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TECHNICAL MEMORANDUM SAMPLING AND ANALYSIS PLAN ADDENDUM FOR NORTH FUEL FARM SITE GROUNDWATER REMEDIATION PROJECT NAS CECIL FIELD FL
4/19/2007
CH2MHILL CONSTRUCTORS INC

Sampling and Analysis Plan Addendum
North Fuel Farm Site Groundwater Remediation Project
Former NAS Cecil Field, Jacksonville, Florida
Contract No. N62467-01-D-0331, Contract Task Order No. 0060

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CTO 0060 Project File

DATE: April 19, 2007

1.0 Introduction

CH2M HILL Constructors, Inc. (CH2M HILL) has been contracted by the Naval Facilities Engineering Command, Southeast (NAVFAC SE) to perform operation, maintenance, and monitoring of the air sparge/biosparge (AS/BS) groundwater treatment system at the former North Fuel Farm (NFF) site at the former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, under Contract No. N62467-01-D-0331, Contract Task Order (CTO) No. 0060. Figure 1 shows the site location for the NFF site within the former NAS Cecil Field.

This Sampling and Analysis Plan (SAP) Addendum has been prepared to present the required sampling activities associated with the remedial action at the NFF site, and is an addendum to the *Work Plan, Installation, Operation, Maintenance and Monitoring of Air Sparge, Biosparge and SVE System, North Fuel Farm Area Remediation Project, Former Naval Air Station Cecil Field, Jacksonville, Florida* (Agviq-CH2M HILL Joint Venture (JVII), 2004), hereafter referred to as the Work Plan. The Work Plan outlines the quarterly effectiveness evaluation for the AS/BS system currently being operated by CH2M HILL at the NFF Site, and was prepared based on the *Remedial Action Plan Addendum, North Fuel Farm Site* (RAPA) (TetraTech NUS, 2004).

The purpose of the activities included in this SAP Addendum is to verify and redefine the configuration of the contaminated groundwater plume at the NFF site and to collect data to support the optimization of the AS/BS treatment system at the NFF site.

Based on the outcome of the sampling activities outlined below, future quarterly sampling events conducted to determine treatment effectiveness will be modified to provide the optimum number of sampling locations and parameters for the continued operation and monitoring activities at the NFF site.

The Work Plan provides the detailed sampling methodology for groundwater and waste characterization samples; sample quality assurance/quality control (QA/QC) procedures to be maintained during all sample collection activities; and sample equipment decontamination procedures, that will be applicable to all sampling activities conducted during the remedial activities at the NFF site and will be adopted for the quarterly operation, maintenance, and monitoring conducted under the Contract Task Order No. 0060. Applicable sections of the Work Plan will be referred to for all other aspects of this scope of work.

2.0 Project Objectives

The objective of this sampling event is to collect data to support the optimization of the treatment system at the NFF. Specifically, the collection of additional analytical data is intended to:

- Confirm magnitude and extent of current groundwater plume.
- Determine the optimum oxygen delivery of the AS/BS system.
- Evaluate the active biological process(es) occurring in subsurface treatment area.
- Address uncertainties in aquifer respiration processes.

3.0 Groundwater Plume Characterization Sampling

The horizontal and vertical delineation of the contaminant plume has not been evaluated since remedial treatment began in 2005. In order to evaluate the current contaminant plume boundary and potential contaminant migration, 35 existing groundwater monitoring wells (within the four subsurface zones) have been chosen for sampling. The wells in this evaluation include the wells that were sampled as part of the treatment effectiveness quarterly sampling during the period July 2005 to August 2006 at the NFF.

Table 1 presents the groundwater sampling parameters for this effort.

The following monitoring wells will be sampled as a synoptic event at the site to identify changes in plume configuration over time.

- Water Table Zone – CEF-372-13R, CEF-076-94S, and CEF-CEF-076-95-S
- Upper Intermediate Zone – CEF-076-43S, CEF-076-49S, CEF-076-57S, CEF-076-60S, CEF-076-69S, CEF-076-91S, CEF-076-92S, CEF-076-93S, CEF-076-105I, CEF-076-106S, CEF-076-113S, and CEF-076-114S
- Lower Intermediate Zone - CEF-076-039D, CEF-076-44I, CEF-076-50I, CEF-076-56I, CEF-076-61I, CEF-076-70I, CEF-076-85I, CEF-076-89I, CEF-076-111I, and CEF-076-112I
- Deep Zone - CEF-076-51D, CEF-076-62D, CEF-076-065D, CEF-076-98D, CEF-076-99D, CEF-076-100D, CEF-076-103D, CEF-076-104D, CEF-076-110D, and CEF-076-116D

Figure 2 shows the location of these wells in relation to the boundaries of the historical groundwater plumes at the site.

Groundwater samples will be collected and analyzed for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and total recoverable petroleum hydrocarbons (TRPH) by Florida Petroleum Residual Organic (FL-PRO) method. Additionally, field parameters (dissolved oxygen [DO], oxidation-reduction potential [ORP], pH, conductivity, temperature, turbidity, and water levels) will also be measured in the field as indicated in Table 1.

4.0 Optimization of AS/BS System (Dissolved Oxygen Study)

The CH2M HILL technical staff will evaluate the DO levels in the wells within the active treatment zone of the site. The study will commence as soon as practical after treatment system shutdown and will be performed over a pre-determined time period (i.e., for several days after shutting down the treatment system). If DO levels remain above background levels in the active treatment zone, then the treatment system operation period/cycle time (pulsing duration and frequency) could likely be reduced without reducing the effectiveness of the system.

A similar oxygen optimization test will include turning on the AS/BS system after shutdown to monitor the rate at which the DO concentrations rise in the wells. If DO saturation occurs in a relatively short time, the sparging system operational periods (in the given pulse cycle) could likely be abbreviated without reducing the effectiveness of the system.

Existing monitoring wells within the treatment area will be used for the DO study. The initial study will include one or two wells, and additional wells may be monitored for the DO study if additional data are needed. These wells will be chosen during the field event and the choice of wells will likely be adjusted as the DO study progresses.

Existing wells within the NFF treatment area were fitted with a cap and valve arrangement during the AS/BS treatment system startup phase (during May to July 2005) in order to facilitate the release of air sparging pressure accumulated within the well riser prior to sampling. The DO study will involve the installation of additional hardware to the existing well riser cap to include tubing that can be attached on both sides (inside and outside) of the cap, as shown in Attachment 1 (sketch and photographs of a typical wellhead retrofit setup). Tubing will be extended from the wellhead cap down to the center of the well screen and the other end of the tubing will be connected to field sampling equipment above ground. It is expected that an aboveground flow-through cell fitted with a DO probe will then be suitable to measure real-time DO values, by allowing the residual aquifer pressure to force the groundwater to surge up the well riser and into the aboveground flow-through cell. A peristaltic pump may also be used within the well if there is inadequate residual pressure in the aquifer to force the groundwater up through the well riser and well head cap and into the flow-through cell. Titration and/or colorimetric DO methods will be used to confirm the DO readings from the flow-through cell. A test conducted by CH2M HILL in early April 2007 of the wellhead retrofit described above on well CEF-076-99D at the NFF site indicated that the retrofit would work.

