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SUMMARY OF RESULTS FOR SECOND MOBILE ENHANCED MULTI-PHASE EXTRACTION
(MEME) EVENTS MILLINGTON SUPPACT TN
06/16/1998
NAVFAC SOUTHERN



DEPARTMENT OF THE NAVY
NAVAL SUPPORT ACTIVITY MEMPHIS
7800 3RD AVENUE
MILLINGTON, TENNESSEE 38054-5045

IN REPLY REFER TO

5090

Ser 0101 **000909**

16 JUN 1998

CERTIFIED MAIL P 615 727 201
RETURN RECEIPT REQUESTED

Mr. Ghattas Murr
TN Dept. of Environment and Conservation
Div. of Underground Storage Tanks
2510 Mt. Moriah, Perimeter Park, Suite E-645
Memphis, TN 38115-1520

Dear Mr. Murr:

The results of the second of two Mobile Enhanced Multi-Phase Extraction (MEME) events for Facility ID #0-791707 is submitted as enclosure (1) per Technical Guidance Document 016.

If additional information is required, please contact Ms. Tonya Barker or Mr. Randy Wilson of the Public Works Department, Environmental Division, at 874-5462 or 874-5902.

Sincerely,

D. H. LITTON
ACTING PUBLIC WORKS OFFICER
BY DIRECTION OF THE COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY MEMPHIS

Encl:

(1) CMD Associates, LLC re: Naval Hospital Boiler System,
MEME Event No. 2 of May 11, 1998

Copy to:

State of Tennessee
Dept. of Environment and Conservation
Div. of Underground Storage Tanks
4th Floor, L&C Tower, 401 Church Street
Nashville, TN 37243-1541

Commanding Officer

Southern Division, Naval Facilities Engineering Command
(Code 1846)

P.O. Box 190010, 2155 Eagle Drive
North Charleston, SC 29419-9010

CMD ASSOCIATES, LLC

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TRANSMITTED VIA HAND DELIVERY

May 11, 1998

Mr. Randy Wilson
Environmental Protection Specialist
Public Works Department, Environmental Division
Naval Support Activity, Memphis
7800 Third Avenue, Building 455, 2nd Floor
Millington, Tennessee 38054-0306

**RE: Report for Mobile Enhanced Multi-Phase Extraction Event No. 2
Underground Storage Tank System Adjacent to Naval Hospital Boiler System
Naval Support Activity, Memphis
Millington, Tennessee
Contract/Purchase Order Number N62467-98-M-0944**

Dear Mr. Wilson:

Enclosed are three (3) copies of the report for the second of two Mobile Enhanced Multi-Phase Extraction (MEME) Events to be performed under the above-referenced contract/purchase order. MEME Event No. 2 was completed by CMD Associates, LLC, and EcoVac Services on April 10, 1998. MEME Event No. 1 was completed on March 25, 1998, and the corresponding report transmitted to you on April 17, 1998 (transmittal letter dated April 16, 1998).

Prior to initiating the MEME Event, separate phase hydrocarbons (SPH) were detected in extraction well NSANHMW04, but not in either of the two observation wells (NSANHMW01 and NSANHMW03). The thickness of SPH measured in extraction well NSANHMW04 was 0.08 foot. Upon completion of the 8-hour MEME Event, SPH were not detected in either the extraction or observation wells. SPH were also not detected in the vacuum truck upon completion of MEME Event No. 2.

Prior to initiating MEME Event No. 2, the water levels in all three wells were above the corresponding reported top of screen depths. As mentioned in the transmittal letter for the MEME Event No. 1 report, it is possible that a small amount of SPH was able to enter well NSANHMW04 during the period of time after completion of MEME Event No. 1, when the water level in extraction well NSANHMW04 was recovering but remained below the reported top of screen depth for the well. Upon completion of MEME Event No. 2, the water level in extraction well NSANHMW04 had again been drawn down to below the corresponding reported top of screen depth. Consequently, a small amount of SPH might have again entered extraction well NSANHMW04 during the recovery period after completion of the second MEME Event.

File (1)

Mr. Randy Wilson
May 11, 1998
Page Two

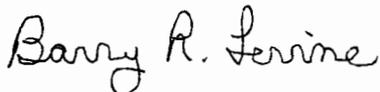
At this time, it is not known if SPH are present in well NSANHWMW04. During our telephone conversation on Thursday, May 7, 1998, you indicated that the base contractor responsible for monthly monitoring at the site might not have made the monthly measurements yet or have not contacted you because SPH were not detected during the monthly monitoring event.

