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FIRST QUARTER 2004 OPERATIONS AND MAINTENANCE STATUS REPORT FOR
BIOVENTING AND BIOSPARGING SYSTEMS AT SOUTH FUEL FARM NAS CECIL FIELD FL
7/1/2007
CH2MHILL CONSTRUCTORS INC

**First Quarter 2004
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:

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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
°C	degrees Celsius
CCI	CH2M HILL Constructors, Inc.
CLEAN	Comprehensive Long-term Environmental Action Navy
CTO	Contract Task Order
DO	dissolved oxygen
EMT	earth-mounded tank
°F	degrees Fahrenheit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
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 EFD SOUTH	Naval Facilities Engineering Command, Engineering Field Division, Southern Division
NM	not measured
NTU	nephelometric turbidity units
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
TtNUS	Tetra Tech NUS, Inc.
UST	underground storage tank

1.0 Introduction

CH2M HILL Constructors, Inc. (CH2M HILL) has been contracted by the Department of the Navy, Southern Division Naval Facilities Engineering Command (NAVFAC EFD SOUTH), to provide operation and maintenance (O&M) services at the South Fuel Farm (SFF), Former Naval Air Station (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 SFF to reduce petroleum hydrocarbon contaminant concentrations in site groundwater and unsaturated soils. The purpose of this 1st Quarter 2004 Operation and Maintenance Status Report is to provide a summary of activities performed at the site during the period of January 1, 2004, to March 31, 2004.

1.1 Objective

The objective of the remedial action at the SFF is to reduce the concentrations of petroleum contaminants in the groundwater and unsaturated soils to Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Levels (GCTLs) and Soil Cleanup Target Levels (SCTLs), as specified in Tables I and II of Chapter 62-777, Florida Administrative Code (FAC), respectively. Bioventing and biosparging systems have been 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 that was 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 (CH2M HILL, 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, CH2M HILL has conducted the system O&M.