4.1 DO Sampling Prior to Shutdown of AS/BS System

DO readings will be taken once the AS/BS system has reached equilibrium (prior to shutdown) to attain baseline DO values. DO samples will then be taken hourly for the first several hours after shutdown, and every few hours thereafter, until the readings level off. The DO measurement interval may be modified at the discretion of the field team leader and CH2M HILL technical staff. However, DO readings will be taken for several days or until the readings stabilize.

4.2 Prior to Startup of the AS/BS System

In preparation for the re-start of the AS/BS system, DO readings will be recorded to attain background values. Upon commencement of the AS/BS system, DO samples will be taken hourly for the first several hours after startup, followed by every few hours thereafter. The DO measurement interval may be modified at the discretion of the field team leader. DO readings will be taken for several days or until the readings stabilize.

5.0 Evaluation of Active Biological Processes

5.1 Monitored Natural Attenuation Sampling

The Work Plan specified sampling eight groundwater monitoring wells for evaluating natural attenuation (NA) progress on a quarterly basis during the first year of treatment system operation at the site. Four additional existing wells will be added to this list of wells to aid in the evaluation of active biological process(es) occurring in the subsurface at the site. A total of 12 wells will be sampled to investigate current remediation conditions.

The NA parameter samples will be collected as a two-time snapshot event. Groundwater samples will be collected from the 12 wells during two events. The first event will occur just prior to turning the AS/BS system back on after a shutdown. This will capture the subsurface conditions during the longest time without active remedial treatment. The second event will occur during peak treatment (e.g., just prior to the AS/BS system shutdown), and will capture “peak treatment” site conditions.

The eight wells currently being sampled for quarterly monitored natural attenuation (MNA) monitoring at NFF are:

- CEF-076-95S (Water Table)
- CEF-076-49S (Upper Intermediate)
- CEF-076-57S (Upper Intermediate)
- CEF-076-61I (Lower Intermediate)
- CEF-076-100D (Deep)
- CEF-076-11Xc (Deep)
- CEF-076-99D (Deep)
- CEF-076-104D (Deep)

The four wells being added to the list include:

- CEF-076-94S (Water Table)
- CEF-076-93-S (Upper Intermediate)
- CEF-076-113S (Upper Intermediate)
- CEF-076-70I (Lower Intermediate)

The data collected for this effort will also be used to aid in resolving any uncertainties in respiration processes occurring at the site. Table 1 presents the groundwater sampling parameters for this effort.

The sample parameters for each of the two MNA sampling events are as follows:

- **Event 1** (event order to be chosen after a preliminary field study has been performed)
  - Sulfate, sulfide, and carbon dioxide in all 12 wells
  - Field parameters (DO, ORP, pH) in all 12 wells
- **Event 2**
  - dissolved hydrogen, dissolved methane, nitrate, nitrite, total phosphorous, sulfate, sulfide, total organic and inorganic carbon and carbon dioxide in original 8 wells
  - sulfate, sulfide, and carbon dioxide in 4 additional wells
  - field parameters (DO, ORP, and pH) in all 12 wells

Due to the presence of sulfate and carbon dioxide in the subsurface environment, measuring DO using a membrane-type probe may not always produce accurate or consistent results. Results should be verified using another method (e.g. titration and/or colorimetric method). These alternate methods may need to be used extensively if the membrane probe results cannot be confirmed or are in doubt.

5.2 Microbial Analysis

Microbial analysis will be performed on representative groundwater samples collected from site wells to better understand the active biological processes in the subsurface environment at the NFF site.

Phospholipid fatty acid (PLFA) analysis provides a broad-based description of the entire microbial community, as well as information about viable biomass concentrations, the composition of the bacterial community, and their metabolic status. PLFA analysis can assess the microbial biomass response to amendments to the subsurface environment (such as oxygen, methane, sodium lactate, etc). PLFAs form the membranes of the microbes. Therefore, the identification and measurement of particular PLFAs provides a quantitative assessment of the microbial community present in the subsurface. It is anticipated that this data will aid in the identification of the active contaminant reduction process(es) via microbial degradation, and is a significant aspect of the optimization of the treatment system.

Seven wells will be sampled for PLFA (see Table 1). These samples will be collected from six wells within the treatment area and one background well, to evaluate the treatment process(es) responsible for contaminant reduction at the site (microbial versus physical

vapor stripping). Samples will be collected via the Microbial Insights' Bio Flo method as detailed in Attachment 2.

Additional PLFA testing may be necessary after the data from the sitewide VOC and MNA sampling and analyses are assessed.

6.0 Waste Characterization Sampling and Analyses

6.1 Liquid Waste Characterization

Waste characterization samples will be collected to evaluate the handling, transportation, and disposal requirements of generated decontamination water and well development water. Liquid samples will be collected and delivered to a Navy-approved and Florida-certified laboratory, and analyzed for the parameters listed in Table 1. Liquid wastes resulting from well purging will be containerized in drums and stored at the site while awaiting waste characterization, waste profiling and coordination of offsite disposal.

No field QC samples are required when collecting waste characterization samples. A CH2M HILL Level B package will be required along with appropriate laboratory QC samples for the required waste characterization and incidental waste stream samples. All analytical data will be submitted by both hard copy and electronic files.

6.2 Data Quality Levels for Measurement Data

The data quality levels (DQLs) for each sampling task described above are listed in Table 3. The sampling and analytical requirements, along with the required level of quality and data packages are listed in Table 1.

Laboratories performing the analyses will meet the qualifications and certifications as per the Navy's *Installation Restoration Program Chemical Data Quality Manual* (IR CDQM) *FESC SP-2056-ENV, September 1999 (NFESC)*. Laboratories will have undergone the laboratory approval process as defined in the subject NFESC document for the scope of work performed under the Installation Restoration Program (IRP). The Navy-approved laboratory that will be used for all sample analyses will also have certification from the State of Florida through the National Environmental Laboratory Accreditation Program (NELAP).

6.3 Analytical Methods

Samples will be collected and analyzed at the offsite laboratory in accordance with the requirements for the analytical methods summarized in Table 1.

Preliminary results will be forwarded to Bethany Garvey in the CH2M HILL Atlanta office.

The final hard copy data and electronic file will be delivered to the following address within 14 days of sample receipt.

Bethany Garvey
CH2M HILL
Northpark 400
1000 Abernathy Road, Suite 1600
Atlanta, GA 30328

770.604.9182 extension 54124
678.604.9282 fax
Bethany.Garvey@ch2m.com

Analytical data validation and quality assurance reporting for groundwater samples for each event will be conducted by CH2M HILL, prior to submitting the analytical data summaries to the Navy, regulators and members of the NAS Cecil Field Base Cleanup Team (BCT).

7.0 Waste Management, Quality Control, Environmental Protection, Health and Safety Plans

All other plans such as the Waste Management Plan, Environmental Protection Plan, Stormwater Pollution Prevention Plan, Quality Control Plan and the Health and Safety Plans are contained in the Work Plan (prepared in 2004, prior to the installation of the treatment system and referenced earlier in this document). These plans are applicable at this site and should be referred to.

