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NAS CECIL FIELD
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SAMPLING AND ANALYSIS OUTLINE FOR FACILITY 682 SITE A-4 NAS CECIL FIELD FL

1/1/1995

ABB ENVIRONMENTAL

SAMPLING AND ANALYSIS OUTLINE

SITE A-4, FACILITY 682

BASE REALIGNMENT AND CLOSURE

ZONE A, YELLOW WATER WEAPONS AREA
GROUP I

NAVAL AIR STATION, CECIL FIELD
JACKSONVILLE, FLORIDA

Unit Identification No. N60200

Contract No. N62467-89-D-0317/090

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January 1995

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GLOSSARY OF TERMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
BRAC	Base Realignment and Closure
DQO	data quality objective
EBS	Environmental Baseline Study
POP	BRAC Cecil Field Project Operations Plan
PRE	Preliminary Risk Evaluation
SAO	Sampling and Analysis Outline
TAL	target analyte list
TCL	target compound list
YWWA	Yellow Water Weapons Area

1.0 SITE DESCRIPTION

This Base Realignment and Closure (BRAC) Program Phase II Sampling and Analysis Outline briefly describes and proposes a plan for assessment of Site A-4 located in the west central section of the Yellow Water Weapons Area (YWWA) at Naval Air Station Cecil Field. Site A-4 is base facility No. 682, an abandoned wastewater treatment plant. The structures associated with Site A-4 include an Imhoff tank, two shallow sludge drying beds, and two lagoons.

The wastewater treatment plant construction date is unknown at this time; however, aerial photographs taken in November 1960 show the facility under construction. The lagoons had not been excavated at that time, but are shown clearly in aerial photographs taken in December 1970. It may have received wastewater for only a short time because another wastewater treatment plant, located south of Mariner Road (Figure 1), supported the now-abandoned facilities associated with the Yellow Water Gunnery Training School in the 1940's, and the present-day housing area, located in the southwest part of YWWA, is served by a newer wastewater treatment plant located within that area.

Site A-4 (Figure 1) is located on the west side of Wildcat Road, southwest of the Yellow Water Weapons Complex. A stormwater drainage system, consisting of surface water diversion ditches around the site perimeter, discharges into the Caldwell Branch of Yellow Water Creek.

2.0 ENVIRONMENTAL BASELINE SURVEY COLOR DESIGNATION

The site was designated with a Grey color code in the Environmental Baseline Survey (EBS) (ABB Environmental Services, Inc. [ABB-ES], 1994a), due to lack of information about the site operations. Aboveground features observed during a site walkover in October 1994 included a concrete Imhoff tank, two low, curbed drying beds surrounded by a large concrete apron, two water-filled lagoons, and a 10- to 12-inch diameter effluent discharge pipe, which was connected to the westernmost lagoon via a below-ground valve box. The Imhoff tank has a solid top; the aboveground tank piping system was capped. The aboveground effluent pipe was also capped at its westernmost end; the eastern end of the piping was connected to the westernmost (Figure 1) lagoon via the valve box.

Below-ground features include the valve box previously mentioned and a vault. At ground surface, the vault is vented with two standing air pipes and an open personnel entry hatch. It is located near the Imhoff tank. The vault was observed to be partially filled with water. The depth of the vault is not known and was not determined during the walkover.

3.0 RECOMMENDATIONS

Completion of the following sampling program is recommended to verify the presence or absence of contamination in surface water, sediment, surface soil, and groundwater. Because this base facility may have accepted wastewater from industrial and residential sources, a broad spectrum analytical program (i.e.,

