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NAS CECIL FIELD, FL
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SAMPLING PLAN FOR NATURAL ATTENUATION OF CONTAMINATED GROUNDWATER AT BUILDING 82 TANK G82 NAS CECIL FIELD FL

11/2/2001

TETRA TECH NUS INC

SAMPLING PLAN – TANK G82 NATURAL ATTENUATION

1.0 INTRODUCTION

This sampling plan was prepared to evaluate natural attenuation of contamination in the groundwater at Tank G82 at NAS Cecil Field.

The Site Assessment Report Addendum (SARA) (TtNUS, 2001) proposed that the groundwater contamination at the site be remediated by natural attenuation, in conjunction with engineering and institutional controls. In their letter of July 3, 2001, the FDEP requested that the Navy evaluate other options for groundwater remediation at the site. In response to this request, the Navy proposed to further evaluate natural attenuation and also provide an evaluation of other active remedial methods. A summary of the results of groundwater sampling from previous events is included in Appendix A. Additional details of the previous investigations can be found in the Site Assessment Report (TtNUS, 2000) and the SARA (TtNUS, 2001).

The evaluation of natural attenuation will consist of collecting groundwater samples and analyzing the samples for contaminants and other natural attenuation parameters, as described further below. In addition, the site will be evaluated using the BIOSCREEN model.

2.0 SAMPLING AND ANALYSIS

The monitoring wells that have been selected to evaluate natural attenuation are shown on Table 1 and on Figure 1. This table also lists the analyses that are to be performed on samples from each well.

Groundwater will be sampled and analyzed to identify trends that are indicative of natural attenuation. Water-level measurements will also be performed during the sampling event at the monitoring wells to be sampled, plus several additional wells. The wells where only the water level will be measured are included on Table 1. Samples will be collected using low flow techniques. Samples from wells denoted with “V”, “P”, and “T” on Table 1 will be analyzed for VOCs, polycyclic aromatic hydrocarbons (PAHs), and TRPH, respectively, as shown on Table 2. Samples from wells denoted with “NA” on Table 1 will be analyzed for natural attenuation parameters, as shown on Tables 3 and 4. Natural attenuation parameters were selected based on the results of natural attenuation analyses at Sites 36 and 37.

The wells selected for natural attenuation evaluation are CEF-G82-3S (background/upgradient), CEF-G82-2S (Source), and CEF-G82-5S (downgradient). There is no existing mid-plume well. Because of the limited size of the plume (less than 100 feet long), no side gradient wells will be sampled. Further, no contaminants were detected in the side gradient wells.

The analytes for natural attenuation (Tables 3 and 4) were selected from the list of analytes for natural attenuation evaluation in the Long-Term Monitoring Plan for Sites 36 and 37 (TtNUS, 2001). That analyte list was derived from standard protocols for natural attenuation evaluation. Based on the results of three quarters of groundwater analyses at Sites 36 and 37, several analytes were dropped for the G82 investigation.

1. Field alkalinity was deleted for this one-time investigation. The laboratory alkalinity was chosen for better control and conditions.
2. Chloride, ethane, and ethene were deleted since this is not a chlorinated compound site.
3. The analyses for all sulfide forms were deleted based on Sites 36 and 37 results. The Sites 36 and 37 data appears to be of limited value. Sulfate concentrations and the change in sulfate concentrations will provide the information regarding biological sulfate reduction. Also, at Sites 36 and 37, not all of the unimpacted (that is, upgradient) locations had measurable sulfate concentrations.
4. Nitrate, nitrite, and phosphate have always been below detection limits.

Note that samples for dissolved iron analysis are to be filtered through a 1-micron cartridge filter.

Collect a duplicate and MS/MSD for samples to be analyzed at the laboratory. No blanks are required, per the NAS Cecil Field protocols.

Standard laboratory turnaround will be requested.

3.0 SAMPLE NUMBERS

Each sample is to be assigned a unique sample identification number. Sample numbers will continue the sequence from the SAR.

The nomenclature established for this investigation is as follows:

1		2		3		4
AAA-NN	-	AA	-	EEEE	-	NN
Site Location and Site Number		Media		Sample Location		Sample Depth or Round

1 Site Location:

CEF - NAS Cecil Field

Site Number:

G82 - Tank G82

2 Media types:

GW - Groundwater

GF - Groundwater Filtered (applies to filtered metals only)

DU - Duplicate

DF - Filtered Groundwater Duplicate

3 Sampling location by media type:

This is the last digits of the well number, such as “2S” for well CEF-G82-2S.

4 Monitoring well sampling event, NN, is as follows:

03 - for the third event at the site.