8.0 Project Organizational Structure

The following updated project organizational structure (Figure 3) and tables show the project personnel, and the appropriate roles and responsibilities of CH2M HILL project team members for this Task Order. Copies of the Project QC Manager and Alternate QC Manager are also attached to this plan in Attachment 3.

9.0 References

CH2M HILL Constructors, Inc. 1998. *Basewide Work Plan, NAS Cecil Field, Jacksonville, FL., Revision No. 1*, November.

Tetra Tech NUS. 2004. *Remedial Action Plan Addendum, North Fuel Farm Site*, February.

AGVIQ-CH2M HILL Joint Venture (JVII). 2004. *Work Plan, Installation, Operation, Maintenance and Monitoring of Air Sparge, Biosparge and SVE System, North Fuel Farm Area Remediation Project, Former Naval Air Station Cecil Field, Jacksonville, Florida*. March.

Tables

TABLE 1

2nd Quarter Effectiveness Evaluation Sampling and One-Time Plume Delineation and MNA Groundwater Sampling at NFF

Former Naval Air Station (NAS) Cecil Field - Jacksonville, Florida

Well Identification	Zone	Screening Interval	VOCs (EPA Method 8260B)	PAHs (EPA Method 8310)	TRPH (FL PRO)	Field Parameters (DO, ORP, pH, Conductivity, Temp., Turbidity, water levels)	Nitrogen, Nitrate (as n) (EPA Method 353.2)	Nitrogen, Nitrite (EPA Method 353.2)	Phosphorus, Total (as p) (EPA Method 365.1)	Total Inorganic Carbon (EPA Method 5310B or 415.1)	Total Organic Carbon (EPA Method 9060 or 415.1)	Methane, Dissolved (EPA Method 8315)	Hydrogen, dissolved (Method RSK 175)	Field Parameters (DO, ORP, pH)	Sulfate (as SO4) (EPA Method 375.4)	Sulfide (EPA Method 376.2)	Carbon dioxide free	Microbial Analysis	Field Params (DO, ORP, pH)	Sulfate (as SO4) (EPA Method 375.4)	Sulfide (EPA Method 376.2)	Carbon Dioxide Free	Microbial Analysis
			Sample time to be determined*				Event 1*												Event 2*				
76-24	Bkg	??				x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
372-13R	WT	1.50 - 11.50'	x	x	x	x																	
76-94S	WT	5.00 - 15.00'	x	x	x	x								x	x	x	x	x	x	x	x	x	x
76-95S	WT- Bkg	5.00 - 15.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
76-43S	UI	35.00 - 40.00'	x	x	x	x																	
76-49S	UI	45.00 - 50.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
76-57S	UI	30.00 - 35.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
76-60S	UI	35.00 - 40.00'	x	x	x	x																	
76-69S	UI	30.00 - 35.00'	x	x	x	x																	
76-91S	UI	25.00 - 30.00'	x	x	x	x																	
76-92S	UI	25.00 - 30.00'	x	x	x	x																	
76-93S	UI	25.00 - 30.00'	x	x	x	x								x	x	x	x		x	x	x	x	
76-106S	UI	25.00 - 30.00'	x	x	x	x																	
76-113S	UI	35.00 - 40.00'	x	x	x	x								x	x	x	x	x	x	x	x	x	x
76-114S	UI	-	x	x	x	x																	
76-105I	UI	45.00 - 50.00'	x	x	x	x																	
76-39D	LI	55.00 - 60.00'	x	x	x	x																	
76-44I	LI	65.00 - 70.00'	x	x	x	x																	
76-50I	LI	75.00 - 80.00'	x	x	x	x																	
76-56I	LI	70.00 - 75.00'	x	x	x	x																	
76-61I	LI	65.00 - 70.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
76-70I	LI	65.00 - 70.00'	x	x	x	x								x	x	x	x	x	x	x	x	x	x
76-85I	LI	55.00 - 60.00'	x	x	x	x																	
76-89I	LI	50.00 - 55.00'	x	x	x	x																	
76-111I	LI	-	x	x	x	x																	
76-112I	LI	50.00 - 55.00'	x	x	x	x																	
76-11Xc	D	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
76-51D	D	100.00 - 110.00'	x	x	x	x																	
76-62D	D	100.00 - 110.00'	x	x	x	x																	
76-65D	D	100.00 - 110.00'	x	x	x	x																	
76-98D	D	105.00 - 110.00'	x	x	x	x																	
76-99D	D	95.00 - 100.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
76-100D	D	110.00 - 115.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
76-103D	D	144.00 - 149.00'	x	x	x	x																	
76-104D	D	110.00 - 115.00'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	
76-110D	D	105.00 - 110.00'	x	x	x	x																	

* Sampling time will be determined after preliminary field study confirms that sampling can occur while system is running.

