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NAS CECIL FIELD, FL
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QUARTERLY OPERATIONS AND MAINTENANCE STATUS REPORT FOR BIOSPARGING
AND SOIL VAPOR EXTRACTION SYSTEM AT DAY TANK 1 SITE FROM 26 FEBRUARY TO 3
JULY 2001 NAS CECIL FIELD FL
8/1/2001
CH2MHILL CONSTRUCTORS INC

**Quarterly
Operation and Maintenance Status Report**

**Biosparging and Soil Vapor Extraction System
Day Tank 1 Site
February 26, 2001 – July 3, 2001**

**Naval Air Station Cecil Field
Jacksonville, Florida**

Contract No. N62467-98-D-0995

Contract Task Order No. 0062

Submitted to:

**U.S. Naval Facilities
Engineering Command
Southern Division**

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August 2001

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Acronym List

ABB-ES	ABB Environmental Services, Inc.
acfh	actual cubic feet per hour
acfm	actual cubic feet per minute
AST	Aboveground Storage Tank
bls	below land surface
CCI	CH2M HILL Constructors, Inc.
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
DO	dissolved oxygen
GCTLs	groundwater cleanup target levels
LNAPL	Light Non-Aqueous Phase Liquids
NADSC	Natural Attenuation Default Source Concentration
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
O&M	operation and maintenance
psi	pounds per square inch
scfm	standard cubic feet per minute
SVOAs	semi-volatile organic aromatics
USEPA	U.S. Environmental Protection Agency
VCS	vapor collection system
VOCs	volatile organic compounds
VEW	Vapor Extraction Well

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 Day Tank 1, Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, under the Remedial Action Contract No. N62467-98-D-0995, Contract Task Order (CTO) No. 0062. The purpose of this Quarterly O&M Report is to provide a summary of activities performed at the site during the period of February 26 to July 3, 2001.

1.1 Objective

The objective of the remedial action at the site of Day Tank 1 is to reduce the concentrations of petroleum related contaminants in the groundwater and unsaturated soils to target levels specified by Chapter 62-777 Florida Administrative Code (FAC). Biosparging/vapor collection is the technology being utilized to achieve this objective.

1.2 Site History

The Day Tank 1 site is located at the Former NAS Cecil Field, approximately 1/8 miles south of the "A" Avenue gate on Jet Road. The site formerly contained a 200,000-gallon aboveground storage tank (AST), piping, and associated equipment to supply jet propellant fuel to the high-speed refuelers located on the flightline. It was reported that numerous spills occurred at the site over the course of the operation of the fuel delivery system (ABB Environmental Services, Inc. [ABB-ES], 1997). ABB-ES completed a contamination assessment for the facility in 1996, which documented the presence of petroleum-contaminated soil and groundwater at the site. A Remedial Action Plan was subsequently developed by ABB-ES in 1997 for the excavation of 20,000 tons of petroleum-contaminated soil and the installation of a biosparging/vapor collection remediation system to address the contaminated groundwater at the site. The AST was removed and 24,000 tons of contaminated soil was excavated in November 1999 by CCI/J.A. Jones under Response Action Contract No. N62467-98-D-0995, CTO No. 0002 (CCI, 2000). The biosparge/ vapor collection system (VCS) was constructed by CCI/J.A. Jones from January 2000 to February 2000 and start-up was performed on February 29, 2000. The system has been operated and maintained by CCI/J.A. Jones under Response Action Contract No. N62467-98-D-0995, Contract Task Order (CTO) No. 0002 for the first year of operation and is currently being operated and maintained by CCI/J.A. Jones under Response Action Contract No. N62467-98-D-0995, CTO No. 0062.

1.3 Remediation System/Technology Description

The chosen technology utilizes the injection of compressed air into the groundwater to volatilize and promote biodegradation of dissolved organic compounds. The VCS was installed to recover the undissolved portion of the injected air.

The biosparge system consists of 16 injection wells that are screened from 32 to 35 feet below land surface (bls), a rotary screw-type compressor, a receiver tank, two oil coalescing filters, and associated piping and instrumentation. The biosparge system is designed for each biosparge well to operate at an airflow rate of 60 actual cubic feet per hour (acfh) and at a wellhead pressure of 18 pounds per square inch (psi).

The VCS consists of eight extraction wells that are screened from 3 to 18 feet bls, a regenerative vacuum blower, a moisture separator equipped with a centrifugal transfer pump and storage tank, and associated piping and instrumentation. The VCS was initially equipped with two 1,000-pound granular activated carbon units (installed in series), which were removed after the first 30 days of operation based upon the concentrations of the pre-treatment air stream. The VCS is designed for each vapor extraction well to operate at an airflow rate of 6 actual cubic feet per minute (acfm) and at a vacuum pressure of 23 inches of water (in H₂O).

The locations of the biosparge/vapor extraction wells and the remediation system are shown on Figure 1-1.

