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TECHNICAL MEMORANDUM REMEDIAL OPTIMIZATION REPORT FOR BUILDING 46 NAS CECIL FIELD FL

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CH2MHILL CONSTRUCTORS INC

Remedial Action Optimization Report for Building 46 Naval Air Station Cecil Field, Jacksonville, Florida

PREPARED FOR: Mark Davidson/BRAC PMO SE
David Grabka/FDEP
Mike Singletary/NAVFAC SE

COPIES: Paul Favara/CH2MHILL
Sam Naik/CH2MHILL
Mike Halil/CH2MHILL

PREPARED BY: Amanda Struse/CH2M HILL
Jonathan Subacz/CH2M HILL
Cayman James/CH2M HILL

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1.0 Introduction

This Optimization Report for remedial activities at the Building 46 site at the former Naval Air Station (NAS) Cecil Field, has been prepared by CH2M HILL Constructors, Inc. (CH2M HILL) for the Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE). This work was performed under Contract Number N62467-98-D-0995, Contract Task Order (CTO) 86. The purpose of this Optimization Report is to evaluate the existing remediation system at Building 46 and provide recommendations to optimize system operations to better facilitate achievement of the remedial action objectives (RAOs) in the shortest time period possible.

The remainder of this report is organized in nine sections:

- Site Description
- Conceptual Site Model
- Remedial Action Objectives
- Target Treatment Zones
- Technology Optimization for groundwater
- Performance Objectives
- Optimization and Exit Strategies
- Recommendations
- References

This report was prepared using the *Guidance for Optimizing Remedy Evaluation, Selection, and Design (*NAVFAC, 2004) and previous reports generated for this site.

2.0 Site Description

2.1 Site History

Building 46 at NAS Cecil Field was the former base gas station and included eight underground storage tanks (USTs), all of which were removed in June 1988. Four of these tanks were in operation before 1970. Each tank had a 2,000-gallon capacity and was located just south of Building 46. Two additional 10,000-gallon capacity tanks were used to store regular and unleaded gasoline, and two 6,000-gallon capacity tanks were used to store diesel and super unleaded gasoline. Figure 1 shows the location of Building 46 at NAS Cecil Field.

2.2 Previous Site Investigations

Based on extensive soil and groundwater contamination detected during a contamination assessment conducted by Harding Lawson Associates (HLA) in early 1998, a site assessment was conducted later that year, to fully delineate the extent of petroleum constituents in both the soil and groundwater in the Building 46 area. The Site Assessment Report (SAR) prepared by HLA (1998) concluded that operation of the USTs resulted in contamination of soil and groundwater by fuel-related compounds, including benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), naphthalene, and total recoverable petroleum hydrocarbons (TRPH). The SAR estimated that an area of soil approximately 5,500 square feet in size at the location of the former USTs was contaminated to a depth of 7 feet below land surface (bls) and was a source of groundwater contamination. The SAR also established that the areal extent of the groundwater contaminant plume in the shallow (7 to 25 feet bls), intermediate (25 to 50 feet bls), and deep (50 to 92 feet bls) zones of the surficial aquifer were approximately 25,300 square feet, 95,700 square feet, and 31,000 square feet, respectively.

A Remedial Action Plan (RAP) for Building 46 was prepared and submitted by Tetra Tech NUS, Inc. (TtNUS) in March 1999. The RAP recommended the implementation of air sparging/soil vapor extraction (AS/SVE) to remediate the highly contaminated soil and groundwater considered to be the contamination source area near Building 46, as well as the implementation of a monitored natural attenuation (MNA) program to address the remainder of the groundwater contaminant plume.

In June 2000, a RAP Addendum was prepared and submitted by TtNUS to propose the addition of a nutrient-enriched biosparging technology to the remedial action. The RAP Addendum recommended the implementation of the PHOSter® nutrient injection system in conjunction with sparging in the intermediate and deep zones of the aquifer, and elimination of the SVE system. The RAP Addendum identified the State of Florida groundwater cleanup target levels (GCTLs) and soil cleanup target levels (SCTLs) as the groundwater and soil treatment goals, respectively. These target levels are detailed in Chapter 62-777 of the Florida Administrative Code (FAC).

Table 1 lists the site chemicals of concern (COCs) for groundwater and soil, along with their corresponding SCTLs and GCTLs. The RAP Addendum identified the remediation objectives of the existing biosparging system as being the reduction of both the soil and groundwater contaminant concentrations to below SCTLs and GCTLs, respectively.

As specified by the RAP Addendum, the remedial action (RA) at Building 46 consisted of construction and operation of two pre-fabricated biosparge systems with supplemental PHOSter® nutrient injection. The biosparge injection well layout constructed at the site per the RAP Addendum is shown on Figure 2. Two treatment system equipment trailers were installed by Priester and Associates (PHA) and CH2M HILL in 2001 on each side of New World Avenue, forming an East system and a West system. The East system consists of a PHOSter® system trailer connected to 8 intermediate (37 to 40 feet bls) and 11 deep (85 to 90 feet bls) sparge wells. The West system consists of a PHOSter® system trailer connected to 8 intermediate (37 to 40 feet bls) and 3 deep (85 to 90 feet bls) sparge wells.

Between January 2001 and April 2004, nitrogen (in the form of nitrous oxide) and phosphorus (in the form of tri-ethyl phosphate) were injected into the subsurface during biosparging as nutrient amendments. The nutrient injection was discontinued in April 2004 due to a decrease in groundwater pH observed at several monitoring wells within the treatment area.

With the discontinuation of the nutrient amendments, the treatment system has been operating as a biosparge system only since April 2004. Currently, both the East and West biosparge systems are operating in a pulsed mode with 6-hour cycles. Within each sparge system, flow distribution to the sparge points can be controlled via a manifold. The East system currently provides 14 actual cubic feet per meter (acfm) of airflow at a pressure of 50 pounds per square inch gauge (psig), and the West system provides 20 acfm of airflow at a pressure of 50 psig. In the East system, 10 of the 19 sparge points are currently active while 7 of the 11 sparge points are active in the West system. The biosparge system specifications are summarized in Table 3.

2.3 Summary of Changes in Groundwater COC Concentrations

Soil and groundwater data collected in 1998 and reported in the RAP Addendum (TtNUS, 2000) will be used as the baseline for evaluating the treatment effectiveness over time. Figures 3 and 4 indicate the extent of groundwater and soil contamination as estimated in the RAP Addendum. A summary of the historical maximum groundwater and soil COC detections are presented in Tables 4 and 5. Comprehensive groundwater and soil data have been included as Attachment 1.

The most recent sitewide groundwater sampling event was completed in December 2005. Based on these results, concentrations of COCs in groundwater have generally decreased across the site since the 1998 baseline, with the exception of naphthalene and MTBE, as shown in the trend charts in Figures 5a through 8b. These figures show each COC plotted on two charts, with figure a showing wells with elevated (outlier) detections of COCs and figure b showing COC detections in the remaining wells. TRPH concentrations have decreased to below GCTLs in all monitoring wells, with the exception of CEF-46-1S.

Mining Visualization Software (MVS) was used to generate a three-dimensional interpretation of the contaminated groundwater at Building 46, based on the most recent (December 2005) sitewide sampling results. These interpretations are presented on Figures 9 and 10. A direct comparison of the size of the groundwater plumes (comparing the 1998 baseline and 2005 groundwater data) is not possible because of the following :

- The baseline and 2005 plumes were generated using different interpretive methods.

- MTBE concentrations were not included in the 1998 baseline plume map.
- Some wells defining the extent of contamination in the intermediate zone were installed after 1998. Intermediate zone contamination on the southwest portion of the site was not fully delineated and therefore not part of the 1998 data.
- The extent of contamination in both the intermediate and shallow zones is not fully defined in either the 1998 or 2005 dataset, leaving the plume sizes open to interpretation.

2.3.1 pH Trends

Table 2 includes pH readings in site monitoring wells over time. The decrease in groundwater pH at the site is partially attributed to the biogeochemical cycling of sulfur. The oxidation of iron-sulfide minerals present in the aquifer matrix (formed naturally as a result of iron and sulfate reduction that occurred prior to biosparging), could be responsible for a reduction in the pH of groundwater. This process is very similar to acid mine drainage, where pyrite is oxidized when mining spoils are brought to the ground surface, generating acidic leachate and mobilizing metals like iron and manganese. The oxidation of iron-sulfide in groundwater produces ferrous iron and sulfate, which act as a continued source of acidity, contributing to the slow recovery of the groundwater pH. Additionally, the groundwater pH is impacted by the clay material in the aquifer. Clay materials are typically characterized as having high cation exchange capacities (CEC), which can affect soil pH. Once the groundwater pH has been reduced to less than 4, carbonates will have been removed from the system, thus eliminating any buffering capacity of the soil material. Typically, groundwater pH values less than 4.5 to 5.0 will inhibit microbial growth and retard the biodegradation of COCs.

2.3.2 Dissolved Oxygen Trends

Based on the available dissolved oxygen (DO) data presented in Table 2, the impact of biosparging in enhancing the aerobic conditions in the aquifer at this site is not clearly evident. DO concentrations measured at any specific well have not been consistent over time, and there is no apparent correlation between the DO and ORP readings. The DO sampling events typically take place a few days after the biosparge systems have been shut down, in order to allow residual pressure in the aquifer to subside before opening wellheads for sampling. This lapse of time could be allowing the DO levels in the aquifer to revert to natural conditions, thus making it impossible to read DO concentrations representative of aquifer conditions during biosparging. The low ORP values measured at CEF-046-01S indicate existence of an anoxic environment in the shallow zone and it appears that this portion of the aquifer is not being impacted by sparging.

A graphical comparison of the 1998 and December 2005 estimated groundwater plumes is presented on Figure 9.

2.4 Summary of Changes in Soil COC Concentrations

Soil samples collected at three locations within the estimated soil contamination area indicate that BTEX and TRPH levels have decreased significantly, when compared to the 1998 baseline data. However, some subsurface soil contaminant concentrations are sporadically exceeding the published State of Florida Leachability Based on Groundwater

(LGW) criteria. The extent of sitewide soil contamination exceeding SCTLs depicted in Figure 9 is based on the 1998 data because subsequent soil sampling events have not included more than three locations (SB-1, SB-2 and SB-14) within this area. Historical analytical results at these three locations are included in Attachment 1.

3.0 Conceptual Site Model

The Building 46 conceptual site model (CSM) was prepared using information from the SAR HLA, 1998), the Supplement Assessment Letter Report (TtNUS, 2003), quarterly monitoring reports (Terraine, 2000 to 2006), and Synthetic Precipitation Leaching Procedure (SPLP) testing conducted by CH2M HILL during December 2006. Site conclusions based on historical information, the current CSM, and the December 2005 sitewide groundwater sampling data are summarized below:

- Geologic and Hydrologic Information
  - The site sediments appear to be composed of primarily silty sand to a depth of approximately 90 feet bls, with the exception of discontinuous pockets of clayey sand lenses (see Figures 11 and 12).
  - Historical boring logs (HLA, 1998) show a hard pan layer at approximately 11 to 14 feet bls near the contaminant source area. However, the boring logs were incomplete and the total extent of the hard pan layer could not be determined, and therefore is not depicted on Figure 12.
  - The depth to groundwater measured in December 2005 is between 8 to 10 feet bls. The potentiometric maps for the intermediate and deep zones (Terraine, 2005) of the aquifer are shown on Figures 13 and 14. The potentiometric map for the shallow zone was not developed due to limited data points.
  - The groundwater flow direction in both the intermediate and deep zones of the aquifer is to the southwest (Figures 13 and 14). Groundwater flow directions were based on the December 2005 data since this was the last site-wide monitoring event.
- Contaminant Distribution, Fate, and Transport
  - Groundwater contamination occurred when COCs migrated from soils that had been contaminated by leaking USTs. Soil and groundwater contaminants include fuel-related compounds such as BTEX, MTBE, naphthalene, and TRPH. Groundwater contamination was determined in the SAR to extend to an area of approximately 25,300 square feet (ft^2) in the shallow zone, 95,700 ft^2 in the intermediate zone, and 31,000 ft^2 in the deep zone.
  - The groundwater plumes, based on the most recent sitewide sampling event (December 2005), are depicted on Figures 9, 10, 15, and 16. Figures 9 and 10 depict groundwater plumes based on COCs exceeding GCTLs; Figure 15 presents COC detections in site monitoring wells; and Figure 16 depicts shallow, intermediate, and deep zone groundwater plumes based on COC exceedances of the Florida Natural Attenuation Default Concentration (NADC) criteria.

- Based on Figure 9, the shallow and intermediate zone plumes of groundwater (with concentrations exceeding the GCTL) appear to have moved to the southwest. The intermediate plume has decreased in overall size, and the deep zone plume appears to have been significantly reduced in size.
- The maximum concentrations of COCs measured in groundwater (Table 4 and Attachment 1) have decreased for BTEX and TRPH. Concentrations of most COCs in groundwater reached below the NADC with minor exceedances for naphthalene and MTBE in two wells, based on the most recent data available (December 2006).
- Soil contamination in the source zone was determined in the SAR to extend to an area of approximately 5,500 square feet and a depth of approximately 7 feet bls.
- The maximum concentrations of COCs measured in soils have decreased for BTEX and TRPH at the site. The COCs are below the direct exposure concentration levels for both residential and commercial/industrial classifications, except for TRPH. Recent SPLP sampling conducted by CH2M HILL indicated very few detections above laboratory detection limits, and evaluation of this data indicates no threat to leaching from residual soil COCs near the former source area near the former Building 46. The results from the SPLP analysis were compared with the Florida Department of Environmental Protection (FDEP) Leachability based on Groundwater (LGW) criteria. Among the five compounds detected above laboratory detection limits, only methylene chloride exceeded the LGW criteria in all three soil samples.

  Methylene chloride is a common solvent and laboratory artifact, and not typically a COC at petroleum sites. It was detected in the trip blanks analyzed for this sampling event, which indicates that the methylene chloride detections in the native samples could have resulted from contamination of the sample bottles either in the field or in the laboratory. This compound is not a site contaminant at the Building 46 site.

  Attachment 3 includes a copy of the SPLP soil sampling results and a discussion of the comparison of these results with the LGW criteria.
- No surface water bodies are located in the area.

- Uncertainty
  - The lateral extent and distribution of a hard pan layer (estimated in historical reports to be present at 11 to 14 feet bls) has not been sufficiently characterized in historical boring logs. However, there is evidence of a clayey sand lens at a depth of approximately 11 to 14 feet bls and at 80 feet bls, near the contaminated soil source area, as indicated in the lithological cross-section of the site shown on Figure 12.
  - The lateral extent of COC exceedances of GCTLs on the northern and southern sides of the shallow and intermediate groundwater plumes are not definitively bound by detections below GCTLs due to the absence of monitoring wells on the north and south side of these plumes.

4.0 Remedial Action Objectives

The RAOs for the Building 46 site, as stated in the RAP, were to reduce both soil and groundwater contaminant concentrations to below state-mandated target cleanup levels (GCTLs and SCTLs).

However, alternate RAOs that would provide flexibility to optimize active remediation strategies should be considered. The following revised RAOs would allow more flexibility in optimizing the existing remedial treatment system while continuing to allow for the protection of human health and the environment:

- Prevent human exposure to contaminated soils and groundwater.
- Reduce contaminant concentrations in soils to levels that prevent migration of contaminants to groundwater and threaten possible future human receptors.
- Prevent further expansion of the groundwater plume.
- Reduce contaminant concentrations in groundwater over time to levels that do not threaten human receptors.

Additionally, at an appropriate milestone in the project, the tenets of Global Risk-Based Corrective Action (RBCA) should be used to the maximum extent practicable, while facilitating compliance with the revised RAOs.

5.0 Target Treatment Zones

The Building 46 site is comprised of target treatment zone 1 (TTZ-1), which encompasses the groundwater contamination plumes in the shallow (7 to 25 feet bls), intermediate (25 to 50 feet bls), and deep (50 to 90 feet bls) zones of the aquifer formation, as indicated on Figure 9. Primary groundwater COCs include BTEX, MTBE, naphthalene, and TRPH.

No target treatment zones for soil are identified at this site because recent detections of COCs in soil have been below the direct exposure residential and industrial SCTLs. Additionally, based on SPLP soil sample results, soil contamination does not pose a leaching threat to groundwater.

6.0 Performance Objectives

The performance objectives for groundwater remediation previously indicated in the RAP Addendum (TtNUS, 2000) for Building 46 include:

- Sustained plume reduction over time
- Operation of the biosparge system until GCTLs are attained

However, based on the proposed revised RAOs and the proposed industrial/commercial future use of the site, the following alternate performance objectives should be considered:

- Focus operation of the biosparge system only in areas where COCs in groundwater currently exceed the NADC, until NADC criteria are met, and then proceed with long-term monitoring until GCTLs are attained.
- Note that during the biosparging phase of operation to reach NADC levels, contaminant reduction rates may decrease and may become asymptotic with time. Additional optimization of the remediation system at an appropriate time may be required, should that occur. However, if the optimized system does not exhibit increased removal capacity, this could indicate that the practical limits of the technology have been achieved. In this case, alternate remedial action objectives for site closure (such as employing Global RBCA considerations) should be pursued.
- No active soil treatment is warranted, because concentrations are below direct-exposure industrial SCTLs, and based on SPLP results, the soils do not pose a leaching threat to groundwater.

7.0 Technology Optimization Alternatives

For TTZ-1, the existing biosparge system was evaluated for optimization purposes by assessing different modes of system operation (Alternatives 1 and 2) and different equipment ownership options (Options 1, 2, and 3) under each of these alternatives. The possible groundwater biosparge system optimization alternatives are summarized in Table 6 and are described and compared below.

Based on the CSM and current site data, the following groundwater treatment alternatives have been identified for evaluation:

- **Alternative GW1:** Total plume treatment based on exceedance of GCTLs
- **Alternative GW2:** Focused Plume Treatment based on exceedance of NADC criteria
- **Alternative GW3:** Long-term MNA without active treatment

Under each groundwater treatment alternative, three options were prepared for equipment ownership during active treatment of groundwater. The options evaluated include the following:

- **Option 1:** Operate system using existing or upgraded rental equipment
- **Option 2:** Operate system using new equipment
- **Option 3:** Operate system using a combination of new and salvaged equipment

7.1 Description of Groundwater Treatment Alternatives and Equipment Options

7.1.1 Alternative GW1 – Total Plume Treatment Based on Exceedance of GCTLs

Groundwater Alternative GW1 includes expanding the biosparge wellfield in the shallow and intermediate groundwater zones along the southwestern edge of the plumes west of New World Avenue and operating select sparge wells, while maintaining current air flow rates (as shown on Figure 17). The well field expansion would encompass the entire area of COCs exceeding GCTLs. Based on the system design in the RAP Addendum (TtNUS, 2000) and the current system operation, the radius of influence (ROI) for the biosparge wells is approximately 30 feet. Using the assumed ROI, a total of 23 additional biosparge wells will

be required to fully address the shallow and intermediate groundwater plumes of GCTL exceedances (as shown on Figure 17). Sparge well selection for operation also will be based on GCTLs, and the system will be operated until GCTLs are attained, or for a period of 5 years. Annual site-wide groundwater monitoring for VOCs and quarterly groundwater monitoring of select wells for VOCs and MNA parameters will be continued until GCTLs are achieved.

For this alternative, and based on current groundwater analytical data, quarterly groundwater monitoring for the following 16 wells, which are located within the shallow, intermediate and deep groundwater plumes (for COCs exceeding GCTLs as shown on Figure 9), will be considered. Costs for the groundwater monitoring effort for the 16 wells listed below are included in the cost estimate:

- **Shallow Zone wells:** CEF-76-1S, CEF-76-2S, CEF-76-3S and CEF-76-4S
- **Intermediate Zone wells:** CEF-76-5I, CEF-76-7I, CEF-76-8I, CEF-76-9I, CEF-76-18I, CEF-76-26I, CEF-76-28I, CEF-76-29I, CEF-76-30I and CEF-76-31I
- **Deep Zone wells:** CEF-46-17D and CEF-46-23D

The equipment options evaluated for this alternative include the following:

- **Option 1 - Rental Equipment:** Existing rental equipment includes two biosparge systems, one east of New World Avenue and one west of New World Avenue. Each system consists of a trailer-mounted 2-hp air compressor, manifold system, and associated piping. These systems are rented from PHA. This option includes the upgrade of the existing rental equipment with 10-hp air compressors in both systems to accommodate the additional air flow requirements of the 23 new biosparge wells.
- **Option 2 - New Equipment:** This option entails the complete replacement of the existing rental equipment for both the East and West systems with new equipment. The new equipment alternative will consist of two trailer-mounted units with air compressors, manifold systems, and associated piping. The new units would consist of two 10-hp compressors, one for each of the West and East systems. The trailer-mounted units would also provide added flexibility with the long-term option of using the remedial equipment at other locations once the remedial action at Building 46 is concluded.
- **Option 3 - Salvaged Equipment:** This alternative involves replacement of the existing two rental systems with a combination of equipment remaining from discontinued remedial systems at the former NAS Cecil Field and supplemental accessories purchased to complete the treatment system. The current available equipment to be used in this alternative includes a 50-hp compressor from the discontinued 103rd Street Site air sparging treatment system at NAS Cecil Field. The compressor would be utilized in addition to a new trailer, manifold, and associated piping. The 103rd Street compressor is capable of delivering enough air flow to operate the East and West systems simultaneously. Directional drilling (under New World Avenue) would be used to install piping to connect the East and West system biosparge wells.

7.1.2 Alternative GW2 – Focused Plume Treatment Based on Areas with Concentrations Exceeding NADC Criteria

Groundwater Alternative GW2 includes focusing the biosparge treatment only in the shallow and intermediate groundwater zones, and in areas where the groundwater COC concentrations exceed the NADC criteria. Based on Figure 16, COCs exceed NADC criteria only on the east side of New World Avenue. Therefore, all equipment options under Alternative GW2 include removal of the biosparge system on the west side of New World Avenue and shutting down the sparge wells associated with the West system. A total of six biosparge wells will be required to address the shallow and intermediate groundwater plumes, based on the current exceedances of the NADC criteria, as shown on Figure 18.

The system will be operated until NADC criteria are attained, estimated to be achieved within a period of 3 years. The recommendation of the 3-year timeframe is based on experience from similar biosparging systems operated at other NAS Cecil Field sites. At that time, active groundwater treatment will be discontinued and long-term monitoring for MNA will proceed until GCTLs are attained.

This alternative will include annual sitewide groundwater monitoring for VOCs, and quarterly groundwater monitoring of select wells for VOCs and MNA parameters until cleanup to NADC criteria is achieved. Based on the groundwater plumes of concentrations currently exceeding the NADC criteria (as shown on Figure 16), two wells within the shallow and intermediate plumes (CEF-46-1S and CEF-46-7I) will be included for quarterly groundwater monitoring.

As a conservative measure, five additional wells in the downgradient portion of the intermediate zone plume of COCs exceeding the GCTLs are proposed to be monitored on an annual basis to verify groundwater plume migration. These five wells are: CEF-46-26I, CEF-46-28I, CEF-46-29I, CEF-46-30I, and CEF-46-31I.

Costs for this groundwater monitoring scheme described are included in the cost estimates in Attachment 2.

The equipment options evaluated for this alternative include the following:

- **Option 1 - Rental Equipment:** This option includes the upgrade of the rental equipment (described in GW1, option 1 description) with a 5-hp air compressor in the East system to accommodate the air flow requirements of the six new biosparge wells.
- **Option 2 - New Equipment:** This option involves the replacement of the existing rental equipment for the East system with new equipment. The new equipment alternative will consist of a trailer-mounted unit with a 5-hp air compressor, manifold system, and associated piping and instrumentation. The trailer-mounted unit would also provide added flexibility with the long-term option of using the remedial equipment at other locations once the remedial action at Building 46 is concluded.
- **Option 3 - Salvaged Equipment:** This alternative includes the replacement of the existing rental equipment with a combination of equipment salvaged from discontinued remedial systems at NAS Cecil Field and new accessories to be purchased. The current available equipment to be used from the Day Tank 1 remedial site consists of a skid mounted 7.5-hp rotary screw air compressor, 80-gallon vertical tank, and associated

filters and piping. This equipment would be supplemented with the construction of a concrete pad and temporary shelter to house the system. A manifold and valve network would also be constructed to connect the system to the proposed sparge wells using the existing high pressure lines.

7.1.3 Alternative GW3 – MNA without Active Treatment

Groundwater Alternative GW3 includes the cessation of both the East and West systems and transitioning directly to a long-term site-wide monitoring program to monitor groundwater plume stability and degradation. There are no equipment options evaluated for this alternative.

This alternative will include annual sitewide groundwater monitoring for VOCs for all site wells showing COC exceedances of GCTLs (the 16 wells listed under Alternative GW1), and quarterly groundwater monitoring for 3 years for (VOCs and MNA parameters) for the two wells with COCs currently exceeding the NADC criteria (wells CEF-46-1S and CEF-46-7I). An additional evaluation at the end of the 3-year period will be required to evaluate monitoring frequency for long-term monitoring until cleanup to GCTLs is achieved.

7.2 Comparison of Groundwater Treatment Alternatives

The groundwater treatment alternatives were evaluated on the basis of effectiveness, implementability, uncertainty, and cost. A summary of the alternatives evaluation is presented in Table 7. The cost estimates are summarized in Attachment 2.

7.2.1 Effectiveness

All of the alternatives provide for adequate coverage of the groundwater plumes and address the existing and proposed alternate groundwater RAOs and performance objectives for the site. Alternatives GW1 and GW2 provide the most protection to human health and the environment in a shorter time than GW3 through active COC mass removal via biodegradation.

7.2.2 Implementability

Alternative GW1 (all three options) requires the installation of 23 sparge wells, and alternative GW2 (both options) requires the installation of 6 sparge wells. For all equipment options, minor site disruption would be required in order to install the new sparge wells. Also, temporarily closing New World Avenue may be required to complete the directional drilling required for alternative GW1. Alternative GW3 would be the easiest to implement.

7.2.3 Uncertainties

The following uncertainties have been identified for Alternative GW1:

- Global RBCA application and FDEP acceptance of new RAOs
- Time to achieve reduction to GCTLs
- Groundwater concentrations must remain below GCTLs in order to shut down select injection wells

The following uncertainties have been identified for Alternative GW2:

- Global RBCA application and FDEP acceptance of new RAOs
- Time to achieve reduction to default MNA criteria
- Groundwater concentrations must remain below default MNA criteria in order to discontinue operation of treatment system
- Time required to operate MNA program until GCTLs are attained

The following uncertainties have been identified for Alternative GW3:

- Global RBCA application and FDEP acceptance of new RAOs
- Time to achieve reduction to GCTLs from default MNA criteria

7.2.4 Cost

The capital and operations and maintenance (O&M) costs for each of the alternatives was estimated for a period of up to 3 additional years based on the considerable extent of cleanup in groundwater and soil achieved over the last 5 years of operation of the biosparge system at this site. The cost estimate worksheets are included in Attachment 2.

The cost estimates for the groundwater treatment alternatives do not include costs for the following factors since they are considered to be common to all of the alternatives and incorporation of these costs would not provide any additional value to the cost assessment:

- Final remedial design report
- Land-use controls
- Five-year reviews
- Future optimization reports

7.3 Selected Groundwater Treatment Alternative

Based on relative ease of implementation, estimated treatment time, and associated costs required to achieve groundwater cleanup to below NADC levels, Alternative GW2, Option 3 is the best alternative for groundwater remediation.

8.0 Optimization and Exit Strategies

System optimization will be conducted annually to achieve remedial goals with minimum investment of time and money. The system optimization and exit strategy will include:

- Review cleanup goals and current and future land use plans
- Review performance data and revise estimated time to achieve RAOs
- Evaluate whether engineering/institutional controls can protect receptors and evaluate potential for system optimization
- Propose new cleanup goals

- Determine if Global RBCA tenets can facilitate more expedited completion of active remedial action

In addition, some of the optimization strategies that will be considered are:

- Reducing the frequency of monitoring
- Reducing the target analytes list for monitoring
- Continued future evaluation of the implemented remedy to determine refinements that may be appropriate in the future

The following recommendations on exit strategies have been identified for the site:

- System O&M for a period of up to 3 years based on experience at other NAS Cecil Field biosparge systems
- Equipment demobilization after a maximum of 3 years
- Establish long-term monitoring plan for MNA

9.0 Recommendations

Based on the information presented in this report, the following recommendations are provided:

- Groundwater Alternative GW2, Option 3 is the recommended groundwater alternative to address TTZ-1 because it is the most cost-effective active remediation alternative, and would help expedite the reduction of site contaminants in soil and groundwater.
- The performance objectives for active remediation (biosparging) for groundwater cleanup should be changed from GCTLs, to NADC criteria. Performance objectives for the long-term monitoring program will be to meet GCTLs.
- Groundwater results should be evaluated to assess the collapse of the plume over time and to determine which sparge wells could be taken out of service once NADC criteria are attained.
- Based on an annual evaluation of treatment effectiveness, reducing the groundwater monitoring well network should be considered.
- Concentrations of COCs in soils do not exceed SCTLs for direct exposure residential or industrial standards, based on the September 2006 and December 2006 quarterly sampling events. Additionally, SPLP sampling indicates that residual soil contamination from COCs does not pose a leachability threat to groundwater quality. The methylene chloride exceedance of the LGW standards appears to be anomalous, and should be verified with another soil sampling event. Based on these observations, no further action (NFA) is recommended for soils.
- Establish a protocol to more accurately measure DO and carbon dioxide content in groundwater, real-time during biosparge operations (e.g., establish accuracy with the use of a Hach® or alternate optical DO meter, or establish an alternate method of sample collection by retrofitting the wellhead cap with flow-through tubing and aboveground

measurement equipment). The current method of measuring DO several days after the biosparge system is shutdown allows the aquifer to revert to natural conditions and does not provide an accurate representation of DO levels during biosparging operations.