WT - Water table zone

UI - Upper intermediat zone

LI - Lower intermediate zone

D - Deep zone

VOCs - Volatile organic compounds

PAHs - Polycyclic aromatic hydrocarbons

TRPH - Total recoverable petroleum hydrocarbon

DO - Dissolved oxygen

ORP - Oxidation reduction potential

TABLE 2

Sampling and Analysis Summary Table - NFF Site

Former Naval Air Station (NAS) Cecil Field - Jacksonville, Florida

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method (Note 1)	Sampling Equipment (Note 1)	TAT (Note 2)	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservation	Containers
Groundwater Plume Characterization Sampling													
Groundwater Sampling	35 monitoring wells: CEF-372-13R, CEF-076-94S, CEF-076-95-S, CEF-076-43S, CEF-076-49S, CEF-076-57S, CEF-076-60S, CEF-076-69S, CEF-076-91S, CEF-076-92S, CEF-076-93S, CEF-076-105I, CEF-076-106S, CEF-076-113S, CEF-076-114S, CEF-076-039D, CEF-076-44I, CEF-076-50I, CEF-076-56I, CEF-076-61I, CEF-076-70I, CEF-076-85I, CEF-076-89I, CEF-076-111I, CEF-076-112I, CEF-076-51D, CEF-076-62D, CEF-076-065D, CEF-076-98D, CEF-076-99D, CEF-076-100D, CEF-076-103D, CEF-076-104D, CEF-076-110D, and CEF-076-116D	Water	35 samples X 4 quarterly events	35 + 4 Dup + 2MS/MSD = 43 per event	Grab	Peristaltic Pump; Teflon Tubing	14 days	CCI Level C	Volatiles	8260B	14 days	HCL pH <2; Cool to 4°C	(2) 40 mL vial
									PAHs	8310	7 days ext; 40 days analysis	Cool to 4°C	(2) 1-Liter Amber glass
									TRPH	FL-PRO	7 days ext; 40 days analysis	Cool to 4°C	(2) 1-Liter Amber glass
				1 per well per event		Peristaltic Pump; Teflon Tubing; Horiba U-10 Water Quality Checker; ORP meter (if not included on Horiba), water level indicator	ASAP	Screening	DO, Temperature, pH, Specific Conductance, Turbidity, ORP, water levels	Field Direct Read Meter	N/A	N/A	N/A
Dissolved Oxygen Study													
Groundwater Sampling	Monitoring wells to be selected in the field	Water	2 events (sample hourly during first several hours, then stretch frequency until DO levels stabilize or level off)	1 per well per event	Grab	Cap and valve system; Peristaltic Pump; Teflon Tubing; Horiba U-10 Water Quality Checker (for DO readings)	ASAP	Screening	Dissolved oxygen	Field Direct Read Meter	N/A	N/A	N/A
				As necessary to confirm flow-through cell readings		Hach Kit and/or Chemetric Test Kit for Winkler titration and/or colometric test for DO	ASAP	Screening	Dissolved oxygen	Field Direct Read Meter	N/A	N/A	N/A
Evaluation of Active Biological Processes - MNA Sampling (Event 1)													
Groundwater Sampling	12 Monitoring wells: 076-94S, 76-95-S, 076-49S, 076-57S, 076-93S, 076-113S, 076-61I, 076-70I, 076-100D, 076-11Xc, 076-99D, 076-104D	Water	1 event (sampling time to be determined)	12 + 1 Dup + 1MS/MSD = 15	Grab	Peristaltic Pump; Teflon Tubing	14 days	CCI Level C	Carbon Dioxide	RSK 175			
	12 Monitoring wells: 076-94S, 76-95-S, 076-49S, 076-57S, 076-93S, 076-113S, 076-61I, 076-70I, 076-100D, 076-11Xc, 076-99D, 076-104D								Sulfate	300.0/375.1	28 days	Cool to 4°C	(1) 250 mL HDPE
	12 Monitoring wells: 076-94S, 76-95-S, 076-49S, 076-57S, 076-93S, 076-113S, 076-61I, 076-70I, 076-100D, 076-11Xc, 076-99D, 076-104D								Sulfide	376.1	7 days	NaOH, Zn Acetate pH >9; Cool to 4°C	(1) 500 mL HDPE
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								Dissolved Hydrogen	AM20GAx	14 days	Cool to 4oC	(2) 40 mL vial
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								Dissolved Methane	RSK 175	14 days	HCL pH <2; Cool to 4°C	(2) 40 mL vial
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								Nitrate	300.0/352.1	48 hours	Cool to 4°C	(1) 250 mL HDPE
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								Nitrite	300.0/354.1	48 hours	Cool to 4°C	(1) 250 mL HDPE
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								TOC	415.1	28 days	HCL or H2SO4 pH <2; Cool to 4°C	(2) 40 mL vial
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								TIC	415.1	28 days	Cool to 4°C	(2) 40 mL vial
	8 Monitoring wells 76-95S, 76-49S, 76-57S, 76-61I, 76-100D, 76-11Xc, 76-99D, 76-104D								Total Phosphorus	365.1	28 days	H2SO4 pH<2; Cool to 4°C	(1) 500 mL HDPE
	12 Monitoring wells: 076-94S, 76-95-S, 076-49S, 076-57S, 076-93S, 076-113S, 076-61I, 076-70I, 076-100D, 076-11Xc, 076-99D, 076-104D			1 per well per event	Grab	Peristaltic Pump; Teflon Tubing; Horiba U-10 Water Quality Checker; ORP meter (if not included on Horiba)	ASAP	Screening	DO, pH, ORP	Field Direct Read Meter	N/A	N/A	N/A

Notes:

1) In accordance with FDEP SOPs

2) TAT is in calendar days

TABLE 2

Sampling and Analysis Summary Table - NFF Site

Former Naval Air Station (NAS) Cecil Field - Jacksonville, Florida

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method (Note 1)	Sampling Equipment (Note 1)	TAT (Note 2)	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservation	Containers
Evaluation of Active Biological Processes - MNA Sampling (Event 2)													
Groundwater Sampling	12 Monitoring wells: 076-94S, 76-95-S, 076-49S, 076-57S, 076-93S, 076-113S, 076-61I, 076-70I, 076-100D, 076-11Xc, 076-99D, 076-104D	Water	1 event (sampling time to be determined)	12 + 1 Dup + 1MS/MSD = 15	Grab	Peristaltic Pump; Teflon Tubing	14 days	CCI Level C	Carbon Dioxide	RSK 175			
									Sulfate	300.0/375.1	28 days	Cool to 4°C	(1) 250 mL HDPE
									Sulfide	376.1	7 days	NaOH, Zn Acetate pH >9; Cool to 4°C	(1) 500 mL HDPE
				1 per well per event	Grab	Peristaltic Pump; Teflon Tubing; Horiba U-10 Water Quality Checker; ORP meter (if not included on Horiba)	ASAP	Screening	DO, pH, ORP	Field Direct Read Meter	N/A	N/A	N/A
Evaluation of Active Biological Processes - Biological Analysis													
Groundwater Sampling	7 Monitoring wells: CEF-07694S, CEF-07695S, CEF-07657S, CEF-076113S, CEF-07661I, CEF-07670I, CEF-076116D	Water	2 events (sample just prior to turning system on and again at peak sparging time)	7 samples x 2 events = 14	Grab	Peristaltic Pump; Teflon Tubing; Falcon Tube (with Bio Flo filter from Microbial Insights);	ASAP	Screening	Phospholipid Fatty Acid (PLFA) Analysis	Microbial Insights[1]	Ship overnight	Cool to 4oC	Bio Flo Filter (filter with 2-3 L water)
Aqueous Waste Characterization													
Disposal of Aqueous Waste	Portable Tank or Drums	Water	Once per container or per 10 drums	As necessary	Grab	Drum thief or dip jar	7 days	CCI Level B	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
									TCL Semi-volatiles	8270C	7 days ext; 40 days analysis	Cool to 4°C	(4) 1L amber glass
									TCL Pesticides	8081A	7 days ext; 40 days analysis		
									Herbicides	8151A	7 days ext; 40 days analysis		
									TAL Metals	6010B/7470A	6 months; 28 days for Hg	HNO_3 pH< 2; Cool to 4°C	(1) 500mL HDPE
									Corrosivity	9040C	ASAP	Cool to 4°C	(1) 1L amber glass
									Ignitability	1010A	ASAP		

[1] See instruction sheet in Attachment B for Bio Flo Sampling method as provided by Microbial Insights.