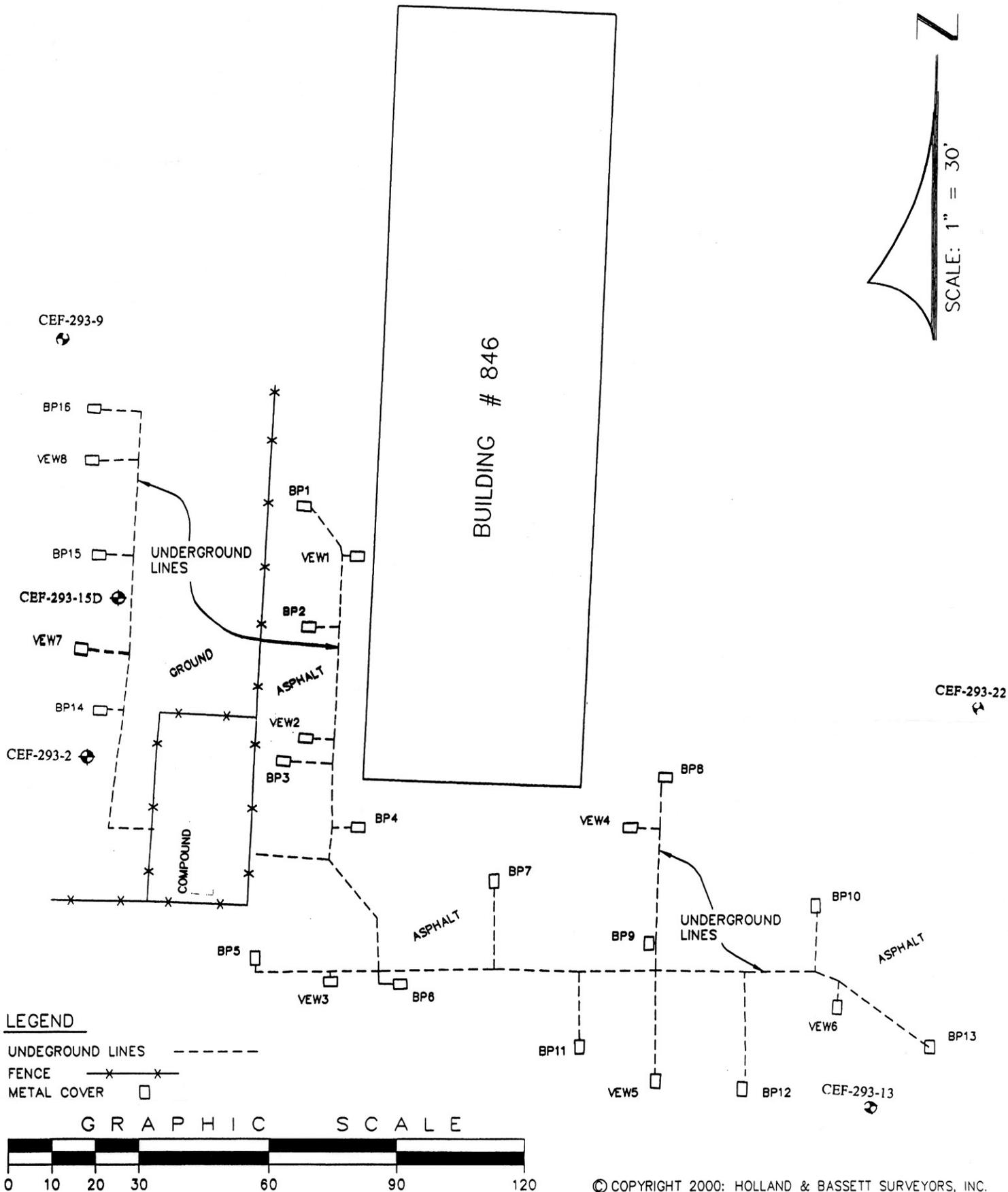
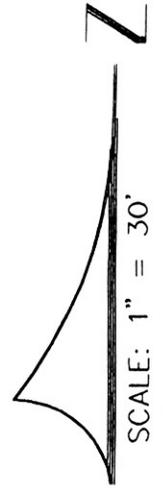


Figure 1-1
Site Map
DayTank 1 Site
NAS Cecil Field

2.0 System Performance Monitoring

O&M checks of the system were performed daily for the first week of operation and weekly thereafter. During an O&M check, a preventative maintenance checklist (based upon manufacturer(s)' recommendations) is completed, and any required maintenance activity is performed.

System checks were performed daily during the first week of operation and monthly thereafter. A system check consists of an O&M check and system performance monitoring, including reading of all meters and gauges and sample collection.

2.1 Operational Efficiencies

Biosparging System

	Period	To Date
Hours of Possible Operation	3,054	11,759
Hours of Actual Operation	2,320	9,990
Percent Hours of Operation	76.0	85.0

Vapor Collection System

	Period	To Date
Hours of Possible Operation	3,054	11,759
Hours of Actual Operation	2,713	10,727
Percent Hours of Operation	88.8	91.2

2.2 Summary of Maintenance and System Downtime

Maintenance was performed during the period in accordance with manufacturer(s)' specifications. Broken belts on the biosparge compressor were replaced on March 19, 2001. No other significant repairs were required during the operating period.

The biosparge system was shut down for a total of 30 days during the monitoring period as described below:

- The system shut down for a total of 5 days due to a high-level fault condition in the moisture separator, which occurred during a heavy rainfall event.
- The system was shut down for 4 days due to broken belts on the biosparge compressor.
- The system was manually shut down on two occasions for a total of 1 day while quarterly groundwater sampling was performed.
- The remaining 20 days of downtime were a result of three automatic shutdowns of the biosparge air compressor for either over temperature and/or over amperage.

The vapor collection system was shut down for a total of 14 days during the monitoring period as described below:

- The system shut down for a total of 5 days due to a high-level fault condition in the moisture separator, which occurred during a heavy rainfall event.
- The system was shut down for 8 days due to a blown fuse in the control panel.
- The system was manually shut down on two occasions for a total of 1 day while quarterly groundwater sampling was performed.

2.3 Pressure/Flow Rate Monitoring

2.3.1 Air Sparge System

During the monitoring period, pressure was measured at each sparge wellhead on a monthly basis. The air-flow rate at each header pipe was measured on the same schedule. The data from the flow and pressure measurement events are provided in Table 2-1.

During normal operation, the wellhead pressures for the shallow sparge wells averaged 10 psi, compared to the design pressure of 18 psi. The air injection rate averaged 54 acfh for each sparge well compared to the design injection rate of 60 acfh per sparge well.

2.3.2 Vapor Extraction System

During the monitoring period, vacuum pressure was measured at each vapor extraction wellhead on a monthly basis. The air flow rate at each header pipe was measured on the same schedule. The data from the flow and vacuum pressure measurement events are provided in Table 2-2.

During normal operation, the wellhead vacuum pressures for the vapor extraction wells averaged 16 inches of water, compared to the design vacuum pressure of 23 inches of water. The airflow rates averaged 6 acfm for each extraction well, which equals the design extraction rate.

2.4 Groundwater Level Measurements

Depth to groundwater/light non-aqueous phase liquid (LNAPL) measurements were recorded at selected monitoring wells on a quarterly basis during the monitoring period. The results from the water/LNAPL level measurements are provided in Table 2-3.

LNAPL was noted in Vapor Extraction Well (VEW)-1 and VEW-2 during the monitoring period. A total of nine LNAPL recovery bailing events were performed at VEW-1 during the monitoring period. A total of approximately 4.5 gallons of LNAPL was recovered from VEW-1 during the monitoring period and 14.5 gallons to date. The LNAPL noted in VEW-2 was minimal during the monitoring period (less than 0.1 feet); therefore, LNAPL recovery was not performed at this location.