TABLE 1

MONITORING WELLS AND SAMPLING RATIONALE
NATURAL ATTENUATION MONITORING
TANK G82
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring well No.	Depth Interval	Depth, Ft	Analytes	Rationale and Comments
CEF-G82-2S	S	14	NA, V, P, T	Source
CEF-G82-3S	S	14	NA, V, P, T	Upgradient
CEF-G82-5S	S	15	NA, V, P, T	Downgradient
CEF-G82-1S(R)	S	15	WL	Water level only
CEF-G82-2I	I	35	WL	Water level only
CEF-G82-4S	S	15	WL	Water level only
CEF-G82-6S	S	15	WL	Water level only

NOTES:
S - Shallow
I - Intermediate
NA - Natural attenuation parameters
V - VOCs by 8260B
P - PAHs by 8310
T - TRPH by FL-PRO
WL - Water Levels only
(R) - Replacement well

TABLE 2

SUMMARY OF CHEMICALS OF CONCERN ANALYTICAL REQUIREMENTS
NATURAL ATTENUATION MONITORING
TANK G82
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Sample Container	Container Volume	Preservation[1]	Maximum Holding Time	Analytical Methodology
TCL VOCs	Glass, black phenolic plastic screw cap, Teflon-lined	2x40 mL	Cool to 4°C, dark, HCl to pH < 2	14 days	SW-846 8260B
PAHs	Amber glass, Teflon-lined cap	1000 mL	Cool to 4°C	Extraction 7 days; analysis within 40 days	SW-846 8310
TRPH	Amber glass, Teflon-lined cap	1000 mL	Cool to 4ºC	Extraction 7 days; analysis within 40 days	FL-PRO

NOTES:

1 Preservation agents: HCl = Hydrochloric acid

TABLE 3

NATURAL ATTENUATION PARAMETERS
FIELD ANALYTICAL METHODS
NATURAL ATTENUATION MONITORING
TANK G82
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Method[2]/ Reference	Data Use	Sample Volume, Container, & Preservation
Temperature	Direct-reading thermometer	Biological processes are temperature dependent.	100-250 mL in glass or plastic container. Analyze immediately
Dissolved Oxygen	CHEMetrics ampoule kits	Concentration of less than 1 mg/L indicates anaerobic conditions.	Follow test kit instructions. Analyze immediately to nearest 0.2 mg/L
pH	Direct-reading meter	Biological processes are pH sensitive.	100-250 mL in glass or plastic container. Analyze immediately
Conductivity	Direct-reading meter	General water quality parameter used to verify that site samples are obtained from the same groundwater system.	100-250 mL in glass or plastic container. Analyze immediately
Ferrous Iron (Fe^{+2})	HACH Test Kit Number IR-18C - Color Disc - 1,10 Phenanthroline Method	Presence of ferrous iron may indicate presence of an anaerobic degradation process due to depletion of oxygen, nitrate, and manganese.	Follow test kit instructions. Analyze immediately to nearest 0.2 mg/L
Oxidation-Reduction Potential (ORP)	Direct-Reading Meter	ORP provides information on RE/DOX conditions and to interpret the nature and state of chemical compounds and biological conditions. ORP typically ranges from +200mV in normal aerobic, oxidizing conditions to -400mV in strongly anaerobic, reductive conditions.	100-250 mL in glass container filling from the bottom. Do not aerate or agitate. Analyze immediately.
Carbon Dioxide (CO_2)	HACH Test Kit Number CA-DT - Digital Titration - Sodium Hydroxide & Phenolphthalein Method (HACH Method 8205)	May be compared with background values as an indication of aerobic and anaerobic process. Is produced during aerobic respiration as well as anaerobic processes. Is utilized during methanogenesis.	Follow test kit instructions. Do not aerate or agitate. Analyze immediately. Analyze to nearest 0.1 mg/L

NOTES:

1 Method refers to U.S. EPA test methods. Standard Methods are based on Standard Methods for the Examination of Water and Wastewater (Clesceri, et al, 1992)