10.0 References

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Tables

TABLE 1
Florida Cleanup Target Levels for COCs in Groundwater and Soil at Building 46

	Groundwater		Soil		
COC	**NADC (µg/L)**	**GCTL (µg/L)**	**Residential (mg/kg)**	**Commercial/ Industrial (mg/kg)**	**LGW**
Benzene	10	1	1.2	1.7	0.007
Ethylbenzene	300	30	1,500	9,200	0.6
MTBE	200	20	4,400	24,000	0.09
Naphthalene	140	14	55	300	1.2
Toluene	400	40	7,500	60,000	0.5
Total Xylenes	200	20	130	700	0.2
TRPH	50,000	5,000	460	2,700	340

COC chemical of concern
NADC Natural Attenuation Default Concentration
MNA monitored natural attenuation
µg/L micrograms per liter
GCTL Groundwater Cleanup Target Level
SCTL Soil Cleanup Target Level
LGW Leachability Based on Groundwater Criteria
mg/kg milligrams per kilogram
MTBE methyl tertiary butyl ether
TRPH total recoverable petroleum hydrocarbons

TABLE 2
Representative Groundwater pH and Dissolved Oxygen from Select Wells at Building 46

	CEF-46-1S					CEF-46-7I					CEF-46-13I					CEF-46-26I				
Date	pH	DO (mg/L)*	DO (mg/L)**	ORP (mV)	Carbon Dioxide (mg/L)	pH	DO (mg/L)*	DO (mg/L)**	ORP (mV)	Carbon Dioxide (mg/L)	pH	DO (mg/L)*	DO (mg/L)**	ORP (mV)	Carbon Dioxide (mg/L)	pH	DO (mg/L)*	DO (mg/L)**	ORP (mV)	Carbon Dioxide (mg/L)
12/2000	6.20	1.05	NM	NM	NM	4.90	1.11	NM	NM	317	5.40	NM	NM	NM	188	8.53	0.03	NM	NM	24.2
03/2001	6.20	2.30	NM	NM	NM	5.30	2.70	NM	NM	NM	5.20	1.80	NM	NM	NM	5.10	2.30	NM	NM	NM
06/29/01	5.97	NM	NM	NM	NM	NM	NM	NM	NM	NM	4.99	NM	NM	NM	NM	4.63	NM	NM	NM	NM
09/2001	6.62	1.84	NM	NM	NM	4.33	1.19	NM	NM	NM	4.93	6.60	NM	NM	NM	3.97	0.93	NM	NM	NM
12/2001	6.00	1.19	NM	NM	NM	2.00	1.75	NM	NM	NM	4.00	1.16	NM	NM	NM	3.00	1.87	NM	NM	NM
03/2002	6.55	1.21	NM	NM	NM	2.69	1.81	NM	NM	NM	5.03	1.27	NM	NM	NM	3.58	1.29	NM	NM	NM
06/2002	6.56	0.94	NM	NM	NM	2.65	2.83	NM	NM	NM	4.15	0.66	NM	NM	NM	3.54	1.04	NM	NM	NM
09/2002	6.42	0.15	NM	NM	NM	2.97	0.51	NM	NM	NM	4.72	0.23	NM	NM	NM	3.29	0.25	NM	NM	NM
12/2002	6.94	0.28	NM	NM	NM	3.52	0.15	NM	NM	NM	3.96	0.17	NM	NM	NM	3.79	0.75	NM	NM	NM
03/2003	7.54	0.89	NM	-204.00	ND	3.23	5.24	NM	360.00	121	6.29	0.99	NM	-31.00	280	6.34	4.66	NM	3.00	ND
06/2003	6.39	0.00	NM	-238.00	Interference	3.80	1.05	NM	278.00	233	3.71	0.00	NM	1.00	Interference	3.31	0.00	NM	-2.00	Interference
09/2003	6.27	2.03	NM	-364.00	Interference	4.51	0.12	NM	81.00	143	3.81	0.36	NM	57.00	Interference	3.40	0.12	NM	111.00	Interference
12/2003	5.98	0.00	ND	-332.00	400	5.19	0.67	ND	-170.00	70	3.93	1.11	ND	160.00	Interference	3.52	0.00	ND	151.00	Interference
03/2004	6.48	NM	ND	-278.00	Interference	4.89	NM	ND	120.00	75	3.76	0.50	ND	NM	Interference	3.51	NM	ND	203.00	Interference
06/2004	6.00	0.04	ND	-296.00	Interference	3.67	0.24	ND	256.00	99	3.08	0.34	1.0	286.00	Interference	2.43	0.32	4.0	284.00	Interference
09/2004	7.42	0.00	ND	-234.00	Interference	3.55	0.00	ND	163.00	68	4.96	0.17	ND	-32.00	Interference	3.69	0.00	ND	91.00	Interference
12/2004	6.39	0.15	ND	-356.90	362	5.62	0.06	ND	-50.60	217	3.93	0.06	ND	37.70	Interference	2.62	0.11	ND	371.60	Interference
03/2005	6.23	0.18	ND	-347.60	170	4.90	0.12	ND	-79.20	122	2.92	0.75	ND	494.30	Interference	2.90	0.12	ND	250.30	Interference
06/2005	6.24	0.71	ND	-347.10	140	4.04	0.67	ND	-39.50	148	2.98	0.71	ND	361.30	Interference	2.54	0.82	ND	297.10	Interference
09/2005	6.52	0.20	ND	-367.70	140	3.65	0.15	ND	253.60	140	3.84	0.84	ND	-90.00	Interference	3.40	0.06	ND	74.90	Interference
12/2005	6.92	0.22	ND	-269.80	123	3.90	0.40	ND	258.30	113	3.55	0.47	ND	257.70	167	3.50	0.43	ND	225.50	Interference
03/2006	5.73	0.24	ND	-129.80	280	4.40	0.38	ND	120.70	128	2.48	0.63	ND	571.60	246	2.84	0.46	ND	498.40	Interference
06/2006	4.30	0.50	ND	-130.00	83	2.04	0.68	ND	37.20	176	3.04	0.26	ND	125.10	58	2.72	0.23	ND	281.80	Interference
09/2006	NM	NM	NM	NM	NM	4.84	0.25	ND	3.40	105	3.86	0.47	ND	-42.30	395	3.78	0.42	ND	-63.80	Interference
12/2006	3.29	0.59	ND	5.10	426	3.39	2.30	4.2	468.20	181	4.07	1.03	ND	121.60	242	3.24	0.69	ND	100.60	Interference

NM Not measured
DO dissolved oxygen
mg/L milligrams per liter
mV millivolts
ND Not Detected

* Horiba Multimeter
**Dissolved Oxygen Hach Test Kit

TABLE 3
Existing Biosparge System Specifications

	East System	West System
Airflow (Volume)	14 acfm	20 acfm
Airflow (Pressure)	50 psig	50 psig
Total Wells	19	11
Intermediate Wells	8	8
Deep Wells	11	3
Total Operating Wells	10	7
Leg 1	4	4
Leg 2	6	3

acfm actual cubic feet per meter
psig pounds per square inch gauge

Table 4
Historical Maximum Groundwater COC Concentrations Detected at Building 46 Site*

Date	Total BTEX			MTBE			Naphthalene			TRPH		
	Shallow (Sample Location)	**Intermediate** (Sample Location)	**Deep** (Sample Location)	**Shallow** (Sample Location)	**Intermediate** (Sample Location)	**Deep** (Sample Location)	**Shallow** (Sample Location)	**Intermediate** (Sample Location)	**Deep** (Sample Location)	**Shallow** (Sample Location)	**Intermediate** (Sample Location)	**Deep** (Sample Location)
06/1998	**78200** (CEF-46-1S)	**34000** (CEF-46-1I)	**217.7** (CEF-46-6D)	NM	NM	NM	**660** (CEF-46-1S)	**250** (CEF-46-7I)	**ND**	**60000** (CEF-46-1S)	**3000** (CEF-46-7I)	**1600** (CEF-46-6D)
12/2000	**74900** (CEF-46-1S)	**43900** (CEF-46-7I)	**36.7** (CEF-46-6D)	NA	NM	NM	**550** (CEF-46-1S)	**260** (CEF-46-7I)	**3.5** (CEF-46-6D)	**23000** (CEF-46-1S)	**13000** (CEF-46-7I)	**<560** (CEF-46-6D)
01/2001	**13.06** (CEF-46-2S)	**25800** (CEF-46-7I)	**12.11** CEF-46-24D)	**7.1** (CEF-46-2S)	**6100** (CEF-46-7I)	**<1** (ALL WELLS)	**11** (CEF-46-2S)	**120** (CEF-46-7I)	**<1.1** (CEF-46-6D)	**540** (CEF-46-2S)	**17000** (CEF-46-7I)	**<530** (CEF-46-14D)
03/2003	**7522** (CEF-46-1S)	**2086** (CEF-46-7I)	**6** (CEF-46-6D)	**619** (CEF-46-1S)	**4380** (CEF-46-7I)	**<1** (ALL WELLS)	**496** (CEF-46-1S)	**<2** (ALL WELLS)	**<2** (ALL WELLS)	**77000** (CEF-46-1S)	**5480** (CEF-46-7I)	**274** (CEF-46-6D)
06/2003	**2276** (CEF-46-1S)	**1604.6** (CEF-46-7I)	**8.7** (CEF-46-6D)	**511** (CEF-46-1S)	**4190** (CEF-46-7I)	**1** (CEF-46-14D)	**947** (CEF-46-1S)	**32.4** (CEF-46-7I)	**<1** (CEF-46-6D)	**33200** (CEF-46-1S)	**4080** (CEF-46-7I)	**<211** (CEF-46-14D)
09/2003	**4580** (CEF-46-1S)	**1687** (CEF-46-7I)	**3.3** (CEF-46-6D)	**365** (CEF-46-1S)	**5140** (CEF-46-7I)	**<1** (ALL WELLS)	**661** (CEF-46-1S)	**123** (CEF-46-7I)	**<1** (CEF-46-6D)	**38300** (CEF-46-1S)	**2530** (CEF-46-7I)	**<225** (ALL WELLS)
12/2003	**6362** (CEF-46-1S)	**1140** (CEF-46-7I)	**<3.0** (CEF-46-6D)	**432** (CEF-46-1S)	**5820** (CEF-46-7I)	**<1** (ALL WELLS)	**501** (CEF-46-1S)	**96.2** (CEF-46-7I)	**<1** (CEF-46-6D)	**39600** (CEF-46-1S)	**5410** (CEF-46-7I)	**<200** (ALL WELLS)
03/2004	**4582** (CEF-46-1S)	**1046.6** (CEF-46-26I)	**<3** (ALL WELLS)	**486** (CEF-46-1S)	**3460** (CEF-46-7I)	**4.2** (CEF-46-14D)	**508** (CEF-46-1S)	**2.15** (CEF-46-7I)	**<0.1** (ALL WELLS)	**16200** (CEF-46-1S)	**1900** (CEF-46-7I)	**<100** (ALL WELLS)
06/2004	**1367** (CEF-46-1S)	**1338.6** (CEF-46-26I)	**<1** (ALL WELLS)	**310** (CEF-46-1S)	**3080** (CEF-46-7I)	**2.4** (CEF-46-14D)	**342** (CEF-46-1S)	**3.34** (CEF-46-7I)	**<2.20** (CEF-46-14D)	**15400** (CEF-46-1S)	**650** (CEF-46-7I)	**<220** (CEF-46-14D)
09/2004	**2613.2Y** (CEF-46-1S)	**929.09 Y** (CEF-46-7I)	**<1 Y** (ALL WELLS)	**276Y** (CEF-46-1S)	**2190Y** (CEF-46-7I)	**2.97Y** (CEF-46-14D)	**252 J3, Y** (CEF-46-1S)	**0.242 J3, 1Y** (CEF-46-7I)	**<2.20 J3 Y** (CEF-46-14D)	**33300Y** (CEF-46-1S)	**980 Y** (CEF-46-7I)	**<220 Y** (CEF-46-6D)
12/2004	**1697.4** (CEF-46-1S)	**1619.2** (CEF-46-7I)	**2.53I** (CEF-46-6D)	**216.1** (CEF-46-1S)	**1943** (CEF-46-7I)	**2.5** (CEF-46-14D)	**621.4** (CEF-46-1S)	**131.2** (CEF-46-7I)	**<0.4I3** (CEF-46-24D)	**25200** (CEF-46-1S)	**1770** (CEF-46-7I)	**140 I V** (CEF-46-6D)
03/2005	**2113** (CEF-46-1S)	**1223.3** (CEF-46-7I)	**1.78I** (CEF-46-6D)	**334** (CEF-46-1S)	**1480** (CEF-46-7I)	**3.19** (CEF-46-14D)	**503** (CEF-46-1S)	**128** (CEF-46-7I)	**<0.112** (CEF-46-6D)	**23000** (CEF-46-1S)	**1570** (CEF-46-7I)	**<20** (CEF-46-14D)
06/2005	**2668** (CEF-46-1S)	**722.79** (CEF-46-7I)	**1.01I** (CEF-46-6D)	**270** (CEF-46-1S)	**628** (CEF-46-7I)	**1.38I** (CEF-46-14D)	**316** (CEF-46-1S)	**<0.101** (ALL WELLS)	**<0.101** (ALL WELLS)	**41100** (CEF-46-1S)	**1730** (CEF-46-26I)	**24 I** (CEF-46-6D)
09/2005	**3480** (CEF-46-1S)	**232.32** (CEF-46-7I)	**0.340I** (CEF-46-6D)	**133** (CEF-46-1S)	**1730** (CEF-46-7I)	**5.30** (CEF-46-14D)	**897** (CEF-46-1S)	**0.260I** (CEF-46-25I)	**<0.1** (ALL WELLS)	**51000** (CEF-46-1S)	**1280** (CEF-46-7I)	**<18** (ALL WELLS)
12/2005	**2218.7** (CEF-46-1S)	**1163.3** (CEF-46-7I)	**45.12** (CEF-46-23D)	**644** (CEF-46-1S)	**2140** (CEF-46-7I)	**27.4** (CEF-46-17D)	**709** (CEF-46-1S)	**28.6** (CEF-46-7I)	**<0.111** (CEF-46-14D & 23D)	**35500** (CEF-46-1S)	**970** (CEF-46-7I)	**158 I** (CEF-46-17D)
3/2006	**714.4** (CEF-46-1S)	**201.65** (CEF-46-7I)	**<0.298** (ALL WELLS)	**267** (CEF-46-1S)	**1290** (CEF-46-7I)	**1.07** (CEF-46-14D)	**544** (CEF-46-1S)	**33.7** (CEF-46-7I)	**<0.100** (ALL WELLS)	**35300** (CEF-46-1S)	**390** (CEF-46-26I)	**<18** (ALL WELLS)
6/2006	**1096.9** (CEF-46-1S)	**251.91** (CEF-46-7I)	**<0.433** (ALL WELLS)	**187** (CEF-46-1S)	**652** (CEF-46-7I)	**<0.336** (ALL WELLS)	**322** (CEF-46-1S)	**60.7** (CEF-46-7I)	**<0.100** (ALL WELLS)	**17100** (CEF-46-1S)	**832** (CEF-46-7I)	**125** (CEF-46-24D)
9/2006	**1767.7** (CEF-46-1S)	**192.78** (CEF-46-7I)	**<0.433** (ALL WELLS)	**140** (CEF-46-1S)	**296L** (CEF-46-7I)	**<0.336** (ALL WELLS)	**502** (CEF-46-1S)	**75.1** (CEF-46-7I)	**<0.100** (ALL WELLS)	**12300** (CEF-46-1S)	**561** (CEF-46-5I)	**361** (CEF-46-6D)
12/2006	**375.1** (CEF-46-1S)	**4.69** (CEF-46-26I)	**1.22** (CEF-46-6D)	**23.1** (CEF-46-1S)	**372** (CEF-46-7I)	**<0.336** (ALL WELLS)	**187** (CEF-46-1S)	**0.8901** (CEF-46-25I)	**0.3701** (CEF-46-6D)	**4130** (CEF-46-1S)	**551** (CEF-46-25I)	**741** (CEF-46-6D)
% Reduction (06/1998 to 12/2006)	**99.5**	**99.99**	**99.4**	**96.2**	**93.90**	**99.99**	**72**	**99.6**	**89.43**	**93**	**82**	**54**

J3 The reported value failed to meet the established quality control criteria for either precision and/or accuracy.
Y Sample was received into laboratory out of acceptable temperature range
I The reported value is between the laboratory method and detection limit
NM Not Measured
NA Not Applicable
ND Non-Detect
"V" The analyte was detected in both the sample and the associated method blank
* All concentrations reported in micrograms per liter(µg/L).

TABLE 5
Historical Maximum Soil COC Detections at the Building 46 Site*

Date	Total BTEX (Sample Location)	MTBE (Sample Location)	Naphthalene (Sample Location)	TRPH (Sample Location)
08/1998	**426.2** (S-34)	NM	**1.3** (S-34)	**840** (S-36)
01/04/01	**747.1** (S-2)	**3.8** (S-2)	**7.3** (S-1)	**9900** (S-1)
06/27/01	**525.4** (S-2)	**0.015** (S-14)	**1.4** (S-1)	**1300** (S-2)
09/20/01	**328.51** (S-2)	**<0.15** (S-1)	**8.8** (S-1)	**1500** (S-1)
12/12/01	**829** (S-2)	**0.012** (S-14)	**34** (S-2)	**1800** (S-2)
03/07/02	**493.7** (S-2)	**0.0021** (S-14)	**24** (S-2)	**2000** (S-2)
06/20/02	**220** (S-14)	**<0.12** (S-2)	**11** (S-2)	**550** (S-2)
09/26/02	**642.57** (S-1)	**0.00268** (S-2)	**21.1** (S-1)	**970** (S-2)
12/13/02	**101.51** (S-2)	**<3.06** (S-2)	**9.98** (S-2)	**428** (S-2)
03/15/03	**398** (S-2)	**<0.532** (S-2)	**10.7** (S-2)	**997** (S-2)
06/09/03	**88** (S-2)	**0.006** (S-14)	**11.2** (S-2)	**413** (S-14)
09/04/03	**137** (S-2)	**0.011** (S-1)	**10.7** (S-2)	**453** (S-2)
12/11/03	**217** (S-2)	**0.228** (S-1)	**39.2** (S-2)	**1010** (S-2)
03/18/04	**8.0217** (S-2)	**0.015** (S-2)	**1.1** (S-2)	**48.2** (S-2)
06/07/04	**8.26** (S-2)	**<0.514** (S-1)	**3.32** (S-2)	**657** (S-2)
09/20/04	**25.431Y** (S-2)	**0.612Y** (S-14)	**15.1Y** (S-14)	**633Y** (S-14)
12/01/04	**248.319** (S-2)	**<0.05174** (S-2)	**9.7** (S-2)	**645** (S-2)
03/13/05	**4.848** (S-1)	**0.191** (S-2)	**1.11** (S-1)	**35** (S-1)
06/09/05	**1.055** (S-2)	**<0.0693** (S-2 & S-14)	**0.224** (S-14)	**31.2** (S-2)
09/07/05	**67.8** (S-2)	**<0.132** (S-2)	**6.15** (S-2)	**357** (S-2)
12/05/05	**27.02** (S-2)	**<0.0916** (S-2)	**1.14** (S-2)	**87.2** (S-2)
03/29/06	**23.01** (S-2)	**<.177** (S-1)	**4.36** (S-1)	**190** (S-1)
06/09/06	**25.66** (S-2)	**<0.00192** (S-2)	**9.99** (S-2)	**553** (S-2)
09/24/06	**2.141** (S-14)	**1.420J** (S-14)	**0.374** (S-14)	**16.3** (S-14)
12/08/06	**36.92** (S-14)	**0.0565** (S-14)	**1.970** (S-14)	**91.1** (S-14)
% Reduction (08/1998 to 12/2006)	**91**	**---**	**-52**	**89**

J = Estimated Value
Y = Sample was received into laboratory out of acceptable temperature range
I = The reported value is between the laboratory method and detection limit
NM = Not Measured
NA = Not Applicable
"V" = The analyte was detected in both the sample and the associated method blank
* All concentrations in mg/kg

TABLE 6
Technology Optimization Summary

Media Addressed	Alternative	Option	Technology Description
TTZ-1 (Groundwater)	GW1	1	Expand the sparge well field targeting GCTL exceedances and operate select sparge wells using current rental equipment.
TTZ-1 (Groundwater)	GW1	2	Expand the sparge well field targeting GCTL exceedances and operate select sparge wells using purchased equipment.
TTZ-1 (Groundwater)	GW1	3	Expand the sparge well field targeting GCTL exceedances and operate select sparge wells using salvaged equipment.
TTZ-1 (Groundwater)	GW2	1	Reconfigure the sparge well field to target only exceedance of NADC criteria and operate select sparge wells using current rental equipment.
TTZ-1 (Groundwater)	GW2	2	Reconfigure the sparge well field to target only exceedance of NADC criteria and operate select sparge wells using newly-purchased equipment.
TTZ-1 (Groundwater)	GW2	3	Reconfigure the sparge well field to target only exceedance of NADC criteria and operate select sparge wells using salvaged equipment.
TTZ-1 (Groundwater)	GW3	NA	Monitor select wells without active groundwater treatment.

TABLE 7
Summary of Alternatives for Options of Remedial Action at TTZ1

Alternative	Effectiveness	Implementability	Uncertainty	Cost
Alternative GW1, Option 1	• Effective in contaminant mass removal • Will effectively treat groundwater plumes	• Requires planning and onsite activity for well and equipment installation • Minimal site disruption during well installation • Minor site & system operation disruption for equipment installation	• Time to achieve effective contaminant reduction to GCTLs • Groundwater concentrations must remain below GCTLs to operate only select wells • Global RBCA application and FDEP acceptance	$768,000
Alternative GW1, Option 2	• Same as Option 1 above.	Same as Option 1 above.	• Same as Option 1 above.	$569,000
Alternative GW1, Option 3	• Same as Option 1 above. Additionally, will combine East and West biosparge systems into one system.	Same as Option 1 above, but with additional site disruption due to installation of piping (directional drilling) to connect east & west biosparge systems	• Same as Option 1 above.	$534,000
Alternative GW2, Option 1	• Effective in contaminant mass removal • Will effectively treat groundwater plumes	• Requires planning and onsite activity for well and equipment installation • Minimal site disruption during well installation	• Time to achieve reduction to default MNA criteria • Time required to operate MNA program until GCTLs are attained • Groundwater concentrations must remain below default MNA criteria to discontinue operation of treatment system • Global RBCA application and FDEP acceptance	$204,000
Alternative GW2, Option 2	• Same as Option 1 above.	Same as Option 1 above, but with minor site & system operation disruption for equipment installation.	• Same as Option 1 above.	$167,000
Alternative GW2, Option 3	• Same as Option 1 above.	• Same as Option 1 above, but with minor site & system operation disruption for equipment installation.	• Same as Option 1 above.	$158,000
Alternative GW3	• Will effectively monitor groundwater plumes	• No site disruption – site activity limited to monitoring	• Time to achieve reduction to GCTLs from default MNA criteria	$92,000

Figures

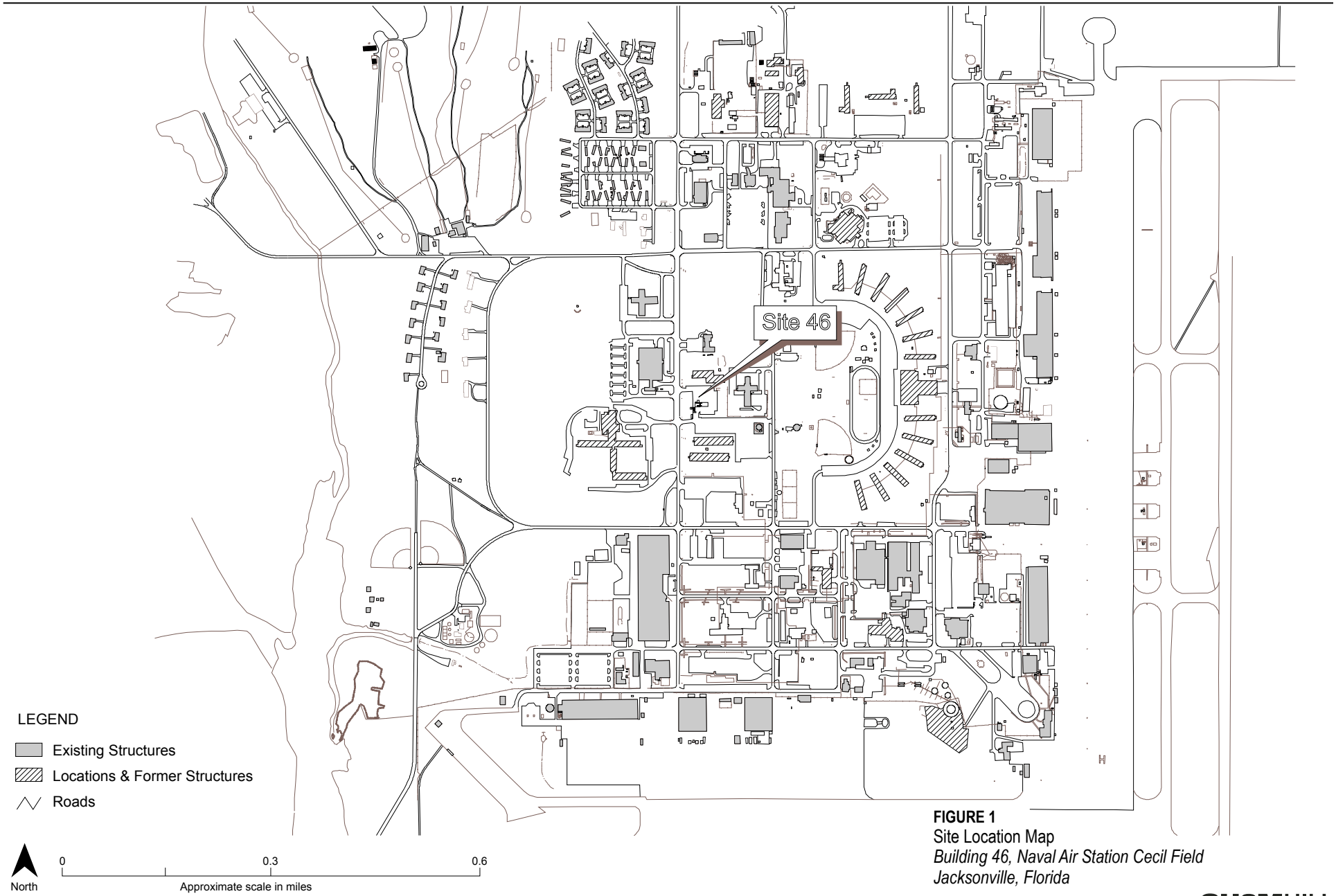
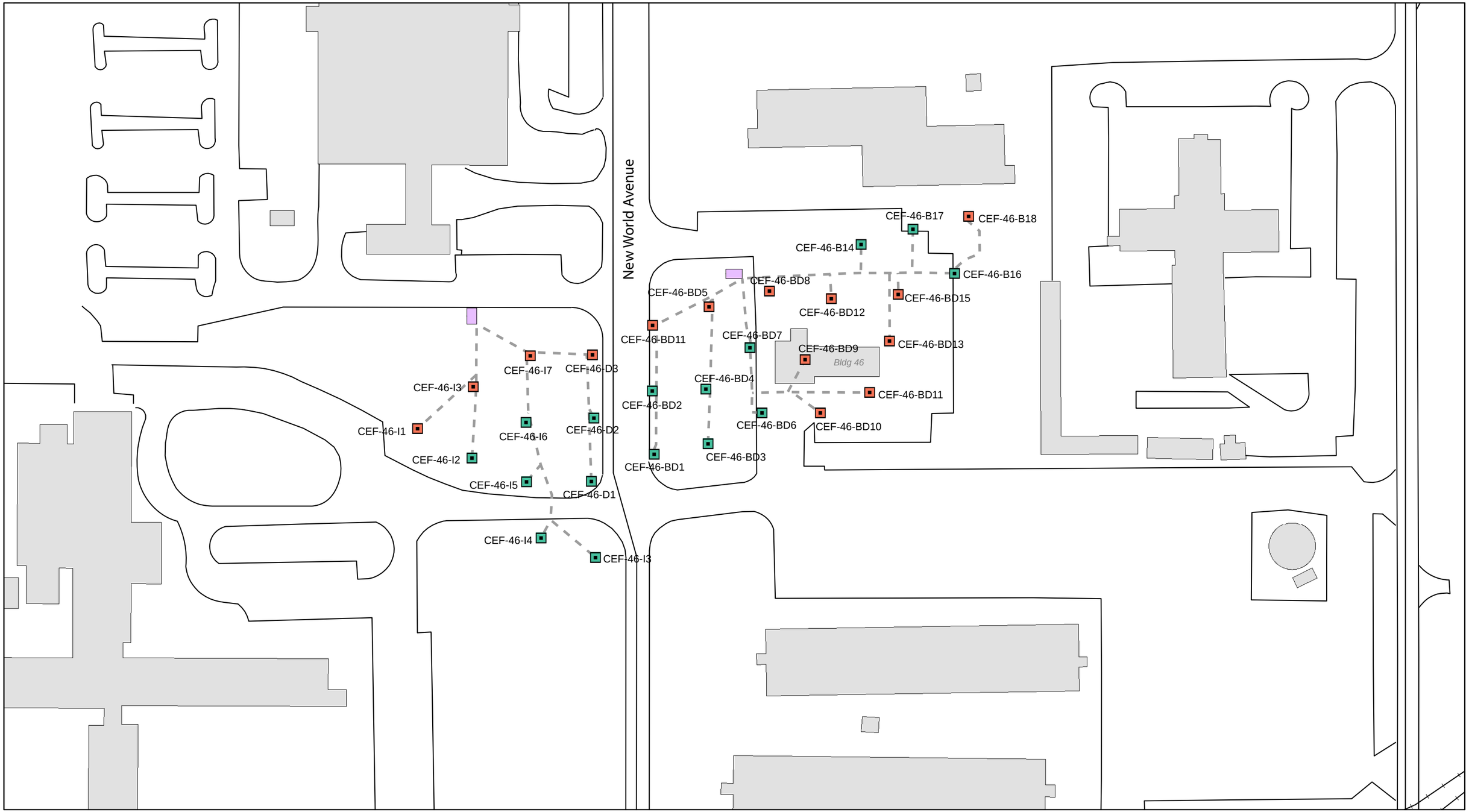


