MACTEC

REPORT OF BROWNSFIELD SITE ASSESSMENT
FORMER CAPE FEAR MEAT PACKING PLANT
BRUNSWICK COUNTY
NAVASSA, NORTH CAROLINA

PREPARED FOR:

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ON BEHALF OF

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1.0 INTRODUCTION

This Brownfield Site Assessment (BSA) report was prepared in support of the United States Environmental Protection Agency (US EPA) Region 4 Brownfield's Assessment Grant for the former Cape Fear Meat Packing Plant, located in Navassa, Brunswick County, North Carolina (the Site). This project is initially being funded by the Town of Navassa and has a three-year funding window that began in October 2006 and runs through September 2009. It is the goal of the Town of Navassa to complete as much assessment and reuse planning as possible during the funding window of the grant. The Town of Navassa intends to eventually redevelop the former Cape Fear Meat Packing Plant based on input from local community groups and Brownfield's task force.

MACTEC Engineering and Environmental Services, Inc. (MACTEC) prepared a site-specific Integrated Sampling and Analysis Plan (ISAP), dated January 4, 2008, Revision 0, which was used in conjunction with the Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) prepared for the Site.

This BSA report was prepared on behalf of the Town of Navassa, in accordance with the EPA approved ISAP and QAPP. The information provided herein contains background project information, assessment activities, results of assessment, a preliminary risk evaluation and our conclusions and recommendations.

2.0 BACKGROUND PROJECT INFORMATION

2.1 Purpose

The purpose of this investigation was to determine the type and general distribution of contaminants present on the subject property, and to evaluate the risk and significance of these constituents to human health in pursuing a request for reuse of the Site. Samples from shallow soils, soil borings, and groundwater and were collected for field and laboratory analysis as part of this Assessment.

2.2 History

The former meat packing building was constructed in the early 1900's and the facility has not operated since around 1923. The packing house building had reportedly belonged to the Cape Fear Packing Company. Information regarding the use of chemicals and equipment associated with the operation of the meat packing facility was not available. Historical use prior to the meat packing facility suggests the Wilmington, Charlotte & Rutherford Railroad terminal had previously operated on the property. This railroad terminal was chartered in 1855. Additional information regarding the terminal was not available.

A Phase I Environmental Assessment (ESA) for the former Cape Fear Meat Packing Plant, dated July 31, 2007, conducted by MACTEC indicated the following:

- Based on the available aerial photography since 1938, the Site land use has remained the same from 1938 to 2007, with the exception of areas that appear to have been forested at different time intervals. The existing building is present on the Site in the 1938 aerial photograph. The 1938, 1949, 1956, 1966, 1972, 1981 and 2006 aerial photographs generally depict the Site as it is now. The area to the west of the building has been cleared since the 2006 aerial. Sanborn Maps were not available for the Site. The City Directory for Wilmington for the year 1917 contains a listing for Cape Fear Packing Company, under "meat packers".

- Mayor Eulis Willis, the current Navassa Mayor, stated the meat packing building was constructed in the early 1900's and the facility has not operated since around 1923. The packing house building had reportedly belonged to the Cape Fear Packing Company. Information regarding the use of chemicals and equipment associated with the operation of the meat packing facility was not available. Historical use prior to the meat packing facility suggests the Wilmington, Charlotte & Rutherford Railroad terminal had previously operated on the property. This railroad terminal was chartered in 1855. Additional information regarding the terminal was not available.

- LAW Engineering and Environmental Services, Inc. (LAW), now known as MACTEC, performed a Phase I ESA which was inclusive of the Site in June of 1996. LAW recommended additional assessment of the Site at that time based on the historical use of the Site. We are of the understanding that no additional work was conducted at that time.

2.3 Previous Phase II Assessment Activities

On behalf of D & G Properties of Wilmington, LLC, The Clark Group, Inc. (Clark) had conducted Phase II ESA activities in 2006 and 2007 at the Site. The results of this work were provided to the North Carolina Department of Environment and Natural Resources (NCDENR) under the Division of Waste Management Inactive Hazardous Sites Branch (IHSB) for review. Soil and groundwater sample results collected during this work indicated the presence of regulated constituents in excess of the NCDENR soil and groundwater standards. Copies of the Clark reports and associated laboratory data are presented in Appendix A. A summary of the available data provided to MACTEC is provided below:

2.3.1 Soil Sampling & Analysis

The Clark soil samples were collected for a variety of laboratory analysis from 42 site locations including the former railroad tracks, around the building and near several of the concrete structures. In general, two sample depth intervals were selected for this work which ranged from 1.5 feet to 3.0 feet below ground surface (bgs), and 6.0 feet to 8.0 feet bgs as described below.

2.3.1.1 Soil Sampling – 1.5 to 3.0 feet

Soil sampling and analysis included the following:

- 42 samples were collected from depths ranging from 1.5 feet to 3.0 feet bgs;
- Six (6) samples were analyzed for 8 RCRA metals, 32 additional samples were analyzed for arsenic, four (4) samples were analyzed for poly-nuclear aromatic hydrocarbons (PAHs) and 11 samples were analyzed for total petroleum hydrocarbons (TPH) for gasoline range organics (GRO) and diesel range organics (DRO);

The results of analysis indicated:

- Arsenic was detected in 28 of the 38 soil samples. Arsenic concentrations ranged: from 0.467 milligrams per kilogram (mg/kg) to less than 1 mg/kg in five (5) samples; from 1 mg/kg and 10 mg/kg in 21 samples; and from >10 mg/kg to 18.1 mg/kg in two (2) samples. The metals results for the other 7 RCRA metals indicated sporadic detections in low concentrations.
- No semi-volatile or TPH compounds were detected above the laboratory detection limits, with the exception of sample TW1. The TW1 sample indicated a TPH-DRO concentration of 169 mg/kg. The location of TW1 was not evident on the Clark sample location map provided to MACTEC.

2.3.1.2 Soil Sampling – 6.0 to 8.0 feet

Soil sampling and analysis included the following:

- 15 samples were collected from depths ranging from 6 feet to 8 feet bgs;
- Each of the 15 samples was analyzed for arsenic only.

The results of analysis indicated:

- Arsenic was detected in 14 of the 15 soil samples. Arsenic concentrations ranged: from 0.687 mg/kg to less than 1 mg/kg in three (3) samples; from 1 mg/kg and 10 mg/kg in seven (7) samples; and from >10 mg/kg to 65.5 mg/kg in four (4) samples.

2.3.2 Groundwater Sampling & Analysis

Clark installed three groundwater monitoring wells (MW-1, 2, and 3) and three temporary wells (TMW-1, 2, and 3). The monitoring wells were used to collect filtered and unfiltered volatile organic compounds (VOCs) by Methods 8260/602, semi-volatile organic compounds (SVOCs) by Method 8270/625, herbicides by Method 8151, pesticides by Method 8081 and 8 RCRA metals. The groundwater samples did not indicate the presence of VOCs, SVOCs, herbicides or pesticides. The presence of arsenic, barium, chromium and lead was detected in each sample at concentrations above their respective North Carolina Administrative Code (NCAC) Title 15A Subchapter 2L Groundwater Standards (2L Standards). The results of the filtered metals analysis for groundwater did not indicate the presence of metals.

2.3.3 Summary of Clark and IHSB Correspondence

The following includes correspondence from Clark and the IHSB during this work:

- IHSB - January 3, 2007 letter (review of the Clark May 26, 2006 report):
    - The list of soil and groundwater analyses were incomplete based on the IHSB sampling requirements;
    - Unfiltered samples are not recognized by the IHSB, therefore, low flow sampling was recommended to reevaluate the metals in groundwater; alternatively they would accept the results as 2L Standard violations.
- Clark – Request for Work Plan, February 6, 2007:
    - They will resample groundwater wells using low flow techniques for 13 Priority Pollutant Metals;
    - Additional soil samples will be collected for 13 Priority Pollutant Metals.
- IHSB – February 14, 2007 letter (review of Clark February 6, 2007 document):
    - Pesticides in soil should be evaluated;
    - Surficial soils should be collected for analysis;
    - Soil samples should be collected and analyzed for volatiles by EPA Method 8260;
    - It is unclear if all areas of concern have been adequately identified/investigated. The open vault and concrete vault were noted as examples of potential areas.
- Clark – Notification of Brownfield's Intention and Confirmation of Scope of Work and Response to IHSB Letter dated February 14, 2007, dated April 13, 2007:
    - Monitoring wells have been re-sampled, and are waiting on analytical results;
    - A 50 foot grid is being staked out for additional soil sampling;
    - Surficial soil samples will be collected at suspect source areas;
    - Volatiles will be conducted at suspect source areas;
- Hunton Williams, LLP – Brownfield Letter of Intent, dated April 17, 2007:
    - Request to enter into a Brownfield agreement with the NCDENR.

2.4 Phase I Assessment Activities – by MACTEC

MACTEC performed a Phase I ESA, for the former Cape Fear Meat Packing Plant, which was documented in our Phase I ESA Report, dated July 31, 2007. MACTEC's Phase I ESA identified the following recognized environmental conditions (RECs) at the Site in addition to those identified by the NCDENR:

2.4.1 Summary of Historical Findings

Historical information indicated that the Site was a former railroad terminal on the late 1800's and was later used as a meat packing plant in the early 1900's. Past handling practices and activities associated with these type of operations could have resulted in the release of hazardous or otherwise regulated materials, and therefore, was considered to be a historical REC.

The review of recent environmental soil and groundwater samples collected at the Site by Clark, indicated the presence of subsurface constituents at concentrations in excess of the State and Federal standards.

No RECs were observed during the Site reconnaissance.

2.4.2 Geologic and Topographic Conditions

The Site is situated in the physiographic province of the Lower Atlantic Coastal Plain of North Carolina. The Site is underlain by sand sediments associated with the recent geologic history of the region. Typically in the region, the sandy beds are 10 to 30 feet thick and overlie Cretaceous clayey beds of the Pee Dee Formation. The Pee Dee Formation is described as sand, clayey sand, and clay greenish gray to olive black, massive glauconitic, locally fossilferous and calcareous. Patches of sandy molluscan-mold limestone are found in the upper portion of this formation.

According to the United States Geological Survey (USGS) Topographic Maps 7.5-minute series, Leland, North Carolina Quadrangle, dated 1984, the elevation of the Site and surrounding area is approximately 6 feet above mean sea level. The topographic relief on the site indicates the principal surface drainage is to the east to the adjacent floodplain. The topographic contrast on the eastern portion of the Site is likely due to the deposition of alluvial sediments from the Cape Fear River over time. Groundwater flow in coastal plain sediments is typically a subdued reflection of the topographic conditions in the surrounding area. Therefore, the groundwater in the surficial aquifer beneath the Site likely flows to the east toward the Cape Fear River.

3.0 BROWNFIELD ASSESSMENT ACTIVITIES

The following sections describe the Data Quality Objectives (DQO) and associated field activities for the Brownfield assessment of soil and groundwater at the former Cape Fear Meat Packaging Plant. A site location map has been provided as Figure 1. Figure 2, provides a 2006 aerial photograph of the Site and surrounding areas. Figures 3 and 4 provide a layout of the sampling locations.

3.1 Data Quality Objectives

The data quality objective for this Assessment was to determine the types of contaminants that are present and absent from the Site, and their general distribution. Samples were collected in apparent background areas as well as areas of likely impact. The sample locations were selected based on the findings of the Phase I ESA for the Site and previous assessment information from Clark.

3.2 Site Conditions

The Site consists of an approximately 2-acre rectangular-shaped tract located to the north of Royster Road in Navassa, Brunswick County, North Carolina. The property is bounded to the north, west and south by undeveloped wooded land. Land to the east of the property consists of wetland type flora followed by the Cape Fear River further to the east. The Site can be accessed through a locked gate and dirt road located on the north side of Royster Road. The dirt road runs from Royster Road to the building along the west side. The undergrowth on the Site was cleared prior to field assessment activities.