1.3 Remediation System/Technology Description

1.3.1 Bioventing System

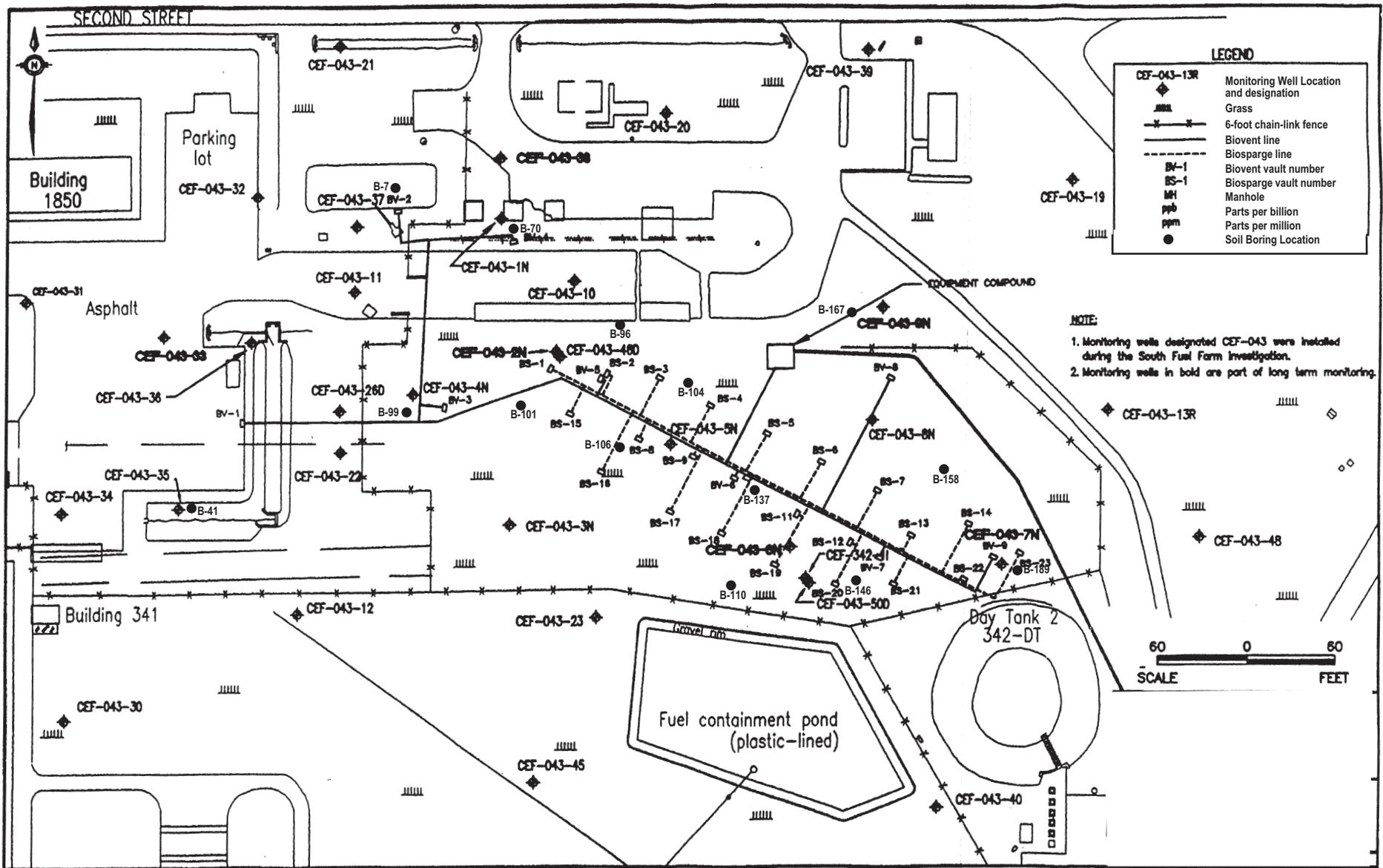
The bioventing system improves intrinsic bioremediation of the contaminated soil by delivering oxygen to the aerobic bacteria in the vadose zone. This is achieved via subgrade wells at a low flow rate to minimize volatilization and stimulate subgrade indigenous microbial activity (ABB-ES, 1996).

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 located in the same fenced canopy covered equipment area as the bioventing system. 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.



LEGEND

◆	CEF-043-13R	Monitoring Well Location and designation
		Grass
—x—x—x—		6-foot chain-link fence
—		Biovent line
- - - - -		Biosparge line
BV-1		Biovent vault number
BS-1		Biosparge vault number
MH		Manhole
ppb		Parts per billion
ppm		Parts per million
●		Soil Boring Location

NOTE:

- Monitoring wells designated CEF-043 were installed during the South Fuel Farm Investigation.
- Monitoring wells in bold are part of long term monitoring.



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

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 read and recorded during the O&M check on a weekly basis. The meters and gauges in the bioventing and biosparging well vaults were read and 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 and rebalanced in attempt to achieve the design specifications. These adjustments will be evaluated during the 2nd quarter of 2004.

2.1 Operational Efficiencies

2.1.1 Bioventing System

	Operational Period	To Date
Hours of Possible Operation	2184	52488
Hours of Actual Operation	2181	36322.4
Percent hours of Operation	99.8%	69.2%

2.1.2 Biosparging System

	Operational Period	To Date
Hours of Possible Operation	2184	52488
Hours of Actual Operation	1207.6	48458.6
Percent hours of Operation	55.2%	92.3%

2.2 Summary of Maintenance and System Downtime

2.2.1 Bioventing System

During the 1st quarter 2004, the bioventing system ran a total of 90.8 days out of a possible 91 days, resulting in 3 hours of downtime. The bioventing system downtime is detailed as follows:

- Manually shut down system for a total of 1 hour for electrical safety while removing and installing biosparge air compressor motor.
- Manually shut down for a total of 2 hours to perform routine equipment maintenance.

