Libraries	**808**	**2**	**02/23/11**
LIMS Sample Login	**811**	**3**	**02/22/10**
LIMS BOD	**813**	**1**	**01/26/06**
LIMS Manual WC	**814**	**draft**	
LIMS Metals Digestion	**816**	**2**	**03/17/08**
LIMS Data Entry	**817**	**4**	**03/01/11**
LIMS Data Reporting	**818**	**2**	**03/01/11**
LIMS Data Flags	**819**	**2**	**02/16/11**
LIMS Status by Labsection	**820**	**2**	**03/16/11**
LIMS Export Data in Access DB Format	**821**	**2**	**03/16/11**
Back-up and Archival of Electronic	**822**	**3**	**02/18/10**
LIMS MDL	**823**	**draft**	
Create an Invoice for Republic	**826**	**2**	**03/15/11**
Draft LIMS QC Charts	**828**	**1**	**06/14/11**
Draft LIMS Add QC to a WS	**829**	**draft**	
LIMS Sample Disposal	**830**	**1**	**03/15/11**
Export Data from LIMS	**831**	**1**	**03/15/11**
Draft EDMR EDD Creation	**833**	**draft**	
Draft IT Disaster Recovery	**834**	**draft**	

Safety

	#	R#	Revised
Sample disposal	**901**	**5**	**01/21/11**
Waste disposal	**902**	**4**	**01/21/11**

Office

	#	R#	Revised
Purchasing	**1001**	**1**	**04/03/07**



STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY
NELAP - RECOGNIZED

ENVIRONMENTAL LABORATORY ACCREDITATION

is hereby granted to

FIRST ENVIRONMENTAL LABORATORIES, INC.
1600 SHORE ROAD, SUITE D
NAPERVILLE, IL 60563

NELAP ACCREDITED

ACCREDITATION NUMBER #100292

According to the Illinois Administrative Code, Title 35, Subtitle A, Chapter II, Part 186, ACCREDITATION OF LABORATORIES FOR DRINKING WATER, WASTEWATER AND HAZARDOUS WASTES ANALYSIS, the State of Illinois formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed below.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part 186 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part 186. Please contact the Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Illinois is not an endorsement or a guarantee of validity of the data generated by the laboratory.

Scott D. Siders

Gary Germann
Manager
Environmental Laboratory Accreditation Program

Scott D. Siders
Accreditation Officer
Environmental Laboratory Accreditation Program

Certificate No.: 002687
Expiration Date: 02/28/2012
Issued On: 03/01/2011

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14. Equipment / Instrumentation

14.1. Introduction

The laboratory maintains supplies, equipment, instrumentation and software necessary for the correct performance of the environmental tests and procedures specified in our accreditation. The equipment and instrumentation used for testing is capable of achieving the accuracy required and complying with the specification of the environmental tests and procedure(s). Before being placed into service, instrumentation is validated in accordance with the guidance provided in Section 13. "Environmental Test and Calibration Methods, and Method Validation".

Calibration, the process of comparing one standard or piece of equipment against a standard or piece of equipment of higher accuracy, is vital to the quality of the end product. The degree of accuracy of the data generated is directly related to the accuracy of the standard or equipment.

14.2. Support Equipment

14.2.1. Support equipment includes balances, ovens, refrigerators, freezers, incubators, water baths, thermometers, pipets, and deionzied water sources.

14.2.2. All support equipment is maintained in working order and records including service calls are maintained. Malfunctioning equipment is removed from service, and clearly labeled out of service until repaired.

14.2.3. All support equipment is calibrated or verified annually over the range of use using NIST traceable references where available.

14.2.4. Balance calibration verification is performed within the expected range for the intended application each working day and records maintained.

14.2.5. Temperature verification for ovens, refrigerators, freezers, incubations and water baths is performed each working day and records maintained.

14.2.6. Glass micro-liter syringes have a certificate attesting to the established accuracy. Mechanical volumetric pipets are checked for accuracy quarterly and records are maintained.

14.2.7. Records of correction factors, if applied, are kept.

14.3. Instrument Calibration

14.3.1. The details of initial instrument calibration procedures are provided in the method specific SOPs, and in SOP #102 titled, "Calibration Curves, Inorganic", and SOP #114 titled, "Calibration Curves, Organic".

14.3.2. Raw data records are retained and must provide sufficient detail to permit reconstruction of the initial instrument calibration.

14.3.3. A calibration curve or standard curve is a comparison of the instrument response versus the concentration of the substance being measured. Typically, when plotted, the curve approximates a straight line.

14.3.3.1. For inorganic analyses, the calculation of the correlation coefficient is a test to determine whether the calibration data can be represented as a straight line. The square of the correlation coefficient is a positive number that exists between zero and one. A correlation coefficient of 1.0000 for a set of data indicates a curve of best fit. An acceptable correlation coefficient is 0.9950 or greater. The frequency at which calibration curves are prepared is specified within the methods.

14.3.3.2. For organic analyses, an average response factor is used to define the relationship of response to concentration. The percent relative standard deviation (%RSD) of the response factors is calculated for each compound in the set of calibration standards. If the %RSD is less than 20 percent then the average response factor may be used for quantitation. Linearity through the origin is not explicit and is assumed using this means of quantification. The frequency at which calibration curves are prepared is specified within the methods.

14.3.4. Sample results must be quantitated from the initial instrument calibration.

14.3.5. Results of analysis must be reported within the concentration range established by the initial calibration.

14.3.5.1. The lowest standard is equal to the reporting limit. Alternatively, if the reporting limit is below the lowest standard, the reporting limit can be verified by running a standard at the concentration of the reporting limit.

14.3.5.2. Samples exceeding the high standard are diluted and reanalyzed within the range of the initial calibration.

14.3.5.3. If calibration is performed using a zero point and a single point calibration standard (such as ICP), then the performance at the low end and the high end of the instruments range will be demonstrated on a daily basis.

14.3.5.4. If reported results are outside the instrument's calibration range and appropriate standards within the calibration range have not been analyzed to demonstrate performance, then the data will be flagged appropriately or an explanation provided in the case narrative.

14.3.5. An independent reference sample is analyzed immediately following a calibration curve to verify the curve. This standard is referred to as the Initial Calibration Verification Standard (ICVS). The ICVS must be prepared from a source different than that used to prepare calibration standards.

14.3.6. A distinction is made between recalibration, when a new curve is prepared, and continuing calibration verification, when a pre-existing curve is verified at the beginning, end, or during an analytical run. Whenever a new curve is prepared, it must be verified with an Initial Calibration Verification Standard (ICVS). Whenever a pre-existing curve is used, it must be verified with a Continuing Calibration Verification Standard (CCVS).

14.3.6.1. The CCVS is also analyzed periodically during the analytical run and at the end of a run to verify that the instrument calibration has been maintained during the run.

14.3.6.2. The CCVS may be prepared from the same source used to prepare calibration standards or from a second source.

14.3.6.3. If the CCVS results are outside established acceptance criteria, corrective action must be performed. Corrective action may require the analysis of a new initial calibration curve.

14.3.6.4. Data associated with an unacceptable CCVS may be reported with the appropriate qualification as follows:

- When the recovery for the CCVS is high biased, the results for samples having a non-detect may be reported.

- When the recovery for the CCVS is low biased, the results for samples exceeding regulatory maximum limit or decision level may be reported.

If more stringent standards or requirements are included in a mandated test method or regulation, they supercede general requirments of TNI standard.

14.4. Equipment/Instrumentation

14.4.1. Our laboratory is equipped with state-of-the-art instrumentation capable of providing a full range of analytical services utilizing EPA approved procedures, and allows us to meet the diverse needs of our clients. The equipment and instrumentation used to produce our product - analytical results - are the single most important tools we use to provide our clients with timely and accurate data, and therefore, represent the single largest area of capital investment.

14.4.2. Critical to our ability to consistently provide our clients with timely and accurate results, is the reliability of our equipment. To ensure reliability and minimize instrument down time, we have developed and implemented a detailed in-house maintenance program for all of our equipment.

14.4.3. Below is a listing of our equipment and instrumentation:

Volatiles Analyses

- Agilent 5975B GC/MS with EST Centurion Autosampler / Dual EnCon Purge & Trap
- Agilent 5973 GC/MS with EST Centurion Autosampler. / Dual Encon Purge & Trap
- Agilent 5972 GC/MS with EST 8100 Autosampler / Dual Encon Purge & Trap
- Agilent 5975 GC/MS with EST Centurion WS Autosampler / Dual Encon Evolution Purge & Trap

Semi-Volatiles & Pesticides/PCBs Analyses

- Agilent 5975 GC/MS with 7683 Autosampler. This is Agilent’s most recent benchtop GC/MS model combined with the 7890A gas chromatograph.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5973 GC/MS with 7673 Autosampler.
- Agilent 5972 GC/MS with 7673 Autosampler.
- Agilent 6890 GC with Dual Electron Capture Detectors. Agilent 6890N with dual micro electron capture detectors.
- Branson 450 Sonic Disrupter
- TCLP Zero Headspace Extraction Apparatus
- Soxhlet and Continuous Liquid-Liquid Extraction Apparatus

Metals Analyses

- Thermo Jarrell Ash ICAP 61E Trace Analyzer: This state-of-the-art instrument combines the speed and power of simultaneous ICP spectroscopy with the ability to reach part per billion and part per trillion detection levels previously only available through the more costly and time consuming graphite furnace methods.
- Coleman 50B Mercury Analyzer System
- Perkin-Elmer ELAN 9000 ICP-MS. For ultra-low detection limits of metals at the parts per trillion level and lower. The SimulScan dual-stage detector measures both high and low level analytes simultaneously.Conventionals / Wastewater Analyses

Conventionals Analyses

- Milton-Roy 401 Spectrophotometer
- Hach 2100N Turbidimeter
- Symphony Model SB70C Conductivity Meter
- YSI 5000 Oxygen Meter
- Pensky-Martens Closed Cup Flash Point Tester
- Lab Crest Cyanide Midi Distillation System
- Orion 710A Ion Selective Electrode Meter
- Skalar SANPlus Analyzer (Cyanide, Phenol, TOC)
- Skalar SANPlus Analyzer ((Nitrate, Ammonia, Sulfate, Chloride)
- Westco Scientific EASYdist
- Oil & Grease Machine SPE-DEX3000 Horizon Technology

Support Equipment

- Drying Oven (4)
- Lindberg Blue M 794 Muffle Furnace
- Refrigerators, Freezers, and Incubators
- Top Pan Balances
- Analytical Balances
- Pipettes & Syringes
- Thermometers
- DI Water Sources – General Lab
- Barnstead E Pure DI Water Source for Volatiles
- Glassware

14.5. References

SOP #101 titled, "Balance Calibration"
SOP ##108 titled, "Maintenance"
SOP #111 titled, "Pipet Calibration"
SOP #113 titled, "Thermometer"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"

15. Measurement Traceability

15.1. Introduction

15.1.1. All equipment having an effect on the accuracy and validity of the tests and procedures are calibrated prior to initial use and on a continuing basis over the entire range of use. The system is designed to be traceable to the International System of Units (SI) where applicable.

15.1.2. Requirements for calibration of reference standards, such as, Class S weights and NIST thermometers, are specified in the appropriate SOP. Reference standards will be calibrated before initial use and after adjustment. They will only be used for calibration purposes.

15.1.3. Internal reference standards are verified using certified reference materials.

15.1.4. Equipment used must be capable of providing the uncertainty of measurement needed per test specification.

15.1.5. Daily calibration for support equipment, such as, balances, deionized water, refrigerators, freezers, and incubators, means "each day the equipment is used."

15.2. Equipment Calibration

15.2.1. The accuracy of Grade S, Class 2 weights are certified by an independent source every five years. Balance calibration is performed annually by a contract calibration service, traceable to the appropriate National Institutes of Standards and Technology (NIST) calibration procedure over the entire range of use. Certificates of calibration are retained on file. On a monthly basis the analyst performs intermediate calibration for balances using Grade S, Class 2 weights. An assigned analyst performs daily balance calibration. See the Balance Calibration SOP for the detailed procedure.

15.2.2. The accuracy of NIST thermometer(s) are certified by an independent source every five years over the entire range of use. An analyst performs thermometer calibration against NIST thermometers annually. See the Thermometer Calibration SOP for the detailed procedure.

15.2.3. Autopipetors and re-pipetors are verified at least quarterly. See the Pipet Calibration SOP for the detailed procedure.

15.2.4. The pH meter has an accuracy of at least ± 0.1 pH units and a scale readability of at least 0.1 pH units. The meter performs temperature measurement and compensation automatically. The meter is calibrated with two standardization buffers prior to each use. See the pH SOP for the detailed procedure.

15.2.5. The conductivity meter is calibrated prior to each use. See the Conductivity SOP for the detailed procedure.

15.2.6. The turbidity meter is calibrated prior to each use. See the Turbidity SOP for the detailed procedure.

15.2.7. Refrigeration units, freezers, ovens, and incubators are each assigned a unique identification. Each unit has one identifiable thermometer that is stored in the unit. The units temperature is monitored and documented on a daily basis. The following information is documented:

- thermometer identification
- refrigerator or freezer identification
- date and time
- temperature
- initials of person recording temperature
- expected temperature
- acceptance range

15.2.8. The conductivity of each deionized water unit is checked and documented daily. The conductivity shall be less than 2.0 uS @ 25^{o}C. If the conductivity is greater than 2.0 uS @ 25^{o}C, then the unit is labeled “unusable” and taken out of service until after the tank is changed by the supplier. The units also have a red light indicating that the conductivity is greater than 0.5 uS. If the red light is on, then the unit is labeled “unusable” and taken out of service until after the tank is changed by the supplier.
uS = micro Simens

15.2.9. If calibration and/or verification of performance for a given piece of equipment fails to meet any acceptance criterion, the item will be taken out of service. The equipment will be clearly identified as being “out of service,” and if possible removed from the laboratory environment and stored in an assigned area until it has been repaired. The equipment will not be returned to use until calibration and/or verification demonstrates acceptable performance.

15.2.10. After determining that a piece of equipment has failed to meet a performance criterion, the laboratory will carefully examine the potential effect of this defect on previous calibrations and tests performed. If it is determined that previously reported data was affected, the Director of Quality Assurance and the Project Manager will be informed of the scope of the problem. The Director of Quality Assurance and the Project Manager will coordinate client notification and re-issuance of corrected Analytical Reports.

15.2.11. Equipment and instrumentation must consistently operate with in the specifications.

15.3. Standards & Reagents Tracking and Traceability

15.3.1. The degree of uncertainty in an analytical process is greater than or equal to the uncertainty in the applied standards. Chemical standards ordinarily are prepared by quantitatively combining constituents of known purity. The purity of the source of the material used for preparing the standards used for constructing the calibration curve standards and for preparing other quality control standards such as, matrix spikes and laboratory control standards, cannot be automatically assumed. Standards and reagents must meet the requirements of the test procedure.

15.3.2. Similarly, the stability of standards is also a prime requirement. If an expiration date is provided by the manufacturer it will be recorded and the standard will not be used beyond such date. If the expiration date is not provided , it is not required.

15.3.3. All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better. Purchasing records, such as, purchase order and packing slips are retained.

15.3.4. Upon receipt, all standards and reagents will be labeled with the date of receipt, expiration date (if available), and the initials of the person responsible for un-packing and accepting the materials. Care will be taken to note any specific storage requirements such as refrigeration.

15.3.5. The analyst opening the reagent or standard is responsible for ensuring that the purity meets the requirements of the test. All standards and reagents will be labeled with the date opened at the time they are initially utilized.

15.3.6. All prepared standards and reagents will be labeled with the standard identification and concentration, solvent, date prepared, expiration date, initials of analyst, and applicable safety information. Detailed instructions for standard and reagent preparation are provided within the method SOPs and bench references.

15.3.7. All reference standards, purchased stock, purchased neat solutions, all intermediate solutions, and all working standards used more than one day, <u>must</u> be traceable to their source and method of preparation. Log books are kept documenting the preparation of standards from the “mother” source. Each reference, stock, intermediate and multiple use working standard is assigned a unique number and entered into the

appropriate Standards Tracking Log. This unique number should also be applied to the label.

15.3.8. All records received with standards such as Certificates of Analysis and Material Safety Data Sheets will be retained. All Certificates of Analysis will be labeled with the assigned standard number.

15.3.9. The assigned number for the source used to prepare the calibration curve, Initial Calibration Verification Standard (ICVS), Continuing Calibration Verification Standard (CCVS), Laboratory Control Standard (LCS), Matrix Spike (MS), Matrix Spike Duplicate (MSD), and surrogates must be referenced on the raw data.