TABLE 2-1
 Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-01	02/29/2000	60	3
	03/01/2000	60	5
	03/02/2000	60	6
	04/07/2000	65	NM
	04/24/2000	60	12
	05/30/2000	60	11
	07/24/2000	60	12
	08/22/2000	60	12
	10/30/2000	60	11
	11/27/2000	60	11
	12/11/2000	60	10
	01/29/2001	60	11
	02/26/2001	70	10
	04/16/2001	55	11
	05/21/2001	55	10.5
07/03/2001	55	10	
BP-02	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	62	10
	04/07/2000	65	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	55	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	65	10
	02/26/2001	75	9
	04/16/2001	60	10
	05/21/2001	55	10
07/03/2001	45	10	
BP-03	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	64	9.5
	04/07/2000	65	8
	04/24/2000	60	10
	05/30/2000	NM	10
	07/24/2000	120	10
	08/22/2000	NM	10
	10/30/2000	120	10
	11/27/2000	120	10
	12/11/2000	NM	10
	01/29/2001	NM	10
	02/26/2001	120	9
	04/16/2001	NM	10
	05/21/2001	NM	10
07/03/2001	NM	10	

TABLE 2-1 CONTINUED
 Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-04	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	62	10
	04/07/2000	65	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	50	10
	08/22/2000	60	10
	10/30/2000	60	11
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	60	10
	02/26/2001	50	10
	04/16/2001	60	10
	05/21/2001	60	10
07/03/2001	60	10	
BP-05	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	60	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	50	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	65	10
	01/29/2001	60	10
	02/26/2001	70	9
	04/16/2001	60	10
	05/21/2001	60	10
07/03/2001	35	10	
BP-06	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	65	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	70	10
	01/29/2001	60	10
	02/26/2001	80	10
	04/16/2001	60	10
	05/21/2001	60	10
07/03/2001	40	10	

TABLE 2-1 CONTINUED
 Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-07	02/29/2000	65	10
	03/01/2000	65	10
	03/02/2000	60	10
	04/07/2000	60	10
	04/24/2000	55	10
	05/30/2000	60	10
	07/24/2000	50	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	70	10
	01/29/2001	60	10
	02/26/2001	80	8
	04/16/2001	60	10
	05/21/2001	65	10
07/03/2001	60	10	
BP-08	02/29/2000	65	10
	03/01/2000	65	10
	03/02/2000	60	10
	04/07/2000	60	10
	04/24/2000	NM	NM
	05/30/2000	50	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	50	10
	02/26/2001	25	9
	04/16/2001	70	10
	05/21/2001	55	10
07/03/2001	30	10	
BP-09	02/29/2000	60	10
	03/01/2000	65	12
	03/02/2000	NM	NM
	04/07/2000	65	10
	04/24/2000	NM	NM
	05/30/2000	60	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	70	10
	02/26/2001	70	10
	04/16/2001	65	10
	05/21/2001	60	10
07/03/2001	50	10	

TABLE 2-1 CONTINUED
 Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-10	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	NM	10
	04/24/2000	NM	NM
	05/30/2000	60	10
	07/24/2000	50	10
	08/22/2000	55	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	65	10
	01/29/2001	60	10
	02/26/2001	80	10
	04/16/2001	80	10
	05/21/2001	70	10
07/03/2001	40	10	
BP-11	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	60	10
	04/24/2000	NM	NM
	05/30/2000	60	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	50	10
	02/26/2001	50	10
	04/16/2001	55	11
	05/21/2001	50	10
07/03/2001	30	10	
BP-12	02/29/2000	NM	NM
	03/01/2000	65	NM
	03/02/2000	60	NM
	04/07/2000	65	NM
	04/24/2000	NM	NM
	05/30/2000	55	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10.5
	11/27/2000	60	10
	12/11/2000	65	10
	01/29/2001	NM	NM
	02/26/2001	60	10
	04/16/2001	60	10
	05/21/2001	50	10
07/03/2001	20	10	

TABLE 2-1 CONTINUED
 Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-13	02/29/2000	65	10
	03/01/2000	65	10
	03/02/2000	60	10
	04/07/2000	65	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	40	10
	08/22/2000	60	10
	10/30/2000	65	10
	11/27/2000	60	10
	12/11/2000	65	10
	01/29/2001	50	10
	02/26/2001	20	9
	04/16/2001	60	10
	05/21/2001	65	10
07/03/2001	65	10	
BP-14	02/29/2000	60	16
	03/01/2000	60	16
	03/02/2000	60	16
	04/07/2000	55	16
	04/24/2000	55	16
	05/30/2000	NM	10
	07/24/2000	60	16
	08/22/2000	60	16
	10/30/2000	70	18
	11/27/2000	60	18
	12/11/2000	60	10
	01/29/2001	65	10
	02/26/2001	70	12
	04/16/2001	60	10
	05/21/2001	60	16
07/03/2001	50	18	
BP-15	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	60	10
	04/24/2000	55	10
	05/30/2000	60	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	60	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	60	10
	02/26/2001	60	9
	04/16/2001	50	10
	05/21/2001	50	10
07/03/2001	30	10	

TABLE 2-1 CONTINUED

Biosparge Wellhead Pressure/Flow Measurements

AS Well	Date	Wellhead Flow (acfh)	Wellhead Pressure (psi)
BP-16	02/29/2000	60	10
	03/01/2000	60	10
	03/02/2000	60	10
	04/07/2000	65	10
	04/24/2000	60	10
	05/30/2000	60	10
	07/24/2000	60	10
	08/22/2000	60	10
	10/30/2000	70	10
	11/27/2000	60	10
	12/11/2000	60	10
	01/29/2001	60	10
	02/26/2001	70	10
	04/16/2001	60	10
	05/21/2001	60	10
	07/03/2001	50	10

NM = not measured

psi = pounds per square inch

acfh = actual cubic feet per hour

TABLE 2-2
Vapor Collection System Wellhead Vacuum/Flow Measurements

Vapor Extraction Well	Date	Wellhead Flow (acfm)	Wellhead Vacuum (in H ₂ O)
VEW-1	02/29/2000	4	38
	03/01/2000	4	38
	03/02/2000	2	39
	04/07/2000	3	41
	04/24/2000	2	40
	05/30/2000	6	6
	07/24/2000	11	2
	08/22/2000	7	8
	10/30/2000	4	10
	11/27/2000	6	10
	12/11/2000	5	8
	01/29/2001	4	21
	02/26/2001	5	15
	04/16/2001	6	8
	05/21/2001	5	36
07/03/2001	5	42	
VEW-2	02/29/2000	6	26
	03/01/2000	6	26
	03/02/2000	5	23
	04/07/2000	NM	40
	04/24/2000	NM	28
	05/30/2000	1	26
	07/24/2000	2	27
	08/22/2000	0	25
	10/30/2000	7	26
	11/27/2000	4	20
	12/11/2000	6	20
	01/29/2001	4	25
	02/26/2001	8	25
	04/16/2001	6	20
	05/21/2001	3	34
07/03/2001	4	20	
VEW-3	02/29/2000	8	28
	03/01/2000	8	28
	03/02/2000	6	19
	04/07/2000	6	18
	04/24/2000	6	16
	05/30/2000	6	13
	07/24/2000	2	30
	08/22/2000	6	1
	10/30/2000	5	10.5
	11/27/2000	6	15
	12/11/2000	6.5	14
	01/29/2001	6	15
	02/26/2001	6	15
	04/16/2001	5	14
	05/21/2001	6	10
07/03/2001	7	8	