2.2.2 Biosparging System

During the 1st quarter 2004, the biosparging system ran a total of 50.3 days out of a possible 91 days, resulting in 976.4 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 resulting in a total of 663.3 hours of downtime.
- Short in wires on the electric motor on the biosparging air compressor resulting in a total of 310.6 hours of downtime.
- Manually shut down for a total of 2.5 hours to perform routine equipment maintenance.

2.3 Pressure/Flow Rate Monitoring

2.3.1 Bioventing System

During the 1st quarter 2004, the blower discharge pressure averaged 27.8 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 108 standard cubic feet per minute (scfm) compared to the design blower flow rate of 80 scfm. Bioventing system data for the 1st quarter 2004 are summarized in Table 2-1.

TABLE 2-1
Bioventing System Data
SFF; 1st Quarter 2004

Date	Blower Discharge Pressure (inches of water)	Blower Discharge Temperature (°F)	Blower Air Flow Rate (scfm)
01/06/2004	26	88	110
01/15/2004	27	100	108
01/21/2004	28	85	110
01/29/2004	28	82	110
02/05/2004	28	110	108
02/12/2004	28	94	108
02/19/2004	28	105	108
02/23/2004	27	107	106
03/04/2004	28	108	107
03/08/2004	30	94	108
03/18/2004	28	112	107
03/24/2004	28	104	108
03/31/2004	27	100	107

°F - degrees Fahrenheit

scfm - standard cubic feet per minute

NR = No Reading

2.3.2 Biosparging System

During the 1st quarter 2004, the injection header discharge pressure averaged 16.6 psig compared to the design injection pressure of 15 psig. The 1st quarter 2004 biosparging system data are tabulated in Table 2-2. Due to the air compressor motor failure and associated repairs injection header pressure was not recorded from January 29 to February 23, 2004, and the week of March 4, 2004.

TABLE 2-2
Biosparging System Data
SFF, 1st Quarter 2004

Date	Air Compressor Supply Pressure (psig)	Air Compressor Discharge Temperature (°F)	Receiver Tank Supply Pressure (psig)	Header Discharge Pressure (psig)
01/06/2004	85	170	78	16.5
01/15/2004	50	178	40	16.5
01/21/2004	50	170	40	16.5
01/29/2004	NM	NM	NM	NM
02/05/2004	NM	NM	NM	NM
02/12/2004	NM	NM	NM	NM
02/19/2004	NM	NM	NM	NM
02/23/2004	108	210	100	17
03/04/2004	NM	NM	NM	NM
03/08/2004	100	185	80	17
03/18/2004	75	215	55	17
03/24/2004	72	205	65	16
03/31/2004	45	200	30	16.5

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 twenty monitoring wells during the 1st quarter 2004. The results from the 1st quarter 2004 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 2004.

The potentiometric surface of the groundwater at the site based on January 21, 2004 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.

TABLE 2-3
 Water Level Measurements
 SFF; 1st Quarter 2004

Well Identification	Date	Top of Casing Elevation (feet NAVD)	Depth to Water (feet bls)	Water Level Elevation (feet NAVD)
CEF-043-1N	01/21/2004	78.15	9.50	68.65
	02/23/2004		8.48	69.67
	03/30/2004		8.63	69.52
CEF-043-2N	01/21/2004	78.00	9.53	68.47
	02/23/2004		8.35	69.65
	03/30/2004		8.57	69.43
CEF-043-3N	01/21/2004	78.26	10.04	68.22
	02/23/2004		9.25	69.01
	03/30/2004		9.43	68.83
CEF-043-4N	01/21/2004	78.07	9.58	68.49
	02/23/2004		8.89	69.18
	03/30/2004		9.10	68.97
CEF-043-5N	01/21/2004	78.46	10.37	68.09
	02/23/2004		8.96	69.50
	03/30/2004		9.15	69.31
CEF-043-6N	01/21/2004	77.79	9.60	68.86
	02/23/2004		8.28	70.18
	03/30/2004		8.47	69.99
CEF-043-7N	01/21/2004	77.61	9.34	68.27
	02/23/2004		8.06	69.55
	03/30/2004		8.28	69.33
CEF-043-8N	01/21/2004	78.41	9.87	68.54
	02/23/2004		8.85	69.56
	03/30/2004		9.07	69.34
CEF-043-9N	01/21/2004	77.50	8.65	68.85
	02/23/2004		7.62	69.88
	03/30/2004		7.82	69.68
CEF-043-10	01/21/2004	78.55	9.97	68.58
	02/23/2004		8.91	69.64
	03/30/2004		9.06	69.49
CEF-043-19	01/21/2004	78.47	9.32	69.15
	02/23/2004		8.86	69.61
	03/30/2004		9.02	69.45
CEF-043-20	01/21/2004	78.59	9.44	69.15
	02/23/2004		8.92	69.67
	03/30/2004		9.13	69.46
CEF-043-21	01/21/2004	76.71	7.47	69.24
	02/23/2004		6.60	70.11
	03/30/2004		6.81	69.90
CEF-043-22	01/21/2004	77.24	8.75	68.49
	02/23/2004		7.80	69.44
	03/30/2004		7.99	69.25
CEF-043-32	01/21/2004	76.53	7.55	68.98