FIGURE 1
Site Location Map
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

ES092006012ATL Cecil107.ai



N

0 50 100 200 Feet

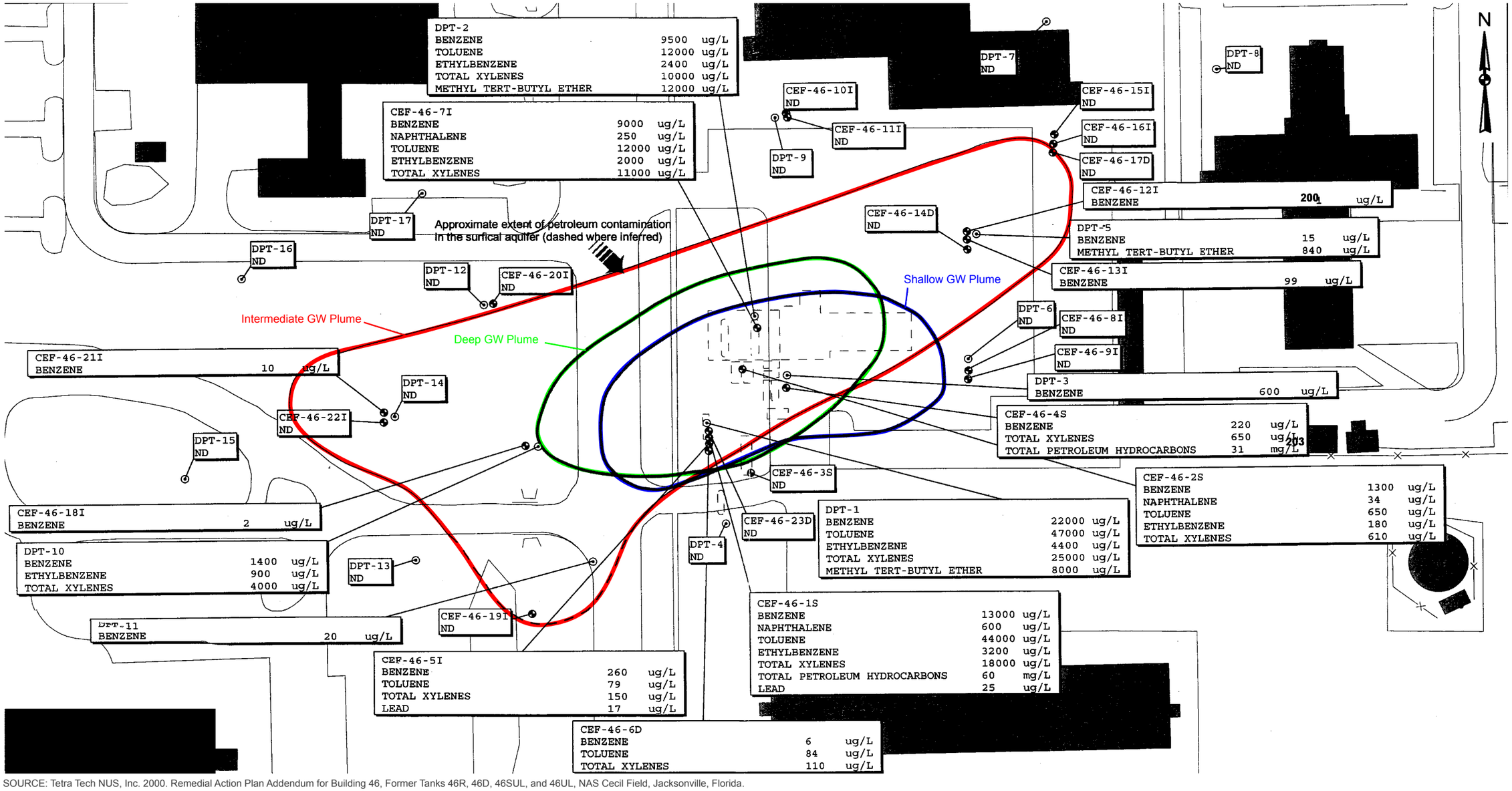
Air Sparge Injection Wells

- Active Existing Air Sparge Injection Well
- Non-Active Existing Air Sparge Injection Well
- Air Sparge Equipment Trailer
- Existing Injection Line
- Road
- Building

Figure 2
Existing Biosparge Injection Well Locations
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

\\boomer\F\\Projects5\NASCecilField\MXD\Injection_Wells.mxd JKelly 9/26/2006



SOURCE: Tetra Tech NUS, Inc. 2000. Remedial Action Plan Addendum for Building 46, Former Tanks 46R, 46D, 46SUL, and 46UL, NAS Cecil Field, Jacksonville, Florida.

LEGEND

- Monitoring Well
- Direct Push Technology (DPT) Screening Location
- Intermediate GW Plume COCs Exceeding Respective GCTLs
- Deep GW Plume COCs Exceeding Respective GCTLs
- Shallow GW Plume COCs Exceeding Respective GCTLs

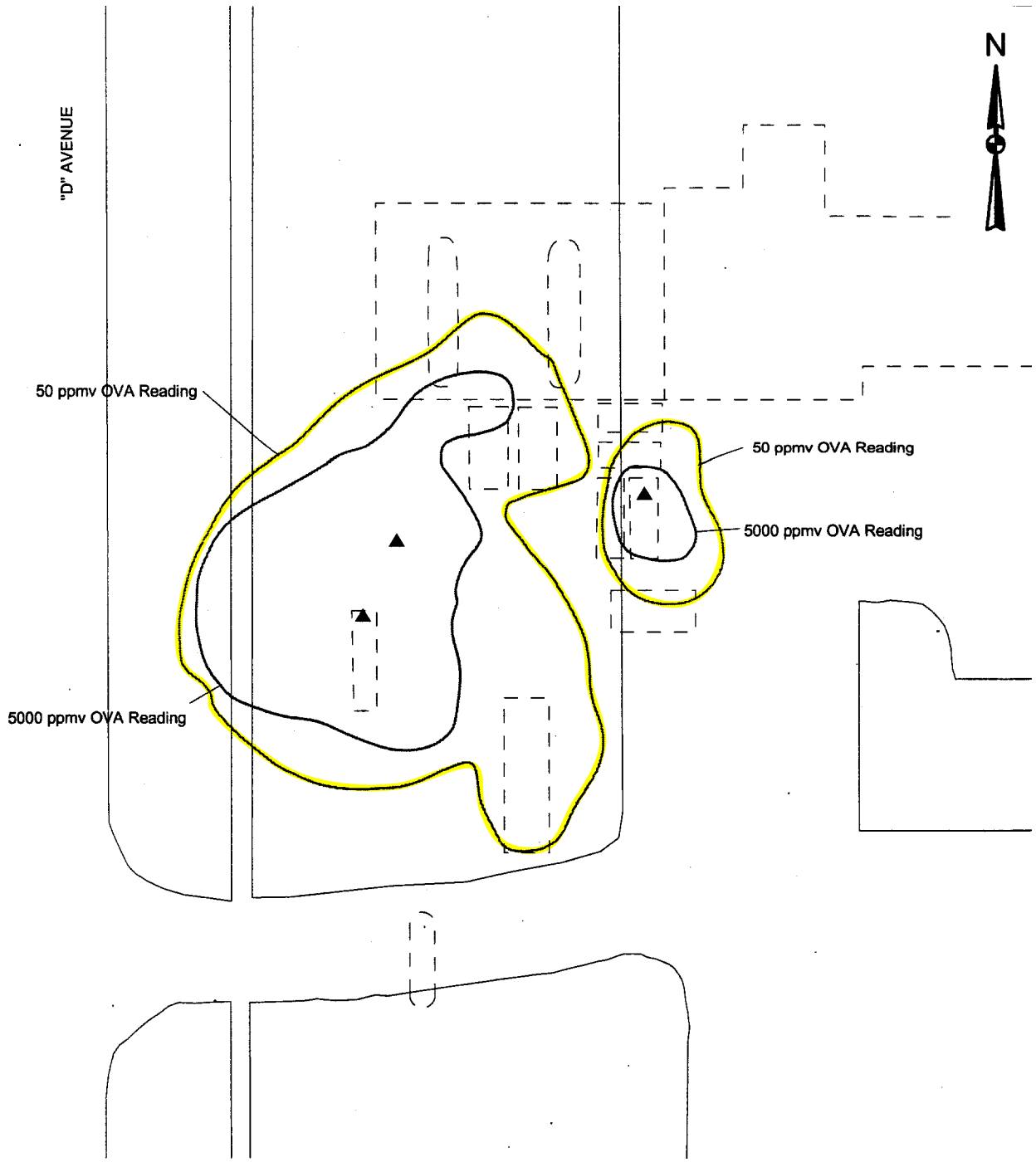
North

0 75 150
Approximate scale in feet

FIGURE 3
Baseline Groundwater COCs Concentration Map
(December 1998)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

ES092006012ATL Cecil105.ai



SOURCE: Tetra Tech NUS, Inc. 2000. Remedial Action Plan Addendum for Building 46, Former Tanks 46R, 46D, 46SUL, and 46UL, NAS Cecil Field, Jacksonville, Florida.

LEGEND

▲ Proposed Soil Monitoring Location

NOTE
All units are ppmv.

North

0 30 60
Approximate scale in feet

FIGURE 4
Baseline Soil Concentration Map (December 1998)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

ES092006012ATL Cecil106.ai

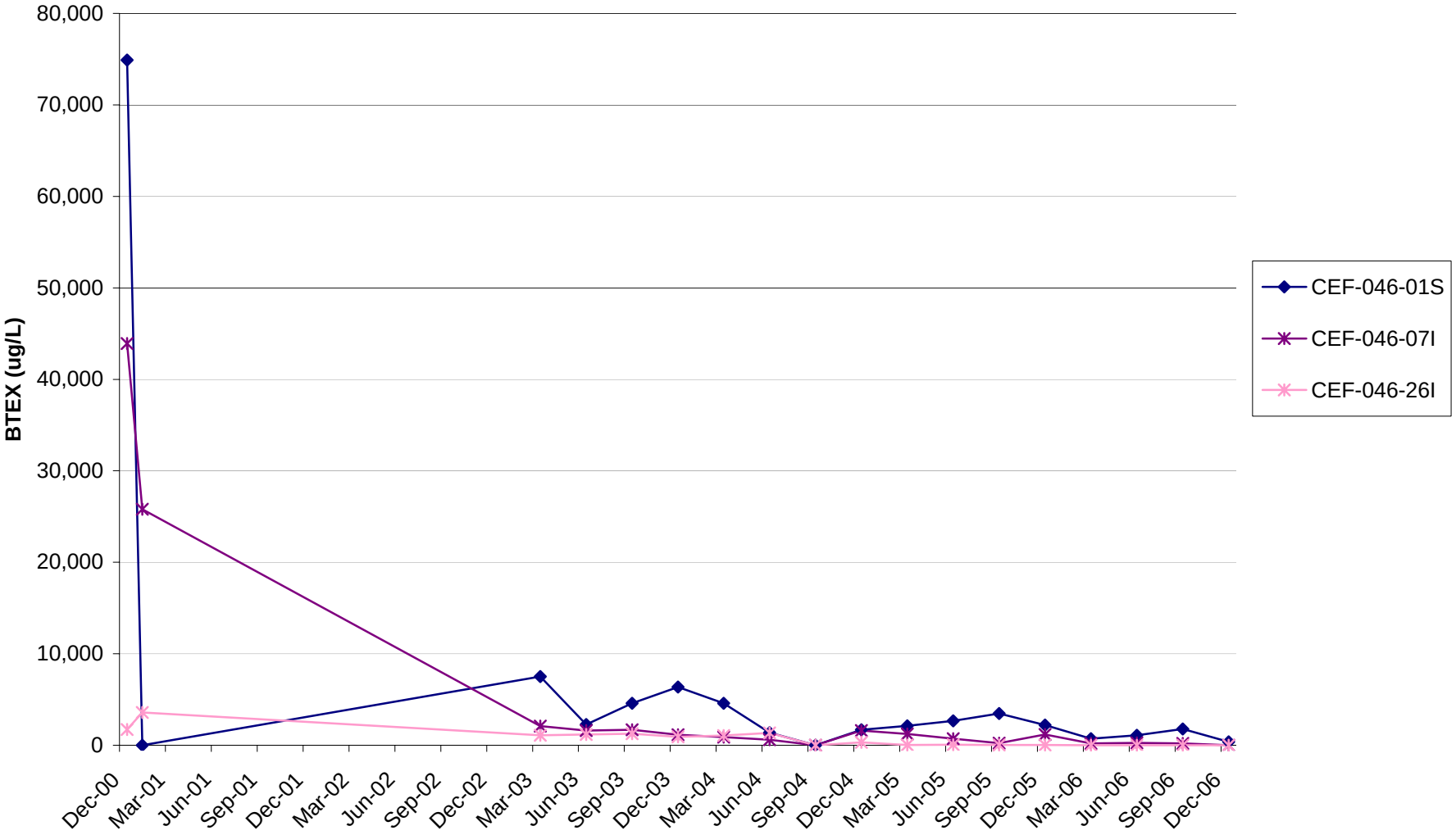


FIGURE 5a
Historical BTEX Concentrations (Outliers)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

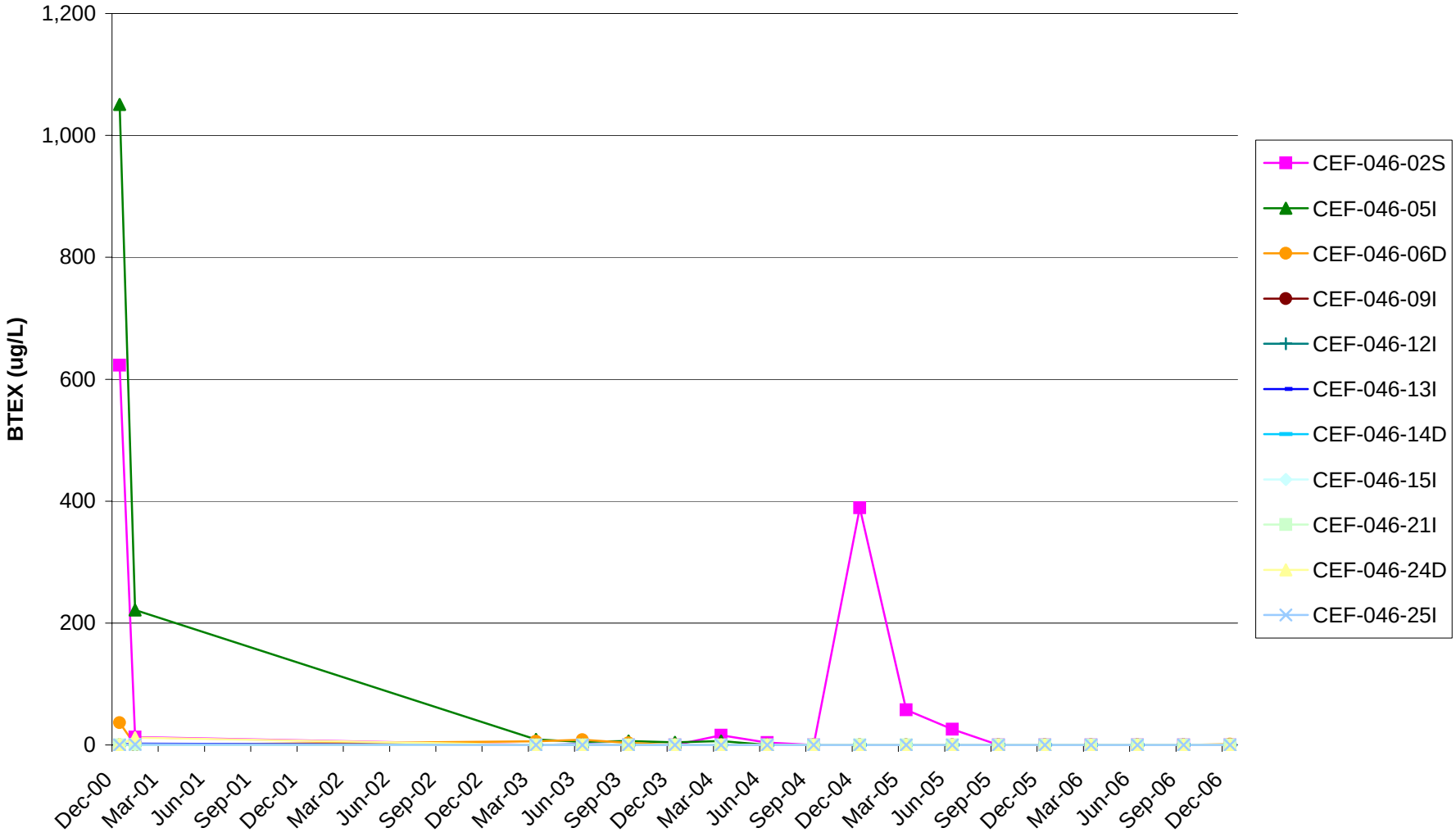


FIGURE 5b
Historical BTEX Concentrations
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

FIGURE 6a
Historical MTBE Concentrations (Outliers)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

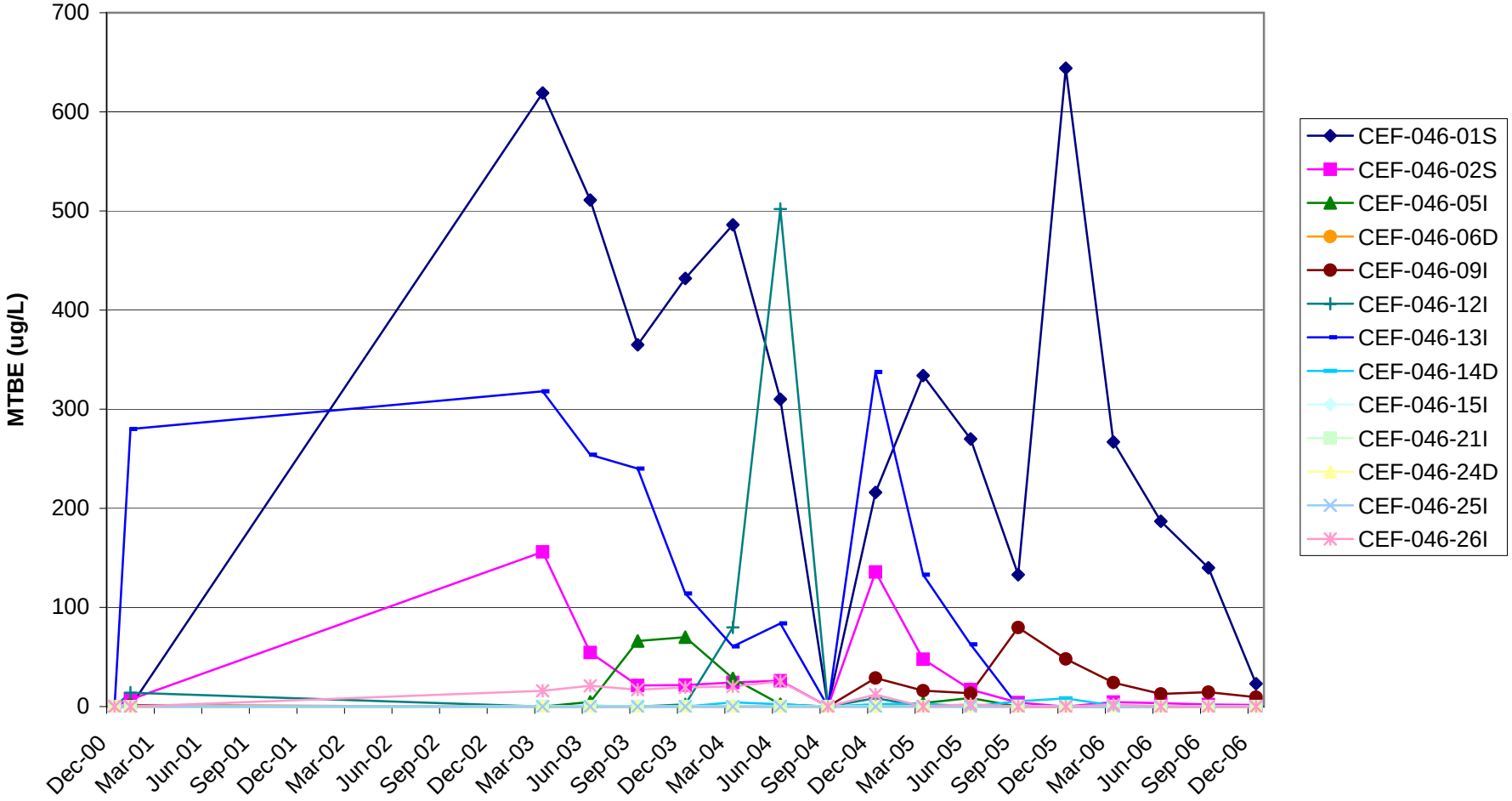


FIGURE 6b
Historical MTBE Concentrations
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

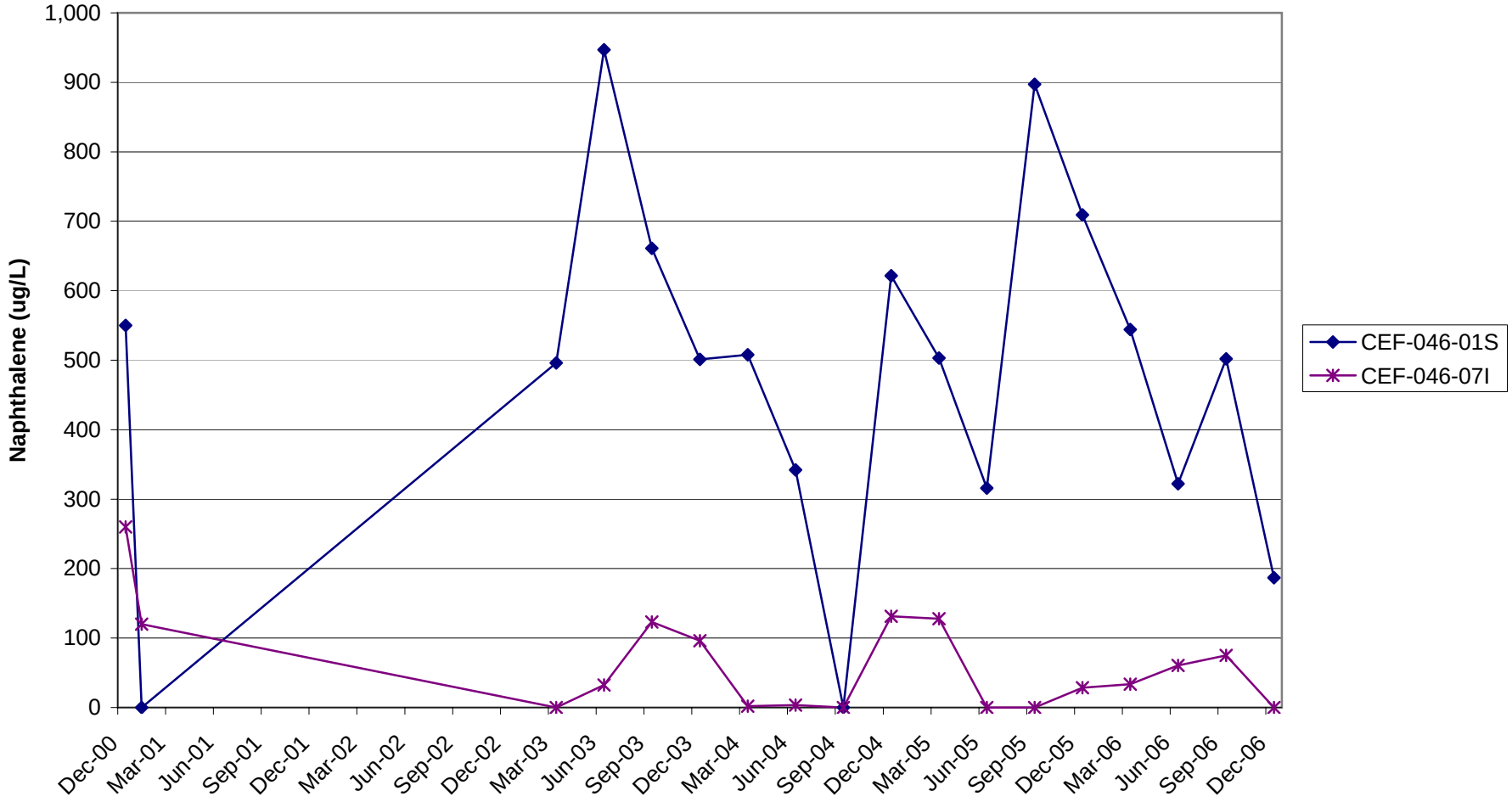


FIGURE 7a
Historical Naphthalene Concentrations (Outliers)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

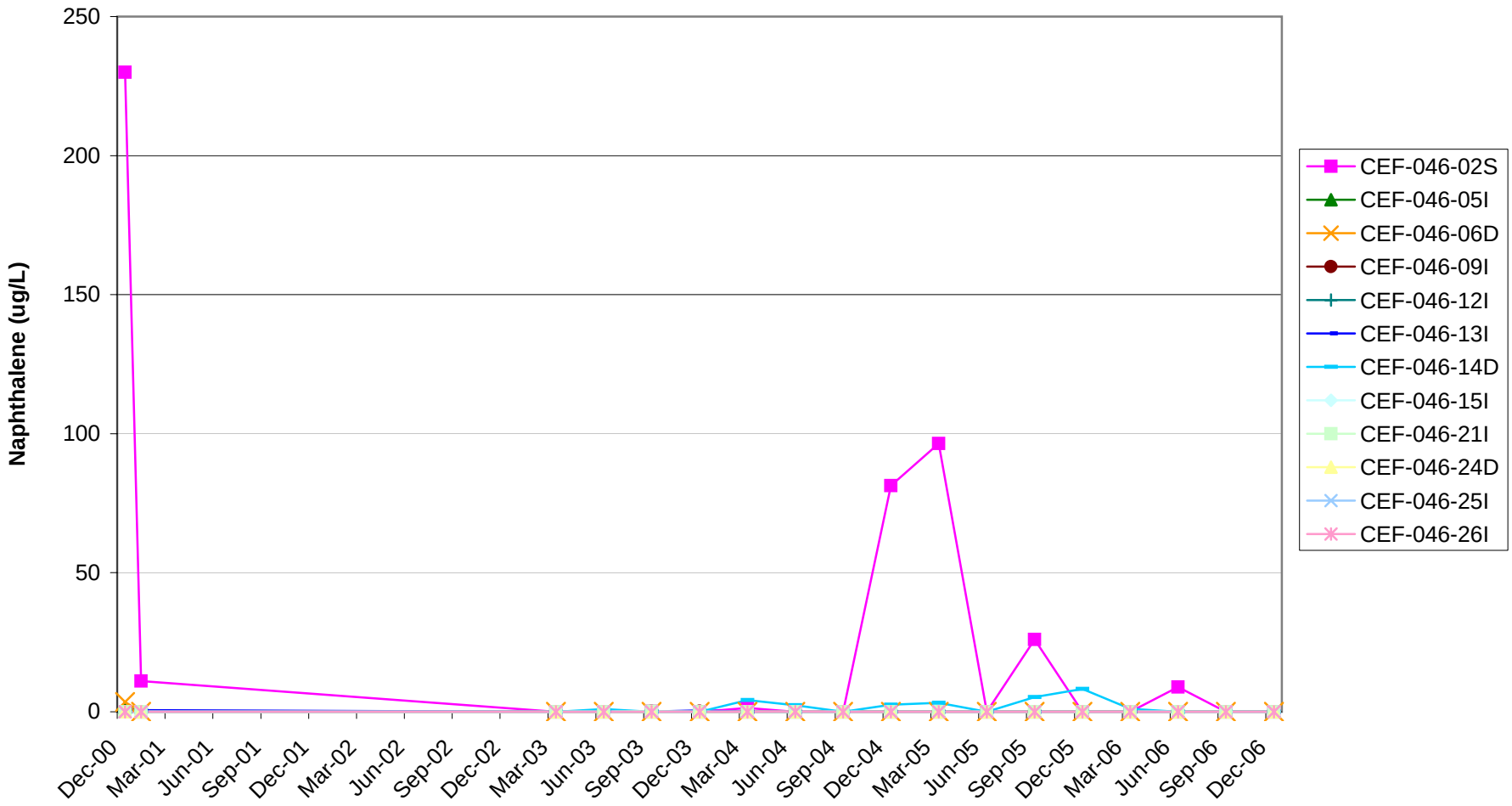


FIGURE 7b
Historical Naphthalene Concentrations
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