15.3.10. Where available, the laboratory shall use calibration standards traceable to national standards. Evidence of correlation of results is obtained by participation in proficiency testing programs.

15.3.11. Where traceability to national standards of measurement is not available, the laboratory must provide satisfactory evidence of correlation of results by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis.

15.4. Transport and Storage of Standards and Reagent and Materials

15.4.1. Standards, reagents, and materials are handled, transported, and stored in a way that protects their integrity.

15.4.2. Their integrity is protected by separation from incompatiable materials and by minimizing exposure to degrading environments.

15.4.3. Standards and reagents are stored according to manufacturer's recommendations and separately from samples.

15.5. Laboratory Supplies

15.5.1. Glassware is cleaned to meet the sensitivity of the method. Routine procedures are established and visibly posted.

15.5.2. Non-routine cleaning procedures unique to a specific method are documented in the method SOP and bench references used by the analyst.

15.5.3. Volumetric glassware used to prepare standards and reagents is ASTM class A.

15.6. References

SOP #101 titled, Balance Calibration
SOP #102 titled, Inorganic Calibration Curves
SOP #111 titled, Pipet Calibration
SOP #113 titled, Thermometer Calibration
SOP #114 titled, Organic Calibration Curves
SOP #118 titled, Measurement Traceability and Calibration,

16. Sample Preservation and Containers

16.1. Introduction

Generally, the client performs sampling. In the event that sampling services are provided by First Environmental Laboratories they are performed in accordance with procedures detailed in the following documents:

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

Special care is taken to ensure representative samples are obtained, and that cross contamination does not occur. Contamination is monitored through the use of trip blanks and field blanks.

16.2. Containers

To ensure that proper sample volumes are obtained, *First Environmental Laboratories, Inc.* provides our clients with clean, pre-labeled, pre-preserved sample containers. Sample containers, preservatives, and holding times are summarized in Table 6.1

16.3. Sample Splitting

General guidelines for splitting sample aliquots for analysis of aqueous and solid samples are available as a bench reference within the laboratory. In all cases, caution must be used during sampling splitting to prevent contamination or loss of analyte. It is also imperative that a representative portion of sample be obtained for analysis.

SAMPLE BOTTLE PRESERVATIVES AND HOLDING TIMES FOR AQUEOUS SAMPLES

METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
General, dissolved	Plastic	Filtered on site, HNO_3 to pH<2	6 months
General, total	Plastic	HNO_3 to pH<2	6 months
Chromium, hexavalent	Plastic	Cool 4^{o} C	24 hours
Mercury	Plastic	HNO_3 to pH<2	28 days

INORGANIC NON-METALS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Acidity	Plastic	Cool 4^{o} C	14 days
Alkalinity	Plastic	Cool 4^{o} C	14 days
Ammonia	Plastic	H_2SO_4 to pH<2, Cool 4^{o} C	28 days
BOD	Plastic	Cool 4^{o} C	48 hours
Bromide	Plastic	None	28 days
Chloride	Plastic	None	28 days
Chlorine	Plastic	Cool 4^{o} C, Immediately	Analyze
Chromium, +6	Plastic	Cool 4^{o} C	24 hours
COD	Plastic	H_2SO_4 to pH<2, Cool 4^{o} C	28 days
Color	Plastic	Cool 4^{o} C	48 hours
Conductivity	Plastic	Cool 4^{o} C	28 days
Cyanide, Total or Amenable	Plastic	NaOH to pH>12, Cool 4^{o} C	14 days
Cyanide, Reactive, pH 2	Plastic	NaOH to pH>12, Cool 4^{o} C	14 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Flash Point, Closed Cup	Glass	Cool 4° C	-
Fluoride	Plastic	None	28 days
Hardness, Total	Plastic	HNO_3 to pH<2	6 months
Nitrite	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (waste water, chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	H_2SO_4 to pH<2, Cool 4° C	14 days
Nitrate/Nitrite (non-chlorinated drinking water)	Plastic	Cool 4° C	48 hours
Nitrate/Nitrite (chlorinated drinking water)	Plastic	Cool 4° C	28 days
Oil & Grease	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
pH	Plastic	None	Analyze, Immediately
Phenols	Glass	H_2SO_4 to pH<2, Cool 4° C	28 days
Phosphorus, Ortho	Plastic	Cool 4° C	48 hours
Phosphorus, Total	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Silica	Plastic	Cool 4° C	28 days
Solids, Dissolved	Plastic	Cool 4° C	7 days
Solids, Suspended	Plastic	Cool 4° C	7 days
Solids, Total	Plastic	Cool 4° C	7 days
Solids, Settleable	Plastic	Cool 4° C	48 hours
Solids, Volatile	Plastic	Cool 4° C	7 days
Sulfate	Plastic	Cool 4° C	28 days
Sulfide	Plastic	ZnOAc + NaOH to	7 days

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
		pH>9 Cool 4^o C	
Sulfide, Reactive pH 2	Plastic	ZnOAc + NaOH to pH>9 Cool 4^o C	7 days
Sulfite	Plastic	None	Analyze Immediately
Surfactants, MBAS	Plastic	Cool 4^o C	48 hours
Turbidity	Plastic	Cool 4^o C	48 hours

ORGANIC PARAMETERS

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
HPLC Pesticides (Aldicarb / Carbonfuran)	Glass vial	Cool 4^o C	28 Days
EDB/DBCP	Glass vial	Cool 4^o C	28 Days
Endothall	Glass	Cool 4^o C	7 days extraction 1 day - analysis
Pesticides and PCBs	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis
PCBs (only)	Glass	Unpreserved Cool 4^o C	None
Petroleum Hydrocarbons, IR	Glass	H_2SO_4 to pH<2, Cool 4^o C	28 days
Phenoxyacid Herbicides	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis
Phthalate Esters	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4^o C	7 days extraction 40 days - analysis

PARAMETER	CONTAINER	PRESERVATIVE	HOLDING TIME
Polynuclear Aromatic Hydrocarbons	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days analysis
GC/MS Semivolatiles	Glass	Unpreserved $Na_2S_2O_3$ if Cl_2 is present, Cool 4° C	7 days extraction 40 days analysis
Total Organic Carbon (TOC)	Plastic	H_2SO_4 to pH<2, Cool 4° C	28 days
Total Organic Halogens (TOX)	Glass	H_2SO_4 to pH<2, Cool 4° C $Na_2S_2O_3$ if Cl_2 is present	28 days
Total Petroleum Hydrocarbons	Glass	Cool 4° C	7 days extraction 40 days - analysis
Volatile Organics	Glass vial	HCl to pH<2 Cool 4° C $Na_2S_2O_3$ if Cl_2 is present,	14 days
Volatile Aromatic Organics	Glass vial	$Na_2S_2O_3$ if Cl_2 is present, HCl to pH<2	14 days

16.3. References

"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, Third Edition, September 1992 and it's updates.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

40 CFR Part 122, 136, et al., "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; National Primary Drinking Water Regulations; and National Secondary Drinking Water Regulations; Analysis and Sampling Procedures; Final Rule," March 12, 2007.

17. Sample Acceptance, Log-in, Storage, Disposal, and Tracking

17.1. Sample Acceptance Policy

Certification requires the laboratory to establish a written acceptance policy that clearly outlines the circumstances under which samples will be accepted. This policy must be made available to all sample collection personnel. A copy of the laboratories' sample acceptance policy is included in First Environmental Laboratories' Service Brochure that is provided to new clients. A copy of the policy will be included along with the chain of custody forms and sample instructions provided with sample bottles. Clients are encouraged to use sampling materials provided by the laboratory.

17.2. Chain of Custody Procedures

17.2.1. Chain of Custody Record

An essential part of any sampling or analytical event is assuring the integrity of the sample from collection to data reporting. The chain of custody provides documentation and traceability of sample possession and handling. Samples are physical evidence and should be handled according to the procedural safeguards outlined in the SOP titled, Sample Acceptance Policy, Receipt, Log-in and Storage, (#119). Any analytical data can potentially be used for purposes of litigation and strict adherence to chain of custody procedures is necessary. Evidentiary chain of custody procedures, which may be required for specific projects at the request of the client, are provided in the SOP titled, Evidentiary Chain of Custody Procedures, (SOP #116).

The chain of custody record contains the following information:

- company's name, address, and phone number, and facsimile number
- contact name
- sampler or collector's name
- project identity / location
- identity of person receiving report
- date / time of sample collection
- sample identification, description, or location
- matrix type
- analyses required or reference to quote/order detailing required analyses
- condition of sample shipper and containers upon receipt
- preservation type
- temperature of cooler upon receipt
- date and time of sample receipt
- signatures of persons involved in the chain of possession
- comments / special instructions

- lab identity (a unique laboratory sample number entered by laboratory personnel)

17.2.2. Initiation of the Chain of Custody (COC)

17.2.2.1. Chain of custody forms will be provided with all sample containers.

17.2.2.2. The chain of custody is initiated in the field by sample collection personnel. The sample collector is responsible for the care and custody of the samples until properly dispatched to the receiving laboratory or turned over to the laboratory. The sample collector must assure that each container is in his/her physical possession or view at all times, or locked in such a place and manner to preclude tampering.

17.2.2.3. If samples are received but the chain of custody is lacking, the person delivering the samples will fill out a chain of custody form. If a third party courier without a COC delivers the samples, the client will be notified immediately. A faxed, signed form from the client is sufficient to allow receipt and analysis by the lab. Clients should be encouraged to use the proper procedures and forms.

17.2.2.4. Deviation from acceptable protocols will be cited in the Analytical Report.

17.2.3. Maintaining Chain-of-Custody

17.2.3.1. Samples awaiting analysis are refrigerated if necessary.

17.2.3.2. If a sample needs to be shipped to a subcontracted laboratory, a purchase order/ chain of custody form will be completed. Pertinent information regarding sample analysis particular to the project such as, method and detection limit requirements will be provided to the subcontracting laboratory. The client must be informed regarding analyses performed externally.

17.2.3.3. In order to satisfy the custodial and evidentiary requirements of sample handling procedures, the following will be adhered to at all times:

- Samples will be stored in a secure area
- Access to the laboratory will be through a monitored reception area. Other access doors to the laboratory will be kept locked.
- Visitors are escorted while in the laboratory. All visitors sign the “Visitor Log."
- After a sample has been removed from storage by the analyst, the analyst is responsible for the custody of the sample. Each analyst should return the sample to the storage area before the end of the working day.

17.2.3.4. The chain of custody record is used to document return of samples to clients.

17.3. Sample Receipt by Laboratory

17.3.1. Laboratory custody of the sample begins at sample receipt. Samples may be delivered by the following methods:

- Field samplers provided by *First Environmental Laboratories, Inc.*
- Field samplers provided by the client
- *First Environmental Laboratories, Inc.* couriers
- Private courier service
- US mail
- The client or an agent of the client.

17.3.2. Independent couriers are not required to sign the chain of custody form. Ideally, the chain of custody should be kept in the sealed sample cooler. The receipt from the courier or the transportation bill should be kept with the chain of custody record retained by the laboratory. Normally, samples will be received by the office manager or Project Manager. The employee receiving the samples is responsible for signing the delivery forms for the carrier. The shipping containers are then taken to the log-in area for completion of the receiving process, which entails unpacking the shipping container and cross checking the chain of custody against the quote/order on file for the project.

17.3.3. Samples received after normal working hours or on weekends, which are not immediately unpacked, will be placed in cold storage.

17.4. Sample Log-in

17.4.1. Thermal Preservation

Samples are examined for proper thermal preservation.

17.4.2. Chemical Preservation and Sample Volume / Damage Inspection

17.4.2.1. Samples are examined for proper containers having appropriate chemical preservation and adequate sample volumes upon receipt. If necessary, a representative portion of sample is split into appropriately preserved containers. The person performing the task documents the action taken and indicates their initials and the date.

17.4.2.2. Samples are visually inspected for damage and indications of potential contamination.

17.4.3. Holding Times

17.4.3.1. Analyses having “short” holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

17.4.3.2. Log-in personnel will notify laboratory personnel when samples are received requiring analyses that are known to have “short” holding times.

17.4.4. Verification

The sample container identification is compared to the chain of custody and the chain of custody is in turn compared to the quote/order. Any discrepancies found are noted and the Project Manager notified. If discrepancies are found, the client will be contacted for clarification.

17.4.5. Laboratory Identification

17.4.5.1. A unique five digit code is assigned to each sample which is the batch I.D.. A three digit number follows the batch ID indicating the sample within the batch. A two digit number and alpha letter designates the bottle type, i.e., 4 oz jar. (Example: 6-0532-001-01C). Container associations are pre-determined within the test groups built in the LIMS. The laboratory sample ID is written on the chain of custody record in the column labeled, “Lab I.D.” The laboratory Bottle labels are printed and placed on the appropriate bottles.:

17.4.5.2. Each container is assigned a unique Lab I.D. code. A durable label and indelible ink are used to ensure sample labeling integrity.

17.4.5.3. The Lab I.D. code is used to identify all samples, subsamples, extracts and digests. The Lab I.D. code/container code is entered into the laboratory records and is used to link the sample with all activities related to sample analysis.

17.4.5.4. At the end of each day a Login Report is printed. The title of the report is, “Login Report – Samples Logged In: XX/XX/XX (date). This report summarizes the lab number (or Lab I.D.), Client Name, Project I.D., Sample Description, Type, Received Date/Time, Due Date, and Initials (of person making entries) are entered in the sample logbook in numerical order. The sample logbook provides a link between each client sample description and the assigned Lab I.D. code.

17.4.6. Documentation

17.4.6.1. The form titled, Sample Acceptance & Log-in Record, is completed during log-in. (See Page 11 of this SOP.) This form is used to document failures to meet sample acceptance criteria. The form is retained in the project file. A copy of the laboratories’ sample acceptance policy is included with the chain of custody forms and sample instructions provided with sample bottles. (See Page 12 of this SOP) If sample acceptance criteria have not been met, decisions to proceed with analysis will be documented. Clients having patterns of failure to comply with sample acceptance criteria will be contacted and notified verbally of the observed problems. A corrective action form will be filed to document the effort made by the laboratory to correct the problem. If the situation does not improve and a pattern of failure to comply with sample acceptance criteria remains, the Director of Quality Assurance will send written notification and seek written acknowledgment from the client.

17.4.6.2. A project file folder is prepared for each sample group submission. The tab of the project file is labeled with the client name, sample number(s), and due date. If the sample(s) require RUSH analysis, the tab is also stamped “RUSH.” The sample acceptance form is included in the project file. It is preprinted to allow entry of the due date, Project Manager I.D., checkboxes for analyte groups, reviewed by, date reported, date faxed, date invoiced.

17.4.6.3. The chain of custody form, accompanying freight bills, quote/order form and log sheets are placed in the project file, which is then forwarded to the Analysis Control Area.

17.4.6.4. The assigned Project Manager reviews the project within 24 hours of log-in completion. The Project Manager initials the file folder upon completing the review.

17.4.6.5. Whenever there is a problem or question associated with sample acceptance, the Project Manager will be notified. The Project Manager is responsible for resolving the problem, documenting resolution of the problem and documenting the decision to proceed with analysis. Depending on the nature of the issue, problem resolution will be documented on either the COC, Sample Acceptance & Log-in Record or on a Phone Log.

17.4.6.6. The COC is part of the final report delivered to the client. Where appropriate the Project Manager will cite deviations from acceptable protocols and qualify analytical data in the final Analytical Report.

17.4.6.7. If samples do not meet acceptance criteria and samples are ultimately rejected, all correspondence and records of conversations concerning the final disposition of rejected samples will be retained.

Note: At some point in the future, the COC form may be revised to include the statements listed on the Sample Acceptance & Log-in Record negating the need to utilize this separate form. This form could continue to be utilized as a phone log when necessary.

17.5. Sample Storage

17.5.1. Samples must be stored in a manner that avoids deterioration, contamination, or damage during storage, handling, preparation, and analysis.

17.5.2. Samples are stored away from all standards, reagents, food and other potentially contaminating sources. Highly contaminated samples must be segregated from other "clean" samples to prevent cross contamination.

17.5.3. Sample extracts, leachates and digests are stored in an area separate from samples.

17.5.4. Samples are stored in accordance with the thermal preservation requirements established in the methods.

17.5.5. The refrigerators used for sample storage are monitored on a daily basis. The temperature of each unit is maintained within $\underline{+}2^{o}$C of the specified preservation temperature unless method specific criteria exist. For samples with a specified storage temperature of 4^{o}C, the temperature is maintained between the freezing point of water to 6^{o}C.