Approximately 229 gallons of water and 1 or more equivalent gallons of fuel oil were recovered from extraction well NSANHWMW04 during the 8-hour duration of MEME Event No. 2. In comparison, approximately 169 gallons of water and 2 or more equivalent gallons of fuel oil were recovered from the well during the 8-hour duration of MEME Event No. 1. This water was discharged into the Naval Support Activity, Memphis, oil/water separator system. Per my telephone conversation with the City of Millington Engineer (Mr. James Cox, Fisher & Arnold, Inc.) on April 2, 1998, and my follow-up confirmation letter to Mr. Cox dated April 6, 1998, collection and analysis of samples of the water recovered during MEME Event No. 2 were not required prior to discharge. A copy of the April 2, 1998, letter to Mr. Cox is also enclosed with this transmittal.

If you have any questions regarding this transmittal or other project matters, please do not hesitate to contact me.

Sincerely,

CMD ASSOCIATES, LLC



Barry R. Levine, P.G.
Project Manager

Enclosures

SITEABJ017MEME.LTR

C: John Karlyk - SOUTHDIV-NFEC (*with enclosures*)
David Schmidt - CMD (*with enclosures*)

CMD ASSOCIATES, LLC

ECOVAC SERVICES

April 30, 1998

Mr. Barry R. Levine, P.G.
CMD Associates
2603 Corporate Avenue, Suite 100
Memphis, Tennessee 38132

**Subject: Enhanced Fluid Recovery (EFR™) Results
Event No. 2
Memphis Support Activity
Naval Hospital Boiler System
Navy Road
Millington, Tennessee
FID #0-791707**

Dear Mr. Levine:

Please find attached the data summary for the second EFR™ event conducted at the subject site on April 10, 1998. EFR™ was previously conducted at this site on March 25, 1998. The following summarizes the results of EFR™ at this site.

SUMMARY OF RESULTS

Separate phase hydrocarbons (SPH) were detected in one monitor well prior to conducting the second EFR™ event (i.e. NSANHMW-4 - 0.08 feet). This thickness represents an increase as SPH was not detected at NSANHMW-4, nor any of the other wells gauged, prior to the initial event. The second event was performed for a duration of eight hours at one extraction point, consisting of monitor well NSANHMW-4. SPH was not detected in the monitor wells upon completion of EFR™.

A calculated total of 2 pounds of carbon (approximately equivalent to 6 pounds of petroleum hydrocarbons - 1 equivalent gallon of fuel oil) were removed during this event. This recovered mass/volume of petroleum hydrocarbons represents a decrease in the mass/volume of petroleum hydrocarbons recovered during the initial EFR™ event (i.e. a calculated total approximately equivalent to 15 pounds of petroleum hydrocarbons - 2 equivalent gallons of fuel oil).

Offgas concentrations remained stable at 120 ppm during the second EFR™ event. The offgas concentrations recorded during this event are within the lower range of the offgas concentrations recorded during the initial event (i.e. 120 to 600 ppm). It is noted that the measured offgas concentrations may represent an underestimate of the actual concentrations (perhaps detecting only 25 to 40 percent of the actual concentrations), and consequently the calculated volume of fuel oil removed, since fuel oil contains some non-volatile fractions that may not be entirely detected by the field instrument.

Mr. Barry R. Levine, P.G.
April 30, 1998
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Air flow rates ranged from 220 to 293 CFM (163 to 213 DSCFM) during the second EFR™ event, including approximately 15 CFM attributed to atmospheric air inflow at the extraction wellhead breather port. Breather ports are sometimes used to enhance the recovery of petroleum hydrocarbon and/or groundwater. Air flow rates increased from 220 to 293 CFM during the initial 1.25 hours of the event and ranged from 275 to 293 CFM for the remaining 6.75 hours of the event. These flow rates represent a slight decrease from the air flow rates recorded during the initial event (i.e. 252 to 299 CFM).

The vacuum readings recorded at the extraction wellhead, which may have been biased by atmospheric air inflow at the breather port, ranged from 12 to 18 inches of mercury.

Differential pressures were recorded during this event to assess the radius of vacuum influence in the vadose zone. Vacuum influence was not detected in either NSANHMW-01 or NSANHMW-03 during this event. It is noted that the groundwater levels in both monitor wells were approximately 5 to 10 feet above the screened interval, thereby affecting the vacuum influence readings. The vacuum influence data are detailed in the attached table.