TABLE 2-2 CONTINUED

Vapor Collection System Wellhead Vacuum/Flow Measurements

Vapor Extraction Well	Date	Wellhead Flow (acfm)	Wellhead Vacuum (in H ₂ O)
VEW-4	02/29/2000	8	38
	03/01/2000	8	38
	03/02/2000	5	37
	04/07/2000	7	14
	04/24/2000	NM	NM
	05/30/2000	6	31
	07/24/2000	6	15
	08/22/2000	6	8
	10/30/2000	7	8
	11/27/2000	7	8
	12/11/2000	7	7
	01/29/2001	6	5
	02/26/2001	6	12
	04/16/2001	8	5
	05/21/2001	10	15
07/03/2001	8	6	
VEW-5	02/29/2000	5	38
	03/01/2000	5	38
	03/02/2000	4	37
	04/07/2000	6	40
	04/24/2000	5	24
	05/30/2000	6	5
	07/24/2000	6	0
	08/22/2000	6	6
	10/30/2000	6	32
	11/27/2000	6	15
	12/11/2000	6	18
	01/29/2001	7	10
	02/26/2001	7	18
	04/16/2001	6	18
	05/21/2001	6	24
07/03/2001	6	0	
VEW-6	02/29/2000	4	38
	03/01/2000	4	38
	03/02/2000	4	39
	04/07/2000	6	43
	04/24/2000	6	40
	05/30/2000	6	41
	07/24/2000	6	40
	08/22/2000	6	10
	10/30/2000	6	39
	11/27/2000	7	13
	12/11/2000	8	20
	01/29/2001	7	15
	02/26/2001	10	56
	04/16/2001	6	20
	05/21/2001	6	17
07/03/2001	5	0	

TABLE 2-2 CONTINUED

Vapor Collection System Wellhead Vacuum/Flow Measurements

Vapor Extraction Well	Date	Wellhead Flow (acfm)	Wellhead Vacuum (in H ₂ O)
VEW-7	02/29/2000	11	22
	03/01/2000	11	24
	03/02/2000	6	18
	04/07/2000	6	40
	04/24/2000	6	15
	05/30/2000	5	32
	07/24/2000	6	5
	08/22/2000	6	5
	10/30/2000	7	5
	11/27/2000	7	7
	12/11/2000	7	5
	01/29/2001	6	6
	02/26/2001	10	5
	04/16/2001	7	5
	05/21/2001	6	16
07/03/2001	10	7	
VEW-8	02/29/2000	8	24
	03/01/2000	8	24
	03/02/2000	6	22
	04/07/2000	7	20
	04/24/2000	6	20
	05/30/2000	6	17
	07/24/2000	6	14
	08/22/2000	6	14
	10/30/2000	6	14
	11/27/2000	6	15
	12/11/2000	6	14
	01/29/2001	6	15
	02/26/2001	7	15
	04/16/2001	6	15
	05/21/2001	6	14
07/03/2001	8	25	

NM = not measured

in H₂O = inches of water

acfm = actual cubic feet per minute

TABLE 2-3
Depth to Groundwater/LNAPL Measurements

Well Identification	Date	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)
CEF-293-01	06/13/00	NA	8.79	0.00
	09/14/00	NA	5.55	0.00
	12/21/00	NA	7.72	0.00
	03/15/01	NA	8.03	0.00
	06/25/01	NA	7.37	0.00
CEF-293-02	06/13/00	NA	9.70	0.00
	09/14/00	NA	6.83	0.00
	12/21/00	NA	8.81	0.00
	03/15/01	NA	9.22	0.00
	06/25/01	NA	8.36	0.00
CEF-293-04	06/13/00	NA	9.45	0.00
	09/14/00	NA	5.44	0.00
	12/21/00	NA	8.33	0.00
	03/15/01	NA	8.62	0.00
	06/25/01	NA	7.75	0.00
CEF-293-05	06/13/00	NA	9.01	0.00
	09/14/00	NA	3.18	0.00
	12/21/00	NA	7.95	0.00
	03/15/01	NM	NM	0.00
	06/25/01	NA	NM	0.00
CEF-293-06	06/13/00	NA	9.77	0.00
	09/14/00	NA	6.89	0.00
	12/21/00	NA	8.75	0.00
	03/15/01	NA	9.00	0.00
	06/25/01	NA	8.39	0.00
CEF-293-07	06/13/00	NA	9.95	0.00
	09/14/00	NA	6.85	0.00
	12/21/00	NA	8.92	0.00
	03/15/01	NA	9.29	0.00
	06/25/01	NA	8.60	0.00
CEF-293-09	06/13/00	NA	9.93	0.00
	09/14/00	NA	7.01	0.00
	12/21/00	NA	8.96	0.00
	03/15/01	NA	9.29	0.00
CEF-293-10	06/13/00	NA	9.46	0.00
	09/14/00	NA	6.75	0.00
	12/21/00	NA	8.52	0.00
	03/15/01	NA	8.80	0.00
	06/25/01	NA	8.21	0.00
CEF-293-11	06/13/00	NA	9.62	0.00
	09/14/00	NA	6.91	0.00
	12/21/00	NA	8.70	0.00
	03/15/01	NA	9.12	0.00
	06/25/01	NA	8.46	0.00

TABLE 2-3 CONTINUED
 Depth to Groundwater/LNAPL Measurements

Well Identification	Date	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)
CEF-293-13	06/13/00	NA	9.05	0.00
	09/14/00	NA	6.31	0.00
	12/21/00	NA	8.11	0.00
	03/15/01	NA	8.63	0.00
	06/25/01	NA	8.06	0.00
CEF-293-14	06/13/00	NA	9.34	0.00
	09/14/00	NA	6.45	0.00
	12/21/00	NA	8.40	0.00
	03/15/01	NA	9.71	0.00
	06/25/01	NA	8.10	0.00
CEF-293-19	06/13/00	NA	8.95	0.00
	09/14/00	NA	6.99	0.00
	12/21/00	NA	8.75	0.00
	03/15/01	NA	9.11	0.00
	06/25/01	NA	8.55	0.00
CEF-293-20	06/13/00	NA	9.40	0.00
	09/14/00	NA	6.85	0.00
	12/21/00	NA	8.53	0.00
	03/15/01	NA	8.81	0.00
	06/25/01	NA	8.25	0.00
CEF-293-21	06/13/00	NA	9.51	0.00
	09/14/00	NA	6.98	0.00
	12/21/00	NA	8.62	0.00
	03/15/01	NA	8.94	0.00
	06/25/01	NA	8.37	0.00
CEF-293-22	06/13/00	NA	8.88	0.00
	09/14/00	NA	6.20	0.00
	12/21/00	NA	7.89	0.00
	03/15/01	NA	8.34	0.00
	06/25/01	NA	7.70	0.00
VEW-01	06/13/00	8.60	10.89	2.29
	09/14/00	4.85	7.70	2.85
	10/12/00	6.26	7.39	1.13
	10/18/00	6.39	7.29	0.90
	10/24/00	6.55	7.56	1.01
	10/30/00	6.80	7.70	0.90
	11/07/00	6.95	7.20	0.25
	11/13/00	7.05	8.13	1.08
	11/20/00	7.10	8.30	1.20
	11/27/00	7.05	9.05	2.00
	12/06/01	7.25	10.15	2.90
	12/11/00	7.35	10.10	2.75
	12/18/00	7.32	10.80	3.48
	12/21/00	7.80	9.61	1.81
01/03/01	7.45	11.85	4.40	
01/17/01	8.16	9.36	1.20	