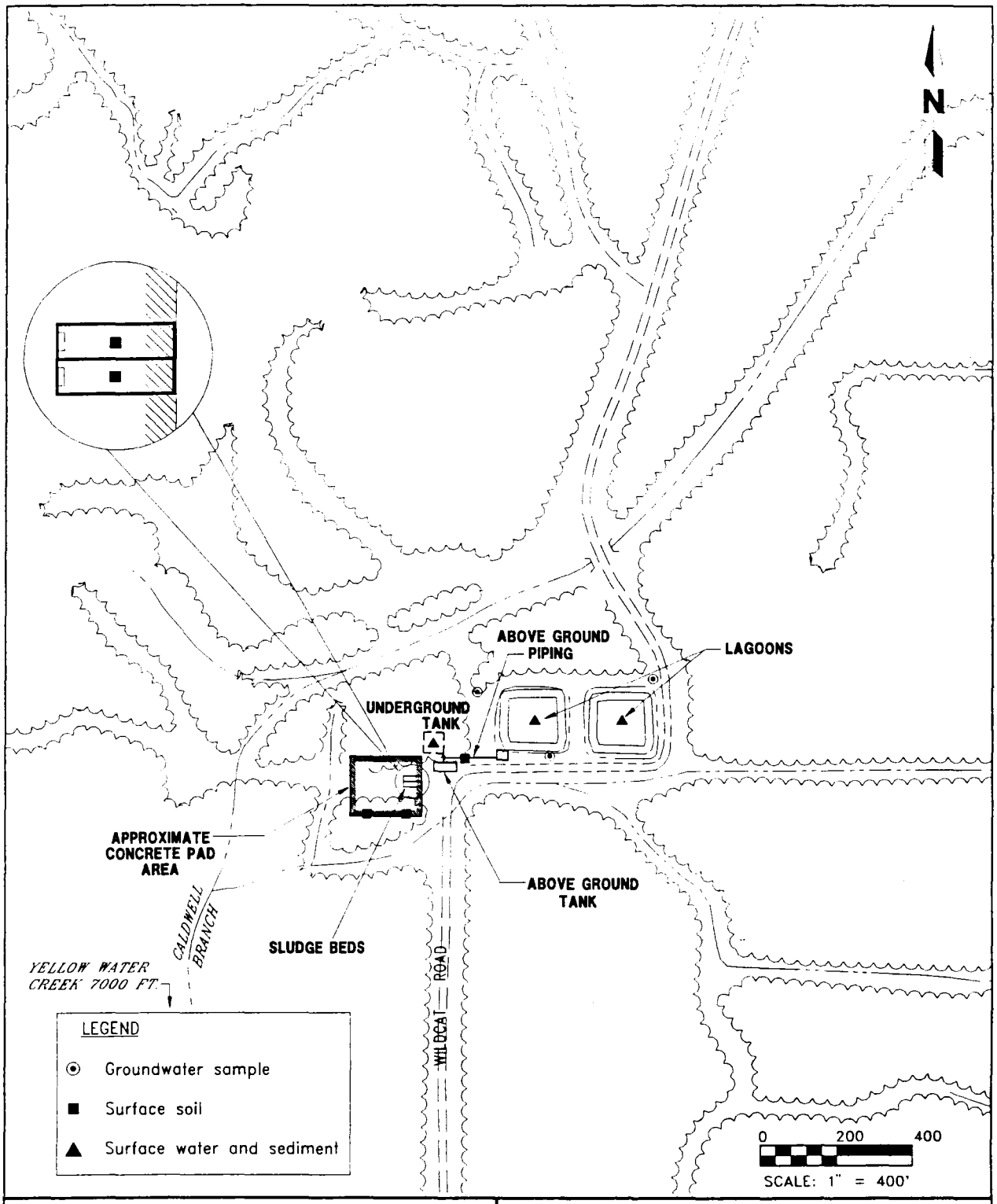

FIGURE 1
SITE A-4
ABANDONED WASTEWATER TREATMENT PLANT
YELLOW WATER WEAPONS AREA

CECIL/SITE-A/KGF-NP/01-27-95

PHASE II SAMPLING AND ANALYSIS OUTLINES, GREY SITES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

SAMPLING AND ANALYSIS REPORT

SITE A-4, FACILITY 682

BASE REALIGNMENT AND CLOSURE

ZONE A, YELLOW WATER WEAPONS AREA GROUP I

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc
bls	below land surface
BRAC	Base Realignment and Closure
EBS	environmental baseline survey
FOSL	Finding of Suitability to Lease
FOST	Finding of Suitability to Transfer
NAS	Naval Air Station
POP	project operations plan
SAO	sampling and analysis outline
TAL	target analyte list
TCL	target compound list

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to the Southern Division, Naval Facilities Engineering Command, has completed the Phase II Sampling and Analysis program for Site A-4, at Naval Air Station (NAS) Cecil Field. This report summarizes the related field operations, observations,and findings undertaken in partial fulfillment of the requirements of the NAS Cecil Field Base Realignment and Closure (BRAC) program.

Site A-4 (base facility No. 682) is an abandoned wastewater treatment facility, located in the west-central section of the Yellow Water Weapons Area of NAS Cecil Field. The site includes an Imhoff tank, a subsurface concrete vault, two shallow sludge drying beds, and two wastewater impound lagoons (Figure 1). Previously unavailable engineering plans for the study area were located subsequent to the completion of field activities. The plans were produced in 1958 and indicate influent wastewater from barracks, offices, and light industrial facilities, located along the main road in Yellow Water Weapons Area, and within the Yellow Water Weapons Compound and Yellow Water Weapons Complex, was pumped to the Imhoff tank in the study area. Partially clarified wastewater was directed from the top of the Imhoff tank to an extensive mounded leach field. Settled solids were pumped to two sludge drying beds. Water released during consolidation of the sludge was captured by an underdrain and directed to the leach field. Other facility drawings indicate the Imhoff tank was backfilled with soil and abandoned in 1974. Additional site background information is available in relevant sections of the Environmental Baseline Survey (EBS) (ABB-ES, 1994a).

