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FIRST QUARTER 2003 OPERATIONS AND MAINTENANCE STATUS REPORT FOR BIOVENTING AND BIOSPARGING SYSTEMS AT SOUTH FUEL FARM NAS CECIL FIELD FL

10/1/2003

CH2MHILL CONSTRUCTORS INC

First Quarter 2003
Operations and Maintenance Status Report

Bioventing and Biosparging Systems
South Fuel Farm
Naval Air Station Cecil Field
Jacksonville, Florida

Contract No. N62467-98-D-0995
Contract Task Order No. 0086

Submitted to:

U.S. Naval Facilities
Engineering Command
Southern Division

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Acronyms

ABB-ES	ABB Environmental Services, Inc.
acfm	actual cubic feet per minute
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BEI	Bechtel Environmental, Inc.
bls	below land surface
BRAC	Base Realignment and Closure
^{o}C	degrees Celsius
CCI	CH2M HILL Constructors, Inc.
CLEAN	Comprehensive Long-term Environmental Action Navy
CTO	Contract Task Order
EMT	earth-mounded tank
^{o}F	degrees Fahrenheit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	flame ionization detector
GCTLs	Groundwater Cleanup Target Levels
in Hg	inches of mercury
JP-5	jet propellant 5
LNAPL	light non-aqueous phase liquid
µg/L	micrograms per liter
mg/L	milligrams per liter
mS/cm	milliSeimens per centimeter
mV	millivolts
NAS	Naval Air Station
NAVD	North American Vertical Datum
NAVFAC	Naval Facilities Engineering Command
NM	not measured
NR	no reading
NTU	nephelometric turbidity unit
O&M	operation and maintenance
ORP	oxygen reduction potential
OVA	organic vapor analyzer
ppm	parts per million
psig	pounds per square inch gauge
PVC	polyvinyl chloride
RAP	Remedial Action Plan
scfm	standard cubic feet per minute
SCTLs	Soil Cleanup Target Levels
SFF	South Fuel Farm
UST	underground storage tank

1.0 Introduction

CH2M HILL Constructors, Inc. (CCI) has been contracted by the Department of the Navy, Southern Division Naval Facilities Engineering Command (NAVFAC), to provide operation and maintenance (O&M) services at the South Fuel Farm (SFF), Former NAS Cecil Field, Jacksonville, Florida, under Response Action Contract No. N62467-98-D-0995, Contract Task Order (CTO) No. 0086.

Bioventing and biosparging systems were installed at the SFF to reduce petroleum hydrocarbon contaminant concentrations in site groundwater and unsaturated soils. The purpose of this 1st Quarter 2003 Operation and Maintenance Status Report is to provide a summary of activities performed at the site during the period of January 1, 2003, to March 31, 2003.

1.1 Objective

The objective of the remedial action at the SFF is to reduce petroleum contaminant concentrations in site groundwater and unsaturated soils to Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Levels (GCTLs) and Soil Cleanup Target Levels (SCTLs), respectively, as specified in Tables I and II of Chapter 62-777, Florida Administrative Code (FAC). Bioventing and biosparging systems were installed and are currently operational at the site to achieve this objective.

1.2 Site History

The SFF is located at the northern edge of the east-west runway at Former NAS Cecil Field in Jacksonville, Florida. The SFF was used as a fuel storage facility for leaded and unleaded gasoline, aviation gasoline, diesel fuel, and jet propellant 5 (JP-5). When fully operational, the facility contained three aboveground storage tanks (ASTs), four underground storage tanks (USTs), and four earth-mounded tanks (EMTs) (Bechtel Environmental, Inc. [BEI], 1998a).

In 1983, the three ASTs were removed. In July 1994, the four USTs and three of the four EMTs were excavated. Excessively contaminated soil excavated during the tank removals was returned to the excavations. A contamination assessment was conducted by ABB Environmental Services, Inc. (ABB-ES) to determine the nature and extent of contamination as required by Chapter 62-770, FAC. A Remedial Action Plan (RAP) was submitted by ABB-ES in 1996 specifying the recommended remedial action as enhanced intrinsic remediation through bioventing and biosparging combined with an oxygen barrier wall. Subsequent to RAP submittal, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) agreed to implement remedial action activities for only the northern portion of the SFF site (BEI, 1998a). The southern portion of the bioventing and biosparging systems and the oxygen barrier were subsequently deleted from the RAP by the BCT. Soil excavation was chosen as

the remedial alternative for the southern portion of the SFF site. CCI excavated 28,953 tons of petroleum-impacted soil from October 1998 to February 1999 (CCI, 2001).

