Solutions-IES
Industrial & Environmental Services

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May 8, 2015

Mr. Kim Caulk, P.G.
Inactive Hazardous Sites Branch – REC Program
NCDENR Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

RE: **Work Plan for Additional Assessment Work and Injection Pilot Test**
**Eaton Corporation Former Facility**
**1100 East Preston Street**
**NCDENR Site ID No. NONCD 0002853**
**Solutions-IES Project No. 2013.0014.EATN**

Dear Mr. Caulk,

Solutions-IES, Inc. (SIES), on behalf of Eaton Corporation (Eaton), is submitting this work plan to the REC Program for planned additional assessment activities and injection pilot tests to evaluate approaches to optimize the existing remedial action implemented for groundwater at the former Eaton facility located at 1100 East Preston Street, Selma, NC. The site is currently occupied by Johnston County Industries, Inc. (JCI).

Five areas have been identified by the team where additional work is warranted: (1) delineation of groundwater contamination near MW-1; (2) improving on-going bioactivity in the Phase 1 bioremediation area; (3) optimizing bioactivity in the Phase 2 bioremediation area; (4) delineation of contamination near MW-18; and (5) gaining a clearer understanding of the contaminant concentrations in the overlying silt/clay layer and evaluating a potential remedial approach to treat this material. Below is a summary of our current understanding of relevant conditions in each area and a defined scope of work.

**Proposed Scope**

Delineation of groundwater contamination near MW-1

Groundwater monitoring has shown that volatile organic compound (VOC) concentrations have been steadily increasing in MW-1 since before the implementation of the current bioremediation design. The objectives of this work are to delineate the current extent of the VOC plume in this western portion of the site, possibly identify a reason for the VOC increases seen in MW-1, and develop a plan to remediate impacted groundwater in this area (if needed). Groundwater samples will be collected at six locations (approximately 50 feet [ft] apart) in a line extending from the edge of the Phase 1 bioremediation area to approximately 100 ft west of MW-1 (see **Figure 1** in **Attachment 1**). At each location, continuous Macro-core® samples will be advanced and groundwater samples will be collected at two depths using direct push technology (DPT) sampling equipment: (a) immediately below the interface of the silt/clay layer and the underlying sand aquifer (approximately 7 ft below ground surface [bgs]); and (b) approximately 17 ft bgs, which is equivalent to the mid-depth of the screened interval in MW-1. If the groundwater results

suggest the VOCs present in MW-1 are possibly a result of downgradient migration from the impacted area near MW-2 (Former Oil Storage Building), up to five additional samples will be collected and analyzed to define the extent of impacted groundwater to the north and south of MW-1 (**Figure 1**). If the sampling indicates the VOCs present in MW-1 originate from a previously unidentified source, up to eight additional soil or groundwater samples will be collected and analyzed to identify this source and define its horizontal extent. Collectively, this approach will result in a grid covering this area from which we can interpret both shallow and deeper VOC contaminant profiles. Once the information is gathered, we can either propose the installation of downgradient compliance well or develop a plan to remediate impacted groundwater in this area.

Phase 1 Bioremediation Area

The objective of this work is to develop methods for improving biotransformation of target chlorinated ethenes to non-toxic end-products (ethene and ethane) in the area near MW-2 and MW-16 treated during Phase 1 of the *in situ* bioremediation project. We hypothesize that the slower than anticipated biotransformation observed to date is due to either a nutrient limitation or the presence of an inhibitory compound(s) or conditions in the groundwater. Low-flow groundwater sampling procedures will be utilized to collect groundwater samples from existing injection wells IW-2A and IW-42B. Field parameters will be collected during purging. Groundwater samples will be analyzed for VOCs, methane, ethene, ethane (MEE), sulfate, sulfide, total sulfur, total nitrogen, total phosphorus, volatile fatty acids (VFAs), and important microbial groups and biomarkers (*Dehalococcoides, Dehalobacter, Desulfuromonas,* Sulfate Reducing Bacteria, Total Eubacteria, Methanogens, TCE reductase, BVC reductase, and VC reductase).

Immediately after sampling, one 55-gallon drum of nutrient media containing 25 milligrams per liter (mg/L) ammonium phosphate, 50 mg/L yeast extract and 1 mg/L vitamin B12 will be injected into each well. A request for approval of this injection field test was submitted on May 8, 2015, to the North Carolina Department of Environment and Natural Resources (NCDENR) Underground Injection Control (UIC) Program as required per Part V 2 of permit WI0500657.