17.5.6. Samples requiring evidentiary chain of custody procedures will be stored in a refrigeration unit that can be secured.

17.5.7. When obtaining a sample aliquot from a submitted sample, laboratory personnel will ensure that the sample is homogenous prior to taking the sample aliquot.

17.6. Sample Disposal

17.6.1. General

Thirty days after completion of the final report, samples will be disposed in an appropriate manner.

17.6.2. Hazardous

17.6.2.1. If a sample is determined to be hazardous during the course of analysis the Project Manager and other analysts are notified. A notation is made on the file folder indicating the hazardous constituent and it's concentration. The sample is flagged with a piece of red tape. The identity and concentration of the hazardous constituent is noted on the red tape. The red tape is used to segregate that sample at the time of routine disposal. When the sample is segregated from other samples for appropriate disposal, it is entered into the "Log for Hazardous Samples Awaiting Disposal." The log details the sample ID, date of storage, physical description, quantity, hazard concentration, method of disposal, and date of final disposal.

17.6.2.2. An attempt is made to return hazardous samples to the originating source. If the sample cannot be returned to the client, then the sample is stored until appropriate disposal arrangements are made.

17.7. Measurement, Calibration, Sample and Data Tracking

17.7.1. The ability to track samples and to link the raw data and final reports unequivocally to the sample is necessary. Also, in the event that the data is used in litigation, the laboratory must be able to recreate the analytical scenario. The procedures and practices routinely used by the laboratory are documented in the Quality Assurance Program Plan (QAPP) and in the SOPs to ensure that the data is accurate and complete, of consistently high quality, and is legally defensible.

17.7.2. Tracking samples and information pertaining to the analysis of a specific sample is performed in either of two ways:

17.7.3. Information can be tracked using the unique 8 digit code assigned to the sample upon receipt. This code is added to the chain of custody by laboratory personnel in the column labeled “Lab I.D.” Examples of the types of information that can be tracked using this code are raw data, report, and/or invoice.

17.7.4. Information can also be tracked using the date of sample receipt, extraction, or analysis.

17.8. References

SOP #119 titled, “Sample Acceptance Policy, Receipt, Log-in and Storage”

SOP #116 titled, “Evidentiary Chain of Custody” (#116)

SOP #123 titled, “Sampling Instructions & Materials”

Attachment 5: Chain of Custody Record

Sampling Instructions

- The sampling containers provided to you may contain small amounts of required preservative. The preservatives in common use are: 1 + 1 sulfuric acid, 1 + 2.5 nitric acid, 1 + 1 hydrochloric acid, and sodium hydroxide pellets. These preservatives are strong acids and bases, and can cause burns. Use caution at all times. Material Safety Data Sheets are available upon request. Information can also be obtained form Chemtrec @ 800-424-9300.
  (Note: 1 + 2.5 translates to 1 part acid to 2.5 parts deionized water).

- Do not rinse the sample containers prior to use.

- Fill plastic and glass containers to approximately one inch from the top and cap tightly.

- Aqueous Samples Requiring Volatile Analysis: Fill volatile vials full (reverse meniscus) and carefully slide the septum onto the vial. Screw on the cap and check the vial for air bubbles. A properly filled vial will contain no air bubbles.

- Soil Samples: 4 oz. jars are used for the collection of soil samples. Special procedures and sampling materials are required for the collection of volatile samples.

- The temperature within the cooler must be maintained at 4^{o}C during transit to the laboratory. Please ensure that appropriate quantities of ice are enclosed within the cooler to maintain this temperature.

- Please complete the enclosed chain of custody. This is an integral component of documentation supporting any analysis performed for regulatory compliance.

- If required, seal the cooler with a custody seal. The custody seal demonstrates to laboratory personnel the maintenance of sample integrity during sample transportation to the laboratory.

- Although each sampling event is unique, remember to get as representative of a sample as possible. This might mean running the water for two minutes; mixing the sample prior to filling the containers; etc.

If you have any questions, please feel free to contact the lab at (630) 778-1200 or consult our website at www.firstenv.com.

Sampling Instructions for QC Containers

In some cases, the laboratory needs additional sample volume in order to meet method QC requirements for the analysis of Matrix Spike (MS) and Matrix Spike Duplicate (MSD).

Extra bottles for MS and MSD are sent for certain bottle types whenever requests for 5 or more sample kits are received.

A colored label on the extra bottles identifies that they are included for QC purposes. It states:

"Needed for internal Lab QC purposes.
Fill all bottles from one sampling location.
Identify sampling location.
Do not enter on COC."

The bottles that need to be filled are placed in a colored plastic bag. Vials are place in a bubble bag. The bag will have a twist tie closure / tag or label that specifies the containers are needed for QC purposes.

Extra bottles are provided for the following containers:
1 L amber NT - 2 QC bottles
O &G – 2 QC bottles
VOA water samples – 3 QC vials
VOA soil samples Method 5035 – 2 sodium bisulfate preserved vials
VOA soil samples Method 5035 frozen – 2 vials w. stir bars

As an example:

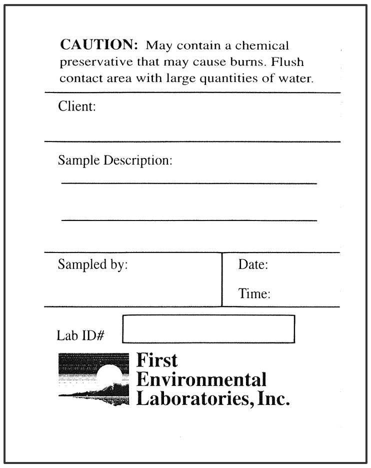
You requested 15 – 5035 Sample Kits. Your cooler will contain 15-5035 kits and 2 sodium bisulfate preserved vials with a yellow label indicating that they are for internal Lab QC purposes. The vials will be in a bubble bag. Please fill the vials from one of the sampling locations and identify the location on the vial label. Do not enter these extra vials separately on the COC.

Sample Acceptance Policy

The regulations guiding laboratory certification requires that our laboratory have a written sample acceptance policy available to sample collectors. Exceptions to the items below will be noted on the chain of custody and in the analytical report.

The sample collector must document the following information on the Chain of Custody:
- Your company's name, address, phone, fax number and e-mail address.
- Identity of person that will receive the report.
- Sampler or collector's name.
- Project identity or location.
- Date and time of sample collection.
- Sample identification, description, or location and matrix type.
- Analyses required or reference to quote or order detailing required analyses.
- Signatures of persons involved in the chain of possession including the collector's.
- Comments or special instructions

Laboratory personnel must document the following on the Chain of Custody or Sample Login and Acceptance form:
- Completeness of the documentation provided by the client (above list).
- Condition of sample shipper and containers upon receipt.
- Preservation type.
- Temperature of cooler upon receipt.
- Date and time of sample receipt.
- Signatures of persons involved in the chain of possession, including receiving personnel.
- Lab sample ID number.



CAUTION: May contain a chemical preservative that may cause burns. Flush contact area with large quantities of water.

Client:

Sample Description:

Sampled by:

Date:

Time:

Lab ID#

First Environmental Laboratories, Inc.

Sample bottles provided by the laboratory are pre-labeled with water resistant labels that are color coded to indicate the type of preservative present in the container.

Dark Blue = Hydrochloric Acid
Red = Nitric Acid
Yellow = Sulfuric Acid
Light Blue = Sodium Hydroxide
Teal = No Treat (No preservative)

Sample bottles need to be labeled using indelible ink. Adequate sample volume must be provided for the analyses requested.

The temperature within the cooler must be maintained at 4°C during transit to the laboratory. Please ensure that appropriate quantities of ice or ice packs are enclosed within the cooler to maintain this temperature.

Analyses having "short" holding times, must be delivered to the laboratory in a manner that provides adequate lead time to meet the holding time.

More information regarding sample volume, preservation, and holding time requirements can be found on our website at *www.firstenv.com* or by contacting us by phone at 630-778-1200.

Sample Acceptance & Login Record

Client Name:	Batch No:	Due Date:

Indicate the number of samples by matrix:

Soils/Sed/Sludge:	Aqueous:	Other:

Indicate the number of containers received per sample:

4 oz WMG		**NaOH (p) CN**		**40mL VOC Vials**	
16 oz WMG		**No Treat (g) Amber/Clear**		**Trip Blank**	
32 oz WMG		**H_2SO_4 (p) WC**		**H_2SO_4 (p) WC Diss**	
5035 Kit Na_2SO_4		**HNO_3 (p) Metals**		**HNO_3 (p) Metals Diss**	
5035 Kit Frozen		**No Treat (p)**		**No Treat (p) Dissolved**	
Other:		**H_2SO_4 (g) Phenol**		**ClAc Vials**	
		HCl or H_2SO_4 (g) O&G		**EDB Vials (NT)**	
Samples on Hold:		**H_2SO_4 (p) TOX**		**Endo**	
Location:		**ZnAc (p)**		**Sterile Bac-T**	

Collector's name present on the COC?	yes no n/a	**Sample preservation requirements met?**	yes no n/a
Client project ID present on the COC?	yes no n/a	**Cooler Temperature:**	______________
Samples clearly identified / match info on the COC?	yes no n/a	**Thermal preservation requirements met?**	yes no n/a
Date and time of collection indicated?	yes no n/a	**Samples arrived within holding times?**	yes no n/a
Containers intact and undamaged?	yes no n/a	***Samples requiring filtration or preservation should be processed as soon as possible.***	

If necessary, provide details and document resolution of problem(s) below. Indicate who was contacted, when they were contacted and by whom, and what decisions were made. Initial and date each entry.

Date:________________________***Client Contact:***____

Authorization to proceed: Yes No

Comments/Resolution:________________________________

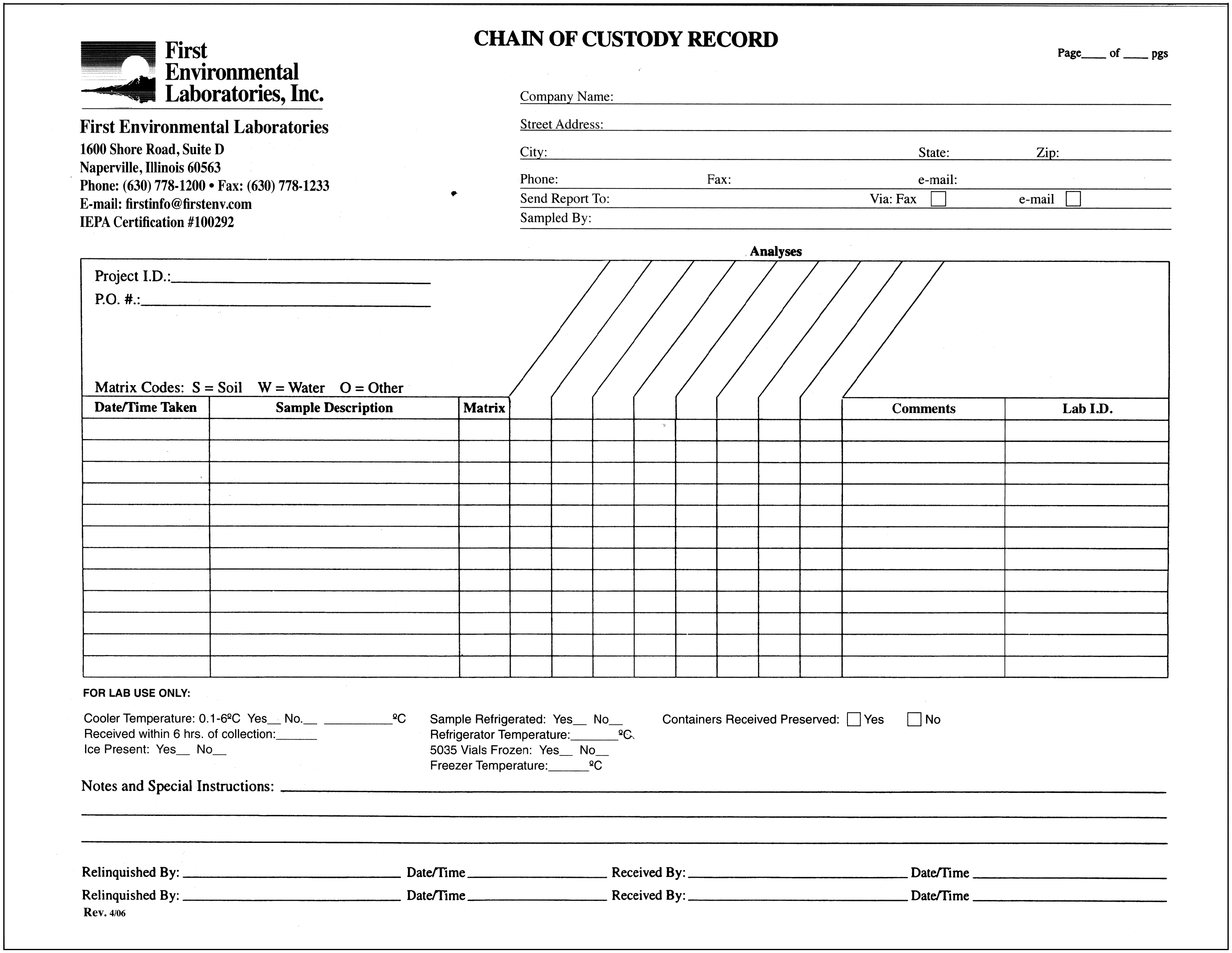
Logged in By:	Project Manager:

==

Final Report:

Reviewed By: **2nd Review By:**	**QC Pkg Required:**
Date E-mailed:	**Batch Full Other**
PDF DATA file Results file Other EDD Invoice	
Date Faxed:	**Date Reviewed:**
Date Invoiced: **PO#**	**Initials:**
Quote Enclosed: **Surcharge:________%**	

Notes:



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IEPA Certification #100292

CHAIN OF CUSTODY RECORD

Page____ of ____ pgs

Company Name:
Street Address:
City: State: Zip:
Phone: Fax: e-mail:
Send Report To: Via: Fax ☐ e-mail ☐
Sampled By:

Analyses

Project I.D.:____________________
P.O. #.:____________________

Matrix Codes: S = Soil W = Water O = Other

Date/Time Taken	Sample Description	Matrix									Comments	Lab I.D.

FOR LAB USE ONLY:

Cooler Temperature: 0.1-6ºC Yes__ No.__ __________ºC
Received within 6 hrs. of collection:______
Ice Present: Yes__ No__

Sample Refrigerated: Yes__ No__
Refrigerator Temperature:_______ºC.
5035 Vials Frozen: Yes__ No__
Freezer Temperature:______ºC

Containers Received Preserved: ☐ Yes ☐ No

Notes and Special Instructions: ____________________

Relinquished By: ____________ Date/Time ____________ Received By: ____________ Date/Time ____________
Relinquished By: ____________ Date/Time ____________ Received By: ____________ Date/Time ____________

Rev. 4/06

18. Assuring the Quality of Environmental Test and Calibration Records

18.1. Introduction

18.1.1. Our objective is to provide our clients with data that is of known and documented quality that is legally defensible in a court of law.

Various checks are implemented to ensure the quality of the test. Statistical control charting is used to detect trends. Reference materials are used to verify calibration and training. Routine participation in a PT program per field of testing is used to monitor overall performance of the test. Replicate and retesting using various techniques is also used to verify test performance.

18.1.2. Quality control procedures can be broken down into three main categories: Instrumentation, Methods, and Samples. Tables A-C list the various quality control indicators frequently used by *First Environmental Laboratories, Inc.* Each method SOP will give the details concerning the quality control indicators and acceptable criteria.

Instrument Quality Control

Table A

Linear Range Analysis
Demonstration of Capability
Limit of Detection
Multi-Point Initial Calibration
Initial Calibration Verification Standard
Initial Calibration Blank
Continuing Calibration Verification Standard
Continuing Calibration Blank
Interference Check Standard (ICP Analysis)
System Tuning (GC/MS Analysis)
Internal Standard Response (Gas Chromatography)

Method Quality Control

Table B

Method Blanks
Lab Control Standard

Sample Quality Control

Table C

Surrogate or System Monitoring Compounds (Organic Analyses)
Matrix Spike/Matrix Spike Duplicate
Duplicates

18.2. Essential Quality Control Procedures

18.2.1. The purpose of a Quality Assurance Program is to verify that the data produced is technically sound, legally defensible and of consistently high quality. The data produced will be of known accuracy, precision, completeness, representativeness, and comparability. These objectives are measured by various internal quality control checks performed during the course of analysis. Each individual method will dictate which Quality Control Indicators (QCI) will be analyzed, at what frequency, and will specify the acceptance criteria. If an acceptance criterion is not met for a particular QCI, the analysis is halted and corrective action is taken. If necessary, samples are re-prepared or re-analyzed. When appropriate, data is flagged and a detailed explanation qualifying the data is provided in the case narrative submitted with the Analytical Report.