BEI installed the approved bioventing and biosparging systems for the northern portion of the SFF site from December 1997 to March 1998. Startup of the bioventing and biosparging systems occurred on April 6, 1998 (BEI, 1998b). BEI performed O&M of the systems from April 1998 to April 1999. EnSafe, Inc. performed the O&M of the systems from April 1999 to May 2001. Since June 2001, CCI has conducted the system O&M.

1.3 Remediation System/Technology Description

1.3.1 Bioventing System

The bioventing system improves intrinsic bioremediation of the contaminated soil by delivering oxygen to the aerobic bacteria in the vadose zone. This is achieved via subgrade wells at a low flow rate to minimize volatilization and stimulate subgrade indigenous microbial activity (ABB-ES, 1996).

The SFF bioventing system consists of 9 two-inch diameter polyvinyl chloride (PVC) vertical bioventing wells (BV-1 through BV-9), a blower, inlet air filter, flow meter, pressure and temperature gauges, valving, piping, and system controls. The aboveground portion of the bioventing system is located in a fenced, canopy covered equipment area. The bioventing wells are screened from approximately 3 to 8 feet below land surface (bls). The bioventing system is designed to deliver air to each well at a flow rate of 4 actual cubic feet per minute (acfm) at a well head pressure of 20 inches of water (ABB-ES, 1996). The locations of the bioventing wells and equipment area are shown on Figure 1-1.

1.3.2 Biosparging System

The biosparging system is used to treat the contaminated groundwater plume at the SFF site. This treatment system promotes the optimum environment for microbial activity and growth by injecting controlled volumes of air into the groundwater below the deepest point of contamination at controlled pressures via subgrade wells (ABB-ES, 1996).

The SFF biosparging system consists of 23 two-inch diameter PVC vertical biosparging wells (BS-1 through BS-23), a rotary screw air compressor, receiver tank, air dryer, in-line moisture separator, in-line coalescing oil filter, pressure regulator/gauge, header piping, valves, flow gauge, and system controls. The aboveground portion of the biosparging system is co-located with the bioventing system in the same fenced canopy covered equipment area. The biosparging wells are screened from approximately 27 to 30 feet bls. The biosparging system is designed for each well to operate at a flow rate of 1 acfm at an injection pressure of 15 pounds per square inch gauge (psig) (ABB-ES, 1996). The locations of the biosparging wells are shown on Figure 1-1.