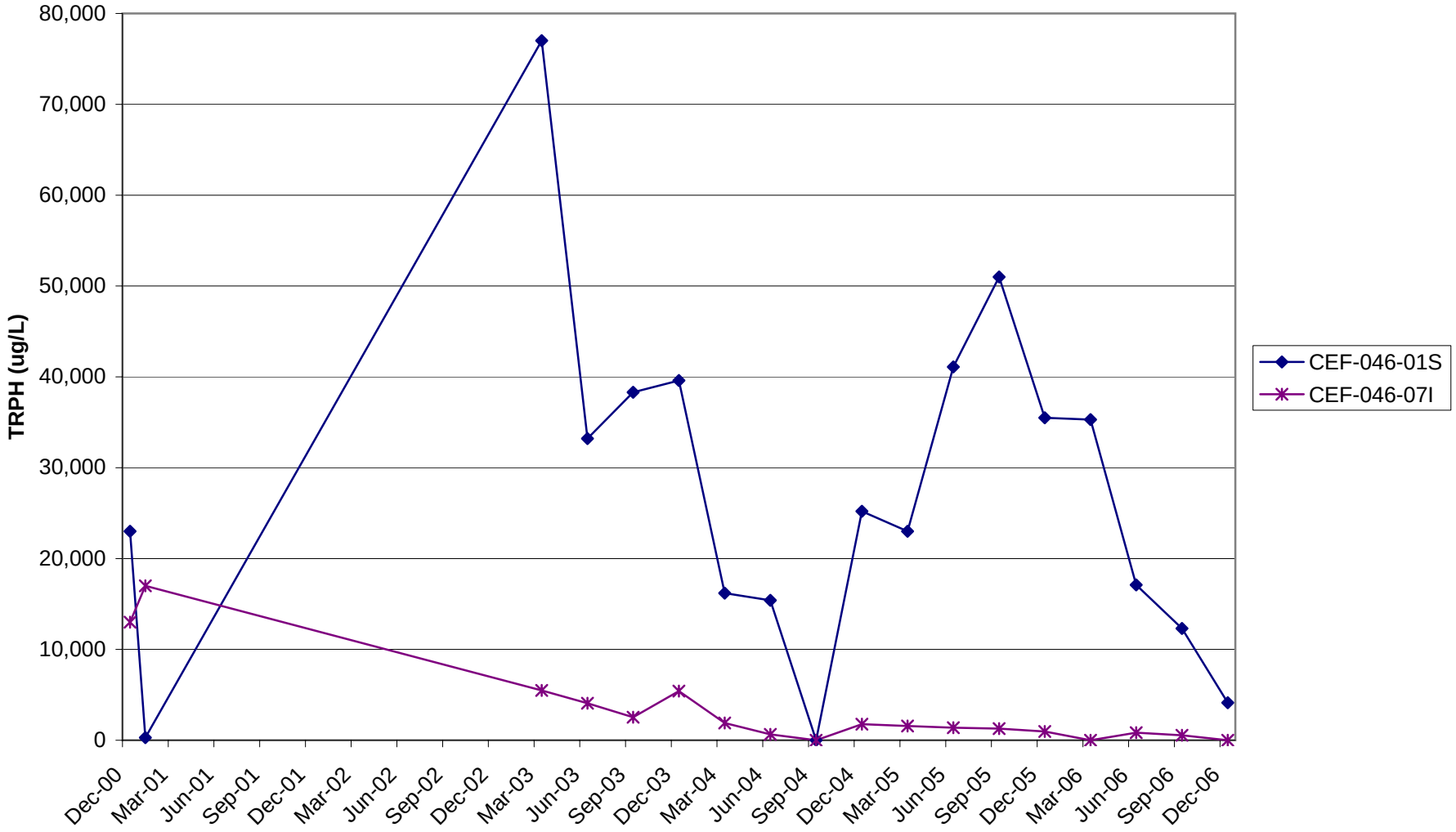


FIGURE 8a
Historical TRPH Concentrations (Outliers)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

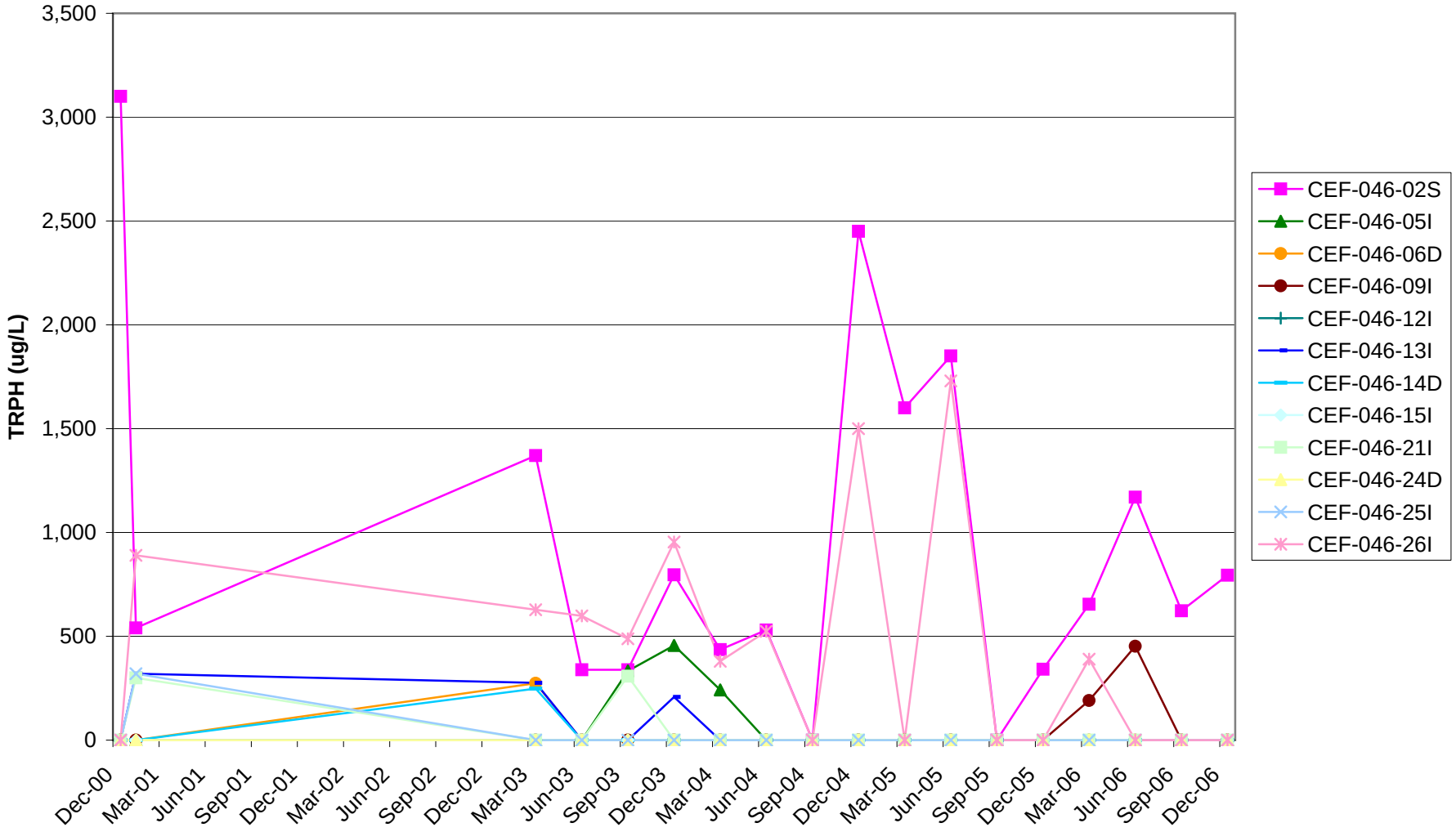
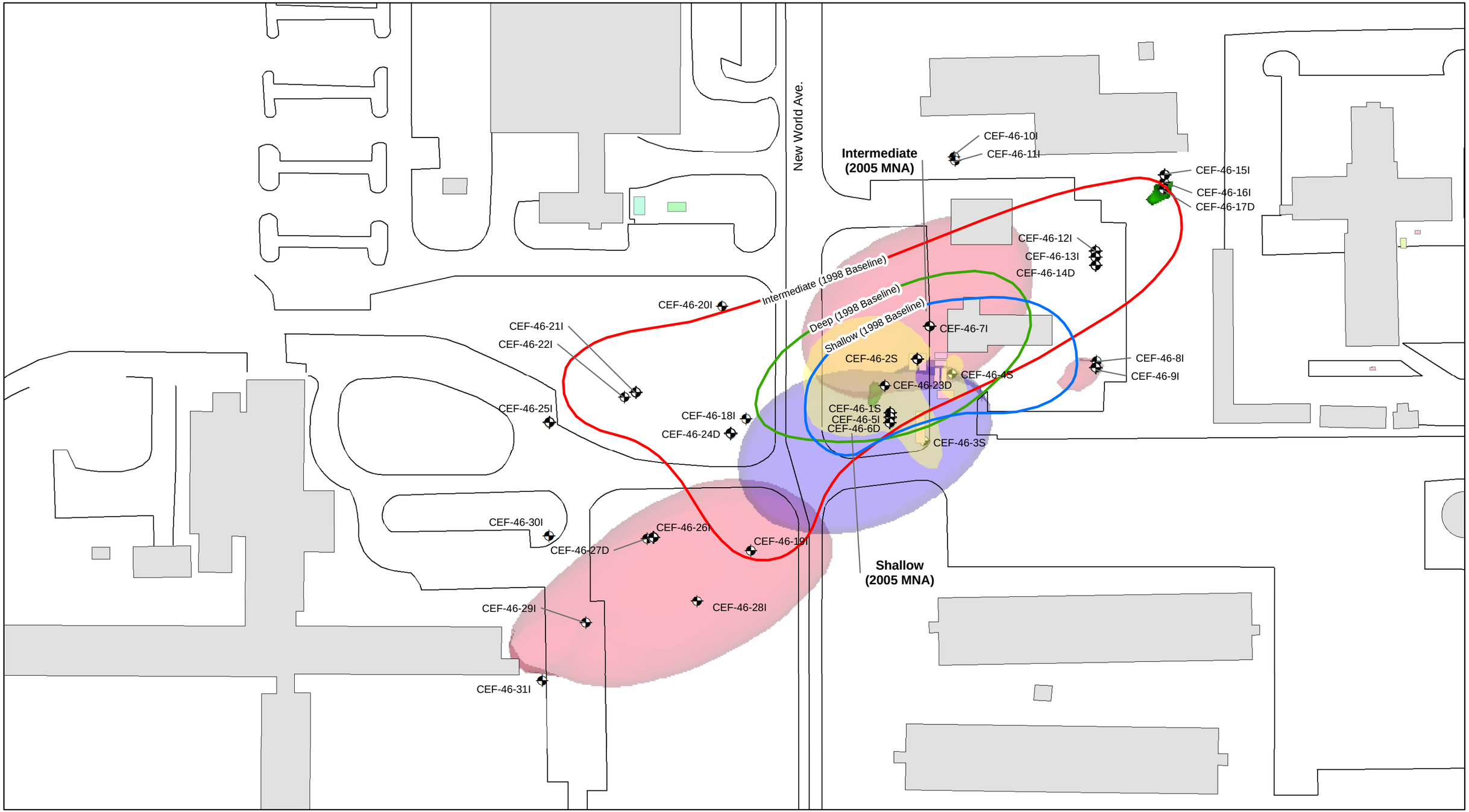


FIGURE 8b
Historical TRPH Concentrations
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL



Groundwater Contamination Plume
Concentration Exceeds Default MNA Criteria

- COCs Exceeding GCTLs in the Deep Aquifer Zone (December 2005)
- COCs Exceeding GCTLs in the Intermediate Aquifer Zone (December 2005)
- COCs Exceeding GCTLs in the Shallow Aquifer Zone (December 2005)
- COCs Exceeding SCTLs in the Soil (1998 Baseline)
- COCs Exceeding GCTLs in the Deep Aquifer Zone (1998 Baseline)
- COCs Exceeding GCTLs in the Intermediate Aquifer Zone (1998 Baseline)
- COCs Exceeding GCTLs in the Shallow Aquifer Zone (1998 Baseline)
- Monitoring Well Location
- Road
- Building

N

0 50 100 200 Feet

Figure 9
COCs Exceeding GCTLs in the Surficial Aquifer and SCTLs in the Soil
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

\\boomer\F\\Projects5\NASCecilField\MXD\Groundwater_Soil_Plume.mxd JKelly 2/2/2007

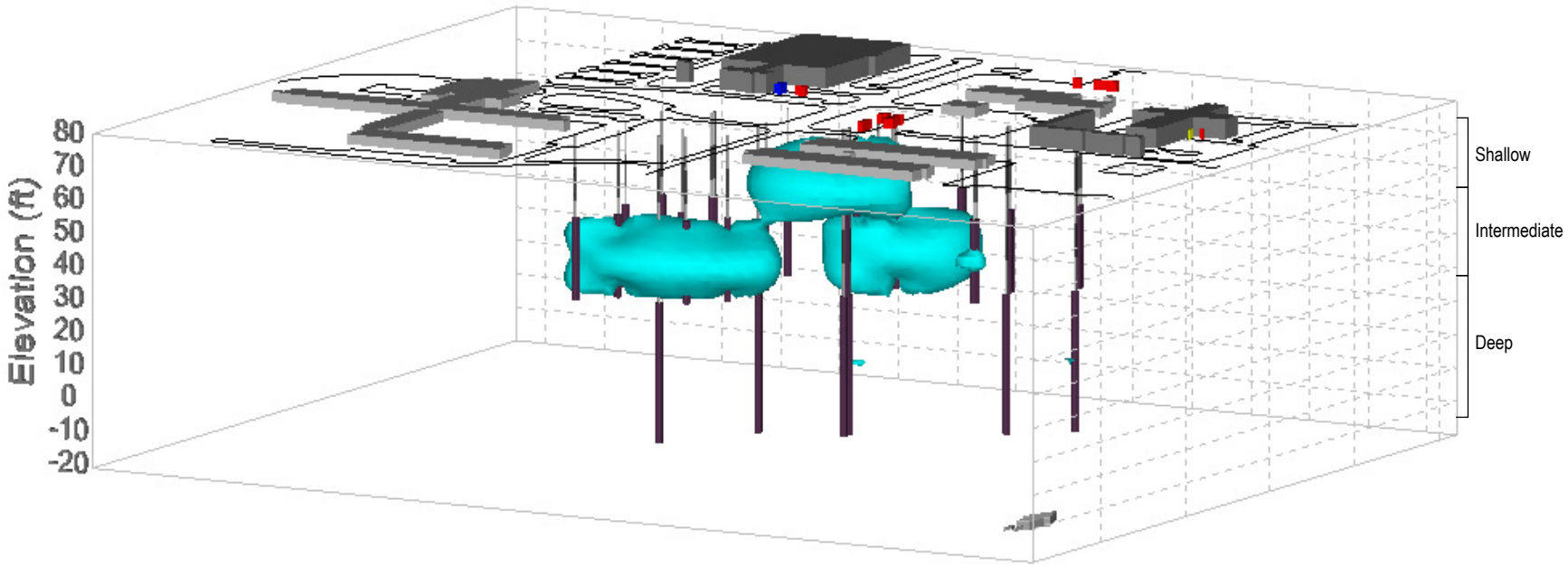


FIGURE 10
COCs Exceeding GCTLs in the Surficial Aquifer
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

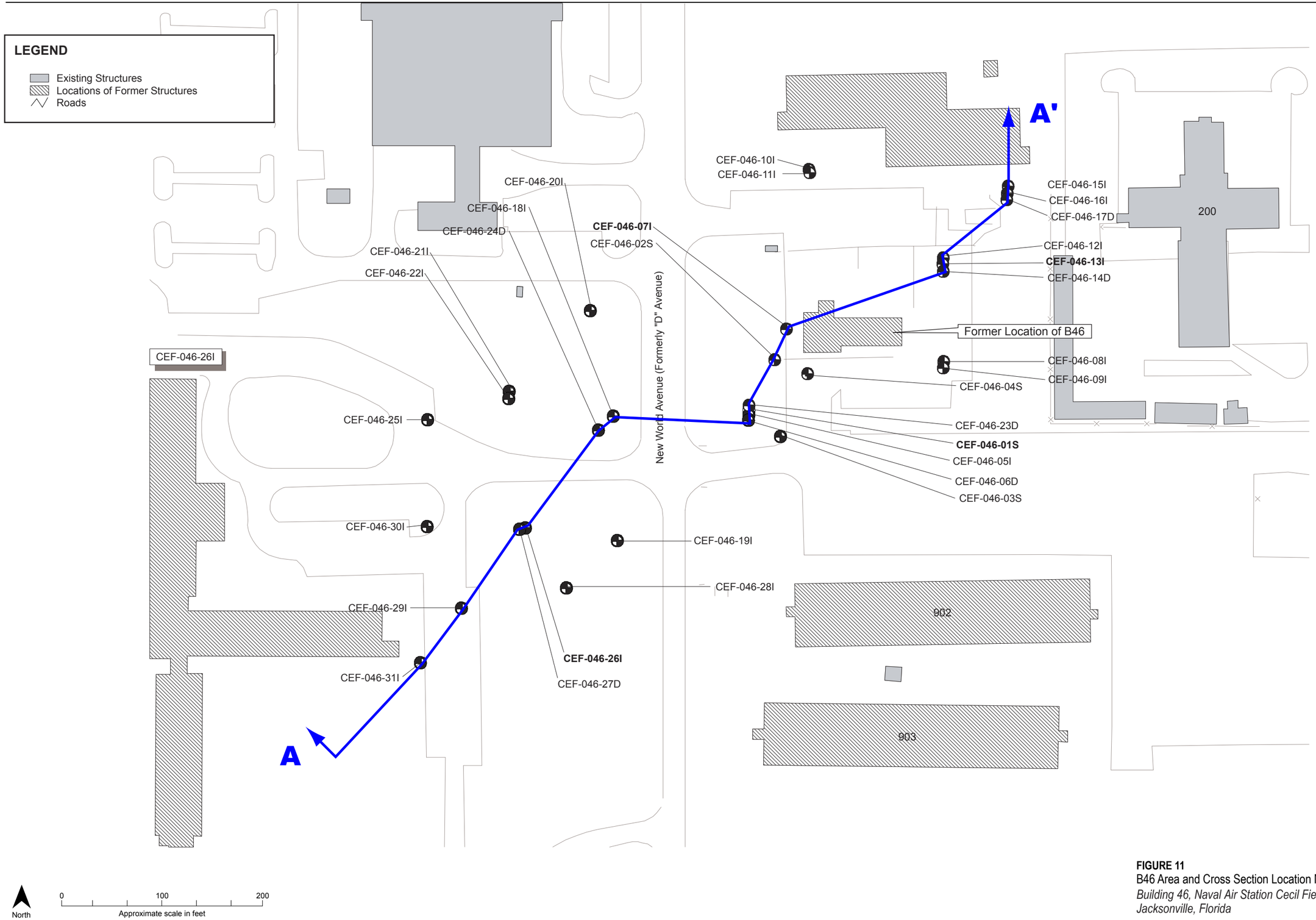
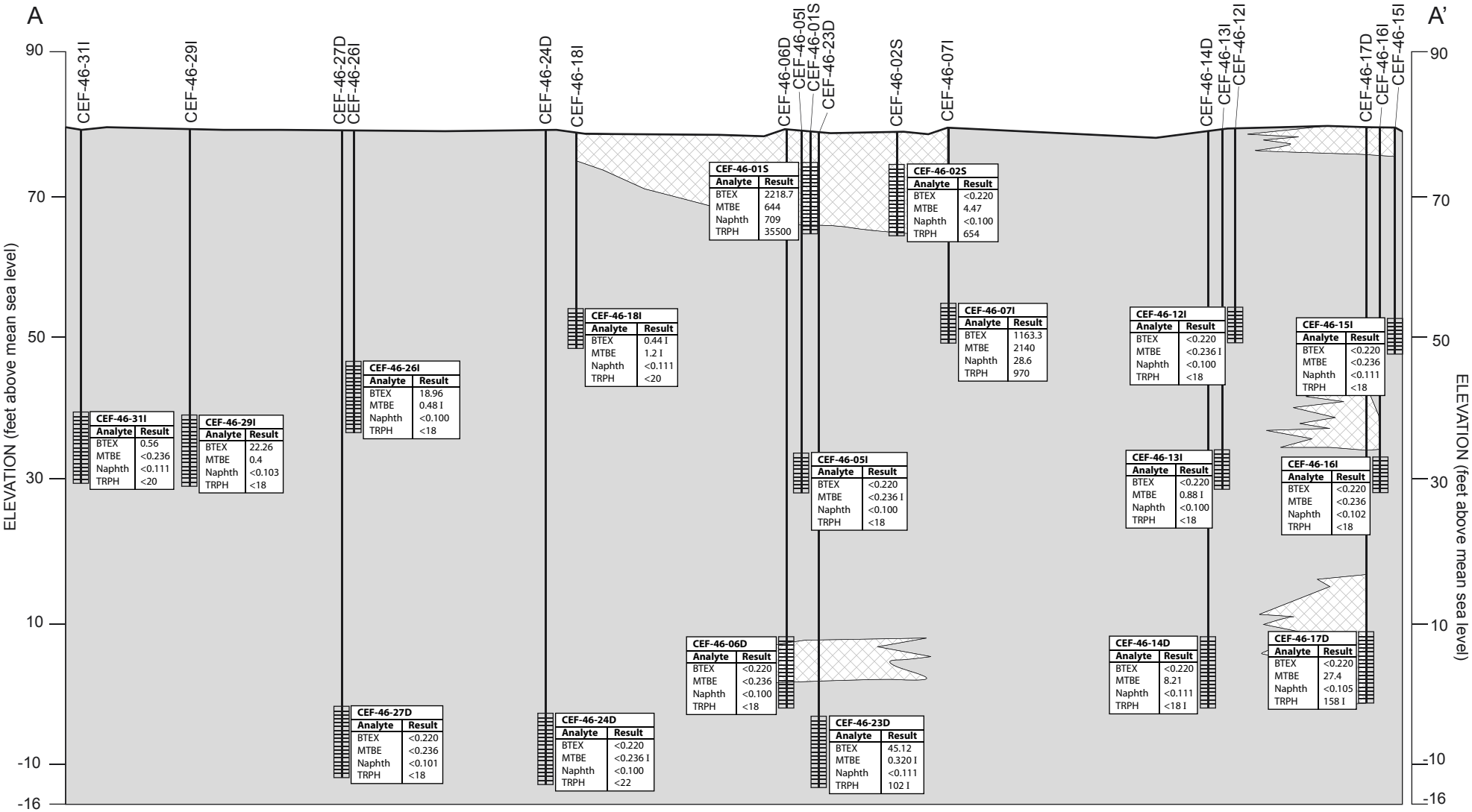


FIGURE 11
B46 Area and Cross Section Location Map
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

ES092006012ATL Cecil101.ai

CH2MHILL



LEGEND

CEF-46-18I
Monitoring well

Screen

Total depth of boring

Silty SANDS, SAND and silt mixture

Clayey SANDS, SAND and CLAY mixtures/inorganic CLAYS of low to medium plasticity

NOTE: All concentrations in µg/L.

0 10 20

Vertical Scale: 1 inch = 20 ft

V.E.: 4.55x

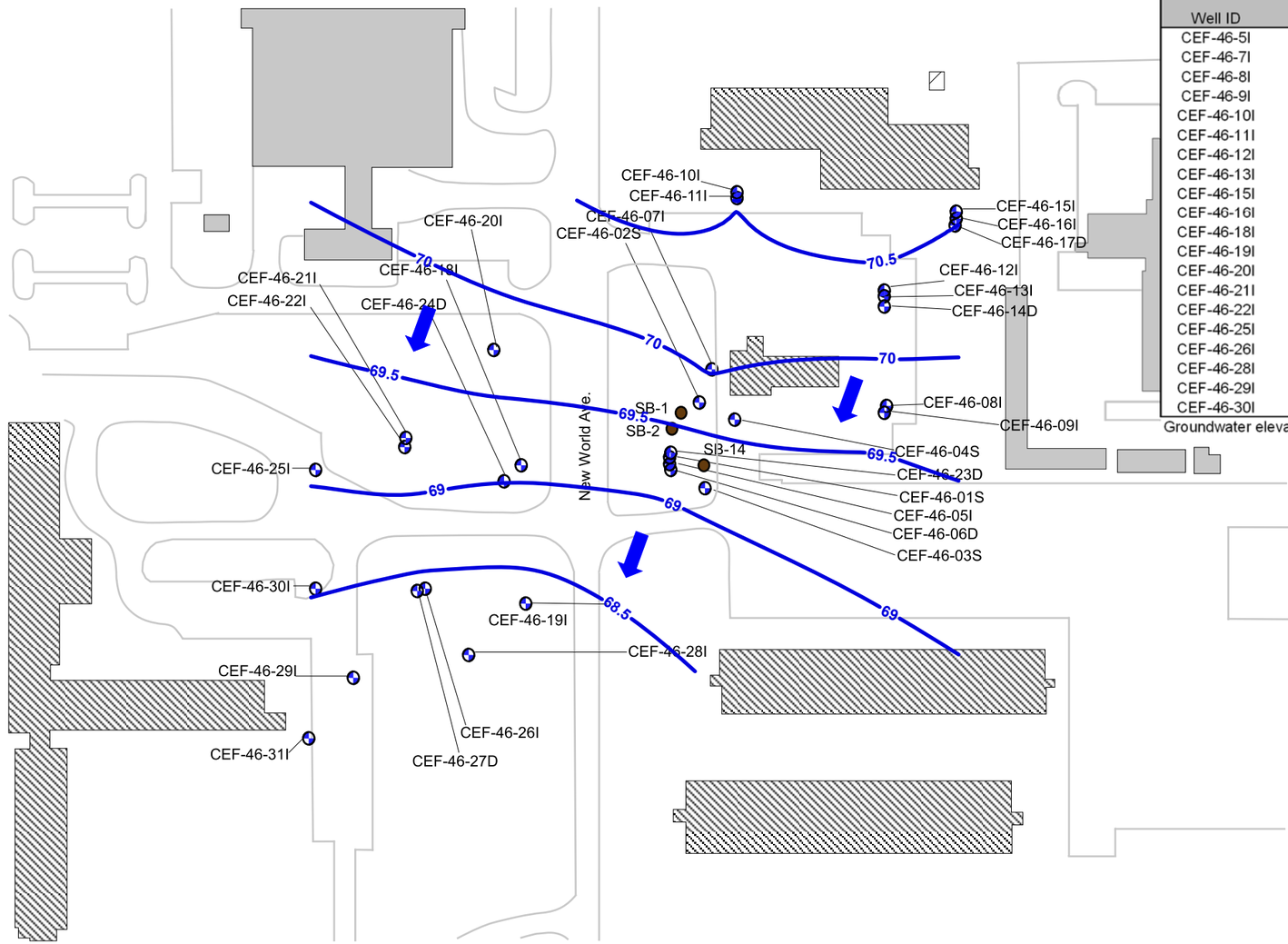
0 45.5 91

Horizontal Scale: 1 inch = 91 ft

FIGURE 12
Lithologic Cross Section A-A'
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

ES092006012ATL Cecil_112.ai



Well ID	Groundwater Elevation
CEF-46-5I	69.17
CEF-46-7I	70.02
CEF-46-8I	69.81
CEF-46-9I	69.65
CEF-46-10I	71.10
CEF-46-11I	70.50
CEF-46-12I	70.38
CEF-46-13I	70.23
CEF-46-15I	70.65
CEF-46-16I	70.46
CEF-46-18I	69.10
CEF-46-19I	68.33
CEF-46-20I	69.74
CEF-46-21I	69.22
CEF-46-22I	69.31
CEF-46-25I	69.07
CEF-46-26I	68.42
CEF-46-28I	68.17
CEF-46-29I	68.13
CEF-46-30I	68.56

Groundwater elevation is in feet

NOTES

Monitoring well CEF-46-31I not used in contour map generation.
Contour plot generated using kriging algorithm with linear variogram model.