Notes:
1) In accordance with FDEP SOPs
2) TAT is in calendar days

TABLE 3
Data Quality Levels
NFF Site, NAS Cecil Field, Jacksonville, Florida

Sampling Activity	Data Quality Level Category
Performance Monitoring Groundwater Characterization Sampling (offsite laboratory)	Definitive
MNA Groundwater Sampling (offsite laboratory)	Definitive
Waste characterization of the contaminated aqueous waste (offsite laboratory analyses)	Definitive

TABLE 4
Project Personnel Directory
NFF Site, NAS Cecil Field, Jacksonville, Florida

Contact	Address and Contact Information
Sidney Allison, Program Manager Sam Naik, Project Manager James Edens, Senior Technical Engineer Eric Burrell, QC Manager Joe Giandonato, Contracts Administration Manager	CH2M HILL Constructors, Inc. Northpark 400 1000 Abernathy Rd, Suite 1600 Atlanta, GA 30328 (770) 604-9182
Michael Halil, Deputy Program Manager	CH2M HILL Constructors, Inc. 10142 103rd Street, Suites 202/105 Jacksonville, FL 32210 904/777-4812 x. 233
Richard Rathnow, Health and Safety Manager	CH2M HILL 151 Lafayette Drive Suite 110 Oak Ridge, TN 37830 (865) 483-9032
Debra-Evans Ripley, Contracting Officer	Naval Facilities Engineering Command Southeast P.O. Box 190010 North Charleston, SC 29419-9010 (843) 743-2147 Debra.evans-ripley@navy.mil
Dorothy Okamoto, COTR	Naval Facilities Engineering Command Southeast P.O. Box 190010 North Charleston, SC 29419-9010 (843) 820-5940
Mark E. Davidson, RPM	BRAC Program Management Office Southeast 4130 Faber Place Drive, Suite 202 North Charleston, SC 29405 (843) 743-2135 Mark.e.davidson@navy.mil
Michael A. Singletary Environmental Engineer Technical Services Branch	Naval Facilities Engineering Command Southeast P.O. Box 190010 North Charleston, SC 29419-9010 Michael.singletary@navy.mil

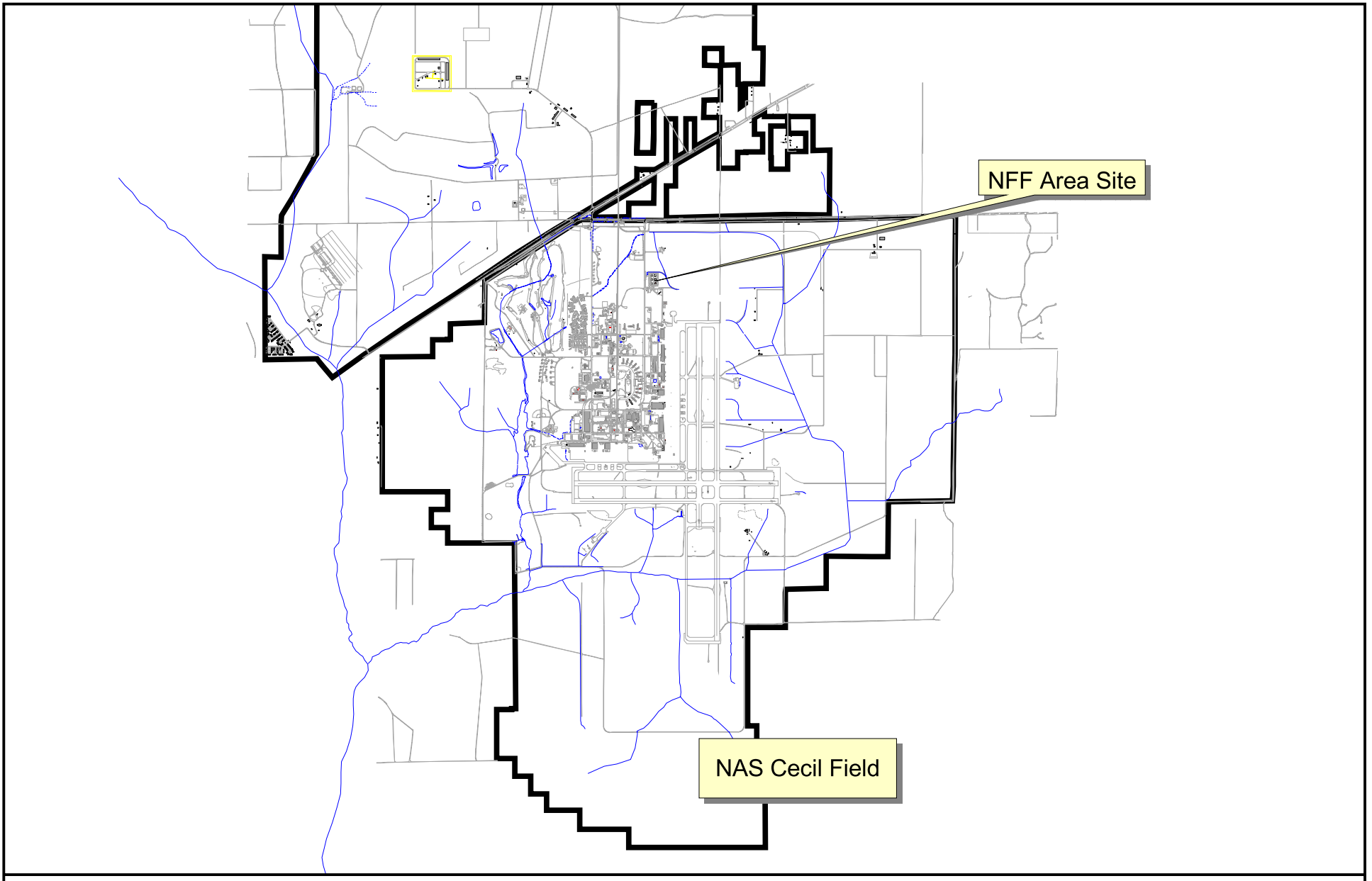
TABLE 5
Roles, Responsibilities, and Authority of QC Personnel Assigned
NFF Site, NAS Cecil Field, Jacksonville, Florida

Role	Responsibility	Authority
Project Manager	• Management and Technical Direction of work • Communication with Southern Division RPM and NTR • Overview subcontract task order performance • Select task order staff • Develop task order Work Plan and supporting plans • Meet task order Performance Objectives • Prepare status reports • Prepare Field Change Requests	• Approve subcontract task order selection • Approve invoices to Southern Division • Approve TASK ORDER baseline schedule • Stop work at the site for any reason • Approve payment to vendors and suppliers • Approve payment to subcontractor • Review technical qualifications of subcontractor • Respond to Design Change Notices
Site Superintendent	• Responsible for all site activities • Provide direction to subcontractor • Act for Project Manager • Provide daily status reports • Prepare task order Work Plan • Conduct daily safety meetings • Review subcontractor qualifications • Stop work for unsafe conditions or practices	• Stop work for subcontractor • Approve corrective action for site work-arounds • Approve materials and labor costs for site operations • Resolve subcontractor interface issues • Approve daily and weekly status reports
Senior Technical Engineer	• Evaluate and recommend appropriate remedial technology • Supervise preparation of Optimization Studies and select most suitable remedial technology for remedial action at the site. • Communicate with Technical Branch of the Navy and with specialty subcontractors on RA design and implementation details.	• Supervise, review and approve design of remedial technology application, remedial action project work plans and post-RA site monitoring.
Project QC Manager	• Monitor and oversee task order compliance with scope of work • Review requests for changes in scope of work • Recommend improvements in work techniques or metrics • Recommend work-around to Site Superintendent • Monitor and report on subcontractor quality and quantities • Audit subcontractors offsite fabrication • Maintain Submittal Register • Participate in Incident-Free Operations conference call	• Complete daily compliance report • Monitor and report on subcontractor quality and quantities • Audit subcontractor offsite fabrication • Maintain Submittal Register • Stop work for non-compliant operations • Maintain Rework Items list • Stop work for non-compliant operations