Potential environmental concerns identified during the EBS have precluded a Finding of Suitability to Lease (FOSL) or a Finding of Suitability to Transfer (FOST) for Site A-4. Due to a lack of information regarding waste types and quantities formerly processed at Site A-4, a Sampling and Analysis Outline (SAO) for assessment of surface water, sediment, surface soil, and groundwater was prepared by ABB-ES and approved by the BRAC Cleanup Team. The Phase II Sampling and Analysis program developed in the SAO is intended to augment existing information used to evaluate whether the site should be recommended for an FOSL or FOST.

2.0 PHASE II INVESTIGATION

This Phase II investigation included collection of five surface soil samples, three groundwater samples, two surface water samples, and two sediment samples. A general site plan detailing monitoring well and sample locations is presented on Figure 1.

Field activities, except where noted and described below, were undertaken in general conformance with the Project Operations Plan (POP) (ABB-ES, 1994b), to fulfill the objectives of the site-specific SAO. Deviations from planned activities in the SAO and/or methods in the POP are generally attributed to additional information obtained following the production of the respective document(s), or site-specific conditions, and are discussed in the relevant

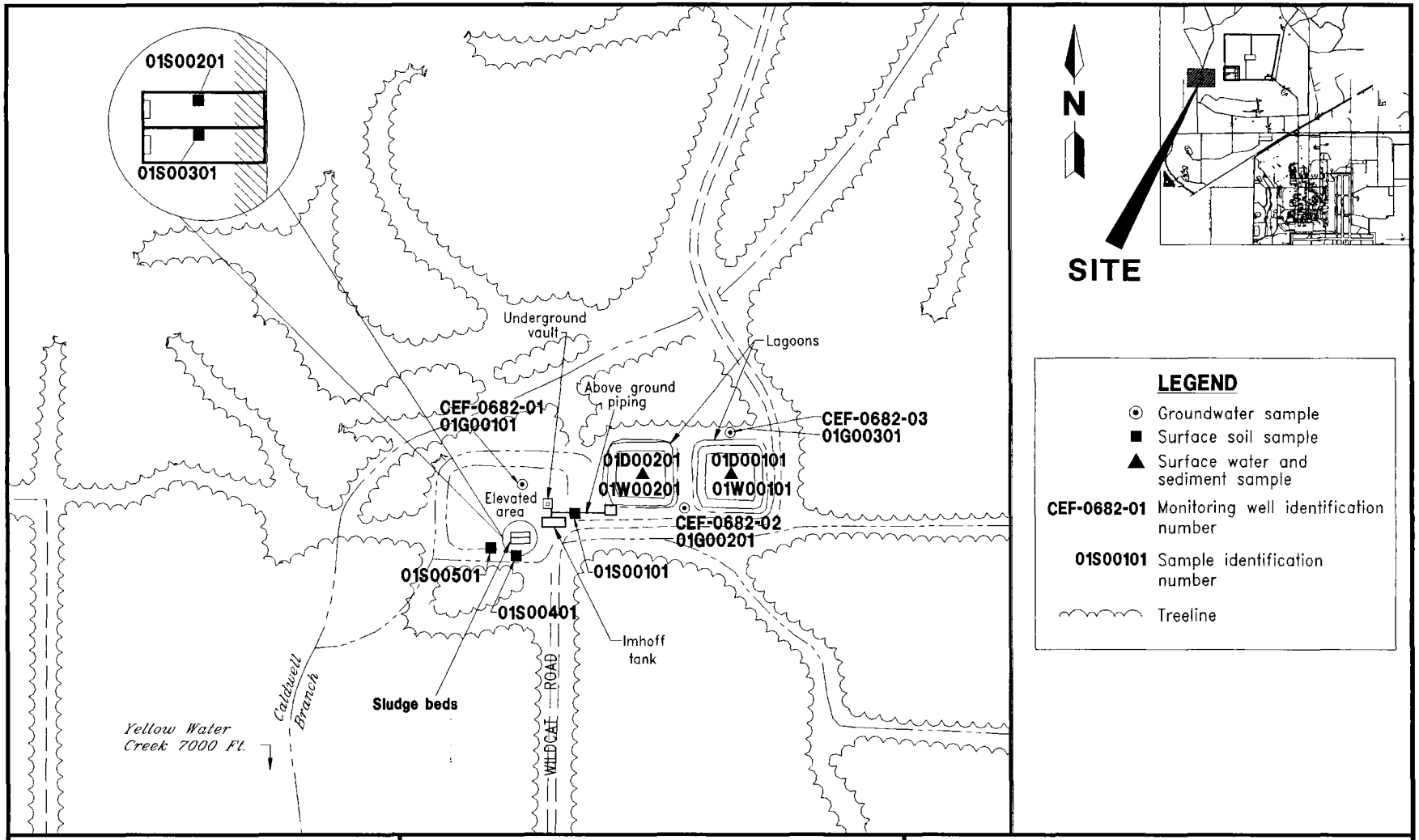

FIGURE 1
SITE A-4
ABANDONED WASTEWATER TREATMENT PLANT
YELLOW WATER WEAPONS AREA
SAMPLE LOCATION PLAN

PHASE II SAMPLING AND ANALYSIS REPORT

NAVAL AIR STATION
CECIL FIELD
JACKSONVILLE, FLORIDA

sections of this report. Field methods and laboratory protocols were specified to satisfy requirements for Level IV data quality.

2.1 SURFACE WATER AND SEDIMENT. A small boat was mobilized to access collection points for surface water and sediment samples at each of the two wastewater lagoons. Surface water samples were collected near the center of each lagoon at approximately 1.50 feet below the water surface. The water depth at each of the sampling locations was approximately 4 feet. Water samples were collected through new Teflon™ tubing connected to a vacuum jug apparatus, using a peristaltic pump. The sample fraction analyzed for volatile organic compounds was not subjected to vacuum. The surface water was visibly clear.

Sediment samples were collected with stainless-steel hand augers, near the center of each of the two wastewater lagoons. The sediment consisted of a 1 to 2-inch layer of black organic-rich silty clay overlying poorly graded, brown silty sand. Sediment was not encountered at the bottom of the subsurface concrete vault. Therefore, no sediment sample was collected at this location. Surface water was not collected from within the subsurface concrete vault due to an oversight during field operations.