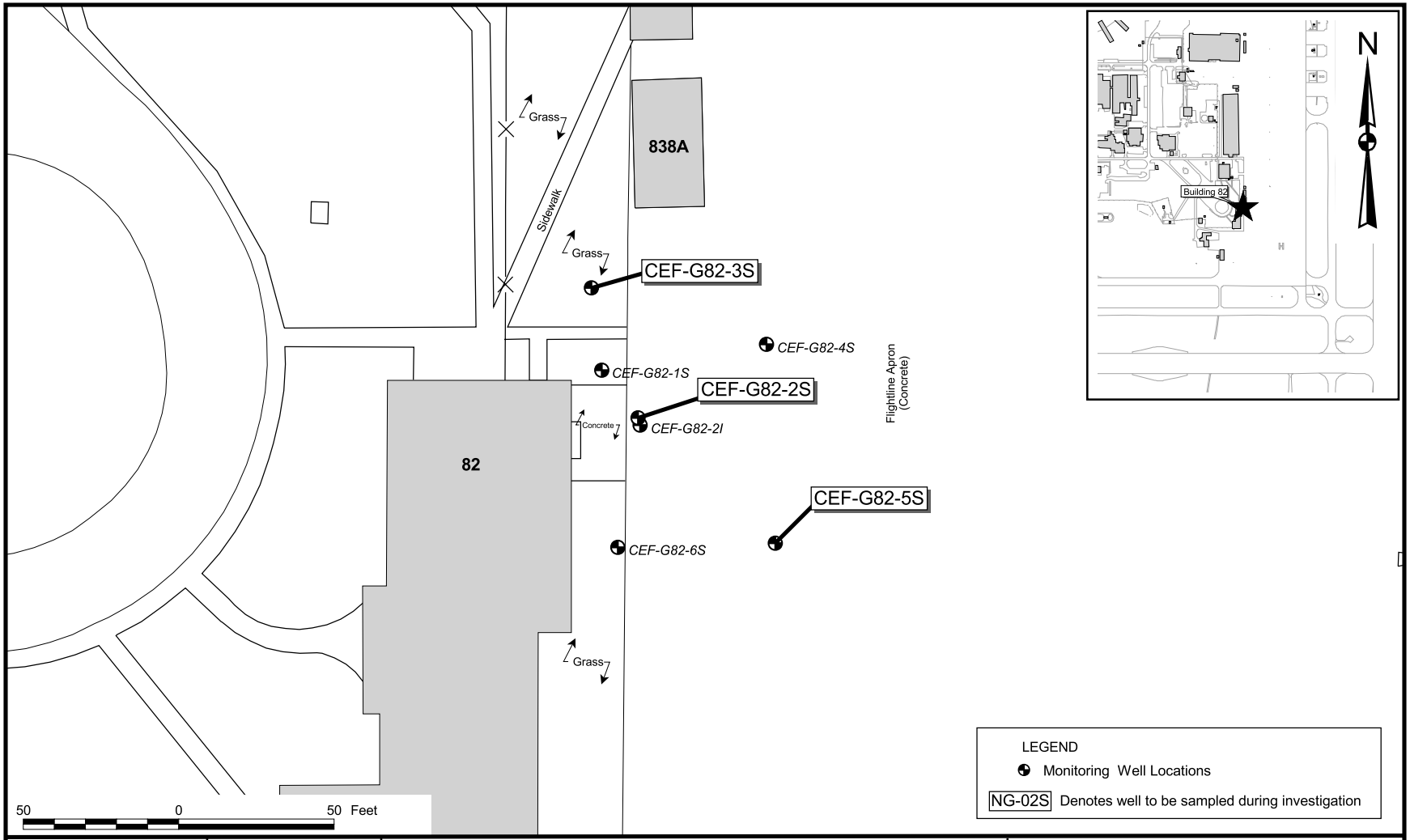
TABLE 4

NATURAL ATTENUATION PARAMETERS
FIXED-BASED LABORATORY METHODS
NATURAL ATTENUATION MONITORING
TANK G82
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Method[2]/ Reference	Data Use	Sample Volume, Container, & Preservation
Alkalinity	EPA 310.1. Manual titrimetric	General water quality parameter used to verify that site samples are obtained from the same groundwater system and to measure the buffering capacity of the groundwater.	100-250 mL in glass or plastic container. Cool to 4°C. Analyze within 14 days.
Iron (Dissolved)(1-micron filter)	SW-846 6010B	Iron can act as electron acceptors during biodegradation, and is compared to the ferrous iron result.	250 mL in plastic container. HNO_3 to pH <2. Cool to 4°C. Analyze within 6 months.
Sulfate (SO_4^{-2})	EPA 300	Potential substrate for microbial respiration. May compete as an electron acceptor if present at moderate concentrations (>20 mg/L).	250 mL in plastic container. Cool to 4°C. Analyze within 28 days.
Methane	RSK SOP-147 & 175	Presence of methane indicates biological degradation via an anaerobic pathway utilizing CO_2 as an electron acceptor.	40 mL in volatile organic analyte (VOA) vial with Teflon lined septum. HCl to pH <2. Cool to 4°C. Analyze within 14 days.
Total Organic Carbon (TOC)	E 415.1	Indicates the total amount of organic carbon at the site that may compete with the degradation of chemicals of concern.	125 mL HDPE. H_2SO_4 to pH < 2.0. Cool to 4°C. Analyze within 28 days.