Method requirements supercede generic guidance provided in non-method documents such as this Quality Assurance Manual, the NELAC Standard, or non-method SOPs developed for training purposes.

18.2.2. Generally, the QCIs can be categorized as being instrument, method, or matrix specific. The following provides definitions of the various QCIs used to ensure that the highest level of data quality is produced consistently.

18.2.3. The specific method and training SOPs contain greater detail regarding frequency, acceptance criteria, initial corrective action, final action, and data qualification and take precedence over the general guidance provided in this document. These SOPs also provide formulae for calculating percent recovery, relative percent difference, regression equations, and statistical acceptance criteria.

18.3. Initial Validation

18.3.1. Prior to using an instrument or method for performing sample analysis, initial validation is performed to characterize the upper and lower range of operation, and to demonstrate precision and accuracy of the analysis.

Addition of an analyte to a previously validated method will require an initial demonstration of capability for that analyte.

18.3.2. Linear Range Analysis: A standard or series of standards analyzed to demonstrate the highest concentration at which the instrument shows acceptable performance.

18.3.3. Method Detection Limit (MDL) Study: Replicate (7 or more) analysis of spiked samples to statistically determine the lowest concentration that can be determined using the method.

Determination of the MDL requires that the test sample aliquot be processed through all stages of sample preparation normally associated with the analysis, i.e., digestion, distillation, and extraction.

18.3.4. The source for the DOC standard is either a quality control (QC) check sample obtained from an appropriate source, such as ERA, APG, or USEPA, or a standard prepared using a standard source that is different from that used in instrument calibration. The concentration of the DOC will ideally be 5-50 times the MDL or 1-4 times the Limit of Quantification (i.e., reporting limit). Four aliquots of standard are analyzed according to the method. The standards are processed through the entire analytical procedure, including sample preparation. Concurrent analysis is not required. Calculate the mean value, mean percent recovery, standard deviation of replicates, and percent relative standard deviation of replicates for each analyte. Compare percent relative standard deviation and average recovery to the corresponding acceptance criteria for precision and accuracy in the approved test method. If information is not available, refer to Table 1020 I in the 20th Edition of Standard Methods.

Analysis cannot begin until all acceptance criteria are met. If any one of the parameters do not meet acceptance criteria, the performance is unacceptable for that analyte. The source of error must be determined and the demonstration of capability repeated for the analytes of interest.

18.3.5. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown identity of target analyte(s). These performance or reference standards provide an independent check of the analytical and reporting procedures used by the laboratory.

18.4. Instrument Specific Quality Control Indicators

18.4.1. System Tuning (GC/MS analyses): The electronics of a GC/MS are adjusted so that a mass spectrum of PFTBA meets predetermined abundances. The tune is further checked by analyzing 4-BFB (Volatiles) or DFTPP (Semi-volatiles) which must meet standard abundances.

If the tune is unacceptable, then all associated data is unusable and the samples must be re-analyzed.

18.4.2. Multi-Point Initial Calibration: A plot of concentrations of known analyte standards verses the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce standards that cover the working range of the instrument.

18.4.3. Initial Calibration Verification Standard (ICVS): A standard from a source different from that used to prepare the multi-point calibration(s) used to verify that the material was of sufficient purity, and that the multi-point calibration was properly prepared.

The ICVS must be within acceptance criteria for the multi-point curve to be deemed acceptable.

18.4.4. Reporting Limit Verification Standard (RLVS): A standard at the reporting limit which is analyzed after the curve to vefiry the reporting limit. This standard is only analyzed when the lowest standard in the calibration curve is greater than the reporting limit.

The RLVS should be withing +/- 30% of the true value.

18.4.5. Continuing Calibration Verification Standard (CCVS): A mid-level standard which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify the initial calibration.

If the CCVS fails, data for all samples analyzed after the failed CCVS is unusable and the samples must be re-analyzed after appropriate corrective action has been taken.

18.4.6. Continuing Calibration Blank or Reagent Blank: A blank which is analyzed at the beginning of each analytical batch and periodically during the course of analysis to verify that the instrument baseline is zero and that the instrument is free of contamination. This QCI is used primarily for metals and conventionals analyses.

The analyte concentration in the blank will be less than the reporting limit unless the method contains an exception. Positive blank values greater than the reporting limit are reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.4.7. Interference Check Standard: A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. This QCI is used only for ICP analysis.

If the interference check standard analysis is not within control, then the background correction points or the inter-element correction factors are incorrect and the accompanying sample data is not usable. After correcting the background correction points and interference correction factors, the samples must be re-analyzed.

18.4.8. Internal Standard: A spike added to each sample prior to performing an organic analysis that is used to perform analyte quantitation. The internal standard is also used to verify instrument response and retention time stability.

18.5. Method Specific Quality Control Indicators

18.5.1. Method Blanks: An analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The method blank is used to document that the procedures are free of contamination sources.

The analyte concentration in the procedure blank should be less than the reporting limit unless the method contains an exception, e.g., phthalates found in GC/MS semi-volatile analyses. Generally, procedure blanks are not subtracted unless permitted by the method. Positive blank values greater than the reporting limit are reported as an out of control condition and, if appropriate, the data is flagged. Corrective action will be initiated prior to resuming sample analysis.

18.5.2. Lab Control Standard (LCS): A spiked aliquot of analyte free matrix, such as de-ionized water, which is carried through the complete sample preparation and analytical procedures. The lab control standard is used to demonstrate that analyte is not lost during the course of sample preparation and analysis.

If the LCS is not within acceptance limits, the sample batch must be re-prepared and re-analyzed. If there is insufficient sample available for re-analysis, the out of control condition is noted and, if appropriate, the data is flagged.

18.5.3. Performance Samples / Reference Standards: External standards obtained from agencies or independent firms that supply environmental quality control standards. The standard contains an unknown amount of target analyte(s), and may contain an unknown identity of target analyte(s). These performance or reference standards provide an independent check of the sample preparation and analytical procedures.

Failure to pass a performance sample initiates the corrective action process.

18.6. Sample Specific Quality Control Indicators

18.6.1. Surrogate or System Monitoring Compounds: An organic compound which is similar to the target analytes in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. The compound(s) are added to each sample prior to sample preparation or analysis to determine matrix effects and analyte recovery after sample analysis.

If the percent recovery for the surrogate(s) is not within acceptance limits, the sample will be re-extracted and re-analyzed. If this is not possible, the out of control condition is noted and, if appropriate, the data is flagged.

18.6.2. Matrix Spikes / Matrix Spike Duplicates (MS/MSD): Duplicate aliquots of sample spiked with a known concentration of target analytes. The spiking occurs prior to sample preparation and analysis. A matrix spike is used to determine the bias of a sample.

If the MS/MSD data is outside acceptance limits, the results for the LCS are checked. If the LCS is in control, the procedure is in control and the data may be reported with a flag identifying the outlier spike data. Potentially, there may be a matrix interference which adversely affected the analytical results. The Method of Standard Additions (MSA) may be used for quantification of metals analytes.

18.6.3. Duplicate: A second analysis that is performed on a sample to determine the precision of the analytical method in a given sample matrix.

If the relative percent difference is not within the acceptance limits, the sample will be reanalyzed. This may indicate that a non-homogenous sample aliquot was obtained for the initial analysis.

18.7. Specific Routine Procedures to Assess Data Precision, Accuracy and Completeness

18.7.1. Accuracy

Accuracy is a measurement of agreement between an observed value and a true (theoretical) value. Several of the above QCIs measure accuracy including; Initial Calibration, Continuing Calibration, Laboratory Control Standard, and Matrix Spikes.

18.7.2. Precision

Precision is a measurement of reproducibility in duplicate and replicate analyses. The relative percent difference (RPD) between duplicate analyses is a measurement of the precision of a given analysis.

18.7.3. Limit of Detection (LOD)

The LOD is an estimate of the minimum amount of a substance that an analytical process can reliably detect. The laboratory utilizes test methods that provide a detection limit that is appropriate and relevant for the intended use of the data.

An LOD is analyte and matrix specific, and is laboratory dependent. The LOD is initially determined for the compounds of interest in each test method in a quality system matrix of interest. The LOD includes all sample processing steps of the analytical method.

A LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature. OR when test results are not to be reported to the LOD. Where an LOD study is not performed, the lab may not report a value below the limit of quanitation.

LODs are 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. The LOD is verified annually for each method, analyte, and matrix except if the following applies: the lowest calibration standard is equal to or below the reporting limit, or the reporting limit is verified by analyzing a standard at the reporting limit each time the analysis is performed.

The Limit of Quantitation (LOQ) is the minimum levels, concentrations, or quantities of an analyte that can be reported with a specified degree of confidence. The LOQ frequently equals the low calibration standard or is approximately 10 times the standard deviation from replicate measurements. In either case, the method LOQ is above the LOD.

If the annual review of the LOD indicates a change to the historic data base, the LOQ will be re-evaluated.

Unless specified otherwise by the method, a method detection limit study is used to determine the LOD. If an MDL is not appropriate, the procedure used to determine LOD will reflect instrument limitations and the intended application of the test method. The MDL is the minimum concentration of a substance that can be measured and

reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.
All procedures used for determining the LOD or MDL must be documented. Documentation must include the quality system matrix type. All supporting data must be retained

18.7.4. Standards & Reagents

All standards and reagents will be purchased from reputable scientific or standard supply firms recognized by the environmental laboratory industry. All analytical reagents will be Analytical Reagent (AR) grade or better.

18.7.5. Selectivity & Sensitivity

The method used for analysis must be appropriately selective and sensitive to meet data quality objectives established by the client.

18.7.6. Test Conditions

Environmental and instrumental test conditions are controlled to the meet the needs to the test.

18.7.7. Completeness

The measure of the amount of valid data obtained from the analytical measurement system compared to the amount that was expected to be obtained under optimal conditions.

Control criteria for each quality control indicator either meet or exceed EPA method requirements. Analyte specific criteria are summarized in the SOP for a given analyte.

18.7.8. Comparability

The confidence with which one data set can be compared to another.

18.7.9. Representativeness

The degree to which the data accurately and precisely represent a characteristic of a population parameter, variation of a property, a process characteristic, or an operational condition.

18.7.10. Correlation of Results

Data is reviewed for correlation of results and chemical relationships. A list of most common relationships follows:

Conductivity and TDS
TDS= 0.65 x Conductivity
COD, BOD, TOC
COD>BOD
BOD>TOC
COD>TOC
Hardness and Ca/Mg
Hardness as Ca Co3 (mg/L) = 2.497 Ca + 4.118 Mg
Solids
TS = TSS + TDS
TSS = TS – TDS
TDS = TS-TSS
Chromium, total
Cr total = (Cr III) + (Cr VI)
Total Kjeldahl N = (Org Nitrogen) + (Ammonium Nitrogen)
Total Concentration = or ≥ Dissolved Concentration

18.7.11. Uncertainty of Measurement

The total uncertainty of measurement needs to consider a variety of sources.

- Uncertainty due to the calibration equipment & calibration processes.
- Uncertainty of the testing instrument as calibrated.
- Uncertainty of the testing instrument during use.
- Uncertainty of the test results.

Uncertainty of measurement is inescapable since no measurement is infinitely precise and no measurement can be performed precisely the same way twice. It is a factor in the development of test methods, training, instrument calibration, and test performance.

In the event the client requests the measurement of uncertainty to be reported with the analytical results, the following documents will be used to calculate the measurement uncertainty:

"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document; and "CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

A variety of choices are made during the calculation of uncertainty of measurement. Care will be taken to evaluate the importance of the various components as they pertain to the project.

Interpretation of the data produced using these procedures will be carefully evaluated based on experience of personnel employed by the laboratory and the existing validation data. The laboratory will take precautions to ensure that the form of reporting does not imply more certainty than determined by the procedures for determining uncertainty of measurement.

18.8. Control Charts

Control charts are based upon a concept developed by Walter Shewart in 1934. The mean and standard deviation (n-1) for at least twenty measurements are determined. A line representing the mean is drawn on the chart. The upper and lower control limits, which are defined as plus and minus three times the standard deviation from the mean, are calculated and drawn on the chart. The range between the upper and lower control limits represents 99 percent of the normal distribution of observations. The upper and lower warning limits, which are defined as plus and minus three two times the standard deviation from the mean, are also calculated and drawn on the chart. The range between the upper and lower warning limits represents 95 percent of the normal distribution of observations. The methods provide specifications for acceptance criteria used to evaluate the result of a quality control indicator (QCI). Normally, the statistical limits generated by a single laboratory is expected to equal or be narrower than the method specification.

The following control charts or tabulations are maintained:

Metals:

Matrix Spike / Matrix Spike Duplicates
    Drinking Water / Dissolved Aqueous (undigested) Matrix
    Aqueous (digested) Matrix
    Soil Matrix
Laboratory Control Samples

Conventionals:

Matrix Spike / Matrix Spike Duplicates
    Aqueous Matrix
    Soil Matrix
Continuing Calibration Verification Sample
Laboratory Control Samples

Organics:

Surrogates
    Aqueous Matrix
    Soil Matrix
Matrix Spike / Matrix Spike Duplicates
    Aqueous Matrix
    Soil Matrix
Laboratory Control Samples

18.9. Interpretation of Control Charts

Control limits represent the normal distribution of a set of observations.
As a general guide, the following conditions indicate a problem exists and initiates the corrective action process:

- A point is outside the control limits
- Seven consecutive points in an increasing trend
- Seven consecutive points in a decreasing trend
- Seven consecutive points above the mean
- Seven consecutive points below the mean
- Three consecutive points occur between the warning and control limits

Out of control data is flagged as it is entered into LIMS. If an assigned cause for the failure is known, the out of control data point will be excluded from the control limit calculations. The control charts are examined for patterns of failure that indicate the need for corrective action investigation into the cause of the failure(s).

18.10. Analytical Record

The following essential information associated with analysis will ill be documented in the analytical record:
- Laboratory ID
- Date & time of analysis
- Instrumetn identification and operating conditions

- Analyte
- Analysis type
- Manual calculations
- Analyst intials / signature

18.12. Non-Standard Methods

When non-standard methods are used, all of the applicable procedures noted in sections 18.1. through 18.11. will be utilized to assure the quality of the test

18.13. References

SOP #106 titled, "IDC & IDMP"
SOP #129 titled, "QCI Inorganic & Organic"
SOP #110 titled "Organic QC"
SOP #102 titled, "Calibration Curves, Inorganic"
SOP #114 titled, "Calibration Curves, Organic"
SOP #109 titled, "MDL"
SOP #112 titled, "Statistical Control"
"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.
"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

19. Reporting the Results

19.1. Introduction

Results of analyses need to be reported objectively, accurately, and unambiguously. Data reduction is performed in accordance with internally established rules and conventions that meet method requirements. The content of the Analytical Report or Certificate of Analysis includes all information requested by the client and necessary for the interpretation of the analytical results, as well as, information required by the method. Quality control data is normally retained on file for reference. Quality control data packages can be prepared per client request.

19.2. Data Reduction

Following analysis, the raw data must be reduced to produce a final value to be reported. The specific calculations are included in the actual method references and method SOPs.

19.2.1. Significant Figures

All digits in a reported result are expected to be known definitely, except for the last digit, which may be in doubt. If more than a single doubtful digit is carried, the extra digit or digits are not significant. Report only such figures as are justified by the accuracy of the work. The reporting limits routinely used by the laboratory establishes significant figures for results. If the sample is analyzed at a dilution the number of significant figures used for reporting is adjusted accordingly.

Example:
Routine reporting limit for nitrite is 0.01 mg/L.
If the sample was analyzed at a 10x, the reporting limit changes to 0.1 mg/L.
If the sample was analyzed at a 100 x, the reporting limit changes to 1 mg/L.

19.2.2. Rounding

Round off by dropping digits that are not significant. If the digit 6,7,8,9 is dropped, increase preceding digit by one unit; if the digit 0,1,2,3,4 is dropped, do no not alter preceding digit. If the digit 5 is dropped, round off preceding digit to the nearest even number.

Example:
2.25 becomes 2.2 and 2.35 becomes 2.4

Generally, First Environmental does not report more than three significant figures.

