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CORRECTIVE MEASURES STUDY TECHNICAL MEMORANDUM SOLID WASTE
MANAGEMENT UNIT 136 (SWMU 136) AREA OF CONCERN 663 (AOC 663) ZONE H CNC
CHARLESTON SC
6/18/1999
ENSAFE

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
CHARLESTON NAVAL COMPLEX,
NORTH CHARLESTON, SOUTH CAROLINA
CTO-029**



**ZONE H CORRECTIVE MEASURES STUDY
TECHNICAL MEMORANDUM
SWMU 136/AOC 663**

CONTRACT N62467-89-D-0318

Prepared for:

**DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA**

Prepared by:

**ENSAFE, INC.
5724 SUMMER TREES DRIVE
MEMPHIS, TENNESSEE 38134
(901)372-7962**

June 18, 1999

Release of this document requires the prior notification of the Commanding Officer of the Southern Division, Naval Facilities Engineering Command, Naval Base Charleston, South Carolina.

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CTO-029**

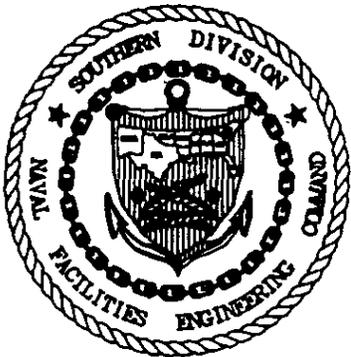


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SWMU 136/AOC 663**

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DEPARTMENT OF THE NAVY
 SOUTHERN DIVISION
 NAVAL FACILITIES ENGINEERING COMMAND
 P.O. BOX 190010
 2155 EAGLE DRIVE
 NORTH CHARLESTON, S.C. 29419-9010

5090/11
 Code 18710
 18 June, 1999

Mr. John Litton, P.E.
 Director, Division of Hazardous and Infectious Waste Management
 SCDHEC-Bureau of Land and Waste Management
 2600 Bull Street
 Columbia, SC 29201

Subj: SUBMITTAL OF SWMU 136/AOC 663 TECHNICAL MEMORANDUM
 PROPOSING NFA STATUS

Dear Mr. Litton:

The purpose of this letter is to submit the enclosed Technical Memorandum for SWMU136/AOC 663. This combined site was placed in the CMS process based on the need for further evaluation to determine whether significant contamination exists. Based on further investigation and discussions between SC DHEC, the Navy and EnSafe it was agreed that this site would be eligible for removal from the CMS process. After completion of the additional investigation it is the opinion of the Navy and EnSafe that this site should be considered an NFA site.

The Navy requests that the Department and the USEPA review and provide comment or approval whichever is appropriate. If you should have any questions please contact Billy Drawdy or myself at (843) 743-9985 and (843) 820-5543 respectively.

Sincerely,

DAVID P. DODDS
 REMEDIAL PROJECT MANAGER
 INSTALLATION RESTORATION III

Encl:

(1) Technical Memorandum for SWMU 136/AOC 663 Removal from the Zone H CMS dated 18 June 1999

Copy to:

SCDHEC (Paul Bergstrand, Johnny Tapia), USEPA (Dann Spariosu)
 CSO Naval Base Charleston (Billy Drawdy), SOUTHNAVFACENGCOM (Tony Hunt)
 SPORTENVDETCASN (Bobby Dearhart)



ENSAFE INC.

ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

311 Plus Park Blvd., Suite 130 • Nashville, Tennessee 37217 • Telephone 615-399-8800 • Facsimile 615-399-7467 • www.ensafe.com

June 15, 1999

Commanding Officer
ATTN: David Dodds, Code 18710
SOUTHNAVFACENCOM
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Subject: CTO-029, Charleston, South Carolina
Document Transmittal - Technical Memorandum SWMU 136/AOC 663,
June 15, 1999

Reference: Contract N62467-89-D-0318 (CLEAN II)

Dear Mr. Dodds:

Please find enclosed two copies of the subject Technical Memorandum. This document is submitted for your formal review prior to distribution to the Project Team. If you are in agreement with the findings of this document, please prepare a Navy cover letter for the official distribution of this document to the Project Team.

Please contact the undersigned if you have any questions concerning this submittal.

Sincerely,
EnSafe Inc.