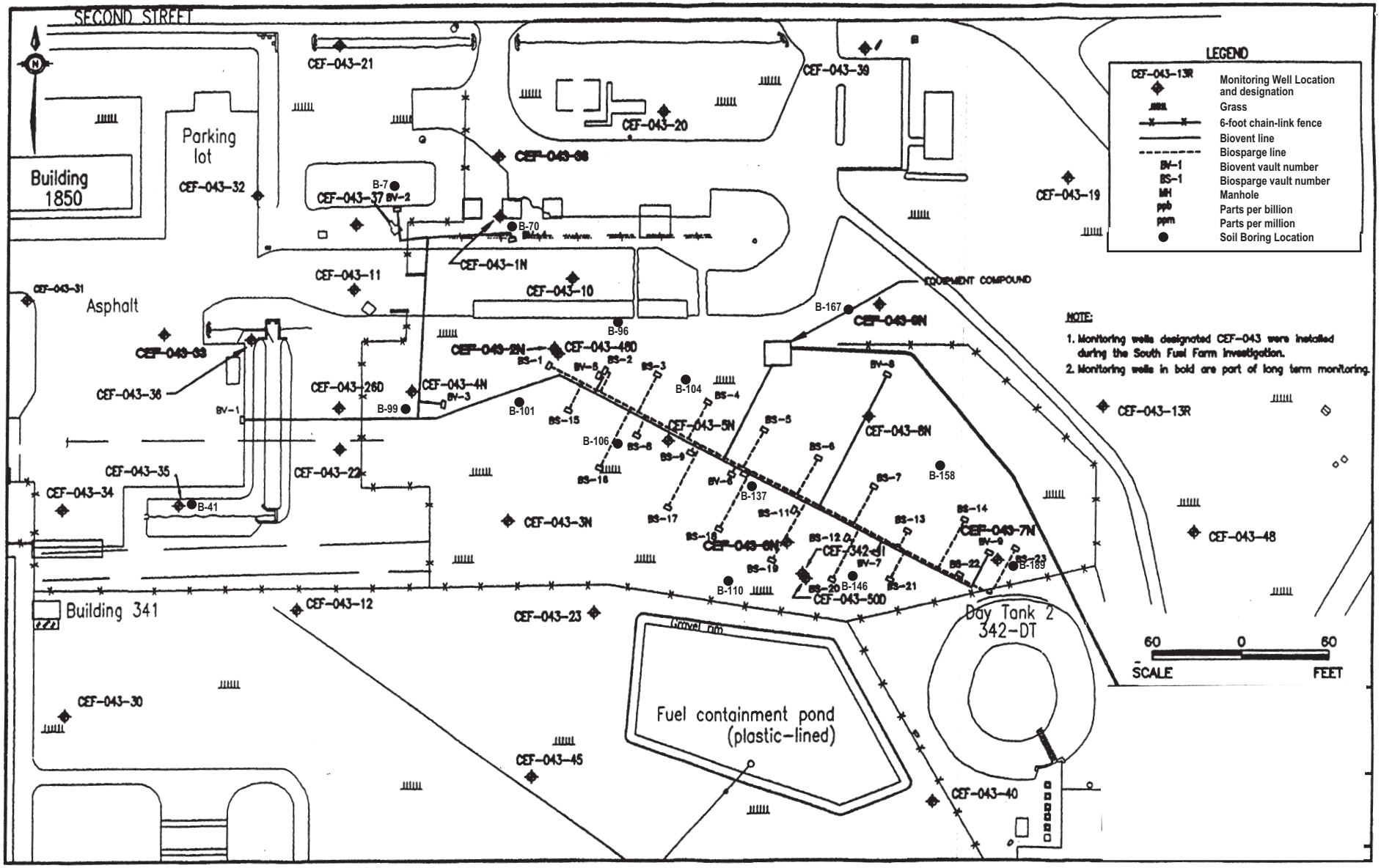

Figure 1-1
Site Plan
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

CH2MHILL

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2.0 System Performance Monitoring

Routine O&M checks of the system were performed weekly. During an O&M check, a preventative maintenance checklist (based upon manufacturer's recommendations) was completed, and any required maintenance activity was performed. The meters and gauges in the equipment area were recorded during the O&M check on a weekly basis. The meters and gauges in the bioventing and biosparging well vaults were recorded during the O&M check on a monthly basis.

During the O&M activities, the injection pressures and individual well air flow rates were adjusted in an attempt to achieve the design specifications. These adjustments will be evaluated during the 2n^{d} quarter of 2002.

2.1 Operational Efficiencies

2.1.1 Bioventing System

	Operational Period	To Date
Hours of Possible Operation	2,160	43,704
Hours of Actual Operation	2,131.25	2,7586.6
Percent hours of Operation	98.6	63.1

2.1.2 Biosparging System

	Operational Period	To Date
Hours of Possible Operation	2,160	43,704
Hours of Actual Operation	1,619.3	4,2194.3
Percent hours of Operation	75	96.5

2.2 Summary of Maintenance and System Downtime

2.2.1 Bioventing System

During the 1st quarter 2003, the bioventing system ran a total of 88.8 days out of a possible 90 days, resulting in 28.5 hours of downtime. The bioventing system downtime is detailed as follows:

- Manual shutdown of the system for a total of 27.5 hours for electrical safety while troubleshooting and installation of new biosparge electric motor was conducted.
- Manual shutdown for a total of 1 hour to perform routine equipment maintenance.

2.2.2 Biosparging System

During the 1st quarter 2003, the biosparging system ran a total of 67.4 days out of a possible 90 days, resulting in 540.7 hours of downtime. The biosparging system downtime is detailed as follows:

- Electric motor failure on the biosparging air compressor and installation of a new motor under warranty resulting in a total of 536.7 hours of downtime.
- Manual shutdown for a total of 4 hours to perform routine equipment maintenance.