Example:
11,642 becomes 11,600
1,162 becomes 1,160

19.2.3. Ambiguous Zeros

In a number written as 5.00, it is understood that all the zeros are significant, or else the number could have been rounded off to 5.0, 5 or whichever was appropriate.

In a number written as 0.52, the zero serves as a place holder. This avoids possible questioning in regards to a real number being excluded (.52).

19.2.4. Dry Weight vs. Wet Weight

Results for waste analyses (with the exception of TCLP analyses) are expressed on an "as is" basis (i.e., the sample results are not corrected for percent moisture). This is in accordance with protocols for "waste" materials.

Results for soils, sediments, and sludges are expressed on a dry weight basis per method protocols.

The calculation for converting wet weight results to dry weight is as follows:

$$\text{sample concentration} = \frac{\text{analyte concentration}}{\text{decimal equivalent of the percent total solids}}$$

19.2.5. Data Quality Flags

The following data flags may be used to qualify the data.

"J": Indicates an estimated concentration. This flag is used when reporting a result that is less than the routine reporting limit but greater than the method detection limit.

"B": Indicates the analyte was found in the associated blank as well as the sample. Common lab contaminants include, acetone, 2-butanone, and methylene chloride, and Bis-2ethylhexylpthalate.

"E": Indicates an estimated value. This flag may be used when the internal standard recovery for the associated compounds fails to meet acceptance criteria. Failure to meet acceptance criteria is due to the presence of a matrix interference. It may also be used to indicate the reported value exceeds the calibration range of the instrument.

"L": The analyte was detected as part of a GC/MS database search. The identification is considered tentative and the concentration is estimated.

"N": Analyte is not part of our NELAC accreditation
"S": Analyte was sub-contracted to another laboratory for analysis.

Other data quality flags may be utilized and appropriately defined in the case narrative.

19.3. Test Reports

The final report sent to the client consists of the following:

19.3.1. Cover Letter

19.3.1.1. A signed cover letter listing the client's name and address, client's project ID, *First Environmentals' File ID* (batch ID), and date of sample receipt.

The following statement is included in the cover letter:

> *"All analyses were preformed in accordance with established methods and within established holding times. All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our certificate is number is XXXXXX: XX/XX/XX through XX/XX/XX"*

19.3.2. Case Narrative

19.3.1.2. A case narrative is included, when necessary for the interpretation of test results, to explain the use of data quality flags, additions or exclusions to the test method, non-standard conditions that may have affected the quality of results, and specific exceptions to routine protocols or failures to meet method criterion.

Failures to meet sample acceptance criteria, such as, temperature compliance, are noted directly on the chain of custody. Failure to meet sample acceptance criteria other than temperature compliance, such as holding time or chemical preservation, will be included in the case narrative.

When required, a statement of the estimated uncertainty of the test results can be provided with the analytical result. Information on uncertainty is needed when a client's instruction requires.

In the event that an opinion or interpretation of results is requested by the client, the laboratory will document the basis upon which the opinion and interpretation is made. Opinions and interpretations will be clearly marked on the report.

19.3.3. The Analytical Report(s)

Each Analytical Report lists the following:

- Title, e.g., “Analytical Report”
- Client ID
- Project ID
- Sample Number (assigned by the laboratory)
- Sample Description
- Lab File ID (unique identification of the certificate or report)
- Date Received
- Date & Time Taken
- Date Reported
- Analyte or Analyte Group
- Results
- Unit of Measure
- Date Prepared
- Time Prepared if holding time is less than 72 hours
- Date Analyzed
- Time Analyzed if holding time is less than 72 hours
- Analysis Method and Method Revision
- Preparation Method
- Flags (data qualifiers)
- Client specific information as required.
- Specification of whether results for solid sample matrices are either “Dry Weight” or “Wet Weight”

The report format is designed to accommodate various test requests for either multiple or single analyte analyses. Required information is presented in a readable format minimizing the possibility of misinterpretation.

19.3.1.4. The original Chain of Custody Record.

19.3.4. Reports are paginated. Each page of the analytical report lists the laboratories File ID or assigned sample number. The first five digits of the sample number is the File ID or Batch Number.

19.3.5. The Analytical Report(s) and cover letter are printed on laboratory letterhead, which specifies the laboratories’ name, address, and phone number. The Project Manager’s name, signature and function.

19.3.6. When laboratory personnel performs sampling, this is documented on the chain of custody and in the cover letter accompanying the final report.

19.3.6. Analyses subcontracted to another laboratory will be flagged on the analytical report with an "S" in the flags column. The flag is defined in the case narrative to the report. A electronic copy of subcontracted results is retained in Sentryfile and is available to the client upon request.

19.3.7. Simplification of the reporting procedures requires a written agreement with the client. In the event that the reporting procedures are simplified, data is readily retrievable.

19.3.8. Facsimiles and E-mail documents will contain the following qualifier:

"The pages accompanying this facsimile (E-mail) transmission contain information, which is confidential or privileged. The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this facsimile in error, please notify us immediately so that we can arrange for the retrieval of the original documents at no cost to you." Alternatively, a stamp will be applied that states "confidential" to the cover page of the facsimile or E-mail.

19.3.9. After completion and delivery of the final Analytical Report to the client, the laboratory will only correct, add or delete information from the report upon directions received from the client. These directions must be appropriately documented. Documentation includes a summary of the change(s), specification of who provided the instructions, the date, and the initials of the person who received the request for correction. Any supplemental report will clearly identify their purpose and will contain all reporting requirements.

19.3.10. In the event that a reporting error is discovered after forwarding the final Analytical Report to the client, the client will be notified immediately in writing. Appropriate actions will be taken to remedy the problem and provide corrected a Analytical Report. The corrected report will provide a summary of the error and the correct action. If the data remains compromised, a written summary of the problem and the scope of impact on the clients' data will be sent to the client.

19.4. References

Refer SOP #818 titled, "<u>LIMS Data Reporting</u>"

20. Definition of Terms Commonly Used in the Environmental Laboratory

DEFINITION OF TERMS & ACRONYMS COMMONLY USED IN THE ENVIRONMENTAL LABORATORY

ACCEPTANCE CRITERIA: specified limits placed on characteristics of an item, process, or service defined in requirement documents. (TNI Standard)

ACCREDITATION: The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. (TNI Standard)

ACCREDITATION BODY: The territorial, state or federal agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation. (TNI Standard)

ACCURACY: The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations; a data quality indicator. (TNI Standard)

ANALYSIS DATE: The calendar date of analysis associated with the analytical result reported for an accreditation or experimental field of proficiency testing. (TNI Standard)

ANALYST: The designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (TNI Standard)

ANALYTICAL UNCERTAINTY: A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis. (TNI Standard)

ASSESSMENT: The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of laboratory accreditation). (TNI Standard)

AUDIT: A systematic and independent examination of facilities, equipment, personnel, training, procedures, record-keeping, data validation, data management, and reporting aspects of a system to determine whether QA/QC and technical activities are being conducted as planned and whether these activities will effectively achieve quality objectives. (TNI Standard)

BATCH: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one (1) to twenty (20) environmental samples of the same quality systems matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be twenty-four (24) hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a
group. An analytical batch can include prepared samples originating from various quality system matrices and can exceed twenty (20) samples. (TNI Standard)

BIAS: The systematic or persistent distortion of a measurement process, which causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value). (TNI Standard)

BLANK: A sample that has not been exposed to the analyzed sample stream in order to monitorcontamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (TNI Standard)
Blanks include:

Equipment Blank: a sample of analyte free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC 2003)
Field Blank: blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

Instrument Blank: a clean sample (e.g. , distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA_QAD)

Method Blank: a sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analytes. (NELAC 2003)

Reagent Blank: (method reagent blank): a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS).

CALIBRATION: A set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by standards.
1) In calibration of support equipment the values realized by standards are established through the use of reference standards that are traceable to the International System of Units (SI).
2) In calibration according to methods, the values realized by standards are typically established through the use of Reference Materials that are either purchased by the laboratory with a certificate of analysis or purity, or prepared by the laboratory using support equipment that has been calibrated or verified to meet specifications. (TNI Standard)

CALIBRATION CURVE: The mathematical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response.
Calibration Standard: A substance or reference material used for calibration. (TNI Standard)

CALIBRATION STANDARD: a substance or reference material used to calibrate an instrument. (QAMS)

CERTIFIED REFERENCE MATERIAL (CRM): Reference material, accompanied by a certificate, having a value, measurement uncertainty, and stated metrological traceability chain to a national metrology institute. (TNI Standard)

CHAIN OF CUSTODY FORM: Record that documents the possession of the samples from the time of collection to receipt in the laboratory. This record generally includes: the number and types of containers; the mode of collection; the collector; time of collection; preservation; and requested analyses. See also Legal Chain of Custody Protocols. (TNI Standard)

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSTATION AND LIABILITY ACT (CERCLA/SUPERFUND): the enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (ARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites. (NELAC 2003)

CONFIDENTIAL BUSINESS INFORMATION (CBI): information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products.

CONFIRMATION: Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to: second column confirmation, Alternate wavelength, derivatization, Mass spectral interpretation, Alternative detectors, or Additional cleanup procedures. (TNI Standard)

CONFORMANCE: an affirmative indication or judgment that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements (ANSI/ANQC E4-1994)

CONTINUING CALIBRATION BLANK (CCB): A blank that is typically analyzed at the beginning of each analytical batch to verify that the instrument baseline is zero and that the instrument is free of contamination. This is used primarily for metals and wet chemistry analyses.

CONTINUING CALIBRATION VERIFICATION STANDARD (CCVS): A mid-level standard which is analyzed with each analytical batch to verify the initial calibration.

CORRECTIVE ACTION: the action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

DATA AUDIT: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality (i.e., that they meet specified acceptance criteria). (NELAC 2003)

DATA REDUCTION: The process of transforming the number of data items by arithmetic or statistical calculation, standard curves, and concentration factors, and collating them into a more useful form. (TNI Standard)

DEMONSTRATION OF CAPABILITY: A procedure to establish the ability of the analyst to generate analytical results of acceptable accuracy and precision. (TNI Standard)

DETECTION LIMIT: the lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit. (NELAC 2003)

DOCUMENT CONTROL: The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed. (ASQC)

ESTIMATED QUANTITATION LIMIT (EQL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the EQL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample EQLs are highly matrix-dependent. The EQLs in SW-846 are provided for guidance and may not always be achievable. (SW-846 Chapter 1)

EXPERIMENTAL FIELD OF PROFICIENCY TESTING (EXPERIMENTAL FOPT): Analytes for which a laboratory is required to analyze a PT sample if they seek or maintain accreditation for the field of accreditation but for which successful analysis is not required in order to obtain or maintain accreditation. (TNI Standard)

FIELD OF ACCREDITATION: Those matrix, technology/method, and analyte combinations for which the accreditation body offers accreditation. (TNI Standard)

FINDING: An assessment conclusion referenced to a laboratory accreditation standard and supported by objective evidence that identifies a deviation from a laboratory accreditation standard requirement. (TNI Standard)

FIELD DUPLICATES: Independent samples that are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

FIELD MEASUREMENT: The determination of physical, biological, or radiological properties, or chemical constituents; that are measured on-site, close in time and space to the matrices being sampled/measured, following accepted test methods. This testing is performed in the field outside of a fixed-laboratory or outside of an enclosed structure that meets the requirements of a mobile laboratory.

FIELD OF PROFICIENCY TESTING (FOPT): Analytes for which a laboratory is required to successfully analyze a PT sample in order to obtain or maintain accreditation, collectively defined as: matrix, technology/method, analyte. (TNI Standard)

HOLDING TIMES: The maximum time that can elapse between two (2) specified activities.

INITIAL DEMONSTRATION OF CAPABILITY (IDC) / INITIAL DEMONSTRATION OF METHOD PERFORMANCE (IDMP): The IDC/IDMP verifies and demonstrates that the instrument, method, and/or analyst is capable of generating precise and accurate analytical data. It is used to validate new analyst and new instrument performance, and to validate changes in analytical equipment or technique.

INITIAL CALIBRATION VERIFICATION STANDARD (ICVS): An ICVS verifies that the standards used to construct the curve were chemically pure, prepared properly, and that they have not degraded significantly since they were made. The ICVS should be obtained from a different source than that used to prepare the standards for constructing the calibration curve. The concentration of the ICVS should be 10%-50% of the maximum calibration range unless specified otherwise in the method. Ideally, the source is a different manufacturer altogether and the manufacturer predetermines the concentration. This standard does not go through sample preparation.

INTERFERENCE CHECK STANDARD (ICS): A standard that contains interfering elements at high concentrations and other non-interfering elements at trace concentrations to prove that the background correction intervals and inter-element correction factors have been set properly. Used in ICP metals analysis only.

INTERIM ACCREDITATION: temporary accreditation status for a laboratory that has met all accreditation criteria except for a pending on-site assessment which has been delay ed for reasons beyond the control of the laboratory. (NELAC 2003)

INTERNAL STANDARD: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. (TNI Standard)

INTERNATIONAL SYSTEM OF UNITS (SI): the coherent system of units adopted and recommended by the General Conference on Weights and Measures. (CCGPM) (VIM 1.12)

LABORATORY CONTROL SAMPLE (however named, such as laboratory fortified blank, spiked blank, or QC check sample): A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes and taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a reference method. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (TNI Standard)

LEGAL CHAIN OF CUSTODY PROTOCOLS: Procedures employed to record the possession of samples from the time of sampling through the retention time specified by the client or program. These procedures are performed at the special request of the client and include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples by the laboratory. In addition, these protocols document all handling of the samples within the laboratory. (TNI Standard)

LINEAR DYNAMIC RANGE (LDR): The concentration range over which the analytical curve remains linear.

LIMIT(S) OF DETECTION (LOD): A laboratory's estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in their facility. (TNI Standard)

LIMIT(S) OF QUANTITATION (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. (TNI Standard)

MATRIX: The substrate of a test sample. (TNI Standard)

> Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.
>
> Non-Potable Water: any aqueous sample excluded from the definition of Drinking Water matrix. Includes surface water, groundwater, effluents, water treatment chemicals, and TCLP or other extracts.
>
> Solid and Chemical Materials: includes soils, sediments, sludges, products and by-products of an industrial process that results in a matrix not previously defined.
>
> Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
>
> Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC 2003)
>
> Quality System Matrix: These matrix definitions are an expansion of the field of accreditation matrices and shall be used for purposes of batch and quality control requirements :

Aqueous: any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Drinking Water: any aqueous sample that has been designated a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with <15% settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges and other matrices with >15% settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air and Emissions: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbent tube, impinger solution, filter, or other device. (NELAC 2003)

MATRIX DUPLICATE: A replicate matrix prepared in the laboratory and analyzed to obtain a measure of precision. (TNI Standard)

MATRIX SPIKE (SPIKED SAMPLE OR FORTIFIED SAMPLE): A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of target analyte to a specified amount of sample for which an independent test result of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency. (TNI Standard)

MATRIX SPIKE DUPLICATE (SPIKED SAMPLE OR FORTIFIED SAMPLE DUPLICATE): A replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte. (TNI Standard)

MAY: denotes permitted action, but not required action. (NELAC 2003)

MATERIAL SAFETY DATA SHEETS (MSDS): Written information provided by vendors concerning a chemical's toxicity, health hazards, physical properties, fire, and reactivity data including storage, spill, and handling precautions.

MEASUREMENT SYSTEM: A method, as implemented at a particular laboratory, and which includes the equipment used to perform the test and the operator(s).

METHOD: A body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification), systematically presented in the order in which they are to be executed. (TNI Standard)

METHOD DETECTION LIMIT (MDL): one way to establish a Limit of Detection, defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

MOBILE LABORATORY: A portable enclosed structure with necessary and appropriate accommodation and environmental conditions for a laboratory, within which testing is performed by analysts. Examples include but are not limited to trailers, vans, and skid-mounted structures configured to house testing equipment and personnel.

MUST: denotes a requirement that must be met. (Random House College Dictionary)

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST): A federal agency of the US Department of Commerce's Technology Administration that is designed as the United States national metrology institute (NMI). (TNI Standard)

NATIONAL ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM (NELAP): the overall National Environmental Laboratory Accreditation Program of which NELAC is a part. (NELAC 2003)

NEGATIVE CONTROL: measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (NELAC 2003)

ORGANIC-FREE REAGENT WATER: For volatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. Organic-free reagent water may also be prepared by boiling water for 15 minutes and, subsequently, while maintaining the temperature at 90^{o}C, bubbling a contaminant-free inert gas through the water for 1 hour.