The Site contains a large five-story masonry building and five surrounding masonry structures that were constructed prior to 1930. General observations indicate that the masonry building is in significant disrepair. Three of the smaller concrete structures contained concrete pits approximately four to six feet below grade. A large concrete slab was also encountered during our field work approximately 0.5 feet below grade near the western portion of the site. This structure had not been identified during previous site activities. The approximate location of these structures is provided in Figure 3.

Two groundwater monitoring wells (MW-1 and MW-2) were observed on the Site. MACTEC is of the understanding that these wells were installed by Clark as part of a preliminary site assessment discussed in Section 2.3. One additional well was observed to the south of the property. Information regarding the use of this monitoring well was not readily available. The presence of above or underground storage tanks, stained or discolored soils or evidence of stressed vegetation, was not observed at the Site. An underground natural gas pipeline is present along the eastern boundary of the Site.

3.3 Soil Assessment

Soil samples were collected from two (2) target intervals. Shallow soil samples were collected from the upper 3 to 12 inches of soil and are designated as SS-1 through SS-28. Deep soil samples were collected from approximately 4.5 to 6.0 feet below ground surface (bgs) at a depth above the existing water table. Deep soil samples are designated as DS-1 through DS-27. The shallow soil samples were collected using stainless-steel hand augering equipment. Deep soil samples were obtained using a hand auger and Direct Push Technology (DPT).

3.3.1 Surficial Soil Sampling Rationale

Evaluation of surficial soil conditions at the Site is important in considering reuse activities as future occupants and users may be directly exposed to shallow soils. As discussed in section 2.3, surficial soil samples were not collected during the Clark assessment. Elevated concentrations of arsenic were detected in the soil samples at depth at certain areas across the Site. Concentrations of PAH and TPH were not detected in these soil samples. In addition, the samples were not tested for pesticides, herbicides and cyanide. Although no specific source areas have been identified, surficial soil sampling was recommended at the Site to assess the presence of contaminants that may have been applied or released to the ground surface from various handling practices.

The rationale for the locations of surficial soil samples was to augment previous data and to assess other potential source areas for releases. Previous data indicated that arsenic was the primary constituent detected across the Site; therefore, the majority of the samples were selected for metals analysis. Since there is limited information on the potential use and handling practices of pesticides, herbicides, cyanide and PCBs, several surficial samples at randomly selected locations were also collected for these analyses. VOC and SVOC analyses were not conducted for the surficial samples; as the Site has not been active since the late 1920's. These compounds, if previously released, would have likely degraded on the surface over the last at least 80 years through volatilization and biodegradation. Sampling and analysis for VOCs and SVOCs, however, was performed for the deeper soil samples discussed in section 3.2.2.

3.3.1.1 Surficial Soil Sample Array

A total of 28 surficial soil samples were collected at the Site (See Figure 3). Two on-site background samples were collected along the western property line of the Site. These locations were selected based on the following available information:

- Historical data – no observed operational activities were apparent in this area;
- Topographic relief – surficial runoff is expected to flow to the east across the Site; and
- Surficial groundwater flow – the expected flow is to the east across the Site toward the Cape Fear River. The background locations along the eastern property boundary were therefore considered upgradient to the former operational activities conducted at the Site.

The remaining sample locations were selected based on existing structures, the approximated location of the former rail road spur and the previous assessment results documented by Clark (See Appendix A).

3.3.1.2 Surficial Soil Sample Depth

Surficial soil sampling was conducted by MACTEC personnel using decontaminated hand augering equipment. Surficial soil samples for this investigation were collected from the upper 3 to 12 inches of soil. Surface soil available for direct human contact is defined by the U.S. Environmental Protection Agency Region IV Office of Technical Services as the top 12 inches of soil (0 to 12 inches below ground surface). Surface vegetation and root material was removed from each sample.

3.3.1.3 Surficial Soil Sample Analysis Selection

Each of the 28 shallow soil samples collected at the Site, were analyzed for TAL metals using Environmental Protection Agency Methods 6010B and 7470A. Ten of these samples were analyzed for pesticides using Environmental Protection Agency method 8151, herbicides using Environmental Protection Agency Method 7470A and cyanide using Environmental Protection Agency method 9012B. In addition, five of the samples were analyzed for polychlorinated biphenyls (PCBs) using Environmental Protection Agency method 8082.

3.3.2 Deep Soil Sampling Rationale

The rationale for the locations of the deeper soil samples was to augment previous data and to assess other potential source areas for releases. The majority of the previous (Clark) data was obtained from soil samples at three (3) and eight (8) feet bgs across the Site; and arsenic was the primary constituent detected. Some of the borings were located to confirm the elevated arsenic levels previously detected, and also to assess these soils for additional compounds that were not previously tested. Arsenic as a component of historically used rodenticides was considered. Pesticides, herbicides and PCBs analyses were not analyzed for these soils across the Site, based on the lack of data that would suggest these compounds were previously buried.

3.3.2.1 Deep Soil Sample Array

A total of eleven deep soil samples were collected at the Site (See Figure 3). Two background samples were collected along the western property line of the Site. The remaining sample locations were selected based on existing structures, the approximated location of the former rail road spur and the previous assessment results documented by Clark (See Appendix C).

3.3.2.2 Deep Soil Sample Depth

Deep soil sampling was conducted using a Geoprobe® drilling machine. Deep soil samples for this investigation were collected from the sample interval of 4.5 to 6.0 feet bgs.

3.3.2.3 Deep Soil Sample Analysis Selection

With the exception of the two background samples, the remaining nine (9) samples were analyzed for TAL metals using EPA Methods 6010B and 7470A, TCL, VOCs using EPA Method 8260B, TCL SVOCs using EPA Method 8270C, and cyanide using EPA method 9012B. The background samples were sampled for TAL metals and cyanide only.

3.3.3 Soil Sampling Activities

Soil boring/sampling activities were conducted at the Site from November 6 thru 10, 2008.

3.3.31 Soil Sampling Methods

The surficial soil borings were advanced by MACTEC personnel using stainless steel hand augering equipment. Prior to boring advancement, the augering equipment was decontaminated in accordance with the procedures described in the ISAP. The surficial soil samples were collected from the upper 3 to 12 inches of material.

The DPT soil sampling was conducted using a Geoprobe® drilling machine. DPT drilling was performed by Carolina Drilling, Inc., a North Carolina registered well driller under the supervision of MACTEC personnel. Deep soil samples were collected using a four feet long solid barrel push device called a Macro-Core® Sampler assembled with a dedicated clean polyvinyl chloride (PVC) liner. Each boring was continuously sampled from ground surface by driving the sampler one sample interval (approximately four feet) into the subsurface and then retrieving the device. The recovered sample core was visually inspected for evidence of potential contamination and classified in the field. Deep soil samples were collected from the sample interval of 4.5 to 6.0 feet bgs.

3.3.3.2 Soil Sample Collection

Soil samples were collected for analysis on November 6 and 7, 2008. Sample collection was conducted in accordance with EPA's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) guidance document, dated November 2001, and our ISAP (MACTEC 2008). Sampling equipment that contacted potentially contaminated media were cleaned before the subsequent use of that device.

Surface vegetation and root material was removed from the ground surface for the shallow soil samples collected. Soil samples for volatile analysis were not composited, but placed directly in laboratory prepared containers in accordance with SW-846 Method 5035. Soil for the composited samples were placed into a decontaminated, stainless steel pan or bowl and mixed to assure a homogenous sample prior to placing the material into laboratory provided sample containers. Geoprobe® DPT is capable of recovering a core of at least two inches in diameter within a plastic sleeve. Core samples were removed from the plastic sleeves and prepared for description and sampling.

Upon collection, the samples were placed into laboratory prepared sample containers, which were immediately placed into coolers filled with bagged ice. These samples were then shipped overnight to Environmental Science Corporation, Inc (ESC). ESC is a North Carolina certified laboratory (# ENV375/DW21704) located in Mount Juliet, Tennessee. Chain-of-custody records and request for analysis were maintained throughout the sample collection and transportation process. A duplicate soil sample (Dulpicate-1) was collected at DS-14 for quality assurance and quality control (QA/QC) purposes.

3.4 Groundwater Assessment

Groundwater samples were collected from two existing monitoring wells (MW-1 and MW-2) and five additional monitoring wells (TMW-4, TMW-5, TMW-6, TMW-7 and TMW-8) that were installed by MACTEC during this assessment. Monitoring well locations are shown on Figures 3 and 4.

3.4.1 Groundwater Monitoring Well Installation

On November 6, 2008, MACTEC advanced five soil borings and subsequently installed five groundwater monitoring wells (TMW-4 through TMW-8) in accordance with the US EPA approved ISAP and QAPP procedures (MACTEC 2008). The locations of the five soil borings/wells are shown on Figures 3 and 4.

The monitoring well installation was performed by Carolina Drilling, Inc., a North Carolina registered well driller, in accordance with North Carolina Well Standards, as specified within Title 15A of the NCAC, Chapter 2, Subchapter 2C (15A MW 2C). A description of the materials encountered within each borehole was recorded in a field logbook. Boring log records are attached in Appendix B.

Two of the monitoring wells (TMW-4 and TMW-5) were installed on the western portion of the property to establish background water quality conditions. TMW-6 was installed on the southern portion of the former railroad spur, south of existing monitoring well MW-1. TMW-7 was installed on the east side of the main building south of existing monitoring well MW-2. MACTEC was unable to locate existing monitoring well MW-3, which was formerly located next to the concrete structure that exists northeast of the main building. TMW-8 was installed to replace MW-3, but was relocated to the west side of the concrete structure due to an existing natural gas line that runs along the east boundary of the Site.

The monitoring wells were installed in the approximate two-inch diameter borehole created by the direct push device. Each well was constructed with a five-foot length of 1-inch inner diameter (ID) PVC 0.01-inch slot well screen flush-threaded to the appropriate length of 1-inch ID PVC rise pipe. The screen and casing were lowered into the open borehole. A sand pack was placed around the screen and extended approximately one to two feet above the top of screen. A one-foot thick, bentonite seal was placed over the sand pack, and the remaining borehole annulus was grouted in place. A locking cap was used to seal each well head and a steel protective well cover was installed around the well riser pipe. Well construction records are attached in Appendix B.

3.4.2 Groundwater Monitoring Well Development, Purging and Sampling

On November 7, 2008 water levels were measured in monitoring wells MW-1, MW-2, and TMW-4 through TMW-8 using an electronic interface probe. The probe is capable of detecting both water and free product. Measurements were recorded to the nearest 0.01-foot. Groundwater levels were obtained in each well to determine the groundwater flow direction. Water levels were measured from top of casing. Top of casing and ground surface was surveyed at each well to determine elevations (See Table 1).

The wells were then developed using a low flow peristaltic pump and dedicated Teflon® tubing at each well to extract groundwater. The Teflon® discharge tubing was connected to a Horiba U-22 meter to record pH, conductivity, and temperature during development. In addition a Hach-2100P Tubidimeter was used to record turbidity during development. The Horiba and Hach unit were calibrated prior to use according to procedures contained in their instruction manuals. The field readings were used to evaluate the stabilization of the ground water flowing into the well during the development process. Well development was performed in accordance with the US EPA approved ISAP and QAPP.

On November 10, 2008, the wells were purged and sampled using a low flow peristaltic pump and dedicated Teflon® tubing. Field pH, conductivity, temperature and turbidity were collected from each well during the purging process and at the time of sampling. The pumping rate was adjusted in the field to minimize turbulence in the samples, thus minimizing agitation and potential for loss of volatile constituents. A summary of the field readings is presented in Table 2. The field sampling reports are attached in Appendix C.

