Final 06.08-03/01/2000-00499

SWMU 15 Biological Soil Remediation Project Close-Out Report and Confirmatory Soil Sampling Technical Memorandum Oceana Naval Air Station, Virginia Beach, Virginia

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia

Contract No. N62470-93-D-4072
CTO-0023

March 2000

Prepared by

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06.08 - 3/1/2000 - 00499

Final

SWMU 15 Biological Soil Remediation Project

Close Out Report and Confirmatory Soil Sampling Technical Memorandum

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CTO Task Order - 023
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Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

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WDC003670127.DOC/1/KTM

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1.0 Introduction

1.1 Purpose

This report documents the confirmatory sampling and potential risk evaluations conducted to determine the effectiveness of the RCRA Interim Action, biological treatment of petroleum contaminated soils, conducted at Solid Waste Management Unit #15 (SWMU 15). This report summarizes the Biological Treatment Project from the recommended alternative of the Corrective Measures Study (CMS) through the successful treatment and offsite use of the treated soils as clean fill. Therefore in addition to presenting confirmatory sampling data, this report serves as the final construction/project completion document for the SWMU 15 Biological Treatment Project.

1.2 Site Background Information

SWMU 15 is located in the former NAS Oceana North Station area, approximately 800 feet northwest of Runway 23R and 1,000 feet northeast of the area used to store recreation vehicles near the old CPO officers' club. The abandoned tank farm at this location served as the primary source of aircraft fuel for the North Station area when it was active from the mid-1950s to the mid-1970s. The tank farm consisted of six tanks: a 414,000-gallon tank used to store JP-3, two 50,000-gallon concrete tanks used for aviation gas, and three adjacent 12,000- to 18,000-gallon tanks believed to be used for automotive fuel, kerosene, or lube oil. According to site assessment reports, the tanks were emptied of fuel and filled with water after they were abandoned; however, tank G-5 was later used to store waste oil. The tanks and their associated piping were dismantled and removed in the mid-1980s

The first environmental investigation at the tank farm was conducted in 1982. Free-phase product was discovered in test pits and well borings. The 1984, the Navy's Initial Assessment Study (IAS) identified the tank farm as a potential hazard, and the EPA identified the tank farm as SWMU 15 in the 1988 RCRA Facility Assessment (RFA). The RFA documented recommendations for additional investigation.

SWMU 15 was investigated as part of the first two phases of the RCRA Facility Investigation (RFI). Phase I was completed in 1993 and Phase II was completed in 1995. The purpose of the RFIs were to characterize the extent of soil and groundwater contamination. Results of the RFIs are documented in the *RCRA Facility Investigation Final Report – Phase I, Naval Air Station Oceana, Virginia Beach, Virginia,* (CH2MHILL, December 1993) and the *RCRA Facility Investigation Report – Phase II, Naval Air Station Oceana, Virginia Beach, Virginia,* (CH2MHILL, dated February 1985).

1.3 SWMU 15 Biological Treatment Project

Pertinent information from various investigations is summarized and provided in the following sections to provide sufficient project closeout information for the SWMU 15 Biological Treatment Project. Specifically, these reports are:

Draft Final Corrective Measures Study for SWMUs 2E, 15, and 24, Naval Air Station, Oceana, Virginia Beach, Virginia, (CH2MHILL,dated March 1996) – This Corrective Measures Study documents the field activities and investigation results that led to the selected remedial alternative of contaminated soil excavation and on-site treatment.

Technical Memorandum – SWMU 15 Soil Investigation Results, Oceana Naval Air Station, (CH2MHILL, dated May 9, 1996) – This technical memorandum documents the investigation methods and results used to delineate the areal boundaries for the volume of contaminated soil slated for excavation and treatment.

Final Report – Final Remedial Action Design and Construction for Soil Remediation at RCRA SWMU 15, Oceana Naval Air Station, Virginia Beach, Virginia, (CH2MHILL, dated November 1997) – This document contains the design specifications for the on-site treatment of the excavated soil.

Final Work Plan for Confirmation Sampling for Site 15 Soil Remediation, Oceana Naval Air Station, Virginia Beach, Virginia, (CH2MHILL, dated September 1998) – This document contains the proposed field methods for soil sampling of the biopiles and the excavation perimeter at SWMU 15 that was conducted during late October and early November 1998.

Draft-Final Technical Memorandum for the Soil Sampling at SWMU 15, Oceana Naval Air Station, Virginia Beach, Virginia, (CH2M HILL, dated April 1999) – This technical memorandum documents the results of SWMU 15 biopile confirmatory soil sampling.

Final Report, Human Health Risk Assessment for the SWMU 15 Biopiles, Naval Air Station, Oceana, Virginia Beach, Virginia, (CH2MHILL, dated June 1999) – This report documents the results of a human health risk assessment of SWMU 15 biopile soils.

Final Work Plan Addendum, Sediment, Surface Water, and Surface Soil Sampling at Multiple SWMUs to support Ecological Risk Assessment, Direct Push Technology Investigation to support MNA at SWMU 15, and Monitored Natural Attenuation Study at SWMU 15, Naval Air Station, Oceana, Virginia Beach, Virginia, (CH2MHILL, dated December 1999) – This document contains the proposed field methods for surface soil sampling of SWMU 15 biopile soil and background locations where the treated soil will be used as clean fill.

Operations & Maintenance Manual, Soil Remediation, Site 15, NAS Oceana, Virginia Beach, Virginia, (S.W. Day Construction Corporation, dated January 10, 2000) – This document contains the SWMU 15 Biological Treatment Project construction variance requests and the final construction as-builts.

Final Technical Memorandum - Ecological Evaluation of the SWMU 15 Biopile Soils, Naval Air Station, Oceana, Virginia Beach, Virginia, (CH2MHILL, dated March 2000) – This memorandum documents the results of surface soil sampling of SWMU 15 biopile soils and background locations to evaluate potential risk to ecological receptors presented by using

the treated biopile soils as clean fill. This memorandum recommends no further action for SWMU 15 biopile soils.

2.0 CMS For SWMUs 2E, 15, and 24

The *Draft Final Corrective Measures Study for SWMUs 2E, 15, and 24, Naval Air Station, Oceana, Virginia Beach, Virginia* documents the field activities and investigation results that led to the selected remedial alternative of contaminated soil excavation and on-site treatment. During the RFI and CMS the Navy installed and sampled site monitoring wells and collected DPT groundwater samples, collected surface and subsurface soil samples, and dug test pits to define the nature and extent of site contamination. The results of these investigations indicated that the groundwater and the soil in the central portion of the SWMU is contaminated with total petroleum volatile compounds primarily composed of BTEX. Soil and groundwater contamination are illustrated in Figure 2-1 and Figure 2-2. In the CMS four remedial alternatives were developed to address the surface and subsurface soil contamination at SWMU 15. They are:

- Alternative 1 – No Action
- Alternative 2 – In-Situ Landfarming
- Alternative 3 – In-Situ Bioventing
- Alternative 4 – Excavation and On-Site Composting

On the basis of long term reliability and effectiveness, reduction of toxicity, mobility, or volume, short-term effectiveness, implementability, and cost, alternative 4 was recommended for implementation.

In the CMS soil cleanup goals were calculated for the SWMU 15 soil based upon the potential for contaminants to leach into the groundwater at levels exceeding the preliminary remediation goal (PRG) for groundwater. Site soil contaminants that were found to present a risk or hazard above accepted limits, either through direct contact with the soil or leaching to groundwater, are total petroleum hydrocarbons (TPH), benzene, and ethylbenzene. The PRGs were based on an adult industrial "most likely" exposure risk for constituents that have been identified as chemicals of potential concern. The cleanup goals were calculated in accordance with the Risk Assessment Guidance for Superfund, (RAGS), Part A and B of Volume 1 (EPA, 1989 and EPA, 1991). The PRGs are documented in Appendix D of the CMS and the calculated soil cleanup levels are documented in Appendix L of the CMS.

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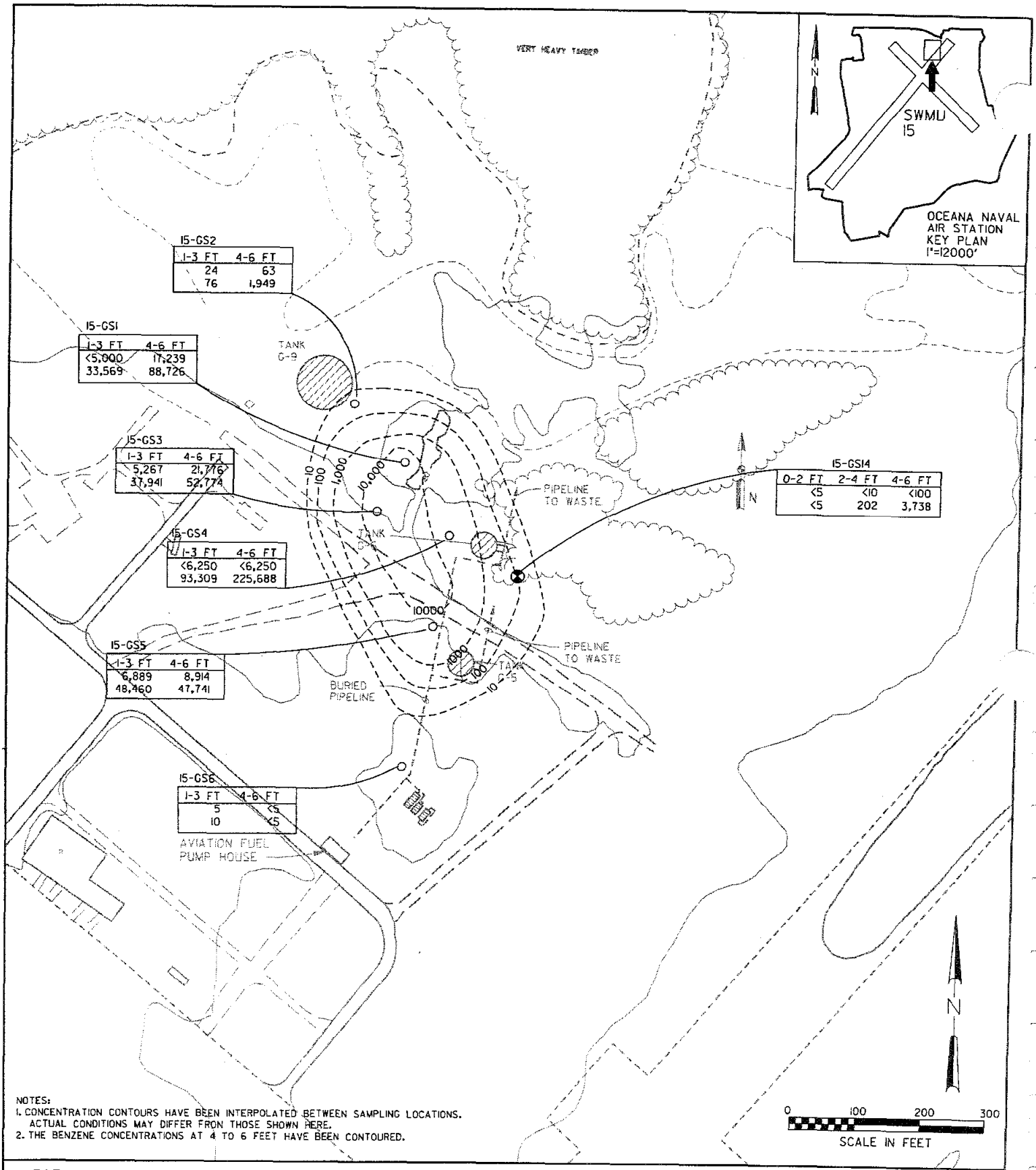

NOTES:
1. CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED BETWEEN SAMPLING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE.
2. THE BENZENE CONCENTRATIONS AT 4 TO 6 FEET HAVE BEEN CONTOURED.

LEGEND

- O RFI SOIL SAMPLING LOCATION
- GEOPROBE SAMPLING LOCATION
- < COMPOUND NOT DETECTED ABOVE THE INDICATED IDL
- --100-- BENZENE ISOCONCENTRATION CONTOUR (ug/kg)

BENZENE
TOTAL BTEX

(ug/kg)

Figure 2-1
BENZENE AND TOTAL BTEX CONCENTRATIONS IN SUBSURFACE SOIL AT SWMU 15
FEBRUARY 1994
Naval Air Station, Oceana
Virginia Beach, Virginia

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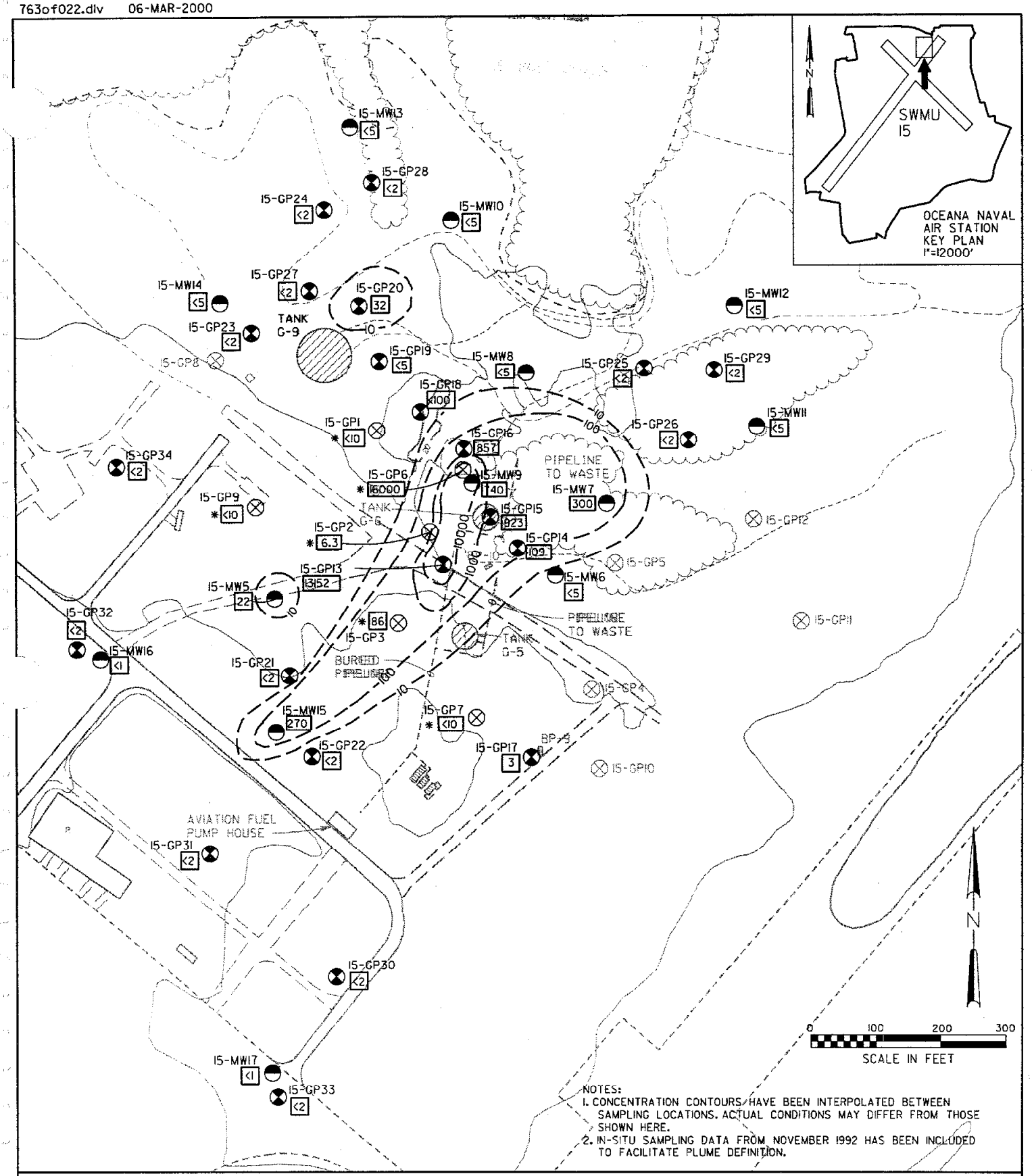

NOTES:
1. CONCENTRATION CONTOURS HAVE BEEN INTERPOLATED BETWEEN SAMPLING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE.
2. IN-SITU SAMPLING DATA FROM NOVEMBER 1992 HAS BEEN INCLUDED TO FACILITATE PLUME DEFINITION.

LEGEND

- ⊗ GEOPROBE PHASE I SAMPLING LOCATION (NOV. 1992)
- GEOPROBE PHASE II SAMPLING LOCATION
- SHALLOW MONITORING WELL
- —5— BENZENE ISOCONCENTRATION CONTOUR ug/L
- [300] BENZENE CONCENTRATION ug/L
- [<5] NOT DETECTED AT THE INDICATED IDL
- * MEASURED IN NOVEMBER 1992

Figure 2-2
BENZENE CONCENTRATIONS IN GROUNDWATER AT SWMU 15
FEBRUARY 1994 TO MARCH 1995
Naval Air Station, Oceana
Virginia Beach, Virginia

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3.0 SWMU 15 Soil Investigation Results – 1996

To delineate the areal boundaries for the volume of contaminated soil slated for excavation and on-site biological treatment, the Navy conducted an additional investigation of the soils at SWMU 15. The result of this investigation is documented in the *Technical Memorandum – SWMU 15 Soil Investigation Results, Oceana Naval Air Station.*

The additional soil investigation, conducted in May 1996, sought to determine the areal and vertical extent of petroleum contamination in subsurface soils. Twenty-four subsurface locations (4-foot depth) and six surface locations were sampled and analyzed for volatiles. The analytical results from the soil samples were used to delineate the volume of soil which contained petroleum contamination at concentration that would leach to the groundwater at levels calculated and modeled to exceed the groundwater PRGs developed in the CMS. Results of this investigation are illustrated in Figure 3-1. The most conservative soil cleanup value for contaminants of concern in SWMU 15 soil, 91 ppb for benzene, was used as the criteria to determine the volume of soil at SWMU 15 for excavation and on-site biological treatment.