TABLE 5
Roles, Responsibilities, and Authority of QC Personnel Assigned
NFF Site, NAS Cecil Field, Jacksonville, Florida

Role	Responsibility	Authority
Site Health and Safety Specialist	• Monitor and report on subcontractor safety and health performance • Record and report safety statistics • Conduct required site safety and health orientation • Maintain Environmental Log • Stop work for unsafe practices or conditions	• Stop work for unsafe practices or conditions • Approve subcontractor site specific health and safety plan • Set weekly safety objectives • Approve resumption of work for resolved safety issues
Subcontract Specialist	• Prepare bid packages • Purchase disposable materials • Maintain subcontract log • Approve payables for disposable items • Maintain government property records	• Provide project scheduling coordination • Responsible for site cost tracking and reporting • Maintain record of site purchases

Figures



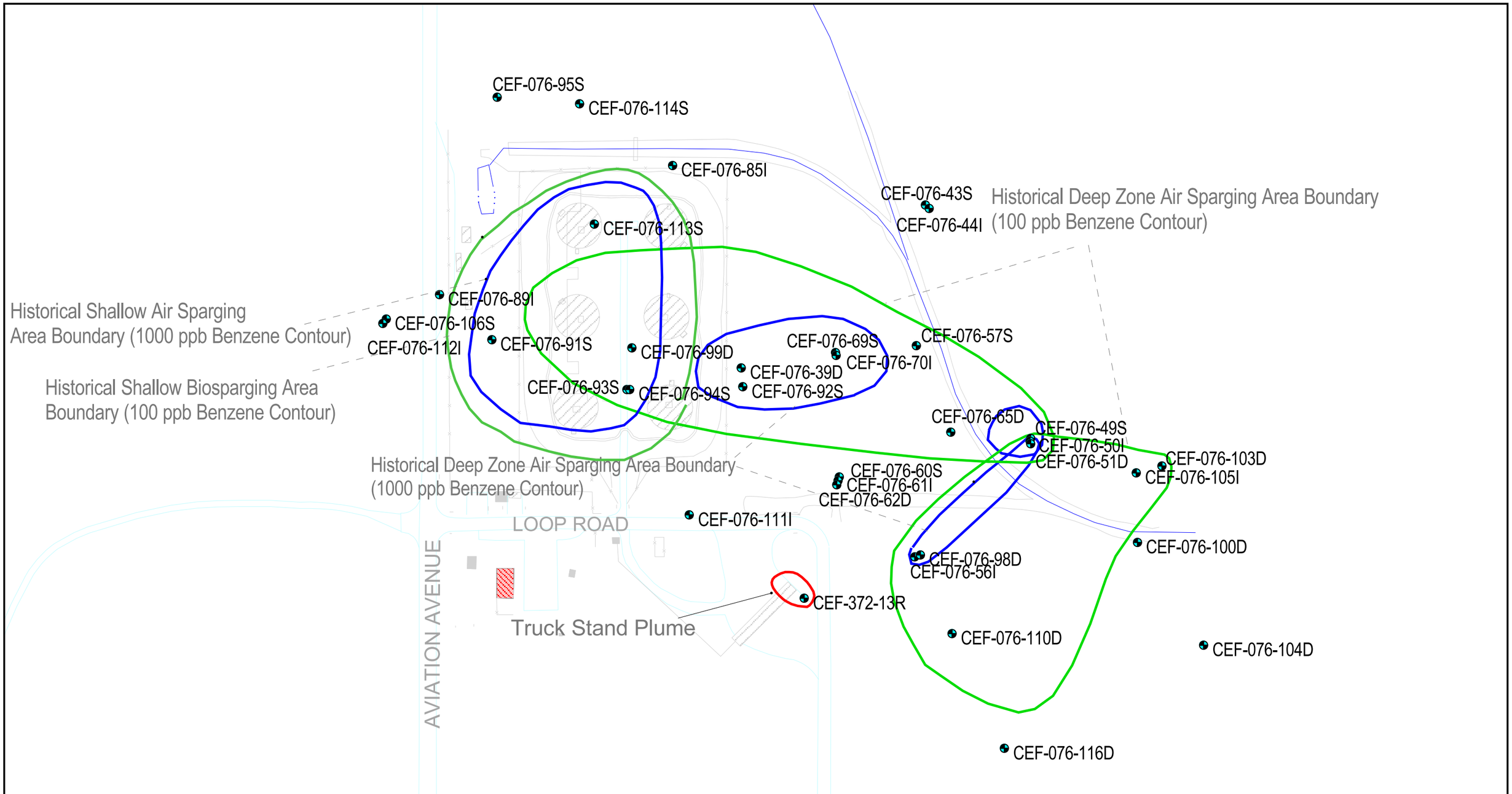
Surface Water
Roads
Property Line

N

0 3000 6000 Feet

1 inch = 5350.83 feet

Figure 1
Site Location
NFF Area Site
NAS Cecil Field, Jacksonville, FL



Groundwater Monitoring Well
Historical 1000 ppb VOC Plume Boundary
Historical 100 ppb VOC Plume Boundary

N

0 90 180 Feet

1 inch = 122 feet

Figure 2
Monitoring Well Locations
First Quarter 2007 Groundwater Monitoring
NFF Site, NAS Cecil Field, Jacksonville, FL

CH2MHILL

File Path: c:\gis\nas_cecilfield.apr, Date: 16 Apr 2007 13:47, User: SNAIK1, NAS Cecil Field Area [Florida State Plane Coordinate System NAD 83 Units Feet] - Figure 2 Monitoring Well Locations