Donald M. Schroeder, P.E.
Environmental Engineer

Enclosures: As Stated

cc:
Contracts File: CTO-029
Project File: 2908-001-14-400-00
SOUTHDIV: Ms. Kim Reavis/Code 0233KR

T E C H N I C A L M E M O R A N D U M

To: Environmental Cleanup Project Team
Charleston Naval Complex
Charleston, South Carolina

Fr: Don Schroeder, P.E.
EnSafe, Nashville

Da: 18 June 1999

Re: SWMU 136/AOC 663 Removal from the Zone H CMS

Objective

The purpose of this technical memorandum (tech memo) is to present the justification for removal of SWMU 136/AOC 663 from the Zone H CMS. SCDHEC has agreed that Zone H Minor Site SWMU 136/AOC 663, along with AOCs 655, 656 and 666 are eligible for removal from the CMS process.

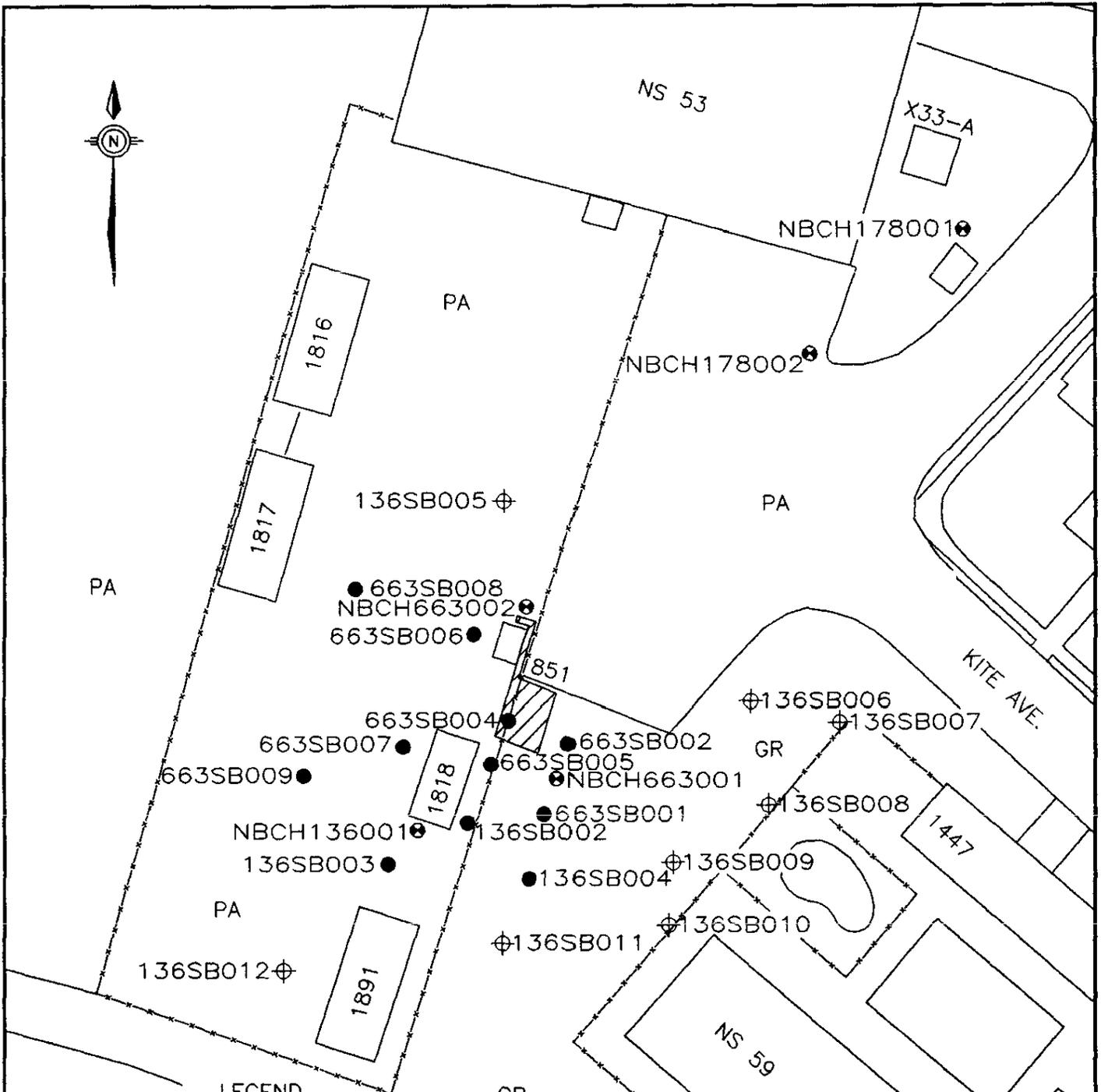
Site Description

SWMU 136 is a former Satellite Accumulation Area (SAA) that received hazardous waste from NS 851 and nearby Building NS 53. AOC 663 is a former fuel dispenser island behind Building NS 53. The Site Map for SWMU 136/AOC 663 is presented on Figure 1. The majority of the site area is paved with asphalt or covered with concrete.