Upon collection, the samples were placed into laboratory prepared sample containers, which were then immediately placed into coolers filled with bagged ice. These samples were then shipped overnight to ESC for laboratory analysis. One equipment rinsate sample, one duplicate groundwater sample, one field blank sample, and a laboratory prepared trip blank sample was obtained for groundwater QA/QC purposes. The duplicate sample (Duplicate-2) was collected at monitoring well MW-2 and the field blank sample (Field Blank-1) was collected in the vicinity of TMW-7.

3.4.3 Groundwater Sample Analysis

Groundwater samples and QA/QC samples were collected into laboratory prepared containers for their respective analyses, placed into a cooler filled with bagged ice and shipped via FedEx to ESC for laboratory analysis. The laboratory analyses, with the exception of the trip blank sample, include the following:

1. TAL metals using EPA Methods 6010B and 7470A;
2. TCL Volatile organics using EPA Method 8260B;
3. Herbicides and pesticides using EPA methods 8151 and 8081A, respectively;
4. Polychlorinated biphenyls (PCBs) using EPA method 8082;

5. TCL Semi-volatiles organics using EPA Method 8270C; and
6. Cyanide using EPA method 9012B

The trip blank samples were analyzed for VOCs, only. Chain-of-custody records and request for analyses were maintained throughout the sample collection and shipment process.

4.0 ASSESSMENT RESULTS

The following provides a discussion of the results for the soil and groundwater sampling conducted, as discussed in Section 3.0.

4.1 Subsurface Conditions

Observations of subsurface conditions were derived from 28 shallow soil borings and 11 deeper soil borings. The locations of these borings are shown on Figure 3.

The materials encountered within the 28 shallow soil borings consisted predominantly of brown fine to medium sand and silty sand, containing organics, gravel and clay of varying quantities, to a depth of 1.0 feet bgs. The organics generally consisted of root matter.

The materials encountered within the 11 deeper soil borings consisted generally of white to light gray clay, with varying quantities to red to orange mottling. Some reddish-yellow to brown, silty to clayey fine sand was observed in four borings (DS-7, DS-21, DS-22, and DS-27) at depths of 4.0 to 6.5 feet bgs.

4.2 Soil Laboratory Analytical Results

The following sections detail the results of the laboratory analysis of soil samples collected at the Site. Table 3 provides a summary of the detected analytical results for the 28 surficial and 11 deep soil samples, and related QA/QC samples. Copies of the original laboratory reports and related chain-of-custody records for this work are presented in Appendix D.

The detected soil data was compared to screening criteria in order to identify constituents of potential concern (COPC) to human health. The screening values used included:

- The current USEPA Region 4 Risk Assessment Guidelines - September 2008 Oakridge National Laboratories Regional Screening Levels (ORNL RSLs) for Residential and Industrial Soil; and
- The 2008 IHSB Soil Remediation Goals (RGs).

The 2004 Region 9 Preliminary Remediation Goals (PRGs) guidelines for soil were used in the QAPP for the Site and were previously used to identify constituents of concern under Region 4 Risk Assessment Guidelines. However, the PRGs have been replaced by the ORNL RSLs in 2008. As noted in Table 3, the ORNL RSLs denoted by "N" have been multiplied by 0.1. The RGs and RSLs for carcinogenic compounds (denoted by a C) are based on a target risk of 1×10^{-6}.

4.2.1 TAL Metal Compounds

As shown on Table 3, the TAL metals analysis indicated the presence of 23 compounds in the majority of soil samples collected. From the 39 samples collected by MACTEC, the analytical data indicated that sample results for aluminum (6), antimony (1), arsenic (34), cobalt (3), iron (7), lead (2) and vanadium (2) were detected at concentrations in excess of the residential RSLs. The distribution of the metals detected in excess of the residential RSLs is illustrated on Figure 4.

As shown on Figure 4, arsenic was the most prevalent compound in excess of the RSLs, which was also consistent with the findings from the previous Clark assessments. A generally even distribution of arsenic in the surficial soils was observed across the site with concentrations ranging from non-detect (<1.1 mg/kg) to 6.9 mg/kg. As shown in Table 3, arsenic residential and industrial RSLs, and the RG values include; 0.39 mg/kg (residential), 1.6 mg/kg (industrial) and 4.4 mg/kg, respectively. The arsenic results indicated 34 samples were found above the residential RSLs; 15 samples were found above the industrial RSLs; and three (3) samples were found above the RGs. The remaining metals detected in excess of the residential RSLs were found randomly across the study area.

4.2.2 Volatile Organic Compounds (VOCs)

Acetone was detected in one of nine samples (DS-7) at an estimated concentration of 0.055 mg/kg, which is well below the RSLs and RGs. No additional VOCs were detected in the soil samples collected. The results for QA/QC samples did not indicate detectable concentrations of VOCs above the laboratory detection limits.

4.2.3 Herbicide and Pesticide Compounds

Two pesticide compounds, endosulfan I and methoxychlor, were detected in sample SS-6. Endosulfan I was detected at an estimated concentration of 0.0042 mg/kg, which is below the 37 mg/kg residential RSL. Methoxychlor was detected at an estimated concentration of 0.02 mg/kg, which is below the 31 mg/kg residential RSL. No additional herbicide or pesticide compounds were detected in the soil samples collected. The results for QA/QC samples did not indicate detectable concentrations of herbicide or pesticide compounds above the laboratory detection limits.

4.2.4 PCB Compounds

PCB compounds were not detected in the soil samples collected. The results for QA/QC samples did not indicate detectable concentrations of PCB compounds above the laboratory detection limits.

4.2.5 Semi-Volatile Organic Compounds

Six SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, fluoranthene, phenanthrene, and pyrene were detected in the 4.5 to 6.0 feet sample DS-27. Benzo(a)pyrene was detected at an estimated concentration of 0.035 mg/kg, which exceeds the 0.015 mg/kg residential RSL. The remaining SVOCs detected in sample DS-27 were below their respective RSLs and RGs. No additional SVOCs were detected in the soil samples collected. The results for QA/QC samples did not indicate detectable concentrations of SVOCs above the laboratory detection limits.

4.2.6 Cyanide

Cyanide was not detected in the soil samples collected. The results for QA/QC samples did not indicate detectable concentrations of cyanide above the laboratory detection limits.

4.3 Groundwater Flow Conditions

As shown on the attached Table 1, groundwater levels measured in each of the wells were used to calculate respective groundwater elevations. These data were then used to develop an interpreted potentiometric surface map of the shallow aquifer, as shown in Figure 4. The average hydraulic gradient of the shallow aquifer is approximately 0.006 feet per foot and slopes towards the east in the general direction of the adjacent Cape Fear River.

4.4 Groundwater Field Analytical Results

Field analysis results of groundwater at the time of sampling indicated the following: pH concentrations ranged from 4.47 standard units (s.u.) in sample MW-1 to 6.60 s.u. in sample MW-2; specific conductivity concentrations ranged from 0.023 milliSiemens per centimeter (mS/cm) in sample TMW-4 to 0.114 mS/cm in sample MW-2; and, temperature ranged from 17.5 degrees Celsius (°C) in sample MW-2 to 21.3 °C in sample MW-1. Turbidity measurements indicated a range of 0.25 nephelometric turbidity units (NTUs) in sample TMW-4 to 8.65 NTU in sample MW-2. A summary of the field data is presented in Table 2. The field sampling reports are attached in Appendix C.

4.5 Groundwater Laboratory Analytical Results

The following sections detail the results of the laboratory analysis of the groundwater samples collected from the two existing groundwater monitoring wells and five additional monitoring wells that were installed by MACTEC during this assessment. Table 4 provides a summary of the detected analytical results for the seven groundwater samples, and related QA/QC samples. Copies of the original laboratory reports and related chain-of-custody records for this work are presented in Appendix D.

As shown on Table 4, the groundwater data was compared to screening criteria in order to identify constituents of potential concern (COPC) to human health. The screening values used included:

- The September 2008 ORNL RSLs for Tapwater; and
- The NCDENR NCAC Title 15A Subchapter 2L Groundwater Standards (2L Standards).

4.5.1 TAL Metal Compounds

Fourteen TAL metal compounds were detected in the groundwater samples collected. Three of these metals, iron, manganese, and silver, were detected at concentrations in excess of the 2L Standard and or the RSLs. Iron was detected in six samples ranging from a concentration of 0.51 mg/L in TMW-7 to 5.3 mg/L in TMW-5, which exceeded the 0.3 mg/L 2L Standard. Manganese was detected at a concentration of 0.076 mg/L in TMW-6 and 0.1 mg/L in TMW-5, which exceeded the 0.05 mg/l 2L Standard. Silver was detected at a concentration of 0.053 mg/L in TMW-7, which exceeded the 0.0175 mg/L 2L Standard.

The results for duplicate sample Duplicate-2 were comparable to the results from MW-2. The remaining QA/QC samples did not indicate detectable concentrations of metals above the 2L Standards and EPA MCLs.

4.5.2 Volatile Organic Compounds

VOCs were not detected in the groundwater samples collected. Chloroform was detected in Trip Blank-1 at an estimated concentration of 0.00049 mg/L, which is below the 0.07 mg/L 2L Standard. Toluene was detected in Trip Blank-2 at an estimated concentration of 0.00031 mg/L, which is below the 1.0 mg/L 2L Standard. The remaining QA/QC samples did not indicate detectable concentrations of VOCs above the laboratory detection limits.

4.5.3 Herbicide and Pesticide Compounds

Herbicide and pesticide compounds were not detected in the groundwater samples collected. The results for QA/QC samples did not indicate detectable concentrations of herbicide and pesticide compounds above the laboratory detection limits.

4.5.4 PCB Compounds

PCB compounds were not detected in the groundwater samples collected. The results for QA/QC samples did not indicate detectable concentrations of PCB compounds above the laboratory detection limits.

4.5.5 Semi-Volatile Organic Compounds

SVOCs were not detected in the groundwater samples collected. The results for QA/QC samples did not indicate detectable concentrations of SVOC compounds above the laboratory detection limits.

4.5.6 Cyanide

Cyanide was not detected in the groundwater samples collected. Cyanide was detected in duplicate sample Duplicate-1 at an estimated concentration of 0.0014 µg/L, which is below the 0.07 µg/L 2L Standard. The remaining QA/QC samples did not indicate detectable concentrations of Cyanide above the laboratory detection limits.

5.0 PRELIMINARY RISK EVALUATION

The data presented in the previous sections were used to develop this discussion of a preliminary risk evaluation of the Former Cape Fear Meat Packing facility. The Site may be revitalized as a community welcome center and for use as a public green space. This preliminary evaluation takes into account the potential human exposure to the detected constituents. The following provides a discussion of our findings.

5.1 Potential Receptors

Currently the site is inactive, however, if renovated for use as a community welcome center, potential receptors would include site visitors (adults and children), visitor center workers, and landscapers/maintenance workers. These receptors may be exposed to surface soils via dermal contact, incidental ingestion, and inhalation of fugitive dust. It is unlikely that these receptors would be exposed to shallow groundwater because there are other sources of potable water nearby, including the Cape Fear River. During construction and/or renovation of the facility, construction workers may be exposed to shallow soils via dermal contact, incidental ingestion, and inhalation of fugitive dust. Because groundwater is shallow (5 to 15 feet bgs), construction workers may come into contact with groundwater during subsurface activities and be exposed via incidental ingestion and dermal contact.

5.2 Potential Constituents of Concern

The soil and groundwater data for the Navassa site has been reviewed and compared to screening criteria in order to identify potential constituents of concern to human health. The review was completed under current USEPA Region 4 risk assessment guidelines using multiple risk-based screening levels:

- USEPA September 2008 ORNL RSLs for Residential Soil and Tapwater – this is the current source for screening levels at Region 4; and

- IHSB Soil RGs and 2L Groundwater Standards for the State of North Carolina.

In accordance with the Region 4 human health risk assessment bulletins, non-carcinogenic risk-based goals have been revised to address additive effects. The North Carolina RGs for "N" compounds are the Region 9 PRGs multiplied by 0.2. The ORNL RSLs denoted by "N" have been multiplied by 0.1. The RGs and RSLs for carcinogenic compounds (denoted by a C) are based on a target risk of 1×10^{-6}.