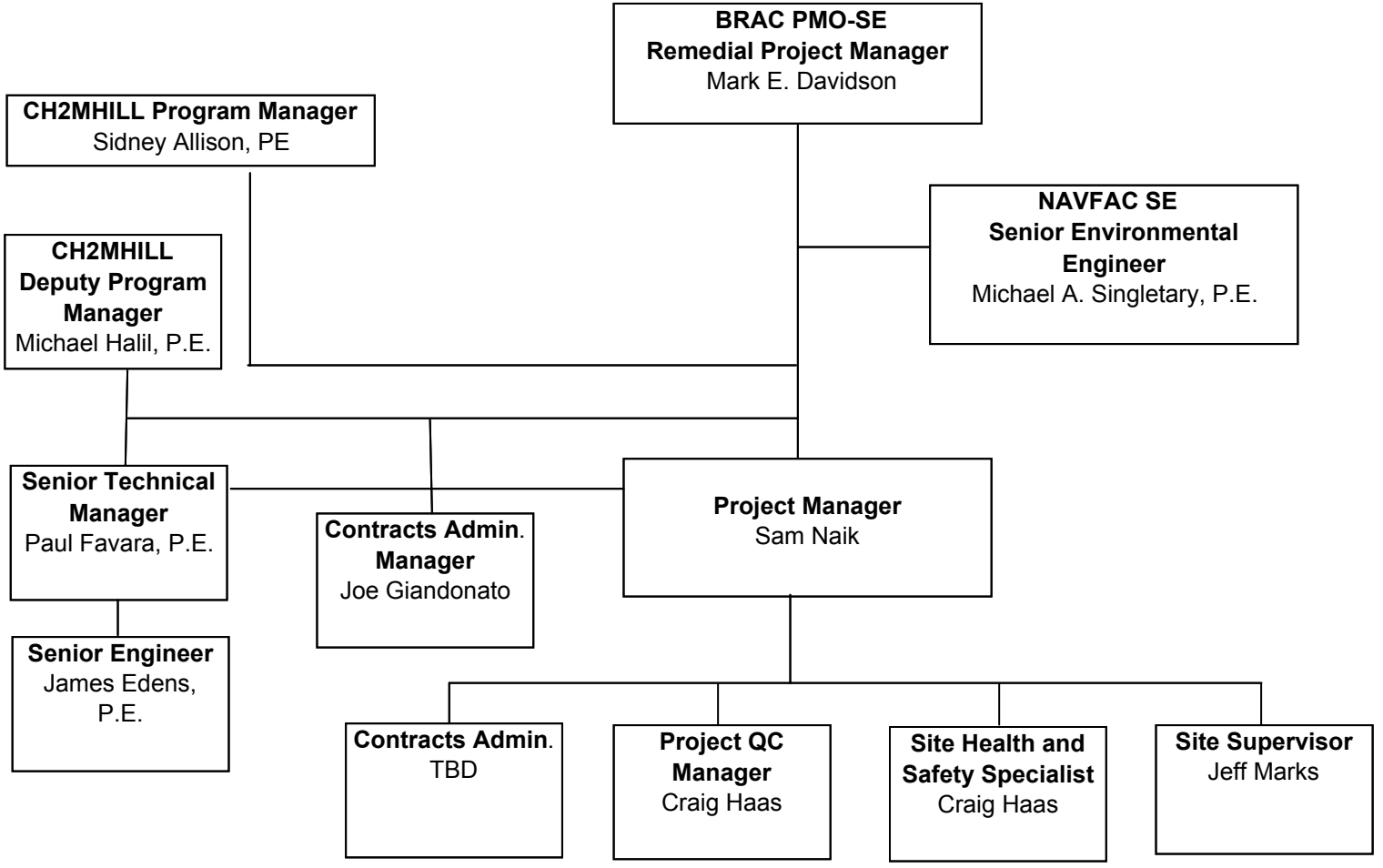
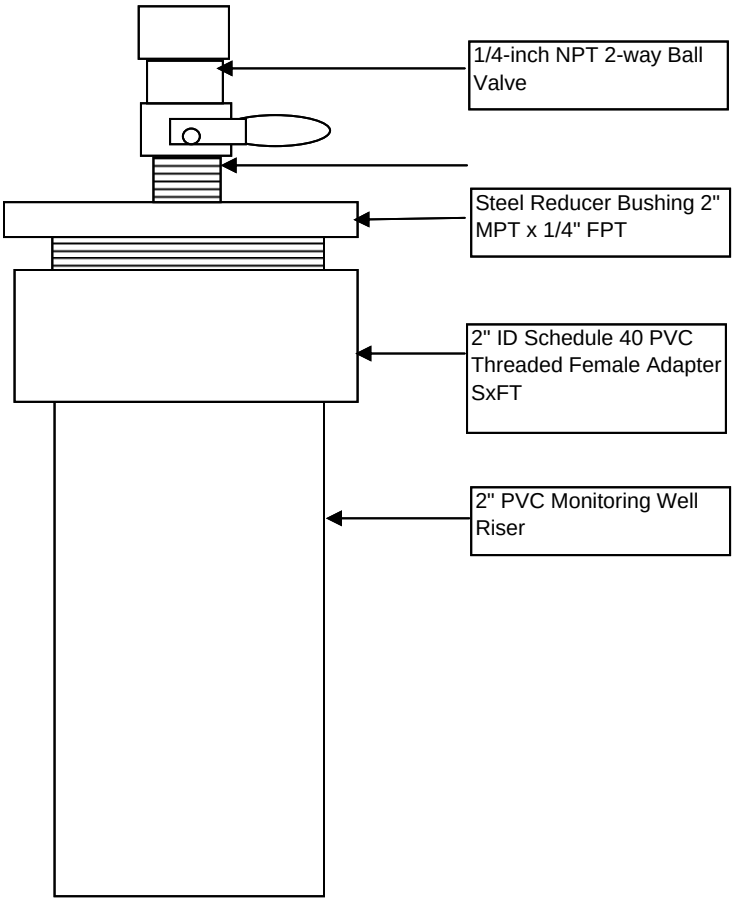


Figure 1-3 Project Organizational Chart,
NFF Site, NAS Cecil Field, Jacksonville, Florida

Figure 3
Organizational Chart
NFF Area Site
NAS Cecil Field, Jacksonville, FL

ATTACHMENT 1

Details of Wellhead Retrofits



Detailed Schematic of Monitoring Wellhead Retrofit for Groundwater Sampling
NFF Site, NAS Cecil Field, Jacksonville, FL

Photographs of Typical Wellhead Retrofit Arrangement for Sampling
NFF Site. NAS Cecil Field, Jacksonville, FL

ATTACHMENT 2

Bio-Flo Sampling Procedure

2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Bio-Flo Sampling Instruction PLFA

1. Prepare the pump (Peristaltic preferred, Grundfos, or air bladder) as normal. Use the clamp provided to ensure a leak proof connection.

2. Remove the filter from Falcon tube.

3. Attach the inlet of the filter with a 1/4" - 5/16" inner diameter (I.D.) tubing using the clamp to secure.

4. Place the filter within a receiving container so that the amount of water filtered can be measured accurately.

5. The amount of water which can be filtered will vary depending upon the turbidity of the sampling location. We suggest filtering a minimum of 2-3L, however, filtering should continue until the filter clogs (i.e. little/no flow out). The more volume that is filtered the more representative the results will be. If the filter clogs before 1L has been filtered, record how much water was filtered through the first filter, then collect an additional filter, recording the volume of water that went through the second filter as well. Both filters should be submitted for testing.

6. Accurately record the amount of water that passed through the filter. Once the volume of water has been recorded, the water can be discarded. Only the filters are submitted for testing.

To Submit Sample:

1. Place the clogged filter in the Falcon tube provided.

2. Note the amount of water that was passed through the filter, the well location, sampling date, and the analyses requested on the label and affix label to the Falcon tube.

A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com

Shipment:

Place the Falcon tube in the foam crate (if provided) and seal within a zippered plastic bag. Samples collected for PLFA analysis need to be shipped on ice (or blue ice) for next day delivery (please call to confirm Saturday delivery). If regular ice is used, the ice should be double bagged.

Samples should be shipped to:

Sample Custodian
Microbial Insights, Inc.
2340 Stock Creek Blvd.
Rockford, TN 37853-3044
(865) 573-8188

Saturday Delivery:

Microbial Insights, Inc. is not open on weekends. Coolers to be delivered on **Saturday** can be collected by a representative of Microbial Insights, Inc. from their FedEx Drop Location. To ensure proper handling if Saturday delivery is required, the FedEx shipping label should be marked under (6) Special Handling, check **Hold Saturday**, and the cooler must be taped with FedEx SATURDAY tape. The cooler should then be addressed to our drop location (address below).