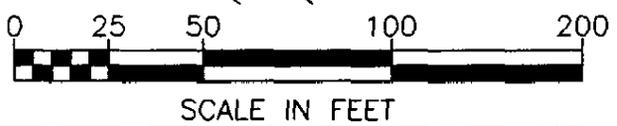
AOC 663 formerly contained two underground storage tanks (USTs). UST 851A was a 500-gallon tank which supplied gasoline to NS 851, which was the fuel dispenser island behind Building NS 53. UST 851B was a 500 gallon UST which supplied diesel fuel to NS 851. There were no Navy DET ISMs completed at the site, but both USTs and associated fuel lines have been removed.

Site Background

The Zone H CMS Work Plan presented the surface soil residential site risk above background at $3.4E-05$ and the industrial site risk above background at $6.6E-06$. The single greatest risk driver in the surface soil was arsenic.



- LEGEND
- GR - GRASS
 - PA - PAVEMENT
 - ⊕ - MONITORING WELL
 - - RFI SOIL SAMPLE
 - ⊕ - CMS SOIL SAMPLE
 - ▨ - APPROX. EXCAVATION AREA FORMER UST



 ZONE H
CMS TECH MEMO
CHARLESTON NAVAL COMPLEX
CHARLESTON, S.C.

FIGURE 1
SWMU 136 & AOC 663
SITE MAP
DWG DATE: 04/16/99 DWG NAME: 2908r125

The primary contributors to groundwater risk and hazard are benzene at site well 663-002 and 2,3,7,8-TCDD equivalents at site well 663-001. However, the TCDD equivalents did not exceed their MCL of 3E-8 mg/L and were identified in only one of the three site wells and only during the first quarter of sampling. Benzene exceeded its MCL (5 $\mu\text{g/L}$) only at site well 663-002, and only during 2 quarters of sampling.

The Project Team has requested that SWMU 136/AOC 663 be placed in the CMS process due to arsenic in surface soil and benzene in groundwater. Further delineation of the extent of arsenic contamination in soils in the unpaved areas of the site was to be provided through supplemental CMS field work. The need for any soil remediation would be based on the results of this additional sampling. Additional short-term groundwater monitoring, (two quarters), was to be performed to confirm or refute the presence of benzene and to determine if remedial action was required. Sampling and analysis of the site groundwater for VOCs and SVOCs was to be performed using three existing site monitoring wells and two wells from nearby SWMU 178. SCDHEC requested that SVOCs be added to the groundwater sampling suite for future rounds to check for the presence of BEHP contamination. Pending the results of these additional investigations, the CMS Work Plan established the objective of transferring this site to the UST/PST program.

Navy DET Activities

The Navy DET removed a 500 gallon gasoline UST and a 500 gallon diesel UST and associated piping from the site in June of 1996. The activities that were performed are summarized in the underground Storage Tank Assessment Report for UST 851A and 851B that is dated October 10, 1996. Four soil samples were taken from the bottom of the UST excavation. The samples were analyzed for 4 Volatile Organics (BTEX) and 16 Extractable Organics (PAH). All four samples were less than the detection limits for all of the BTEX and PAH constituents that were analyzed.

There was approximately 45 feet of piping from the gasoline and diesel tanks to the dispenser island at NS 851. The piping that was removed from the pipe trench was visually sound with no noticeable pitting or holes. Four soil samples were taken from the bottom of the pipe trench excavation. The samples were analyzed for 4 Volatile Organics (BTEX) and 16 Extractable Organics (PAH). Three of the four pipe run samples were taken from locations that were beneath mechanical joints on the pipe runs. The three pipe run samples contained concentrations of benzo(a)pyrene and/or benzo(b)fluoranthene that exceeded the residential soil RBC, with a Target Hazard Quotient of 0.1. The fourth pipe run sample was taken from the end of the pipe run. This sample was below the detection limit for all the BTEX and PAH constituents that were analyzed, with the exception of an estimated pyrene concentration of 180 $\mu\text{g/kg}$ (RBC 230,000 $\mu\text{g/kg}$). Both

tanks and the associated piping were removed from the site and disposed of properly. After completion of the tank removal activities, all of the excavated soil was returned to the tank pit.