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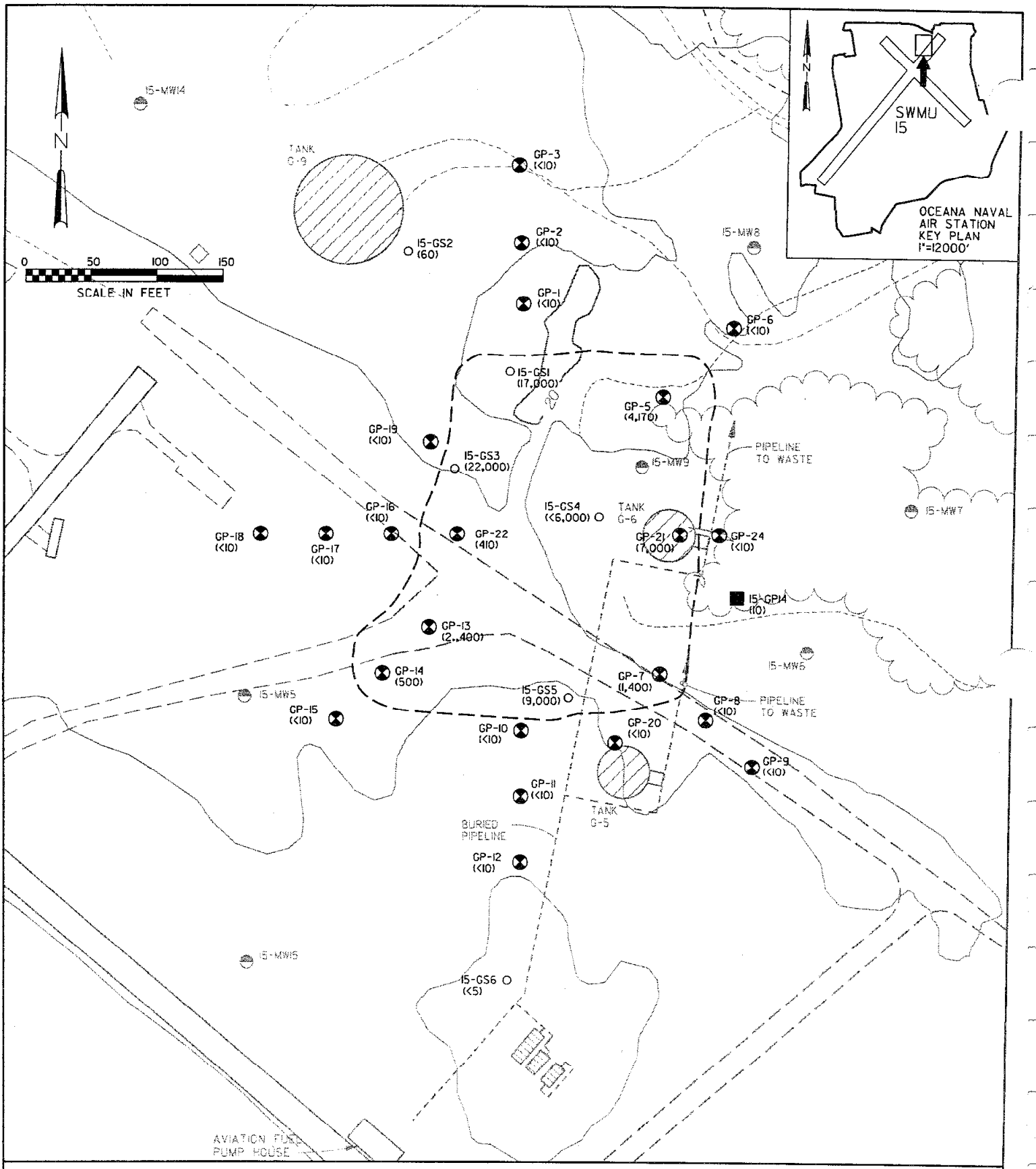

LEGEND

- PREDESIGN SOIL SAMPLING LOCATION
- CMS SHALLOW MONITORING WELL
- RFI SHALLOW MONITORING WELL
- RFI SOIL SAMPLING LOCATION
- GEOPROBE SOIL SAMPLE
- ISOCONCENTRATION CONTOUR OF 100 ppb BENZENE

NOTES:

1. ALL SOIL SAMPLES ARE FROM APPROXIMATELY 4 FT DEPTH.
2. CONCENTRATIONS OF BENZENE ARE IN ppb.

Figure 3-1
BENZENE CONCENTRATIONS IN SOIL SAMPLES AT SWMU 15
MARCH 1996
Naval Air Station, Oceana
Virginia Beach, Virginia

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4.0 Remedial Action Design and Construction Report

The *Final Report – Final Remedial Action Design and Construction for Soil Remediation at RCRA SWMU 15, Oceana Naval Air Station, Virginia Beach, Virginia* contains the design specifications for the on-site biological treatment of the excavated soil. The document contains the following information:

- Basis of Design
- Construction Specifications
- Construction and Contractor As-built Drawings
- Sampling and Analysis Plan
- Statement of Qualifications – Biological Treatment
- Soil Treatment Plan
- Groundwater Treatment Plan
- Confirmatory Sampling Data
- Contractor's Progress Reports

S.W. Day Construction Corporation from Chesapeake, VA was selected as the project's General Contractor. S.W. Day subcontracted Quality Enterprises, USA, from Chesapeake, VA to excavate the soil and Biosystems Technology, Inc., of Blacksburg, VA to conduct the biological treatment of the excavated soil.

During the RFI and CMS investigations the extent of soil contamination at SWMU 15 was identified primarily in the vicinity of former tanks G-5, G-6, and G-9, in an area comprising approximately 2 acres. The field investigation conducted in March 1996 further delineated the extent of contamination as an area of about 1.45 acres based upon a 91 ppb cleanup level for benzene.

4.1 Basis of Design

The remedial action design and construction document states that the average thickness of the lower-permeability clayey silt layer of the shallow aquifer extends from the ground surface to a depth of approximately 7 feet. Groundwater in the general vicinity is estimated to vary between 3 and 8 feet below surface elevation. On the basis of this information the depth of excavation for removal of contaminated soil was determined to be approximately 7 feet. This depth corresponds to an elevation of approximately 11 feet above mean sea level. The volume of soil slated for excavation and treatment was determined to be approximately 19,000 cubic yards.

The design document proposed ex-situ treatment of the contaminated soil. The design required the soil to be prepared for biological treatment by running it through a hammermill screen to break up soil clumps, which would in-turn maximize void space and surface area, and aerate the soils. During the screening process the design called for the

addition of nutrients and substrate to enhance the biological activity in the soils. The design proposed a phased approach to biological treatment with three lifts, of approximately 6,300 cubic yards each, being treated and piled. Per the design, the prepared soil for each phase was to be positioned into long piles on an impervious surface and covered with heavy duty plastic (10 mil or greater) to maintain warm temperatures and optimum moisture conditions. The design prescribed a 6-week treatment process and confirmatory sampling to show the desired reduction in TPH and BTEX compounds. Confirmatory sampling was prescribed according to the Virginia Solid Waste Management Regulations for disposal of petroleum-contaminated soil (50 ppm of TPH and 10 ppm of BTEX). After successful treatment, the soils were to be placed back into the original excavation.

4.2 Biopile Soil Remediation

S.W. Day and Biosystems proceeded with the remediation of the contaminated soil. Due to the higher than expected clay content of the strata all of the soil was treated at once, rather than in lifts. The homogenized soil was deposited into two biopiles and seeded with nutrients. Air and water were supplied to the biopiles via a network of pipes layered between every 3-foot layer of soils prepared for biological treatment. Following the construction of the biopiles, the soils were covered with black plastic to enhance bioremediation. Construction variance requests and the final project construction as-builts are contained in the *Operations & Maintenance Manual, Soil Remediation, Site 15, NAS Oceana, Virginia Beach, Virginia.*

The remediation took longer than the anticipated six weeks due to lack of approved confirmatory sampling procedures and methodology to assess potential risk; therefore, the biopiles remained in place for approximately 18 months. In July 1998, the Navy and EPA agreed to complete current remediation activities and all future investigations and remedial actions following the procedural and substantive requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The change in regulatory oversight, from RCRA to CERCLA, initiated new discussion between the Navy and EPA regarding the completion of the SWMU 15 Biological Treatment Project. A confirmatory sampling plan, that included assessing potential risk to human health, was developed and agreed to in September 1998. Per the agreement, the Navy conducted a sampling event for the soil in the two biopiles at multiple locations and multiple depths to determine the effectiveness of the biological treatment process. Subsurface soil samples were also collected from the perimeter of the excavation to confirm that the excavation was sufficient in areal extent to remove contaminated soil. The methods and results of the sampling event are documented in the next section of this document. This information comprises the bulk of the *Draft-Final Technical Memorandum for the Soil Sampling at SWMU 15, Oceana Naval Air Station, Virginia Beach, Virginia* for which this document finalizes.

5.0 SWMU 15 Biopile and Field Soil Sampling

During October and November 1998, CH2M HILL, Inc. conducted confirmatory soil sampling of soil remediation biopiles and the soil excavation perimeter at SWMU 15, in accordance with the *Final Work Plan for Confirmation Sampling for Site 15 Soil Remediation, Oceana Naval Air Station, Virginia Beach, Virginia.* The principal goals of this confirmation sampling were to: (1) determine the contaminant concentrations in the soil remaining around the perimeter of the excavation area; and (2) determine the residual contaminant concentrations in the soil within the biopiles, composed of the excavated soil.

In order to support a planned human health risk assessment, all analyses of soil was conducted at a contracted laboratory that fulfills all requirements of the U.S. Navy's QA/QC Program Manual and EPA's Contract Laboratory Program. A signed certificate of analysis was provided with each laboratory analysis, along with a certificate of compliance certifying that all work was performed in accordance with the applicable federal, state, and local regulations. All analyses were performed following Navy guidance for Level D.

All data was validated before the project staff interpreted the data. The data validation was performed by an independent subcontractor, conformed to the Navy guidance for Level D. Data requiring qualification was flagged with the appropriate symbol. Results for QA/QC samples were reviewed and, if needed, the data was further qualified. Finally, the data set as a whole was examined for consistency, anomalous results, and reasonableness.

The detected chemicals from the SWMU 15 validated analytical soil data are located in Appendix A5-1. Methods and results for the soil sampling are documented below.

5.1 Excavation-Perimeter Confirmation Sampling Methods

On November 4, 1998, 10 grab soil samples were collected from the perimeter surrounding the excavation area at SWMU-15. The samples were collected at equidistant intervals (approximately every 200 feet) around the perimeter of the excavation, at a distance of two feet outward from the edge of the excavation perimeter. The soil samples were collected from a depth interval of one to two feet below ground surface.

Upon collection, the ten soil samples and appropriate QC samples were submitted to an off-site laboratory (GP Environmental of Gaithersburg, MD) for analysis for benzene, toluene, ethylbenzene, xylenes (BTEX) using SW-846 and EPA Method 8260, polynuclear aromatic hydrocarbons (PAHs) using SW-846 and EPA Method 8310, and TPH using EPA Method 8015. The sampling locations are illustrated in Figure 5-1.

5.2 Biopile Confirmation Sampling Methods

In 1997 the fuel-contaminated soil was excavated to a depth of seven feet below ground surface and the depth of excavation was nearly equivalent to the lowest recorded water table in the excavation area. Upon completion of the excavation, the excavated soil was

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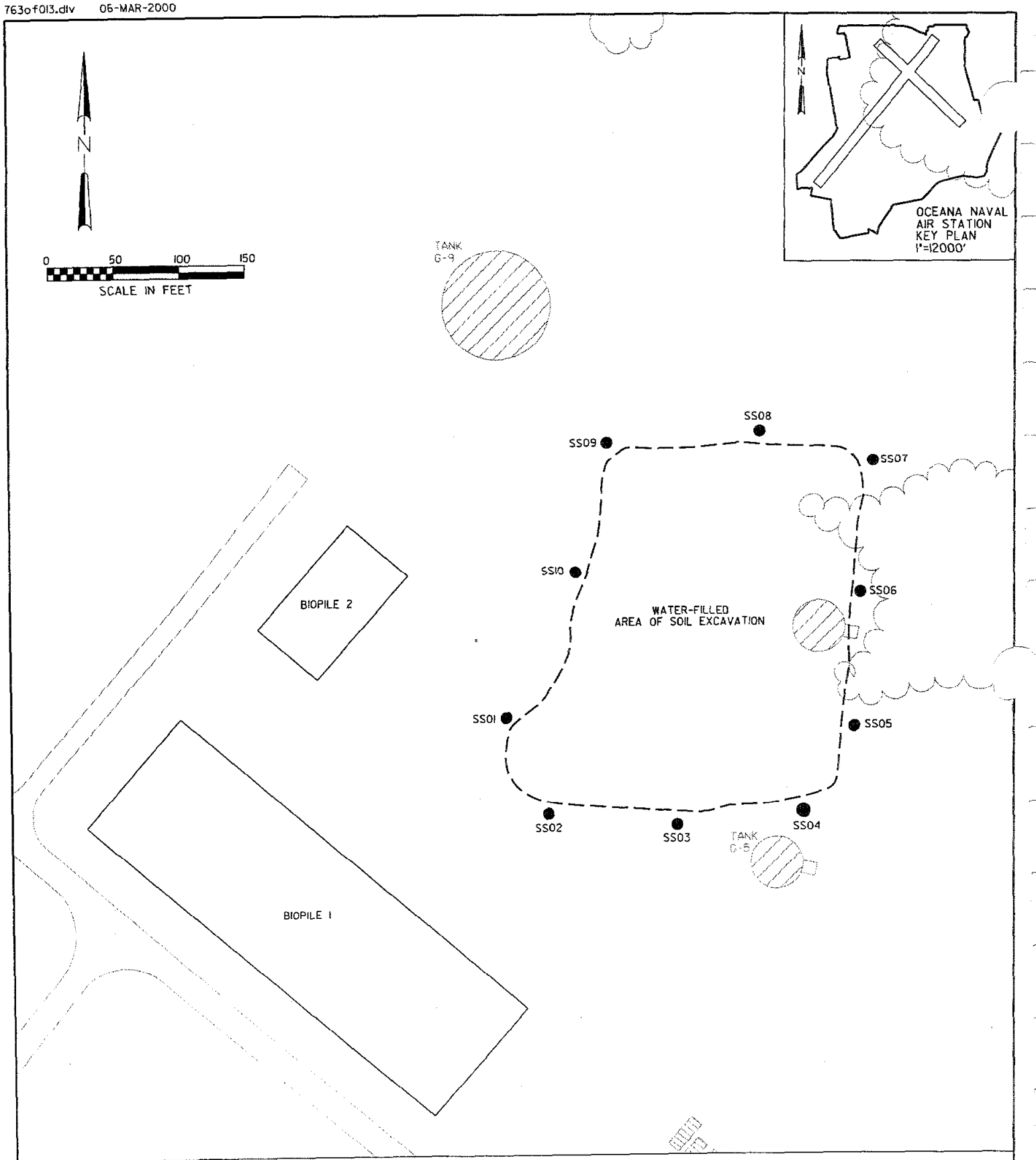

NOTE:
ALTHOUGH THE SAMPLES POSSESS AN "SS" DESIGNATION THEY ARE SUBSURFACE SOIL SAMPLES COLLECTED FROM 1-2 FEET BELOW GROUND SURFACE.

LEGEND

● SAMPLE LOCATION

— — — APPROXIMATE AREA OF EXCAVATION

Figure 5-1
CONFIRMATORY SOIL SAMPLE LOCATIONS AT SWMU 15-NOVEMBER 1998
Naval Air Station, Oceana
Virginia beach, Virginia

CH2MHILL

screened and pulverized with a hammer mill to generate a material with a uniform grain size. The soil was then deposited into two biopiles in lifts using a conveyor belt and seeded with fertilizer to biodegrade the organic contaminants. Over a period of 18 months, the soil was bioremediated.

5.3 Sample Numbers

As proposed in the Confirmatory Sampling Work Plan, confirmatory soil samples were collected from the two biopiles at SWMU-15 to determine the residual contaminant concentrations in the soil after bioremediation. Based upon the homogeneous nature of the soil, the number of confirmatory soil samples collected at the biopiles summarized below:

Biopile 1	27 Soil Samples collected during October 28-30, 1998
Biopile 2	7 Soil Samples collected on November 4, 1998

At the request of the EPA, a power curve analysis was conducted for benzene to determine if the number of samples proposed in the work plan were sufficient to fully characterize the volume of soil being sampled. As part of the USEPA guidance on determining data quality objectives, EPA has developed software to iteratively determine the appropriate number of samples for a given site. The *Data Quality Objectives Decision Error Feasibility Trials (DQO/DEFT)* (EPA QA/G-4D, September 1994) provides a means for estimating the number of samples needed based on several input parameters. The input data and the model output for total number of samples is discussed below. Additional detail on the DQO/DEFT model is provided in Appendix A5-2.

Action Level: 50
Upper Bound on Gray Region: 91
Probability Limits on Decision Errors: 5%

Number of Benzene Samples: 27

The power curve results indicate that the number of benzene samples collected is sufficient.

5.3.1 Sample Locations

The locations of confirmatory soil samples within the two biopiles are illustrated on Figure 5-2. The soil sample locations were derived using statistical methods published in the EPA guidance document Statistical Methods for Evaluating the Attainment of Cleanup Goals, Volume 3: Reference-Based Standards for Soils and Solid Media, December 1992. First, the piles were gridded such that a single grid contained between 1-2 percent of the area of the pile. The derivation of sampling locations began with the selection of a single random location within the sampling area following formulas presented in Chapter 5 of the guidance document. Formulas to determine the separation distance and row spacing were applied to each pile to form a triangular sampling network. The last step involved the determination of random offset distances from triangulated sampling points in X and Y directions to determine the exact sampling points. A randomly selected variance of ±3 feet was used.

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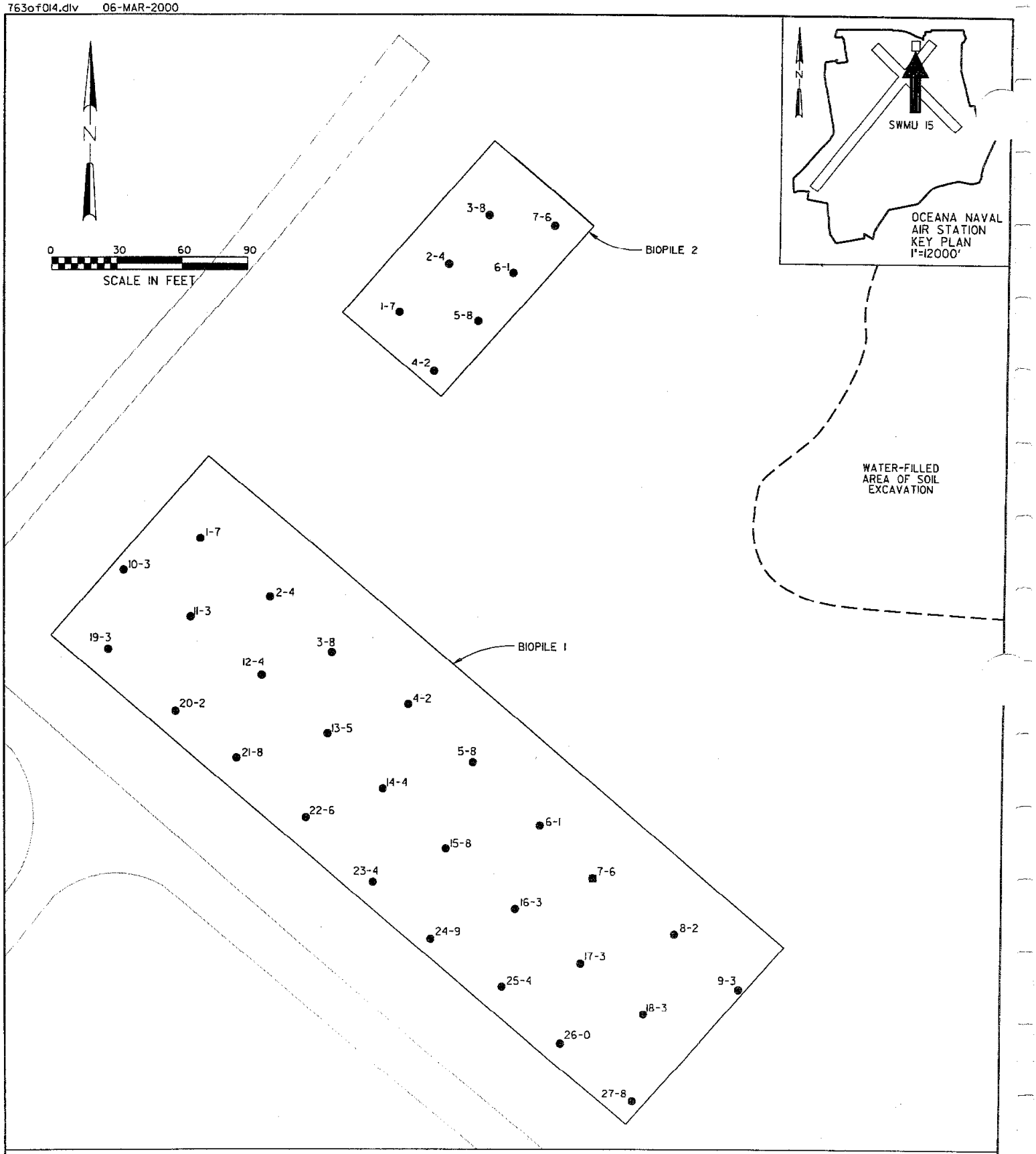

LEGEND

6-1 ● VOC, PAH, AND TPH SAMPLING LOCATIONS - SAMPLE DEPTHS BELOW GROUND SURFACE (BGS)

NOTE:
SAMPLES FROM BIOPILE #1 ARE DESIGNATED AS OW15-SB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SB24-9 IS BIOPILE #1, SAMPLE 24 FROM 9 FT BGS)
SAMPLES FROM BIOPILE #2 ARE DESIGNATED AS OW15 -SBB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SBB3-8 IS BIOPILE #2, SAMPLE 3 FROM 8 FT BGS)

— — APPROXIMATE AREA OF EXCAVATION

Figure 5-2
SOIL SAMPLE LOCATIONS IN BIOPILES
AT SWMU 15-NOVEMBER 1998
Naval Air Station, Oceana
Virginia Beach, Virginia

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5.3.2 Sample Depths

Sample depths for each sampling point were selected using randomly generated numbers between 0 and 9 feet. Where the randomly selected depth was greater than the depth of the pile, the sample was collected at the lowermost sample depth obtainable in the field.