TABLE 2-3 CONTINUED
 Depth to Groundwater/LNAPL Measurements

Well Identification	Date	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)
VEW-01 continued	01/29/01	7.68	11.11	3.43
	02/13/01	7.57	11.48	3.91
	02/19/01	7.61	11.45	3.84
	02/26/01	7.70	11.68	3.98
	03/06/01	7.55	11.10	3.55
	03/12/01	7.59	11.31	3.72
	03/15/01	8.34	10.50	2.16
	04/09/01	7.29	8.08	0.79
	04/16/01	7.31	8.29	0.98
	05/03/01	7.20	11.00	3.80
	05/08/01	7.35	11.10	3.75
	05/14/01	7.52	11.58	4.06
	05/21/01	7.59	11.50	3.91
	06/25/01	7.70	10.55	2.85
07/03/01	6.55	10.67	4.12	
VEW-02	06/13/00	7.50	13.02	5.52
	09/14/00	5.75	5.76	0.01
	12/21/00	7.70	7.73	0.03
	03/15/01	8.34	8.36	0.02
	06/25/01	7.92	7.96	0.04
VEW-03	06/13/00	NA	8.05	0.00
	09/14/00	NA	5.25	0.00
	12/21/00	NA	7.21	0.00
	03/15/01	NA	7.75	0.00
	06/25/01	NA	7.06	0.00
VEW-04	06/13/00	NA	8.38	0.00
	09/14/00	NA	5.68	0.00
	12/21/00	NA	7.60	0.00
	03/15/01	NA	8.07	0.00
	06/25/01	NA	7.70	0.00
VEW-05	06/13/00	NA	7.53	0.00
	09/14/00	NA	4.85	0.00
	12/21/00	NA	6.75	0.00
	03/15/01	NA	7.18	0.00
	06/25/01	NA	6.56	0.00
VEW-06	06/13/00	NA	7.26	0.00
	09/14/00	NA	4.60	0.00
	12/21/00	NA	6.40	0.00
	03/15/01	NA	6.94	0.00
	06/25/01	NA	6.45	0.00
VEW-07	06/13/00	NA	9.06	0.00
	09/14/00	NA	6.15	0.00
	12/21/00	NA	8.15	0.00
	03/15/01	NA	8.65	0.00
	06/25/01	NA	8.36	0.00

TABLE 2-3 CONTINUED

Depth to Groundwater/LNAPL Measurements

Well Identification	Date	Depth to LNAPL (feet)	Depth to Water (feet)	LNAPL Thickness (feet)
VEW-08	06/13/00	NA	9.06	0.00
	09/14/00	NA	6.16	0.00
	12/21/00	NA	8.11	0.00
	03/15/01	NA	8.57	0.00
	06/25/01	NA	8.33	0.00

NA = Not Applicable, LNAPL not present

LNAPL = Light Non-Aqueous Phase Liquid

3.0 Summary of Sampling and Laboratory Analytical Results

3.1 Vapor Monitoring

The VCS discharge stack was sampled monthly during the monitoring period for analyses by U.S. Environmental Protection Agency (USEPA) Method 18, TO-14. Copies of the analytical laboratory reports from the air sampling events are provided in Appendix A, and analytical results are summarized in Tables 3-1 and 3-2. The pounds per day loading rate summary is provided in Table 3-3.

Based upon an average pounds per day VOC removal rate of 0.019 pounds per day and an on-stream time of 113 days, a total of 2.2 pounds of volatile organic compounds (VOCs) were removed from the subsurface during the monitoring period via volatilization and 21.6 pounds have been removed to date. It should be noted that this calculation does not take into account the reductions resulting from biodegradation of the contaminants in the groundwater or the mass removed via recovery of LNAPL.

3.2 Groundwater Monitoring

Thirteen locations (five monitoring wells and six vapor extraction wells) at the site were sampled on March 15 and June 25, 2001, for VOCs and semi-volatile organic aromatics (SVOAs) by USEPA Methods 602 and 610. All sampling points located within the treatment zone of the biosparge system exhibited decreases in contaminant concentrations from the quarterly groundwater sampling event performed on December 21, 2000. Upgradient monitoring well CEF-293-4 remained non-detect for all constituents. Downgradient monitoring well CEF-293-22 exhibited a decrease in naphthalene and 1- and 2-methylnaphthalene concentrations and a slight increase in benzene concentration. Monitoring well CEF-293-20, located approximately 260 feet downgradient from CEF-293-22, exhibited detections of naphthalene and 2-methylnaphthalene above groundwater cleanup target levels (GCTLs) per Chapter 62-777 FAC, all of which were non-detect during the previous monitoring period. Vapor extraction wells VEW-1 and VEW-2 were not sampled during the monitoring period due to the presence of LNAPL.

The locations of the monitoring/vapor extraction wells are shown on Figure 1-1. Copies of the analytical laboratory reports from the groundwater sampling events are provided in Appendix B, and analytical results are summarized in Table 3-4.

Dissolved oxygen (DO) measurements were recorded at selected monitoring wells on March 15, 2001. The results, as summarized in Table 3-5, indicate that the DO concentrations in the monitoring/vapor extraction wells within the treatment zone were elevated as a result of remediation system operation on March 15, 2001. The DO measurements were not recorded on June 25, 2001, due to a malfunctioning DO meter.