2.2 SURFACE SOIL. Surface soil samples were collected with stainless-steel spoons, from a depth of 0 to 1 foot below land surface (bls). Surface soil samples were collected from each of the two former sludge drying beds, in an open area east of the Imhoff tank, and at two locations along the drainage ditch at the south perimeter of the study area.

2.3 GROUNDWATER. Three shallow groundwater monitoring wells were installed in the area surrounding the two wastewater lagoons. Wells were completed at a depth of 15 feet bls in soil borings advanced with 6-1/4-inch inside diameter hollow-stem augers. Soil boring logs are attached as Appendix A. Following installation and development of monitoring wells, groundwater was purged and sampled using low flow methods.

3.0 ANALYTICAL DATA EVALUATION

Five surface soil samples, two sediment samples, two surface water samples, and three groundwater samples were collected during the sampling program for Site A-4. Detected compounds and human health screening criteria are presented in Tables 1 through 4.

A qualitative comparison between concentrations of analytes detected in surface water and sediment and ecological screening criteria indicates a relatively low risk to ecological receptors from exposure to these media.

Human health screening criteria for antimony, beryllium, cadmium, chromium, lead, manganese, and vanadium were exceeded in surface soil samples collected in the study area. At one surface soil sampling location, the concentration of lead was in excess of 200 times the background screening value and more than nine times greater than the human health screening value. The concentration of vanadium

Table 1
Summary of Positive Detections in Groundwater

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameters	Risk-Based Concentrations[1]	FDEP Groundwater Guidance Concentrations[2]	Federal MCL	Sample 01G00101	Sample 01G00201	Sample 01G00301	Exceeds Screening Concentration
Semivolatile Organic Compounds (µg/ℓ)							
bis(2-Ethylhexyl)phthalate	4.8	6	6			2 J	
Pesticide/PCBs (µg/ℓ)							
delta-HCH		0.05			0.0011 J		
Dieldrin	0.0042	0.1		0.0027 J	0.0043 J	0.0025 J	Yes
gamma-Chlordane	0.052	2	2	0.0021 J			
Heptachlor epoxide	0.0012	0.2	0.2	0.0039 J			Yes
Inorganics (µg/ℓ)							
Aluminum	37,000	200	200	1,250	10,800	19,800	Yes
Arsenic	0.038	50	50	5.4 J	4.8 J	5.4 J	Yes
Barium	2,600	2,000	2,000	95.6 J	389	67.7 J	
Beryllium	0.016	4	4		2.3 J	0.5 J	Yes
Cadmium	18	5	5	0.3 J		0.65 J	
Calcium	1,055,398			17,400	12,600	1,700 J	
Chromium	180	100		2.9 J	11	13.4	
Cobalt	2,200				2.2 J	0.97 J	
Copper	1,400	1,000	100	1.5 J	25.1	14.1 J	
Iron	13,267	300	300	3,160	9,200	3,360	Yes
Lead		15	15		71.8	18.2	Yes
Magnesium	118,000			7,760	5,210	1,440 J	
Manganese	180	50	50	38.8	39.1	10.8 J	
Nickel	730	100	100	2.6 J	9.5 J	5.2 J	
Potassium	297,016			1,160 J	1,250 J	3,970 J	
Sodium	396,000	160,000	20,000	7,920	5,230	15,600	