LEGEND

- Locations of Former Structures
- Existing Structures
- Monitoring Well
- Soil Boring
- Roads
- Indicates groundwater flow direction

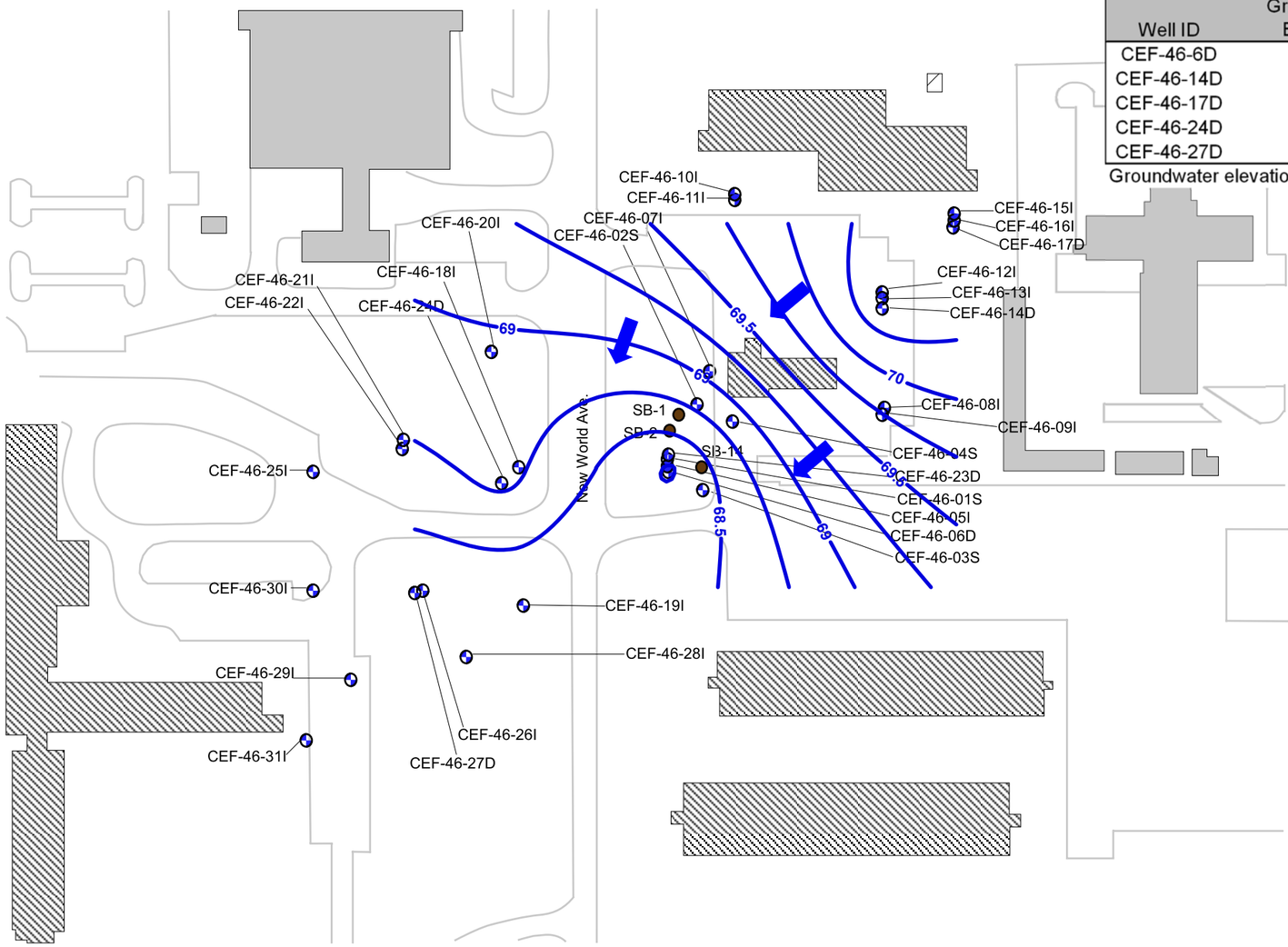
SOURCE: Terraine. 2005. 2005 Annual Operation and Maintenance Status Report, January 1, 2005 to December 31, 2005, Nutrient Injection System Building, Former Tanks 46R, 46D, 46SUL, and 46 UL. Naval Air Station Cecil Field, Jacksonville, Florida.

North

0 100 200
Approximate scale in feet

FIGURE 13
Groundwater Potentiometric Map, Intermediate Zone (December 2005)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL



Well ID	Groundwater Elevation
CEF-46-6D	68.22
CEF-46-14D	70.46
CEF-46-17D	70.37
CEF-46-24D	68.82
CEF-46-27D	68.29

Groundwater elevation is in feet

NOTES

Monitoring well CEF-46-23D not used in contour map generation.
Contour plot generated using kriging algorithm with linear variogram model.

LEGEND

- Locations of Former Structures
- Existing Structures
- Monitoring Well
- Soil Boring
- Roads
- Indicates groundwater flow direction

SOURCE: Terraine. 2005. 2005 Annual Operation and Maintenance Status Report, January 1, 2005 to December 31, 2005, Nutrient Injection System Building, Former Tanks 46R, 46D, 46SUL, and 46 UL. Naval Air Station Cecil Field, Jacksonville, Florida.

North

0 100 200
Approximate scale in feet

FIGURE 14
Groundwater Potentiometric Map, Deep Zone (December 2005)
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

ES092006012ATL Cecil104.ai

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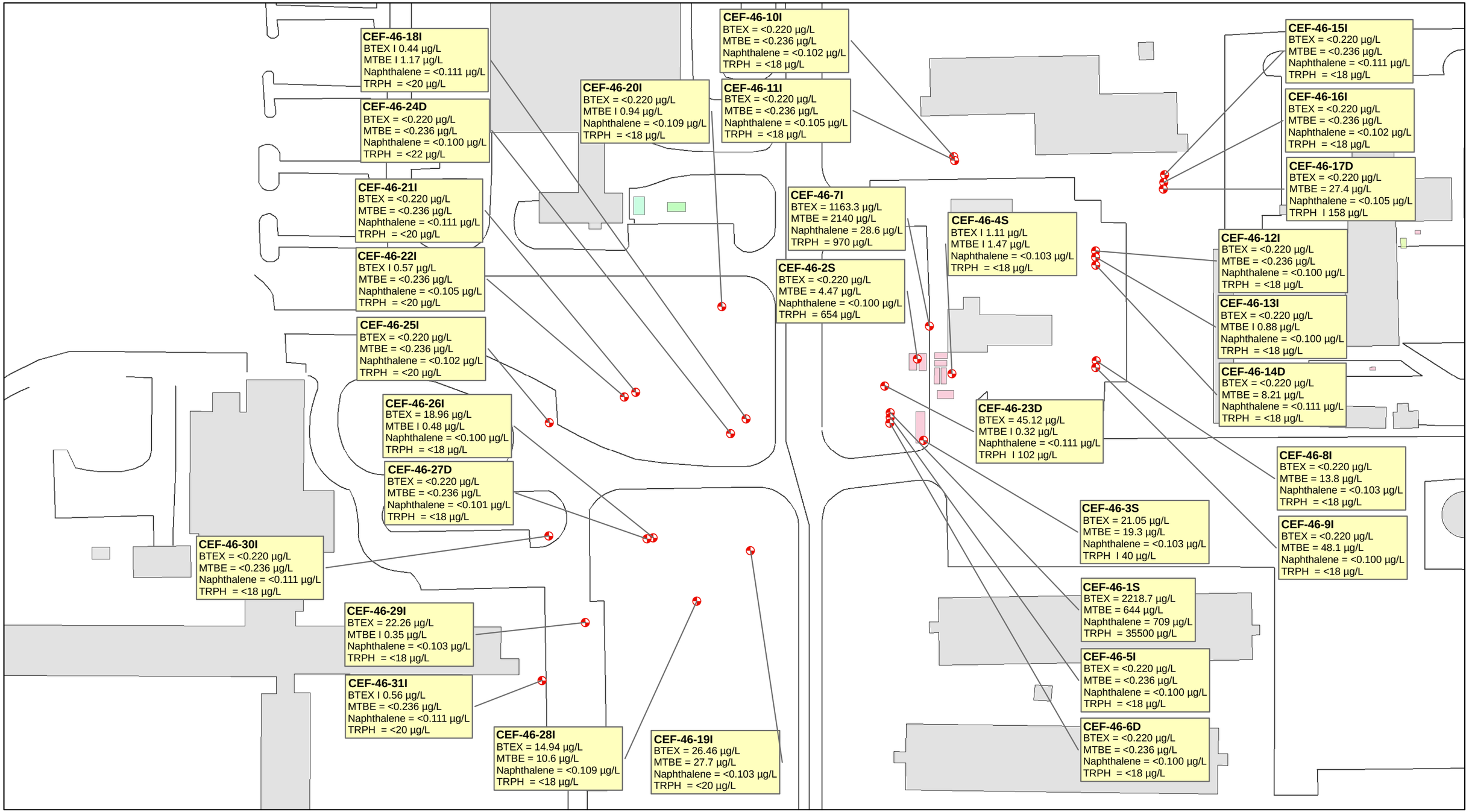


N

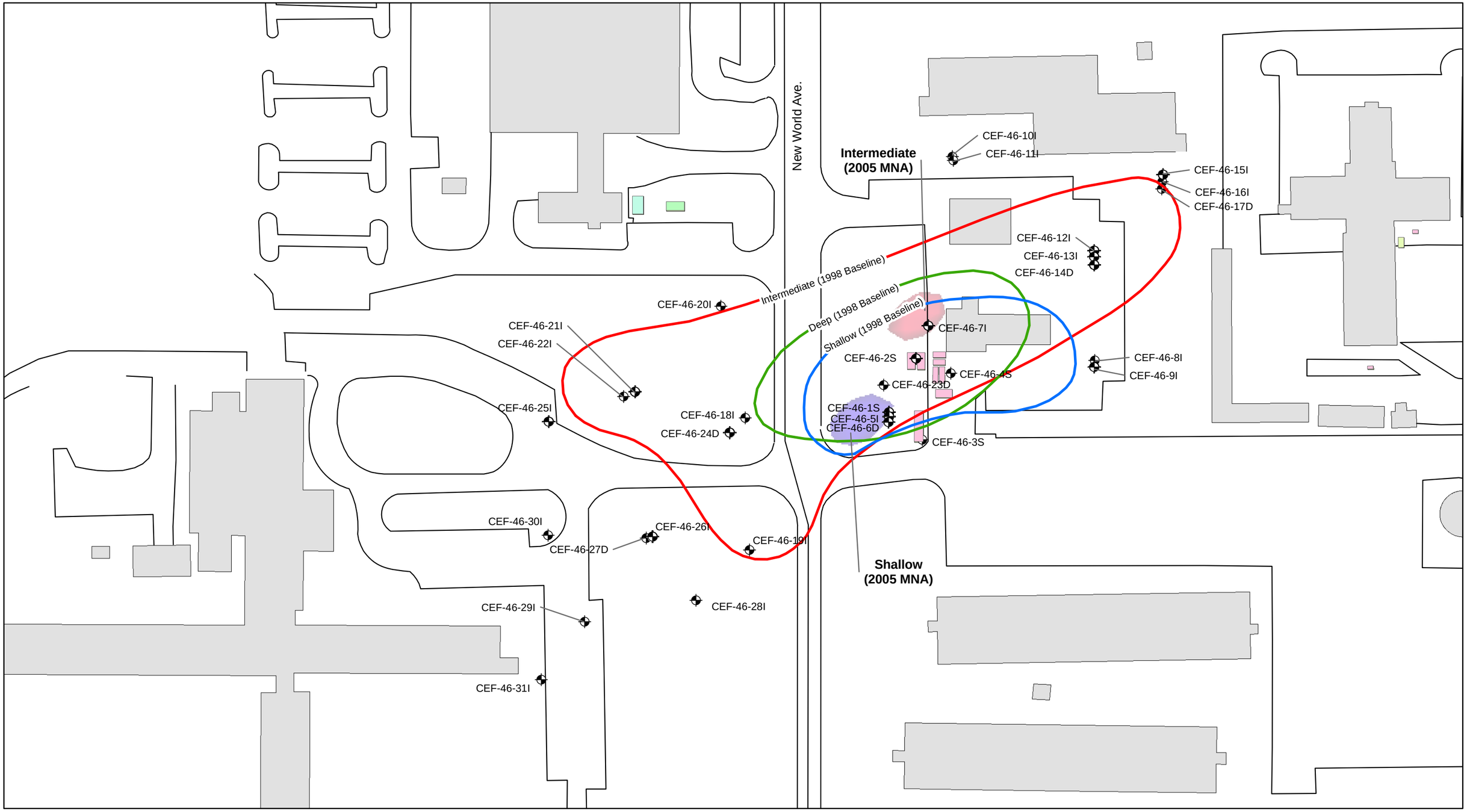
0 50 100 200 Feet

Road
Building
Monitoring Well Location

Figure 15
COC Detections in Surficial Aquifer,
December 2005
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

File Path: F:\Projects5\NASCecilField\MXD\Groundwater_12_05.mxd, Date: January 17, 2007, User: JKELLY3, Comments: Boomer



N

0 50 100 200 Feet

Groundwater Contamination Plume
Concentration Exceeds Default MNA Criteria

- COCs Exceeding Default MNA Criteria in the Intermediate Aquifer Zone December 2005)
- COCs Exceeding Default MNA Criteria in the Shallow Aquifer Zone (December 2005)
- COCs Exceeding GCTLs in the Deep Aquifer Zone (1998 Baseline)
- COCs Exceeding GCTLs in the Intermediate Aquifer Zone (1998 Baseline)
- COCs Exceeding GCTLs in the Shallow Aquifer Zone (1998 Baseline)
- Monitoring Well Location
- Road
- Building

Figure 16
COCs Exceeding Default MNA Criteria
in the Surficial Aquifer
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

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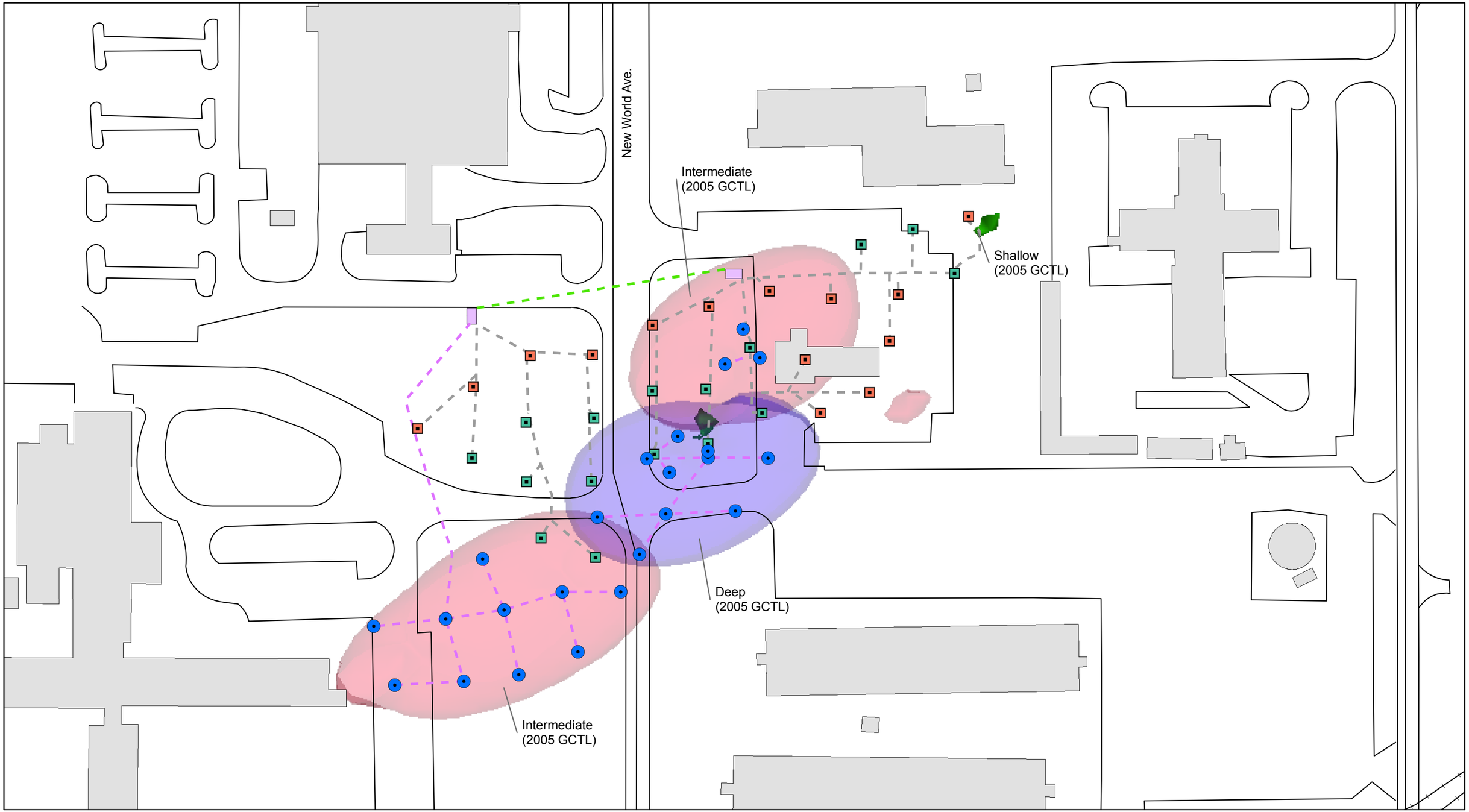
\\boomer\F\\Projects5\NASCecilField\MXD\Groundwater_Plume_GCTL_1998_baseline.mxd JKelly 2/5/2007



N

0 50 100 200 Feet

Groundwater Contamination Plume
- COCs Exceeding GCTLs in the Deep Aquifer Zone (December 2005)
- COCs Exceeding GCTLs in the Intermediate Aquifer Zone (December 2005)
- COCs Exceeding GCTLs in the Shallow Aquifer Zone (December 2005)

Air Sparge Injection Wells
- Proposed Air Sparge Injection Well
- Active Existing Air Sparge Injection Well
- Non-Active Existing Air Sparge Injection Well

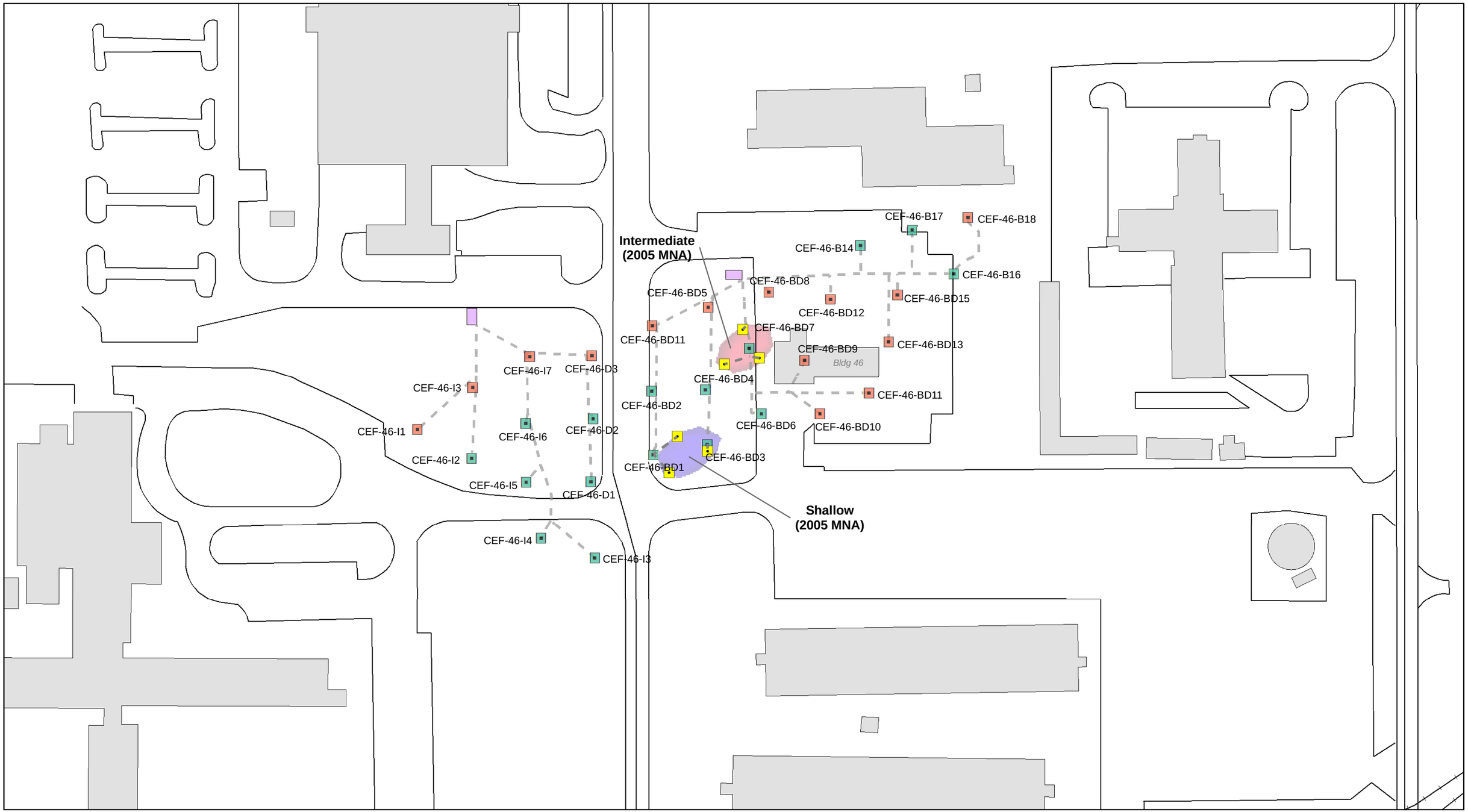
Injection Line
- Existing Injection Line
- Proposed Injection Line
- Optional Connecting Line

- Air Sparge Equipment Trailer
- Road
- Building

Figure 17
Existing Biosparge Well Locations and Proposed Expansion of Biosparge Well Field for Alternative GW1
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

CH2MHILL

\\boomer\F\\Projects5\NASCecilField\MXD\Expansion_Wells.mxd JKelly 5/10/2007



N

0 50 100 200 Feet

Groundwater Contamination Plume
Concentration Exceeds Default MNA Criteria
COCs Exceeding Default MNA Criteria in the Intermediate Aquifer Zone (December 2005)
COCs Exceeding Default MNA Criteria in the Shallow Aquifer Zone (December 2005)

Air Sparge Injection Wells
Active Existing Air Sparge Injection Well
Non-Active Existing Air Sparge Injection Well
Proposed Shallow Biosparge Injection Wells
Air Sparge Equipment Trailer

Proposed Shallow Injection Line
Existing Injection Line
Road
Building

Figure 18
Existing Biosparge Injection Well Locations and Proposed Expansion of Biosparge Well Field for Alternative GW2
Building 46, Naval Air Station Cecil Field
Jacksonville, Florida

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\\boomer\F\\Projects5\NASCecilField\MXD\Existing_Injection_Wells.mxd JKelly 1/22/2007

Attachment 1
Historical Analytical Data

ATTACHMENT A
GROUNDWATER ANALYTICAL RESULTS

BUILDING 46 NUTRIENT INJECTION SYSTEM
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Well	Date	Benzene	Ethyl Benzene	Toluene	Xylene	BTEX	Methyl tert-butyl ether	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) anthracene	Chrysene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Benzo (g,h,i) perylene	Nitrate (mg/L)	Nitrite (mg/L)	Orthophosphate (mg/L)	Sulfate (mg/L)	TRPH (ug/L)
CEF-46-1S	12/21/00	13000	2900	40000	19000	74900	NM	550	NM	NM	1.4	<1.1	0.98	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	0.085 J	0.15	<1	NM	23000
	01/25/01	0.28	0.44	1.4	3.2	5.32	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	0.2	0.25	NM	290
	03/14/03	592	1160	1190	4580	7522	619	496	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<0.100	0.15	<0.100	NM	77000
	06/09/03	262	626	318	1070	2276	511	947	136	162	<0.10	0.29	0.22	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	33200
	09/03/03	350	735	575	2920	4580	365	661	133	126	<0.10	0.45	0.26	0.48	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	38300
	12/11/03	430	982	1410	3540	6362	432	501	89	117	<0.10	0.26	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.30	<0.100	NM	39600
	03/18/04	401	741	1160	2280	4582	486	508	61.5	98.5	<0.10	0.24	<0.10	0.18	0.27	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	16200
	06/08/04	163	484	194	526	1367	310	342	36.6	76.5	<5.10	<2.04	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<0.204	<0.204	<0.510	<0.204	<0.204	<0.204	<0.204	<0.100	<0.005	0.083 ?	NM	15400
	09/21/04	54.8Y	321Y	97.4Y	2140Y	2613.2Y	276Y	252 J3Y	24.2 J3Y	64.2 J3Y	<5.49 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<2020 J3Y	<0.02Y	<0.005Y	0.389Y	NM	33300Y
	12/01/04	153	601.5	163.9	779	1697.4	216.1	621.4	65.6	143	<0.235	<0.165	<0.347	<0.110	0.204 I	<0.106	<0.102	<0.150	<0.084	<0.102	<0.259	<0.167	<0.133	<0.094	<0.160	<0.018	<0.005	0.099	NM	25200
	03/13/05	174	687	152	1100	2113	334	503	56.9	94.5	<0.0840	<0.012	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	0.006	0.0317 V	NM	23000
	06/09/05	263	767	308	1330	2668	270	316	51.3	73.0	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005 J4	0.0740	109	41100
	09/06/05	127	664	169	2520	3480	133	897	52.6	188	<0.0840	<0.112	0.500 I	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	<0.005	0.116	97.9	51000
	12/06/05	85.9	627	95.8	1410	2218.7	644	709	20.9 I	108	<0.933	<1.24	<1.00	<1.11	<0.889	<1.20	<1.50	<1.18	<0.744	<0.667	<1.00	<1.67	<1.34	<1.62	<1.11	NM	NM	NM	42.8	35500
	03/29/06	15.2	205	36.2	458	714.4	267	544	65.8	119	<0.0840	<0.112	0.240 I	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	4.37	35300
	06/09/06	21.9	259	118	698	1096.9	187	322	36.7	78	<0.0840	0.280 I	0.200 I	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<.0146	<0.100	NM	NM	NM	24.5	17100
	09/24/06	31.6	359	57.1	1320	1767.7	140	502	76.9	111	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	63.0	12300
	12/09/06	12.8	131	37.3	194	375.1	23.1	187	32.2	53	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	MN	11000	4130
CEF-46-2S	12/21/00	300	72	51	200	623	NA	230	NM	NM	<1.1	5.5	3.1	0.35	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.60	<0.4	0.22	NM	3100
	01/25/01	7.3	0.96	1.5	3.3	13.06	7.1	11	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.083	<0.40	<1.0	NM	540
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	156	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.100	<0.100	NM	1370
	06/05/03	<1.00	<1.0	<1.0	<1.0	<1.0	54.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	339
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	21.3	0.24	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	339
	12/11/03	<1.00	<1.0	<1.0	<3.0	<1.0	21.7	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.30	<0.100	NM	796
	03/18/04	12.4	<1.0	<1.0	3.7	16.1	24.3	1.4	0.16	0.21	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	436
	06/08/04	3.72	<1.00	<1.00	<1.00	3.72	26.1	0.643 I	<2.04	<2.04	<5.10	0.398 I	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<0.204	<0.204	<0.510	<0.204	<0.204	<0.204	<2.04	<0.10	<0.005	0.150 ?	NM	530
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	8.32Y	<2.17 J3Y	<2.17 J3Y	<2.17 J3Y	<2.17 J3Y	<2.17 J3Y	<2.17 J3Y	<5.43Y	<1.09Y	<1.09Y	<5.43Y	<0.217Y	<2.17Y	<0.217Y	<0.543Y	<0.217Y	<0.217Y	<0.217Y	<2.17 J3Y	0.1Y	0.005Y	0.027 ?Y	NM	0.26Y
	12/01/04	118	134.6	0.5700 I	136	389.17	135.8	81.30	4.56 I	<0.214	<0.235	2.32 I	2.00 I	<0.110	<0.118	<0.106	<0.102	<0.150	<0.084	<0.102	<0.259	<0.167	<0.133	<0.094	<0.160	<0.018	0.007	0.08	NM	2450
	03/13/05	54.6	1.04 I	0.210 I	1.64	57.49	47.8	96.50	7.77	0.439 I	<0.0840	0.602 I	0.684 I	0.306 I	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	0.008	0.0350 V	NM	1600
	06/09/05	25.9	< 0.201	< 0.142	< 0.220	25.9	17.2	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.014	0.0330	664	1850
	09/06/05	<0.143	<0.201	<0.142	< 0.220	<0.220	3.95	26.0	1.12 I	<0.203	< 0.0840	< 0.112	0.240 I	<0.100	<0.0800	<0.108	<0.135	< 0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	< 0.055	<0.005	0.00800	843	NM
	09/21/05	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	341
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	4.47	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1880	654
	03/30/06	0.460 I	0.420 I	<0.176	<0.298	0.880 I	3.41	8.9	0.810 I	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<.0106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	722	1170
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	2.00	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	442	623
	09/25/06	<0.305	<0.338	<0.257	<0.433	<0.433	1.69	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	297	794
	12/08/06	3.18	0.600 I	<0.257	1.46	5.24	2.44	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	415	431
CEF-46-3S	12/06/05	17.2	1.81 I	0.480 I	1.56 I	21.05	19.3	<0.103	<0.137	<0.209	<0.0866	<0.115	<0.0928	<0.103	<0.0825	<0.111	<0.139	<0.0691	<0.0619	<0.0619	<0.0928	<0.155	<0.125	<0.151	<0.103	NM	NM	NM	503	40 I
CEF-46-4S	12/06/05	0.570 I	<0.201	<0.142	0.540 I	1.11 I	1.47 I	<0.103	<0.137	<0.209	<0.0866	<0.115	<0.0928	<0.103	<0.0825	<0.111	<0.109	<0.109	<0.0691	<0.0619	<0.0928	<0.155	<0.125	<0.151	<0.103	NM	NM	NM	255	<18
CEF-46-5I	12/21/00	850	38	13	150	1051	NM	1.6	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<550
	01/25/01	180	7.4	3.1	31	221.5	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	<520
	03/14/03	<1.0	<1.0	<1.0	9.0	9.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.35	3.92	NM	<200
	06/05/03	<1.00	<1.0	<1.0	5.2	5.2	4.6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.30	<0.30	<0.282	NM	<106
	09/03/03	<1.00	<1.0	<1.0	6.6	6.6	66.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	0.965	NM	333
	12/11/03	<1.00	<1.0	<1.0	4.1	4.1	70	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	1.31	NM	456
	03/18/04	1.4	<1.0	1.1	3.9	6.4	28.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.600	<0.60	<0.100	NM	242
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	2.3	<2.04	<2.04	<2.04	<5.10	<2.04	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<2.04	<0.204	<0.510	<0.204	<0.204	<0.204	<2.04	<0.100	0.46	2.09 ?	NM	<200
	09/21/04	<1.00Y	1.61Y	<1.00Y	2.93Y	4.54Y	<1.00Y	<2.20 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<2.20 J3Y	<0.02Y	0.118Y	0.103Y	NM	<200Y
	12/01/04	<0.143	0.4400 I	<0.1417	<0.220	0.4400 I	<0.2359	<0.23	<0.206	<0.216	<0.237	<0.167	<0.127	<0.111	<0.120	<0.107	<0.103	<0.152	<0.085	<0.103	<0.262	<0.168	<0.134	<0.095	<0.162	<0.018	<0.005	<0.003	NM	120 I V
	03/13/05	1.75 I	<0.201	<0.142	1.23 I	2.98 I	3.56	<0.112	<0.148	<0.233	<0.0933	<0.124	<0.100	<0.110	<0.0867	<0.120	<0.150	<0.118	<0.0700	<0.0667	<0.100	<0.171	<0.134	<0.162	<0.113	<0.0550	0.021	1.91	NM	<18
	06/09/05	< 0.143	< 0.201	< 0.142	0.950 I	0.950 I	8.65	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.005	4.16	5440	19 I
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	0.023	0.0410	462	<18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	2520	<18
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1660	<18
	06/09/06	0.340 I	<0.338	<0.257	<0.433	0.340 I	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	2380	129 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1910	56 I
	12/09/06	<0.305	<0.338	<0.257	<0.433	<0.443	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	14400	18 I
CEF-46-6D	12/21/00	2.8	9.9	6	18	36.7	NM	3.5	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.6	<0.4	0.22	NM	<560
	02/08/01	<1.0	<1.0	<1.0	<1.0	<4.0	<1.0	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.60	<0.40	<1.0	NM	<500
	03/14/03	<1.0	<1.0	<1.0	6.0	6.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.270	4.61	NM	274
	06/09/03	<1.00	<1.0	<1.0	8.7	8.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.674	NM	<200
	09/03/03	<1.00	<1.0	<1.0	3.3	3.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.31	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.300	<0.30	5.81	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.100	0.33	1.34	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.500	<1.00	<0.100	NM	<100
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.04	<2.04	<2.04	<5.10	<2.04	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<2.04	<0.204	<0.510	<0.204	<0.204	<0.204	<2.04	<0.100	0.102	0.127 ?	NM	<200
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<2.15 J3Y	<2.15 J3Y	<2.15 J3Y	<5.38 J3Y	<2.15 J3Y	<2.15 J3Y	<5.38Y	<1.08Y	<1.08Y	<5.38Y	<0.215Y	<2.15Y	<0.215Y	<0.538Y	<0.215Y	<0.215Y	<0.215Y	<2.15 J3Y	<0.02Y	0.008Y	0.013 ?Y	NM	<220Y
	12/01/04	<0.143	1.180 I	<0.1417	1.35 I	2.53 I	<0.2359	<0.23	<0.208	<0.219	<0.240	<0.169	<0.128	<0.112	<0.121	<0.108	<0.104	<0.153	<0.085	<0.104	<0.265	<0.170	<0.135	<0.096	<0.164	<0.018	<0.084	22.5	NM	140 I V
	03/13/05	<0.143	<0.201	<0.142	1.78 I	1.78 I	<0.236	<0.112	<0.148	<0.233	<0.0933	<0.124	<0.100	<0.110	<0.0867	<0.120	<0.150	<0.118	<0.0700	<0.0667	<0.100	<0.171	<0.134	<0.162	<0.113	<0.0550	0.059	17.8	NM	<18
	06/09/05	< 0.143	< 0.201	< 0.142	1.01 I	1.01 I	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.054	19.8 Q	9580	24 I
	09/06/05	<0.143	<0.201	<0.142	0.340 I	0.340 I	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.150	1.20	0.0680	7050	<18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	8480	<18
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	8270	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	7510	135 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.0133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	5290	36 I
	12/09/06	<0.305	<0.338	<0.257	1.22	1.22	<0.336	0.370 I	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	12400	74 I
CEF-46-7I	12/21/00	9100	2800	17000	15000	43900	NM	260	NM	NM	0.86	<1.1	0.7	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	13000
	02/22/01	6500	1400	10000	7900	25800	6100	120	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.6	<0.4	<1.0	NM	17000
	03/14/03	945	150	86.5	904	2086	4380	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	<0.100	<0.100	NM	5480
	06/09/03	678	123	51.6	752	1604.6	4190	32.4	0.42	0.24	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50	<0.50	<0.100	NM	4080
	09/03/03	832	158	<10.0	697	1687.0	5140	123	6.12	7.92	<0.10	<0.10	0.14	0.47	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.100	NM	2530
	12/11/03	734	111	5	290	1140.0	5820	96.2	4.76	6.28	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	5410
	03/18/04	386	66	8.5 ?	414	874.5	3460	2.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.60	<0.100	NM	1900
	06/08/04	208	42.7	11.3	330	592.0	3080	3.34	<2.04	<2.04	<5.10	<2.04	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<2.04	<0.204	<0.510	<0.204	<0.204	<0.204	<2.04	<0.100	0.022	0.073 ?	NM	650
	09/21/04	494Y	38.1Y	9.99Y	387Y	929.09Y	2190Y	0.242 J3, IY	<2.20 J3Y	<2.20 J3Y	<5.49 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<2.20 J3Y	<0.02Y	0.016Y	0.028 ?Y	NM	980Y
	12/01/04	833	144.9	10.30	631	1619.2	1943	131.2	5.18	8.13	<0.230	<0.162	<0.123	<0.107	<0.116	<0.104	<0.100	<0.147	<0.082	<0.100	<0.254	<0.163	<0.130	<0.092	<0.157	0.018	0.034	0.012	NM	1770
	03/13/05	775	176	3.26	269	1223.3	1480	128	5.39	7.40	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.00510 V I	NM	1570
	06/09/05	394	127	2.79	199	722.79	628	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.005	0.0250	279	1380
	09/06/05	92.9	41.3	2.52	95.6	232.32	1730	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	0.013	0.0190	167	1280
	12/06/05	651	144	11.3 I	357	1163.3	2140	28.6	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	54.6	970
	03/30/06	146	26.0	0.650 I	29	201.65	1290	33.7	0.900 I	1.10 I	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	37.1	<18
	06/09/06	207	33.2	0.310 I	11.4	251.91	652	60.7	2.67 I	1.24 I	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	33.0	832
	09/25/06	162	25.4	0.310 I	5.07	192.78	296 L	75.1	2.96 I	0.510 I	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	28.6	544
	12/08/06	<0.305	0.490 I	<0.257	<0.433	0.490 I	372	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	139.0	<18
Groundwater Criteria [1]		1	30	40	20	n/a	20	14	28	28	210	20	280	210	2100	280	210	0.05	4.8	0.05	0.5	0.2	0.05	0.005	210	10 *	1 *	n/a	250 *	5000
Natural Attenuation Default Source [1]		100	300	400	200	n/a	200	140	280	280	2100	200	2800	2100	21000	2800	2100	5	480	5	50	20	5	0.5	2100	100 *	10 *	n/a	n/a	50000