NOTES:

1 Method refers to U.S. EPA test methods. Standard Methods are based on Standard Methods for the Examination of Water and Wastewater (Clesceri, et al, 1992)



DRAWN BY: MJJ	DATE: 29Oct01	SITE PLAN BUILDING 82 - TANK G82 NATURAL ATTENUATION EVALUATION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER: 0394
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE: AS NOTED			DRAWING NO.: FIGURE 1 / REV: 0

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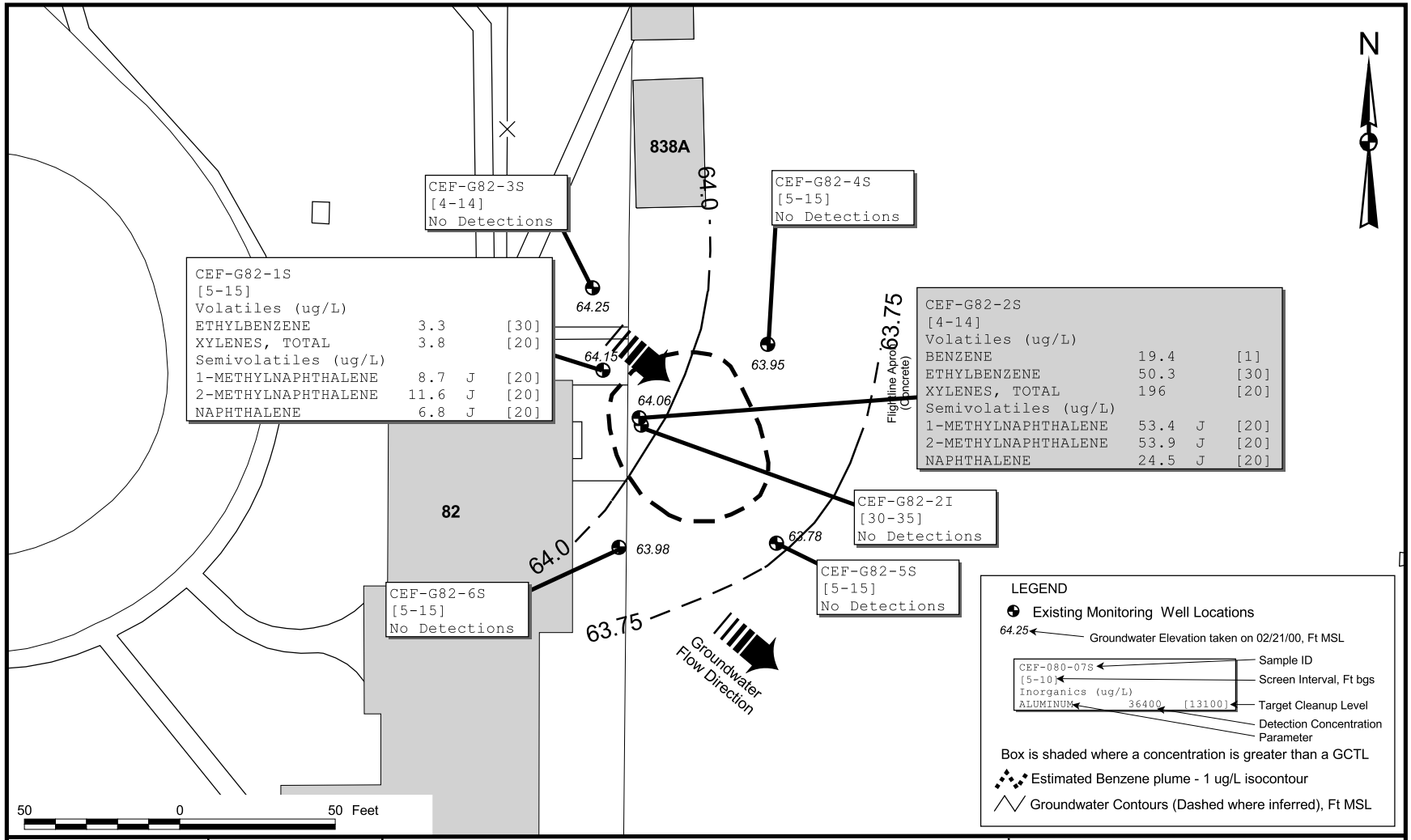
APPENDIX A

EXISTING GROUNDWATER RESULTS



DRAWN BY MJJ	DATE 04Apr00	GROUNDWATER CONCENTRATIONS ABOVE FDEP CRITERIA AND ELEVATION DATA BUILDING 82 - TANK G82 SITE ASSESSMENT REPORT ADDENDUM NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0394
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3-1 / REV 0

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