For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

POSITIVE CONTROL: measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (NELAC 2003)

PRECISION: The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (TNI Standard)

PRESERVATION: Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis. (TNI Standard)

PRIMARY ACCREDITATION BODY (PRIMARY AB): The accreditation body responsible for assessing a laboratory’s total quality system, on-site assessment, and PT performance tracking for fields of accreditation. (TNI Standard)

PROCEDURE: A specified way to carry out an activity or process. Procedures can be documented or not. (TNI Standard)

PROFICIENCY TESTING: A means of evaluating a laboratory’s performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (TNI Standard)

PROFICIENCY TESTING PROGRAM: The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (TNI Standard)

PROFICIENCY TESTING PROVIDER (PTP): A person or organization accredited by the TNI-approved Proficiency Testing Provider Accreditor to operate a TNI-compliant PT program. (TNI Standard)

PROFICIENCY TESTING PROVIDER ACCREDITOR (PTPA): An organization that is approved by TNI to accredit and monitor the performance of proficiency testing providers. (TNI Standard)

PROFICIENCY TEST SAMPLE (PT): A sample, the composition of which is unknown to the laboratory and is provided to test whether the laboratory can produce analytical results within the specified acceptance criteria. (TNI Standard)

PROFICIENCY TESTING STUDY (PT STUDY): A single complete sequence of circulation of proficiency testing samples to all participants in a proficiency test program. (TNI Standard)

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PROTOCOL: A detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis) which must be strictly followed. (TNI Standard)

PT STUDY CLOSING DATE: The calendar date for which analytical results for a PT sample shall be received by the pt provider from the laboratory. (TNI STANDARD)

PT STUDY OPENING DATE: The calendar date that a PT sample is first made available to any laboratory by a PT provider. (TNI Standard)

QUALITY ASSURANCE: An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client. (TNI Standard)

QUALITY ASSURANCE (PROJECT) PLAN (QAPP): a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EPA-QAD)

QUALITY CONTROL: The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality; also the system of activities and checks used to ensure that measurement systems are maintained within prescribed limits, providing protection against “out of control” conditions and ensuring that the results are of acceptable quality. (TNI Standard)

QUALITY CONTROL SAMPLE: A sample used to assess the performance of all or a portion of the measurement system. One of any number of samples, such as Certified Reference Materials, a quality system matrix fortified by spiking, or actual samples fortified by spiking, intended to demonstrate that a measurement system or activity is in control. (TNI Standard)

QUALITY MANUAL: A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (TNI Standard)

QUALITY SYSTEM: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC) activities. (TNI Standard)

QUALITY SYSTEM MATRIX: These matrix definitions are to be used for purposes of batch and quality control requirements:
Air and Emissions: Whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device.
Aqueous: Any aqueous sample excluded from the definition of Drinking Water or Saline/Estuarine. Includes surface water, ground water effluents, and TCLP or other extracts.
Biological Tissue: Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
Chemical Waste: A product or by-product of an industrial process that results in a matrix not previously defined.
Drinking Water: Any aqueous sample that has been designated a potable or potential potable water source.
Non-Aqueous Liquid: Any organic liquid with <15% settleable solids.
Saline/Estuarine: Any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.
Solids: Includes soils, sediments, sludges and other matrices with >15% settleable solids. (TNI Standard)

RAW DATA: The documentation generated during sampling and analysis. This documentation includes, but is not limited to, field notes, electronic data, magnetic tapes, untabulated sample results, QC sample results, print outs of chromatograms, instrument outputs, and handwritten records. (TNI Standard)

REAGENT GRADE: Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

REAGENT WATER: Water that has been generated by any method which would achieve the performance specifications for ASTM Type II water. For organic analyses, see the definition of organic-free reagent water.

REFERENCE MATERIAL: a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (IS) Guide 30-2.1)

REFERENCE STANDARD: a standard, generally of the highest metrological quality available at a given location, from which measurements made at the location are derived. (VIM-6.08)

REPLICATE ANALYSES: the measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval. (NELAC 2003)

REQUIREMENT: denotes a mandatory specification; often designated by the term "shall". (NELAC 2003)

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA): the enabling legislation under 42 USC 321 *et seq.* (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave", including its generation, transportation, treatment, storage, and disposal. (NELAC 2003)

REFERENCE MATERIAL: Material or substance one or more of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (TNI Standard)

REFERENCE STANDARD: Standard used for the calibration of working measurement standards in a given organization or at a given location. (TNI Standard)

REVOCATION: The total or partial withdrawal of a laboratory's accreditation by an accreditation body. (TNI Standard)

SAFE DRINKING WATER ACT (SDWA): the enabling legislation, 42 USC 300 f *et seq.* (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations. (NELAC)

SAMPLE: Any solution or media introduced into an analytical instrument on which an analysis is performed excluding calibration standards, initials calibration verification check standards, calibration blanks, and continuing calibration verification check standards.

SAMPLING: Activity related to obtaining a representative sample of the object of conformity assessment, according to a procedure. (TNI Standard)

SAMPLE TRACKING: procedures employed to record the possession of the samples from the time of sampling until analysis, reporting, and archiving. These procedures include the use of a Chain of Custody Form that documents the collection, transport, and receipt of compliance samples to the laboratory. In addition, access to the laboratory is limited and controlled to protect the integrity of samples (NELAC 2003)

SELECTIVITY: The ability to analyze, distinguish, and determine a specific analyte or parameter from another component that may be a potential interferent or that may behave similarly to the target analyte or parameter within the measurement system. (TNI Standard)

SENSITIVITY: The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (TNI Standard)

SHALL: denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there be no deviation. This does not prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled. (ANSI)

SHOULD: denotes a guideline or recommendation whenever noncompliance with the specification is permissible (ANSI)

SPIKE: a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery efficiency or for other quality control purposes. (NELAC 2003)

SPLIT SAMPLES: Aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples should be taken for the matrix duplicate analysis. These are usually taken after mixing or compositing and are used to document intra- or inter-laboratory precision.

STANDARD: The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of standard setting and meets the approval requirements of standard adoption organizations procedures and policies. (TNI Standard)

STANDARD ADDITION: The practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences.

STANDARD METHOD: a test method issued by an organization generally recognized as competent to do so.

STANDARD OPERATING PROCEDURES (SOPS): A written document that details the method for an operation, analysis, or action, with thoroughly prescribed techniques and steps. SOPs are officially approved as the methods for performing certain routine or repetitive tasks. (TNI Standard)

STANDARDIZED REFERENCE MATERIAL (SRM): a certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method. (EPA_QAD)

STUDY: This term refers to a PT Study or Supplemental PT Study. (TNI Standard)

SUPPLEMENTAL PROFICIENCY TESTING STUDY (SUPPLEMENTAL PT STUDY): A PT sample that may be from a lot previously released by a PT Provider that meets the requirements for supplemental PT samples given in Volume 3 of this Standard but that does not have a pre-determined opening date and closing date. (TNI Standard)

SURROGATE: a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes. (QAMS)

SUSPENSION: The temporary removal of a laboratory's accreditation for a defined period of time, which shall not exceed six (6) months or the period of accreditation, whichever is longer, in order to allow the laboratory time to correct deficiencies or area of non-conformance with the Standard. (TNI Standard)

TNI PT BOARD: A board consisting of TNI members or affiliates, appointed by the TNI Board of Directors, which is responsible for the successful implementation and operation of the TNI Proficiency Testing Program. The duties of the TNI PT Board are defined in the TNI PT Board Charter. (TNI Standard)

TRACEABILITY: The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project. (TNI Standard)

TRIP BLANK: A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

TECHNOLOGY: A specific arrangement of analytical instruments, detection systems, and/or preparation techniques. (TNI Standard)

VERIFICATION: Confirmation by examination and objective evidence that specified requirements have been met.
NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.
The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record. (TNI Standard)

VALIDATION: the confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

VERIFICATION: confirmation by examination and provision of evidence that specified requirements have been met. (NELAC 2003)

> NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.
>
> The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record.

WORK CELL: a well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented. (NELAC 2003)

WORKING RANGE: the difference between the Limit of Quantitation and the upper limit of measurement system calibration.

SOURCES:

40CFR Part 136 Guidelines Establishing Test Procedures for the Analysis of Pollutants

American Society for Quality Control (ASQC), Definitions of Environmental Quality Assurance Terms, 1996

American National Standards Institute (ANSI), Style Manual for Preparation of Proposed American National Standards, Eighth Edition, March 1991

ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for Radiobioassay Laboratories

ANSI/ASQC E4, 1994

ANSI N42.23-1995, Measurement and Associated Instrument Quality Assurance for

International Standards Organization (ISO) Guides 2, 30, 8402

International Vocabulary of Basic and General Terms in Metrology (VIM): 1984. Issued by BIPM, IEC, ISO, and OIML

International Organization for Standardization (ISO)/IEC and International Organization of Legal Metrology (OIML)

National Institute of Standards and Technology (NIST)

National Environmental Laboratory Accreditation Conference (NELAC), July 2003 Standards

(QAMS), Glossary of Terms of Quality Assurance Terms, 8/31/92 and 12/6/95

Radiobioassay Laboratories International Vocabulary of Basic and General Terms in Metrology (VIM): 1984. Issued by Bureau

Random House College Dictionary

United States Environmental Protection Agency (US EPA) Quality Assurance Management Section

Uniform Federal Policy for Quality Assurance Project Plans (UFP QAPP) March 2005

US EPA Quality Assurance Management Section (QAMS), Glossary of Terms of Quality Assurance Terms, 8/31/92 and 12/6/95

US EPA Quality Assurance Division (QAD)

Webster's New World Dictionary of the American Language

VIM – Draft edition October 2005

TNI Technical Modules, as follows:
Volume 1, Module 3 Quality Systems for Asbestos Testing
Volume 1, Module 4 Quality Systems for Chemical Testing
Volume 1, Module 5 Quality Systems for Microbiological Testing
Volume 1, Module 6 Quality Systems for Radiochemical Testing
Volume 1, Module 7 Quality Systems for Toxicity Testing

21. Use of Accreditation

21.1. The laboratory will display the most recent accreditation certificate.

21.2. The laboratory will ensure that statements made concerning accreditation fields of testing and accreditation status are accurate.

21.3. If the laboratory chooses to use the TNI logo or accrediting authority's name, the phrase "TNI" and the laboratory's accreditation number will be included. This applies to catalogs, advertisements, business solicitations, proposals, quotations and Analytical Reports.

21.4. The laboratories use of TNI certificate, TNI accreditation status and/or TNI logo do not constitute or imply endorsement by the accrediting authority and should never be construed as endorsement by the accrediting authority.

22. References

National Environmental Laboratory Accreditation Conference (NELAC), Quality Systems, Approved July 12, 2002.

"Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", SW-846, Third Edition, July 1992 and it's updates.

"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983.

"Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, Revised July 1982.

"Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992. (This edition is utilized for the analysis of samples requiring compliance with Illinois Drinking Water Laboratory Certificate Program.)

"Standard Methods for the Examination of Water and Wastewater", 19th Edition, 1995.

"Methods for the Determination of Organic Compounds in Drinking Water" EPA/600/4-88/039, July 1991.

"Methods for the Determination of Organic Compounds in Drinking Waters – Supplement II," EPA/600/R-92/29, August 1992.

"Methods or the Determination of Inorganic Substance in Environmental Samples," EPA/600/R-93/100, August 1993.

"Methods or the Determination of Metals in Environmental Samples – Supplement I," EPA/600/R-94-111, May 1994.

"Technical Notes on Drinking Water Methods," EPA-600/R-94-173.

"USEPA Contract Laboratory Program, Statement of Work for Organics Analysis," OLM01.0, Including Rev. OLM01.1 (December 1990) and Rev. OLM01.2 (January 1991).

"Laboratory Data Validation , Functional Guidelines for Evaluating Inorganics Anayses", USEPA, July, 1988.

"Laboratory Data Validation , Functional Guidelines for Evaluating Organics Analyses", USEPA, February, 1988.

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA 600/4-79-019.

"Quality Assurance Principles for Analytical Laboratories", 2nd Ed., 1991.

"Manual for the Certification of Laboratories Analyzing Drinking Water," 4th Edition, March 1997.

"Quality Assurance for Chemical Measurement," John Keenan Taylor, Lewis Publishers Inc., 1987.

NELAC 2003 Standard

"Environmental Analytical Measurement Uncertainty Estimation, Nested Hierarchical Approach", Defense Technical Information Center #ADA396946, 2001. This reference includes the SOP and EXCEL calculator prepared by Defense Technical Information Center to support this document.

"CCIL Protocol for Estimating Measurement Uncertainty Using QC Data (Type A)", Mark Hugdahl, Technical Manager, ALS Environmental (Vancouver), & the CCIL Committee on Measurement Uncertainty, Version 1.0 (June 23, 2003).

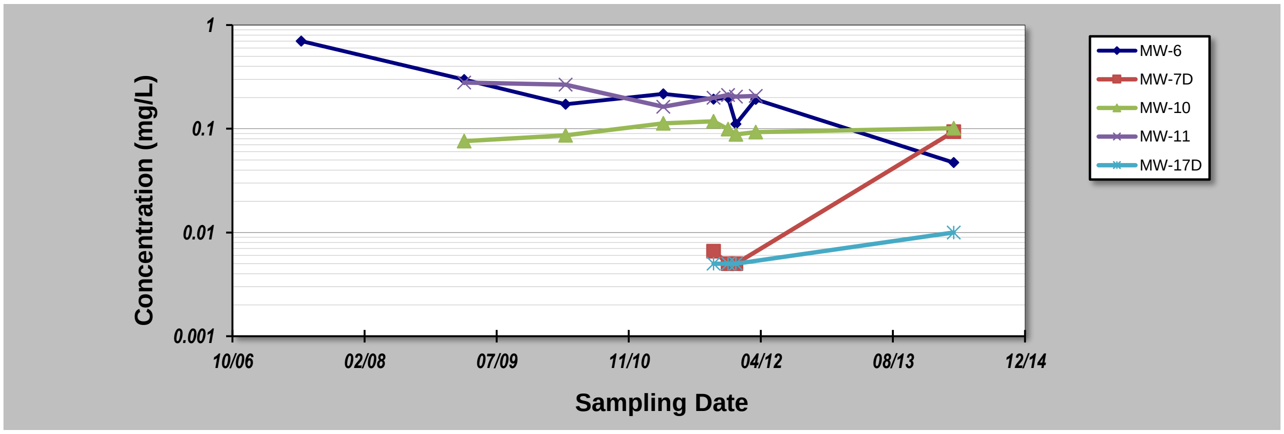
APPENDIX E

MANN-KENDALL ANALYSIS RESULTS

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Dec-16
Facility Name: Birdsong Peanut Plant
Conducted By: LMG
Job ID: R1507990
Constituent: Chromium
Concentration Units: mg/L

Sampling Point ID:		MW-6	MW-7D	MW-10	MW-11	MW-17D		
Sampling Event	**Sampling Date**	**CHROMIUM CONCENTRATION (mg/L)**						
1	6/27/2007	0.701						
2	3/5/2009	0.298		0.076	0.279			
3	3/24/2010	0.172		0.0866	0.266			
4	3/29/2011	0.217		0.113	0.163			
5	10/5/2011	0.193	0.00658	0.118	0.199	0.005		
6	11/29/2011	0.199	0.005	0.099	0.211	0.005		
7	12/29/2011	0.111	0.005	0.0884	0.204	0.005		
8	3/13/2012	0.192		0.0928	0.207			
9	4/16/2013							
10	4/1/2014	0.0472	0.0939	0.101		0.01		
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.79	1.60	0.14	0.18	0.40		
Mann-Kendall Statistic (S):		-24	1	8	-5	3		
Confidence Factor:		99.4%	50.0%	80.1%	71.9%	72.9%		
Concentration Trend:		Decreasing	No Trend	No Trend	Stable	No Trend		