5.3.3 Sample Collection Methods

All soil samples were collected as grab samples from discreet randomly selected locations and depths within the biopiles. The soil samples were collected with an auger and removed to sample containers using a stainless steel trowel. Samples were immediately placed in sample containers with minimum headspace to minimize volatile contaminant loss.

During the sample collection activities, soil sample OW15-SB24-9 (biopile 1, sample 24 from a depth of 9 feet) could not be collected at nine feet since perched groundwater was present at this depth. Thus, the sample was collected above the perched water table, at 8.5 feet below ground surface. Additionally, sample OW15-SBB3-8 (biopile 2, sample 3 at 8 feet) could not be collected from a depth of eight feet since the auger encountered refusal at this location. Thus, the sample was collected at 7 feet below ground surface.

Upon collection, the thirty-four soil samples and appropriate QC samples were submitted to an off-site laboratory (GP Environmental of Gaithersburg, MD) for analysis of Volatile Organic Compounds (VOCs) using SW-846 and EPA Method 8260, PAHs using SW-846 and EPA Method 8310 and Total Petroleum Hydrocarbons (TPH) using SW-846 and EPA Method 8015.

5.4 Excavation-Perimeter Confirmation Sampling Results

CH2M HILL compared the analytical results of the excavation-perimeter soils to the EPA Region III RBC screening levels for industrial and residential soils. Figure 5-3 illustrates the locations where the detected chemical concentrations exceeded these screening levels. Where a chemical concentration exceeded more than one screening level, exceedances were posted and labeled. Table 5-1 lists the locations of the exceeding detections, sample collection dates, chemicals that exceeded screening limits, the analytical results, any data validation qualifiers, the detection limits, the screening levels, and exceedance quotients. The exceedance quotient is the detected concentration divided by the regulatory limit. It serves as a quick assessment of the degree to which specific chemicals exceed regulatory limits.

Chemicals that were non-detect values but have detection limits that exceeded regulatory screening limits for EPA Region III RBC screening levels for industrial and residential soils are tabulated in Appendix A5-3.

In summary, the Region III RBC for benzo(a)anthracene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene for industrial and/or residential soil(s) was exceeded in soils from the excavation perimeter at SWMU-15, as listed in Table 5-1. Specifically, the exceedances of the Region III RBC occurred in samples OW15-SS03-01, OW15-SS05-01 and OW15-SS07-01.

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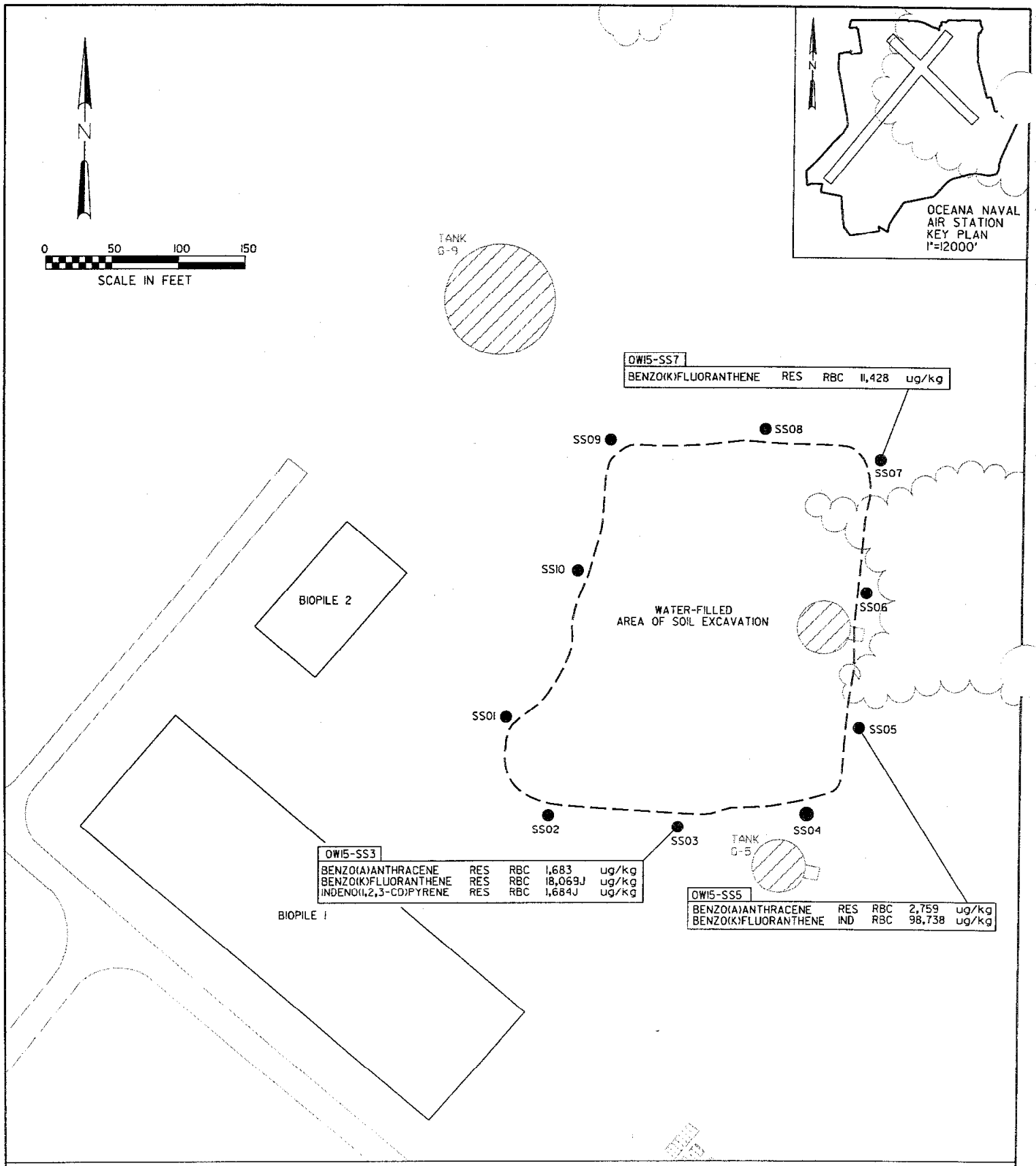

NOTE:
ALTHOUGH THE SAMPLES POSSESS AN "SS" DESIGNATION THEY ARE SUBSURFACE SOIL SAMPLES COLLECTED FROM 1-2 FEET BELOW GROUND SURFACE.

Figure 5-3
CHEMICALS DETECTED IN SOIL THAT EXCEED EPA REGION III RBC SCREENING LEVELS FOR RESIDENTIAL OR INDUSTRIAL SOIL AT SWMU 15 EXCAVATION - NOVEMBER 1998

Naval Air Station, Oceana
Virginia beach, Virginia

LEGEND

● SAMPLE LOCATION

— — — APPROXIMATE AREA OF EXCAVATION

CH2MHILL

Table 5-1
Excavation-Perimeter Soil Exceedances of Regulatory Screening Levels
SWMU-15, Oceana Naval Air Station, Virginia Beach, Virginia

Sample ID	Date Sample Collected	Analyte	Analytical Value (µg/Kg)	Data Validation Qualifier	Detection Limit (µg/Kg)	Regulatory Criteria	Regulatory Criteria Value (µg/Kg)	Exceedance Quotient[1]
OW15-SS03-01	11/04/1998	Benzo(a)anthracene	1683		381.061	Residential Soil RBC	870	1.9
		Benzo(k)fluoranthene	18069	J	30022.98	Residential Soil RBC	8700	2.1
		Ideno(1,2,3-cd)pyrene	1684	J	15011.49	Residential Soil RBC	870	1.9
OW15-SS05-01	11/04/1998	Benzo(k)fluoranthene	98738		34210.54	Industrial Soil RBC	78000	1.3
		Benzo(a)anthracene	2759		434.211	Industrial Soil RBC	7800	0.4
						Residential Soil RBC	870	3.2
OW15-SS07-01	11/04/1998	Benzo(k)fluoranthene	11428		3121.3	Residential Soil RBC	8700	1.3

Notes:
J - Estimated
Industrial Soil RBC - EPA Region III Risk-Based Concentration for Industrial Soil
Residential Soil RBC - EPA Region III Risk-Based Concentration for Residential Soil
[1]Exceedance Quotient is calculated as follows: Analytical Value/Regulatory Criteria Value

These soil data will be addressed in an SWMU-wide risk assessments for both human and ecological receptors. These risk assessments will address all site media, including soils, groundwater, surface water, and sediment. Drafts of these risk assessments were submitted for regulatory review in March 2000.

5.5 Biopile Confirmation Sampling Results

CH2M HILL compared the analytical results of the biopile soils to the EPA Region III RBC screening levels for industrial and residential soils. Figure 5-4 illustrates the locations where the detected chemical concentrations exceeded these screening levels. Where a chemical concentration exceeded more than one screening level, exceedances were posted and labeled. Table 5-2 lists the locations of the exceeding detections, sample collection dates, chemicals that exceeded screening limits, the analytical results, any data validation qualifiers, the detection limits, the screening levels, and the exceedance quotients. Where a chemical exceeded more than one screening level, both were tabulated.

Chemicals that were non-detect values but have detection limits that exceeded regulatory screening limits for EPA Region III RBC screening levels for industrial and residential soils are tabulated in Appendix A5-4.

In summary, the EPA Region III RBC for benzo(a)anthracene and benzo(b)fluoranthene for industrial and/or residential soil(s) was exceeded in soils from the biopiles at SWMU-15, as listed in Table 5-2. Specifically, the exceedances of the Region III RBC occurred in samples OW15-SB3-8, OW15-SB5-8, OW15-SB12-4, OW15-SB19-3, OW15-SB23-4 (these five samples were from biopile number 1) and OW15-SBB2-4, OW15-SBB3-8 and OW15-SBB6-1P (these three samples were from biopile number 2).

The analytical method used to acquire a single value for TPH, Method 418.1, is not generally used by analytical laboratories because it uses freon to extract the hydrocarbons and freon is an environmental contaminant. Freon is also very expensive and its use is cost-prohibitive. The freon also extracts hydrocarbons from asphalt and organic matter that is often not associated with site contamination. Therefore, as stated in the work plan, all biopile soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) using EPA Method 8015. This method resulted in values for gasoline-range organics (GRO) and diesel range organics (DRO). Since there is some overlap between the DRO and GRO analyses, the sum of the two method results is conservative in comparison to a similar sample result using Method 418.1.

The TPH values were compared to the Virginia Department of Environmental Quality (VDEQ) solid waste regulatory limit for TPH. The TPH values (either DRO or GRO) exceeded the VDEQ solid waste regulatory criteria of 50 parts per million (ppm) in seven soil samples collected from Biopile 1, and one soil sample collected from Biopile 2. A summary of these TPH exceedances is provided in Table 5-3. The TPH value derived from the sum of DRO and GRO values was compared to the Virginia Department of Environmental Quality (VDEQ) solid waste regulatory limit for TPH. The total TPH values (sum of DRO and GRO) exceeded the VDEQ solid waste regulatory criteria of 50 parts per million (ppm) in eight soil samples collected from Biopile 1, and one soil sample collected

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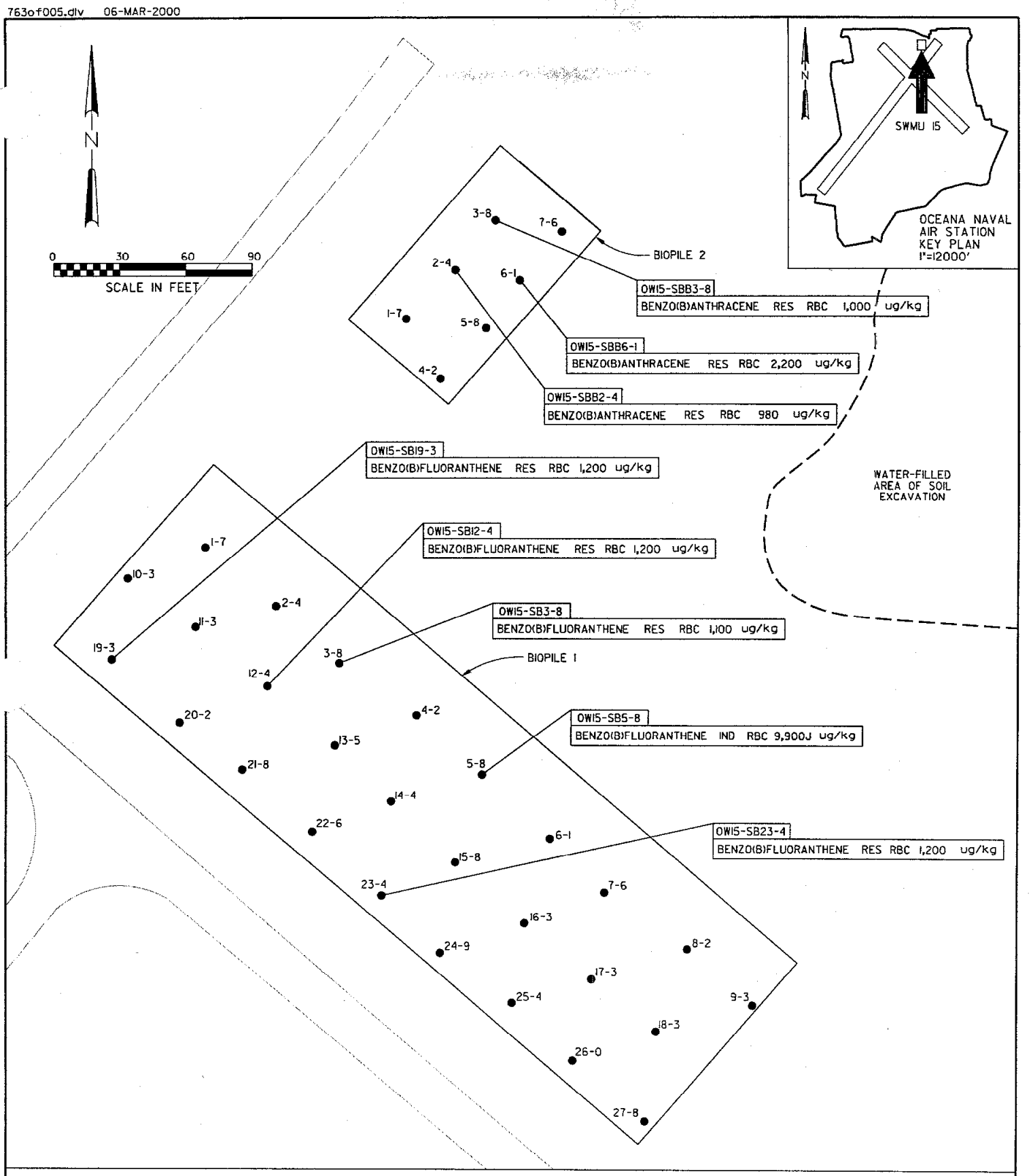

LEGEND

6-1 ● VOC, PAH, AND TPH SAMPLING LOCATIONS - SAMPLE DEPTHS BELOW GROUND SURFACE (BGS)

NOTE:
SAMPLES FROM BIOPILE #1 ARE DESIGNATED AS OW15-SB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SB24-9 IS BIOPILE #1, SAMPLE 24 FROM 9 FT BGS)
SAMPLES FROM BIOPILE #2 ARE DESIGNATED AS OW15 -SBB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SBB3-8 IS BIOPILE #2, SAMPLE 3 FROM 8 FT BGS)

— — APPROXIMATE AREA OF EXCAVATION

Figure 5-4
CHEMICALS DETECTED IN BIOPILE SOIL THAT EXCEED EPA REGION III RBC SCREENING LEVELS FOR RESIDENTIAL OR INDUSTRIAL SOIL, AT SWMU 15-NOVEMBER 1998

Naval Air Station, Oceana
Virginia Beach, Virginia

CH2MHILL

Table 5-2
Biopile Soil Exceedances of Regulatory Screening Levels
SWMU-15, Oceana Naval Air Station, Virginia Beach, Virginia

Sample ID	Date Sample Collected	Analyte	Analytical Value (µg/Kg)	Data Validation Qualifier	Detection Limit (µg/Kg)	Regulatory Criteria	Regulatory Criteria Value (µg/Kg)	Exceedance Quotient[1]
OW15-SB3-8	10/29/1998	Benzo(b)fluoranthene	1100		770	Residential Soil RBC	870	1.3
OW15-SB5-8	10/29/1998	Benzo(b)fluoranthene	9900	J	16000	Industrial Soil RBC	7800	1.3
		Benzo(b)fluoranthene	9900	J	16000	Residential Soil RBC	870	11.4
OW15-SB12-4	10/29/1998	Benzo(b)fluoranthene	1200		770	Residential Soil RBC	870	1.4
OW15-SB19-3	10/29/1998	Benzo(b)fluoranthene	1200		790	Residential Soil RBC	870	1.4
OW15-SB23-4	10/29/1998	Benzo(b)fluoranthene	1200		310	Residential Soil RBC	870	1.4
OW15-SBB2-4	10/30/1998	Benzo(a)anthracene	980		400	Residential Soil RBC	870	1.1
OW15-SBB3-8	10/30/1998	Benzo(a)anthracene	1000		400	Residential Soil RBC	870	1.1
OW15-SBB6-1P	10/30/1998	Benzo(a)anthracene	2200		40	Residential Soil RBC	870	2.5

Notes:
J - Estimated
Industrial Soil RBC - EPA Region III Risk-Based Concentration for Industrial Soil
Residential Soil RBC - EPA Region III Risk-Based Concentration for Residential Soil
[1]Exceedance Quotient is calculated as follows: Analytical Value/Regulatory Criteria Value

Table 5-3
Biopile Soil Exceedances of VDEQ TPH Regulatory Criteria Value
SWMU-15, Oceana Naval Air Station, Virginia Beach, Virginia

Sample ID	Date Sample Collected	Analyte	Analytical Value (mg/Kg)	Data Validation Qualifier	Detection Limit (mg/Kg)	Regulatory Criteria	Regulatory Criteria Value (mg/Kg)	Exceedance Quotient[1]
OW15-SB3-8	10/29/1998	TPH-GRO	193.73		0.59	VDEQ	50	3.9
		TPH-DRO	74.3		2	VDEQ	50	1.5
OW15-SB5-8	10/29/1998	TPH-DRO	62.6		2.1	VDEQ	50	1.3
OW15-SB11-3	10/29/1998	TPH-GRO	52.7		0.6	VDEQ	50	1.1
OW15-SB13-5	10/29/1998	TPH-DRO	51.3		2.1	VDEQ	50	1.0
OW15-SB15-8	10/29/1998	TPH-DRO	61.1		2	VDEQ	50	1.2
OW15-SB21-8	10/29/1998	TPH-DRO	190.3		2.1	VDEQ	50	3.8
OW15-SB27-8	10/28/1998	TPH-DRO	70		2.1	VDEQ	50	1.4
OW15-SBB5-8	10/30/1998	TPH-GRO	137.94	J	0.64	VDEQ	50	2.8

Notes:
J - Estimated
TPH-GRO - Total Petroleum Hydrocarbons, Gasoline Range Organics
TPH-DRO - Total Petroleum Hydrocarbons, Diesel Range Organics
VDEQ - Virginia Department of Environmental Quality
[1]Exceedance Quotient is calculated as follows: Analytical Value/Regulatory Criteria Value

from Biopile 2. A summary of these TPH exceedances is provided in Table 5-4. The locations of these exceedances are illustrated in Figure 5-5. Most of the exceedances of the clean fill regulatory limit occur at the base of the biopiles at a sample depth of 8 feet.