ATTACHMENT A
GROUNDWATER ANALYTICAL RESULTS

BUILDING 46 NUTRIENT INJECTION SYSTEM
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Well	Date	Benzene	Ethyl Benzene	Toluene	Xylene	BTEX	Methyl tert-butyl ether	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) anthracene	Chrysene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Benzo (g,h,i) perylene	Nitrate (mg/L)	Nitrite (mg/L)	Orthophosphate (mg/L)	Sulfate (mg/L)	TRPH (ug/L)
CEF-46-8I	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	13.8	<0.103	<0.137	<0.209	<0.0866	<0.115	<0.0928	<0.103	<0.0825	<0.111	<0.139	<0.109	<0.0691	<0.0619	<0.0928	<0.155	<0.125	<0.151	<0.103	NM	NM	NM	13.3	<18
CEF-46-9I	12/20/00	<1.0	<1.0	<1.0	<1.0	<4.0	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<570
	01/25/01	<1.0	<1.0	<1.0	<1.0	<4.0	1.3	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	<500
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.170	<0.100	NM	<200
	06/04/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.30	0.411	NM	<211
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	0.22	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.100	<0.30	<0.100	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	0.22	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.100	0.180	0.308	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.300	<0.30	<0.100	NM	<111
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<2.20	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	<0.100	<0.005	0.055 ?	NM	<210
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	3.92Y	<2.20 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<0.220 J3Y	<0.02Y	<0.005Y	0.018 ?Y	NM	220Y
	12/01/04	<0.143	0.5500 I	<0.1417	0.440 I	0.990 I	28.85	0.32 I	<0.202	<0.212	<0.232	<0.164	<0.124	<0.108	<0.117	<0.105	<0.101	<0.149	<0.083	<0.101	<0.257	<0.165	<0.131	<0.093	<0.159	<0.018	<0.005	0.013	NM	80 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	16.0	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.00830 V	NM	<18
	06/09/05	< 0.143	0.420 I	< 0.142	0.550 I	0.970 I	13.5	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005	0.00800	253	< 18
	09/06/05	< 0.143	<0.201	<0.142	0.220 I	0.220 I	79.7	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	<0.005	0.0340	288 ?	< 18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	48.1	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	486	<18
	03/30/06	0.260 I	<0.126	<0.176	<0.298	<0.298	24.2	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	556	191
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	12.7	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	380	452
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	14.6	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	114	54 I
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	9.52	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	228	<18
CEF-46-10I	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.102	<0.136	<0.207	<0.0857	<0.114	<0.0918	<0.102	<0.0816	<0.110	<0.138	<0.108	<0.0684	<0.0612	<0.0918	<0.153	<0.123	<0.149	<0.102	NM	NM	NM	9.04	<18
CEF-46-11I	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.105	<0.140	<0.214	<0.0884	<0.118	<0.0947	<0.105	<0.0842	<0.114	<0.142	<0.112	<0.0705	<0.0632	<0.0947	<0.158	<0.127	<0.154	<0.105	NM	NM	NM	17.4	<18
CEF-46-12I	12/20/00	<1.0	<1.0	<1.0	<1.0	<4.0	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<530
	01/24/01	<1.0	<1.0	<1.0	<1.0	<4.0	14	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	<520
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	<0.100	<0.100	NM	<200
	06/05/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	<100
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	<225
	12/11/03	<1.00	<1.0	<1.0	<3.0	<1.0	2.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	<200
	03/18/04	<1.00	<1.0	<1.0	<3.0	<3.0	79.9	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.600	<0.60	<0.100	NM	<222
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	502	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<1.10	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	0.028 ?	0.014	0.017 ?	NM	<200
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	18.9Y	<2.00 J3Y	<2.00 J3Y	<2.00 J3Y	<5.00 J3Y	<2.00 J3Y	<2.00 J3Y	<5.00Y	<1.00Y	<1.00Y	<5.00Y	<0.200Y	<2.00Y	<0.200Y	<0.500Y	<0.200Y	<0.200Y	<0.200Y	<0.200 J3Y	<0.02Y	<0.005Y	0.052 ?Y	NM	<200Y
	12/01/04	<0.143	<0.2010	<0.1417	<0.220	<0.220	8.480	<0.22	<0.200	<0.210	<0.230	<0.162	<0.123	<0.107	<0.116	<0.104	<0.100	<0.147	<0.082	<0.100	<0.254	<0.163	<0.130	<0.092	<0.157	0.046	0.006	0.017	NM	240 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	0.450 I	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	0.009 I	0.00500 V I	NM	<18
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.006	0.00800	47.5	< 18
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.100	< 0.133	<0.203	<0.0810	< 0.112	< 0.0900	<0.100	<0.0800	< 0.108	<0.135	< 0.106	<0.0670	< 0.0600	< 0.0900	<0.150	< 0.121	< 0.146	<0.100	< 0.055	<0.005	0.0230	57.1	< 18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	43.9	<18
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	0.310 I	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	47.8	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	49.9	70 I
	09/25/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	63	<18
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.335	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	68.3	<18
CEF-46-13I	12/20/00	<1.0	<1.0	<1.0	0.45	0.45	NM	0.89	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<540
	01/24/01	<1.0	<1.0	1.5	0.62	2.12	280	0.6	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	320
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	318	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	<0.100	<0.100	NM	276
	06/05/03	1.10	<1.0	<1.0	<1.0	1.1	254	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	<100
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	240	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	<0.100	NM	<225
	12/11/03	<1.00	<1.0	<1.0	<0.30	<1.0	114	0.5	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.60	<0.100	NM	208
	03/18/04	<1.00	<1.0	<1.0	<3.0	<3.0	60.7	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.600	<0.30	<0.100	NM	<250
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	83.8	<2.02	<2.02	<2.02	<5.05	<2.02	<2.02	<5.05	<1.01	<1.01	<5.05	<0.202	<2.02	<0.202	<0.505	<0.202	<0.202	<0.202	<2.02	<0.02	<0.005	0.078 ?	NM	<220
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	149Y	<2.22 J3Y	<2.22 J3Y	<2.22 J3Y	<5.56 J3Y	<2.22 J3Y	<2.22 J3Y	<5.56Y	<1.11Y	<1.11Y	<5.56Y	<0.222Y	<2.22Y	<0.222Y	<0.556Y	<0.222Y	<0.222Y	<0.222Y	<2.22 J3Y	<0.02Y	<0.005Y	0.013?Y	NM	<200Y
	12/01/04	<0.143	0.9000 I	<0.1417	1.29 I	2.19 I	337.5	<0.22	<0.202	<0.212	<0.232	<0.164	<0.124	<0.108	<0.117	<0.105	<0.101	<0.149	<0.083	<0.101	<0.257	<0.165	<0.131	<0.093	<0.159	<0.018	<0.005	0.017	NM	150 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	133	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	0.013	0.00500 I V	NM	<18
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	62.7	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005	0.0180	481	< 18
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	1.75 I	<0.100	< 0.133	<0.203	<0.0840	<0.112	< 0.0900	<0.100	<0.0800	<0.108	<0.135	< 0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	< 0.146	<0.100	< 0.055	< 0.005	0.0370	519	< 18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	0.880 I	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	189	<18
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	0.400 I	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	104	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	54.3	96 I
	09/25/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	33.5	<18
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	42.6	<18
CEF-46-14D	12/20/00	<1.0	<1.0	0.42	0.37	0.79	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	0.088	<0.4	0.26	NM	<550
	01/24/01	<1.0	<1.0	<1.0	0.23	0.23	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	0.17	NM	<530
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	<0.100	0.102	NM	248
	06/04/03	<1.00	<1.0	<1.0	<1.0	<1.0	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.102	NM	<211
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	0.188	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.100	0.176	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	4.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.100	NM	<100
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	2.4	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<1.10	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	0.018 ?	<0.005	0.134 ?	NM	<220
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	2.97Y	<2.20 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49 J3Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<2.20 J3Y	<0.02 QY	<0.005Y	0.144Y	NM	<200Y
	12/01/04	<0.143	<0.2010	<0.1417	<0.220	<0.220	2.500	<0.22	<0.204	<0.214	<0.235	<0.165	<0.126	<0.110	<0.118	<0.106	<0.102	<0.150	<0.084	<0.102	<0.259	<0.167	<0.133	<0.094	<0.160	<0.018	<0.005	0.161	NM	80 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	3.190	<0.101	<0.133	<0.210	<0.084	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135 J3	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.169	NM	<20
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	1.38 I	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	0.005	0.271	5.16	< 20
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	5.30	<0.100	< 0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	< 0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	< 0.146	<0.100	< 0.055	0.005	0.316	29.3 ?	<18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	8.21	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	15.3	<18
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	1.07	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	2.12	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	<2.00	94 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	2.91 J4	<18
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	<2.00	52 I
CEF-46-15I	12/20/00	<1.0	<1.0	<1.0	<1.0	<4.0	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<550
	01/24/01	0.17	<1.0	<1.0	<1.0	0.17	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	<530
	03/13/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.100	<0.100	<0.100	NM	<200
	06/04/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	<222
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.42	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.100	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<3.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.42	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.100	<0.100	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.100	<0.10	<0.100	NM	<100
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<1.10	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	0.021 ?	<0.005	0.005 ?	NM	<220
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<2.11Y	<2.11 J3Y	<2.11 J3Y	<5.26Y	<2.11Y	<2.11Y	<5.26Y	<1.05Y	<1.05Y	<5.26Y	<0.211Y	<2.11Y	<0.211Y	<0.526Y	<0.211Y	<0.211Y	<0.211Y	<2.11Y	<0.02 QY	<0.005Y	0.006 ?Y	NM	<220Y
	12/01/04	<0.143	<0.2010	<0.1417	<0.220	<0.220	<0.2359	<0.23	<0.206	<0.216	<0.237	<0.167	<0.127	<0.111	<0.120	<0.107	<0.103	<0.152	<0.085	<0.103	<0.262	<0.168	<0.134	<0.095	<0.162	<0.018	<0.005	0.005 I	NM	110 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.00500 I V	NM	<18.0
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.05	0.0100	25.6	< 20
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.100	< 0.133	<0.203	< 0.0840	< 0.112	< 0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	< 0.146	<0.100	< 0.055	<0.005	<0.00360	34.8 ?	<18
	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	20.3	<18
	03/30/06	<0.140	<0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	29.8	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	26.7	28 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	23.9	<18
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	33.8	<18
Groundwater Criteria [1]		1	30	40	20	n/a	20	14	28	28	210	20	280	210	2100	280	210	0.05	4.8	0.05	0.5	0.2	0.05	0.005	210	10 *	1 *	n/a	250 *	5000
Natural Attenuation Default Source[1]		100	300	400	200	n/a	200	140	280	280	2100	200	2800	2100	21000	2800	2100	5	480	5	50	20	5	0.5	2100	100 *	10 *	n/a	n/a	50000

ATTACHMENT A
GROUNDWATER ANALYTICAL RESULTS

BUILDING 46 NUTRIENT INJECTION SYSTEM
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Well	Date	Benzene	Ethyl Benzene	Toluene	Xylene	BTEX	Methyl tert-butyl ether	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) anthracene	Chrysene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Benzo (g,h,i) perylene	Nitrate (mg/L)	Nitrite (mg/L)	Orthophosphate (mg/L)	Sulfate (mg/L)	TRPH (ug/L)
CEF-46-16I	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.102	<0.136	<0.207	<0.0857	<0.114	<0.0918	<0.102	<0.0816	<0.110	<0.138	<0.0684	<0.0684	<0.0612	<0.0918	<0.153	<0.123	<0.149	<0.102	NM	NM	NM	20.5	<18
CEF-46-17D	12/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	27.4	<0.105	<0.140	<0.214	<0.0884	<0.118	<0.0947	<0.105	<0.0842	<0.114	<0.142	<0.112	<0.0705	<0.0632	<0.0947	<0.158	<0.127	<0.154	<0.105	NM	NM	NM	982	158 I
CEF-46-18I	12/07/05	<0.143	<0.201	<0.142	0.440 I	0.440 I	1.17 I	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	84.2	<20
CEF-46-19I	12/07/05	21.6	0.640 I	<0.142	4.86	26.46	27.7	<0.103	<0.137	<0.209	<0.0866	<0.115	<0.0928	<0.103	<0.0825	<0.111	<0.139	<0.109	<0.0691	<0.0619	<0.0928	<0.155	<0.125	<0.151	<0.103	NM	NM	NM	1230	<20
CEF-46-20I	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	0.940 I	<0.109	<0.145	<0.221	<0.0913	<0.122	<0.0978	<0.109	<0.0870	<0.117	<0.147	<0.115	<0.0728	<0.0652	<0.0978	<0.163	<0.132	<0.159	<0.109	NM	NM	NM	112	<18
CEF-46-21I	12/20/00	<1.0	<1.0	<1.0	<1.0	<4.0	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<550
	01/25/01	0.25	<1.0	0.7	<1.0	0.95	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	300
	03/13/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<0.100	<0.100	<0.100	NM	<200
	06/05/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	<100
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	0.18	0.27	0.2	<0.10	0.5	0.67	2.82	0.16	0.35	0.16	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16	<0.10	<0.100	NM	308
	12/11/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.10	<0.100	NM	<200
	03/18/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.30	<0.100	NM	<222
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.04	<2.04	<2.04	<5.10	<2.04	<2.04	<5.10	<1.02	<1.02	<5.10	<0.204	<2.04	<0.204	<0.510	<0.204	<0.204	<0.204	<2.04	<0.020	<0.005	0.010 ?	NM	<200
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<2.20Y	<2.20 J3Y	<2.20 J3Y	<5.49Y	<2.20Y	<2.20Y	<5.49Y	<1.10Y	<1.10Y	<5.49Y	<0.220Y	<2.20Y	<0.220Y	<0.549Y	<0.220Y	<0.220Y	<0.220Y	<2.20Y	<0.04 QY	<0.005Y	0.006Y	NM	<220Y
	12/01/04	<0.143	<0.2010	<0.1417	<0.220	<0.220	<0.2359	<0.23	<0.206	<0.216	<0.237	<0.167	<0.127	<0.111	<0.120	<0.107	<0.103	<0.152	<0.085	<0.103	<0.262	<0.168	<0.134	<0.095	<0.162	<0.018	<0.005	0.007	NM	100 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135 J3	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.00500 I V	NM	<18
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.05	< 0.00360	14.1	< 18
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.100	<0.133	<0.203	<0.0840	< 0.112	< 0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	< 0.0600	< 0.0900	<0.150	< 0.121	< 0.146	<0.100	< 0.055	<0.005	<0.00360	29.5	< 18
	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	10.6	<20
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	14.9	<18
	06/09/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	12.6	76 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	26.2	35 I
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	34.2	<18
CEF-46-22I	12/07/05	<0.143	<0.201	<0.142	0.570 I	0.570 I	<0.236	<0.105	<0.140	<0.214	<0.0884	<0.118	<0.0947	<0.105	<0.0842	<0.114	<0.142	<0.112	<0.0705	<0.0632	<0.0947	<0.158	<0.127	<0.154	<0.105	NM	NM	NM	1060	<20
CEF-46-23D	12/07/05	0.900 I	2.04	1.48 I	40.7	45.12	0.320 I	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	6310	102 I
CEF-46-24D	12/20/00	<1.0	<1.0	0.47	0.41	0.88	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	0.18	NM	<500
	01/25/01	8.3	0.81	1	2	12.11	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	0.19	NM	<510
	03/14/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.21	0.841	NM	<200
	06/05/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.438	NM	<100
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.30	0.212	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	0.16	0.119	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.10	<0.100	NM	<100
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<1.10	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	0.018 ?	<0.005	0.679 ?	NM	<200
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<2.04Y	<2.04 J3Y	<2.04 J3Y	<5.10Y	<2.04Y	<2.04Y	<5.10Y	<1.02Y	<1.02Y	<5.10Y	<0.204Y	<2.04Y	<0.204Y	<0.510Y	<0.204Y	<0.204Y	<0.204Y	<0.204Y	<0.02 QY	<0.005Y	0.02?Y	NM	<200Y
	12/01/04	<0.143	<0.2010	<0.1417	<0.220	<0.220	<0.2359	0.40 I	<0.200	<0.210	<0.230	<0.162	<0.123	<0.107	<0.116	<0.104	<0.100	<0.147	<0.082	<0.100	<0.254	<0.163	<0.130	<0.092	<0.157	<0.018	<0.005	<0.003	NM	130 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135 J3	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.138	NM	<18
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005	0.154	2030	< 20
	09/06/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	<0.005	0.0980	1840	<18
	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	2120	<22
	03/29/06	<0.140	<0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1800	<18
	06/09/06	<0.305	<0.388	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1430	125 I
	09/24/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	732	31 I
	12/08/06	<0.305	<0.338	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	737	34 I
CEF-46-25I	12/20/00	<1.0	<1.0	<1.0	<1.0	<4.0	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.23	<0.6	<0.4	<1.0	NM	<560
	01/25/01	0.25	<1.0	<1.0	0.42	0.67	<1.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	320
	03/13/03	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<0.100	0.15	<0.100	NM	<200
	06/04/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	<200
	09/03/03	<1.00	<1.0	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.30	<0.100	NM	<225
	12/10/03	<1.00	<1.0	<1.0	<3.0	<1.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.100	<0.100	NM	<200
	03/16/04	<1.00	<1.0	<1.0	<3.0	<3.0	<1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.10	<0.100	NM	<111
	06/08/04	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<2.02	<2.02	<2.02	<5.05	<2.02	<2.02	<5.05	<1.01	<1.01	<5.05	<0.202	<2.02	<0.202	<0.505	<0.202	<0.202	<0.202	<2.02	<0.020	<0.005	0.040 ?	NM	<200
	09/21/04	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<1.00Y	<2.11Y	<2.11 J3Y	<2.11 J3Y	<5.26Y	<2.11Y	<2.11Y	<5.26Y	<1.05Y	<1.05Y	<5.26Y	<0.211Y	<2.11Y	<0.211Y	<0.526Y	<0.211Y	<0.211Y	<0.211Y	<2.11Y	<0.02 QY	<0.005Y	0.035 ?Y	NM	<220Y
	12/01/04	<0.143	0.4800 I	<0.1417	<0.220	0.4800 I	<0.2359	<0.22	<0.204	<0.214	<0.235	<0.165	<0.126	<0.110	<0.118	<0.106	<0.102	<0.150	<0.084	<0.102	<0.259	<0.167	<0.133	<0.094	<0.160	<0.018	<0.005	<0.027	NM	100 I V
	03/13/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.101	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135 J3	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.0176 V	NM	<18
	06/09/05	<0.143	<0.201	<0.142	<0.220	<0.220	< 0.236	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005	0.0210	622	< 20
	09/06/05	<0.143	<0.201	<0.142	0.590 I	<0.220	< 0.236	0.260 I	< 0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	< 0.106	<0.0670	< 0.0600	< 0.0900	<0.150	< 0.121	< 0.146	<0.100	<0.055	<0.005	0.0230	477	< 20
	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.102	<0.136	<0.207	<0.0857	<0.114	<0.0918	<0.102	<0.0816	<0.110	<0.138	<0.108	<0.0684	<0.0612	<0.0918	<0.153	<0.123	<0.149	<0.102	NM	NM	NM	271	<20
	03/29/06	<0.140	0.126	<0.176	<0.298	<0.298	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	93.2	<18
	06/09/06	<0.305	<0.388	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0600	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	65.1	68 I
	09/24/06	<0.305	<0.388	<0.257	<0.433	<0.433	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0600	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	33.0	38.0 I
	12/09/06	<0.305	<0.388	<0.257	<0.433	<0.433	<0.336	0.890 I	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0600	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	94.9	55 I
CEF-46-26I	12/20/00	1300	78	41	310	1729	NM	<1.1	NM	NM	<1.1	<1.1	<1.1	<1.1	<1.1	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.6	<0.4	<1.0	NM	<530
	01/25/01	2400	270	100	820	3590	<5.0	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.60	<0.40	<1.0	NM	890
	03/14/03	866	23.3	5.4	199	1094	15.9	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<0.100	0.35	<0.100	NM	628
	06/05/03	845	30	<10.0	314	1189	21	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	NM	598
	09/03/03	902	24	<10.0	347	1273	17.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.10	<0.100	NM	488
	12/11/03	693	16.5	7.9	198	915	19.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.300	<0.30	<0.100	NM	954
	03/18/04	870	8.3	6.3 ?	162	1046.6	20.3	<2.20	<2.20	<2.20	<5.49	<2.20	<2.20	<5.49	<1.10	<1.10	<5.49	<0.220	<2.20	<0.220	<0.549	<0.220	<0.220	<0.220	<2.20	0.02	<0.005	0.071 ?	NM	380
	06/08/04	832	87.9	47.7	371	1338.6	25.4	0.13	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.100	<0.60	<0.100	NM	524
	09/21/04	184Y	27.7Y	7.84Y	233Y	452.54Y	141Y	<2.04Y	<2.04 J3Y	<2.04 J3Y	<5.10Y	<2.04Y	<2.04Y	<5.10Y	<1.02Y	<1.02Y	<5.10Y	<0.204Y	<2.04Y	<0.204Y	<0.510Y	<0.204Y	<0.204Y	<0.204Y	<2.04Y	<0.02 QY	<0.005Y	0.047 ?Y	NM	280Y
	12/01/04	168	16.67	6.42	128	319.09	12.05	0.56 I	<0.206	<0.216	<0.237	<0.167	<0.127	<0.111	<0.120	<0.107	<0.103	<0.152	<0.085	<0.103	<0.262	<0.168	<0.134	<0.095	<0.162	<0.018	<0.005	0.03	NM	1500
	03/13/05	5.17	2.03	0.420 I	17.6	25.22	1.83 I	0.216 I	<0.133	<0.210	<0.0840	<0.112	<0.0900	<0.0990	<0.0780	<0.108	<0.135 J3	<0.106	<0.0630	<0.0600	<0.0900	<0.154	<0.121	<0.146	<0.102	<0.0550	<0.005	0.00500 I V	NM	59 I
	06/09/05	9.21	4.68	0.570 I	42.4	56.86	2.33	<0.101	< 0.133	< 0.210	< 0.0840	< 0.112	< 0.0900	< 0.0990	< 0.0780	< 0.108	< 0.135 J3	< 0.106	< 0.0630	< 0.0600	< 0.0900	< 0.154	< 0.121	< 0.146	< 0.102	< 0.055	< 0.005	0.0460	3190	1730
	09/06/05	1.16 I	0.900 I	<0.142	13.3	15.36	<0.236	<0.100	<0.133	<0.203	<0.0840	<0.112	< 0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	<0.055	<0.005	0.0410	2300	67 I
	12/07/05	6.72	0.740 I	<0.142	11.5	18.96	0.480 I	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1890	<18
	03/29/06	1.00	0.490 I	<0.176	9.64	11.13	1.89	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	415	390
	06/09/06	0.460 I	<0.338	<0.257	5.35	5.81	0.380 I	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1460	107 I
	09/24/06	0.490 I	<0.338	<0.257	4.10	5.05	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	876	19 I
	12/08/06	0.730 I	<0.338	<0.257	3.96	4.69	<0.336	<0.100	<0.133	<0.203	<0.0840	<0.112	<0.0900	<0.100	<0.0800	<0.108	<0.135	<0.106	<0.0670	<0.0600	<0.0900	<0.150	<0.121	<0.146	<0.100	NM	NM	NM	1190	20 I
CEF-46-27D	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.101	<0.134	<0.205	<0.0848	<0.113	<0.0909	<0.101	<0.0808	<0.109	<0.136	<0.107	<0.0677	<0.0606	<0.0909	<0.152	<0.122	<0.147	<0.101	NM	NM	NM	2.22	<18
CEF-46-28I	12/07/05	13.6	<0.201	<0.142	1.34 I	14.94	10.6	<0.109	<0.145	<0.221	<0.0913	<0.122	<0.0978	<0.109	<0.0870	<0.117	<0.147	<0.115	<0.0728	<0.0652	<0.0978	<0.163	<0.132	<0.159	<0.109	NM	NM	NM	1300	<18
CEF-46-29I	12/07/05	19.8	<0.201	<0.142	2.46	22.26	0.350 I	<0.103	<0.137	<0.209	<0.0866	<0.115	<0.0928	<0.103	<0.0825	<0.111	<0.139	<0.109	<0.0691	<0.0619	<0.0928	<0.155	<0.125	<0.151	<0.103	NM	NM	NM	2220	<18
CEF-46-30I	12/07/05	<0.143	<0.201	<0.142	<0.220	<0.220	<0.236	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	721	<18
CEF-46-31I	12/07/05	0.560 I	<0.201	<0.142	<0.220	0.560 I	<0.236	<0.111	<0.148	<0.226	<0.0933	<0.124	<0.100	<0.111	<0.0889	<0.120	<0.150	<0.118	<0.0744	<0.0667	<0.100	<0.167	<0.134	<0.162	<0.111	NM	NM	NM	2120	<20
Groundwater Criteria [1]		1	30	40	20	n/a	20	14	28	28	210	20	280	210	2100	280	210	0.05	4.8	0.05	0.5	0.2	0.05	0.005	210	10 *	1 *	n/a	250 *	5000
Natural Attenuation Default Source[1]		100	300	400	200	n/a	200	140	280	280	2100	200	2800	2100	21000	2800	2100	5	480	5	50	20	5	0.5	2100	100 *	10 *	n/a	n/a	50000

All values reported in ug/L unles otherwise noted
1 = Ch 62-777 F.A.C Groundwater Cleanup Target Levels (GCTL) reported in ug/L unless otherwise noted by "*"
(yellow) Concentrations exceed their respective GCTL value
* GCTL Reported in mg/L

NM = Not Measured
n/a = Not applicable
? = Rejected during data validation
"V" = the analyte was detected in both the sample and the associated method blank

L = Off-scale high, actual value is known to be greater than the value given.
I= The reported value is between the laborotory method and detection limit
J3 = The reported value failed to meet the established quality control criteria for either precision and/or accuracy
Q= Sample was represerved out of hold time due to preservative with nitric acid instead of sulfuric acid. The lab error did not impact validity of reported values
Y = Sample was received into laboratory out of acceptable temperature range.