TABLE 2-3
 Water Level Measurements
 SFF, 1st Quarter 2004

	02/23/2004		6.72	69.81
	03/30/2004		6.99	69.54
CEF-043-33	01/21/2004	76.97	8.15	68.82
	02/23/2004		7.32	69.65
	03/30/2004		7.54	69.43
CEF-043-34	01/21/2004	76.84	NM	NM
	02/23/2004		NM	NM
	03/30/2004		NM	NM
CEF-043-38	01/21/2004	77.62	8.82	68.80
	02/23/2004		8.27	69.35
	03/30/2004		8.49	69.13
CEF-043-48	01/21/2004	77.10	9.05	68.05
	02/23/2004		8.56	68.54
	03/30/2004		8.76	68.34
CEF-043-50D	01/21/2004	77.23	10.57	66.66
	02/23/2004		9.25	67.98
	03/30/2004		9.48	67.75

bls - below land surface

NAVD - National Geodetic Vertical Datum 1929 (NGVD 1929)

NM - not measured

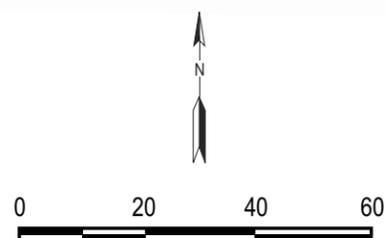
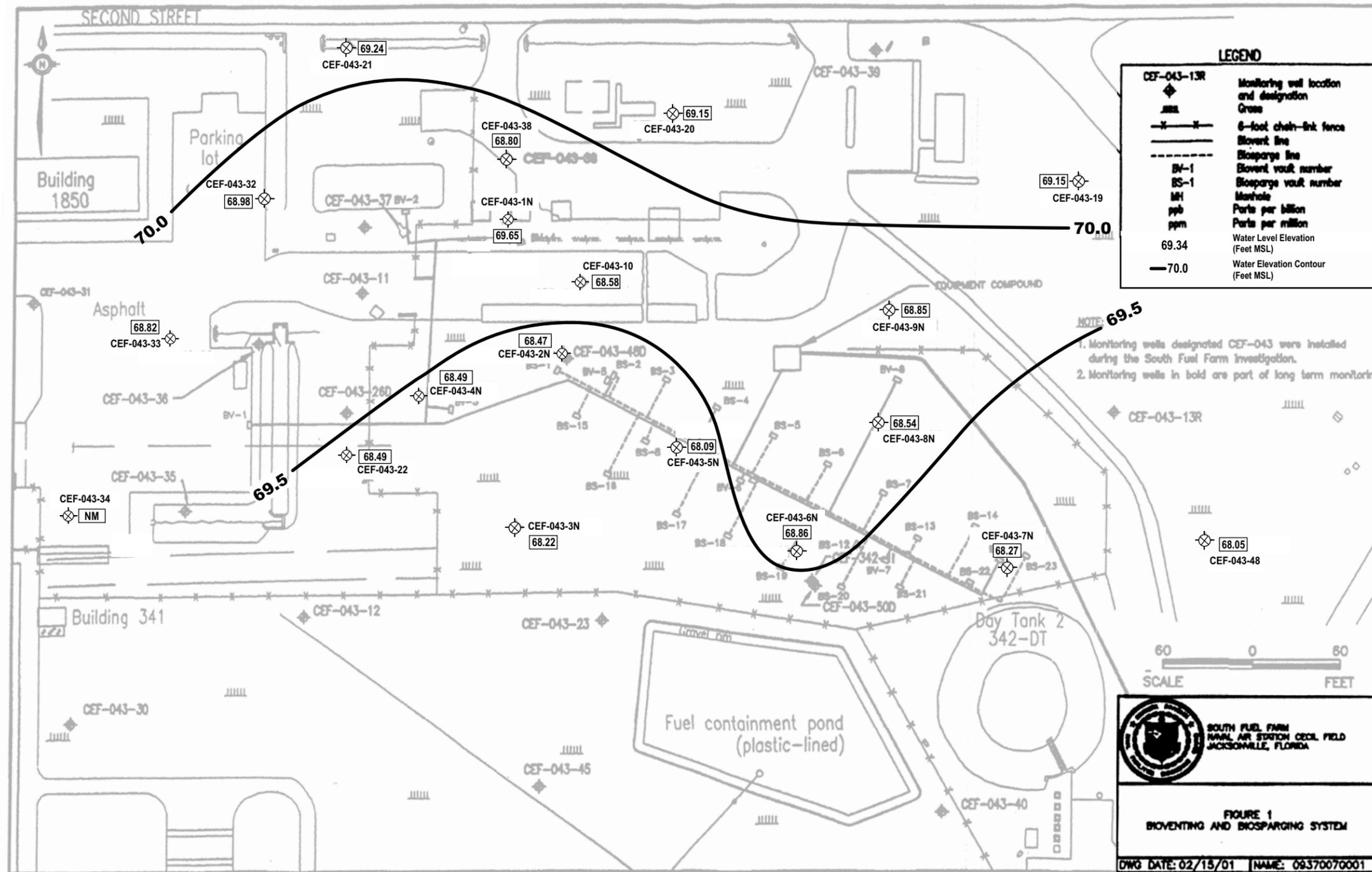


Figure 2-1
Potentiometric Surface Map - January 21, 2004
South Fuel Farm
NAS Cecil Field
Jacksonville, Florida

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 2004.

3.2 Groundwater Monitoring

Groundwater sampling is conducted on an annual basis. The annual groundwater sampling event is scheduled to be performed in 2nd quarter 2004.

Field tests were performed on the headspace and groundwater from selected monitoring wells on a monthly basis during 1st quarter 2004 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 an organic vapor analyzer [OVA]). The groundwater in each monitoring well was tested for pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and oxygen reduction potential (ORP). 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. OVA 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 wells in the northern portion of the bioventing/biosparging systems. This suggests that biological activity is occurring in this area. Elevated hydrocarbon levels (OVA readings greater than 50 parts per million [ppm]) were noted in monitoring wells CEF-043-2N and CEF-043-4N.