TABLE 5-4
Total Petroleum Hydrocarbon Concentrations from SWMU 15 Biopile Samples that Exceed the VDEQ 50 PPM Solid Waste Regulatory Limit

Sample ID	TPH (Mg/Kg) (Sum of DRO and GRO)
OW15-SB13-5	53.5
OW15-SB7-6	60.8
OW15-SB15-8	63.9
OW15-SB5-8	67.3
OW15-SB11-3	75
OW15-SB27-8	80
OW15-SBB5-8	155.4
OW15-SB21-8	201.4
OW15-SB3-8	268

Biopile soil samples were analyzed for the volatiles benzene, ethylbenzene, toluene, and xylenes, using EPA Method 8260. Table 5-5 lists the analytical results of this analysis in ug/L (ppb) for each of these chemicals and a value for the sum of them as total BTEX. Non-detects are in standard type and detects are in boldface type. Only one sample, OW15-SB3-8 with a total BTEX value of 14.84 parts per million (ppm) exceeded the VDEQ solid waste regulatory criteria of 10 ppm.

The concentration of benzene in one soil sample, OW15-SB3-8, was found to exceed the 91 parts per billion (ppb) PRG for soil; this sample location also exceeded the VADEQ solid waste regulatory limit for TPH. As modeled by CH2M HILL in the March 1996 CMS report, a 91 ppb or greater concentration of benzene in soil at this area will leach benzene into the groundwater at levels that exceed the cleanup goal of 26 ug/L that was determined in the CMS report.

The Biopile soil sample analytical results for DRO/GRO (summed as total TPH) and benzene, ethylbenzene, toluene, and xylenes (summed as total BTEX) were used to calculate the 95 percent upper confidence limit (95% UCL) of the arithmetic mean concentration for the data grouping. The Shapiro-Wilks W-test using an alpha value of one percent was used to determine if the data fit a lognormal or normal distribution. If the W-test was inconclusive, the most conservative value between the normal and lognormal 95% UCL values was used. The 95% UCL did not exceed the maximum detected concentration. The selected 95% UCL was compared to solid waste regulatory screening levels. Table 5-6 documents the results of the statistical evaluation and comparison to screening levels. The TPH was determined to be lognormally distributed, therefore, the lognormal 95% UCL of 63 Mg/Kg was selected for comparison. This value exceeds the 50 Mg/Kg TPH regulatory screening limit for solid waste disposal as clean fill. The distribution of the total BTEX values from

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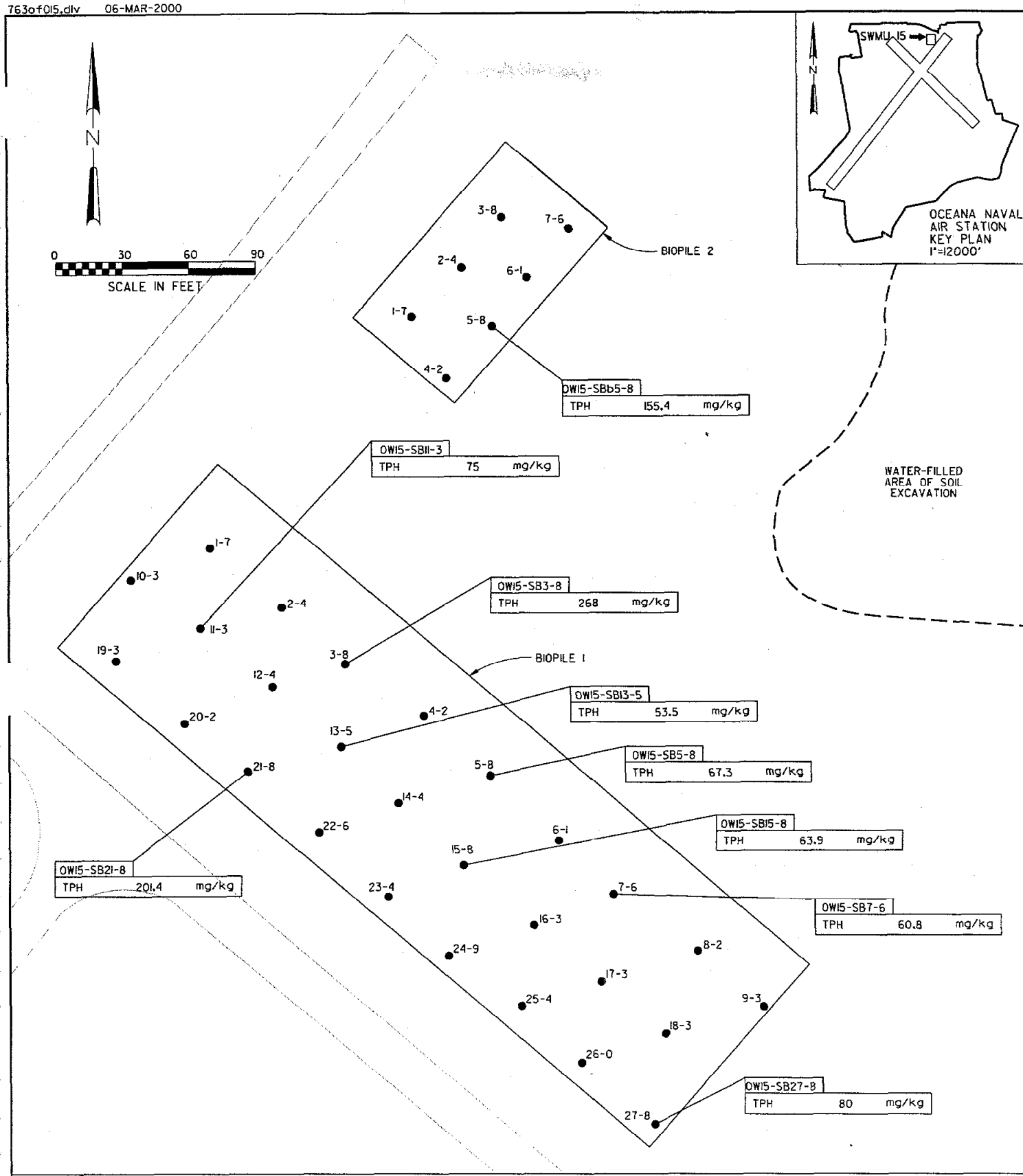

LEGEND

6-1 ● VOC, PAH, AND TPH SAMPLING LOCATIONS - SAMPLE DEPTHS BELOW GROUND SURFACE (BGS)

NOTE:
SAMPLES FROM BIOPILE #1 ARE DESIGNATED AS OW15-SB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SB24-9 IS BIOPILE #1, SAMPLE 24 FROM 9 FT BGS)
SAMPLES FROM BIOPILE #2 ARE DESIGNATED AS OW15 -SBB"SAMPLE #"-"SAMPLE DEPTH"
(I.E. OW15-SBB3-8 IS BIOPILE #2, SAMPLE 3 FROM 8 FT BGS)

— — APPROXIMATE AREA OF EXCAVATION

Figure 5-5
TPH (SUM OF DRO & GRO) VALUES THAT EXCEED VDEQ 50 ppm SOLID WASTE REGULATORY LIMIT

Naval Air Station, Oceana
Virginia Beach, Virginia

CH2MHILL

TABLE 5-5
Summary of BTEX Detections in SWMU 15 Biopile Soil (ug/L)

Sample ID	Benzene		Ethylbenzene		Toluene		Xylenes (total)		Total BTEX	
OW15-SB10-3	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB11-3	<30	U	66		<30	U	633		759	
OW15-SB12-4	<30	U	**345**		<30	U	**1557**		**1962**	
OW15-SB13-5	<6	UL	2	L	<6	UL	28		42	
OW15-SB14-4	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB15-8	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB16-3	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB16-3	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB1-7	<6	U	2	J	<6	U	7		21	
OW15-SB17-3	<6	U	**5**	**K**	<6	U	**20**		**37**	
OW15-SB18-3	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB19-3	<6	U	<6	U	<6	U	2		20	
OW15-SB20-2	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB20-2P	<6	UL	6	L	<6	UL	101		119	
OW15-SB21-8	**77**	**K**	**760**	**L**	**280**	**L**	**5700**		**6817**	
OW15-SB22-6	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB23-4	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB2-4	<6	U	3	J	<6	U	21		36	
OW15-SB24-9	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB25-4	<6	U	**10**	**K**	<6	U	**52**		**74**	
OW15-SB26-0	<11	U	<11	U	<11	U	<11	U	<44	U
OW15-SB27-8	<12	U	<12	U	<12	U	<12	U	<48	U
OW15-SB3-8	**103**		**791**		**1754**		**12201**		**14849**	
OW15-SB4-2	<6	UJ	<6	UJ	<6	UJ	<6	U	<24	U
OW15-SB4-2P	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB5-8	<6	U	<6	U	<6	U	<6	U	<24	U
OW15-SB6-1	<6	U	**4**	**K**	<6	U	**20**		**36**	
OW15-SB6-1P	<6	U	**2**	**K**	<6	U	**11**		**25**	
OW15-SB7-6	<6	U	**64**	**K**	<6	U	**283**		**359**	
OW15-SB8-2	<6	U	**34**	**K**	<6	U	**164**		**210**	
OW15-SB9-3	<6	UJ	**2**	**K**	<6	UJ	**13**		**27**	
OW15-SBB1-7	<6	U	<6	U	<6	U	**2**		**20**	
OW15-SBB2-4	<6	U	**27**		<6	U	**125**		**164**	
OW15-SBB3-8	**2**	**K**	**2**	**K**	<6	U	**6**		**16**	
OW15-SBB4-2	<6	U	**3**	**J**	6	U	**18**		**33**	
OW15-SBB5-8	<6	U	**760**	**J**	<6	U	**2000**		**2772**	
OW15-SBB6-1	<6	U	<6	U	<6	U	**4**		**22**	
OW15-SBB6-1P	<6	U	<6	U	<6	U	**4**		**22**	

Table 5-6
Comparison of Biopile Soil Sample Concentrations to Screening Levels
SWMU-15, Oceana Naval Air Station, Virginia Beach, Virginia

Chemical Name	Number of Samples	Average	t-value	Standard Deviation	Normal 95% UCL	Lognormal 95% UCL	Selected (1)	Maximum Detected Concentration	Screening Level
TPH (mg/kg)									
TPH-DRO	34	27.19411765	2.036	34.94	77.06	35.96		190.3	
TPH-GRO	34	17.80411765	2.036	39.45	74.10	27.93		193.73	
Total TPH *	34	44.93	2.036	57.13	126.45	**63.04**	**63.0**	268.03	**50**
Volatile Organics (ug/kg)									
Benzene	34	8.96	2.036	21.02	38.94	8.48		103	
Ethylbenzene	34	86.46	2.036	224.05	406.15	143.86		791	
Toluene	34	63.51	2.036	302.44	495.06	22.81		1,754	
Xylenes (total)	34	676.51	2.036	2288.02	3941.26	3048.96		12,201	
Total BTEX	34	1353.07	2.036	5039.41	**8543.73**	5926.89	**8,544**	27,050	**10,000**

* - Total TPH is a conservative sum of the TPH-DRO and TPH-GRO.

(1) Total TPH is lognormal distribution based on the w-test. The distribution for total BTEX was inconclusive; therefore, maximum UCL value conservatively used.

the W-test was inconclusive; therefore, the maximum 95% UCL which was the normal value 8,544 ug/Kg was selected for comparison. This value does not exceed the 10,000 ug/Kg (10 ppm) total BTEX regulatory screening limit for solid waste disposal as clean fill.

A human health risk assessment was conducted to evaluate the potential health risks associated with the exposure to the SWMU 15 biopile soils. The baseline risk assessment, which characterizes future human health risks associated with the disbursement of the biopiles soils to become surficial soil if no additional remediation is implemented, was conducted to assess the potential human health impacts from the site under current conditions. The *Final Report Human Health Risk Assessment of the SWMU 15 Biopile, Oceana Naval Air Station, Virginia Beach, Virginia* found that all of the noncarcinogenic and carcinogenic risks for the individual pathways (ingestion, inhalation, and dermal contact) evaluated in the assessment to be below or within the USEPA's target levels. Additionally, all of the cumulative risks associated with potential exposure to the biopile soil were below or with in the USEPA's target levels. The excavation-perimeter soil sample data were not included in this risk assessment and will be evaluated in an SWMU-wide risk assessment to be conducted at a later date.

Due to the exceedance of the TPH screening, the Navy proposed to perform additional biological treatment of a portion of the biopile soils. As 6 of the 9 sampling locations that exceeded the TPH screening level were collected from the 8 ft sampling depth, the Navy re-evaluated the biopile statistics using a smaller soil data set. The smaller data set included all soil samples collected from the Biopiles from the surface to a depth of seven feet. The calculated 95% UCL of 50 Mg/Kg for the smaller data set is equivalent to the TPH screening level of 50 Mg/Kg. Table 5-7 documents the results of the statistical evaluation and comparison to screening levels for the 0-7 feet data set. The 95% UCL value of 50 Mg/Kg was conservatively estimated because the total TPH that was included in this evaluation was a sum of the DRO and GRO analysis. There is overlap in parameters analyzed for in the DRO and GRO methods which would be double-counted in the sum approach for determination of total TPH. Additionally, the distribution of the TPH for the 0-7 feet data set was considered to be inconclusive. The use of the most conservative 95% UCL for TPH from the data set adds additional conservatism to the evaluation. As indicated in Table 5-7, the 95% UCL for the 0-7 foot biopile soil may statistically be considered to meet the criteria for clean fill.

5.6 Additional Biological Treatment

The VADEQ requested that the Navy re-treat the bottom 3 feet of the biopile soil and an additional volume of soil that surrounds the three confirmation samples in the upper 0-7 foot depth range that exceeded the TPH screening level. The Navy agreed to deconstruct the biopiles, moving the soil characterized as clean fill to one area and spreading the soil that failed the TPH screen in another area for additional biological treatment. Figures 5-6 and 5-7 illustrate the volume of soils for additional treatment.

The Navy spread the soil slated for re-treatment to a uniform depth of 18-24 inches. Figure 5-8 illustrates the areal distribution of the soil slated for re-treatment. At the request of the VADEQ all soil slated for re-treatment was distributed on the ground surface on top of a layer of thick-mil plastic sheeting to minimize contact and mixture with underlying clean soil.

Table 5-7
Comparison of 0 - 7 Feet Deep Biopile Soil Sample Concentrations to Screening Levels
SWMU-15, Oceana Naval Air Station, Virginia Beach, Virginia

Chemical Name	Number of Samples	Average	t-value	Standard Deviation	Normal 95% UCL	Lognormal 95% UCL	Selected (1)	Maximum Detected Concentration	Screening Level
TPH (mg/kg)									
TPH-DRO	26	16.5538462	2.06	11.91	33.6	21.4		51	
TPH-GRO	26	9.17153846	2.06	11.16	25.2	17.5		53	
Total TPH *	26	25.6361538	2.06	17.10	**50.2**	34.6	**50.2**	75	**50**
Volatile Organics (ug/kg)									
Benzene	26	4.02	2.060	3.27	9	5		15	
Ethylbenzene	26	23.52	2.060	67.92	121	30		345	
Toluene	26	4.02	2.060	3.27	9	5		15	
Xylenes (total)	26	118.44	2.060	322.39	581	428		1557	
Total BTEX	26	140.48	2.060	389.60	**700**	583	**700**	1902	**10,000**

* - Total TPH is a conservative sum of the TPH-DRO and TPH-GRO.

(1) The distribution for total TPH and the total BTEX are inconclusive based on the w-test; therefore, maximum UCL value conservatively used.

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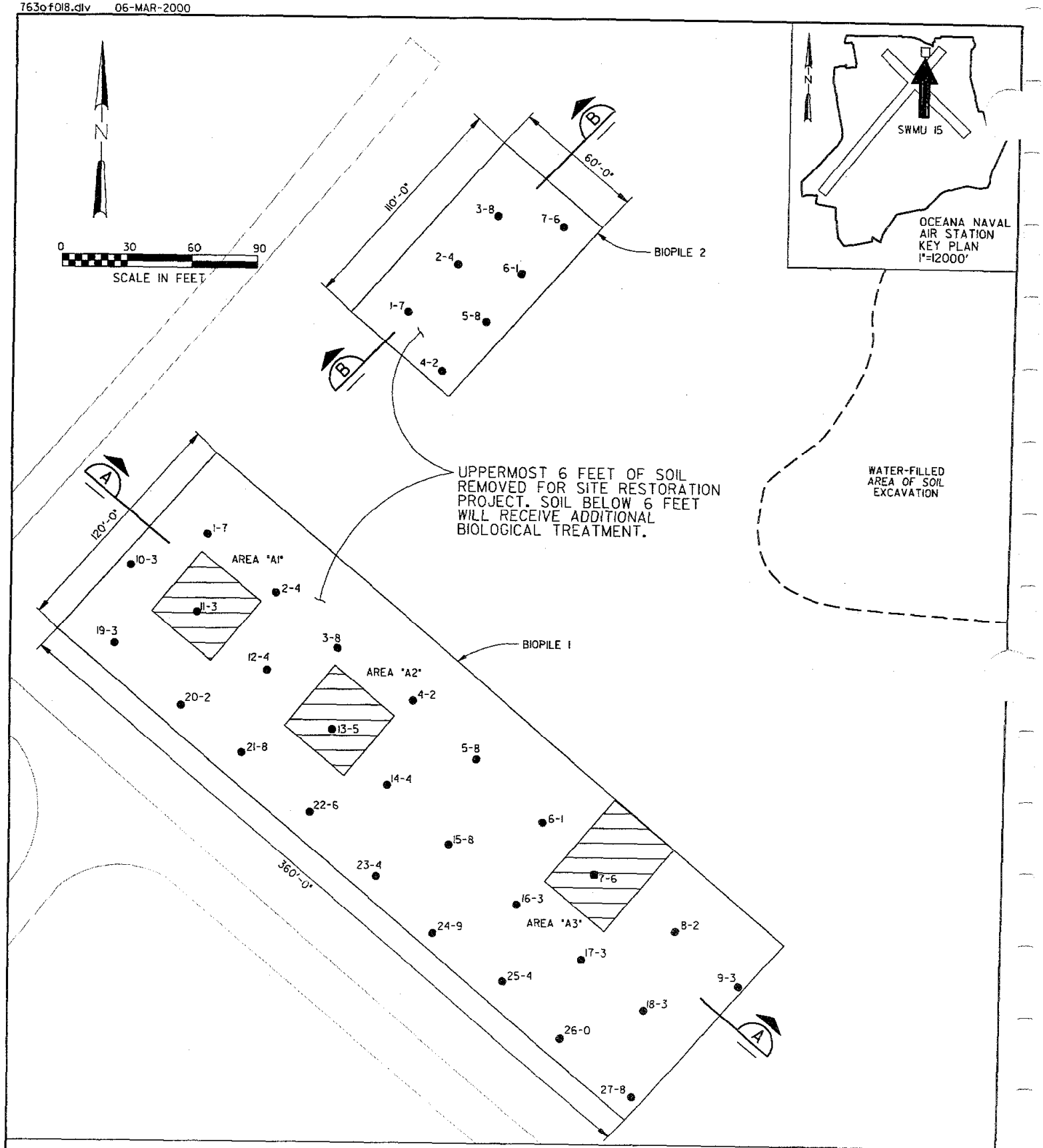

LEGEND

SOIL WITHIN THE UPPERMOST 6 FEET THAT WILL RECEIVE ADDITIONAL BIOLOGICAL TREATMENT (SEE FIGURE 2-7 FOR CROSS-SECTION)

Figure 5-6
MAP VIEW OF SWMU 15 BIOPILES
Naval Air Station, Oceana
Virginia Beach, Virginia