Table 5 provides a list of constituents that exceed either the IHSB Soil Remediation Goals or RGs or the ORNL RSLs for residential soil. The highest reported concentrations for arsenic, iron, vanadium, and benzo(a)pyrene are greater than North Carolina's IHSB Soil RGs. In addition, the highest reported concentrations for aluminum, antimony, arsenic, cobalt, iron, vanadium, and benzo(a)pyrene exceed the ORNL residential soil RSLs. The soil screening values are based on residential exposures and are a conservative approach to identify potential constituents of concern in near surface soils.

Table 6 provides a list of constituents that exceed North Carolina 2L standards and the ORNL Tapwater RSLs. The maximum reported concentrations of iron, manganese, and silver exceed the North Carolina 2L standards. The maximum reported concentrations of arsenic, iron, manganese, and silver exceed the ORNL tapwater RSLs. These screening values are based on residential exposure to water and are conservative indicators of potential risk for future site receptors for groundwater exposures.

6.0 CONCLUSIONS

On the basis of the data presented in the previous sections, MACTEC has developed the following conclusions regarding the Site:

6.1 Soil Evaluation

Several constituents in soil exceed risk-based screening levels for soils, and were therefore identified as COPCs for the planned use of the Site. Arsenic was the most prevalent compound in excess of the RSLs, which was consistent with the findings from both the previous Clark assessments and the recent MACTEC assessment.

6.1.1 Surficial Soils

The distribution of arsenic in the surficial soils across the site indicates concentrations ranging from non-detect (<1.1 mg/kg) to 6.9 mg/kg. The mean concentration of arsenic for the surficial samples collected was 2.0 mg/kg. As shown on Figure 4, the arsenic concentrations above the residential RSLs were generally spread across the study area and did not indicate a "hot spot" or source area. We note that arsenic is naturally occurring in North Carolina coastal plain sediments. According to a study conducted by the North Carolina Department of Agriculture and Consumer Services (NCDACS), where over 3,200 soil samples were collected for analysis of heavy metals in North Carolina, the average arsenic concentration was 4.5 mg/kg (Hardy, Myers and Stokes, 2008). This data suggests that the arsenic concentrations detected in the surficial soils at the Site may be the result of naturally occurring conditions.

Other metals, such as aluminum, cobalt, iron, and lead, were detected in the surficial samples above the RSLs. Aluminum was present in only one location near the northeast concrete structure above the RSLs. Cobalt was detected slightly above the RSLs in three locations; on either side of the eastern concrete pit, and adjacent to the concrete structure east of the former plant building. Iron found above the RSLs was present in five apparent random locations. Lead was detected in one location above the RSLs near the concrete structure east of the former plant building. Each of the metals discussed were found in practically every sample collected at the site (including the background samples), however, only a few of these metals were found at concentrations in excess of the RSLs. Based on the findings, MACTEC is of the opinion that the metals in excess of the RSLs are likely naturally occurring conditions.

6.1.2 Deep Soils

The deeper soil samples collected from 2.0 to 8.0 feet bgs collected by Clark indicated arsenic concentrations ranging from non-detect (<1.1 mg/kg) to 65.5 mg/kg. The Clark findings suggest a localized area of elevated arsenic concentrations greater than 11 mg/kg to the west of the former packing structure in the general vicinity of the former railroad track. Clark's data for concentrations of arsenic under 11 mg/kg were generally found randomly across the study area. The deeper samples (4.5 to 6.0 feet bgs) collected by MACTEC did not indicate the presence arsenic concentrations across the Site greater than 3.7 mg/kg. As shown in Figure 4, soil samples collected along the railroad track (DS-13, DS-14 and D-15) indicated arsenic concentrations from 1.3 mg/kg to 2.6 mg/kg. In addition, arsenic in the surficial soil samples collected along the former track ranged from 0.54 mg/kg from SS-17 to 4.2 mg/kg from SS-12. It is unclear why several of the lower eight foot samples collected by Clark indicated some of the highest arsenic concentrations detected at the Site. MACTEC's sampling results did not produce similar arsenic concentrations.

Other metals, such as aluminum, antimony, iron, and vanadium, were detected in the deeper samples above the residential RSLs. As with the metals detected in the surficial samples, each of the metals discussed were found in practically every sample collected at the site (including the background samples), however, only a few of these metals were found at concentrations in excess of the RSLs. Based on the findings, MACTEC is of the opinion that the metals in excess of the RSLs are likely naturally occurring conditions.

Only one semi-volatile compound, benzo(a)pyrene, was detected above the RSLs from the DS-27 sample.

6.2 Groundwater Evaluation

The groundwater results indicate only four metals, arsenic, iron, manganese and silver, are present at concentrations in excess of the Tapwater RSLs. Iron was the most prevalent compound, which was detected in six of the seven wells sampled at concentrations ranging from 0.51 mg/l in TMW-7 to 5.3 mg/l in TMW-5. Wells TMW-4 and TMW-5 are the two background monitoring wells, which both had elevated iron concentrations. Comparing the soil results for iron in the vicinity of the monitoring wells tested, the data suggests iron concentrations in the deeper soils were elevated above the RSLs in five of the six wells. This data suggests that some leaching of iron into groundwater may be occurring. Manganese was detected in two wells and silver in one well. Based on the soil data, it is unclear why these compounds were detected in elevated concentrations. Arsenic was detected in one sample from Duplicate 2 (MW-2) at an estimated concentration of 0.0002 mg/L. This arsenic concentration did not exceed the 2L Standards and was not detected in the MW-2 sample. With the exception of the metals discussed above, no other compounds were detected in groundwater at the Site.

7.0 RECOMMENDATIONS

The levels of constituents detected above the residential RSLs are relatively low and most may be associated with naturally occurring conditions. In order to minimize concern about arsenic and other constituents exceeding residential screening levels, MACTEC recommends that a site-specific risk evaluation be completed. In this evaluation, the soil data will be evaluated statistically to identify the 95 percent upper confidence limits (UCLs) of the arithmetic mean for those constituents greater than screening levels. Also, exposure parameters more appropriate for the future site receptors will be identified and used to calculate site-specific RGs protective of site visitors, site workers, landscapers/maintenance workers, and construction workers. A comparison of the 95 percent UCLs to site-specific RGs should minimize concerns that soil at the site might present a potential risk to human receptors. RGs for groundwater may also be prepared that would show no potential impact to construction workers incidentally ingesting groundwater. Other exposure pathways for groundwater are incomplete.

Upon completion of the site-specific risk evaluation, a determination will be made to address whether additional assessment activities should be conducted or whether recommendations for remediation and development are warranted.

8.0 REFERENCES

David H. Hardy, Jeana Myers, and Catherine E. Stokes. [Raleigh, N.C.] *Heavy metals in North Carolina soils : occurrence & significance /:* N.C. Department of Agriculture and Consumer Services, Agronomic Division, [2008] http://www.ncagr.gov/agronomi/pdffiles/hmetals.pdf

MACTEC, *Quality Assurance Project Plan*, U.S. EPA Brownfields Assessment Project, Former Cape Fear Meat Packing Plant Site, Navassa, Brunswick County, North Carolina, MACTEC Engineering and Consulting, Inc. January 4, 2008.

MACTEC, *Integrated Sampling and Analysis Plan*, U.S. EPA Brownfields Assessment Project, Former Cape Fear Meat Packing Plant Site, Navassa, Brunswick County, North Carolina, MACTEC Engineering and Consulting, Inc. January 4, 2008.

TABLE 1
GROUNDWATER ELEVATION DATA
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

WELL ID	DATE INSTALLED	WELL DIAMETER (INCHES)	SCREENED INTERVAL (FT)	TOTAL DEPTH (FT BGS)	GS ELEVATION (FT)	TOC ELEVATION (FT)	DEPTH TO GROUNDWATER (FT TOC)	GROUNDWATER ELEVATION (FT)
MW-1*	12/7/2005	2	5 - 15	15	100.00	99.66	10.91	88.75
MW-2*	12/7/2005	2	2 - 12	12	93.99	93.57	5.39	88.18
MW-UKN	NA	4	NA	24.14	91.48	93.03	5.00	88.03
TMW-4	11/6/2008	1	15 - 20	20	103.52	105.89	15.87	90.02
TMW-5	11/6/2008	1	10 - 15	15	99.93	102.54	12.38	90.16
TMW-6	11/6/2008	1	10 - 15	15	99.07	101.32	12.40	88.92
TMW-7	11/6/2008	1	10 - 15	15	92.84	95.68	7.36	88.32
TMW-8	11/6/2008	1	10 - 15	15	97.20	99.37	11.50	87.87

Notes:

1. Elevations are based on an assumed benchmark.
2. Water levels were collected on November 7, 2008.
3. BSG - Below ground surface
4. GS - Ground surface
5. TOC - Top of casing
6. * - Wells installed by The Clark Group
7. NA - Not Available

Prepared by: AEG 1/16/09
Checked by: WBM 1/28/09
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TABLE 2
SUMMARY OF FIELD GROUNDWATER DATA
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

WELL ID	pH (s.u)	TEMPERATURE (°C)	CONDUCTIVITY (mS/cm)	TURBIDITY (NTU)	APPEARANCE
MW-1*	4.54	21.2	0.030	3.42	CLEAR
	4.42	21.0	0.029	1.42	CLEAR
Sample Reading	**4.47**	**21.3**	**0.030**	**1.37**	**CLEAR**
MW-2*	6.45	19.2	0.104	99.4	CLEAR
	6.64	18.7	0.107	26.2	CLEAR
	6.82	18.3	0.108	18.6	CLEAR
Sample Reading	**6.60**	**17.5**	**0.114**	**8.65**	**CLEAR**
TMW-4	4.97	20.1	0.024	15.3	CLEAR
	4.97	19.1	0.023	1.06	CLEAR
	4.90	19.1	0.023	0.50	CLEAR
Sample Reading	**4.93**	**19.0**	**0.023**	**0.25**	**CLEAR**
TMW-5	5.38	18.8	0.043	10.2	CLEAR
	5.42	18.9	0.040	6.26	CLEAR
	5.40	18.8	0.039	1.40	CLEAR
Sample Reading	**5.40**	**18.8**	**0.038**	**1.01**	**CLEAR**
TMW-6	5.47	22.0	0.042	4.97	CLEAR
	5.44	21.1	0.049	1.66	CLEAR
	5.46	21.1	0.048	0.72	CLEAR
Sample Reading	**5.44**	**21.0**	**0.047**	**0.68**	**CLEAR**
TMW-7	6.18	17.9	0.077	112	CLEAR
	6.19	18.7	0.076	13.5	CLEAR
	5.89	18.8	0.075	6.70	CLEAR
Sample Reading	**5.99**	**18.6**	**0.074**	**2.64**	**CLEAR**
TMW-8	4.53	19.6	0.130	15.0	CLEAR
	5.15	18.9	0.067	5.49	CLEAR
	4.87	19.1	0.059	1.69	CLEAR
Sample Reading	**4.96**	**19.0**	**0.058**	**1.35**	**CLEAR**

Notes:

1. Field data was collected on November 10, 2008
2. s.u. - standard units
3. mS/cm - milliSemens per centimeter
4. NTU - nephelometric turbidity units
5. TOC - Top of casing
6. * - Wells installed by The Clark Group

Prepared by: AEG 1/16/09
Checked by: WBM 1/28/09

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TABLE 3
SUMMARY OF DETECTED SOIL PARAMETERS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