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

TABLE 3-1
 Field Test Results
 SFF, 1st Quarter 2004

Well Identification	Sample Date	Air					Groundwater					
		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	01/21/2004	0	2.4	18.6	29.9	6	5.81	0.264	41	2.46	22.7	101
	02/23/2004	0	1.25	19.8	29.6	4	5.6	0.201	44	6.62	21.2	104
	03/30/2004	0	1.3	18.6	29.9	3	5.89	0.216	71	5.21	22.1	85
CEF-043-2N	01/21/2004	2.8	5.6	13.3	29.9	2600	5.69	0.183	47	2.34	23	103
	02/23/2004	1.4	3.8	16.4	29.6	820	5.23	0.176	2.3	6.37	21.7	74
	03/30/2004	0.8	3.9	15.7	29.8	876	5.16	0.183	18	5.12	22.6	96
CEF-043-3N	01/21/2004	0	1.1	20.3	29.9	3	5.33	0.03	250	9.31	22	222
	02/23/2004	0	1.6	18.7	29.6	3.5	5.21	0.037	3.9	8.69	20.9	241
	03/30/2004	0	1.1	17.3	29.8	4.2	5.25	0.106	7	6.21	22	269
CEF-043-4N	01/21/2004	0	5.5	15.6	29.9	8000	5.6	0.443	7.5	4.92	21.8	5
	02/23/2004	0	6.3	16.7	29.7	8000+	5.52	0.471	126	5.25	21.2	12
	03/30/2004	0	5.1	16.1	29.9	8000+	5.73	0.484	92	7.36	22.6	22
CEF-043-5N	01/21/2004	0	0	20.8	29.9	3	5.3	0.082	21.1	10.34	21.4	230
	02/23/2004	0	0	20.3	29.6	2	5.41	0.071	52	6.11	20.9	241
	03/30/2004	0	0	18.9	29.6	1	5.61	0.061	83	6.03	22.5	243
CEF-043-6N	01/21/2004	0	0.3	20.4	29.9	45	5.54	0.13	18.6	9.13	22.3	190
	02/23/2004	0	0.3	19.7	29.6	30	5.62	0.193	14	7.24	21.3	203
	03/30/2004	0	0.6	20.1	29.8	13	5.82	0.176	18	7.36	23	261
CEF-043-7N	01/21/2004	0	0.8	20.1	30	4	5.19	0.09	419	4.3	22.1	48
	02/23/2004	0	0.2	20.6	29.7	1	4.73	0.084	47.5	8.08	21	292
	03/30/2004	0	0.4	18.7	29.8	0	5.69	0.099	51	7.51	22.3	173
CEF-043-8N	01/21/2004	0	1.7	19.3	29.9	3	5.68	0.08	68.3	9.5	21.7	158
	02/23/2004	0	0.1	20.8	29.7	3	5.25	0.055	4.8	7.59	20.7	289
	03/30/2004	0	0.1	19.3	29.9	0	5.51	0.067	11	6.31	22.7	230

TABLE 3-1
 Field Test Results
 SFF; 1st Quarter 2004

Well Identification	Sample Date	Air					Groundwater					
		Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Pressure (in Hg)	OVA (ppm)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
CEF-043-9N	01/21/2004	0	3.4	16.5	29.9	4	6	0.171	52.6	2.58	21.9	107
	02/23/2004	0	5.3	14.9	29.7	2	5.1	0.172	1.6	5.11	20.4	309
	03/30/2004	0	3.7	15.1	29.8	1	5.67	0.178	7.2	7.61	22.1	161
CEF-043-10	01/21/2004	0	3.7	16.3	29.9	101	5.57	0.325	165	3.67	24.1	149
	02/23/2004	0	4.1	16.3	29.7	1.3	5.4	0.26	150	5.53	23.1	196
	03/30/2004	0	1.3	16	29.7	15	5.33	0.305	166	5.93	23.5	200
CEF-043-19	01/21/2004	0	1	20.3	29.9	3	4.71	0.31	40	3.77	22.1	244
	02/23/2004	0	0.2	20.5	29.7	2.5	4.91	0.046	26	6.16	21.8	255
	03/30/2004	0	0.5	19.9	29.8	2	4.98	0.041	10	5.17	22.6	241
CEF-043-20	01/21/2004	0.1	0	20.9	29.9	35	5.28	0.027	15.9	5.46	22.9	214
	02/23/2004	0	0	19.8	29.6	25	5.47	0.039	12	5.85	21.7	231
	03/30/2004	0	0.1	18.6	29.7	10	5.38	0.048	15	5.26	21.3	238
CEF-043-21	01/21/2004	0	0	20.8	29.9	21	5.61	0.095	410	2.26	21.9	147
	02/23/2004	0	0.4	20.6	29.6	1	6.05	0.102	25.6	8.61	20.6	238
	03/30/2004	0	0	20.1	29.9	5	5.85	0.113	19.7	6.75	21.6	218
CEF-043-22	01/21/2004	0	2.1	19.3	29.9	2	5	0.044	939	6.46	22.1	238
	02/23/2004	0	2.5	17.9	29.7	3.7	4.8	0.044	9	7.77	21.1	300
	03/30/2004	0	1.9	16.8	29.9	2	4.93	0.049	17	6.81	22.1	264
CEF-043-32	01/21/2004	0.1	0.2	20.9	29.9	8	5.93	0.088	24.7	5.95	23.1	146
	02/23/2004	0	0.6	20.4	29.6	0.5	5.6	0.083	7.3	7.09	21.7	228
	03/30/2004	0	1.1	18.4	29.9	1.8	5.86	0.087	11.3	7.14	22.8	235
CEF-043-33	01/21/2004	0	0.2	20.9	29.9	3	5.21	0.141	8	2.25	24	210
	02/23/2004	0	3.5	17.8	29.7	2	5.35	0.126	5	7.53	22.6	267
	03/30/2004	0	3.3	16.2	29.8	3	5.4	0.132	7	6.88	23.7	263
CEF-043-34	01/21/2004	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	02/23/2004	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	03/30/2004	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