2.3 Pressure/Flow Rate Monitoring

2.3.1 Bioventing System

During the 1st quarter 2003, the blower discharge pressure averaged 29.4 inches of water compared to the design blower discharge pressure of 40 inches of water. The total air injection flow rate at the blower averaged 101 standard cubic feet per minute (scfm) compared to the design blower flow rate of 80 scfm. Bioventing system data for 1st quarter 2003 are summarized in Table 2-1.

TABLE 2-1
Bioventing System Data

Date	Blower Discharge Pressure (inches of water)	Blower Discharge Temperature (°F)	Blower Air Flow Rate (scfm)
01/07/2003	NR	NR	NR
01/15/2003	29	80	125
01/20/2003	28	100	125
01/22/2003	27	95	120
01/23/2003	29	80	90
01/30/2003	28	106	85
02/06/2003	29	93	90
02/13/2003	28	100	85
02/20/2003	30	100	125
02/25/2003	30	92	90
03/05/2003	30	116	80
03/12/2003	32	114	80
03/20/2003	31	122	100
03/26/2003	31	114	106

°F - degrees Fahrenheit
scfm - standard cubic feet per minute
NR = No Reading

Reduced air flow rates less than the design values are likely due to the screen intervals of select injection wells located in low permeability zones as compared to the screen intervals of design/pilot test injection wells.

2.3.2 Biosparging System

During the 1st quarter 2003, the injection header discharge pressure averaged 15.6 psig compared to the design injection pressure of 15 psig. The 1st quarter 2003 biosparging system data are tabulated in Table 2-2.

TABLE 2-2
Biosparging System Data

Date	Air Compressor Supply Pressure (psig)	Air Compressor Discharge Temperature (°F)	Receiver Tank Supply Pressure (psig)	Header Discharge Pressure (psig)
01/07/2003	NM	NM	NM	NM
01/15/2003	NM	NM	NM	NM
01/20/2003	48	190	40	17
01/23/2003	55	75	45	18
01/30/2003	55	190	50	16
02/06/2003	45	170	38	15
02/13/2003	45	180	40	15
02/20/2003	50	180	40	15
02/25/2003	40	170	30	15
03/05/2003	55	200	50	15
03/12/2003	55	195	45	15
03/20/2003	50	205	45	15
03/26/2003	50	190	45	15.5

psig – pounds per square inch gauge
°F – degrees Fahrenheit
NM - Not Measured

2.4 Water Level Measurements

Depth to groundwater measurements were recorded on a monthly basis from 20 monitoring wells during the 1st quarter 2003. The results from the 1st quarter 2003 groundwater level measurement surveys are provided in Table 2-3. Light non-aqueous phase liquid (LNAPL) was not detected in monitoring wells during the 1st quarter 2003.

The potentiometric surface of the groundwater at the site based on February 25, 2003 water levels is depicted on Figure 2-1. In general, the groundwater flow in the vicinity of the bioventing and biosparging systems is to the south-southwest.

TABLE 2-3
Water Level Measurements

Well Identification	Date	Top of Casing Elevation (feet NAVD)	Depth to Water (feet bls)	Water Level Elevation (feet NAVD)
CEF-043-1N	01/15/2003	78.15	6.36	71.79
	02/25/2003		6.31	71.84
	03/26/2003		5.68	72.47
CEF-043-2N	01/15/2003	78.00	7.22	70.78
	02/25/2003		6.37	71.63
	03/26/2003		5.71	72.29
CEF-043-3N	01/15/2003	78.26	8.03	70.23
	02/25/2003		7.42	70.84
	03/26/2003		4.48	73.78
CEF-043-4N	01/15/2003	78.07	7.39	70.68
	02/25/2003		6.64	71.43
	03/26/2003		6.15	71.92
CEF-043-5N	01/15/2003	78.46	7.96	70.50
	02/25/2003		7.30	71.16
	03/26/2003		6.60	71.86
CEF-043-6N	01/15/2003	77.79	7.31	71.15
	02/25/2003		6.46	72.00
	03/26/2003		5.72	72.74
CEF-043-7N	01/15/2003	77.61	6.24	71.37
	02/25/2003		5.45	72.16
	03/26/2003		3.90	73.71
CEF-043-8N	01/15/2003	78.41	7.17	71.24
	02/25/2003		6.31	72.10
	03/26/2003		5.25	73.16
CEF-043-9N	01/15/2003	77.50	5.71	71.79
	02/25/2003		4.87	72.63
	03/26/2003		3.88	73.62
CEF-043-10	01/15/2003	78.55	7.58	70.97
	02/25/2003		6.78	71.77
	03/26/2003		6.03	72.52
CEF-043-19	01/15/2003	78.47	6.26	72.21
	02/25/2003		5.68	72.79
	03/26/2003		4.68	73.79
CEF-043-20	01/15/2003	78.59	6.82	71.77
	02/25/2003		5.98	72.61
	03/26/2003		5.11	73.48
CEF-043-21	01/15/2003	76.71	5.37	71.34
	02/25/2003		4.68	72.03
	03/26/2003		4.22	72.49
CEF-043-22	01/15/2003	77.24	6.57	70.67
	02/25/2003		5.85	71.39
	03/26/2003		5.43	71.81