Microbial Insights, Inc.
FedEx Drop Location
1601 Murdock Road
Knoxville, TN 37932
(865) 300-8053 or
(865) 384-4005

Please note, it is essential that our laboratory name be on the address label and you **MUST** call Microbial Insights, Inc. on the Friday to arrange for collection of your shipment on Saturday, with the Tracking # of the package. **Without proper labeling and the tracking information, there is no guarantee that the samples will be collected.**

ATTACHMENT 3

Copies of Letters Designating Project QC Manager and Alternate Project QC Manager

CH2M HILL
Northpark 400
1000 Abernathy Road
Suite 1600
Atlanta, GA 30328
Tel 770.604.9095
Fax 770.604.9282

April 16, 2007

Mr. Craig Haas
CH2M HILL Constructors, Inc.
225 East Robinson Street Suite 505
Orlando, Florida 32801-4321

RE: Contract No. N62467-01-D-0331
Contract Task Order No. 0060
Naval Air Station (NAS) Cecil Field – Jacksonville, Florida
Project Quality Control Manager Letter of Appointment

Dear Mr. Haas:

Herein describes the responsibilities and authority delegated to you in your capacity as the Project QC Manager at NAS Cecil Field, Contract Task Order (CTO) 0060 under RAC Contract No. N62467-01-D-0331.

In this position, you assist and represent the Program QC Manager in continued implementation and enforcement of the Project QC Plans. Your primary role is to ensure all requirements of the contract are met. Consistent with this responsibility, you will: (i) implement the QC program as described in the Navy RAC contract; (ii) manage the site-specific QC requirements in accordance with the Project QC Plans; (iii) attend the coordination and mutual understanding meeting; (iv) conduct QC meetings; (v) oversee implementation of the three phases of control; (vi) perform submittal review and approval; (vii) ensure testing is performed; (viii) prepare QC certifications and documentation required in the Navy RAC Contract; and, (ix) furnish a Completion Certificate to the Contracting Officer or designated representative, upon completion of work under a contract task order , attesting that "the work has been completed, inspected, and tested, and is in compliance with the contract."

Your responsibilities further include identifying and reporting quality problems, rejecting nonconforming materials, initiating corrective actions, and recommending solutions for nonconforming activities.

You have the authority to control or stop further processing, delivery, or installation activities until satisfactory disposition and implementation of corrective actions are achieved. You have the authority to direct the correction of non-conforming work. All work requiring corrective action will be documented on daily reports, and, in the event non-conforming work is not immediately corrected you are required to submit a non-conformance report to the PM and copy the Program QC Manager. A status log will be kept of all non-conforming work. You shall immediately notify the Program QC Manager in the event of any stop work order.

It is imperative that you comply with all terms of the basic contract. In particular, Section C, Paragraph 6.5.2, which states:

> *"No work or testing may be performed unless the QC Program Manager or Project QC Manager is on the work site."*

In the event that you are not able to be at the work site when work or testing is to be performed, it is your responsibility to inform the Program QC Manager and Project Manager, in advance, so that other arrangements can be made.

Further, if you are requested to perform the duties of the Site Supervisor, it is your responsibility to inform the Program QC Manager so that approval can be obtained in advance from the Contracting Officer or designated representative, in accordance with Section C Paragraph 6.6.2.1 of the contract.

You are a key member of the Project Manager's team. You ensure that work meets the specific requirements and intent of the work plan, the Navy's scope of work and the basic contract. Should you have any questions regarding this role, you should immediately contact the Program QC Manager, Theresa Rojas. Your day-to-day activities on the site should be coordinated with all site personnel and the Project Manager. In event of any deficient items, the Superintendent and Project Manager should be advised immediately so they have opportunity to remedy the situation.

Sincerely,

CH2M HILL Constructors, Inc.

Michael Halil
Deputy Program Manager

cc: Project File No. 350277

CH2M HILL
Northpark 400
1000 Abernathy Road
Suite 1600
Atlanta, GA 30328
Tel 770.604.9095
Fax 770.604.9282

April 16, 2007

Mr. Randy Dumaop
AGVIQ Environmental Services
6219 Authority Avenue
Jacksonville, Florida 32221

RE: Contract No. N62467-01-D-0331
Contract Task Order No. 0060
Naval Air Station (NAS) Cecil Field – Jacksonville, Florida
Alternate Project Quality Control Manager Letter of Appointment

Dear Mr. Dumaop:

Herein describes the responsibilities and authority delegated to you in your capacity as the alternate Project QC Manager at NAS Cecil Field, Contract Task Order (CTO) 0060 under RAC Contract No. N62467-01-D-0331.

In this position, you assist and represent the Project QC Manager in the event that he is not on the project site and the Program QC Manager in continued implementation and enforcement of the Project QC Plans. Your primary role is to ensure all requirements of the contract are met. Consistent with this responsibility, you will: (i) implement the QC program as described in the Navy RAC contract; (ii) manage the site-specific QC requirements in accordance with the Project QC Plans; (iii) attend the coordination and mutual understanding meeting; (iv) conduct QC meetings; (v) oversee implementation of the three phases of control; (vi) perform submittal review and approval; (vii) ensure testing is performed; (viii) prepare QC certifications and documentation required in the Navy RAC Contract; and, (ix) furnish a Completion Certificate to the Contracting Officer or designated representative, upon completion of work under a contract task order , attesting that "the work has been completed, inspected, and tested, and is in compliance with the contract."

Your responsibilities further include identifying and reporting quality problems, rejecting nonconforming materials, initiating corrective actions, and recommending solutions for nonconforming activities.

You have the authority to control or stop further processing, delivery, or installation activities until satisfactory disposition and implementation of corrective actions are achieved. You have the authority to direct the correction of non-conforming work. All work requiring corrective action will be documented on daily reports, and, in the event non-conforming work is not immediately corrected you are required to submit a non-conformance report to the PM and copy the Program QC Manager. A status log will be kept of all non-conforming work. You shall immediately notify the Program QC Manager in the event of any stop work order.

It is imperative that you comply with all terms of the basic contract. In particular, Section C, Paragraph 6.5.2, which states:

> *"No work or testing may be performed unless the QC Program Manager or Project QC Manager is on the work site."*

In the event that you are not able to be at the work site when work or testing is to be performed, it is your responsibility to inform the Program QC Manager and Project Manager, in advance, so that other arrangements can be made.

Further, if you are requested to perform the duties of the Site Supervisor, it is your responsibility to inform the Program QC Manager so that approval can be obtained in advance from the Contracting Officer or designated representative, in accordance with Section C Paragraph 6.6.2.1 of the contract.

You are a key member of the Project Manager's team and ensure that work meets the specific requirements and intent of the work plan, the Navy's scope of work and the basic contract. Should you have any questions regarding this role, you should immediately contact the Program QC Manager, Theresa Rojas. Your day-to-day activities on the site should be coordinated with all site personnel and the Project Manager. In event of any deficient items, the Superintendent and Project Manager should be advised immediately so they have opportunity to remedy the situation.

Sincerely,

CH2M HILL Constructors, Inc.

Michael Halil
Deputy Program Manager

cc: Project File No. 350277