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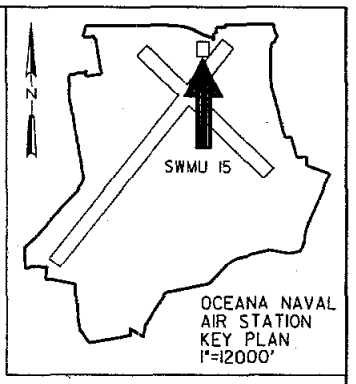
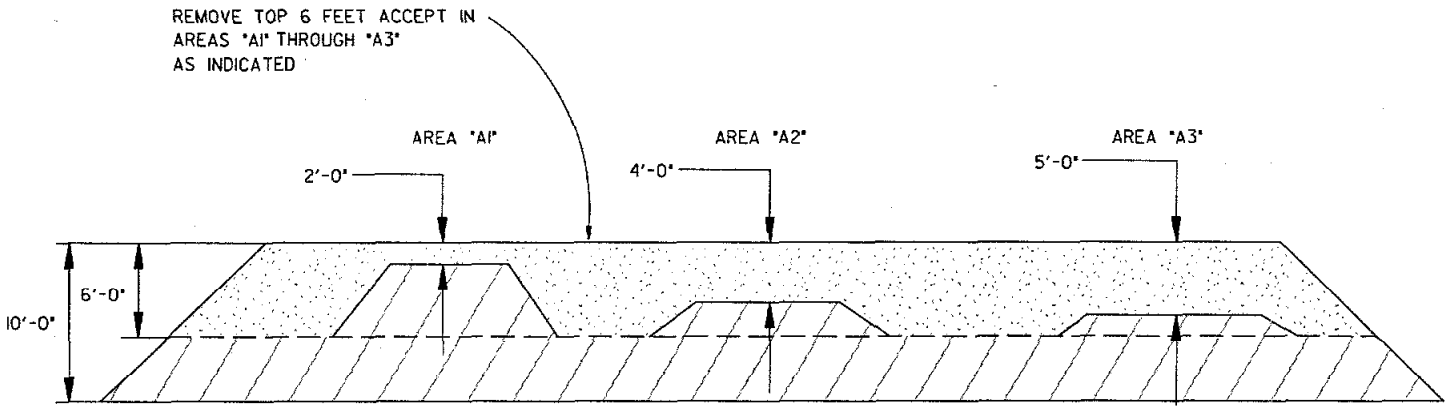
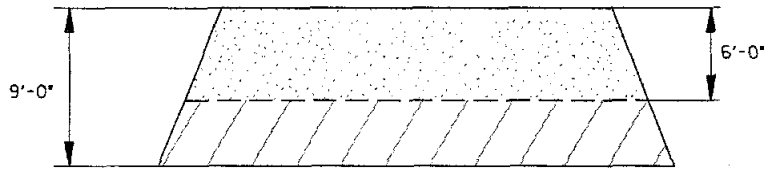




CROSS SECTION BIOPILE 1 (A)
NTS



CROSS SECTION BIOPILE 2 (B)
NTS

LEGEND

SOIL FOR SITE RESTORATION PROJECT

SOIL FOR ADDITIONAL BIOLOGICAL TREATMENT, CONFIRMATORY SAMPLING AND POSSIBLE SITE RESTORATION

Figure 5-7
CROSS SECTION OF SWMU-15 BIOPILES
Naval Air Station, Oceana
Virginia Beach, Virginia

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The soil was tilled to enhance aeration and biodegradation of TPH. After 2 weeks of aeration another confirmatory sampling event was conducted to confirm that the soil aeration had achieved the 50 ppm total TPH cleanup goal. The volume of the re-treated soils was divided into 13 cells, each cell having approximately 575 yd^3 of soil. Each was divided into sub-cells, each being an equal quadrant of the original cell. The statistical derivation for the number of confirmatory samples required to characterize the retreated soil is documented in Appendix A5-5.

A grab sample from each of the four sub-cells was composited and thirteen composite soil samples were sample submitted to a laboratory for analysis for total TPH. As the soil depth for re-treatment is 18-24 inches, all these confirmatory samples were collected from the center of the retreated soil layer, approximately 9-12 inches from the surface.

The results of these 13 samples were evaluated to determine if the VADEQ's solid waste requirement of 50 ppm TPH has been achieved. Table 5-8 documents the results in comparison to the 50 PPM cleanup goal. The results indicated that 6 of 13 soil samples exceeded the 50 PPM cleanup goal.

TABLE 5-8
Preliminary Soil Sampling Results for DRO and GRO
SWMU 15 Biopile Soil Sampling, 08/09/99
Naval Air Station, Oceana

Sample ID	DRO (mg/Kg)	GRO (mg/Kg)	Sum of DRO & GRO	Exceedance of 50 PPM
OW15-SB28	9	1.3	10.3	
OW15-SB29	29	0.4	29.37	
OW15-SB30	120	4.3	124.3	124.3
OW15-SB31	170	2.3	172.3	172.3
OW15-SB32	180	1.3	181.3	181.3
OW15-SB33	110	4.0	114	114
OW15-SB34	39	2.0	41	
OW15-SB35	27	2.6	29.6	
OW15-SB36	41	1.3	42.3	
OW15-SB37	17	0.7	17.66	
OW15-SB38	77	2.0	79	79
OW15-SB39	56	0.9	56.92	56.92
OW15-SB40	34	1.4	35.4	
OW15-SB41	29	2.8	31.8	

This data was presented to, and discussed by, the NAS Oceana Partnering Team in September 1999. The team agreed that the spreading and tilling aerated the soils to enhance the biological process, and that continued contaminant degradation was expected. On October 5, 1999 Biosystems, the bioremediation contractor, collected composite soil samples from the six cells which had exceedances of TPH in accordance with procedures followed for previous sampling. The soil samples were submitted to an analytical laboratory for analysis of TPH for DRO, as agreed to by the NAS Oceana Partnering Team. The detection limit was 10 mg/Kg. Table 5-9 lists the results. All samples yielded DRO less than the detection limit. Therefore, the soil has been determined to meet the VADEQ criteria for clean fill.

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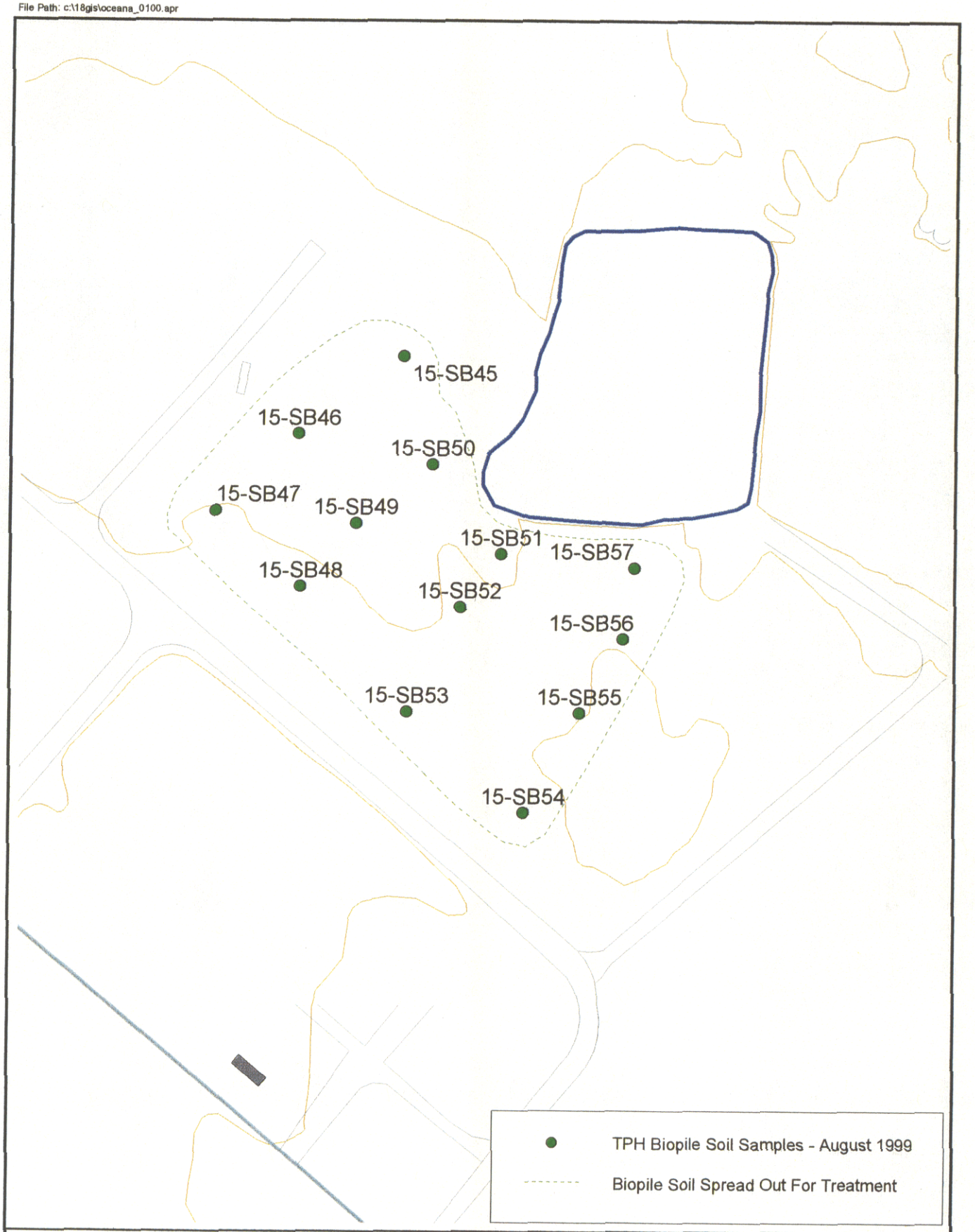

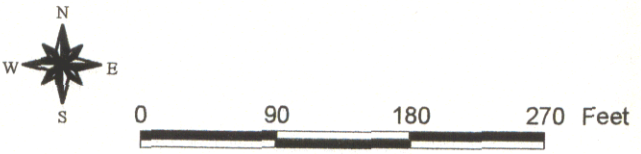

Figure 5-8
Biopile Soil Sample Locations for TPH
NAS Oceana, Virginia Beach, Virginia

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TABLE 5-9
Soil Sampling Results for TPH - DRO
SWMU 15 Biopile Soil Sampling, 10/03/99
Naval Air Station, Oceana

Sample ID	DRO (mg/Kg)	Exceedance of 50 PPM
30	120	0
31	170	0
32	180	0
33	110	0
38	77	0
39	56	0

5.7 Treated Soils

Initially, the project plans called for the treated soils to be placed back into the excavated area. However several factors caused the Navy re-evaluated the need to fill in the excavation; (1) additional costs associated with dewatering the pond, (2) the pond aiding in the remediation of the site groundwater, and (3) the use of the treated soils for a site restoration, as the soils present no unacceptable risk to human health per the *Final Report Human Health Risk Assessment of the SWMU 15 Biopile, Oceana Naval Air Station, Virginia Beach, Virginia.* The additional review of the location and size of the water-filled excavation determined that the pond would not represent an airfield hazard as originally anticipated.

At the completion of the confirmatory sampling events, the Navy considered the biopile soil to be "clean fill" per VADEQ solid waste regulations. Therefore the soil was proposed for use in the site restoration project at the adjacent former tarmac area. However, the VOC, PAH, and metals, soil sampling data were subjected to a screening ecological risk assessment to assess the risk of biopile soil to flora and fauna when used as surface soil in the adjacent tarmac area. The preliminary screen resulted in an assessment that the PAHs were elevated as the PAH data were collected prior to the biopiles being. Therefore, the BTAG recommended the Navy evaluate potential risk to ecological receptors if the treated soils were used as planned in the restoration project.

6.0 Human Health Risk Assessment for the SWMU 15 Biopile Soils

The *Final Report, Human Health Risk Assessment for the SWMU 15 Biopiles, Naval Air Station, Oceana, Virginia Beach, Virginia* presents the results of an assessment of potential human health risks associated with the treated soil from the biopiles. Analytical results from soil samples were used to examine the potential future human health risks if the biopiles are leveled and the soil regraded as surface soil.

The results of the SWMU 15 biopile baseline human health risk assessment were used to help determine whether additional biopile soil remediation is necessary prior to the disbursement of the soil. The results of the risk characterization are presented below.

6.1 Soil Exposure

Confirmation soil samples were collected from 34 locations in the biopiles at SWMU 15. Risks to hypothetical future residential and recreational users, were evaluated for the inhalation of volatiles and fugitive dust, incidental ingestion, and dermal contact exposure routes. The constituents detected in the soil and selected PAHs with high detection limits were first screened to identify the COPCs using the screening methodology discussed previously. Risks were then calculated for the COPCs. The age-adjusted approach for the residential receptor was used for determining incremental lifetime carcinogenic risks for the inhalation, ingestion, and dermal contact scenarios as discussed in the *Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual(Part B, Development of Risk-based Remediation Goals)* (USEPA, December 1991).

The results of the risk characterization are presented below. Table 6-1 summarizes the risks and hazards for each COPC and exposure route for each of the exposure scenarios.

6.2 Soil Exposure

Confirmation soil samples were collected from 34 locations in the biopiles at SWMU 15. Risks to hypothetical future residential and recreational users, were evaluated for the inhalation of volatiles and fugitive dust, incidental ingestion, and dermal contact exposure routes. The constituents detected in the soil and selected PAHs with high detection limits were first screened to identify the COPCs. Risks were then calculated for the COPCs. The age-adjusted approach for the residential receptor was used for determining incremental lifetime carcinogenic risks for the inhalation, ingestion, and dermal contact scenarios as discussed in the *Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual(Part B, Development of Risk-based Remediation Goals)* (USEPA, December 1991).

All of the cumulative noncancer hazards and cancer risks for each pathway are below or within the USEPA's benchmark levels (HI less than 1, cancer risk less than or within range of 10^{-4} to 10^{-6}).

Table 6-1
Summary of Media-Specific Risks and Hazards
Biopile Soils at SWMU 15 - NAS Oceana

Media: Soil

Chemical	Residential Child				Residential Adult				Age Adjusted[a,b]			
	HQ				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Anthracene	--	5.2E-05	1.0E-03	1.1E-03	--	5.5E-06	1.7E-04	1.7E-04	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	4.2E-07	--	4.2E-07
Benzo(a)pyrene	--	--	--	--	--	--	--	--	4.1E-10	6.0E-06	--	6.0E-06
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	3.1E-06	--	3.1E-06
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	4.7E-07	--	4.7E-07
Benzo[ghi]perylene	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	--	--	--	--	--	--	--	--	--	8.4E-09	--	8.4E-09
Dibenz[a,h]anthracene	--	--	--	--	--	--	--	--	--	1.2E-05	--	1.2E-05
Totals	**--**	**5.2E-05**	**1.0E-03**	**1.1E-03**	**--**	**5.5E-06**	**1.7E-04**	**1.7E-04**	**4.1E-10**	**2.2E-05**	**--**	**2.2E-05**

Chemical	Recreational Child				Recreational Child				Recreational Adult				Recreational Adult			
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Anthracene	--	1.5E-05	3.1E-04	3.2E-04	--	--	--	--	--	1.6E-06	4.9E-05	5.1E-05	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	8.7E-08	--	8.7E-08	--	--	--	--	--	3.7E-08	--	3.7E-08
Benzo(a)pyrene	--	--	--	--	4.3E-12	1.2E-06	--	1.2E-06	--	--	--	--	4.9E-12	5.3E-07	--	5.3E-07
Benzo(b)fluoranthene	--	--	--	--	--	6.5E-07	--	6.5E-07	--	--	--	--	--	2.8E-07	--	2.8E-07
Benzo(k)fluoranthene	--	--	--	--	--	9.7E-08	--		--	--	--	--	--	4.2E-08	--	4.2E-08
Benzo[ghi]perylene	--	--	--	--	--	--	--		--	--	--	--	--	--	--	--
Chrysene	--	--	--	--	--	1.7E-09	--		--	--	--	--	--	7.5E-10	--	7.5E-10
Dibenz[a,h]anthracene	--	--	--	--	--	2.5E-06	--	2.5E-06	--	--	--	--	--	1.1E-06	--	1.1E-06
Totals	**--**	**1.5E-05**	**3.1E-04**	**3.2E-04**	**4.3E-12**	**4.5E-06**	**--**	**4.4E-06**	**--**	**1.6E-06**	**4.9E-05**	**5.1E-05**	**4.9E-12**	**1.9E-06**	**--**	**1.9E-06**

Inh = Inhalation
Ing = Ingestion
Der = Dermal
[a] Cancer risk for the resident is summarized using the age-adjusted approach.
[b] Age-adjusted approach used as directed in *Risk Assessment Guidance for Superfund: Volume I - Part B (Development of Risk-Based Preliminary Remediation Goals)*, USEPA, December 1991.

6.3 Summary of Total Risks Across Pathways

To summarize the soil risks to each receptor, the noncarcinogenic hazards and carcinogenic risks associated for a given pathway were summed. Risks from the inhalation, ingestion, and dermal contact exposures were added for each exposed receptor, as appropriate.

All of the total carcinogenic risks across pathways for the residential and recreational scenarios are below or within USEPA's target risk range.

Therefore, it does not appear that leveling of the soils from the biopiles will result in a risk to potential future residential or recreational users at SWMU 15. All of the cumulative noncancer hazards and cancer risks for each pathway are below or within the USEPA's benchmark levels (HI less than 1, cancer risk less than or within range of 10^{-4} to 10^{-6}).

7.0 Ecological Risk Evaluation of SWMU 15 Biopile Soils

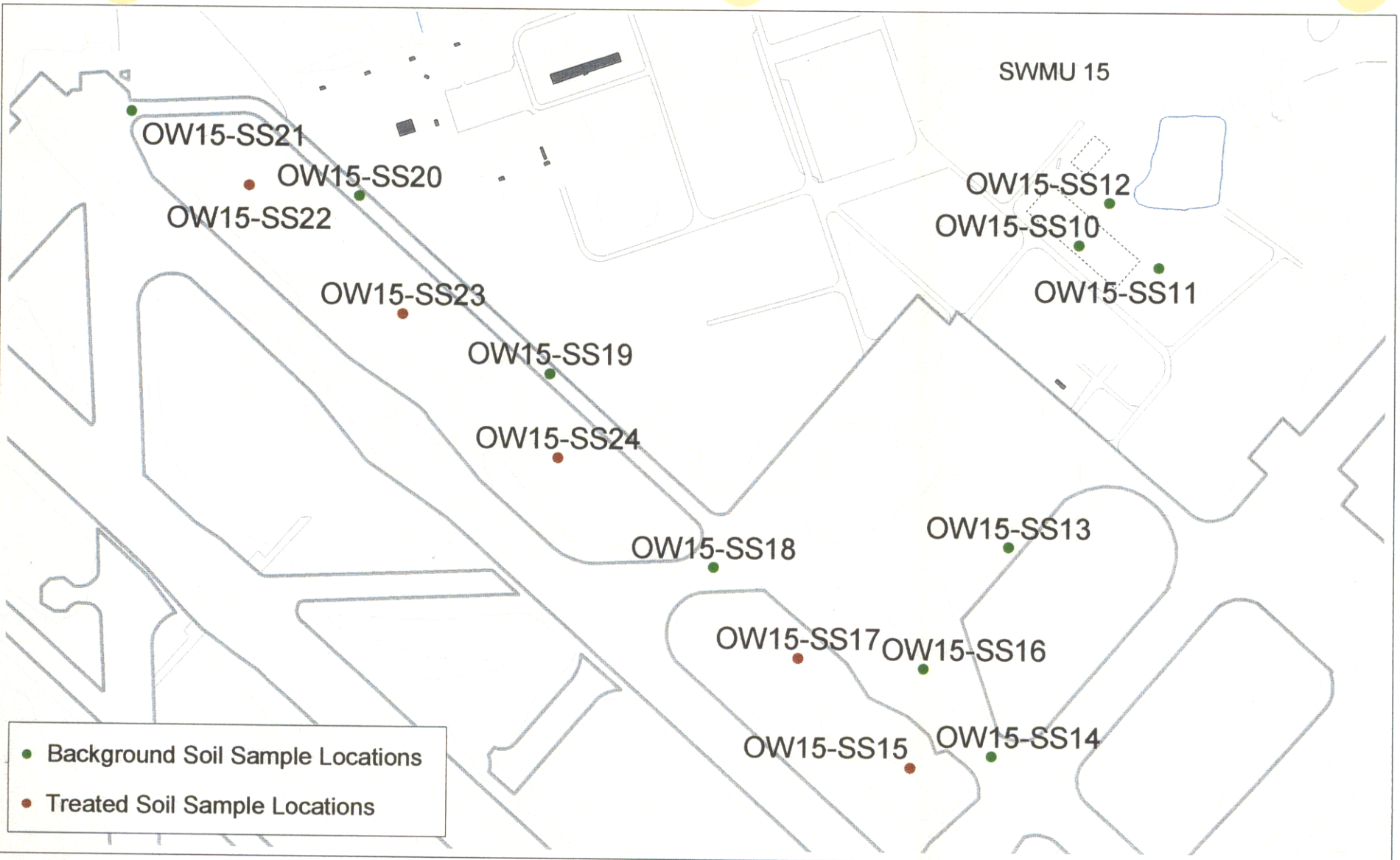
The confirmatory samples collected in August 1999 were analyzed for TPH and metals. The TPH results were used to determine the effectiveness of the spreading and tilling of the biopiles designated for retreatment, and the metals data was collected for use in the planned human health and ecological risk assessments for the SWMU 15 site. During the October 1999 review of the proposed technical approach to conducting ecological risk assessments at NAS Oceana SWMUs, the NAS Oceana Partnering Team's Ecological Subgroup determined that an ecological risk assessment should be conducted on the SWMU 15 biopiles soils prior to use in the station's tarmac restoration project.