TABLE 2-3
Water Level Measurements

Well Identification	Date	Top of Casing Elevation (feet NAVD)	Depth to Water (feet bls)	Water Level Elevation (feet NAVD)
CEF-043-32	01/15/2003	76.53	6.02	70.51
	02/25/2003		4.66	71.87
	03/26/2003		4.22	72.31
CEF-043-33	01/15/2003	76.97	6.02	70.95
	02/25/2003		5.21	71.76
	03/26/2003		4.89	72.08
CEF-043-34	01/15/2003	76.84	5.98	NM
	02/25/2003		5.28	71.56
	03/26/2003		4.91	71.93
CEF-043-38	01/15/2003	77.62	6.45	71.17
	02/25/2003		5.71	71.91
	03/26/2003		5.07	72.55
CEF-043-48	01/15/2003	77.10	6.03	71.07
	02/25/2003		5.18	71.92
	03/26/2003		3.87	73.23
CEF-043-50D	01/15/2003	77.23	7.86	69.37
	02/25/2003		8.03	69.20
	03/26/2003		7.57	69.66

bls - below land surface
NAVD - National Geodetic Vertical Datum (NGVD) 1929
NM - not measured

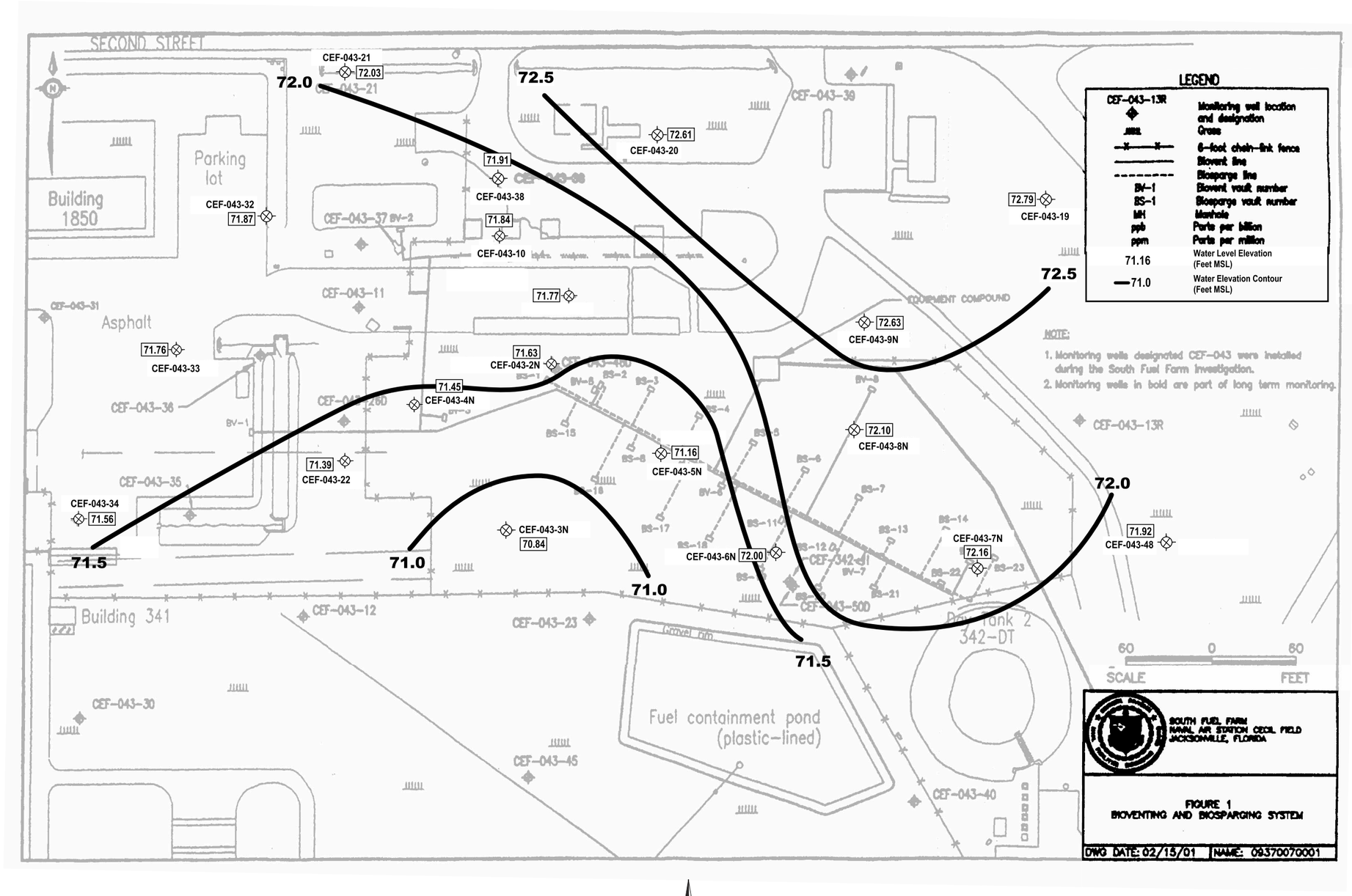

Figure 2-1
Potentiometric Surface Map - February 25, 2003
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

3.0 Summary of Sampling and Laboratory Analytical Results

3.1 Soil Monitoring

Soil screening and sampling are conducted on an annual basis. The next annual soil screening and sampling event is scheduled to be performed in 4th quarter 2003.

3.2 Groundwater Monitoring

Groundwater sampling is conducted on an annual basis. The annual groundwater sampling event is scheduled to be performed in the 2nd quarter 2003.

Field tests were performed on the headspace and groundwater from select monitoring wells on a monthly basis during the 1st quarter 2003 to evaluate indications of biological activity and influence of the bioventing and biosparging systems. The headspace in each monitoring well was tested for percent methane, percent carbon dioxide, percent oxygen, pressure, and total hydrocarbons (using a flame ionization detector [FID]). The groundwater in each monitoring well was tested for pH, conductivity, turbidity, dissolved oxygen, temperature, and eH. The results of the field tests are summarized in Table 3-1.

Methane, carbon dioxide, and oxygen levels are measured as an indication of biological activity. Pressure is measured as an indication of the influence of the bioventing and biosparging systems. FID readings are measured as an indication of the levels of petroleum hydrocarbons. As compared to upgradient wells (CEF-043-19, -20, -21, and -48), in general, elevated carbon dioxide levels and less than ambient oxygen levels were observed in most wells in the vicinity of the bioventing/biosparging systems. This suggests that biological activity is occurring. Elevated hydrocarbon levels (FID readings greater than 50 parts per million [ppm]) were noted in monitoring well CEF-043-4N.

The dissolved oxygen levels were greater than 1 milligram per liter (mg/L), which indicates favorable conditions for aerobic biological activity.