							Client Sample ID	SS-1 0.3 - 1 FT		DS-1 4.5 - 6 FT		SS-2 0.3 - 1 FT		DS-2 4.5 - 6 FT		SS-3 0.3 - 1 FT		SS-4 0.3 - 1 FT		SS-5 0.3 - 1 FT		SS-6 0.3 - 1 FT		SS-7 0.3 - 1 FT		DS-7 4.5 - 6 FT		SS-8 0.3 - 1 FT		SS-9 0.3 - 1 FT		SS-10 0.3 - 1 FT		SS-11 0.3 - 1 FT	
							Lab Sample ID	L374170-01		L374170-02		L374170-03		L374170-04		L374170-05		L374170-06		L374170-07		L374170-08		L374170-09		L374170-10		L374170-11		L374170-12		L374170-13		L374170-14	
							Date Sampled	11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/7/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/7/2008		11/7/2008		11/6/2008		11/6/2008	
Method	Parameter	Units	RSLs Res		RSLs Ind		IHSB RG 08	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
7471	Mercury	mg/kg	2.3	n	31	n	4.6	0.033		0.009	J	0.015	J	0.007	J	0.002	J	0.0093	J	0.0091	J	0.0071	J	0.028		0.0073	J	0.0095	J	0.022	J3	0.023		0.019	J
6010B	Aluminum	mg/kg	7700	n	99000	nm	15000	1300		4100		1400		**12000**		1500		830		2200		1100		6900		4200		1700		1500		1400		2100	V
6010B	Antimony	mg/kg	3.1	n	41	n	6.2	<1.1		<1.2		<1.1		<1.2		<1.1		<1.1		<1.1		<1.1		<1.2		**6.2**		0.93	J	<1.1		<1.1		0.9	J, P1, J6
6010B	Arsenic	mg/kg	0.39	c*	1.6	c	4.4	**0.61**	J	**1.3**		**0.62**	J	**3.3**		0.29	J	0.36	J	**0.72**	J	**0.76**	J	**3.2**		<1.1		**0.42**	J	<1.1		<1.1		**0.77**	J
6010B	Barium	mg/kg	1500	n	19000	nm	3000	7.2		6.5		3.4		11		4.7		4.4		4.5		5.5		13		16		10		4.8		6.4		20	J3
6010B	Beryllium	mg/kg	16	n	200	n	NE	0.053	J	0.079	J	0.058	J	0.27		0.078	J	<0.11		0.062	J	0.057	J	0.14		0.42		0.086	J	0.074	J	0.082	J	0.11	J
6010B	Cadmium	mg/kg	7	n	81	n	14	0.051	J	0.099	J	0.066	J	<0.29		0.056	J	0.06	J	0.05	J	0.055	J	0.059	J	1.8		0.34		0.2	J	0.24	J	0.51	
6010B	Calcium	mg/kg	NE		NE		NE	190		78		40		46		1000		130		230		110		140		280		330		56		180		350	J3, J6
6010B	Chromium	mg/kg	39	c	200	c	46	1.8		7.5		2.1		28		1.1		0.67		1.8		1.3		11		14		1.6		1.7		2.8		4.8	J3
6010B	Cobalt	mg/kg	2.3	n	30	n	NE	0.32	J	0.36	J	0.21	J	1.1		0.22	J	0.25	J	0.16	J	0.3	J	0.53	J	1.9		0.19	J	0.16	J	0.32	J	0.2	J
6010B	Copper	mg/kg	310	n	4100	n	NE	2		1	J	0.57	J	3.8		0.46	J	0.48	J	0.6	J	0.5	J	1.5		0.66	J	0.91	J	0.74	J	1.1		2	P1
6010B	Iron	mg/kg	5500	n	72000	nm	11000	1100		2500		1700		**8700**		750		730		1500		1000		4500		**16000**		1900		900		1200		2500	V
6010B	Lead	mg/kg	400		800		400	12		3.3		9.3		14		1.4		3.8		1.5		5		7.9		9.3		7.2		6.3		13		6.4	J3
6010B	Magnesium	mg/kg	NE		NE		NE	53		140		42		620		89		35		59		41		240		150		66		42		54		67	
6010B	Manganese	mg/kg	180	n	2300	n	360	31		5.8		4		4.3		6		6.3		5		39		11		30		22		10		20		13	J3
6010B	Nickel	mg/kg	160	n	2000	n	320	1.3		1.3		1.8		4.6		0.64	J	1.6		0.7	J	<1.1		1.6		3.4		1	J	0.77	J	0.81	J	1.3	P1
6010B	Potassium	mg/kg	NE		NE		NE	55		160		50		680		62		45		56		62		390		240		64		48		59		70	
6010B	Selenium	mg/kg	39	n	510	n	78	<1.1		0.58	J	0.42	J	<1.2		<1.1		<1.1		0.44	J	<1.1		1.2	J	<1.1		<1.1		<1.1		<1.1		<1.1	
6010B	Silver	mg/kg	39	n	510	n	78	<0.55		<0.59		<0.54		<0.59		<0.54		<0.56		<0.54		<0.54		<0.59		0.47	J	<0.54		<0.54		<0.54		4.6	
6010B	Sodium	mg/kg	NE		NE		NE	<28.		9	J	<27.		15	J	8.1	J	22	J	<27.		<27.		13	J	13	J	<27.		<27.		8.4	J	<28.	
6010B	Thallium	mg/kg	0.63	n	8.2	n	1	<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		0.6	J	<0.30		<0.30		<0.30		0.6	J, P1
6010B	Vanadium	mg/kg	39	n	520	n	78	4.4		7.8		4.9		**92**		2		2.1		4.6		3.2		21		34		3.6		2.7		3.6		6.6	
6010B	Zinc	mg/kg	2300	n	31000	nm	4600	4.8		2.7		2.1		7.5		1.4	J	4.3		2.2		5.6		7.4		16		9		2.5		7.2		12	J3
8081A	Endosulfan I	mg/kg	37	n	370	n	74	<0.022		NA		<0.022		NA		NA		<0.022		NA		0.0042	J	NA		NA		<0.022		NA		NA		NA	
8081A	Methoxychlor	mg/kg	31	n	310	n	62	<0.022		NA		<0.022		NA		NA		<0.022		NA		0.02	J	NA		NA		<0.022		NA		NA		NA	
8260B	Acetone	mg/kg	6100	n	61000	n	12000	NA		NA		NA		NA		NA		NA		NA		NA		NA		0.055	J	NA		NA		NA		NA	
8270C	Benzo(a)anthracene	mg/kg	0.15	c	2.1	c	0.15	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.032		NA		NA		NA		NA	
8270C	Benzo(b)fluoranthene	mg/kg	0.15	c	2.1	c	0.15	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.030		NA		NA		NA		NA	
8270C	Benzo(a)pyrene	mg/kg	0.015	c	0.21	c	0.015	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.027		NA		NA		NA		NA	
8270C	Fluoranthene	mg/kg	230	n	2200	n	460	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.38		NA		NA		NA		NA	
8270C	Phenanthrene	mg/kg	NE		NE		NE	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.38		NA		NA		NA		NA	
8270C	Pyrene	mg/kg	170	n	1700	n	340	NA		NA		NA		NA		NA		NA		NA		NA		NA		<0.38		NA		NA		NA		NA	

Notes:
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TABLE 3 Cont.
SUMMARY OF DETECTED SOIL PARAMETERS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

							Sample ID	SS-12 0.3 - 1 FT		SS-13 0.3 - 1 FT		DS-13 4.5 - 6 FT		SS-14 0.3 - 1 FT		DS-14 4.5 - 6 FT		DUPLICATE-1		SS-15 0.3 - 1 FT		DS-15 4.5 - 6 FT		SS-16 0.3 - 1 FT		SS-17 0.3 - 1 FT		SS-18 0.3 - 1 FT		SS-19 0.3 - 1 FT		SS-20 0.3 - 1 FT		SS-21 0.3 - 1 FT	
							Lab Sample ID	L374170-15		L374170-16		L374170-17		L374170-18		L374170-19		L374170-40		L374170-20		L374170-21		L374170-22		L374170-23		L374170-24		L374170-25		L374170-26		L374170-27	
							Date Sampled	11/7/2008		11/7/2008		11/7/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008		11/6/2008	
Method	Parameter	Units	RSLs Res		RSLs Ind		IHSB RG 08	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
7471	Mercury	mg/kg	2.3	n	31	n	4.6	0.012	J	0.021	J	0.0093	J	0.03		0.0049	J	0.0071	J	0.042		<0.024		0.02	J	0.017	J	0.01	J	0.014	J	0.0095	J	0.0042	J
6010B	Aluminum	mg/kg	7700	n	99000	nm	15000	1500		2800		**9100**		2000	V	**11000**		**8900**		2200		**8600**		3700		2200	V	6200		3300		1500		7000	
6010B	Antimony	mg/kg	3.1	n	41	n	6.2	0.59	J	1	J	0.98	J	0.76	J, J6, P1	0.66	J	<1.2		<1.2		<1.2		<1.2		<1.1	, J6	0.59	J	<1.1		<1.1		<1.2	
6010B	Arsenic	mg/kg	0.39	c*	1.6	c	4.4	**4.2**		**0.88**	J	**1.3**		<1.1		**2.1**		**1.7**		**1.4**		**2.6**		**1.2**	J	**0.54**	, P1	**1.9**		**1.7**		**0.71**	J	**3.5**	
6010B	Barium	mg/kg	1500	n	19000	nm	3000	9.4		11		10		16	J3	10		7.8		35		8.1		42		15		13		8.8		6.5		7.5	
6010B	Beryllium	mg/kg	16	n	200	n	NE	0.082	J	0.13		0.19		0.1	J	0.22		0.13		0.14		0.17		0.17		0.17	P1	0.094	J	0.044	J	0.041	J	0.067	J
6010B	Cadmium	mg/kg	7	n	81	n	14	0.29		0.59		1		0.44		<0.31		<0.30		0.1	J	<0.30		0.14	J	<0.27		<0.28		<0.28		<0.27		<0.29	
6010B	Calcium	mg/kg	NE		NE		NE	290		2500		260		390	J3	260		130		980		87		1900		1100	, J6	1100		580		250		74	
6010B	Chromium	mg/kg	39	c	200	c	46	2		3.8		14		2.8		20		16		3.3		13		7.4		2.8		8.5		5.7		1.7		12	
6010B	Cobalt	mg/kg	2.3	n	30	n	NE	0.28	J	0.42	J	0.54	J	0.29	J	0.74		0.55	J	1		1.6		2		0.8	P1	0.65		0.5	J	0.24	J	0.47	J
6010B	Copper	mg/kg	310	n	4100	n	NE	2.6		2.3		2.1		2.9	P1	2.1		2.3		20		2.4		27		2.8		3.2		4.9		1.1		2.1	
6010B	Iron	mg/kg	5500	n	72000	nm	11000	1500		3400		2200		2000	J3, V	2900		2900		3100		4200		3700		2400	3, V	3200		3700		1300		**8400**	
6010B	Lead	mg/kg	400		800		400	13		7.8		6.6		12	J3	7.2		6.5		32		9		**77**		18		10		7.2		3.1		5.3	
6010B	Magnesium	mg/kg	NE		NE		NE	80		220		330		72		380		300		130		410		1200		92		200		120		59		190	
6010B	Manganese	mg/kg	180	n	2300	n	360	21		31		3.9		28	J3	5		3.4		47		4.2		56		49	, J6	6.6		13		18		5.4	
6010B	Nickel	mg/kg	160	n	2000	n	320	2.5		0.64	J	2.1		<1.1		1.4		1.2	J	1.1	J	1.7		6.5		0.74	, P1	4.5		0.98	J	<1.1		1.5	
6010B	Potassium	mg/kg	NE		NE		NE	100		150		600		88		790		580		100		690		160		120		240		130		58		180	
6010B	Selenium	mg/kg	39	n	510	n	78	0.35	J	1.4		<1.2		<1.1		0.85	J	<1.2		<1.2		1.1	J	0.5	J	<1.1		<1.1		<1.1		<1.1		<1.2	
6010B	Silver	mg/kg	39	n	510	n	78	<0.54		<0.55		<0.59		<0.56		<0.61		<0.61		0.21	J	<0.60		0.25	J	<0.54		<0.56		<0.56		<0.54		<0.59	
6010B	Sodium	mg/kg	NE		NE		NE	6.6	J	10	J	11	J	8.3	J, P1	16	J	9.5	J	15	J	8.8	J	49		13	, P1	20	J	7.3	J	<27.		<29.	
6010B	Thallium	mg/kg	0.63	n	8.2	n	1	<0.30		0.59	J	<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30	
6010B	Vanadium	mg/kg	39	n	520	n	78	3.4		8.2		27		4.7		31		34		6.6		**47**		9.7		5.1		16		9.1		2.9		22	
6010B	Zinc	mg/kg	2300	n	31000	nm	4600	13		9.1		4.1		23	J3	4.4		3.9		57		5.3		95		15		17		39		3.4		3	
8081A	Endosulfan I	mg/kg	37	n	370	n	74	NA		<0.022		NA		NA		NA		NA		<0.024		NA		NA		<0.022		NA		NA		NA		NA	
8081A	Methoxychlor	mg/kg	31	n	310	n	62	NA		<0.022		NA		NA		NA		NA		<0.024		NA		NA		<0.022		NA		NA		NA		NA	
8260B	Acetone	mg/kg	6100	n	61000	n	12000	NA		NA		<0.059		NA		<0.061		<0.061		NA		<0.060		NA		NA		NA		NA		NA		NA	
8270C	Benzo(a)anthracene	mg/kg	0.15	c	2.1	c	0.15	NA		NA		<0.032		NA		<0.032		<0.032		NA		<0.032		NA		NA		NA		NA		NA		NA	
8270C	Benzo(b)fluoranthene	mg/kg	0.15	c	2.1	c	0.15	NA		NA		<0.030		NA		<0.030		<0.030		NA		<0.030		NA		NA		NA		NA		NA		NA	
8270C	Benzo(a)pyrene	mg/kg	0.015	c	0.21	c	0.015	NA		NA		<0.027		NA		<0.027		<0.027		NA		<0.027		NA		NA		NA		NA		NA		NA	
8270C	Fluoranthene	mg/kg	230	n	2200	n	460	NA		NA		<0.39		NA		<0.40		<0.40		NA		<0.39		NA		NA		NA		NA		NA		NA	
8270C	Phenanthrene	mg/kg	NE		NE		NE	NA		NA		<0.39		NA		<0.40		<0.40		NA		<0.39		NA		NA		NA		NA		NA		NA	
8270C	Pyrene	mg/kg	170	n	1700	n	340	NA		NA		<0.39		NA		<0.40		<0.40		NA		<0.39		NA		NA		NA		NA		NA		NA	