See notes at end of table.

Table 2
Summary of Positive Detections in Sediment Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameters	Background Screening Concentrations[1]	Risk-Based Screening Concentrations (Resident Surface Soil)[2]	Sample 01D00101	Sample 01D00201	Exceeds Human Health Screening Concentrations (Resident Surface Soil)
Volatile Organic Compounds (µg/kg)					
2-Butanone		47,000		3 J	
Semivolatile Organics (µg/kg)					
Di-n-butylphthalate		7,800,000		76 J	
Pesticide/PCBs (µg/kg)					
4,4'-DDE		1,900	0.52 J	1.4 J	
Aldrin		38	0.094 J	0.052 J	
alpha-Chlordane		490		0.058 J	
beta-HCH		100		0.089 J	
Dieldrin		40		0.06 J	
Endosulfan II		470,000	0.14 J		
Endrin aldehyde				0.11 J	
gamma-Chlordane		490	0.14 J	0.35 J	
Inorganics (mg/kg)					
Aluminum	2,200	78,000	9930	1030 J	
Antimony		31		0.74 J	
Barium	8	5,500	21 J	4.7 J	
Beryllium		0.15	0.14		
Cobalt		1,000,000	697		
Chromium	4.4	390	9.1	4	
Cobalt		4,700	0.33 J		
Copper	2	2900	4.8 J	7.5	
Iron	826	47,824	1260	525 J	
Lead	14.4	400	15.2	12.3 J	
Magnesium	202	460,468	215 J	36.1 J	
Manganese	3.8	390	3.3 J	1.6 J	
Nickel		1600	0.91 J		
Potassium		1,000,000	116 J		
Vanadium		550	7 J	1.5 J	

[1] Background screening location was STCSDR.
[2] USEPA Region III Risk-Based Concentration (RBC) for residential soil exposure . Values are taken from the USEPA Region III RBC dated January 31, 1995, and are based on a cancer risk of 10^{-6} and a hazard quotient of 1. For the essential nutrients, screening values were derived based on recommended daily allowances.

Notes: NAS = Naval Air Station.
µg/kg = micrograms per kilograms.
PCBs = polychlorinated biphenyls.
DDE = dichlorodiphenyldichloroethene.
mg/kg = milligrams per kilograms.
USEPA = U.S. Environmental Protection Agency.

Table 3
Summary of Positive Detections in Surface Soil Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameter	Background Screening Concentration	Risk-Based Screening Concentrations (Resident)[1]	Florida Cleanup Goals (Resident)[2]	Risk-Based Screening Concentrations (Industrial)[3]	Florida Cleanup Goals (Industrial)[2]	Sample 01S00101	Sample 01S00201	Sample 01S00301	Exceeds Residential Screening Concentration	Exceeds Industrial Screening Concentration
Semivolatile Organics (µg/kg)										
4-Chloroaniline		310,000	190,000	8,200,000	2,300,000		360	680		
bis(2-Ethylhexyl)phthalate		46000	45,000	410,000	100,000		840	390		
Di-n-butylphthalate		7,800,000	7,500,000	200,000,000	150,000,000			30 J		
Pesticides/PCBs (µg/kg)										
4,4'-DDD		2,700	4,400	24,000	17,000		1.7 J	0.9 J		
4,4'-DDE		1,900	2,900	17,000	9,900		4.2 J	4.1		
4,4'-DDT		1,900	3,100	17,000	12,000		0.59 J	0.55 J		
alpha-HCH		100	200	910	500		0.019 J			
alpha-Chlordane		490	800	4,400	2,800		6.9 J	6.7		
Aroclor-1254		1,600	1,000	41,000	3,500		63	47		
Dieldrin		40	70	360	300	0.047 J				
Endosulfan I		470,000	340,000	12,000,000	4,400,000					
Endosulfan II		470,000	340,000	12,000,000	4,400,000	0.14 J				
Endrin aldehyde			23		480,000		0.68 J	1.6 J		
Endrin ketone						0.19 J				
gamma-HCH (Lindane)		490	800	4,400	2,600			0.089 J		
gamma-Chlordane		490	800	4,400	2,800		5.1 J	3.6 J		
Heptachlor epoxide		70	100	630	300					
Inorganics (mg/kg)										
Aluminum	29,000	78,000	75,000	1,000,000		1900 J	668 J	845 J		
Antimony		31	26	820	210			145	Yes	
Barium	21	5,500	5,000	140,000	74,000	1,160	2630	11.5		

See notes at end of table.