TABLE 3-1
Field Test Results
South Fuel Farm, 1st Quarter 2003

		Air					Groundwater					
Well Identification	Sample Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Pressure (in Hg)	OVA (ppm)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
CEF-043-1N	01/15/2003	0	3	17.1	29.6	0.1	6.01	0.241	0.9	3.22	20.77	233
	02/25/2003	0.2	2.3	16	30	1.84	6.13	0.389	34	4.22	20.1	222
	03/26/2003	0.1	2.7	17.9	29.8	0	6.54	0.435	0.8	2.87	20.6	234
CEF-043-2N	01/15/2003	0	2.8	17.8	29.6	0	5.4	0.147	1.8	2.45	21.39	192
	02/25/2003	0.2	2.2	17.4	30	6.28	5.59	0.243	4	4.89	20.5	213
	03/26/2003	0.1	2.1	16.3	29.9	0.84	6.68	0.271	999	5.77	21.7	76
CEF-043-3N	01/15/2003	0	0.8	20.6	29.6	0.16	4.27	0.48	42	5.56	21.1	343
	02/25/2003	0.1	2	18.6	30	1.3	4.8	0.076	43.2	7.4	20	364
	03/26/2003	0.1	2.1	17.8	29.8	1.6	5.51	0.063	554	6.36	20.6	289
CEF-043-4N	01/15/2003	0	12.1	2.2	29.5	3.2	5.7	0.428	72	3.08	20.5	71
	02/25/2003	0.1	14.7	0	30	63.18	5.43	0.73	4.2	3.41	19.7	86
	03/26/2003	0	11.7	1.4	29.9	0	6.11	0.745	17.1	3.22	20.4	-81
CEF-043-5N	01/15/2003	0	0.8	20.4	29.6	1	4.55	0.075	21	7.99	21.6	320
	02/25/2003	0	0	20.9	30	2.31	4.8	0.093	24.9	10	20.3	359
	03/26/2003	0.1	0	20.5	29.9	3.4	5.84	0.105	27	11.33	20.8	299
CEF-043-6N	01/15/2003	0	2.1	15.7	29.6	1.2	4.92	0.305	0	6.7	21.8	319
	02/25/2003	0	0.6	20.4	30	4.34	4.92	0.375	5.6	8.24	20.5	351
	03/26/2003	0.1	0.7	19.2	29.9	10.3	5.83	0.428	17.2	9.3	21	314
CEF-043-7N	01/15/2003	0	0.2	21	29.6	1.2	5.33	0.132	16	2.27	21.1	290
	02/25/2003	0	0.4	20.9	30	3.18	5.23	0.18	32	9.18	18.8	363
	03/26/2003	0	0.6	20	29.9	NM	5.96	0.275	16.3	9.55	20.3	224
CEF-043-8N	01/15/2003	0	0.2	21.1	29.6	0	4.72	0.091	7	6.91	21	301
	02/25/2003	0	1.2	19.9	30	1.25	4.91	0.107	75	7.77	19.7	322
	03/26/2003	0	1.8	16.4	29.9	1.05	6.12	0.127	17.3	7.59	20.6	282
CEF-043-9N	01/15/2003	0	1.5	20.4	29.6	0.1	5.33	0.114	14.2	2.2	21.2	227
	02/25/2003	0	1.2	20.4	30	0.34	4.72	0.17	7.3	7.42	19.9	295
	03/26/2003	0	0.9	19.6	29.9	1.2	6.2	0.183	10.4	8.41	20.6	273
CEF-043-10	01/15/2003	0	4.4	15.3	29.6	0	5.12	0.273	9.5	3.61	24	243
	02/25/2003	0.1	3.5	15.5	30	3.8	5.29	0.314	28.5	1.66	22.2	268
	03/26/2003	0.1	4.2	12.8	29.9	0	6.2	0.381	84.4	6.23	23.3	195
CEF-043-19	01/15/2003	0	1.1	20.9	29.7	0.1	3.93	0.027	1	6.08	21.3	397
	02/25/2003	0	1.2	20.6	30	1.2	4.63	0.038	13.6	6.01	20	382
	03/26/2003	0.2	2.1	18.6	29.9	1.4	5.28	0.037	2	6.17	21	286
CEF-043-20	01/15/2003	0	0.7	20.6	29.6	0.2	4.48	0.026	6.2	5.78	21	319
	02/25/2003	0.1	0.3	20.8	30	3.05	4.99	0.035	4.2	3.14	21.2	314
	03/26/2003	0.1	0	20.7	29.8	1.95	6	0.044	15.7	5	20.9	239