Notes:
See Page 3 of 3

TABLE 3 Cont.
SUMMARY OF DETECTED SOIL PARAMETERS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

							Client Sample ID	DS-21 4.5 - 6 FT		SS-22 0.3 - 1 FT		DS-22 4.5 - 6 FT		SS-23 0.3 - 1 FT		DS-23 4.5 - 6 FT		SS-24 0.3 - 1 FT		SS-25 0.3 - 1 FT		DS-25 4.5 - 6 FT		SS-26 0.3 - 1 FT		SS-27 0.3 - 1 FT		DS-27 4.5 - 6 FT		SS-28 4.5 - 6 FT	
							Lab Sample ID	L374170-28		L374170-29		L374170-30		L374170-31		L374170-32		L374170-33		L374170-34		L374170-35		L374170-36		L374170-37		L374170-38		L374170-39	
							Date Sampled	11/6/2008		11/7/2008		11/7/2008		11/6/2008		11/6/2008		11/7/2008		11/7/2008		11/7/2008		11/7/2008		11/7/2008		11/7/2008		11/6/2008	
Method	Parameter	Units	RSLs Res		RSLs Ind		IHSB RG 08	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
7471	Mercury	mg/kg	2.3	n	31	n	4.6	0.013	J	0.015	J	0.008	J	0.025		0.015	J	0.026		0.025	J	0.0082	J	0.022	J	0.0088	J	<0.024		0.0067	J
6010B	Aluminum	mg/kg	7700	n	99000	nm	15000	**9200**		1800		3400		**7800**		6800		2200		2500		6200		3800		3600		1800		5000	
6010B	Antimony	mg/kg	3.1	n	41	n	6.2	<1.2		<1.1		0.89	J	<1.1		<1.2		<1.2		<1.3		<1.2		<1.2		<1.2		<1.2		<1.2	
6010B	Arsenic	mg/kg	0.39	c*	1.6	c	4.4	**2.1**		**3.3**		**2.4**		**4.2**		**2.7**		**0.98**	J	**5.5**		**3.7**		**4.6**		**6.9**		**1.2**	P1	**3.1**	
6010B	Barium	mg/kg	1500	n	19000	nm	3000	12		14		8.6		12		12		15		97		11		320		19		3.8		7.3	
6010B	Beryllium	mg/kg	16	n	200	n	NE	0.12	J	0.11	J	0.094	J	0.068	J	0.064	J	0.048	J	0.71		0.17		1.7		0.29		0.16		0.087	J
6010B	Cadmium	mg/kg	7	n	81	n	14	<0.31		<0.27		<0.30		<0.28		<0.29		<0.31		0.25	J	<0.31		<0.30		<0.29		<0.29		<0.30	
6010B	Calcium	mg/kg	NE		NE		NE	29	J	710		220		880		260		680		2000		620		1300		1100		200		580	
6010B	Chromium	mg/kg	39	c	200	c	46	16		3.1		5.1		16		9.1		3.6		4.2		13		5.1		10		6.6	J3	10	
6010B	Cobalt	mg/kg	2.3	n	30	n	NE	0.42	J	0.61		0.4	J	0.54	J	0.31	J	0.48	J	**3.9**		0.66		**4.3**		**2.6**		0.55	J, P1	0.47	J
6010B	Copper	mg/kg	310	n	4100	n	NE	1.8		2.2		1	J	3.4		1.2		4.7		23		1.3		36		4.6		0.58	J	1.9	
6010B	Iron	mg/kg	5500	n	72000	nm	11000	1500		3800		4000		**11000**		2500		2700		4500		**6600**		**8000**		**12000**		4100	V, J3	**6400**	
6010B	Lead	mg/kg	400		800		400	6.4		5.6		2.7		7.8		7.9		20		24		3.7		6.3		**52**		2.5	J3	4.4	
6010B	Magnesium	mg/kg	NE		NE		NE	260		81		120		250		180		83		190		340		380		240		260		190	
6010B	Manganese	mg/kg	180	n	2300	n	360	2.9		30		4		4.8		1.6		31		35		5.2		54		36		7.5	J3	3.7	
6010B	Nickel	mg/kg	160	n	2000	n	320	0.98	J	1.2		1.1	J	1.4		0.64	J	1.6		5.8		2.2		6.1		4.9		2.2		1.2	J
6010B	Potassium	mg/kg	NE		NE		NE	560		90		150		190		270		110		180		590		190		340		560		350	
6010B	Selenium	mg/kg	39	n	510	n	78	0.67	J	<1.1		0.61	J	<1.1		<1.2		<1.2		<1.3		<1.2		0.41	J	<1.2		<1.2		<1.2	
6010B	Silver	mg/kg	39	n	510	n	78	<0.61		<0.55		<0.59		<0.56		<0.59		<0.62		<0.63		<0.61		<0.60		<0.58		<0.59	V	<0.59	
6010B	Sodium	mg/kg	NE		NE		NE	12	J	<27.		<30.		14	J	11	J	14	J	42		9.6	J	130		8.4	J	<29.		67	
6010B	Thallium	mg/kg	0.63	n	8.2	n	1	<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30		<0.30	
6010B	Vanadium	mg/kg	39	n	520	n	78	23		6.7		12		29		13		7.3		11		20		17		20		8.3		27	
6010B	Zinc	mg/kg	2300	n	31000	nm	4600	3.2		13		4		5.5		1.9		30		96		6.7		14		51		5.2	P1	3.7	
8081A	Endosulfan I	mg/kg	37	n	370	n	74	NA		<0.022		NA		NA		NA		NA		NA		NA		NA		<0.023		NA		NA	
8081A	Methoxychlor	mg/kg	31	n	310	n	62	NA		<0.022		NA		NA		NA		NA		NA		NA		NA		<0.023		NA		NA	
8260B	Acetone	mg/kg	6100	n	61000	n	12000	0.027	J	NA		<0.059		NA		<0.059		NA		NA		<0.061		NA		NA		<0.059		NA	
8270C	Benzo(a)anthracene	mg/kg	0.15	c	2.1	c	0.15	<0.032		NA		<0.032		NA		<0.032		NA		NA		<0.032		NA		NA		0.041	J	NA	
8270C	Benzo(b)fluoranthene	mg/kg	0.15	c	2.1	c	0.15	<0.030		NA		<0.030		NA		<0.030		NA		NA		<0.030		NA		NA		0.042	J	NA	
8270C	Benzo(a)pyrene	mg/kg	0.015	c	0.21	c	0.015	<0.027		NA		<0.027		NA		<0.027		NA		NA		<0.027		NA		NA		**0.035**	J	NA	
8270C	Fluoranthene	mg/kg	230	n	2200	n	460	<0.40		NA		<0.39		NA		<0.39		NA		NA		<0.40		NA		NA		0.1	J	NA	
8270C	Phenanthrene	mg/kg	NE		NE		NE	<0.40		NA		<0.39		NA		<0.39		NA		NA		<0.40		NA		NA		0.079	J	NA	
8270C	Pyrene	mg/kg	170	n	1700	n	340	<0.40		NA		<0.39		NA		<0.39		NA		NA		<0.40		NA		NA		0.072	J	NA	

Notes:
1. Samples analyzed by Environmental Science Corp
2. Less than symbol (<) signifies that the concentration was below reportable limits.
3. Only constituents detected above reportable laboratory limits are listed.
4. Detected constituents with laboratory detection limits above the regulatory standards are shaded.
5. Detections above regulatory standards are shaded and **bold**.
6. **RSLs** - USEPA September 2008 Oak Ridge National Laboratory Regional Screening Levels - Residential & Industrial
7. **IHSB RG 08** - North Carolina Inactive Hazardous Sites Branch Health-Based Soil Remediation Goals Updated September 2008.
8. See attached full laboratory data package for additional analyzed constituents not detected above reporting limits.
9. All data are reported in milligrams per kilogram (mg/kg).
10. NE - Not Established / NA - Not Analyzed
11. Sample ID - Duplicate-1 was collected at the DS-14 sample location.
12. Sample IDs SS-1/DS-1 and SS-2/DS-2 were considered to be background sample locations.