At 2 to 3 months after nutrient addition, the two wells will be sampled again for the same analytical parameters to determine if nutrient addition stimulated microbial growth and contaminant biodegradation. If contaminant biodegradation is stimulated, we will develop a plan to amend the groundwater across a wider portion of the Phase 1 area with nutrient supplement. If the nutrient amendment is not successful in stimulating dechlorination, we would then recommend groundwater samples be collected from IW-2A and IW-42B and sent to CB&I in Lawrenceville, NJ for a bench-scale microcosm test to attempt to identify the condition(s) that is inhibiting microbial activity.

Phase 2 Bioremediation Area

In this area, one of three performance monitoring wells has shown evidence of on-going bioactivity. Several reasons are hypothesized for the limited performance observed in the other two wells. The

activities proposed in this area are designed to address these possibilities. The objectives of this work are to: (a) develop methods to more effectively distribute organic substrate and pH buffer already in the aquifer to accelerate biodegradation in areas treated during the Phase 2 of the *in situ* bioremediation project; and (b) determine if nutrient amendments are effective in stimulating complete dechlorination to non-toxic end-products.

To achieve these objectives, a short-term injection test will be conducted in injection wells IW-60A and IW-60B near MW-3. One drum of concentrated nutrient media (see composition described above) will be injected into both IW-60A and IW-60B followed by tap water for approximately 30 hours (hrs). Similar to the Phase 1 process, the NCDENR UIC program has been notified under existing permit WI0500657. The injection flow rate will be set at the maximum rate that does not result in pressure buildup at the land surface (1 to 2 pounds per square inch [psi]). Pressure transducers will be installed in wells MW-3, MW-19, IW-54A, MW-9, MW-17 and MW-16 to record pressure at 15 minute intervals from the start of the test to 2 weeks after to determine the amount of water that can be injected without resulting in excessive pressure buildup in the confined aquifer. A continuously recording pH probe will be installed in MW-3 to monitor breakthrough of the neutral injection water. In addition, MW-3 will be sampled five times during the test for dissolved sulfate, magnesium (from the colloidal buffer initially injected) and total organic carbon (TOC) to evaluate the effectiveness in distributing bioremediation amendments. Assuming this injection occurs prior to the next sampling event at the site (currently scheduled for July 2015), MW-3 will be monitored for dechlorinating microorganisms during this event.

Results of this work will provide the following information: (a) how many gallons of water can be injected per week without causing an excessive rise in water pressure in the confined aquifer; (b) is injecting additional tap water without large amounts of organic substrate or buffer effective in moving the previously injected emulsified vegetable oil (EVO) and buffer ($Mg(OH)_2$) away from the injection point; and (c) is nutrient addition effective in stimulating complete dechlorination. Results from this work will be used to develop a plan to optimize on-going contaminant biodegradation in the Phase 2 bioremediation area.

<u>MW-18</u>

MW-18 was installed as a compliance monitoring well between the treated areas along the storm sewer and Bawdy Swamp Creek. However, rather than providing an unimpacted sentinel location, it has revealed an area of elevated VOC concentrations (possibly approaching DNAPL levels) apart from the original treatment area. The objectives of this work are to: (a) determine the horizontal and vertical extent of the high VOC concentration zone near MW-18; (b) obtain information on subsurface lithology in the bottom of drainage ditch that was the former Bawdy Swamp Creek; and (c) develop a plan to remediate this zone. At seven locations surrounding MW-18 (see **Figure 1**), we will advance membrane interface probe (MIP) borings and record VOC concentrations from the ground surface to 1 to 2 ft into saprolite beneath the sand aquifer (approximately 30 ft bgs). At the depth of the highest MIP concentration in each boring, we will collect one soil sample by Macro-core® and one groundwater sample for analysis of VOCs.

In addition, one continuous core will be collected and logged extending from the bottom of ditch/former Bawdy Swamp Creek to the saprolite to define subsurface lithology in this area. Results from this work will be used to develop a plan to remediate the area surrounding MW-18.

Silt/Clay Layer

The heavily contaminated silt/clay layer overlying the sand aquifer is a continuing source of VOCs to groundwater. Because the seasonal water table varies at the site up to and including ground surface, this layer is considered as part of the groundwater zone and no specific soil remedial action is required. However, treating the silt/clay layer overlying the sand aquifer in certain areas would be a beneficial long-term strategy for the site. SIES has explored numerous approaches to treat the silt/clay layer and believes *in situ* soil mixing offers acceptability, implementability and high possibilities for success. The objective of this work is to treat VOC impacted silt and clay material in a limited area by *in situ* soil mixing and evaluate the cost and performance of this approach for application in other areas of the site.