CMS Soil Sampling

The additional soil sampling called for in the CMS Work Plan has been performed. Additional surface and subsurface soil samples were taken at eight locations in June of 1998. The sample locations are numbered 136-S-B005 through 136-S-B012 as shown on Figure 1. The additional soil sampling results are presented in Table 1. All eight of the surface soil samples were below the background reference concentration for arsenic, (15.6 mg/kg). Six of the eight subsurface samples were below the background reference concentration for arsenic, (22.5 mg/kg). Of the two samples that were higher than background, one of the samples was 2 percent higher than background and the other was 10 percent higher than background.

CMS Groundwater Sampling

Two additional rounds of groundwater sampling, as called for in the CMS Work Plan, were performed on site monitoring wells 136-001, 663-001, 663-002 and nearby wells 178-001 and 178-002. The first additional round was performed in May of 1998 and the second additional round was performed in March of 1999. The purpose of the additional groundwater sampling was to confirm or refute the presence of benzene and BEHP in the groundwater. Both rounds of sampling results at all five of the monitoring wells were below the detection limits for benzene. BEHP levels were either below the normal detection limits (10 $\mu\text{g/L}$) or below the BEHP MCL (6 $\mu\text{g/L}$) in 8 of the 10 additional samples that were taken during CMS sampling. The only 2 BEHP detections, (9.1 $\mu\text{g/L}$ and 13 $\mu\text{g/L}$), were at levels that were below or just above the normal detection limits in two of the site wells. The benzene and BEHP results for all of the sampling rounds are included in Table 2.

The BEHP detections during the CMS sampling were very close to the normal quantitation limit for this compound of 10 $\mu\text{g/L}$. In order to further understand the source of this material, historical laboratory data was reviewed for the presence of BEHP in field blanks and laboratory blanks. Table 3 presents a summary of the historical field blank data for Zone H. A total of 45 field blank samples were analyzed for the presence of BEHP. Of this total, 40% of the field blanks contained detectable levels of BEHP. A total of 29% of the field blanks contained BEHP levels greater than the MCL value of 6 $\mu\text{g/L}$. The highest BEHP level in a single field blank was 91 $\mu\text{g/L}$. Of the total number of non-detects in the field blank samples, 44% were greater than the normal quantitation limit of 10 $\mu\text{g/L}$. The highest BEHP level in a single non-detect sample was 130 $\mu\text{g/L}$.

Table 1
Soil Data for Arsenic at SWMU 136/AOC 663

Sample Number	Arsenic (mg/kg)
Background Reference:	
Surface - 01 Suffix	15.6
Subsurface - 02 Suffix	22.5
SWMU 136	
136-S-B002-01	7.3
136-S-B003-01	11.4
136-S-B003-02	7.1 J
136-S-B004-01	23.9
136-S-B005-01	4.9
136-S-B005-02	4
136-S-B006-01	4.9
136-S-B006-02	1.7 UJ
136-S-B007-01	4.4
136-S-B007-02	1.1 UJ
136-S-B008-01	14.5
136-S-B008-02	4.8
136-S-B009-01	5.8
136-S-B009-02	18.1
136-S-B010-01	7
136-S-B010-02	24.8
136-S-B011-01	8.8
136-S-B011-02	1.7 UJ
136-S-B012-01	8.8
136-S-B012-02	23
AOC 663	
663-S-B001-01	5.8
663-S-B002-01	3.4
663-S-B004-01	6.3
663-S-B004-02	3.6

Table 1
Soil Data for Arsenic at SWMU 136/AOC 663

Sample Number	Arsenic (mg/kg)
Background Reference:	
Surface - 01 Suffix	15.6
Subsurface - 02 Suffix	22.5
663-S-B005-01	6.8
663-S-B005-02	5.4
663-S-B006-01	4 J
663-S-B007-01	16.2
663-S-B009-01	NS
663-S-B009-02	NS

Notes:

- J - The associated numerical value is an estimated quantity.
 - UJ - The material was analyzed for but not detected. The sample quantitation limit is estimated.
 - NS - Not sampled
- Boxed value indicates sample concentration exceeded background reference value.