ATTACHMENT A
SOIL ANALYTICAL RESULTS

BUILDING 46 NUTRIENT INJECTION SYSTEM
NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Soil Boring Number	Sample Date	Benzene	Ethyl Benzene	Toluene	Xylene	BETX	Methyl tert-butyl ether	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	1-Methylnaphthalene	2-Methylnaphthalene	Pyrene	Benzo (a) anthracene	Chrysene	Benzo (b) fluoranthene	Benzo (k) fluoranthene	Benzo (a) pyrene	Indeno (1, 2, 3-cd) pyrene	Dibenzo (a,h) anthracene	Benzo (g,h,i) perylene	TRPH
SB-1	01/04/01	<0.9	65	14	390	469	3.1	73	<0.18	<1.8	1.235	0.67	<0.18	0.179	--	--	0.039	<.018	0.48	0.02	0.0243	0.0102	0.0063	<0.018	<0.018	9900
	06/27/01	0.61	34	9.1	110	153.71	<0.0012	1.4	<0.18	0.16	0.15	0.15	<0.18	0.051	--	--	0.012	0.022	0.19	0.012	0.013	0.0056	0.0073	<0.018	0.0049	150
	09/20/01	0.65	6.1	0.69	40	47.44	<0.15	8.8	<0.2	<0.2	<0.2	0.28	<0.2	0.11	--	--	0.019	<0.02	0.15	0.034	0.026	0.018	0.011	0.026	0.024	1500
	12/12/01	0.069	0.13	0.013	0.55	0.762	0.0084	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.02	--	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	19
	03/07/02	3	67	7.1	200	277.1	<1.2	23	<0.19	<0.19	<0.19	0.27	<0.19	0.057	--	--	0.0057	0.023	0.26	<0.019	<0.19	0.0053	<0.019	<0.019	<0.019	1600
	06/20/02	0.15	7.9	0.82	27	35.87	<.11	5.2	<0.18	<0.18	0.92 J	0.086 J	<0.18	0.024 J	--	--	<0.018	<0.018	0.04	<0.018	<0.018	.0035 J	.0038 J	<0.018	<0.018	180
	09/26/02	2.17	97.7	10.7	532	642.57	<1.19	21.1	<0.20	<0.20	<0.20	0.27 J	<0.20	0.054 J	--	--	0.017 J	0.032 J	<0.020	0.015 J	0.022 J	<0.020	<0.020	0.017 J	0.012 J	800
	12/13/02	0.153	4.17	0.406	27.8	32.5	<0.166	2.84	<0.68	<0.68	<0.143	<0.0436	<0.0449	0.0517	<1.02	3.02	0.0251	<0.00885	<0.0102	<0.0122	<0.0116	<0.0068	<0.0292	<0.0204	<0.0517	151
	03/15/03	<0.034	0.155	<0.034	0.794	0.949	<0.169	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	0.089	0.132	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	65.3
	06/09/03	0.1869	1.526	0.2224	3.082	5.017	<0.252	0.0805	0.00432	0.00864	0.0755	0.0502	0.0176	0.00943	0.62	0.976	0.0118	<0.00393	<0.00393	<0.00393	<0.00393	<0.00393	<0.00393	<0.00393	<0.00393	27.7
	09/04/03	0.0226	1.8	0.043	1.48	3.346	0.011	0.231	<0.0033	0.00561	0.0531	0.0182	0.00528	0.00561	0.615	0.985	0.0066	<0.0033	<0.0033	0.00462	0.00363	0.0066	0.00825	0.0033	0.00924	34.6
	12/11/03	0.486	1.11	0.572	12	14.168	0.228	2.11	<0.0033	0.0099	0.0356	0.0238	0.0191	0.0158	1.72	2.9	0.0122	<0.0033	<0.0033	0.0102	0.00726	0.0142	0.0116	<0.0033	<0.00957	154
	03/18/04	0.0021	0.0597	0.0218	0.333	0.417	<0.006	0.277	<0.00398	<0.00398	0.0131	0.0123	<0.00398	0.00796	0.322	0.704	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	<0.00398	12.3
	06/07/04	<0.514	<0.514	<0.514	3.2	3.200	<0.514	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	0.175	0.4	<0.150	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	<0.0998	13.2
	09/20/04	<0.256Y	<0.256Y	<0.256Y	0.273Y	0.273Y	0.418Y	<0.100Y	<0.100 Y	<0.100 J3Y	<0.100 J3Y	<0.100 Y	<0.100Y	<0.100Y	<0.100 J3Y	<0.150 J3Y	<0.150Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	9.9Y
	12/01/04	<0.000596	<0.0005623	<0.0005623	<0.000874	<0.000874	<0.0005827	<0.07708	<0.06734	<0.07411	<0.09095	<0.05945	<0.02727	<0.02912	<0.06959	<0.07128	<0.03468 j3	<0.01810	<0.02000	<0.01776	<0.01776	<0.02057	<0.02164	<0.02196	<0.01735	85.3
	03/13/05	<0.000709	0.680	0.118 I	4.050	4.848	0.152 I	1.110	<0.0977	<0.074	<0.0654	<0.0394	<0.0532	<0.024	0.654	1.460	<0.0039	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	35.0
	06/09/05	< 0.000635	< 0.000524	< 0.000876	< 0.00108	< 0.003115	< 0.000667	<0.0671	< 0.0977	< 0.074	< 0.0654	< 0.0394	< 0.0532	< 0.024	< 0.0838	< 0.0712	< 0.0339	< 0.0181	< 0.020	< 0.0176	< 0.0176	< 0.0206	< 0.0216	< 0.0219	< 0.0173	17.9
	09/07/05	<0.000575	<0.000474	<0.000793	0.00275 I	0.00275 I	<0.000604	<0.0671	<0.0977	<0.074	<0.0654	<0.0394	<0.0532	<0.024	<0.0838	<0.0712	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	2.66 I
	12/05/05	<0.000884	0.00208 I	0.00379 I	0.00202 I	0.00789 I	<0.000928	<0.0671	<0.0977	<0.074	<0.0654	<0.0394	<0.0532	<0.024	<0.0838	0.166 I	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	17.7
	03/29/06	<0.223	2.170	1.050	10.900 J3	14.12	<0.177	4.360	<0.0977	<0.074	<0.0654	0.0497 I	<0.0532	<0.024	1.810	3.930	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	190
	06/09/06	<0.00212	<0.00221	<0.00227	<0.00451	<0.00451	<0.00168	<0.00671	<0.0977	<0.074	<0.0654	<0.0394	<0.0532	<0.024	<0.0838	<0.0712	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	42.1
	09/24/06	<0.00844	0.0272 J3	0.0480	0.124 J3	0.1992	0.724 J3	<0.0671	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	0.168	0.309	0.0933 I	0.0343 I	0.0437 I	0.432	0.362	0.179	0.151 I	<0.0219	0.0987 I	14.5
	12/08/06	<0.00995	0.0413 J3	0.0380 V J3	0.135 J3	0.2143	0.0505	<0.0671	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	<0.0838	<0.0712	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	12.4
SB-2	01/04/01	7.1	120	10	610	747.1	3.8	38.5	<0.18	<0.18	0.515	0.66	<0.18	0.173	--	--	0.044	0.0425	<0.018	0.01685	0.02945	0.0215	<0.018	<0.018	0.0255	3900
	06/27/01	1.4	57	47	420	525.4	<0.0011	0.84	0.17	1	0.46	0.59	0.086	0.21	--	--	0.046	0.077	0.071	0.026	0.037	0.019	0.0072	<0.019	0.0091	1300
	09/20/01	0.51	32	6	290	328.51	<0.12	7.4	<0.2	2.1	<0.20	0.58	<0.2	0.2	--	--	0.049	0.076	0.16	0.026	<0.020	0.02	<0.020	<0.020	<0.020	430
	12/12/01	<11	99	110	620	829	<11	34	<0.2	0.12	0.38	0.23	<0.2	0.043	--	--	0.018	0.017	0.15	0.01	0.0066	0.007	<0.020	0.0081	0.015	1800
	03/07/02	1.7	38	24	430	493.7	<1	24	<0.19	<0.19	<0.19	0.47	<0.19	0.085	--	--	0.012	0.049	<0.019	0.027	0.051	0.026	0.051	<0.019	0.015	2000
	06/20/02	0.14	2.8	6	72	80.94	<.12	11	<0.17	<0.17	<0.17	0.2	0.1 J	0.065 J	--	--	0.015 J	0.028 J	0.075	0.013 J	0.018 J	0.010 J	<0.017	<0.017	<0.017	550
	09/26/02	0.746 J	9.15	22	274	305.15	<1.2	20.5	<0.19	<0.19	<0.19	0.99	<0.19	0.17 J	--	--	0.060 J	0.12 J	<0.019	0.030 J	0.042 J	0.029	0.0079 J	0.032 J	0.016 J	970
	12/13/02	<0.611	8.01	12.8	80.7	101.51	<3.06	9.98	<0.661	<0.661	<0.139	0.0582	<0.0436	<0.0139	2.13	9.78	0.0906	<0.00859	<0.00991	<0.0119	<0.0112	<0.00661	<0.0284	<0.0198	<0.0502	428
	03/15/03	1.32	43.1	31.1	322	398	<0.532	10.7	<0.066	0.079	<0.066	0.317	0.066	<0.066	7.59	12.9	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	997
	06/09/03	0.4545	11.07	0.4463	75.58	88	<0.413	11.2	0.033	0.0632	0.136	0.206	0.058	0.0333	7.06	12	0.0425	0.00953	0.0123	0.0107	0.00556	0.0111	0.0107	<0.00397	0.0115	288
	09/04/03	0.717	18.6	3.05	115	137	<0.466	10.7	0.0304	0.0544	0.108	0.141	0.0403	0.0188	5.99	9.95	0.0224	0.00825	0.00528	<0.0033	<0.0033	0.00627	<0.0033	<0.0033	0.00528	453
	12/11/03	0.0442	14.9	10.4	192	217	0.008	39.2	0.109	0.17	0.311	0.414	0.117	0.0696	21.1	39.5	0.101	0.0459	0.0221	0.0191	0.0122	0.0284	0.0158	<0.0033	0.0188	1010
	03/18/04	0.0028	1.46	0.0389	6.52	8.0217	0.015	1.1	0.0253	<0.00422	0.0611	0.0769	<0.00422	0.011	1.65	2.93	0.0143	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	48.2
	06/07/04	<0.467	<0.467	<0.467	8.26	8.2600	<0.467	3.32	<0.100	0.115	0.183	0.27	<0.100	<0.100	7.13	13.4	<0.150	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	657
	09/20/04	<0.280Y	4.31Y	<0.280Y	21Y	25.431Y	0.366Y	1.35Y	<0.100Y	<0.100 J3Y	<0.100 J3Y	<0.100Y	<0.100Y	<0.100Y	0.794 J3Y	1.740 J3Y	<0.150Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	155Y
	12/01/04	0.249	28.94	41.13	178.000	248.319	<0.05174	9.700	<0.06734	<0.07411	<0.09095	0.09700 I	<0.02727	<0.02912	4.163	9.567	<0.03468 J3	<0.01810	<0.020000	<0.01776	<0.01776	<0.02057	<0.02164	<0.02196	<0.01735	645
	03/13/05	<0.0594	0.306	0.888	1.800	2.994	0.191	1.080	<0.0977	<0.0740	<0.654	<0.0394	<0.0532	<0.0240	0.734	1.500	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	28.0
	06/09/05	< 0.0660	0.104 I	<0.0909	0.951	1.055	<0.0693	0.149 I	< 0.0977	< 0.740	< 0.0654	0.0420 I	< 0.532	< 0.0240	0.311	0.573	< 0.0339	< 0.0181	<0.0200	<0.0176	<0.0176	< 0.0206	< 0.0216	< 0.0219	< 0.0173	31.2
	09/07/05	<0.126	10.400	1.700	57.400	67.800	<0.132	6.150	<0.0977	<0.0740	0.0720 I	0.0720 I	<0.0532	<0.0240	2.720	5.850	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	357
	12/05/05	<0.0872	3.060	2.360	21.600	27.020	<0.0916	1.140	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	0.410	1.160	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	87.2
	03/29/06	<0.210	2.780	3.530	16.700 J3	23.01	<0.167	2.310	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	1.060	2.370	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	58.6
	06/09/06	<0.0242	5.160	<0.00259	20.500	25.660	<0.00192	9.990	<0.0977	0.0853 I	0.217	0.127 I	0.124 I	<0.0240	5.560	13.000	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	553
	09/24/06	<0.0820	0.0157 J3 I	0.0349	0.0681 J3	0.1187	1.040 J3	<0.0671	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	<0.0838	<0.0712	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	4.22 I
	12/08/06	<0.00953	0.0229 J3 I	0.0276 V J3	0.299 J3	0.3495	0.0385	0.379	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	0.391	0.755	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	24.9
SB-14	01/04/01	<0.001	<0.001	0.011	0.0077	0.0187	0.0081	0.23	<0.18	<0.18	<0.18	<0.18	<0.18	<0.018	--	--	<0.018	<0.018	0.785	0.0145	0.008	0.0115	0.0075	0.0101	0.016	43
	06/27/01	0.1	0.16	<0.0011	0.15	0.41	0.015	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	0.014	--	--	<0.019	<0.019	0.44	0.0059	0.0072	0.019	<0.019	0.023	<0.019	270
	09/20/01	0.0025	0.0025	0.002	0.0024	0.0094	<0.0012	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.020	--	--	<0.020	<0.020	0.32	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	55
	12/12/01	0.11	0.18	0.014	0.71	1.014	0.012	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	<0.019	--	--	<0.019	<0.019	0.058	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	65
	03/07/02	0.054	0.045	<0.0011	0.032	0.131	0.0021	0.56	<0.19	<0.19	<0.19	<0.19	<0.19	0.011	--	--	<0.019	<0.019	1.2	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	120
	06/20/02	<0.11	110 J	<0.11	110 J	220	<0.11	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.018	--	--	<0.018	<0.018	1.4 J	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	23
	09/26/02	<0.001	0.0288	<0.001	0.0321	0.0609	0.00268	<0.19	<0.19	<0.19	<0.19	<0.19	<0.19	0.011 J	--	--	0.0099 J	<0.019	0.38 J	0.03	0.018 J	0.062 J	<0.019	0.059 J	<0.019	117
	12/13/02	<0.125	0.402	0.602	0.602	1.606	<0.314	<2.08	<2.08	<2.08	<0.439	<1.34	<1.38	<0.439	<3.14	<3.14	<0.565	<0.271	<0.314	<0.376	<0.355	<0.208	<0.898	<0.627	<1.59	192
	03/15/03	0.138	0.823	0.087	0.966	2.01	<0.140	0.185	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	0.228	0.429	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	<0.066	51.2
	06/09/03	0.0099	0.1241	0.02	0.1563	0.31	0.006	6.2	0.0334	0.0645	0.137	0.154	0.0523	0.0556	6.15	10.8	0.0499	0.0277	0.0265	0.0319	0.0242	0.0292	0.0292	0.013	0.0299	413
	09/04/03	0.0046	0.0045	0.0061	0.0083	0.0235	<0.005	0.553	<0.0033	<0.0033	0.00627	0.00594	<0.0033	<0.0033	0.353	0.543	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00627	54.5
	12/11/03	0.0147	0.0016	0.0011	0.0055	0.0229	<0.005	1.01	0.0155	<0.0033	0.00891	0.00759	0.0132	0.0287	0.49	0.795	0.0337	0.0234	0.0191	0.0241	0.0241	0.0419	0.0333	0.0162	0.0376	126
	03/18/04	0.0012	0.0063	0.0019	0.0027	0.0121	<0.006	0.0085	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	0.00628	0.0144	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	0.0103	20.7
	06/07/04	<0.455	<0.455	<0.455	<0.455	<0.455	<0.455	1.67	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	0.368	0.69	<0.150	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	116
	09/20/04	<0.450Y	<0.450Y	<0.450Y	<0.450Y	<0.450Y	0.612Y	15.1Y	<0.100Y	0.328 J3Y	0.433 J3Y	0.905Y	0.940 IY	0.103Y	8.560 J3Y	16.900 J3Y	0.215Y	<0.100Y	0.0463 IY	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	<0.100Y	633Y
	12/01/04	<0.000707	0.07285	0.002564	0.218	0.2934	< 0.0006913	0.9073	<0.06734	<0.07411	<0.09095	<0.05945	<0.02727	<0.02912	0.3703	0.829	<0.03468	<0.01810	<0.02000	<0.01776	<0.01776	<0.02057	<0.02164	<0.02196	<0.01735	19.2
	03/13/05	<0.0547	0.336	0.601	1.280	2.2170	<0.0534	0.245	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.024	0.115 I	0.246	<0.0339	<0.0181	<0.020	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	26.9
	06/09/05	< 0.000604	< 0.000498	< 0.000833	< 0.00103	< 0.002965	<0.0693	0.224	< 0.0977	< 0.740	< 0.0654	0.0420 I	< 0.532	< 0.0240	0.105 I	0.0733 I	< 0.0339	< 0.0181	<0.0200	<0.0176	<0.0176	< 0.0206	< 0.0216	< 0.0219	< 0.0173	18.2
	09/07/05	<0.0905	6.390	1.990	38.400	46.78	<0.0950	3.990	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	1.390	3.240	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	238
	12/05/05	<0.0872	0.876	1.540	5.140	7.556	<0.0765	0.135 I	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	<0.0838	<0.0712	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	9.51
	03/29/06	2.28 I	0.0255 J4	<0.00229 J4	0.0206 J3	2.3261	<0.00170	<0.0671	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	<0.0838	<0.0712	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	18.6
	06/09/06	<0.00232	<0.00242	<0.00248	0.0174	0.0174	<0.00184	0.663	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	0.297	0.192	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	246
	09/24/06	<0.00862	0.258 J3	0.143	1.740 J3	2.141	1.420 J3	0.374	<0.0977	<0.0740	<0.0654	<0.0394	<0.0532	<0.0240	0.443	0.908	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	16.3
	12/08/06	0.0300 I	5.200 J3	2.690 VJ3	29.00	36.92	0.0565	1.970	<0.0977	<0.0740	<0.0654	0.0437 I	<0.0532	<0.0240	0.910	2.220	<0.0339	<0.0181	<0.0200	<0.0176	<0.0176	<0.0206	<0.0216	<0.0219	<0.0173	91.1
Direct Exposure Residential [1]		1.2	1500	7500	130	n/a	4400	55	1800	2400	2600	2200	21000	3200	200	210	2400	1.4	140	1.4	15	0.1	1.5	0.1	2500	460
Leachability from GW Criteria [1]		0.007	0.6	0.5	0.2	n/a	0.09	1.2	27	2.1	160	250	2500	1200	3.1	8.5	880	0.8	77	2.4	24	8	6.6	0.7	32000	340

Y = The sample was received into laboratory out of acceptable temperature range.
I = The reported value is between the laboratory method detection limit and the laboratory practicial quantitation limit.
J = Estimated value
J3 = The reported value failed to meet the established quality control criteria for either precision and/or accuracy.
All values reported in mg/kg
1 = Ch 62-777 F.A.C Soil Cleanup Target Levels (SCTL) reported in mg/kg
Highlighted values indicate compounds that exceed the SCTL or the Leachability Criteria

Attachment 2
Cost Estimate Worksheets

ATTACHMENT B.

Cost Summary for Groundwater Alternatives 1, 2, and 3 with Equipment Options for Remedial Action at TTZ1.

Groundwater Alternative 1	**Alternative 1, Option 1**	**Alternative 1, Option 2**	**Alternative 1, Option 3**
Total Project Duration (Years)	5	5	5
Capital Cost	$66,900	$201,300	$103,400
Annual O&M Cost of Alternative	$151,450	$79,450	$92,980
Present Value of Alternative	**$768,000**	**$569,000**	**$534,000**
Project Description	Upgrade existing rental equipment to accommodate expanded biosparge system to treat plume of contaminants exceeding GCTLs.	New equipment installation to replace existing rental equipment, using purchased equipment to accommodate expanded biosparge system to treat plume of contaminants exceeding GCTLs..	Equipment installation to replace existing rental equipment , using a combination of salvaged and purchased equipment to accommodate expanded biosparge system to treat plume of contaminants exceeding GCTLs..
Groundwater Alternative 2	**Alternative 2, Option 1**	**Alternative 2, Option 2**	**Alternative 2, Option 3**
Total Project Duration (Years)	3	3	3
Capital Cost	$26,700	$54,100	$42,100
Annual O&M Cost of Alternative	$62,220	$39,620	$40,750
Present Value of Alternative	**$204,000**	**$167,000**	**$158,000**
Project Description	Continue Biosparge system on East side only, using current rental equipment to sparge shallow and intermediate injection wells and treat plume of contaminants exceeding NADC criteria only.	New equipment installation to replace existing rental equipment, using purchased equipment to accommodate shallow and intermediate injection wells and treat plume of contaminants exceeding NADC criteria only.	Use a combination of salvaged and newly-purchased equipment to accommodate shallow and intermediate injection wells and treat plume of contaminants exceeding NADC criteria only.
Groundwater Alternative 3	**Alternative 3**		
Total Project Duration (Years)	3		
Capital Cost	$0		
Annual O&M Cost of Alternative	$32,188		
Present Value of Alternative	**$92,000**		
Project Description	No active groundwater treatment. Continue quarterly and annual monitoring of select wells until NADC criteria are attained.		

Disclaimer: The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternatives. Changes in the cost elements are likely to occur as a result of new information and data collected and potential revisions in the design assumptions.

Element: **Biosparge System - Upgrade Existing Rental Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 1

WORK STATEMENT

Upgrade rental equipment for East and West Biosparge Systems for increased capacity from existing two 2-HP compressors to two 10-HP compressors.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Replace existing two 2 HP compressors with two 10 HP compressors		2	$ 4,500	$ 9,000	Telecon with Priester Associates
SUBTOTAL				**$9,000**	
Project Management	5%	of	$ 9,000	$ 450	
Technical Support	15%	of	$ 9,000	$ 1,350	
Construction Management	20%	of	$ 9,000	$ 1,800	
Project Delivery	5%	of	$ 9,000	$ 450	
SUBTOTAL				**$4,050**	
WELL INSTALLATION COSTS				**$53,800**	
TOTAL CAPITAL COST				**$66,900**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Existing Equipment Rental Cost	12	Monthly	$ 3,992	$ 47,904	
Additional monthly cost if using upgraded equipment	12	Monthly	$ 2,008	$ 24,096	Telecon with Priester Associates
Electricity Cost	1	Year	$ 9,024	$ 9,024	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year	$ 67,925	$ 67,925	
TOTAL ANNUAL O&M COST				**$ 151,450**	

PRESENT VALUE ANALYSIS - 5 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$66,900	$66,900	1.000	$66,900	
5	ANNUAL O&M COST	$757,250	$151,450	4.632	$701,590	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$768,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Biosparge System - New Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 2

WORK STATEMENT

Newly-purchased equipment installation to replace current rental equipment operating on East and West biosparge systems.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
West System					
Air Sparge System					
Compressor Rotary Claw 23.0 psi @70 CFM 10 HP	1	EA	$ 13,658	$ 13,658	Manufacturer: Busch
Inlet filter silencer		EA	incl. above		Manufacturer: Busch
Check valve		EA	incl. above		Manufacturer: Busch
Pressure relief valve		EA	incl. above		Manufacturer: Busch
Automatic Drain	1	EA	incl. above		
Piping and mounting	1	EA	incl. above		
Inbound freight	1	EA	incl. above		
Air Sparge System Sub-total				**$ 13,658**	Provided by: Onion Environmental
Sparge Manifold					
Solenoid valve	5	EA			Manufacturer: Burkert
6213 normally closed 2 way, , 120V 60 Hz 18W		EA			
25mm orifice, Buna Seals, Brass Body, 1/2" NPT		EA			
UL-LISTED		EA			
Flow Meters	20	EA			Manufacturer: McMaster
Valve Ball union	20	EA			
Pressure gauges 0-30	20	EA			Manufacturer: McMaster
Piping labor and valves	12	EA			Manufacturer: OE
Sparge Manifold Sub-total				**$ 3,519**	Provided by: Onion Environmental
General Description - Control Panel					
Control Panel Sub-total				**$ 4,587**	Provided by: Onion Environmental
Trailer					
Trailer 6'x10' Enclosed side door	1	EA			
Control room lighting and fan	1	EA			
115 receptacle	1	EA			
Electrical supplies	1	EA			
Electrical Labor	3	EA			
Fire Extinguisher - 10 lbs	2	EA			
Mount lights, switches, and sensors fan	8	EA			
Freight	1	EA			
Trailer Sub-total				**$ 4,200**	Provided by: Onion Environmental
Operational Manual	1	EA	$ 800	$ 800	
QC	1	EA	$ 400	$ 400	
Startup	1	EA	$ 2,000	$ 2,000	
Delivery to site	1	EA	$ 1,500	$ 1,500	
Shop Testing	1	EA	$ 300	$ 300	
WEST SYSTEM SUBTOTAL				**$ 44,622**	Provided by: Onion Environmental

Element: **Biosparge System - New Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 2

WORK STATEMENT

Newly-purchased equipment installation to replace current rental equipment operating on East and West biosparge systems.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
East System					
Air Sparging					
Compressor Rotary Claw 15 HP	1	EA	$ 13,658	$ 13,658	Manufacturer: Busch
Inlet filter silencer		EA	incl. above		Manufacturer: Busch
Check valve		EA	incl. above		Manufacturer: Busch
Pressure relief valve		EA	incl. above		Manufacturer: Busch
Automatic Drain	1	EA	incl. above		
Piping and mounting	1	EA	incl. above		
Inbound freight	1	EA	incl. above		
Air Sparging Sub-Total				**$ 13,658**	Provided by: Onion Environmental
Sparge Manifold					
Solenoid valve	5	EA			Manufacturer: Burkert
6213 normally closed 2 way, , 120V 60 Hz 18W		EA			
25mm orifice, Buna Seals, Brass Body, 1/2" NPT		EA			
UL-LISTED		EA			
Flow Meters	25	EA			Manufacturer: McMaster
Valve Ball union	25	EA			
Pressure gauges 0-30	25	EA			Manufacturer: McMaster
Piping labor and valves	16	EA			Manufacturer: OE
Sparge Manifold Sub-total				**$ 4,280**	Provided by: Onion Environmental
General Description - Control Panel	1	EA			
Custom control panel for 230/3/60 4 wire remediation system		EA			
estimated price for Master control panel 120V single phase;		EA			
Surge suppression		EA			
5 timers		EA			
1- 15 hp motor starter		EA			
1- High pressure switch		EA			
1- height Temp switch	1	EA			
inbound freight	1	EA			
install Labor	4	EA			
Supplies	1	EA			
Drawings	1	EA			
Control Panel Sub-total				**$ 4,587**	Provided by: Onion Environmental
Trailer	1	EA			
Trailer 6'X 10' Enclosed side door	1	EA			
Control Room Lighting and fan	1	EA			
115 receptacle	1	EA			
Electrical Supplies	1	EA			
Electrical Labor	3	EA			
Fire extinguisher 10 lb	2	EA			
Mount Lights Switches & Sensors fan	8	EA			
Freight	1	EA			
Trailer Sub-total				**$ 4,200**	Provided by: Onion Environmental