TABLE 3-1
Pre-Treatment Vapor Analytical Results

Compound	02/28/00	03/07/00	03/16/00	03/23/00	05/30/00	06/19/00	07/24/00	08/15/00	09/18/00	10/18/00	11/13/00	12/11/00	01/17/01	02/13/01	03/12/01	04/16/01	05/03/01	05/29/01	06/15/01
1,1,1-Trichloroethane	ND																		
1,1,2,2-Tetrachloroethane	ND																		
1,1,2-Trichloroethane	ND																		
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	NA	ND																
1,1-Dichloroethane	ND																		
1,1-Dichloroethene	ND																		
1,2,4-Trichlorobenzene	ND																		
1,2,4-Trimethylbenzene	2130	3580	824	5060	4690	8640	7750	2840	1610	ND	1120	878	550	446	932	317	457	460	170
1,2-Dibromoethane	ND																		
1,2-Dichloroethane	ND																		
1,2-Dichlorobenzene	ND	NA	ND	ND															
1,3-Dichlorobenzene	ND	NA	ND	ND															
1,4-Dichlorobenzene	ND	NA	ND	ND															
1,2-Dichloropropane	ND	ND	ND	ND	ND	62.8	ND												
1,3,5-Trimethylbenzene	898	1780	422	2870	3380	5940	6330	2650	1600	ND	1520	1010	957	662	1320	NA	898	860	380
2-Chlorotoluene	ND	NA	ND	ND															
4-Ethyltoluene	605	1080	224	1470	1510	3030	2580	782	336	ND	NS	654	152	144	165	70.3	79.6	430	170
Alpha-Chlorotoluene	ND	NA																	
Benzene	112	1350	210	979	83.3	138	161	33.5	9.6	12	30	ND	12	27	19	12	12	ND	ND
Bromoform	ND	NA	ND	ND															
Bromomethane	ND																		
Bromodichloromethane	ND	NA	ND	ND															
Carbon Disulfide	ND	NA	ND	ND															
Carbon Tetrachloride	ND																		
Chlorobenzene	ND																		
Chloroethane	ND																		
Chloroform	ND	ND	19	ND	72.9	21	ND	ND	ND	1.2	ND	ND	ND	ND	ND	3.2	0.77	ND	ND
Chloromethane	ND	1.3	ND	ND	ND	ND	ND	1.2	ND	ND	ND								
cis-1,2-Dichloroethene	ND																		
cis-1,3-Dichloropropene	ND																		
Dibromochloromethane	ND	NA	ND	ND															
Dichlorodifluoromethane	ND	1.8	ND	ND	ND	ND	3.1	3.6	2.4	ND	ND								
Dichlorotetrafluoroethane	ND	NA	ND	ND															
Ethylbenzene	1540	3060	585	4510	1740	3320	3360	811	260	107	392	165	134	213	198	91.9	98.8	190	90
Freon 113	229	ND	2350	305	263	389	1860	165	47	ND	ND	68	ND	93.6	27	20	22	NA	NA
Freon 114	ND	NA	NA																
Hexachlorobutadiene	ND																		
Hexane	ND	NA	840	380															
m,p-Xylene	2840	6460	1200	9410	4640	7540	7460	1820	141	275	811	397	451	681	793	405	376	650	290
m-Dichlorobenzene	ND	NA	NA																
Methyl Tert Butyl Ether	ND	1.0	ND	ND															
Methylene Chloride	ND	ND	87.3	114	163	46.7	105	ND	11	ND	ND	ND	ND	9.3	2.3	0.41	2.4	ND	ND
o-Dichlorobenzene	ND	NA	NA																
o-Xylene	397	1820	375	2940	2270	3620	3760	1340	91.9	168	759	572	432	370	581	200	344	330	140
p-Dichlorobenzene	ND	NA	NA																
Styrene	ND																		
Tetrachloroethene	ND	ND	43	ND															
Toluene	90.7	1410	1060	2770	452	500	715	112	23	17	54.6	13	39.1	79.4	63.6	32	33	70	ND
trans-1,2-Dichloroethene	ND	NS	NS	NA	NA	NA	NA	NA	NA	ND	ND								
trans-1,3-Dichloropropene	ND																		
trans-1,4-Dichloro-2-butene	ND	NA	ND	ND															
Trichloroethene	ND																		
Trichlorofluoromethane	ND	2	ND	ND	ND	ND	ND	1.3	0.89	ND	ND								

TABLE 3-1 CONTINUED

Pre-Treatment Vapor Analytical Results

Compound	02/28/00	03/07/00	03/16/00	03/23/00	05/30/00	06/19/00	07/24/00	08/15/00	09/18/00	10/18/00	11/13/00	12/11/00	01/17/01	02/13/01	03/12/01	04/16/01	05/03/01	05/29/01	06/15/01
Trichlorotrifluoroethane	ND	NA																	
Vinyl Chloride	ND																		
Xylenes (total)	3230	8280	1570	12300	6940	11200	11200	3170	233	443	1570	971	880	1050	1370	607	720	980	430
Total Volatile Organics	8842	20540	7399	30428	19264.2	33247.5	34081	10553.5	4129.5	585.3	4686.6	3757	2727.1	2725.3	4104	1764.91	3047.86	4810	2050

Note:

1. Total Volatile Organics = Sum of all detected volatile organic compounds
2. In computing Total Volatile Organics not detected compounds were assumed to be zero.
3. All samples were analyzed by EPA Method 18, TO-14.
4. All concentrations are in micrograms per cubic meter.
5. ND= Not Detected, please see Appendix D for detection limits
5. NA= Not analyzed for listed parameter

TABLE 3-2
Post-Treatment Vapor Analytical Results

Compound	02/28/2000	03/07/2000	03/16/2000	03/23/2000
1,1,1-Trichloroethane	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND
1,2,4-Trimethylbenzene	1.5	0.74	0.83	ND
1,2-Dibromoethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND
4-Ethyltoluene	ND	ND	ND	ND
Alpha-Chlorotoluene	ND	ND	ND	ND
Benzene	0.32	ND	0.86	ND
Bromoform	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
Chloroform	ND	ND	0.68	ND
Chloromethane	ND	0.63	0.70	0.98
cis-1,2-Dichloroethene	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND
Dichlorodifluoromethane	ND	0.78	1.5	1.6
Dichlorotetrafluoroethane	ND	ND	ND	ND
Ethylbenzene	3.8	0.74	0.74	0.65
Freon 113	2.0	1.8	73	7.6
Freon 114	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND
Hexane	ND	ND	ND	ND
m,p-Xylene	5.2	1.1	1.6	1.1
m-Dichlorobenzene	6.6	5.6	5.0	3.9
Methyl Tert Butyl Ether	ND	ND	ND	ND
Methylene Chloride	1.4	ND	2.9	1.2
o-Dichlorobenzene	ND	ND	ND	ND
o-Xylene	1.7	0.56	0.61	0.52
p-Dichlorobenzene	0.66	ND	ND	ND
Styrene	6.8	1.3	1.2	2
Tetrachloroethane	0.94	4.3	3.4	ND
Toluene	13.0	1	34	1.4
trans-1,2-Dichloroethene	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND

TABLE 3-2 CONTINUED
 Post-Treatment Vapor Analytical Results

Compound	02/28/2000	03/07/2000	03/16/2000	03/23/2000
Trichlorotrifluoroethane	ND	ND	ND	ND
Vinyl Chloride	ND	0.56	0.25	ND
Xylenes (total)	6.9	1.6	2.2	1.6
Total Volatile Organics	43.92	19.11	127.27	20.95