Table 2
Groundwater Data for Organics at SWMU 136/AOC 663

Sample Number	Date	Benzene ($\mu\text{g/L}$)	BEHP ($\mu\text{g/L}$)
MCL		5	6
SWMU 136			
136-G-W001-01	10/24/94	5 UJ	10 U
136-G-W001-02	03/30/95	5 U	2.7 U
136-G-W001-03	09/25/95	5 U	12 U
136-G-W001-04	04/02/96	5 U	10 U
136-G-W001-05	05/28/98	5 U	10 U
136-G-WC01-01	03/11/99	5 U	9 J

Table 2
Groundwater Data for Organics at SWMU 136/AOC 663

Sample Number	Date	Benzene ($\mu\text{g/L}$)	BEHP ($\mu\text{g/L}$)
MCL		5	6
SWMU 178			
178-G-W001-01	10/19/94	5 UJ	11 U
178-G-W001-02	04/26/95	NS	1300 U
178-H-W001-02	04/26/95	NS	530 J
178-G-W001-03	09/21/95	NS	290
178-G-W001-04	03/26/96	NS	27 U
178-G-W001-05	05/28/98	5 U	14 U
178-G-WC01-01	03/18/99	5 U	13
178-G-W002-01	10/19/94	5 UJ	11 U
178-G-W002-02	03/30/95	NS	50 U
178-G-W002-03	09/21/95	NS	12 U
178-G-W002-04	03/27/96	NS	10 UJ
178-G-W002-05	07/28/98	5 U	10 U
178-G-WC02-01	03/19/99	5 U	10 U
AOC 663			
663-G-W001-01	10/25/94	5 UJ	11 U
663-G-W001-02	03/30/95	5 U	4.9 U
663-G-W001-03	09/13/95	5 U	11 U
663-G-W001-04	03/15/96	5 U	10 U
663-G-W001-05	05/29/98	5 U	10 U
663-G-WC01-01	03/18/99	5 U	10 U
663-G-W002-01	10/24/94	5 UJ	10 U

Table 2
Groundwater Data for Organics at SWMU 136/AOC 663

Sample Number	Date	Benzene ($\mu\text{g/L}$)	BEHP ($\mu\text{g/L}$)
MCL		5	6
663-G-W002-02	03/30/95	160	25 U
663-G-W002-03 RE	09/13/95	13	180
663-G-W002-04	03/14/96	3 J	59
663-G-W002-05	05/28/98	5 U	11 U
663-G-WC02-01	03/18/99	5 U	0.6 J

Notes:

- U - The material was analyzed but not detected at the listed numerical quantitation limit.
- J - The associated numerical value is an estimated quantity.
- NS - Not sampled
- UJ - The material was analyzed for but not detected. The sample quantitation limit is estimated. Boxed value indicates sample concentration exceeded MCL.

Table 3
BEHP Data for Field Blanks in Zone H

Sample Number	Date	BEHP ($\mu\text{g/L}$)
017-E-W001-01	10/18/94	14.1
178-E-W001-01	10/22/94	15
662-F-W001-01	10/24/94	23.8
GDH-E-W005-01	11/07/94	28.9
GDH-D-W008-01	11/08/94	15.9 UJ
009-E-W001-01	11/19/94	44.2
013-F-W003-02	03/27/95	14 U
013-E-W007-02	03/27/95	130 U
GDH-E-W003-02	03/28/95	11 U

Table 3
BEHP Data for Field Blanks in Zone H

Sample Number	Date	BEHP ($\mu\text{g/L}$)
GDH-F-W07D-02	03/31/95	11 U
655-E-W001-02	04/03/95	12 U
009-E-W002-02	04/17/95	57
009-F-W002-02	04/17/95	12 U
009-E-W08D-02	04/25/95	26
009-F-W08D-02	04/25/95	8.4 J
009-D-W007-03	09/15/95	22
009-E-W007-03	09/15/95	7.3 J
009-F-W007-03	09/15/95	6.3 J
667-D-W001-03	09/23/95	4.2 J
667-E-W001-03	09/23/95	11 U
667-F-W001-03	09/23/95	11 U
009-D-W012-03	09/29/95	31
009-E-W012-03	09/29/95	91
009-F-W012-03	09/29/95	11 U
GDH-D-W11D-03	10/12/95	11 U
GDH-E-W11D-03	10/12/95	2.2 J
GDH-F-W11D-03	10/12/95	11 U
014-E-W03D-05	07/28/98	6 J
017-D-W004-05	07/28/98	2 J
009-F-W024-01	08/10/98	1 J

Notes:

- U - The material was analyzed but not detected at the listed numerical quantitation limit.
- J - The associated numerical value is an estimated quantity.
- UJ - The material was analyzed for but not detected. The sample quantitation limit is estimated. Boxed value indicates field blank concentration exceeded the BEHP MCL of 6 $\mu\text{g/L}$.