Element: **Biosparge System - New Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 2

WORK STATEMENT

Newly-purchased equipment installation to replace current rental equipment operating on East and West biosparge systems.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Operation Manual	1	EA	$ 800	$ 800	
QC	1	EA	$ 400	$ 400	
Start up	1	EA	$ 2,000	$ 2,000	
Delivery to site	1	EA	$ 1,500	$ 1,500	
Shop testing	1	EA	$ 300	$ 300	
EAST SYSTEM SUBTOTAL				**$ 45,383**	Provided by: Onion Environmental
WELL INSTALLATION COSTS				**$53,800**	
SUBTOTAL				**$ 143,805**	Provided by: Onion Environmental
Project Management	5%	of	$ 143,805	$ 7,190	
Technical Support	15%	of	$ 143,805	$ 21,571	
Construction Management	15%	of	$ 143,805	$ 21,571	
Project Delivery	5%	of	$ 143,805	$ 7,190	
SUBTOTAL				**$57,522**	
TOTAL CAPITAL COST				**$201,300**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Electricity Cost	1	Year	$ 9,024	$ 9,024	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year	$ -	$ 67,925	
TOTAL ANNUAL O&M COST				**$ 79,450**	

PRESENT VALUE ANALYSIS - 5 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$201,300	$201,300	1.000	$201,300	
5	ANNUAL O&M COST	$397,250	$79,450	4.632	$368,051	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$569,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Biosparge System - Salvaged Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 3

WORK STATEMENT

New equipment and salvaged compressor installation to replace current rental equipment operating on West biosparge system

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Sparge Manifold					
Solenoid valve	4	EA			6213 normally closed 2 way, , 120V 60 Hz 18W, 25mm orifice, Buna Seals, Brass Body, 1.25 " NPT,UL-LISTED
Flow Meters	39	EA			McMaster
Valve Ball union	39	EA			
Pressure gauges 0-30	39	EA			McMaster
Piping labor and valves	15	EA			OE
Sparge Manifold Sub-Total				**$ 6,728**	
Control Panel					
4 timers	1	EA			Custom control panel for 230/3/60 4 wire remediation system
1- High pressure switch	1	EA			estimated price for Master control panel 120V single phase;
1- height Temp switch	1	EA			Surge suppression
inbound freight	1	EA			
install Labor	4	EA			
Supplies	1	EA			
Drawings	1	EA			
Control Panel Sub-Total				**$ 4,063**	
Building					
8' X 12' with Roll up door	1	EA			
Control Room Lighting	1	EA			
Vents	4	EA			
12 Fan	1	EA			
115 receptacle	1	EA			
Electrical Supplies	1	EA			
Electrical Labor	3	EA			
Fire extinguisher 10 lb	2	EA			
Mount Lights Switches & Sensors fan	8	EA			
Freight	1	EA			
Building Sub-Total				**$ 8,700**	
Operation Manual	1	EA	$ 800	$ 800	
QC	1	EA	$ 400	$ 400	
Start up including placing compressor and tank in building	1	EA	$ 2,500	$ 2,500	
Delivery to site	1	EA	$ 1,500	$ 1,500	
Shop testing	1	EA	$ 300	$ 300	
SYSTEM SUBTOTAL				**$24,990.41**	
WELL INSTALLATION COSTS				**$37,649.00**	
SUBTOTAL				**$ 62,639**	

Element: **Biosparge System - Salvaged Equipment for East and West Systems**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 1, Option 3

WORK STATEMENT

New equipment and salvaged compressor installation to replace current rental equipment operating on West biosparge system

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Project Management	10%	of	$ 62,639	$ 6,264	
Technical Support	20%	of	$ 62,639	$ 12,528	
Construction Management	25%	of	$ 62,639	$ 15,660	
Project Delivery	10%	of	$ 62,639	$ 6,264	
SUBTOTAL				**$40,716**	
TOTAL CAPITAL COST				**$103,400**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Electricity Cost	1	Year	$ 22,559	$ 22,559	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year	$ 7,260	$ 67,925	
TOTAL ANNUAL O&M COST				**$ 92,980**	

PRESENT VALUE ANALYSIS - 5 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$103,400	$103,400	1.000	$103,400	
5	ANNUAL O&M COST	$464,900	$92,980	4.632	$430,728	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$534,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Biosparge System - Continue Using Existing Rental Equipment for East System**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 2, Option 1

WORK STATEMENT

Continue using rental equipment for East biosparge system for shallow and intermediate injection wells.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Shutdown of West System	1	LS	$ 500	$ 500	
WELL INSTALLATION COSTS				$ 17,900	
SUBTOTAL				**$ 18,400**	
Project Management	5%	of	$ 18,400	$ 920	
Technical Support	15%	of	$ 18,400	$ 2,760	
Construction Management	20%	of	$ 18,400	$ 3,680	
Project Delivery	5%	of	$ 18,400	$ 920	
SUBTOTAL				**$8,280**	
TOTAL CAPITAL COST				**$26,700**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Existing Equipment Rental Cost	12	Monthly	$ 1,996	$ 23,952	**(Cost reduced to account for one trailer)**
Electricity Cost	1	Year	$ 902	$ 902	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year		$ 34,866	
TOTAL ANNUAL O&M COST				**$ 62,220**	

PRESENT VALUE ANALYSIS - 3 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$26,700	$26,700	1.000	$26,700	
3	ANNUAL O&M COST	$186,660	$62,220	2.851	$177,358	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$204,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Biosparge System - New Equipment for East System**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 2, Option 2

WORK STATEMENT

Newly-purchased equipment installation on East side only, to replace current rental equipment operating on East and West biosparge systems.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
East System					
Air Sparge System					
Compressor Rotary Claw 23.0 psi @70 CFM 10 HP	1	EA	$ 1,716	$ 1,716	Manufacturer: Dayton
Inlet filter silencer		EA	incl. above		Manufacturer: Dayton
Check valve		EA	incl. above		Manufacturer: Dayton
Pressure relief valve		EA	incl. above		Manufacturer: Dayton
Automatic Drain	1	EA	incl. above		
Piping and mounting	1	EA	incl. above		
Inbound freight	1	EA	incl. above		
Air Sparge System Sub-total				**$ 1,716**	Provided by: Grainger Industrial Supply
Sparge Manifold					
Solenoid valve	5	EA			Manufacturer: Burkert
6213 normally closed 2 way, , 120V 60 Hz 18W		EA			
25mm orifice, Buna Seals, Brass Body, 1/2" NPT		EA			
UL-LISTED		EA			
Flow Meters	20	EA			Manufacturer: McMaster
Valve Ball union	20	EA			
Pressure gauges 0-30	20	EA			Manufacturer: McMaster
Piping labor and valves	12	EA			Manufacturer: OE
Sparge Manifold Sub-total				**$ 3,519**	Provided by: Onion Environmental
General Description - Control Panel					
Control Panel Sub-total				**$ 4,587**	Provided by: Onion Environmental
Trailer					
Trailer 6'x10' Enclosed side door	1	EA			
Control room lighting and fan	1	EA			
115 receptacle	1	EA			
Electrical supplies	1	EA			
Electrical Labor	3	EA			
Fire Extinguisher - 10 lbs	2	EA			
Mount lights, switches, and sensors fan	8	EA			
Freight	1	EA			
Trailer Sub-total				**$ 4,200**	Provided by: Onion Environmental
Operational Manual	1	EA	$ 800	$ 800	
QC	1	EA	$ 400	$ 400	
Startup	1	EA	$ 2,000	$ 2,000	
Delivery to site	1	EA	$ 1,500	$ 1,500	
Shop Testing	1	EA	$ 300	$ 300	
EAST SYSTEM SUBTOTAL				**$ 20,738**	Provided by: Onion Environmental
WELL INSTALLATION COST				**$17,900**	
SUBTOTAL				**$ 38,638**	Provided by: Onion Environmental

Element: **Biosparge System - New Equipment for East System**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 2, Option 2

WORK STATEMENT

Newly-purchased equipment installation on East side only, to replace current rental equipment operating on East and West biosparge systems.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Project Management	5%	of	$ 38,638	$ 1,932	
Technical Support	15%	of	$ 38,638	$ 5,796	
Construction Management	15%	of	$ 38,638	$ 5,796	
Project Delivery	5%	of	$ 38,638	$ 1,932	
SUBTOTAL				**$15,455**	
TOTAL CAPITAL COST				**$54,100**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Electricity Cost	1	Year	$ 2,256	$ 2,256	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year		$ 34,866	
TOTAL ANNUAL O&M COST				**$ 39,620**	

PRESENT VALUE ANALYSIS - 3 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$54,100	$54,100	1.000	$54,100	
3	ANNUAL O&M COST	$118,860	$39,620	2.851	$112,937	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$167,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Biosparge System - Salvaged Equipment for East System**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 2, Option 3

WORK STATEMENT

Salvaged equipment and compressor operating on East biosparge system

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Salvaged Air Compressor - Day Tank 1					
Biosparge System					
Salvaged 7.5 hp compressor	1	EA	$ -	$ -	Manufacturer: Dayton
Inlet filter silencer		EA	incl. above		Manufacturer: Dayton
Check valve		EA	incl. above		Manufacturer: Dayton
Pressure relief valve		EA	incl. above		Manufacturer: Dayton
Automatic Drain	1	EA	incl. above		
Piping and mounting	1	EA	incl. above		
Inbound freight	1	EA	incl. above		
Biosparge System Sub-total				**$ -**	Provided by: Grainger Industrial Supply
Sparge Manifold					
Solenoid valve	5	EA			Manufacturer: Burkert
6213 normally closed 2 way, , 120V 60 Hz 18W		EA			
25mm orifice, Buna Seals, Brass Body, 1/2" NPT		EA			
UL-LISTED		EA			
Flow Meters	20	EA			Manufacturer: McMaster
Valve Ball union	20	EA			
Pressure gauges 0-30	20	EA			Manufacturer: McMaster
Piping labor and valves	12	EA			Manufacturer: OE
Sparge Manifold Sub-total				**$ 3,519**	Provided by: Onion Environmental
General Description - Control Panel					
Control Panel Sub-total				**$ 4,587**	Provided by: Onion Environmental
Trailer					
Trailer 6'x10' Enclosed side door	1	EA			
Control room lighting and fan	1	EA			
115 receptacle	1	EA			
Electrical supplies	1	EA			
Electrical Labor	3	EA			
Fire Extinguisher - 10 lbs	2	EA			
Mount lights, switches, and sensors fan	8	EA			
Freight	1	EA			
Trailer Sub-total				**$ 4,200**	Provided by: Onion Environmental
Operational Manual	1	EA	$ 800	$ 800	
QC	1	EA	$ 400	$ 400	
Startup	1	EA	$ 2,000	$ 2,000	
Delivery to site	1	EA	$ 1,500	$ 1,500	
Shop Testing	1	EA	$ 300	$ 300	
EAST SYSTEM SUBTOTAL				**$ 17,306**	Provided by: Onion Environmental
SUBTOTAL				**$ 17,306**	Provided by: Onion Environmental

Element: **Biosparge System - Salvaged Equipment for East System**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 2, Option 3

WORK STATEMENT

Salvaged equipment and compressor operating on East biosparge system

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Project Management	5%	of	$ 17,306	$ 865	
Technical Support	15%	of	$ 17,306	$ 2,596	
Construction Management	15%	of	$ 17,306	$ 2,596	
Project Delivery	5%	of	$ 17,306	$ 865	
SUBTOTAL				**$6,922**	
WELL INSTALLATION COST				**$17,900**	
TOTAL CAPITAL COST				**$42,100**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Electricity Cost	1	Year	$ 3,384	$ 3,384	CH2M HILL Estimate - based on 24h/day 168 d operation. Energy cost assumed at $0.15 per kW.
System Repairs	1	Year	$ 2,500	$ 2,500	Includes labor and equipment.
Annual Performance Monitoring cost	1	Year		$ 34,866	
TOTAL ANNUAL O&M COST				**$ 40,750**	

PRESENT VALUE ANALYSIS - 3 YEARS

Discount Rate = 2.6%

From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$42,100	$42,100	1.000	$42,100	
3	ANNUAL O&M COST	$122,250	$40,750	2.851	$116,158	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$158,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Groundwater Monitoring Only**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Alternative 3

WORK STATEMENT

No active treatment. Quarterly Monitoring at 2 wells currently showing exceedance of NADC Criteria and Annual Groundwater Monitoring at 16 Wells currently showing exceedance of GCTLs.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
None				$ -	
SUBTOTAL				**$ -**	
Project Management	5%	of	$ -	$ -	
Technical Support	15%	of	$ -	$ -	
Construction Management	15%	of	$ -	$ -	
Project Delivery	5%	of	$ -	$ -	
SUBTOTAL				**$0**	
TOTAL CAPITAL COST				**$0**	

OPERATIONS AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Annual Performance Monitoring cost	1	Year		$ 32,188	
TOTAL ANNUAL O&M COST				**$ 32,190**	

PRESENT VALUE ANALYSIS - 3 YEARS

Discount Rate = 2.6% From www.omb.gov

End Year	COST TYPE	TOTAL COST	TOTAL COST PER YEAR	DISCOUNT FACTOR (3.5%)	PRESENT VALUE	NOTES
1	CAPITAL COST	$0	$0	1.000	$0	
3	ANNUAL O&M COST	$96,570	$32,190	2.851	$91,758	
	TOTAL PRESENT VALUE OF ALTERNATIVE				**$92,000**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Installation of Biosparge Injection Wells**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Groundwater Alternative 1, Option 1 and Option 2

WORK STATEMENT

Biosparge injection well installation along the leading edge of the groundwater plume. Assume installation of 23 biosparge wells.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Well Installation					
Initial Submittals including Health and Safety Plan, Work Plans	1	LS	$ 300	$ 300	Partridge Drilling prices
Mobilization and site set up (including set up of decontamination pad)	1	EA	$ 1,200	$ 1,200	Partridge Drilling prices
Installation of 9 x 40' x 1/2" air sparge wells with 30" of .010 slot screen	23	EA	$ 1,040	$ 23,920	Partridge Drilling prices
IDW Management	1	LS	$ 1,755	$ 1,755	Partridge Drilling prices
Install prefabricated fiberglass valve box with PVC tee fitting on well head riser and a HDPE-PVC tranisition fitting connecting the lateral HDPE pipe to the tee fitting.	17	EA	$ 50	$ 850	Partridge Drilling prices
Well Development	23	Hour	$ 140	$ 3,220	Partridge Drilling prices
Site restoration, final decontamination and demobilization	1	LS	$ 500	$ 500	Partridge Drilling prices
1"-HDPE (SDR-11) pipe	6,800	LF	$ 0	$ 1,904	Unit rate base on construction at North Fuel Farm site at Cecil Field
Walk-behind Trencher Rental	2	weeks	$ 378	$ 756	Unit rate based on estimate from RSC Equipment Rental
Walk-behind Trencher Rental	2	EA	$ 15	$ 30	Delivery cost - deliver or pickup each way
Injection Well Subtotal				**$33,649**	
SUBTOTAL				**$ 33,649**	
Project Management	10%	of	$ 33,649	$ 3,365	
Technical Support	20%	of	$ 33,649	$ 6,730	
Construction Management	25%	of	$ 33,649	$ 8,412	
Project Delivery	5%	of	$ 33,649	$ 1,682	
SUBTOTAL				**$20,189**	
TOTAL CAPITAL COST				**$53,800**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Installation of Biosparge Injection Wells and Directional Drilling**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Groundwater Alternative 1, Option 3

WORK STATEMENT

Biosparge injection well installation along the leading edge of the groundwater plume. Assume installation of 23 biosparge wells.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Well Installation					
Initial Submittals including Health and Safety Plan, Work Plans	1	LS	$ 300	$ 300	
Mobilization and site set up (including set up of decontamination pad)	1	EA	$ 1,200	$ 1,200	
Installation of 9 x 40' x 1/2" air sparge wells with 30" of .010 slot screen	23	EA	$ 1,040	$ 23,920	
IDW Management	1	LS	$ 1,755	$ 1,755	
Install prefabricated fiberglass valve box with PVC tee fitting on well head riser and a HDPE-PVC tranisition fitting connecting the lateral HDPE pipe to the tee fitting.	17	EA	$ 50	$ 850	
Well Development	23	Hour	$ 140	$ 3,220	
Site restoration, final decontamination and demobilization	1	LS	$ 500	$ 500	
1"-HDPE (SDR-11) pipe	6,800	LF	$ 0	$ 1,904	Unit rate base on construction at North Fuel Farm site at Cecil Field
Walk behind Trencher Rental	2	weeks	$ 378	$ 756	Unit rate based on estimate for RSC Equipment Rental
Walk behind Trencher Delivery	2	EA	$ 15	$ 30	Delivery cost - deliver or pickup each way
SUBTOTAL				**$33,649**	
Directional Drilling Installation					
Directional Drilling (Mob, Demob, Fusion and Installation of 4" HDPE Line)	1	EA	$ 4,000	$ 4,000	
SUBTOTAL				**$4,000**	
TOTAL CONSTRUCTION COST				**$37,649**	
Project Management	10%	of	$ 37,649	$ 3,765	
Technical Support	20%	of	$ 37,649	$ 7,530	
Construction Management	25%	of	$ 37,649	$ 9,412	
Project Delivery	5%	of	$ 37,649	$ 1,882	
SUBTOTAL				**$22,589**	
TOTAL CAPITAL COST				**$60,200**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Installation of Biosparge Wells**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Groundwater Alternative 2, Option 1 through Option 3

WORK STATEMENT

Biosparge well installation within areas of the groundwater plume exceeding the NADC criteria. Assume installation of 6 biosparge wells.

CAPITAL COSTS

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Injection Well Installation					
Initial Submittals including Health and Safety Plan, Work Plans	1	LS	$ 300	$ 300	
Mobilization and site set up (including set up of decontamination pad)	1	EA	$ 1,200	$ 1,200	
Installation of 9 x 40' x 1/2" air sparge wells with 30" of .010 slot screen	6	EA	$ 1,040	$ 6,240	
IDW Management	1	LS	$ 1,755	$ 1,755	
Install prefabricated fiberglass valve box with PVC tee fitting on well head riser and a HDPE-PVC tranisition fitting connecting the lateral HDPE pipe to the tee fitting.	6	EA	$ 50	$ 300	
Well Development	6	Hour	$ 140	$ 840	
Site restoration, final decontamination and demobilization	1	LS	$ 500	$ 500	
1"-HDPE (SDR-11) pipe	100	LF	$ 0	$ 28	Unit rate base on construction at North Fuel Farm site at Cecil Field
Walk behind Trencher Rental	2	weeks	$ 378	$ 756	Unit rate based on estimate for RSC Equipment Rental
Walk behind Trencher Delivery	2	EA	$ 15	$ 30	Delivery cost - deliver or pickup each way
TOTAL CONSTRUCTION COST				**$11,163**	
Project Management	10%	of	$ 11,163	$ 1,116	
Technical Support	20%	of	$ 11,163	$ 2,233	
Construction Management	25%	of	$ 11,163	$ 2,791	
Project Delivery	5%	of	$ 11,163	$ 558	
SUBTOTAL				**$6,698**	
TOTAL COST				**$17,900**	

Source of Cost Data

1. Sources are as noted in cost table.

Element: **Groundwater Monitoring for Treatment Performance and MNA**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Groundwater Alternatives 1, 2 and 3

WORK STATEMENT

Groundwater Monitoring for VOCs and MNA parameters for the three groundwater treatment alternatives GW1, GW2 and GW3

ANNUAL OPERATION AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Alternative GW1 - Treatment of Groundwater plume of contaminants exceeding Florida GCTLs					
Quarterly Sampling of 16 wells listed under Alternative GW1					Jan '07 Lab quote; cost per event
VOCs by 8260B	76	EA	$ 75	$ 5,700	16 wells +2 MS/MSD+ 1 Dupl. for 4 qtrs/yr
PAHs by 8310	76	EA	$ 110	$ 8,360	
TRPH by FL-PRO	76	EA	$ 80	$ 6,080	
Nitrate/Nitrite by 353.2	40	EA	$ 15	$ 600	8 wells +MS/MSD=dupl.
Sulfate by 300	40	EA	$ 15	$ 600	8 wells +MS/MSD=dupl.
Sulfide by 376.1	40	EA	$ 15	$ 600	1
Carbon Dioxide by RSK-175	40	EA	$ 15	$ 600	8 wells +MS/MSD=dupl.
Diss. Methane RSK-175	40	EA	$ 75	$ 3,000	8 wells +MS/MSD=dupl.
Field kits for MNA parameters and well development parameters (DO, ORP, pH, conductance)	4	qtrs	$ 250	$ 1,000	CH2M HILL Estimate
Sample Cooler shipments	4	qtrs	$ 100	$ 400	CH2M HILL Estimate
Labor for 3 Field Technicians	432	hours	$ 55	$ 23,760	3 techs for 3 days per event
Travel and Per Diems	36	man days	$ 218	$ 7,865	9 man days per event
Data Validation and Reporting	120	hours	$ 73	$ 8,736	
Project Management	8	hours	$ 78	$ 624	
Annual Performance Monitoring Cost				**$ 67,925**	
Alternative GW2 - Treatment of Groundwater plume of contaminants exceeding FDEP NADC Criteria					
Quarterly Sampling of 6 wells listed under Alternative GW2 and annual sampling of 5 addt'l wells near leading edge of GCTL-exceedance plume					Jan '07 Lab quote; cost per year (4 events)
VOCs by 8260B	56	EA	$ 75	$ 4,200	11 wells +2 MS/MSD+ 1 Dupl.
PAHs by 8310	56	EA	$ 110	$ 6,160	
TRPH by FL-PRO	56	EA	$ 80	$ 4,480	
Nitrate/Nitrite by 353.2	36	EA	$ 15	$ 540	
Sulfate by 300	36	EA	$ 15	$ 540	
Sulfide by 376.1	36	EA	$ 15	$ 540	6 wells +MS/MSD+dupl. per qtr for 4 qtrs/yr
Carbon Dioxide by RSK-175	36	EA	$ 15	$ 540	
Diss. Methane RSK-175	36	EA	$ 75	$ 2,700	
Field kits for MNA parameters and well development parameters (DO, ORP, pH, conductance)	4	qtrs	$ 250	$ 1,000	CH2M HILL Estimate
Sample Cooler shipments	4	qtrs	$ 100	$ 400	CH2M HILL Estimate
Labor for 3 Field Technicians	144	hours	$ 55	$ 7,920	3 techs for 1 day/per event
Travel and Per Diems	12	man days	$ 218	$ 2,622	
Data Validation and Reporting	40	hours	$ 73	$ 2,912	
Project Management	4	hours	$ 78	$ 312	
Annual Performance Monitoring Cost				**$ 34,866**	

Element: **Groundwater Monitoring for Treatment Performance and MNA**

Site: Building 46, Cecil Field Navy Base
Location: Jacksonville, FL
Phase: Optimization Study
Base Year: 2006
Alternative: Groundwater Alternatives 1, 2 and 3

WORK STATEMENT

Groundwater Monitoring for VOCs and MNA parameters for the three groundwater treatment alternatives GW1, GW2 and GW3

ANNUAL OPERATION AND MAINTENANCE COST

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL	NOTES
Alternative GW3 - Monitoring for contaminants exceeding Florida GCTLs					
Annual Sampling of 16 wells listed under Alternative GW1 and Quarterly Sampling of 2 wells listed under Alternative GW2					Jan '07 Lab quote; cost per event
VOCs by 8260B	35	EA	$ 75	$ 2,625	(16 wells +2 MS/MSD+ 1 Dupl. once per yr) + (2 wells +1MS-MSD+1 Dup for 4 qtrs/yr)
PAHs by 8310	35	EA	$ 110	$ 3,850	
TRPH by FL-PRO	35	EA	$ 80	$ 2,800	
Nitrate/Nitrite by 353.2	16	EA	$ 15	$ 240	
Sulfate by 300	16	EA	$ 15	$ 240	
Sulfide by 376.1	16	EA	$ 15	$ 240	
Carbon Dioxide by RSK-175	16	EA	$ 15	$ 240	2 wells +MS/MSD+1dupl per event for 4 events/yr.
Diss. Methane RSK-175	16	EA	$ 75	$ 1,200	
well development parameters	4	qtrs	$ 125	$ 500	CH2M HILL Estimate
Sample Cooler shipments	4	qtrs	$ 50	$ 200	CH2M HILL Estimate
Labor for Field Technicians	132	hours	$ 55	$ 7,260	3 techs for 3 days per annual event; 2 techs for 1 day per quarterly event
Travel and Per Diems	15	man days	$ 218	$ 3,277	2 techs for 1 day for 3 qtrs; 3 techs for 3 days for annual event
Data Validation and Reporting	120	hours	$ 73	$ 8,736	
Project Management	10	hours	$ 78	$ 780	
Annual Performance Monitoring Cost				**$ 32,188**	

Source of Cost Data

1. Sources are as noted in cost table.

Estimated Energy Costs per year for Equipment with Various Horsepower (HP) Ratings

HP	KWH	1 DAY (KW-H)	1 YR (KW-H)	COST (KW-H) assumed $0.15 per KWH
50	37.3	895.2	150,394	$22,559
10	7.5	179.04	30,079	$4,512
2	1.5	35.808	6,016	$902
5	3.7	89.52	15,039	$2,256
7.5	5.6	134.28	22,559	$3,384

Attachment 3
Discussion of SPLP Soil Sampling Analytical Results

ATTACHMENT C

Synthetic Precipitation Leaching Procedure (SPLP) Soil Sampling

Soil samples were collected from three locations (SB-1, SB-2 and SB-14) at the Building 46 site on December 8, 2006. These samples were collected during the quarterly soil sampling effort conducted by Terraine, Inc. (Terraine). At these three locations, Terraine collected soil samples at four depth intervals - 4 feet below land surface (bls), 6 feet bls, 8 feet bls, and 10 feet bls, and analyzed the headspace readings using a flame ionization detector (FID). At each soil boring, the sample that showed the highest FID readings was sent to the offsite laboratory for analysis. CH2M HILL collected a split from each of Terraine's three samples going to the offsite laboratory, and shipped these split samples to a separate offsite laboratory for SPLP analysis by EPA methods 8260B for volatile organic compounds, and 8270C for polynuclear aromatic hydrocarbons.

Table C-1 shows the detections above laboratory detection limits from the SPLP analytical results. Five compounds showed detections above laboratory detection limits. These compounds were 1,4-dichlorobenzene, methylene chloride, naphthalene, 1-methylnaphthalene and 2-methylnaphthalene.

The SPLP analytical results reported in milligrams per liter (mg/L) were converted to milligrams per kilogram (mg/kg) based on the laboratory's extraction parameters (50 grams of solid into 1 liter of fluid). This conversion resulted in multiplying the mg/L results for each parameter by a factor of 20 to arrive at the mg/kg units for comparison with the FDEP Leachability Based on Groundwater (LGW) criteria, which are published in mg/kg units. Of the five compounds detected above laboratory detection limits, only methylene chloride exceeded the LGW Criteria, in all three soil samples.

Methylene chloride is a common solvent and laboratory artifact, and not typically a contaminant of concern at petroleum sites. Methylene chloride was detected in the trip blanks analyzed for this sampling event, which indicates that the methylene chloride detections in the native samples could have resulted from contamination of the sample bottles either in the field or in the laboratory. An additional sample from each of these soil borings should be collected to verify the presence of methylene chloride in soil.

TABLE C-1
Detected Concentrations from SPLP Soil Sampling (December 2006)
Building 46 Site, Former NAS Cecil Field, Jacksonville, FL.

	Station ID	**SBORING 1- 9 ft bls**	**SBORING 2 10 feet bls**	**SBORING 14- 10 feet bls**
	Sample ID	**8646SB1S061208**	**8646SB2S061208**	**8646SB14S061208**
	Sample Date	**12/8/2006**	**12/8/2006**	**12/8/2006**
Parameter	**LGW**	**SELL**	**SELL**	**SELL**
SW8260B				
1,4-Dichlorobenzene	2.2	0.00306 J	ND	0.0045 J
Methylene chloride	0.02	**0.0656 JB**	**0.0472 JB**	**0.0456 JB**
SW8270C				
1-methylnaphthalene	1.7	ND	0.0136 J	0.00462 J
2-Methylnaphthalene	0.9	ND	0.0148 J	ND
Naphthalene	1.3	ND	0.0118 J	0.0148 J

Notes:
All sample concentrations reported in milligrams per liter (mg/kg).
LGW Leachability based on Groundwater Criteria
SELL **S**oil **E**quivalent **L**eachable **L**evels derived by conversion
U The analyte was analyzed for, but not detected.
J Result is estimated.
B The analyte was detected in the associated method and/or calibration blank.
JB Estimate value..The analyte was detected in the associated Field Blank, Method and/or calibration blank.
NA Not Available at time of rule adoption
Values **Bold** and **Shaded** are concentrations that exceed the **LGW.**