Note:

1. Total Volatile Organics = Sum of all detected volatile organic compounds
2. In computing Total Volatile Organics not detected compounds were assumed to be zero.
3. All samples were analyzed by EPA Method 18, TO-14.
4. All concentrations are in micrograms per cubic meter.
5. ND= Not Detected, please see Appendix D for detection limits

TABLE 3-3
 Pounds Per Day Loading/Emissions Rates

Location	Sample Date	Flow Rate (SCFM)	Total VOC Concentration (mg/m³)	Loading Rate (lbs/day)
Pre-Treatment	02/28/2000	44	8.842	0.035
	03/07/2000	56	20.54	0.103
	03/16/2000	61	7.399	0.041
	03/23/2000	46	19.26	0.080
	05/30/2000	44	30.42	0.120
	06/19/2000	45	33.25	0.135
	07/24/2000	50	34.08	0.153
	08/15/2000	49	10.55	0.046
	09/18/2000	51	4.13	0.019
	10/18/2000	48	0.79	0.003
	11/13/2000	48	4.69	0.020
	12/11/2000	48	3.78	0.016
	01/17/2001	45	2.27	0.009
	02/13/2001	49	2.730	0.012
	03/12/2001	70	4.104	0.026
	04/16/2001	63	1.764	0.010
05/03/2001	65	3.047	0.018	
05/29/2001	70	4.810	0.030	
06/15/2001	70	2.050	0.013	
Post-Treatment	02/28/2000	44	0.044	0.00017
	03/07/2000	56	0.019	0.00010
	03/16/2000	61	0.127	0.00070
	03/23/2000	46	0.030	0.00012

TABLE 3-4
Groundwater Analytical Results

Sample I.D.	Date	Benzene	Ethyl- benzene	Toluene	Xylenes (total)	Naphtha- lene	1-Methyl- naphthalene	2-Methyl- naphthalene	Phenanthrene
CEF-293-04	01/25/00	ND	ND	ND	ND	ND	ND	ND	ND
	06/13/00	ND	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
CEF 293-09	01/25/00	43.1	602	826	2150	378	128	182	ND
	06/13/00	ND	1.4	ND	2.7	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
CEF 293-13	01/25/00	57.6	43	2.3	70.7	124	54.2	68	ND
	06/13/00	128	124	3.1	193	157	64.2	82.2	ND
	09/14/00	112	106	2.2	161	163	61.1	75	ND
	12/21/00	1.6	ND	ND	ND	40.7	29.6	39.2	ND
	03/15/01	ND	ND	ND	ND	4.6	15.5	20.6	ND
	06/25/01	0.24	1.3	ND	0.51	1	7	11	0.22
CEF 293-20	01/25/00	ND	ND	ND	ND	ND	ND	ND	ND
	06/13/00	ND	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	0.67	0.25	0.37	0.46	54	19	21	0.34
CEF 293-22	01/25/00	24.2	19.4	0.88	47.8	142	59.6	67	ND
	06/13/00	43.2	60.6	5.5	218	188	80.3	95.4	ND
	09/14/00	6.4	8.4	ND	20.7	38.7	22	25.1	ND
	12/21/00	19.7	9.7	<1	11.9	95	31.6	42.4	ND
	03/15/01	32.6	28.2	0.97	72.4	148	49.7	71.3	ND
	06/25/01	25	12	ND	18.9	45	16	22	ND
VEW-01	01/25/00	18.5	257	59.4	726	350	220	307	ND
	06/13/00					FREE PRODUCT			
	09/14/00					FREE PRODUCT			
	12/21/00					FREE PRODUCT			
	03/15/01					FREE PRODUCT			
	06/25/01					FREE PRODUCT			
VEW-02	01/25/00	91.6	149	29.2	573	283	118	139	ND
	06/13/00					FREE PRODUCT			
	09/14/00	ND	ND	ND	156	ND	ND	ND	ND
	12/21/00					FREE PRODUCT			
	03/15/01					FREE PRODUCT			
	06/25/01					FREE PRODUCT			
VEW-03	01/25/00	24.4	85.6	11.5	128	220	78	102	ND
	06/13/00	ND	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 3-4 CONTINUED
Groundwater Analytical Results

Sample I.D.	Date	Benzene	Ethyl- benzene	Toluene	Xylenes (total)	Naphtha- lene	1-Methyl- naphthalene	2-Methyl- naphthalene	Phenanthrene
VEW-04	01/25/00	81	138	7.8	288	232	88.7	108	ND
	06/13/00	ND	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
VEW-05	01/25/00	118	72.5	11.3	110	194	59.8	86.1	ND
	06/13/00	33.2	ND	ND	3.1	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
VEW-06	01/25/00	31.1	97.9	12.7	283	189	64.6	77.2	ND
	06/13/00	1.8	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
VEW-07	01/25/00	48	213	97.8	459	481	172	210	ND
	06/13/00	ND	ND	ND	ND	ND	ND	ND	ND
	09/14/00	ND	ND	ND	ND	ND	ND	ND	ND
	12/21/00	ND	ND	ND	ND	ND	ND	ND	ND
	03/15/01	ND	ND	ND	ND	ND	ND	ND	ND
	06/25/01	ND	ND	ND	ND	ND	ND	ND	ND
VEW-08	01/25/00	53.4	242	4.5	451	393	124	162	ND
	06/13/00	4	41.8	1.4	37.2	86.6	44.9	39.6	ND
	09/14/00	ND	4.8	ND	5.5	5.5	6.5	5.2	ND
	12/21/00	ND	10.6	<1	9.4	15.7	16	17.1	ND
	03/15/01	ND	6.4	ND	5.4	3.7	3.7	3.8	ND
	06/25/01	ND	1.5	ND	0.78	0.36	0.46	0.96	ND
Cleanup Goal - RAP		1	NA	NA	50	NA	NA	NA	NA
GCTL		1	30	40	20	20	20	20	210
NADSC		100	300	400	200	200	200	200	2100

Notes:

1. All concentrations are in micrograms per liter($\mu\text{g/L}$).
3. ND= Not Detected, please see Appendix D for detection limits
4. NS=Not Sampled