Table 3 (Continued)
Summary of Positive Detections in Surface Soil Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameter	Background Screening Concentration	Risk-Based Screening Concentrations (Resident)[1]	Florida Cleanup Goals (Resident)[2]	Risk-Based Screening Concentrations (Industrial)[3]	Florida Cleanup Goals (Industrial)[2]	Sample 01S00101	Sample 01S00201	Sample 01S00301	Exceeds Residential Screening Concentration	Exceeds Industrial Screening Concentration
Beryllium		0.15	0.1	1.3	0.2				Yes	Yes
Cadmium		39	37	1000	600		15.7	175	Yes	
Calcium		1,000,000				125,000	65,800	92,200		
Chromium	31.2	390	150	10,000	220	764	9.2	13.7	Yes	Yes
Cobalt		4,700	4,700	120,000	110,000	52.5	8.6	3		
Copper		2,900	2,900	76,000	72,000			4.5		
Iron	8,060	47,824				910	691	923		
Lead	15.6	400	400		1,000	3,770	16.3	20.8	Yes	Yes
Magnesium	474	460,468				25,800	14,500	17,800		
Manganese	17	390	10,000	10,000	170,000	1,990	392	340	Yes	
Mercury		23	23	610	480		0.27	0.32		
Nickel	7.2	1,600	1,500	41,000	11,000	278	60.8	166		
Potassium	310	1,000,000				18,300	23,400	20,000		
Selenium		390	390	10,000	9,900	157	260			
Silver		390	380	10,000	8,000		0.17			

See notes at end of table.

Table 3 (Continued)
Summary of Positive Detections in Surface Soil Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameter	Background Screening Concentration	Risk-Based Screening Concentrations (Resident)[1]	Florida Cleanup Goals (Resident)[2]	Risk-Based Screening Concentrations (Industrial)[3]	Florida Cleanup Goals (Industrial)[2]	Sample 01S00401	Sample 01S00501	Exceeds Residential Screening Concentration
Semivolatile Organics (µg/kg)								
4-Chloroaniline		310,000	190,000	8,200,000	2,300,000			
bis(2-Ethylhexyl)phthalate		46,000	45,000	410,000	100,000			
Di-n-butylphthalate		7,800,000	7,500,000	200,000,000	150,000,000			
Pesticides/PCBs (µg/kg)								
4,4'-DDD		2,700	4,400	24,000	17,000			
4,4'-DDE		1,900	2,900	17,000	9,900	0.69J		
4,4'-DDT		1,900	3,100	17,000	12,000			
alpha-HCH		100	200	910	500			
alpha-Chlordane		490	800	4,400	2,800			
Aroclor-1254		1,600	1,000	41,000	3,500		0.093 J	
Dieldrin		40	70	360	300			
Endosulfan I		470,000	340,000	12,000,000	4,400,000	0.052 J		
Endosulfan II		470,000	340,000	12,000,000	4,400,000			
Endrin aldehyde			23		480,000			
Endrin ketone						0.36 J		
gamma-HCH (Lindane)		490	800	4,400	2,600			
gamma-Chlordane		490	800	4,400	2,800			
Heptachlor epoxide		70	100	630	300	0.023 J		
Inorganics (mg/kg)								
Aluminum	29000	78000	75000	1,000,000		3000 J	2550 J	
Antimony		31	26	820	210			Yes
Barium	21	5500	5000	140,000	74,000	1670	1220	

See notes at end of table.