Groundwater levels were recorded during this event to determine drawdown of the aquifer during EFR™. It is noted that the groundwater levels in both monitor wells were approximately 5 to 10 feet above the screened interval, thereby likely affecting these readings. The groundwater drawdown data are detailed in the attached table and summarized below:

<u>Monitor Well</u>	<u>Maximum Change</u>	<u>Approximate Distance from NSANHMW-04</u>
NSANHMW-03	-0.27 feet	55 feet
NSANHMW-01	-0.12 feet	80 feet

Approximately 229 gallons of liquid (SPH was not detected on the vacuum truck upon completion of the event) were recovered during this EFR™ event and offloaded to an onsite groundwater treatment system.

Thank you for this opportunity to team with CMD Associates in serving the environmental needs of The Department of the Navy. We look forward to working with you again in the future to provide innovative and cost effective environmental solutions at this and other sites.

Sincerely,

EcoVac Services



Nick Athens

EFR™ FIELD DATA SHEET

Client: CMD Associates				Facility Name: Naval Hospital Boiler Area (Memphis NSA)						Facility ID#: 0-791707			Event #: 2			
Facility Address: Memphis Naval Support Activity, Navy Road, Millington, Tennessee								Technician: Lewis			Date: 4/10/98					
Extraction Well(s)	Start Time (hh:mm)	End Time (hh:mm)	Interval Time (min)	Extraction Well-head Vacuum (in. Hg)				Offgas Velocity (ft/min)	Total Flow (CFM)	Stack Gas Temp. (° F)	Total Flow (DSCFM)	Offgas Concentrations			Rate of Carbon Removal (lbs/hour)	Total Carbon Removed (pounds)
				Inlet	MW-4							Initial PPM _v	Ending PPM _v	Average PPM _v		
NSANHMW-04	7:30	7:45	15	24	18			1,200	220	80	213	120	120	120	0.3	0.1
"	7:45	8:00	15	23	17			1,200	220	120	195	120	120	120	0.3	0.1
"	8:00	8:15	15	22	16			1,300	238	130	202	120	120	120	0.3	0.1
"	8:15	8:30	15	20	14			1,400	257	150	192	120	120	120	0.3	0.1
"	8:30	8:45	15	18	13			1,500	275	160	186	120	120	120	0.3	0.1
"	8:45	9:00	15	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	9:00	9:15	15	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	9:15	9:30	15	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	9:30	10:00	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	10:00	10:30	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	10:30	11:00	30	17	12			1,500	275	170	163	120	120	120	0.2	0.1
"	11:00	11:30	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	11:30	12:00	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	12:00	12:30	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	12:30	13:00	30	17	12			1,500	275	170	163	120	120	120	0.2	0.1
"	13:00	13:30	30	17	12			1,500	275	170	163	120	120	120	0.2	0.1
"	13:30	14:00	30	17	12			1,500	275	170	163	120	120	120	0.2	0.1
"	14:00	14:30	30	17	12			1,500	275	170	163	120	120	120	0.2	0.1
"	14:30	15:00	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
"	15:00	15:30	30	17	12			1,600	293	170	174	120	120	120	0.2	0.1
Vacuum Truck Information				Well No.		Breather Port (CFM)		Stinger Depth (feet)			Recovery/Disposal Information					
Subcontractor: NB Env.				NSANHMW-04		15		10			Total Gal. of Liquid: 229*					
Invoice No.:											Disposal Facility: *					
Truck Operator: Crabtree											Manifest No.: N/A					
Truck No.: VK-39 KingVac											Total Lbs. of Carbon (Offgas): 2					
Vacuum Pump Type: Liquid Ring											Cum. Lbs. Carbon Removed: 7					
Tank Capacity: 2,566											Lbs. Hydrocarbons Removed: 6					
Stack I.D. (inches): 5.8											Cum. Lbs. Hydrocarbons: 21					
Calibration Gas: 500 ppm Hexane											Equiv. Gal. Removed: 1					
Molecular Weight: 130 g/mole											Cum. Equiv. Gal. Removed: 3					
ECOVAC SERVICES				Comments: * Recovered liquid offloaded to onsite treatment system												