= above GC
 = above NADSC

TABLE 3-5
Groundwater Field Analytical Results

	Date	ph (s. u.)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)
CEF-293-4	01/25/2000	6.69	0.218	NM	21.3
	06/13/2000	6.15	0.259	-0.50	26.3
	09/14/2000	6.30	0.246	1.94	27.4
	12/21/2000	8.44	0.263	2.90	20.5
	03/15/2001	6.30	0.247	1.22	20.6
	06/25/2001	6.22	0.259	NM	25.2
CEF-293-9	01/25/2000	5.99	0.088	NM	21.4
	06/13/2000	5.55	0.068	-0.36	24.6
	09/14/2000	6.03	0.830	2.82	26.0
	12/21/2000	7.71	0.075	5.50	22.4
	03/15/2001	6.29	0.066	7.80	20.7
	06/25/2001	6.31	0.094	NM	23.3
CEF-293-13	01/25/2000	5.64	0.039	NM	21.4
	06/13/2000	4.99	0.068	-0.33	24.4
	09/14/2000	4.87	0.054	2.14	26.1
	12/21/2000	7.41	0.075	1.42	21.5
	03/15/2001	5.50	0.063	2.14	19.8
	06/25/2001	5.01	0.069	NM	24.4
CEF-293-20	01/25/2000	5.96	0.062	NM	20.8
	06/13/2000	5.04	0.083	-0.16	27.0
	09/14/2000	5.19	0.100	1.38	29.3
	12/21/2000	7.65	0.101	2.24	24.6
	03/15/2001	5.49	0.105	2.78	23.4
	06/25/2001	4.83	0.103	NM	26.3
CEF-293-22	01/25/2000	6.44	0.126	NM	23.0
	06/13/2000	5.71	0.180	-0.47	27.7
	09/14/2000	5.74	0.812	1.83	28.0
	12/21/2000	8.14	0.573	2.80	23.1
	03/15/2001	5.86	0.230	2.27	22.0
	06/25/2001	5.55	0.365	NM	25.2
VEW-1	01/25/2000	5.33	0.057	NM	23.0
	06/13/2000	NM	NM	NM	NM
	09/14/2000	NM	NM	NM	NM
	12/21/2000	NM	NM	NM	NM
	03/15/2001	NM	NM	NM	NM
	06/25/2001	NM	NM	NM	NM
VEW-2	01/25/2000	5.63	0.085	NM	22.7
	06/13/2000	NM	NM	NM	NM
	09/14/2000	6.20	0.114	2.26	26.2
	12/21/2000	NM	NM	NM	NM
	03/15/2001	NM	NM	NM	NM
	06/25/2001	NM	NM	NM	NM
VEW-3	01/25/2000	5.90	0.070	NM	22.1
	06/13/2000	4.86	0.034	-0.57	26.2
	09/14/2000	5.44	0.040	5.23	26.8
	12/21/2000	7.74	0.047	6.02	22.8
	03/15/2001	6.24	0.047	8.02	21.8
	06/25/2001	4.80	0.056	NM	24.7

TABLE 3-5
Groundwater Field Analytical Results

	Date	ph (s. u.)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)
VEW-4	01/25/2000	5.59	0.078	NM	23.0
	06/13/2000	NM	NM	NM	NM
	09/14/2000	6.48	0.086	2.48	26.6
	12/21/2000	7.92	0.045	4.55	23.8
	03/15/2001	5.31	0.045	6.81	22.2
	06/25/2001	5.40	0.045	NM	24.8
VEW-5	01/25/2000	6.28	0.113	NM	21.5
	06/13/2000	4.87	0.080	-0.59	25.5
	09/14/2000	5.96	0.066	3.23	26.8
	12/21/2000	7.84	0.069	3.42	21.6
	03/15/2001	5.58	0.061	5.80	20.7
	06/25/2001	5.35	0.060	NM	24.7
VEW-6	01/25/2000	5.78	0.076	NM	21.4
	06/13/2000	5.28	0.151	-0.60	26.0
	09/14/2000	8.81	0.066	3.08	26.9
	12/21/2000	7.37	0.083	4.33	22.3
	03/15/2001	6.57	0.127	7.26	20.9
	06/25/2001	5.54	0.064	NM	25.3
VEW-7	01/25/2000	5.63	0.074	NM	21.8
	06/13/2000	5.12	0.126	-0.56	24.9
	09/14/2000	5.52	0.070	2.22	25.8
	12/21/2000	7.78	0.700	2.67	22.5
	03/15/2001	5.96	0.068	6.65	21.5
	06/25/2001	5.60	0.078	NM	24.0
VEW-8	01/25/2000	6.29	0.206	NM	22.1
	06/13/2000	5.60	0.219	-0.60	24.2
	09/14/2000	5.77	0.118	1.92	25.9
	12/21/2000	7.87	0.156	1.31	22.5
	03/15/2001	6.35	0.137	2.06	21.2
	06/25/2001	5.86	0.128	NM	23.4

s. u. = standard units

mS/cm = milliseimens per centimeter

mg/L = Milligrams per liter

°C = degrees Centigrade

NM = not measured

4.0 Conclusions and Recommendations

Of the five monitoring wells (CEF-293-4, 9, 13, 20 and 22) and six extraction wells (VEW-3 through VEW-8) sampled, only two wells, CEF-293-20 and CEF-293-22, were found to have contaminant concentrations greater than the GCTL specified by Chapter 62-777 FAC during the June 2001 groundwater sampling event. Both locations were below the Natural Attenuation Default Source Concentration (NASDC) specified by Chapter 62-777 FAC and both wells are located outside the design radius of influence of the biosparge system.

Vapor extraction wells VEW-1 and VEW-2 were not sampled during the monitoring period due to the presence of LNAPL. LNAPL has been bailed on a weekly basis from VEW-1 since October 2000; a total of approximately 14.5 gallons has been recovered to date. Vapor extraction well VEW-2 did not contain significant volume of LNAPL for recovery to be performed during the monitoring period. No significant decreases in LNAPL thickness at VEW-1 were noted during the monitoring period.

It is recommended that the remediation system continue to operate and LNAPL be recovered until it is no longer present in VEW-1 and VEW-2. VEW-1 and VEW-2 should be sampled after LNAPL is no longer present to ensure the groundwater in this area has been remediated. Additional plans for delineation and recovery of LNAPL in the vicinity of VEW-1 and VEW-2 are currently being developed by the Comprehensive Long-Term Environmental Action Navy (CLEAN) contractor.

5.0 References

ABB Environmental Services, Inc. 1996. Contamination Assessment Report, Day Tank 1, Facility 293, Naval Air Station Cecil Field, Jacksonville, Florida.

ABB Environmental Services, Inc. January 1997. Remedial Action Plan, Day Tank 1, Facility 293, Naval Air Station Cecil Field, Jacksonville, Florida.

CH2M HILL Constructors, Inc. January 2000. Work Plan Addendum No. 03 Day Tank 1 Biosparge and Vapor Collection System Installation, Naval Air Station Cecil Field, Jacksonville, Florida.

Appendix A

Laboratory Analytical Reports for Air Samples (available upon request)

- Accutest E87466
- Accutest E89565
- Accutest E90713
- STL 105842
- STL 106511

Appendix B

Laboratory Analytical Reports for Groundwater Samples (available upon request)

- Accutest F9213
- PEL 2106184