Inadvertently, the station used a portion of the staged biopile soils in the facility's tarmac restoration project prior to the completion of the planned ecological risk assessment on the soils. Subsequently the Ecological Subgroup evaluated the August 1999 data and determined that the concentrations of the inorganic compounds were not an issue in the biopile soils as the detected levels of these compounds were consistent with regional background concentrations. However, PAH concentrations in the biopile soil remained unknown and the Ecological Subgroup determined that additional sampling was required to demonstrate that PAH concentrations had decreased along with TPH concentrations. The team agreed that the Navy would collect ten additional surface soil samples from the top three inches of the biopile soils remaining at SWMU 15 and from the biopile soil already spread in the tarmac restoration area, and collect five background surface soil samples adjacent to the tarmac restoration area; the samples would be analyzed for PAHs using Method 8310, to determine whether or not PAHs were still a concern. The team further agreed that, rather than continuing with a full Ecological Risk Assessment of the biopile soil, the results from the additional PAH sampling event would be evaluated and further action would be documented in a technical memorandum.

The proposal to conduct the additional sampling was documented in the *Final Work Plan Addendum, Sediment, Surface Water, and Surface Soil Sampling at Multiple SWMUs to support Ecological Risk Assessment, Direct Push Technology Investigation to support MNA at SWMU 15, and Monitored Natural Attenuation Study at SWMU 15, Naval Air Station, Oceana, Virginia Beach, Virginia*. The locations of these samples are illustrated on Figure 7-1, located at the end of this section. Results of the soil sampling are documented in the *Technical Memorandum - Ecological Evaluation of the SWMU 15 Biopile Soils, Naval Air Station, Oceana, Virginia Beach, Virginia*, dated March 2000.

Concentrations of the PAHs benzo(a)pyrene, benzo(k)fluoranthene, fluoranthene, and pyrene were elevated in a small portion of the samples, but when compared to equally high levels of the same PAHs in background soil samples, these are not seen as a concern. Summing the maximum detected concentration of each PAH compound as a worst case exposure scenario (all maximum contaminant detections being co-located in a single sample) yields a concentration of 6,736 ug/kg for total PAHs. An action level for total PAHs equal to or greater than 40,000 ug/kg was agreed to by the NAS Oceana Partnering

Team. Thus, the total maximum PAH concentration, even when calculated as a worst case exposure scenario, is well below the team's agreed upon action level. The drop in PAHs and TPH was due to the re-treatment of the soil. The soil is being spread thinly within the tarmac restoration area which will further enhance the biodegradation process. In summary, the team reached consensus that based on the December 1999 sampling results, PAHs are not considered to be a concern in the biopile soils and no further action is warranted.