Prepared by: AEG 01/15/09
Checked by: WBM 01/28/09

Qualifiers:

J	(EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low
J3	The associated batch QC was outside the established quality control range for precision.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

ESC Note: Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

TABLE 4
SUMMARY OF DETECTED GROUNDWATER PARAMETERS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project No. 6550-07-0413.05

Client Sample ID						**MW-1**		**MW-2**		**TMW-4**		**TMW-5**		**TMW-6**		**TMW-7**		**TMW-8**		**DUPLICATE-2 (MW-2)**		**TRIP BLANK-1**		**TRIP BLANK-2**		**EQUIP RINSATE-1**		**FIELD BLANK-1**	
Lab Sample ID						L374170-43		L374170-44		L374170-46		L374170-47		L374170-48		L374170-49		L374170-45		L374170-50		L374170-42		L374170-52		L374170-41		L374170-51	
Date Sampled						11/10/2008		11/10/2008		11/10/2008		11/10/2008		11/10/2008		11/10/2008		11/10/2008		11/6/2008		11/10/2008		11/6/2008		11/10/2008		11/10/2008	
Method	**Parameter**	**Units**	**2L Standard**	**RSLs Tap**		**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**
9012B	Cyanide	mg/l	0.07	0.073	n	<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		0.0014	J	NA		NA		<0.0050		<0.0050	
6020	Antimony	mg/l	NE	0.0015	n	<0.0010		0.00033	J	<0.0010		<0.0010		<0.0010		<0.0010		<0.0010		0.00031	J	NA		NA		<0.0010		<0.0010	
6020	Arsenic	mg/l	0.05	0.000045	c	<0.0010		<0.0010		<0.0010		<0.0010		<0.0010		<0.0010		<0.0010		**0.00023**	J	NA		NA		<0.0010		<0.0010	
7470A	Mercury	mg/l	0.00105	0.0011	n	<0.00020		<0.00020		<0.00020		<0.00020		<0.00020		0.00005	J	<0.00020		<0.00020		NA		NA		<0.00020		<0.00020	
6010B	Aluminum	mg/l	NE	3.7	n	0.12		0.1		<0.10		<0.10		<0.10		<0.10		0.17		<0.10		NA		NA		0.067	J	<0.10	
6010B	Barium	mg/l	2	0.73	n	0.015		0.007		0.011		0.012		0.0099		<0.0050		0.029		0.0064		NA		NA		0.025		0.025	
6010B	Calcium	mg/l	NE	NE		1.4		26		0.94		0.77		4.9		13		2.3		26		NA		NA		0.16	J	<0.50	
6010B	Iron	mg/l	0.3	2.6	n	<0.10		**0.99**		**1.2**		**5.3**		**3.9**		**0.51**		**1.3**		**1.1**		NA		NA		<0.10		<0.10	
6010B	Magnesium	mg/l	NE	NE		0.76		0.54		0.66		0.59		0.53		0.82		1.1		0.56		NA		NA		0.027	J	<0.10	
6010B	Manganese	mg/l	0.05	0.088	n	0.0069	J	0.0053	J	0.031		**0.1**		**0.076**		0.0076	J	0.02		0.0037	J	NA		NA		0.0029	J	<0.010	
6010B	Potassium	mg/l	NE	NE		1.1		1.6		0.96		1.7		1.3		1.2		2.6		1.8		NA		NA		<0.50		0.14	J
6010B	Selenium	mg/l	0.05	0.018	n	<0.0065		0.008	J	0.0069	J	0.0078	J	<0.0065		0.0077	J	<0.0065		0.012	J	NA		NA		<0.0065		<0.0065	
6010B	Silver	mg/l	0.0175	0.018	n	<0.010		<0.010		<0.010		0.004	J	0.0065	J	**0.053**		<0.010		0.0044	J	NA		NA		<0.010		0.0055	J
6010B	Sodium	mg/l	NE	NE		2.1		2.2		1.8		2.1		3		4.4		4.3		2.3		NA		NA		<0.50		<0.50	
6010B	Zinc	mg/l	1.05	1.1	n	<0.030		0.0089	J	0.044		0.031		0.033		<0.030		0.016	J	<0.030		NA		NA		0.012	J	<0.030	
8260B	Chloroform	mg/l	0.07	0.00019	c	<0.00033		<0.00033		<0.00033		<0.00033		<0.00033		<0.00033		<0.00033		<0.00033		**0.00049**	J	<0.00033		<0.00033		<0.00033	
8260B	Toluene	mg/l	1	0.23	n	<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		<0.0050		0.00031	J	<0.0050		<0.0050	

Prepared by: AEG 01/15/09
Checked by: WBM 01/28/09

Notes:
1. Samples analyzed by Environmental Science Corp
2. Less than symbol (<) signifies that the concentration was below reportable limits.
3. Only constituents detected above reportable limits are listed.
4. Detected constituents with laboratory detection limits above the regulatory standards are shaded.
5. Detections above regulatory standards are shaded and bold.
6. **2L Standard** - North Carolina Administrative Code Title 15A Subchapter 2L Groundwater Standards (15A NCAC 2L)
7. **RSLs - USEPA September 2008 Oak Ridge National Laboratory Regional Screening Levels - Tapwater**
8. See attached full laboratory data package for additional analyzed constituents not detected above reporting limits.
9. All data are reported in milligrams per liter (mg/L).
10. NE - Regulatory standard has not been established
11. NA - Not Analyzed

Qualifiers:

J (EPA) - Estimated value below the lowest calibration point. Confidence correlates with concentration.

ESC Note: Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

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TABLE 5
PRELIMINARY RISK-BASED SCREENING OF SOIL RESULTS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project 6550-07-0413.05

Parameter	**Maximum Concentration mg/kg**	**IHSB Soil RGs mg/kg (a)**		**ORNL Residential Soil RSLs mg/kg (b)**	
Aluminum	12000	15000	N	**7700**	N
Antimony	6.2	6.2	N	**3.1**	N
Arsenic	6.9	**4.4**	N	**0.39**	C
Cobalt	4.3	na		**2.3**	N
Iron	16000	**11000**	N	**5500**	N
Thallium (sulfate)	<1.3 (c)	1.3	N	**0.63**	N
Vanadium	92	**78**	N	**39**	N
Benzo(a)pyrene	0.035	**0.015**	C	**0.015**	C
Benzo(a)anthracene	<0.40 (c)	**0.15**	C	**0.15**	C
Benzo(b)fluoranthene	<0.40 (c)	**0.15**	C	**0.15**	C

Notes:

na Not available

(a) The NC values are based on the October 2004 USEPA Region 9 PRG table. Noncarcinogens are corrected for additivity by multiplying by 0.2.

(b) Region 4 has adopted the Oakridge National Laboratories Regional Screening Levels (ORNL RSLs) as the risk-based screening criteria in Region 4. Noncarcinogens are corrected for additivity by multiplying by 0.1.

(c) The detection limit is greater than the screening value.

TABLE 6
PRELIMINARY RISK-BASED SCREENING OF GROUNDWATER RESULTS
Former Cape Fear Meat Packing Plant
Town of Navassa, Brunswick County, North Carolina
MACTEC Project 6550-07-0413.05

Parameter	Maximum Concentration, mg/L mg/L	2L Standard mg/L (a)		ORNL Tapwater RSLs mg/L (b)	
Arsenic	0.00023	0.05		**4.50E-05**	C
Iron	5.3	**0.3**		**2.6**	N
Manganese	0.1	**0.05**		**0.088**	N
Silver	0.053	**0.0175**		**0.018**	N

Notes:

(a) State of NC values for drinking water.

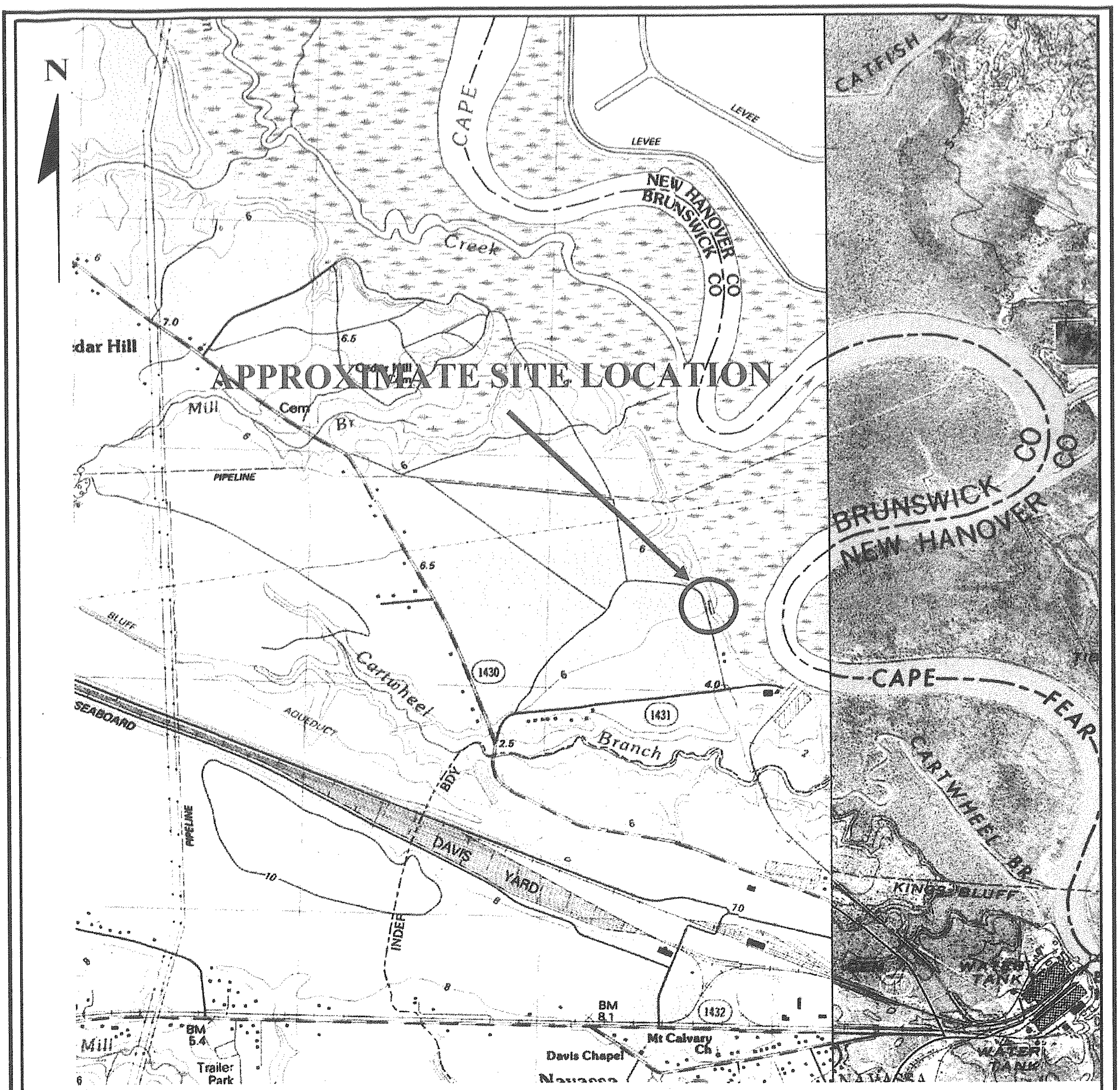
(b) Region 4 has adopted the Oakridge National Laboratories Regional Screening Levels (ORNL RSLs) as the risk-based screening criteria in Region 4.

Noncarcinogens are corrected for additivity by multiplying by 0.1.

Carcinogenic target risk equal to 1 x 10^{-6}.

Both (a) and (b) assume residential ingestion of groundwater as potable water.