TABLE 3-1
 Field Test Results
 SFF; 1st Quarter 2004

Well Identification	Sample Date	Air					Groundwater					
		Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Pressure (in Hg)	OVA (ppm)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	ORP (mV)
CEF-043-38	01/21/2004	0	1.7	20.3	29.9	3	5.1	0.058	60	7.32	21.7	211
	02/23/2004	0	1.9	18.3	29.6	4	5.21	0.073	71	5.31	21.8	206
	03/30/2004	0	1.7	17.6	29.8	8	5.27	0.069	126	7.42	22.5	222
CEF-043-48	01/21/2004	0	0.6	20.5	29.9	2	5.56	0.063	54	6.6	21.5	113
	02/23/2004	0	0.4	20.6	29.7	2	4.9	0.039	4.3	8.65	20.5	314
	03/30/2004	0	0.4	20	29.9	0	5.11	0.081	5.7	6.35	21.9	327
CEF-043-50D	01/21/2004	0.1	0	20.8	29.9	2	5.55	0.137	7.3	8.03	23	188
	02/23/2004	0	0.5	20.6	29.6	5	5.24	0.127	3.1	7.69	22.3	294
	03/30/2004	0	0	19.8	29.9	2.3	5.37	0.135	5	7.25	22.7	280

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 - millisiemens per centimeter

NTU - nephelometric turbidity units

mg/L - milligrams per liter

°C - degrees Celcius

ORP - oxygen reducing potential

mV – millivolts

4.0 Conclusions and Recommendations

The bioventing and biosparging systems operated continuously during 1st quarter 2004. The resulting operational efficiency of the bioventing and biosparging systems was 99.8 percent and 55.2 percent, respectively. The bioventing system actual blower discharge pressure averaged 27.8 inches of water compared to the design blower discharge pressure of 40 inches of water and total air injection flow rate averaged 108 scfm compared to the design blower flow rate of 80 scfm. The biosparging system actual injection discharge pressure averaged 16.6 psig compared to the design injection pressure of 15 psig.

Based on field parameter testing, biological activity is occurring at the site. The biosparging injection continues to provide sufficient oxygen as indicated by the DO readings being greater than 1 mg/L.

Based on the results of the field tests, CH2M HILL 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.

Bechtel Environmental, Inc. 1998a. Operation and Maintenance Plan Bioventing and Biosparging System; South Fuel Farm; Naval Air Station Cecil Field, Jacksonville, Florida. July.

Bechtel Environmental, Inc. 1998b. Completion Report for the South Fuel Farm Bioventing and Biosparging Systems; Naval Air Station Cecil Field, Jacksonville, Florida. September.

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