Table 3 (Continued)
Summary of Positive Detections in Surface Soil Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameter	Background Screening Concentration	Risk-Based Screening Concentrations (Resident)[1]	Florida Cleanup Goals (Resident)[2]	Risk-Based Screening Concentrations (Industrial)[3]	Florida Cleanup Goals (Industrial)[2]	Sample 01S00401	Sample 01S00501	Exceeds Residential Screening Concentration
Beryllium		0.15	0.1	1.3	0.2	0.95		Yes
Cadmium		39	37	1,000	600			
Calcium		1,000,000				2,020	52,800	
Chromium	31.2	390	150	10,000	220	1,000	700	Yes
Cobalt		4,700	4,700	120,000	110,000	57.1	45	
Copper		2900	2,900	76,000	72,000			
Iron	8,060	47,824				4,060	1,780	
Lead	15.6	400	400		1,000	2,360	1,220 J	Yes
Magnesium	474	460,468				23,400	22,600	
Manganese	17	390	10,000	10,000	170,000	23 J	523	
Mercury		23	23	610	480			
Nickel	7.2	1,600	1,500	41,000	11,000	107	83.7	
Potassium	310	1,000,000				13,000	16,100	
Selenium		390	390	10,000	9,900	150	271	
Silver		390	380	10,000	8,000			
Sodium		1,000,000				10,500	12,000	
Vanadium	34.2	550	480	14,000	4,800	1,030	911	
Zinc		23,000	23,000	610,000	550,000	471	1,100 J	

See notes at end of table.

Table 3 (Continued)
Summary of Positive Detections in Surface Soil Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

[1] (USEPA) Region III Risk Based Concentrations (RBCs) for residential soil exposure per January 1993 guidance (Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening, EPA/903/R-93-001) was used for screening. Actual values are taken from the USEPA Region III RBCs dated January 31, 1995, and are based on a cancer risk of 10^{-6} and a hazard quotient of 1. For the essential nutrients, screening values were derived based on recommended daily allowances.

[2] Values are taken from the Florida Department of Environmental Protection memorandum, Cleanup Goals for Military Sites in Florida dated April 5, 1995.

[3] (USEPA) Region III RBCs for industrial soil exposure per January 1993 guidance (Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening, EPA/903/R-93-001) was used for screening. Actual values are taken from the USEPA Region III RBCs dated January 31, 1995, and are based on a cancer risk of 10^{-6} and a hazard quotient of 1.

Notes: NAS = Naval Air Station.
μg/kg = micrograms per kilograms.
PCBs = polychlorinated biphenyls.
J = detected concentration was estimated.
DDD = dichlorodiphenyldichloroethane.
DDE = dichlorodiphenyldichloroethene.
DDT = dichlorodiphenyltrichloroethane.
mg/kg = milligrams per kilograms.
▒ = Sample concentration exceeds screening value(s).
USEPA = U.S. Environmental Protection Agency.

Table 4
Summary of Positive Detections in Surface Water Samples

Phase II, Sampling and Analysis Report
Site A-4, Facility 682
Base Realignment and closure
Zone A, Yellow Water Weapons Area Group
NAS Cecil Field, Jacksonville, Florida

Parameters	Background Screening Concentrations	Florida Surface Water Standards[1]	Sample 01W00101	Sample 01W00201	Exceeds Florida Surface Water Standards[1]
Inorganics ($\mu g/\ell$)					
Barium	28.6	1,000	2 J	2.8 J	
Calcium	66,000		1130 J	1120 J	
Chromium		11		0.91 J	
Copper		[2]2.9		0.87 J	
Iron	762	300	246	1170 J	Yes
Lead	5.8	[2]5.6	2.1 J	2.1 J	
Magnesium	2,560		464 J	377 J	
Manganese	14.8	100	6.2 J	10.5 J	

[1] The lowest freshwater value from Florida Administrative Code 62-302 amended January 1995.
[2] The standard is hardness dependent. The value reported is for marine environments.

Notes: NAS = Naval Air Station.
$\mu g/\ell$ = micrograms per liter.
J = detected concentration was estimated.
= Sample concentration exceeds screening value(s).

detected in the same sample was more than 25 times the human health screening value. Potential ecological risks associated with exposure to surface soil were not evaluated.

Human health screening criteria for arsenic, beryllium, and lead were also exceeded in groundwater samples collected in the study area. The lagoons in the study area may represent a potential exposure pathway to groundwater for ecological receptors. This would be most applicable during extended periods of low precipitation, which could cause the lagoons to gain from the shallow surficial aquifer.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Several inorganic analytes were detected at concentrations above background and risk-based screening values in surface soil and groundwater samples collected in the study area. A qualitative assessment of the analytical data indicates a requirement for additional sampling and analysis in order to determine the areal extent of surface soil and groundwater contamination. Additional surface water and sediment samples are also recommended to determine whether the Caldwell Branch of the Rowell Creek or its minor tributaries have been affected.

Nine additional surface soil samples, with analysis for target analyte list (TAL) inorganics, are proposed to determine the extent of inorganic contaminants in surface soils in the study area. Two surface water and sediment samples, with analysis for target compound list (TCL) organics and TAL inorganics, are proposed to determine whether or not contaminants detected in surface soil and groundwater have impacted tributaries of Rowell Creek. One groundwater sample, with analysis for TCL organics and TAL inorganics, is proposed to evaluate groundwater in the vicinity of the sludge drying beds and leachfield. Refer to Figure 2 for proposed sample locations.