FIGURES



* 2 ACRE PORTION OF PARCEL # 0240000102

MACTEC

SITE LOCATION MAP
NAVASSA BROWNFIELDS PROJECT
NAVASSA, NORTH CAROLINA

USGS 7.5 MIN. QUAD., LELAND, NC, 1984

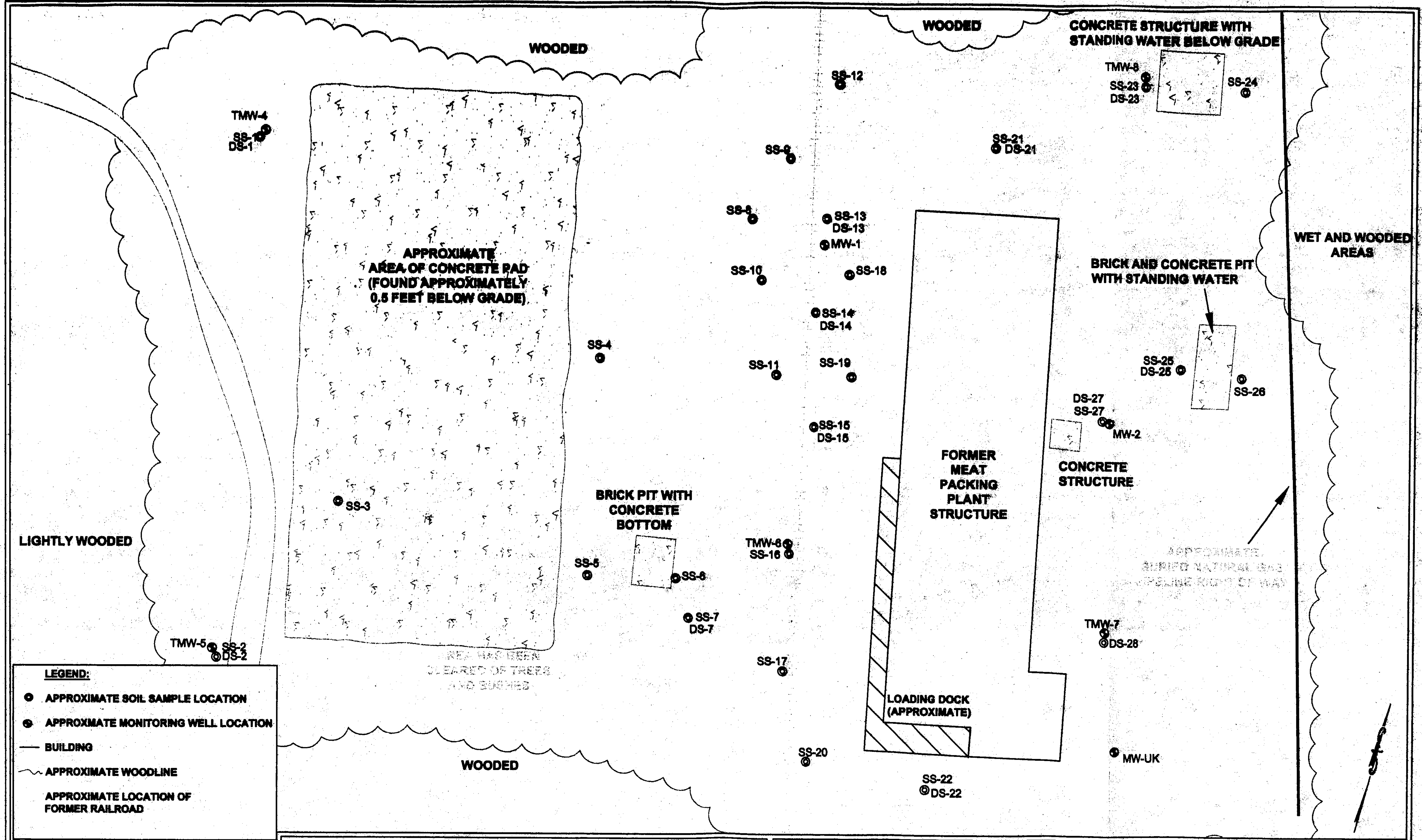
DRAWN: WBM	JOB #: 6550-07-0413
APPROVAL: BWA	DATE: 3/6/09
SCALE: AS SHOWN	FIG. NO. 1

REF: G:\PROJ\CLIENTS\NAVBROWNFIELDS\NAVFIG.1

AERIAL SITE MAP
NAVASSA BROWNFIELDS PROJECT
NAVASSA, NORTH CAROLINA

MACTEC

DRAWN: WBM	JOB: 6550-07-0413
APPROVAL: BWJ	DATE: 3/6/07
SCALE: AS SHOWN	FIG: 2



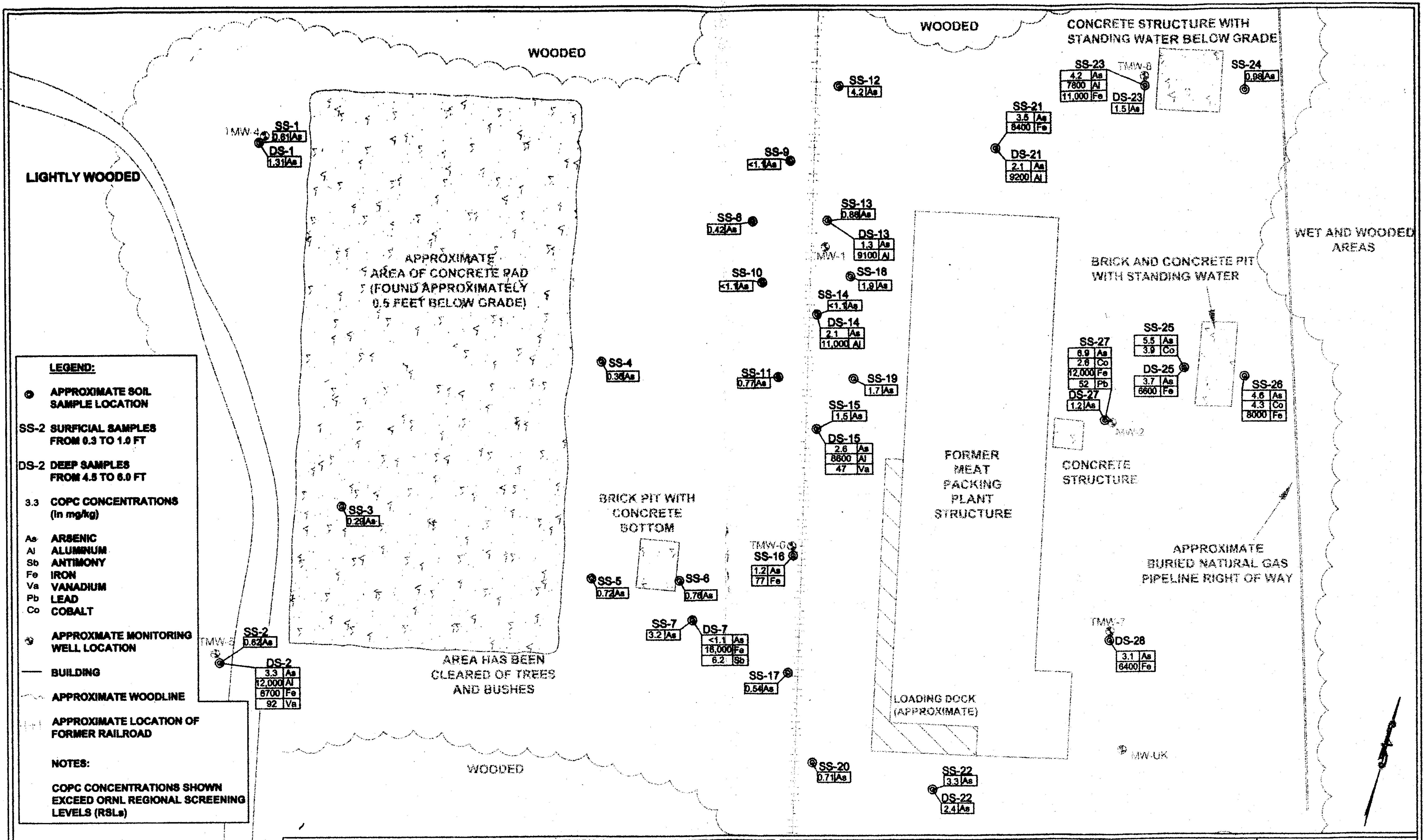
GRADIC SCALE - IN FEET

0 30 60

SOIL AND GROUNDWATER SAMPLE LOCATION MAP
NAVASSA BROWNFIELDS PROJECT
NAVASSA, NORTH CAROLINA

MACTEC

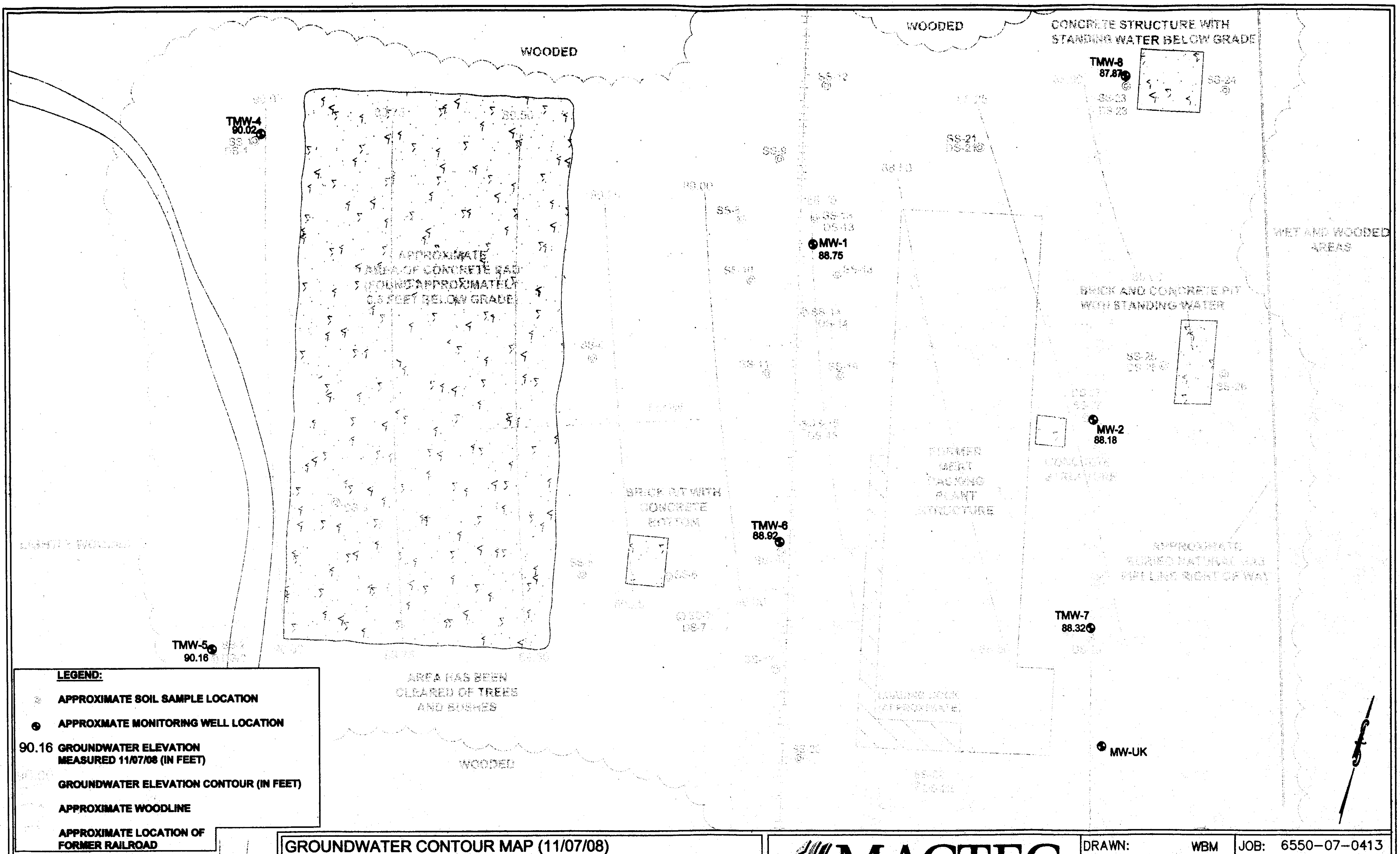
DRAWN: WBM	JOB: 6550-07-0413
APPROVAL: BWH	DATE: 3/6/09
SCALE: AS SHOWN	FIG: 3



DISTRIBUTION OF COPC's IN SOIL
NAVASSA BROWNFIELDS PROJECT
NAVASSA, NORTH CAROLINA

MACTEC

DRAWN:	WBM	JOB:	6550-07-0413
APPROVAL:	BWJ	DATE:	3/6/09
SCALE:	AS SHOWN	FIG:	4



GROUNDWATER CONTOUR MAP (11/07/08)
NAVASSA BROWNFIELDS PROJECT
NAVASSA, NORTH CAROLINA

MACTEC

DRAWN:	WBM	JOB:	6550-07-0413
APPROVAL:	BWJ	DATE:	3/6/09
SCALE:	AS SHOWN	FIG:	5