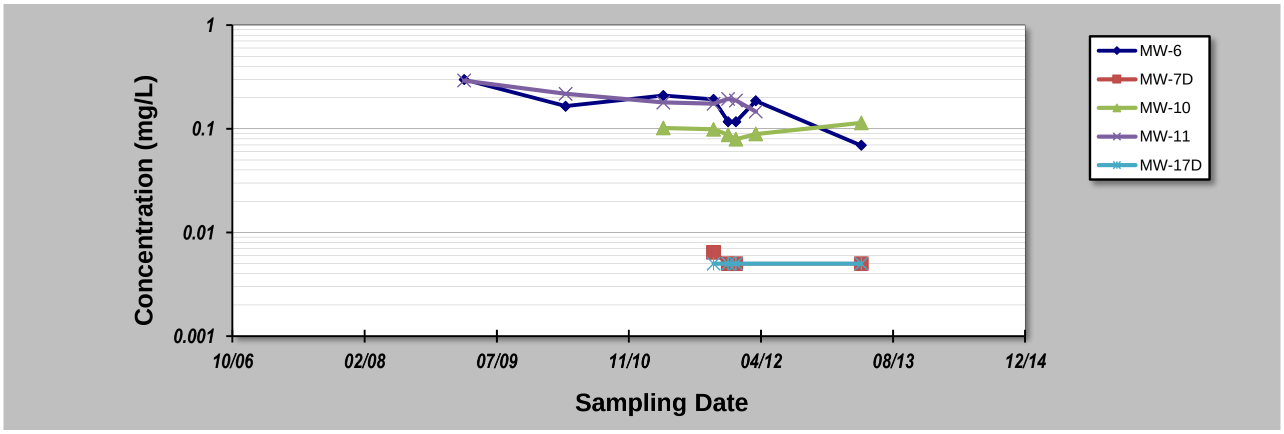
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Dec-16
Facility Name: Birdsong Peanut Plant
Conducted By: LMG
Job ID: R1507990
Constituent: Chromium (dissolved)
Concentration Units: mg/L

Sampling Event	Sampling Date	MW-6	MW-7D	MW-10	MW-11	MW-17D		
		CHROMIUM (DISSOLVED) CONCENTRATION (mg/L)						
1	6/27/2007							
2	3/5/2009	0.298			0.292			
3	3/24/2010	0.165			0.217			
4	3/29/2011	0.209		0.102	0.179			
5	10/5/2011	0.192	0.00642	0.0988	0.174	0.005		
6	11/29/2011	0.117	0.005	0.0875	0.194	0.005		
7	12/29/2011	0.117	0.005	0.0792	0.187	0.005		
8	3/13/2012	0.186		0.0891	0.146			
9	4/16/2013	0.0692	0.005	0.114		0.005		
10	4/1/2014							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.41	0.13	0.13	0.23	0.00		
Mann-Kendall Statistic (S):		-17	-3	-1	-13	0		
Confidence Factor:		97.7%	72.9%	50.0%	96.5%	37.5%		
Concentration Trend:		Decreasing	Stable	Stable	Decreasing	Stable		



Notes:

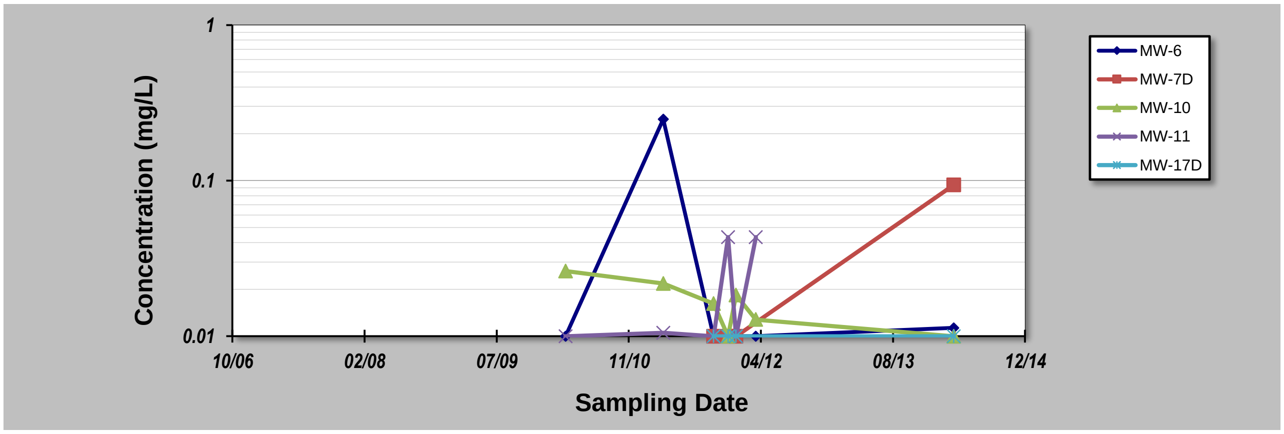
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Dec-16
Facility Name: Birdsong Peanut Plant
Conducted By: LMG

Job ID: R1507990
Constituent: Trivalent Chromium
Concentration Units: mg/L

Sampling Point ID:		MW-6	MW-7D	MW-10	MW-11	MW-17D		
Sampling Event	Sampling Date	TRIVALENT CHROMIUM CONCENTRATION (mg/L)						
1	6/27/2007							
2	3/5/2009							
3	3/24/2010	0.01		0.0262	0.01			
4	3/29/2011	0.248		0.0218	0.0105			
5	10/5/2011	0.01	0.01	0.0162	0.01	0.01		
6	11/29/2011	0.01	0.01	0.01	0.0433	0.01		
7	12/29/2011	0.01	0.01	0.0184	0.01	0.01		
8	3/13/2012	0.01		0.0128	0.0433			
9	4/16/2013							
10	4/1/2014	0.0113	0.0939	0.01		0.01		
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.03	1.35	0.37	0.81	0.00		
Mann-Kendall Statistic (S):		1	3	-14	5	0		
Confidence Factor:		50.0%	72.9%	97.5%	76.5%	37.5%		
Concentration Trend:		No Trend	No Trend	Decreasing	No Trend	Stable		



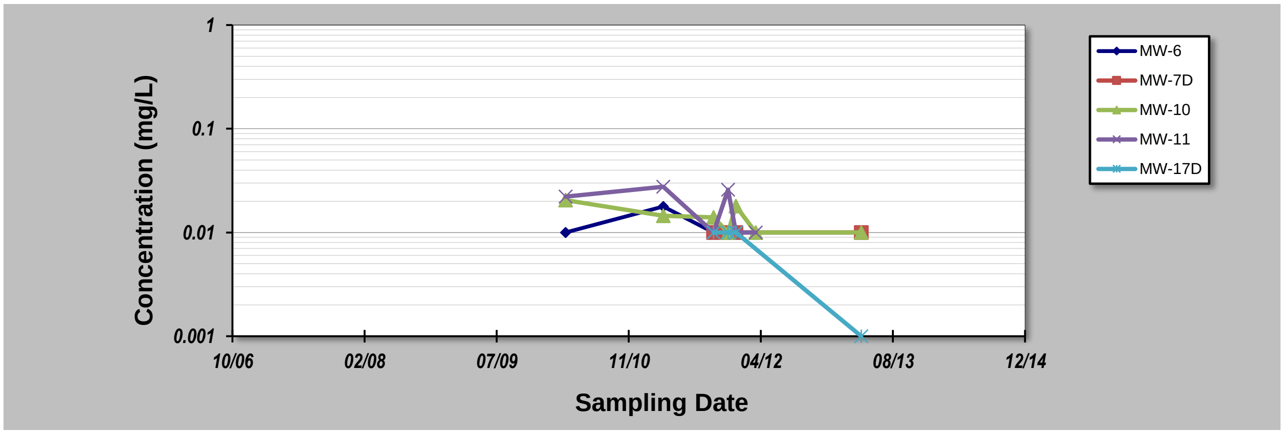
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Dec-16
Facility Name: Birdsong Peanut Plant
Conducted By: LMG
Job ID: R1507990
Constituent: Trivalent Chromium (dissolved)
Concentration Units: mg/L

Sampling Event	Sampling Date	TRIVALENT CHROMIUM (DISSOLVED) CONCENTRATION (mg/L)						
	Sampling Point ID:	MW-6	MW-7D	MW-10	MW-11	MW-17D		
1	6/27/2007							
2	3/5/2009							
3	3/24/2010	0.01		0.0205	0.0222			
4	3/29/2011	0.0178		0.0145	0.0276			
5	10/5/2011	0.01	0.01	0.014	0.01	0.01		
6	11/29/2011	0.01	0.01	0.01	0.0259	0.01		
7	12/29/2011	0.01	0.01	0.018	0.01	0.01		
8	3/13/2012	0.01		0.01	0.01			
9	4/16/2013	0.01	0.01	0.01		0.001		
10	4/1/2014							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	0.27	0.00	0.30	0.48	0.58		
	Mann-Kendall Statistic (S):	-4	0	-12	-6	-3		
	Confidence Factor:	66.7%	37.5%	94.9%	81.5%	72.9%		
	Concentration Trend:	Stable	Stable	Prob. Decreasing	Stable	Stable		



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

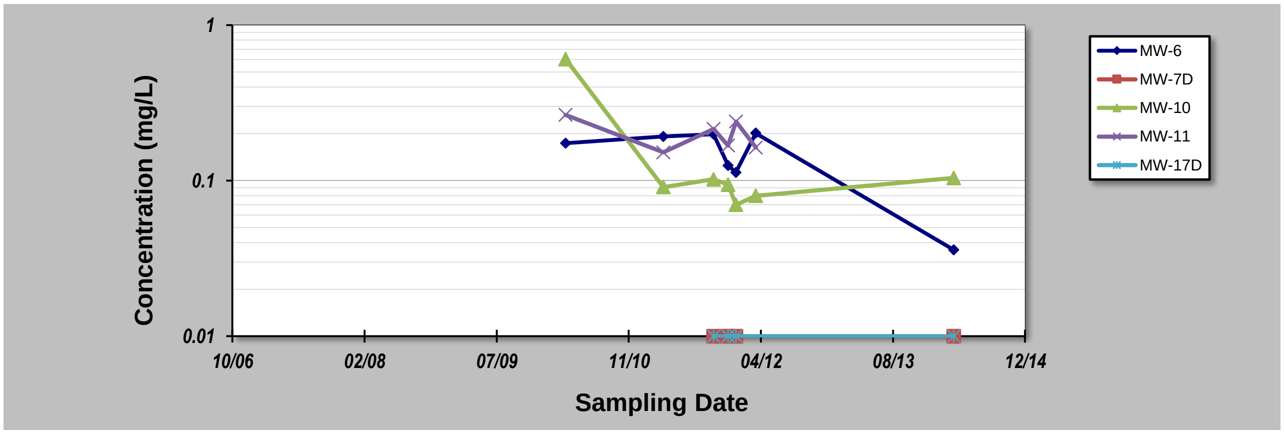
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: 22-Dec-16
Facility Name: Birdsong Peanut Plant
Conducted By: LMG

Job ID: R1507990
Constituent: Hexavalent Chromium
Concentration Units: mg/L

Sampling Point ID:		MW-6	MW-7D	MW-10	MW-11	MW-17D		
Sampling Event	**Sampling Date**	**HEXAVALENT CHROMIUM CONCENTRATION (mg/L)**						
1	6/27/2007							
2	3/5/2009							
3	3/24/2010	0.174		0.605	0.265			
4	3/29/2011	0.192		0.0909	0.152			
5	10/5/2011	0.199	0.01	0.102	0.215	0.01		
6	11/29/2011	0.125	0.01	0.0943	0.168	0.01		
7	12/29/2011	0.113	0.01	0.07	0.24	0.01		
8	3/13/2012	0.202		0.08	0.163			
9	4/16/2013							
10	4/1/2014	0.0359	0.01	0.104		0.01		
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.41	0.00	1.19	0.23	0.00		
Mann-Kendall Statistic (S):		-5	0	-5	-3	0		
Confidence Factor:		71.9%	37.5%	71.9%	64.0%	37.5%		
Concentration Trend:		Stable	Stable	No Trend	Stable	Stable		



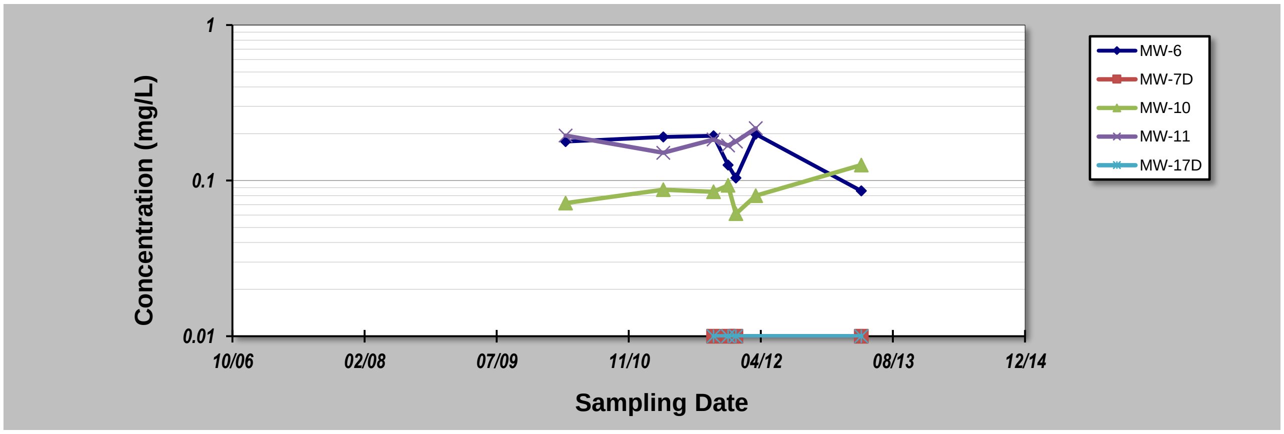
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	22-Dec-16	**Job ID:**	R1507990
Facility Name:	Birdsong Peanut Plant	**Constituent:**	Hexavalent Chromium (dissolved)
Conducted By:	LMG	**Concentration Units:**	mg/L

Sampling Event	**Sampling Date**	**HEXAVALENT CHROMIUM (DISSOLVED) CONCENTRATION (mg/L)**						
Sampling Point ID:		**MW-6**	**MW-7D**	**MW-10**	**MW-11**	**MW-17D**		
1	6/27/2007							
2	3/5/2009							
3	3/24/2010	0.178		0.0718	0.195			
4	3/29/2011	0.191		0.0874	0.151			
5	10/5/2011	0.194	0.01	0.0848	0.184	0.01		
6	11/29/2011	0.126	0.01	0.0932	0.168	0.01		
7	12/29/2011	0.104	0.01	0.0612	0.178	0.01		
8	3/13/2012	0.199		0.08	0.217			
9	4/16/2013	0.0859	0.01	0.126		0.01		
10	4/1/2014							
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.31	0.00	0.24	0.12	0.00		
Mann-Kendall Statistic (S):		-5	0	5	3	0		
Confidence Factor:		71.9%	37.5%	71.9%	64.0%	37.5%		
Concentration Trend:		Stable	Stable	No Trend	No Trend	Stable		



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI Environmental Inc., www.gsi-net.com

APPENDIX F

UNIFORM ENVIRONMENTAL COVENANT

After Recording Return to:
Birdsong Corporation
P.O. Box 565
Colquitt, GA 39837

CROSS-REFERENCE:
Deed Book: _________
Page: ________

Environmental Covenant

This instrument is an Environmental Covenant executed pursuant to the Georgia Uniform Environmental Covenants Act (hereinafter "Act"), O.C.G.A. § 44-16-1, *et seq*. This Environmental Covenant is entered into by Birdsong Corporation, Man Investments Holdings Inc., and the State of Georgia, Department of Natural Resources, Environmental Protection Division (hereinafter "EPD") and subjects the property identified below to the activity and/or use limitations and other requirements and grants such other rights in favor of EPD and Birdsong Corporation as set forth herein.

Fee Simple Owner/Grantor:
Birdsong Corporation
P.O. Box 565
Colquitt, GA 39837

Grantee/Holder with the power to enforce:
Birdsong Corporation
P.O. Box 565
Colquitt, GA 39837

Grantee/Entity with express power to enforce:
State of Georgia
Department of Natural Resources
Environmental Protection Division
2 Martin Luther King Jr. Drive, SE
Suite 1456 East Tower
Atlanta, GA 30334

Persons with Interests other than Fee Simple:
Man Investments Holdings Inc.
452 Fifth Avenue, 27th Floor
New York, NY 10018

Property Subject

The property subject to this Environmental Covenant is the portion of the Birdsong Peanut Plant Facility, located on 608 East Main Street in Colquitt, Miller County, Georgia, and further identified by the tax parcel ID number below (hereinafter

“Property”). This tract was conveyed on March 31, 2000 from Farmers Fertilizer & Milling Co. to Birdsong Corporation recorded in Deed Book 150, Page 133, Miller County Records. The tract is located in Land Lot 152 of the 13th District of Miller County, Georgia. A legal description of the tract is attached as Exhibit A and a map of the tract is attached as Exhibit B.