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400 0 400 800 Feet

FIGURE 7-1
CONFIRMATORY BIOPILE SURFACE SOIL SAMPLES
SWMU 15, NAS OCEANA
VIRGINIA BEACH, VIRGINIA

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Appendix A5-1 to Section 5

Detected Chemicals from the SWMU 15 Validated Analytical Soil Data

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB10-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	4.0000	J	UG/KG	6.0000
OW15-SB10-3	10/29/1998	1,3,5-TRIMETHYLBENZENE	3.0000	J	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	BENZENE	2.0000	K	UG/KG	6.0000
OW15-SB10-3	10/29/1998	BENZO(A)ANTHRACENE	20.0000		UG/KG	20.0000
OW15-SB10-3	10/29/1998	BENZO(G,H,I)PERYLENE	160.0000	J	UG/KG	400.0000
OW15-SB10-3	10/29/1998	CHRYSENE	16.0000	J	UG/KG	20.0000
OW15-SB10-3	10/29/1998	METHYLENE CHLORIDE	17.0000		UG/KG	6.0000
OW15-SB10-3	10/29/1998	PERCENT SOLIDS	82.7000		%	0.0000
OW15-SB10-3	10/29/1998	PYRENE	11.0000		UG/KG	10.0000
OW15-SB10-3	10/29/1998	TPH-DRO	33.1000		MG/KG	2.1000
OW15-SB10-3	10/29/1998	TPH-GRO	1.9000		MG/KG	0.6000
OW15-SB11-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	683.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	1,3,5-TRIMETHYLBENZENE	340.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	4-ISOPROPYLTOLUENE	103.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	ANTHRACENE	100.0000	J	UG/KG	200.0000
OW15-SB11-3	10/29/1998	BENZO(A)ANTHRACENE	20.0000		UG/KG	20.0000
OW15-SB11-3	10/29/1998	BENZO(G,H,I)PERYLENE	130.0000	J	UG/KG	390.0000
OW15-SB11-3	10/29/1998	CHRYSENE	15.0000	J	UG/KG	20.0000
OW15-SB11-3	10/29/1998	ETHYLBENZENE	66.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	ISOPROPYLBENZENE	314.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	METHYLENE CHLORIDE	73.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	NAPHTHALENE	252.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	N-PROPYLBENZENE	91.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	O-XYLENE	26.0000	J	UG/KG	30.0000
OW15-SB11-3	10/29/1998	P&M-XYLENE	607.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	PERCENT SOLIDS	83.9000		%	0.0000
OW15-SB11-3	10/29/1998	PHENANTHRENE	77.0000	J	UG/KG	100.0000
OW15-SB11-3	10/29/1998	PYRENE	6.5000	J	UG/KG	10.0000
OW15-SB11-3	10/29/1998	SEC-BUTYLBENZENE	39.0000		UG/KG	30.0000
OW15-SB11-3	10/29/1998	TPH-DRO	22.3000		MG/KG	2.0000
OW15-SB11-3	10/29/1998	TPH-GRO	52.7000		MG/KG	0.6000
OW15-SB12-4	10/29/1998	1,2,4-TRIMETHYLBENZENE	1102.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	1,3,5-TRIMETHYLBENZENE	487.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	4-ISOPROPYLTOLUENE	157.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	ACENAPHTHENE	280.0000	J	UG/KG	390.0000
OW15-SB12-4	10/29/1998	ANTHRACENE	190.0000	J	UG/KG	200.0000
OW15-SB12-4	10/29/1998	BENZO(A)ANTHRACENE	59.0000		UG/KG	20.0000
OW15-SB12-4	10/29/1998	BENZO(B)FLUORANTHENE	1200.0000		UG/KG	770.0000
OW15-SB12-4	10/29/1998	BENZO(G,H,I)PERYLENE	720.0000		UG/KG	390.0000
OW15-SB12-4	10/29/1998	CHRYSENE	130.0000		UG/KG	20.0000
OW15-SB12-4	10/29/1998	ETHYLBENZENE	345.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	FLUORENE	3300.0000		UG/KG	770.0000
OW15-SB12-4	10/29/1998	ISOPROPYLBENZENE	432.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	METHYLENE CHLORIDE	109.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	NAPHTHALENE	373.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	N-PROPYLBENZENE	165.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	O-XYLENE	35.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	P&M-XYLENE	1522.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	PERCENT SOLIDS	84.5000		%	0.0000
OW15-SB12-4	10/29/1998	PHENANTHRENE	120.0000		UG/KG	100.0000
OW15-SB12-4	10/29/1998	PYRENE	13.0000		UG/KG	10.0000
OW15-SB12-4	10/29/1998	SEC-BUTYLBENZENE	62.0000		UG/KG	30.0000
OW15-SB12-4	10/29/1998	TPH-DRO	18.4000		MG/KG	2.0000
OW15-SB12-4	10/29/1998	TPH-GRO	17.2200		MG/KG	0.5900
OW15-SB13-5	10/29/1998	1,2,4-TRIMETHYLBENZENE	35.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	1,3,5-TRIMETHYLBENZENE	39.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	4-ISOPROPYLTOLUENE	3.0000	L	UG/KG	6.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB13-5	10/29/1998	ACENAPHTHENE	40.0000	J	UG/KG	160.0000
OW15-SB13-5	10/29/1998	ANTHRACENE	370.0000		UG/KG	80.0000
OW15-SB13-5	10/29/1998	BENZO(A)ANTHRACENE	14.0000		UG/KG	8.0000
OW15-SB13-5	10/29/1998	BENZO(G,H,I)PERYLENE	180.0000		UG/KG	160.0000
OW15-SB13-5	10/29/1998	CHRYSENE	5.8000	J	UG/KG	8.0000
OW15-SB13-5	10/29/1998	ETHYLBENZENE	2.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	FLUORENE	260.0000	J	UG/KG	310.0000
OW15-SB13-5	10/29/1998	METHYLENE CHLORIDE	16.0000	B	UG/KG	6.0000
OW15-SB13-5	10/29/1998	NAPHTHALENE	9.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	N-PROPYLBENZENE	3.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	O-XYLENE	11.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	P&M-XYLENE	17.0000	L	UG/KG	6.0000
OW15-SB13-5	10/29/1998	PERCENT SOLIDS	82.3000		%	0.0000
OW15-SB13-5	10/29/1998	PHENANTHRENE	180.0000		UG/KG	41.0000
OW15-SB13-5	10/29/1998	PYRENE	6.9000		UG/KG	4.1000
OW15-SB13-5	10/29/1998	TPH-DRO	51.3000		MG/KG	2.1000
OW15-SB13-5	10/29/1998	TPH-GRO	2.2700		MG/KG	0.1200
OW15-SB14-4	10/29/1998	BENZO(A)ANTHRACENE	5.7000	J	UG/KG	20.0000
OW15-SB14-4	10/29/1998	BENZO(G,H,I)PERYLENE	130.0000	J	UG/KG	390.0000
OW15-SB14-4	10/29/1998	CHRYSENE	17.0000	J	UG/KG	20.0000
OW15-SB14-4	10/29/1998	FLUORENE	360.0000	J	UG/KG	770.0000
OW15-SB14-4	10/29/1998	METHYLENE CHLORIDE	28.0000	L	UG/KG	6.0000
OW15-SB14-4	10/29/1998	PERCENT SOLIDS	84.5000		%	0.0000
OW15-SB14-4	10/29/1998	PYRENE	10.0000		UG/KG	10.0000
OW15-SB14-4	10/29/1998	TPH-DRO	5.4000	L	MG/KG	2.0000
OW15-SB14-4	10/29/1998	TPH-GRO	0.8900		MG/KG	0.1200
OW15-SB15-8	10/29/1998	1,3,5-TRIMETHYLBENZENE	7.0000	K	UG/KG	6.0000
OW15-SB15-8	10/29/1998	ACENAPHTHENE	1300.0000	J	UG/KG	1600.0000
OW15-SB15-8	10/29/1998	ANTHRACENE	1200.0000		UG/KG	780.0000
OW15-SB15-8	10/29/1998	BENZO(A)ANTHRACENE	340.0000		UG/KG	78.0000
OW15-SB15-8	10/29/1998	BENZO(G,H,I)PERYLENE	3600.0000		UG/KG	1600.0000
OW15-SB15-8	10/29/1998	CHRYSENE	470.0000		UG/KG	78.0000
OW15-SB15-8	10/29/1998	FLUORENE	17000.0000		UG/KG	3100.0000
OW15-SB15-8	10/29/1998	INDENO(1,2,3-CD)PYRENE	410.0000		UG/KG	310.0000
OW15-SB15-8	10/29/1998	METHYLENE CHLORIDE	16.0000	B	UG/KG	6.0000
OW15-SB15-8	10/29/1998	PERCENT SOLIDS	84.4000		%	0.0000
OW15-SB15-8	10/29/1998	PHENANTHRENE	1600.0000		UG/KG	400.0000
OW15-SB15-8	10/29/1998	PYRENE	56.0000		UG/KG	40.0000
OW15-SB15-8	10/29/1998	TPH-DRO	61.1000		MG/KG	2.0000
OW15-SB15-8	10/29/1998	TRICHLOROETHENE	2.0000	J	UG/KG	6.0000
OW15-SB15-8DL	10/29/1998	TPH-GRO	2.8100	L	MG/KG	0.5900
OW15-SB16-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SB16-3	10/29/1998	1,3,5-TRIMETHYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SB16-3	10/29/1998	ACENAPHTHENE	200.0000	J	UG/KG	400.0000
OW15-SB16-3	10/29/1998	ANTHRACENE	86.0000	J	UG/KG	200.0000
OW15-SB16-3	10/29/1998	BENZO(A)ANTHRACENE	46.0000		UG/KG	20.0000
OW15-SB16-3	10/29/1998	BENZO(B)FLUORANTHENE	600.0000	J	UG/KG	790.0000
OW15-SB16-3	10/29/1998	BENZO(G,H,I)PERYLENE	580.0000		UG/KG	400.0000
OW15-SB16-3	10/29/1998	CHRYSENE	100.0000		UG/KG	20.0000
OW15-SB16-3	10/29/1998	FLUORENE	2700.0000		UG/KG	790.0000
OW15-SB16-3	10/29/1998	INDENO(1,2,3-CD)PYRENE	37.0000	J	UG/KG	320.0000
OW15-SB16-3	10/29/1998	METHYLENE CHLORIDE	15.0000	B	UG/KG	6.0000
OW15-SB16-3	10/29/1998	NAPHTHALENE	720.0000	J	UG/KG	4000.0000
OW15-SB16-3	10/29/1998	PERCENT SOLIDS	82.5000		%	0.0000
OW15-SB16-3	10/29/1998	PHENANTHRENE	52.0000	J	UG/KG	100.0000
OW15-SB16-3	10/29/1998	PYRENE	13.0000		UG/KG	10.0000
OW15-SB16-3	10/29/1998	TPH-DRO	10.4000		MG/KG	2.1000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB16-3	10/29/1998	TPH-GRO	2.7100		MG/KG	0.6100
OW15-SB1-7	10/29/1998	1,2,4-TRIMETHYLBENZENE	10.0000		UG/KG	6.0000
OW15-SB1-7	10/29/1998	1,3,5-TRIMETHYLBENZENE	60.0000		UG/KG	6.0000
OW15-SB1-7	10/29/1998	ANTHRACENE	110.0000	J	UG/KG	200.0000
OW15-SB1-7	10/29/1998	BENZO(A)ANTHRACENE	20.0000		UG/KG	20.0000
OW15-SB1-7	10/29/1998	BENZO(B)FLUORANTHENE	700.0000	J	UG/KG	780.0000
OW15-SB1-7	10/29/1998	BENZO(G,H,I)PERYLENE	410.0000		UG/KG	400.0000
OW15-SB1-7	10/29/1998	CHLOROFORM	1.0000	J	UG/KG	6.0000
OW15-SB1-7	10/29/1998	CHRYSENE	54.0000		UG/KG	20.0000
OW15-SB1-7	10/29/1998	ETHYLBENZENE	2.0000	J	UG/KG	6.0000
OW15-SB1-7	10/29/1998	FLUORENE	1200.0000		UG/KG	780.0000
OW15-SB1-7	10/29/1998	METHYLENE CHLORIDE	30.0000		UG/KG	6.0000
OW15-SB1-7	10/29/1998	P&M-XYLENE	7.0000		UG/KG	6.0000
OW15-SB1-7	10/29/1998	PERCENT SOLIDS	83.2000		%	0.0000
OW15-SB1-7	10/29/1998	PYRENE	12.0000		UG/KG	10.0000
OW15-SB1-7	10/29/1998	TPH-DRO	11.6000		MG/KG	2.0000
OW15-SB1-7	10/29/1998	TPH-GRO	6.9000		MG/KG	0.6000
OW15-SB17-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	30.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	1,3,5-TRIMETHYLBENZENE	23.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	4-ISOPROPYLTOLUENE	5.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	ACENAPHTHENE	46.0000	J	UG/KG	160.0000
OW15-SB17-3	10/29/1998	ANTHRACENE	190.0000		UG/KG	80.0000
OW15-SB17-3	10/29/1998	BENZO(A)ANTHRACENE	11.0000		UG/KG	8.0000
OW15-SB17-3	10/29/1998	BENZO(G,H,I)PERYLENE	170.0000		UG/KG	160.0000
OW15-SB17-3	10/29/1998	CHRYSENE	17.0000		UG/KG	8.0000
OW15-SB17-3	10/29/1998	ETHYLBENZENE	5.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	FLUORENE	390.0000		UG/KG	320.0000
OW15-SB17-3	10/29/1998	METHYLENE CHLORIDE	23.0000	B	UG/KG	6.0000
OW15-SB17-3	10/29/1998	N-PROPYLBENZENE	4.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	O-XYLENE	2.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	P&M-XYLENE	18.0000	K	UG/KG	6.0000
OW15-SB17-3	10/29/1998	PERCENT SOLIDS	82.2000		%	0.0000
OW15-SB17-3	10/29/1998	PHENANTHRENE	100.0000		UG/KG	41.0000
OW15-SB17-3	10/29/1998	PYRENE	4.9000		UG/KG	4.1000
OW15-SB17-3	10/29/1998	TPH-DRO	10.7000		MG/KG	2.1000
OW15-SB17-3DL	10/29/1998	TPH-GRO	2.8500		MG/KG	0.6100
OW15-SB18-3	10/29/1998	ACENAPHTHENE	38.0000	J	UG/KG	160.0000
OW15-SB18-3	10/29/1998	ANTHRACENE	32.0000	J	UG/KG	80.0000
OW15-SB18-3	10/29/1998	BENZO(A)ANTHRACENE	9.7000		UG/KG	8.0000
OW15-SB18-3	10/29/1998	BENZO(G,H,I)PERYLENE	150.0000	J	UG/KG	160.0000
OW15-SB18-3	10/29/1998	CHRYSENE	22.0000		UG/KG	8.0000
OW15-SB18-3	10/29/1998	FLUORENE	380.0000		UG/KG	310.0000
OW15-SB18-3	10/29/1998	METHYLENE CHLORIDE	18.0000	B	UG/KG	6.0000
OW15-SB18-3	10/29/1998	PERCENT SOLIDS	82.7000		%	0.0000
OW15-SB18-3	10/29/1998	PHENANTHRENE	32.0000	J	UG/KG	41.0000
OW15-SB18-3	10/29/1998	PYRENE	2.4000	J	UG/KG	4.1000
OW15-SB18-3	10/29/1998	TPH-DRO	7.5000		MG/KG	2.1000
OW15-SB18-3	10/29/1998	TPH-GRO	0.5800		MG/KG	0.1200
OW15-SB19-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	2.0000	J	UG/KG	6.0000
OW15-SB19-3	10/29/1998	ACENAPHTHENE	180.0000	J	UG/KG	400.0000
OW15-SB19-3	10/29/1998	ANTHRACENE	96.0000	J	UG/KG	200.0000
OW15-SB19-3	10/29/1998	BENZO(A)ANTHRACENE	33.0000		UG/KG	20.0000
OW15-SB19-3	10/29/1998	BENZO(B)FLUORANTHENE	1200.0000		UG/KG	790.0000
OW15-SB19-3	10/29/1998	BENZO(G,H,I)PERYLENE	550.0000		UG/KG	400.0000
OW15-SB19-3	10/29/1998	CHRYSENE	110.0000		UG/KG	20.0000
OW15-SB19-3	10/29/1998	FLUORENE	2200.0000		UG/KG	790.0000
OW15-SB19-3	10/29/1998	METHYLENE CHLORIDE	31.0000		UG/KG	6.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB19-3	10/29/1998	P&M-XYLENE	2.0000	J	UG/KG	6.0000
OW15-SB19-3	10/29/1998	PERCENT SOLIDS	82.6000		%	0.0000
OW15-SB19-3	10/29/1998	PHENANTHRENE	44.0000	J	UG/KG	100.0000
OW15-SB19-3	10/29/1998	PYRENE	14.0000		UG/KG	10.0000
OW15-SB19-3	10/29/1998	TPH-DRO	10.5000		MG/KG	2.1000
OW15-SB19-3	10/29/1998	TPH-GRO	2.6000		MG/KG	0.1000
OW15-SB20-2	10/29/1998	1,2,4-TRIMETHYLBENZENE	4.0000	J	UG/KG	6.0000
OW15-SB20-2	10/29/1998	1,3,5-TRIMETHYLBENZENE	3.0000	J	UG/KG	6.0000
OW15-SB20-2	10/29/1998	ANTHRACENE	61.0000	J	UG/KG	79.0000
OW15-SB20-2	10/29/1998	BENZO(A)ANTHRACENE	9.4000		UG/KG	7.9000
OW15-SB20-2	10/29/1998	CHRYSENE	5.1000	J	UG/KG	7.9000
OW15-SB20-2	10/29/1998	FLUORENE	210.0000	J	UG/KG	310.0000
OW15-SB20-2	10/29/1998	METHYLENE CHLORIDE	17.0000		UG/KG	6.0000
OW15-SB20-2	10/29/1998	PERCENT SOLIDS	83.2000		%	0.0000
OW15-SB20-2	10/29/1998	PHENANTHRENE	28.0000	J	UG/KG	41.0000
OW15-SB20-2	10/29/1998	PYRENE	2.3000	J	UG/KG	4.1000
OW15-SB20-2	10/29/1998	TPH-DRO	10.6000		MG/KG	2.0000
OW15-SB20-2	10/29/1998	TPH-GRO	2.1600		MG/KG	0.1200
OW15-SB20-2	10/29/1998	TRICHLOROETHENE	2.0000	J	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	1,2,4-TRIMETHYLBENZENE	398.0000	J	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	1,3,5-TRIMETHYLBENZENE	237.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	4-ISOPROPYLTOLUENE	77.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	ACENAPHTHENE	72.0000	J	UG/KG	160.0000
OW15-SB20-2P	10/29/1998	ANTHRACENE	61.0000	J	UG/KG	80.0000
OW15-SB20-2P	10/29/1998	BENZO(A)ANTHRACENE	20.0000		UG/KG	8.0000
OW15-SB20-2P	10/29/1998	BENZO(G,H,I)PERYLENE	290.0000		UG/KG	160.0000
OW15-SB20-2P	10/29/1998	CHRYSENE	27.0000		UG/KG	8.0000
OW15-SB20-2P	10/29/1998	ETHYLBENZENE	6.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	FLUORENE	1200.0000		UG/KG	310.0000
OW15-SB20-2P	10/29/1998	ISOPROPYLBENZENE	137.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	NAPHTHALENE	29.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	N-BUTYLBENZENE	61.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	N-PROPYLBENZENE	79.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	O-XYLENE	13.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	P&M-XYLENE	88.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	PERCENT SOLIDS	83.0000		%	0.0000
OW15-SB20-2P	10/29/1998	PHENANTHRENE	47.0000		UG/KG	41.0000
OW15-SB20-2P	10/29/1998	PYRENE	7.9000		UG/KG	4.1000
OW15-SB20-2P	10/29/1998	SEC-BUTYLBENZENE	33.0000	L	UG/KG	6.0000
OW15-SB20-2P	10/29/1998	TPH-DRO	8.6000		MG/KG	2.0000
OW15-SB20-2P	10/29/1998	TPH-GRO	21.5600	J	MG/KG	0.6000
OW15-SB20-2P	10/29/1998	TRICHLOROETHENE	4.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	1,2,4-TRIMETHYLBENZENE	2900.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	1,3,5-TRIMETHYLBENZENE	216.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	4-ISOPROPYLTOLUENE	61.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	ACENAPHTHENE	340.0000		UG/KG	160.0000
OW15-SB21-8	10/29/1998	ANTHRACENE	1600.0000	J	UG/KG	81.0000
OW15-SB21-8	10/29/1998	BENZO(A)ANTHRACENE	57.0000		UG/KG	8.1000
OW15-SB21-8	10/29/1998	BENZO(G,H,I)PERYLENE	890.0000		UG/KG	160.0000
OW15-SB21-8	10/29/1998	CHRYSENE	68.0000		UG/KG	8.1000
OW15-SB21-8	10/29/1998	ETHYLBENZENE	760.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	FLUORENE	1900.0000		UG/KG	320.0000
OW15-SB21-8	10/29/1998	INDENO(1,2,3-CD)PYRENE	56.0000	J	UG/KG	320.0000
OW15-SB21-8	10/29/1998	ISOPROPYLBENZENE	151.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	NAPHTHALENE	1200.0000	J	UG/KG	1600.0000
OW15-SB21-8	10/29/1998	NAPHTHALENE	144.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	N-PROPYLBENZENE	74.0000	K	UG/KG	6.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB21-8	10/29/1998	O-XYLENE	1200.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	P&M-XYLENE	4500.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	PERCENT SOLIDS	81.0000		%	0.0000
OW15-SB21-8	10/29/1998	PHENANTHRENE	770.0000	J	UG/KG	42.0000
OW15-SB21-8	10/29/1998	PYRENE	24.0000		UG/KG	4.2000
OW15-SB21-8	10/29/1998	SEC-BUTYLBENZENE	24.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	STYRENE	15.0000	K	UG/KG	6.0000
OW15-SB21-8	10/29/1998	TOLUENE	280.0000	L	UG/KG	6.0000
OW15-SB21-8	10/29/1998	TPH-DRO	190.3000		MG/KG	2.1000
OW15-SB21-8	10/29/1998	TPH-GRO	11.1500		MG/KG	0.3100
OW15-SB21-8	10/29/1998	TRICHLOROETHENE	7.0000	K	UG/KG	6.0000
OW15-SB22-6	10/29/1998	1,3,5-TRIMETHYLBENZENE	2.0000	J	UG/KG	6.0000
OW15-SB22-6	10/29/1998	ACENAPHTHENE	67.0000	J	UG/KG	160.0000
OW15-SB22-6	10/29/1998	ANTHRACENE	290.0000		UG/KG	79.0000
OW15-SB22-6	10/29/1998	BENZO(A)ANTHRACENE	57.0000		UG/KG	7.9000
OW15-SB22-6	10/29/1998	BENZO(G,H,I)PERYLENE	1100.0000		UG/KG	160.0000
OW15-SB22-6	10/29/1998	CHRYSENE	17.0000		UG/KG	7.9000
OW15-SB22-6	10/29/1998	FLUORENE	710.0000		UG/KG	310.0000
OW15-SB22-6	10/29/1998	METHYLENE CHLORIDE	18.0000	B	UG/KG	6.0000
OW15-SB22-6	10/29/1998	PERCENT SOLIDS	84.2000		%	0.0000
OW15-SB22-6	10/29/1998	PHENANTHRENE	100.0000		UG/KG	41.0000
OW15-SB22-6	10/29/1998	PYRENE	6.6000		UG/KG	4.1000
OW15-SB22-6	10/29/1998	TPH-DRO	8.1000		MG/KG	2.0000
OW15-SB22-6	10/29/1998	TPH-GRO	4.3000		MG/KG	0.5900
OW15-SB23-4	10/29/1998	1,2,4-TRIMETHYLBENZENE	6.0000		UG/KG	6.0000
OW15-SB23-4	10/29/1998	1,3,5-TRIMETHYLBENZENE	6.0000	J	UG/KG	6.0000
OW15-SB23-4	10/29/1998	4-ISOPROPYLTOLUENE	3.0000	J	UG/KG	6.0000
OW15-SB23-4	10/29/1998	ACENAPHTHENE	81.0000	J	UG/KG	160.0000
OW15-SB23-4	10/29/1998	ANTHRACENE	110.0000		UG/KG	79.0000
OW15-SB23-4	10/29/1998	BENZO(A)ANTHRACENE	25.0000		UG/KG	7.9000
OW15-SB23-4	10/29/1998	BENZO(B)FLUORANTHENE	1200.0000		UG/KG	310.0000
OW15-SB23-4	10/29/1998	BENZO(G,H,I)PERYLENE	370.0000		UG/KG	160.0000
OW15-SB23-4	10/29/1998	CHRYSENE	35.0000		UG/KG	7.9000
OW15-SB23-4	10/29/1998	FLUORENE	1000.0000		UG/KG	310.0000
OW15-SB23-4	10/29/1998	METHYLENE CHLORIDE	17.0000		UG/KG	6.0000
OW15-SB23-4	10/29/1998	N-PROPYLBENZENE	1.0000	J	UG/KG	6.0000
OW15-SB23-4	10/29/1998	PERCENT SOLIDS	83.8000		%	0.0000
OW15-SB23-4	10/29/1998	PHENANTHRENE	49.0000		UG/KG	41.0000
OW15-SB23-4	10/29/1998	PYRENE	12.0000		UG/KG	4.1000
OW15-SB23-4	10/29/1998	TPH-DRO	12.9000		MG/KG	2.0000
OW15-SB23-4	10/29/1998	TPH-GRO	16.1200	J	MG/KG	0.6000
OW15-SB23-4	10/29/1998	TRICHLOROETHENE	2.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	1,2,4-TRIMETHYLBENZENE	11.0000		UG/KG	6.0000
OW15-SB2-4	10/29/1998	1,3,5-TRIMETHYLBENZENE	6.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	ANTHRACENE	220.0000		UG/KG	200.0000
OW15-SB2-4	10/29/1998	BENZO(A)ANTHRACENE	11.0000	J	UG/KG	20.0000
OW15-SB2-4	10/29/1998	BENZO(G,H,I)PERYLENE	140.0000	J	UG/KG	410.0000
OW15-SB2-4	10/29/1998	CHRYSENE	16.0000	J	UG/KG	20.0000
OW15-SB2-4	10/29/1998	ETHYLBENZENE	3.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	ISOPROPYLBENZENE	3.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	METHYLENE CHLORIDE	16.0000		UG/KG	6.0000
OW15-SB2-4	10/29/1998	NAPHTHALENE	7.0000		UG/KG	6.0000
OW15-SB2-4	10/29/1998	N-PROPYLBENZENE	2.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	O-XYLENE	3.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	P&M-XYLENE	18.0000		UG/KG	6.0000
OW15-SB2-4	10/29/1998	PERCENT SOLIDS	80.2000		%	0.0000
OW15-SB2-4	10/29/1998	PHENANTHRENE	200.0000		UG/KG	110.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB2-4	10/29/1998	PYRENE	5.0000	J	UG/KG	11.0000
OW15-SB2-4	10/29/1998	SEC-BUTYLBENZENE	1.0000	J	UG/KG	6.0000
OW15-SB2-4	10/29/1998	TPH-DRO	11.0000		MG/KG	2.1000
OW15-SB2-4	10/29/1998	TPH-GRO	5.6000		MG/KG	0.6200
OW15-SB2-4	10/29/1998	TRICHLOROETHENE	3.0000	J	UG/KG	6.0000
OW15-SB24-9	10/29/1998	1,2,4-TRIMETHYLBENZENE	5.0000	K	UG/KG	6.0000
OW15-SB24-9	10/29/1998	1,3,5-TRIMETHYLBENZENE	7.0000	K	UG/KG	6.0000
OW15-SB24-9	10/29/1998	ACENAPHTHENE	48.0000	J	UG/KG	160.0000
OW15-SB24-9	10/29/1998	ANTHRACENE	170.0000		UG/KG	81.0000
OW15-SB24-9	10/29/1998	BENZO(A)ANTHRACENE	12.0000		UG/KG	8.1000
OW15-SB24-9	10/29/1998	BENZO(G,H,I)PERYLENE	180.0000		UG/KG	160.0000
OW15-SB24-9	10/29/1998	CHRYSENE	21.0000		UG/KG	8.1000
OW15-SB24-9	10/29/1998	FLUORENE	460.0000		UG/KG	320.0000
OW15-SB24-9	10/29/1998	METHYLENE CHLORIDE	21.0000	B	UG/KG	6.0000
OW15-SB24-9	10/29/1998	PERCENT SOLIDS	81.1000		%	0.0000
OW15-SB24-9	10/29/1998	PHENANTHRENE	84.0000		UG/KG	42.0000
OW15-SB24-9	10/29/1998	PYRENE	4.9000		UG/KG	4.2000
OW15-SB24-9	10/29/1998	SEC-BUTYLBENZENE	7.0000	K	UG/KG	6.0000
OW15-SB24-9	10/29/1998	TPH-DRO	11.3000		MG/KG	2.1000
OW15-SB24-9DL	10/29/1998	TPH-GRO	5.0600	L	MG/KG	0.6200
OW15-SB25-4	10/29/1998	1,2,4-TRIMETHYLBENZENE	52.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	1,3,5-TRIMETHYLBENZENE	58.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	4-ISOPROPYLTOLUENE	6.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	ACENAPHTHENE	76.0000	J	UG/KG	160.0000
OW15-SB25-4	10/29/1998	ANTHRACENE	260.0000		UG/KG	79.0000
OW15-SB25-4	10/29/1998	BENZO(A)ANTHRACENE	22.0000		UG/KG	7.9000
OW15-SB25-4	10/29/1998	BENZO(G,H,I)PERYLENE	380.0000		UG/KG	160.0000
OW15-SB25-4	10/29/1998	CHRYSENE	35.0000		UG/KG	7.9000
OW15-SB25-4	10/29/1998	ETHYLBENZENE	10.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	FLUORENE	790.0000		UG/KG	310.0000
OW15-SB25-4	10/29/1998	METHYLENE CHLORIDE	21.0000	B	UG/KG	6.0000
OW15-SB25-4	10/29/1998	NAPHTHALENE	15.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	N-PROPYLBENZENE	9.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	O-XYLENE	6.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	P&M-XYLENE	46.0000	K	UG/KG	6.0000
OW15-SB25-4	10/29/1998	PERCENT SOLIDS	83.4000		%	0.0000
OW15-SB25-4	10/29/1998	PHENANTHRENE	120.0000		UG/KG	41.0000
OW15-SB25-4	10/29/1998	PYRENE	7.1000		UG/KG	4.1000
OW15-SB25-4	10/29/1998	TPH-DRO	10.2000		MG/KG	2.0000
OW15-SB25-4DL	10/29/1998	TPH-GRO	8.8300	L	MG/KG	0.6000
OW15-SB26-0	10/28/1998	BENZO(A)ANTHRACENE	200.00		UG/KG	190.00
OW15-SB26-0	10/28/1998	BENZO(G,H,I)PERYLENE	1500.00	J	UG/KG	3800.00
OW15-SB26-0	10/28/1998	CHRYSENE	100.00	J	UG/KG	190.00
OW15-SB26-0	10/28/1998	FLUORENE	4900.00	J	UG/KG	7400.00
OW15-SB26-0	10/28/1998	INDENO(1,2,3-CD)PYRENE	180.00		UG/KG	150.00
OW15-SB26-0	10/28/1998	METHYLENE CHLORIDE	20.00	B	UG/KG	11.00
OW15-SB26-0	10/28/1998	PERCENT SOLIDS	88.10		%	0.00
OW15-SB26-0	10/28/1998	PH	4.72		PH	0.01
OW15-SB26-0	10/28/1998	PHENANTHRENE	580.00	J	UG/KG	970.00
OW15-SB26-0	10/28/1998	PYRENE	24.00	J	UG/KG	97.00
OW15-SB26-0	10/28/1998	TPH-Diesel	25.70		MG/KG	1.90
OW15-SB26-0	10/28/1998	TPH-Gas	2.69		MG/KG	0.57
OW15-SB27-8	10/28/1998	ACENAPHTHENE	180.00	J	UG/KG	320.00
OW15-SB27-8	10/28/1998	ANTHRACENE	96.00	J	UG/KG	160.00
OW15-SB27-8	10/28/1998	BENZO(A)ANTHRACENE	32.00		UG/KG	16.00
OW15-SB27-8	10/28/1998	BENZO(B)FLUORANTHENE	740.00		UG/KG	620.00
OW15-SB27-8	10/28/1998	BENZO(G,H,I)PERYLENE	400.00		UG/KG	320.00