The first step in implementing the pilot test of *in situ* soil mixing will be to plan and coordinate the relocation of the Former Oil Storage Shed. Once the shed is removed, a grid of MIP points will be installed over a roughly 100 ft x 75 ft area underneath the former shed and the grassed area behind the shed (up to 30 locations to a depth of 10 ft bgs, see **Figure 1**) to define the more highly contaminated area requiring remediation. At five locations, soil samples will be collected and analyzed for VOCs for confirmation of the MIP results, and then pH, TOC, and MEE to serve as a baseline comparison to the eventual remedy to be implemented. One sample will also be analyzed for the suite of microbial groups and biomarkers listed in the Phase 1 Bioremediation Area scope.

Results of this work will be used to define the area to be treated by a field pilot test of *in situ* soil mixing. A work plan will be developed and submitted to the REC Program prior to implementation of the soil mixing field pilot test.

Relative to groundwater, all documents to date have met the milestones identified in the Administrative Agreement and 15A NCAC 13C .0302(l)(1-4). Remediation Party and RSM certifications for this submittal are included in **Attachment 2**.

If you have any questions or need any additional information, please feel free to contact me at (919) 873-1060.

Yours truly,
**Solutions-IES, Inc.**

Jody Overmyer, P.E., PMP®
Project Manager

M. Tony Lieberman, RSM, PMP®
Senior Consultant

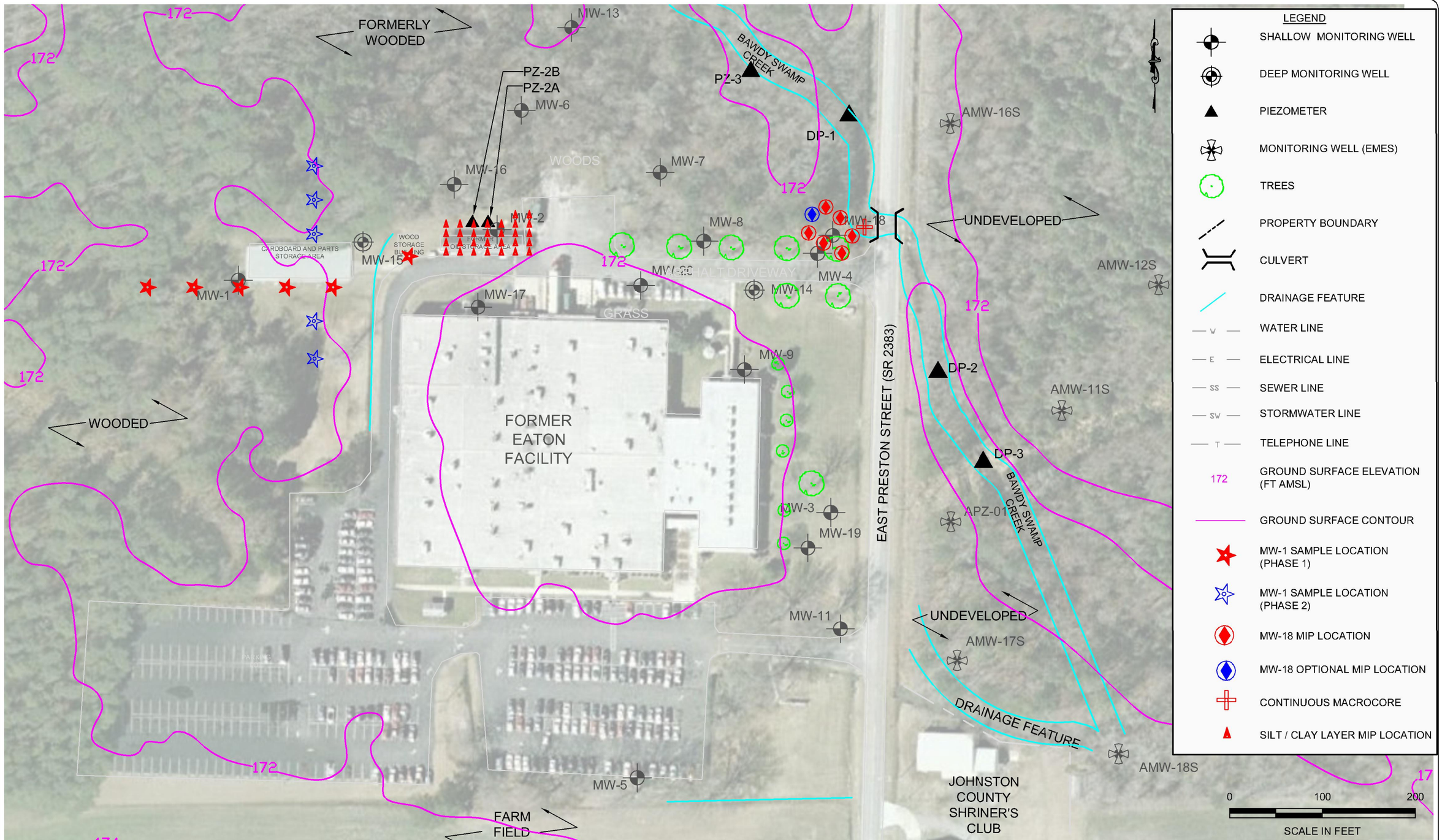
Attachments 1 Figure 1
2 Certification Statements