A total of 15 additional field blank samples, not listed above, were analyzed for BEHP, but none was detected at the normal quantitation limit of 10 $\mu\text{g/L}$.

The field blank data indicates that there are several sources of BEHP contamination. The highest levels of BEHP contamination generally came from the equipment rinsate blanks. This indicates that the sample tubing and other field sampling equipment are a consistent source of BEHP contamination. BEHP contamination is also evident in the field blanks and the DI system blanks. Overall, the frequent presence of BEHP in the field blank data indicates that there is a significant BEHP source that is not associated with any site-specific contamination.

Table 4 presents a summary of the historical lab blank data for Zone H. A total of 66 lab blank samples were analyzed for the presence of BEHP. Of this total, 33% of the lab blanks contained detectable levels of BEHP. A total of 5% of the lab blanks contained BEHP levels greater than the MCL value of 6 $\mu\text{g/L}$. The highest BEHP level in a single lab blank was 19 $\mu\text{g/L}$. The lab blank data also indicates BEHP source that is not associated with any site-specific contamination. While the lab blank numbers are not as high as the field blank numbers, the numbers are significant when the only two BEHP detections during the CMS sampling were values that were very close to the normal BEHP detection limit.

Recommendation

The additional surface soil sampling results document that there is no arsenic contamination in the surface soils of the site. All eight of the additional surface soil samples that were taken were below the background reference arsenic concentrations. Six of the eight subsurface samples were below the background reference concentration for arsenic. Of the two subsurface samples that were higher than background, one of the samples was 2 percent higher and the other sample was 10 percent higher. The sample that was 2 percent higher was taken from a paved area. We do not regard these two subsurface samples as contributing to any site risk level that warrants further investigation or remedial response.

The two additional rounds of groundwater monitoring, per project team request and CMS Work Plan requirements, did not show benzene concentrations above their detection limits. The detection of BEHP in 2 of the 10 CMS samples is not related to any known previous site activities. BEHP is a common additive in many types of plastics including well materials and well sampling supplies. The results of reviewing the field blank and lab blank data indicates that there is a significant source of BEHP contamination that is not related to any site specific activities. There is no trend of BEHP results that are indicative of a release at the site or a mass of contamination that could be subject to remediation. The level of BEHP detection and temporal variation is not indicative of any site-wide contamination and merits no further investigation.

Given these results, we believe that this site should be designated as a NFA site and be removed from the CMS altogether. If there are remaining regulatory issues associated with the Navy DET tank removal performed at the site, these should be handled by the appropriate UST/PST program.

Table 4
BEHP Data for Lab Blanks in Zone H

Sample Number	Date	BEHP ($\mu\text{g/L}$)
BLK-0-4897-29	03/18/96	2 J
BLK-0-5067-14	03/28/96	6 J
BLK-0-5067-15	03/29/96	2 J
BLK-0-5067-17	04/03/96	3 J
BLK-0-5150-12	04/05/96	6 J
BLK-0-5150-01	04/08/96	3 J
BLK-0-5236-15	04/13/96	19
BLK-0-5286-14	04/17/96	14
BLK-0-5150-15	04/18/96	1 J
BLK-0-5329-01	04/21/96	15
BLK-0-5191-02	04/23/96	4 J
BLK-0-5236-02	04/23/96	4 J
BLK-0-5236-17	04/23/96	2 J
BLK-0-8273-01	04/28/99	2 J
BLK-0-8273-03	04/28/99	0.8 J
BLK-0-4163-05	05/29/98	2 J
BLK-0-4991-06	07/29/98	3 J
BLK-0-5007-09	08/03/98	2 J
BLK-0-4991-08	08/07/98	1 J
BLK-0-5210-07	08/13/98	3 J
BLK-0-5269-06	08/17/98	2 J
BLK-0-5271-05	08/17/98	2 J

Notes:

J - The associated numerical value is an estimated quantity.

Boxed value indicates lab blank exceeded BEHP MCL of 6 $\mu\text{g/L}$.

A total of 44 additional lab blank samples, not listed above, were analyzed for BEHP, but none was detected at the normal quantitation limit of 10 $\mu\text{g/L}$.