Tax Parcel ID Number: C014 027000 of Miller County, Georgia

Environmental Covenant Runs with the Land and is Perpetual

Pursuant to O.C. G.A. §§ 44-16-5(a) and 44-16-9(a), this Environmental Covenant shall run with the land and shall be perpetual unless terminated or amended pursuant to terms herein or in accordance with provisions in the Act. Thus, this Environmental Covenant shall be binding upon Birdsong Corporation, Man Investments Holdings Inc., and all successors, assigns and transferees of any interest in the Property or any portion thereof.

Administrative Records

This Environmental Covenant imposes activity and/or use limitations and other requirements on the Property that arise under corrective action performed and/or being performed at the Birdsong Peanut (formerly known as Farmers Fertilizer & Milling Co.) site, Hazardous Site Inventory No. 10710. Records pertaining to this corrective action are available at the following location(s):

Georgia Environmental Protection Division
Response and Remediation Program
2 MLK Jr. Drive, SE, Suite 1054 East Tower
Atlanta, GA 30334
M-F 8:00 AM to 4:30 PM excluding state holidays

Birdsong Corporation
Attn: Linda Helms
P.O. Box 565
Colquitt, GA 39837

The property is part of a site and has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the property owner or the Georgia Environmental Protection Division for further information concerning this Property. This notice is provided in compliance with the Georgia Hazardous Site Response Act.

This Environmental Covenant is required because a release of tetrachloroethene (PCE), chromium, cadmium, and selenium to groundwater occurred on the Property. PCE is a "regulated substance" as defined under the Georgia Hazardous Site Response Act, O.C.G.A. § 12-8-90 *et seq.*, and the rules promulgated thereunder (hereinafter "HSRA" and "Rules", respectively). The Corrective Action consisted of in-situ chemical oxidation, and establishment of institutional controls prohibiting the use or extraction of groundwater at the Property to protect human health and the environment.

Activity and Use Limitations and Other Requirements Arising under Corrective Action

The Property is subject to the following activity and/or use limitations and other requirements arising under the corrective action:

Use Limitations

Real Property

The Property shall be used only for non-residential uses, as defined in Section 391-3-19-.02 of the Rules as of the date of this Environmental Covenant. Any residential use on the Property shall be prohibited. Any activity on the Property that may result in the release or exposure to the regulated substances that were contained as part of the Corrective Action, or create a new exposure pathway, is prohibited.

Groundwater

The use or extraction of groundwater beneath the Property for drinking water or for any other non-remedial purposes shall be prohibited.

Other

N/A

Other Requirements

Periodic Reporting

Annually, by no later than July 30 following the effective date of this Environmental Covenant, the Owner shall submit to EPD an Annual Report in the format attached hereto as Exhibit C stating whether or not the activity and use limitations in this Environmental Covenant are being abided by.

Notice of Limitations and Requirements in Future Conveyances

Each instrument hereafter conveying any interest in the Property (or any portion thereof) shall include a statement that the Property is subject to this Environmental Covenant, a copy of the Environmental Covenant and the location in the Deed Records where this Environmental Covenant is recorded.

Permanent Markers

Permanent markers on each side of the Property shall be installed and maintained that delineate the restricted area as specified in Section 391-3-19-.07(10) of the Rules. Disturbance or removal of such markers is prohibited.

Pursuant to O.C.G.A. § 44-16-6, this Environmental Covenant shall not be construed to authorize a use of the Property that is otherwise prohibited by zoning, ordinance, local law or general law or by a recorded instrument that has priority over this Environmental Covenant.

Rights of Access and Enforcement

Authorized representatives of EPD and/or Birdsong Corporation shall have the right to enter the Property at reasonable times in connection with implementation, compliance and/or enforcement of this Environmental Covenant. This Environmental Covenant shall be enforceable by EPD, Birdsong Corporation and other parties as provided in the Act. Such rights of access and enforcement herein shall not limit EPD's authority under other applicable law.

No Interest in Real Property in EPD

EPD's rights under this Environmental Covenant and the Act shall not be considered an interest in real property.

Recording of Environmental Covenant and Service on Other Persons

Within thirty (30) days after execution of this Environmental Covenant by the Director, Birdsong Corporation shall record the Environmental Covenant in every county in which any portion of the Property is located in accordance with the law governing the recording and priority of interests in real property. Within thirty (30) days after recording of the Environmental Covenant, Birdsong Corporation shall send a stamped copy of the recorded Environmental Covenant to EPD and to each of the following: (1) Birdsong Corporation & Man Investments Holdings Inc., (2) each person holding a recorded interest in the Property; (3) each person in possession of the Property; (4) each municipality, county, consolidated government, or other unit of local government in which the Property is located; and (5) each owner in fee simple whose property abuts the Property.

Representations and Warranties by Grantor

Grantor represents and warrants that:

1) Birdsong Corporation has the authority and power to enter into this Environmental Covenant, to carry out all obligations hereunder and to grant the rights provided herein;

2) Birdsong Corporation is the sole owner of the Property and holds fee simple title;

3) All persons with existing interests other than fee simple in the Property have been identified; the type and status of their interests have been determined; for those interests where the type and/or status make it necessary, the person's agreement to this Environmental Covenant or subordination of the interest has been obtained; and the aforementioned information regarding all interests other than fee simple in the Property has been provided to EPD;

4) This Environmental Covenant does not authorize a use of the Property that is otherwise prohibited by zoning, ordinance, local law or general law or by a recorded instrument that has priority over this Environmental Covenant;

5) This Environmental Covenant does not violate, contravene and/or constitute a breach or default under any agreement, contract, order or instrument to which Grantor is a party or by which Grantor may be bound; and

6) At least thirty (30) days prior to presenting this Environmental Covenant to EPD for execution, a copy of the proposed final text of this Environmental Covenant has been served on Man Investments Holdings Inc.; each person holding a recorded interest in the Property; each person in possession of the Property; each municipality, county, consolidated government, or other unit of local government in which the Property is located; and each owner in fee simple whose property abuts the Property.

Submission of Required Documents and Communications

Documents and communications required by this Environmental Covenant shall be submitted to:

Georgia Environmental Protection Division
Branch Chief
Land Protection Branch
2 Martin Luther King Jr. Drive SE
Suite 1054 East Tower
Atlanta, GA 30334

With a copy to:

Birdsong Corporation
P.O. Box 565
Colquitt, GA 39837

EPD's Environmental Covenants Registry

This Environmental Covenant and any amendment thereto or termination thereof may be included in EPD's registry for environmental covenants.

Severability

Should any provision of this Environmental Covenant be found by a court of competence jurisdiction to be invalid and/or unenforceable in any respect, the remaining provisions shall continue in full force and effect.

Effective Date

This Environmental Covenant shall be effective on the date the fully executed Environmental Covenant is recorded in accordance with O.C.G.A. § 44-16-8(a).

Grantor has caused this Environmental Covenant to be executed pursuant to the Georgia Uniform Environmental Covenants Act on the _____ day of _____________, 20___.

Signed, sealed, and delivered in the presence of:	**For the Grantor:**
Unofficial Witness (*Signature*)	Name of Grantor (*Print*) (Seal)
Unofficial Witness Name (*Print*)	Grantor's Authorized Representative (*Signature*)
	Authorized Representative Name (*Print*)
Unofficial Witness Address (*Print*)	
	Title of Authorized Representative (*Print*)
Notary Public (*Signature*)	
	Dated:________________
My Commission Expires:_______________	(NOTARY SEAL)

Grantee has caused this Environmental Covenant to be executed pursuant to the Georgia Uniform Environmental Covenants Act on the _____ day of _____________, 20___.

Signed, sealed, and delivered in the presence of:	**For the Grantee:**
______________________________ Unofficial Witness (*Signature*)	______________________________ Name of Grantee (*Print*) (Seal)
______________________________ Unofficial Witness Name (*Print*)	______________________________ Grantee's Authorized Representative (*Signature*)
______________________________ ______________________________ Unofficial Witness Address (*Print*)	______________________________ Authorized Representative Name (*Print*)
	______________________________ Title of Authorized Representative (*Print*)
______________________________ Notary Public (*Signature*)	
	Dated:________________
My Commission Expires:_______________	(NOTARY SEAL)

Signed, sealed, and delivered in the presence of:	**For the State of Georgia Environmental Protection Division:**
	(Seal)
______________________________ Unofficial Witness *(Signature)*	______________________________ *(Signature)*
	Richard Dunn
______________________________ Unofficial Witness Name (*Print*)	Director
______________________________	Dated:______________________
______________________________ Unofficial Witness Address (*Print*)	(NOTARY SEAL)
______________________________ Notary Public *(Signature)*	
My Commission Expires:_________________	

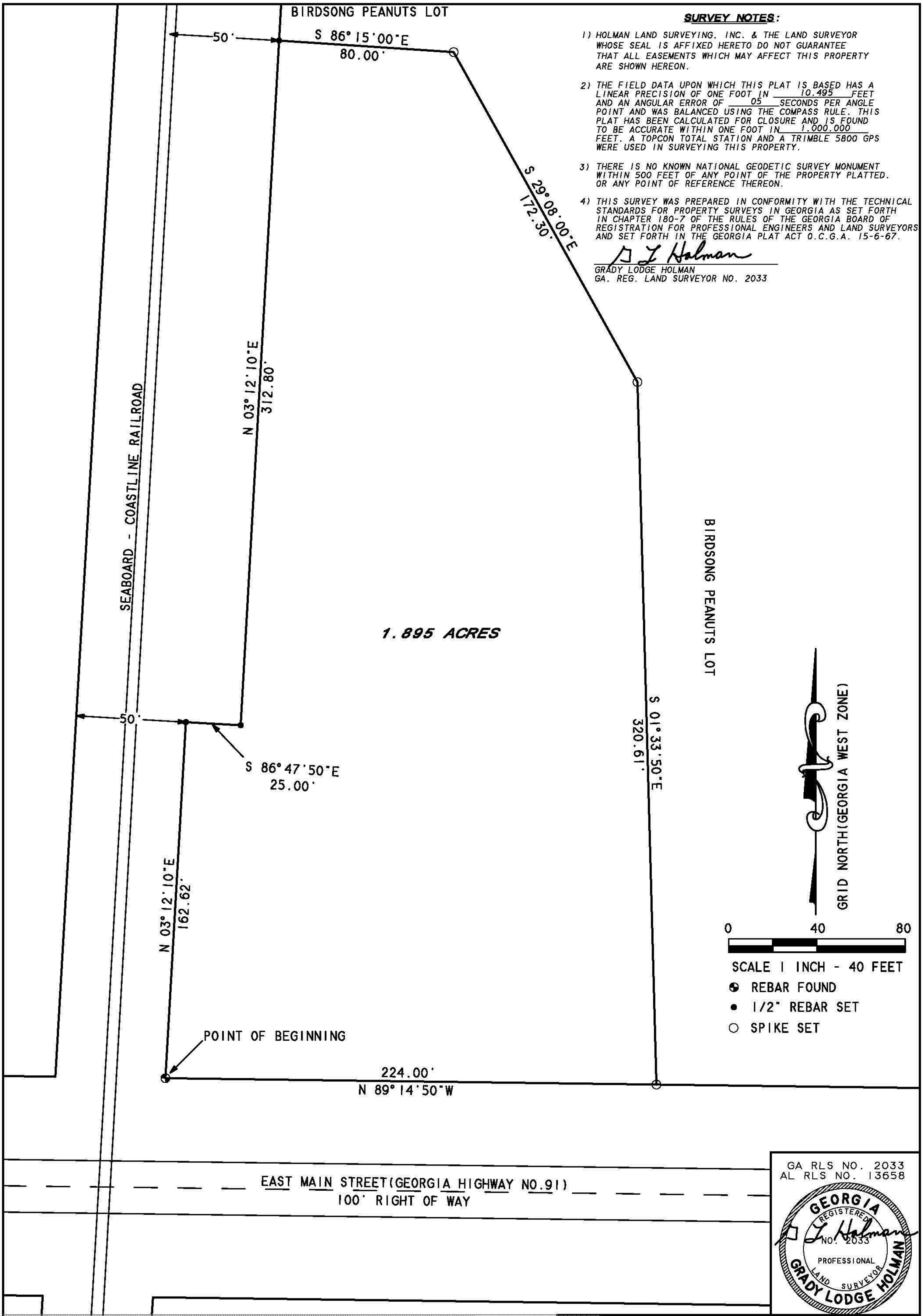
Exhibit A
Legal Description

LEGAL DESCRIPTION

All that tract of land situate, lying and being in Colquitt, Miller County, Georgia and being more particularly described as follows:

Commencing at a 1/2" rebar found at the intersection of the north right of way margin of East Main Street and the east right of way margin of the Seaboard-Coastline Railroad; the POINT OF BEGINNING. Thence North 3 degrees 12 minutes 10 seconds East, along the east right of way margin of the Seaboard-Coastline Railroad, a distance of 162.62 feet to a 1/2" rebar set; thence South 86 degrees 47 minutes 50 seconds East, along the east right of way margin of the Seaboard -Coastline Railroad, a distance of 25.00 feet to a 1/2" rebar set; thence North 3 degrees 12 minutes 10 seconds East, along the east right of way margin of the Seaboard-Coastline Railroad, a distance of 312.80 feet to a 1/2" rebar set; thence South 86 degrees 15 minutes 00 seconds East, a distance of 80.00 feet to a spike set; thence South 29 degrees 08 minutes 00 seconds East, a distance of 172.30 feet to a spike set; thence South 1 degree 33 minutes 50 seconds East, a distance of 320.61 feet to a spike set at the north right of way margin of East Main Street; thence North 89 degrees 14 minutes 50 seconds West, along the north right of way margin of East Main Street, a distance of 224.00 feet to the POINT OF BEGINNING; said described tract containing 1.895 acres, more or less, being located in Land Lot no.152 - 13TH Land District of Colquitt, Miller County, Georgia.

Exhibit B
Map



SURVEY NOTES:

1) HOLMAN LAND SURVEYING, INC. & THE LAND SURVEYOR WHOSE SEAL IS AFFIXED HERETO DO NOT GUARANTEE THAT ALL EASEMENTS WHICH MAY AFFECT THIS PROPERTY ARE SHOWN HEREON.

2) THE FIELD DATA UPON WHICH THIS PLAT IS BASED HAS A LINEAR PRECISION OF ONE FOOT IN 10,495 FEET AND AN ANGULAR ERROR OF 05 SECONDS PER ANGLE POINT AND WAS BALANCED USING THE COMPASS RULE. THIS PLAT HAS BEEN CALCULATED FOR CLOSURE AND IS FOUND TO BE ACCURATE WITHIN ONE FOOT IN 1,000,000 FEET. A TOPCON TOTAL STATION AND A TRIMBLE 5800 GPS WERE USED IN SURVEYING THIS PROPERTY.

3) THERE IS NO KNOWN NATIONAL GEODETIC SURVEY MONUMENT WITHIN 500 FEET OF ANY POINT OF THE PROPERTY PLATTED. OR ANY POINT OF REFERENCE THEREON.

4) THIS SURVEY WAS PREPARED IN CONFORMITY WITH THE TECHNICAL STANDARDS FOR PROPERTY SURVEYS IN GEORGIA AS SET FORTH IN CHAPTER 180-7 OF THE RULES OF THE GEORGIA BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS AND SET FORTH IN THE GEORGIA PLAT ACT O.C.G.A. 15-6-67.

G L Holman

GRADY LODGE HOLMAN
GA. REG. LAND SURVEYOR NO. 2033

SCALE 1 INCH - 40 FEET

- ◉ REBAR FOUND
- ● 1/2" REBAR SET
- ○ SPIKE SET

GA RLS NO. 2033
AL RLS NO. 13658

GRADY LODGE HOLMAN
NO. 2033

G L Holman

SURVEY FOR

BBJ GROUP LLC

LAND LOT NO. 152 - 13TH LAND DISTRICT

COLQUITT, MILLER COUNTY, GEORGIA

DRAWING 083115BJ	DRAWN BY G.L.H	FIELD WORK BY J.T.	SCALE: 1" - 40'	DATE 08-31-2015

HLS

HOLMAN LAND SURVEYING INC.

PROFESSIONAL LAND SURVEYORS

P.O. BOX 790 - 15156 RIVER STREET
BLAKELY, GA. 39823
TEL: 229-723-4040 FAX: 229-723-8477
E-MAIL: LONGSHOT@WINDSTREAM.NET

C:\General CADD 12\Gxd\083115BG.gxd -- 08/31/2015 -- 03:59 PM -- Scale 1 : 480.000