Electronic cc: Mr. Jeffrey Allen, Eaton, jeffpallen@eaton.com
Ms. Karen Souza, Allegheny Environmental Services, Inc., ksouza_aesi@verizon.net
Mr. Bill Sharek, Johnston County Industries, Inc., bill.sharek@jcindustries.com
Mr. Albert Daniel, NSEW Corporation, albert@baileyfeedmill.com

# ATTACHMENT 1

## FIGURE 1

PROJECT NUMBER 2013.0014.EATN | DRAFTER KTS | CHECKED BY JLO | PROJECT MANAGER JLO | DATE 4/23/2015 | FILE First Annual Post-Injection Report.dwg





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NOTES:
1) MW-1 PHASE 2 SAMPLE LOCATIONS MAY CHANGE BASED ON PHASE 1 RESULTS.

FORMER EATON FACILITY
1100 EAST PRESTON STREET
SELMA, JOHNSTON COUNTY, NC

PROPOSED ASSESSMENT LOCATIONS

FIGURE: 1

# ATTACHMENT 2

## CERTIFICATION STATEMENTS

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2

IHSB SITE NAME NONCD 0002853 Former Eaton Selma

DATE & NAME OF DOCUMENT 5/8/2015 Work Plan for Additional Assessment and Injection Pilot Test

TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

## REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Jeffrey Allen
Name of Remediating Party

Jeffrey Allen
Signature of Remediating Party

5-19-2015
Date

**NOTARIZATION**

Ohio (Enter State)

Cuyahoga **COUNTY**

I, Cathryn Block, a Notary Public of said County and State, do hereby certify that Jeffrey Allen did personally appear and sign before me this day, produced proper identification in the form of drivers license, was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 19th day of May, 2015.

Cathryn Block
Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 11/23/15.

NOTARIAL SEAL STATE OF OHIO

CATHRYN BLOCK
NOTARY PUBLIC
FOR THE
STATE OF OHIO
My Commission Expires
November 23, 2015

*Document Certification Form No. DC - I*
*(Revised 8/11)*

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
IHSB SITE NAME NONCD 0002853 Former Eaton Selma
DATE & NAME OF DOCUMENT 5/8/2015 Work Plan for Additional Assessment and Injection Pilot Test
TYPE OF SUBMITTAL (circle all that apply): Report, (Work plan,) Work Phase Comp. Statement, Schedule Change

## REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

M. Tony Lieberman
Name of Registered Site Manager

M. Tony Lieberman
Signature of Registered Site Manager

Date 5/19/15

## REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

M. TONY LIEBERMAN
Name of Registered Site Manager

M. Tony Lieberman
Signature of Registered Site Manager

Date 5/19/15

**NOTARIZATION**

North Carolina (Enter State)

Wake **COUNTY**

I, Debra Tabron, a Notary Public of said County and State, do hereby certify that M. Tony Lieberman did personally appear and sign before me this day, produced proper identification in the form of Driver's License, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 19th day of May, _____.

Debra A Tabron
Notary Public (signature)

(OFFICIAL SEAL)

DEBRA A. TABRON
Notary Public
Wake County
NORTH CAROLINA

My commission expires: 8.22.15.

*Document Certification Form No. DC - II*
*(Revised 8/11)*