TABLE 3-1
Field Test Results
South Fuel Farm, 1st Quarter 2003

		Air					Groundwater					
Well Identification	Sample Date	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Pressure (in Hg)	OVA (ppm)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
CEF-043-21	01/15/2003	0	1.7	19.6	29.6	0	5.43	0.1	2.7	2.93	19.9	269
	02/25/2003	0.1	0.4	20.8	30	1.92	5.45	0.152	7.1	2.04	20.1	307
	03/26/2003	0.1	0	20.6	29.8	0.83	6.02	0.131	2.5	5.7	20.6	241
CEF-043-22	01/15/2003	0	4.2	16.5	29.6	0	4.27	0.046	61	4.98	21	354
	02/25/2003	0.1	3.8	16.3	30	0	4.41	0.064	30.8	20.8	2.6	387
	03/26/2003	0.1	2.5	14.9	29.9	0	5.41	0.062	25.3	7.29	20.7	296
CEF-043-32	01/15/2003	0	0.4	20.8	29.7	0	5.81	0.303	3.3	4.51	23	241
	02/25/2003	0.2	0.2	20.8	30	3.34	6.06	0.38	45.5	5.2	21.8	2.3
	03/26/2003	0.1	0.2	20.4	29.9	2.36	6.61	0.476	15.3	8.63	22.4	230
CEF-043-33	01/15/2003	0	0.3	21.1	29.4	0	5.33	0.144	12.5	5.76	23.2	264
	02/25/2003	0.1	1	20	30	2.44	5.71	0.071	23	5.82	18.4	279
	03/26/2003	0	0.1	20.5	29.9	20	6.23	0.408	0.1	6.48	23.2	243
CEF-043-34	01/15/2003	0	2.5	19.1	29.4	0	5.5	0.051	18.8	5.43	19.2	263
	02/25/2003	0	0.5	20.5	30	2.28	5.45	0.183	41.6	3.89	21.9	299
	03/26/2003	0.1	0	20.9	29.9	1.1	6.41	0.06	17.8	3.78	20.3	220
CEF-043-38	01/15/2003	0	1.9	20.2	29.6	0.17	5.9	0.17	9	5.61	21	249
	02/25/2003	0.1	1.4	18.9	30	2.35	6.07	0.288	9.5	5.75	20.1	206
	03/26/2003	0.1	0.8	18.8	29.9	0.82	6.4	0.303	13.4	6.8	21	237
CEF-043-48	01/15/2003	0	0.7	21	297	NM	4.52	0.029	25	7.49	20	329
	02/25/2003	0	0.1	21.2	30	NM	5.45	0.072	16.6	8.61	18.6	336
	03/26/2003	0	0	20.5	29.9	1.45	6.52	0.159	63	9.09	20.3	231
CEF-043-50D	01/15/2003	0	0.9	20.8	29.6	2	4.91	0.116	0	7.21	22.6	314
	02/25/2003	0	2.2	19.5	30	3.13	4.95	0.16	1.2	7.39	22.2	343
	03/26/2003	0	0.6	20	29.9	2.65	5.87	0.15	0.3	7.52	22.2	313

Note: All measurements taken using direct reading instruments in the field.
% -percent
in Hg -inches of mercury
OVA - organic vapor analyzer
ppm - parts per million
mS/cm – milliSiemans per centimeter
NTU – nephelometric turbidity units
mg/L – milligrams per liter
oC - degrees Celsius
ORP - oxygen reducing potential
mV - millivolts

4.0 Conclusions and Recommendations

The bioventing and biosparging systems operated continuously during the 1st quarter 2003. The resulting operational efficiency of the bioventing and biosparging systems was 98.6 percent and 75 percent, respectively. Based on the field parameter testing it appears that biological activity is occurring at the site. The biosparging injection continues to provide sufficient oxygen as indicated by the dissolved oxygen readings being greater than 1 mg/L.

Based solely on the results of the field tests, CCI recommends continuing the operation of the bioventing and biosparging remediation systems. The Navy Comprehensive Long-term Environmental Action Navy (CLEAN) contractor is currently evaluating remedial alternatives to supplement and/or modify the existing bioventing and biosparging systems. Operation of the current bioventing and biosparging systems will continue until implementation of the remedial alternative.

5.0 References

ABB Environmental Services, Inc. October 1996. Remedial Action Plan; South Fuel Farm; Naval Air Station Cecil Field, Jacksonville, Florida. October.

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