A plan for further assessment has been proposed. Therefore, a reclassification of the color code for Site A-4, from Gray to Yellow, is recommended. A preliminary risk evaluation, based on the results of additional sampling, will be required.

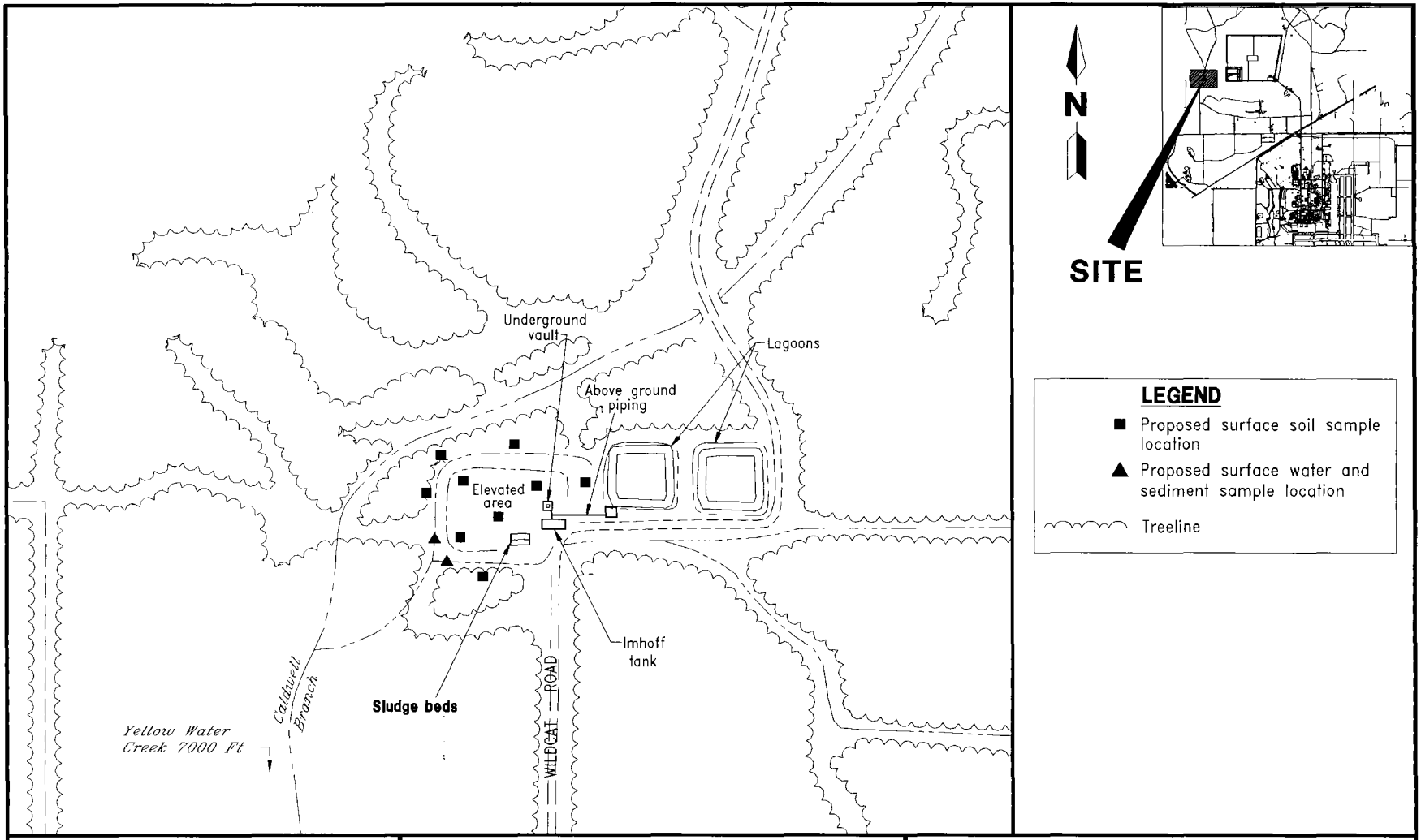

FIGURE 2
SITE A-4
ABANDONED WASTEWATER TREATMENT PLANT YELLOW WATER WEAPONS AREA
PROPOSED ADDITIONAL SAMPLING LOCATION PLAN

PHASE II SAMPLING AND ANALYSIS REPORT

NAVAL AIR STATION
CECIL FIELD
JACKSONVILLE, FLORIDA

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APPENDIX A

SOIL BORING LOGS