EFR™ EVENT GAUGING DATA

Client: CMD Associates		Facility Name: Naval Hospital Boiler Area (Memphis NSA)			Facility ID#: 0-791707		Event #: 2		
Facility Address: Memphis Naval Support Activity, Navy Road, Millington, Tennessee					Technician: Lewis		Date: 4/10/98		
Well Designation	Well Diameter (inches)	Total Depth (feet)	Before EFR™ Event			After EFR™ Event			Depth to Liquid Change (feet)
			Depth to SPH (feet)	Depth to Water (feet)	SPH Thickness (feet)	Depth to SPH (feet)	Depth to Water (feet)	SPH Thickness (feet)	
NSANHMW-01	2	27.46	-	11.08	0.00	-	11.20	0.00	+0.26
NSANHMW-03	2	22.88	-	0.33	0.00	-	0.57	0.00	+1.46
NSANHMW-04*	2	15.81	1.15	1.23	0.08	-	11.00	0.00	-9.83
			Comments: * Denotes monitor well utilized as an extraction well Well screens in NSAHMW-01,03, and 04 at 17',12', and 5', repectively						

Differential Pressure and Groundwater Drawdown Data Recorded During EFR™
 Event No. 2 (April 10, 1998)
 Memphis Naval Support Activity - Naval Hospital Boiler System
 Navy Road
 Millington, Tennessee
 FID #0-791707

DIFFERENTIAL PRESSURE DATA

		Well Designation:	
		NSANHWMW-03	NSANHWMW-01
Nearest Extraction Well:		NSANHWMW-04	NSANHWMW-04
Approximate Distance:		55 feet	80 feet
Time	Elapsed Time	Differential Pressure Readings (inches of water):	
8:00	0.5 hr.	0.00	0.00
8:30	1.0 hr.	0.00	0.00
9:00	1.5 hrs.	0.00	0.00
9:30	2.0 hrs.	0.00	0.00
Maximum Change:		0.00	0.00

Top of well screens in NSAHMW-01, 03, and 04 at 17', 12', and 5', respectively

GROUNDWATER DRAWDOWN DATA

		Well Designation:	
		NSANHWMW-03	NSANHWMW-01
Nearest Extraction Well:		NSANHWMW-04	NSANHWMW-04
Approximate Distance:		55 feet	80 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):	
Prior to EFR™		0.33	11.08
9:30	2.0 hrs.	0.45	11.20
10:30	3.0 hrs	0.50	11.20
11:30	4.0 hrs.	0.54	11.20
12:30	5.0 hrs.	0.58	11.20
13:30	6.0 hrs.	0.60	11.20
14:30	7.0 hrs.	0.57	11.20
Maximum Change:		-0.27	-0.12

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VIA FACSIMILE AND REGULAR MAIL

FILE COPY

April 6, 1998

Mr. James Cox, P.E.
Fisher & Arnold, Inc.
3205 Players Club Parkway
Memphis, Tennessee 38125

**RE: Discharge of Recovered Ground Water
Mobile Enhanced Multi-Phase Extraction Event No. 2
Underground Storage Tank System Adjacent to Naval Hospital Boiler System
Naval Support Activity, Memphis
Millington, Tennessee
Facility ID No.: 0-791707**

Dear Mr. Cox:

Per our telephone conversation on Thursday, April 2, 1998, it is CMD Associates, LLC's (CMD's) understanding that collection and laboratory analysis of additional samples will not be required prior to discharging the above-referenced recovered ground water into the Naval Support Activity, Memphis, oil/water separator system.

The ground water to be discharged will be recovered during performance of Mobile Enhanced Multi-Phase Extraction (MEME) Event No. 2, currently scheduled to occur on Thursday, April 9, 1998. Prior to discharge of the 169 gallons of water recovered during MEME Event No. 1 on Wednesday, March 25, 1998: 1) Duplicate samples of the recovered ground water were collected; 2) the duplicate samples were analyzed for oil and grease, total lead, and total petroleum hydrocarbons - diesel range organics by A & L Analytical Laboratories (Memphis, Tennessee); 3) the analytical results were transmitted to you for review; and 4) CMD received your approval to discharge the recovered ground water to the Naval Support Activity, Memphis, oil/water separator system.

Mr. James Cox, P.E.
April 6, 1998
Page Two

A copy of the final A & L Analytical Laboratories report is attached for your files. It is not expected that the volume of water recovered during MEME Event No. 2, or the constituent concentrations in the recovered ground water, will be significantly different than for MEME Event No. 1.

Do not hesitate to call me if you have questions or require additional information. Your assistance in this matter has been greatly appreciated.

Sincerely,

CMD ASSOCIATES, LLC



Barry R. Levine, P.G.
Project Manager

BRL\BL\ABJ\012-F&A.LTR

Attachment

c: R. Wilson (NSA, Memphis)
D. Schmidt (CMD)

CMD ASSOCIATES, LLC