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB27-8	10/28/1998	CHRYSENE	54.00		UG/KG	16.00
OW15-SB27-8	10/28/1998	FLUORENE	2100.00		UG/KG	620.00
OW15-SB27-8	10/28/1998	METHYLENE CHLORIDE	10.00	B	UG/KG	12.00
OW15-SB27-8	10/28/1998	PERCENT SOLIDS	82.90		%	0.00
OW15-SB27-8	10/28/1998	PH	7.61		PH	0.01
OW15-SB27-8	10/28/1998	PHENANTHRENE	110.00		UG/KG	82.00
OW15-SB27-8	10/28/1998	PYRENE	8.30		UG/KG	8.20
OW15-SB27-8	10/28/1998	TPH-Diesel	70.00		MG/KG	21.00
OW15-SB27-8	10/28/1998	TPH-Gas	10.01		MG/KG	0.60
OW15-SB3-8	10/29/1998	1,2,4-TRIMETHYLBENZENE	6031.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	1,3,5-TRIMETHYLBENZENE	631.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	4-ISOPROPYLTOLUENE	150.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	ANTHRACENE	440.0000		UG/KG	200.0000
OW15-SB3-8	10/29/1998	BENZO(A)ANTHRACENE	28.0000		UG/KG	20.0000
OW15-SB3-8	10/29/1998	BENZO(B)FLUORANTHENE	1100.0000		UG/KG	770.0000
OW15-SB3-8	10/29/1998	BENZO(G,H,I)PERYLENE	560.0000		UG/KG	390.0000
OW15-SB3-8	10/29/1998	CHLOROFORM	9.0000	B	UG/KG	29.0000
OW15-SB3-8	10/29/1998	CHRYSENE	99.0000		UG/KG	20.0000
OW15-SB3-8	10/29/1998	ETHYLBENZENE	791.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	NAPHTHALENE	438.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	N-PROPYLBENZENE	183.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	O-XYLENE	1166.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	P&M-XYLENE	11035.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	PERCENT SOLIDS	84.6000		%	0.0000
OW15-SB3-8	10/29/1998	PHENANTHRENE	220.0000		UG/KG	100.0000
OW15-SB3-8	10/29/1998	PYRENE	14.0000		UG/KG	10.0000
OW15-SB3-8	10/29/1998	SEC-BUTYLBENZENE	57.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	TOLUENE	1754.0000		UG/KG	29.0000
OW15-SB3-8	10/29/1998	TPH-DRO	74.3000		MG/KG	2.0000
OW15-SB3-8	10/29/1998	TPH-GRO	193.7300		MG/KG	0.5900
OW15-SB4-2	10/29/1998	ACENAPHTHENE	23.0000	J	UG/KG	160.0000
OW15-SB4-2	10/29/1998	ANTHRACENE	100.0000		UG/KG	79.0000
OW15-SB4-2	10/29/1998	BENZO(A)ANTHRACENE	14.0000		UG/KG	7.9000
OW15-SB4-2	10/29/1998	BENZO(G,H,I)PERYLENE	120.0000	J	UG/KG	160.0000
OW15-SB4-2	10/29/1998	CHRYSENE	3.1000	J	UG/KG	7.9000
OW15-SB4-2	10/29/1998	FLUORENE	230.0000	J	UG/KG	310.0000
OW15-SB4-2	10/29/1998	PERCENT SOLIDS	83.7000		%	0.0000
OW15-SB4-2	10/29/1998	PHENANTHRENE	30.0000	J	UG/KG	41.0000
OW15-SB4-2	10/29/1998	PYRENE	4.1000		UG/KG	4.1000
OW15-SB4-2	10/29/1998	TPH-DRO	12.2000		MG/KG	2.0000
OW15-SB4-2	10/29/1998	TPH-GRO	1.1000		MG/KG	0.1200
OW15-SB4-2P	10/29/1998	ACENAPHTHENE	46.0000	J	UG/KG	160.0000
OW15-SB4-2P	10/29/1998	ANTHRACENE	140.0000		UG/KG	80.0000
OW15-SB4-2P	10/29/1998	BENZO(A)ANTHRACENE	17.0000		UG/KG	8.0000
OW15-SB4-2P	10/29/1998	BENZO(G,H,I)PERYLENE	240.0000		UG/KG	160.0000
OW15-SB4-2P	10/29/1998	CHRYSENE	16.0000		UG/KG	8.0000
OW15-SB4-2P	10/29/1998	FLUORENE	530.0000		UG/KG	310.0000
OW15-SB4-2P	10/29/1998	METHYLENE CHLORIDE	16.0000	B	UG/KG	6.0000
OW15-SB4-2P	10/29/1998	PERCENT SOLIDS	83.1000		%	0.0000
OW15-SB4-2P	10/29/1998	PHENANTHRENE	59.0000		UG/KG	41.0000
OW15-SB4-2P	10/29/1998	PYRENE	7.0000		UG/KG	4.1000
OW15-SB4-2P	10/29/1998	TPH-DRO	9.8000		MG/KG	2.0000
OW15-SB4-2PDL	10/29/1998	TPH-GRO	1.4200	L	MG/KG	0.6000
OW15-SB5-8	10/29/1998	1,2,4-TRIMETHYLBENZENE	12.0000		UG/KG	6.0000
OW15-SB5-8	10/29/1998	4-ISOPROPYLTOLUENE	8.0000		UG/KG	6.0000
OW15-SB5-8	10/29/1998	ACENAPHTHENE	2300.0000	J	UG/KG	8000.0000
OW15-SB5-8	10/29/1998	BENZO(A)ANTHRACENE	570.0000		UG/KG	400.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB5-8	10/29/1998	BENZO(B)FLUORANTHENE	9900.0000	J	UG/KG	16000.0000
OW15-SB5-8	10/29/1998	BENZO(G,H,I)PERYLENE	4800.0000	J	UG/KG	8000.0000
OW15-SB5-8	10/29/1998	CHRYSENE	940.0000		UG/KG	400.0000
OW15-SB5-8	10/29/1998	FLUORENE	32000.0000		UG/KG	16000.0000
OW15-SB5-8	10/29/1998	INDENO(1,2,3-CD)PYRENE	410.0000	J	UG/KG	320.0000
OW15-SB5-8	10/29/1998	METHYLENE CHLORIDE	24.0000		UG/KG	6.0000
OW15-SB5-8	10/29/1998	PERCENT SOLIDS	82.0000		%	0.0000
OW15-SB5-8	10/29/1998	PHENANTHRENE	2600.0000		UG/KG	2100.0000
OW15-SB5-8	10/29/1998	PYRENE	130.0000	J	UG/KG	210.0000
OW15-SB5-8	10/29/1998	TPH-DRO	62.6000		MG/KG	2.1000
OW15-SB5-8	10/29/1998	TPH-GRO	4.7400		MG/KG	0.6100
OW15-SB6-1	10/29/1998	1,2,4-TRIMETHYLBENZENE	24.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	1,3,5-TRIMETHYLBENZENE	18.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	4-ISOPROPYLTOLUENE	3.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	ACENAPHTHENE	130.0000	J	UG/KG	160.0000
OW15-SB6-1	10/29/1998	ANTHRACENE	380.0000		UG/KG	80.0000
OW15-SB6-1	10/29/1998	BENZO(A)ANTHRACENE	23.0000		UG/KG	8.0000
OW15-SB6-1	10/29/1998	BENZO(G,H,I)PERYLENE	340.0000		UG/KG	160.0000
OW15-SB6-1	10/29/1998	CHRYSENE	46.0000		UG/KG	8.0000
OW15-SB6-1	10/29/1998	ETHYLBENZENE	4.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	FLUORENE	1300.0000		UG/KG	310.0000
OW15-SB6-1	10/29/1998	METHYLENE CHLORIDE	23.0000	B	UG/KG	6.0000
OW15-SB6-1	10/29/1998	O-XYLENE	3.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	P&M-XYLENE	17.0000	K	UG/KG	6.0000
OW15-SB6-1	10/29/1998	PERCENT SOLIDS	82.9000		%	0.0000
OW15-SB6-1	10/29/1998	PHENANTHRENE	160.0000		UG/KG	41.0000
OW15-SB6-1	10/29/1998	PYRENE	11.0000		UG/KG	4.1000
OW15-SB6-1	10/29/1998	TPH-DRO	11.4000		MG/KG	2.0000
OW15-SB6-1DL	10/29/1998	TPH-GRO	6.7600	L	MG/KG	0.6000
OW15-SB6-1P	10/29/1998	1,2,4-TRIMETHYLBENZENE	11.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	1,3,5-TRIMETHYLBENZENE	9.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	ACENAPHTHENE	210.0000	J	UG/KG	400.0000
OW15-SB6-1P	10/29/1998	ANTHRACENE	190.0000	J	UG/KG	200.0000
OW15-SB6-1P	10/29/1998	BENZO(A)ANTHRACENE	44.0000		UG/KG	20.0000
OW15-SB6-1P	10/29/1998	BENZO(B)FLUORANTHENE	670.0000	J	UG/KG	780.0000
OW15-SB6-1P	10/29/1998	BENZO(G,H,I)PERYLENE	490.0000		UG/KG	400.0000
OW15-SB6-1P	10/29/1998	CHRYSENE	87.0000		UG/KG	20.0000
OW15-SB6-1P	10/29/1998	ETHYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	FLUORENE	2600.0000		UG/KG	780.0000
OW15-SB6-1P	10/29/1998	INDENO(1,2,3-CD)PYRENE	38.0000	J	UG/KG	310.0000
OW15-SB6-1P	10/29/1998	METHYLENE CHLORIDE	14.0000	B	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	N-PROPYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	O-XYLENE	1.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	P&M-XYLENE	10.0000	K	UG/KG	6.0000
OW15-SB6-1P	10/29/1998	PERCENT SOLIDS	83.6000		%	0.0000
OW15-SB6-1P	10/29/1998	PHENANTHRENE	93.0000	J	UG/KG	100.0000
OW15-SB6-1P	10/29/1998	PYRENE	13.0000		UG/KG	10.0000
OW15-SB6-1P	10/29/1998	TPH-DRO	16.7000		MG/KG	2.0000
OW15-SB6-1P	10/29/1998	TPH-GRO	9.2700		MG/KG	0.6000
OW15-SB7-6	10/29/1998	1,2,4-TRIMETHYLBENZENE	100.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	1,3,5-TRIMETHYLBENZENE	180.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	4-ISOPROPYLTOLUENE	10.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	ACENAPHTHENE	150.0000	J	UG/KG	160.0000
OW15-SB7-6	10/29/1998	ANTHRACENE	480.0000		UG/KG	79.0000
OW15-SB7-6	10/29/1998	BENZO(A)ANTHRACENE	25.0000		UG/KG	7.9000
OW15-SB7-6	10/29/1998	BENZO(G,H,I)PERYLENE	380.0000		UG/KG	160.0000
OW15-SB7-6	10/29/1998	CHRYSENE	41.0000		UG/KG	7.9000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SB7-6	10/29/1998	ETHYLBENZENE	64.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	FLUORENE	1200.0000		UG/KG	310.0000
OW15-SB7-6	10/29/1998	METHYLENE CHLORIDE	16.0000	B	UG/KG	6.0000
OW15-SB7-6	10/29/1998	NAPHTHALENE	52.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	N-BUTYLBENZENE	22.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	N-PROPYLBENZENE	23.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	O-XYLENE	23.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	P&M-XYLENE	260.0000	K	UG/KG	6.0000
OW15-SB7-6	10/29/1998	PERCENT SOLIDS	83.5000		%	0.0000
OW15-SB7-6	10/29/1998	PHENANTHRENE	360.0000		UG/KG	41.0000
OW15-SB7-6	10/29/1998	PYRENE	11.0000		UG/KG	4.1000
OW15-SB7-6	10/29/1998	TPH-DRO	49.2000		MG/KG	2.0000
OW15-SB7-6	10/29/1998	TPH-GRO	11.6800		MG/KG	0.6000
OW15-SB8-2	10/29/1998	1,2,4-TRIMETHYLBENZENE	70.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	1,3,5-TRIMETHYLBENZENE	97.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	4-ISOPROPYLTOLUENE	8.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	ACENAPHTHENE	310.0000	J	UG/KG	1600.0000
OW15-SB8-2	10/29/1998	ANTHRACENE	1400.0000		UG/KG	790.0000
OW15-SB8-2	10/29/1998	BENZO(A)ANTHRACENE	190.0000		UG/KG	79.0000
OW15-SB8-2	10/29/1998	BENZO(G,H,I)PERYLENE	2800.0000		UG/KG	1600.0000
OW15-SB8-2	10/29/1998	CHRYSENE	190.0000		UG/KG	79.0000
OW15-SB8-2	10/29/1998	ETHYLBENZENE	34.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	FLUORENE	2500.0000	J	UG/KG	3100.0000
OW15-SB8-2	10/29/1998	INDENO(1,2,3-CD)PYRENE	150.0000	J	UG/KG	310.0000
OW15-SB8-2	10/29/1998	METHYLENE CHLORIDE	18.0000	B	UG/KG	6.0000
OW15-SB8-2	10/29/1998	NAPHTHALENE	24.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	N-BUTYLBENZENE	14.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	N-PROPYLBENZENE	12.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	O-XYLENE	24.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	P&M-XYLENE	140.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	PERCENT SOLIDS	83.7000		%	0.0000
OW15-SB8-2	10/29/1998	PHENANTHRENE	700.0000		UG/KG	410.0000
OW15-SB8-2	10/29/1998	PYRENE	19.0000	J	UG/KG	41.0000
OW15-SB8-2	10/29/1998	SEC-BUTYLBENZENE	97.0000	K	UG/KG	6.0000
OW15-SB8-2	10/29/1998	TPH-DRO	16.0000		MG/KG	2.0000
OW15-SB8-2	10/29/1998	TPH-GRO	5.9600		MG/KG	0.6000
OW15-SB9-3	10/29/1998	1,2,4-TRIMETHYLBENZENE	11.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	1,3,5-TRIMETHYLBENZENE	13.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	ACENAPHTHENE	71.0000	J	UG/KG	160.0000
OW15-SB9-3	10/29/1998	ANTHRACENE	190.0000		UG/KG	81.0000
OW15-SB9-3	10/29/1998	BENZO(A)ANTHRACENE	16.0000		UG/KG	8.1000
OW15-SB9-3	10/29/1998	BENZO(G,H,I)PERYLENE	300.0000		UG/KG	160.0000
OW15-SB9-3	10/29/1998	CHRYSENE	38.0000		UG/KG	8.1000
OW15-SB9-3	10/29/1998	ETHYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	FLUORENE	520.0000		UG/KG	320.0000
OW15-SB9-3	10/29/1998	METHYLENE CHLORIDE	2.0000	B	UG/KG	6.0000
OW15-SB9-3	10/29/1998	NAPHTHALENE	10.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	N-PROPYLBENZENE	1.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	O-XYLENE	2.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	P&M-XYLENE	11.0000	K	UG/KG	6.0000
OW15-SB9-3	10/29/1998	PERCENT SOLIDS	82.5000		%	0.0000
OW15-SB9-3	10/29/1998	PHENANTHRENE	100.0000		UG/KG	41.0000
OW15-SB9-3	10/29/1998	PYRENE	3.2000	J	UG/KG	4.1000
OW15-SB9-3	10/29/1998	TPH-DRO	11.6000		MG/KG	2.1000
OW15-SB9-3	10/29/1998	TPH-GRO	8.7300		MG/KG	0.6100
OW15-SBB1-7	10/30/1998	1,2,4-TRIMETHYLBENZENE	6.0000	J	UG/KG	6.0000
OW15-SBB1-7	10/30/1998	1,3,5-TRIMETHYLBENZENE	6.0000	J	UG/KG	6.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SBB1-7	10/30/1998	ACENAPHTHENE	470.0000	J	UG/KG	810.0000
OW15-SBB1-7	10/30/1998	ANTHRACENE	2800.0000		UG/KG	410.0000
OW15-SBB1-7	10/30/1998	BENZO(A)ANTHRACENE	370.0000		UG/KG	41.0000
OW15-SBB1-7	10/30/1998	BENZO(G,H,I)PERYLENE	2300.0000		UG/KG	810.0000
OW15-SBB1-7	10/30/1998	CHRYSENE	440.0000		UG/KG	41.0000
OW15-SBB1-7	10/30/1998	FLUORENE	6600.0000		UG/KG	1600.0000
OW15-SBB1-7	10/30/1998	METHYLENE CHLORIDE	46.0000		UG/KG	6.0000
OW15-SBB1-7	10/30/1998	P&M-XYLENE	2.0000	J	UG/KG	6.0000
OW15-SBB1-7	10/30/1998	PERCENT SOLIDS	81.5000		%	0.0000
OW15-SBB1-7	10/30/1998	PHENANTHRENE	910.0000		UG/KG	210.0000
OW15-SBB1-7	10/30/1998	PYRENE	33.0000		UG/KG	21.0000
OW15-SBB1-7	10/30/1998	TPH-DIESEL RANGE	11.6000		MG/KG	2.1000
OW15-SBB1-7	10/30/1998	TPH-GAS RANGE	1.4400		MG/KG	0.6100
OW15-SBB2-4	10/30/1998	1,2,4-TRIMETHYLBENZENE	50.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	1,3,5-TRIMETHYLBENZENE	87.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	4-ISOPROPYLTOLUENE	4.0000	J	UG/KG	6.0000
OW15-SBB2-4	10/30/1998	ACENAPHTHENE	4000.0000	J	UG/KG	8000.0000
OW15-SBB2-4	10/30/1998	ANTHRACENE	2000.0000	J	UG/KG	4000.0000
OW15-SBB2-4	10/30/1998	BENZO(A)ANTHRACENE	980.0000		UG/KG	400.0000
OW15-SBB2-4	10/30/1998	BENZO(G,H,I)PERYLENE	9600.0000		UG/KG	8000.0000
OW15-SBB2-4	10/30/1998	CHRYSENE	2300.0000		UG/KG	400.0000
OW15-SBB2-4	10/30/1998	ETHYLBENZENE	27.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	FLUORENE	55000.0000		UG/KG	16000.0000
OW15-SBB2-4	10/30/1998	METHYLENE CHLORIDE	49.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	NAPHTHALENE	22.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	N-PROPYLBENZENE	10.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	O-XYLENE	15.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	P&M-XYLENE	110.0000		UG/KG	6.0000
OW15-SBB2-4	10/30/1998	PERCENT SOLIDS	83.0000		%	0.0000
OW15-SBB2-4	10/30/1998	PHENANTHRENE	2800.0000		UG/KG	2000.0000
OW15-SBB2-4	10/30/1998	PYRENE	150.0000	J	UG/KG	200.0000
OW15-SBB2-4	10/30/1998	TPH-DIESEL RANGE	15.9000		MG/KG	2.0000
OW15-SBB2-4	10/30/1998	TPH-GAS RANGE	26.5800		MG/KG	0.6000
OW15-SBB3-8	10/30/1998	1,2,4-TRIMETHYLBENZENE	11.0000	K	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	1,3,5-TRIMETHYLBENZENE	9.0000	K	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	ACENAPHTHENE	5000.0000	J	UG/KG	7900.0000
OW15-SBB3-8	10/30/1998	ANTHRACENE	2500.0000	J	UG/KG	4000.0000
OW15-SBB3-8	10/30/1998	BENZO(A)ANTHRACENE	1000.0000		UG/KG	400.0000
OW15-SBB3-8	10/30/1998	BENZO(G,H,I)PERYLENE	11000.0000		UG/KG	7900.0000
OW15-SBB3-8	10/30/1998	CHRYSENE	2400.0000		UG/KG	400.0000
OW15-SBB3-8	10/30/1998	ETHYLBENZENE	2.0000	K	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	FLUORENE	67000.0000		UG/KG	16000.0000
OW15-SBB3-8	10/30/1998	METHYLENE CHLORIDE	45.0000	K	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	P&M-XYLENE	6.0000	K	UG/KG	6.0000
OW15-SBB3-8	10/30/1998	PERCENT SOLIDS	83.5000		%	0.0000
OW15-SBB3-8	10/30/1998	PHENANTHRENE	4900.0000		UG/KG	2000.0000
OW15-SBB3-8	10/30/1998	PYRENE	160.0000	J	UG/KG	200.0000
OW15-SBB3-8	10/30/1998	TPH-DIESEL RANGE	7.1000		MG/KG	2.0000
OW15-SBB3-8	10/30/1998	TPH-GAS RANGE	1.4400		MG/KG	0.1200
OW15-SBB4-2	10/30/1998	1,2,4-TRIMETHYLBENZENE	11.0000		UG/KG	6.0000
OW15-SBB4-2	10/30/1998	1,3,5-TRIMETHYLBENZENE	17.0000		UG/KG	6.0000
OW15-SBB4-2	10/30/1998	ACENAPHTHENE	400.0000	J	UG/KG	790.0000
OW15-SBB4-2	10/30/1998	ANTHRACENE	220.0000	J	UG/KG	400.0000
OW15-SBB4-2	10/30/1998	BENZO(A)ANTHRACENE	100.0000		UG/KG	40.0000
OW15-SBB4-2	10/30/1998	BENZO(G,H,I)PERYLENE	1000.0000		UG/KG	790.0000
OW15-SBB4-2	10/30/1998	CHRYSENE	160.0000		UG/KG	40.0000
OW15-SBB4-2	10/30/1998	ETHYLBENZENE	3.0000	J	UG/KG	6.0000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SBB4-2	10/30/1998	FLUORENE	5500.0000		UG/KG	1600.0000
OW15-SBB4-2	10/30/1998	METHYLENE CHLORIDE	29.0000		UG/KG	6.0000
OW15-SBB4-2	10/30/1998	NAPHTHALENE	12.0000		UG/KG	6.0000
OW15-SBB4-2	10/30/1998	O-XYLENE	2.0000	J	UG/KG	6.0000
OW15-SBB4-2	10/30/1998	P&M-XYLENE	16.0000		UG/KG	6.0000
OW15-SBB4-2	10/30/1998	PERCENT SOLIDS	83.8000		%	0.0000
OW15-SBB4-2	10/30/1998	PHENANTHRENE	170.0000	J	UG/KG	200.0000
OW15-SBB4-2	10/30/1998	PYRENE	23.0000		UG/KG	20.0000
OW15-SBB4-2	10/30/1998	TPH-DIESEL RANGE	10.3000		MG/KG	2.0000
OW15-SBB4-2	10/30/1998	TPH-GAS RANGE	12.4900		MG/KG	0.6000
OW15-SBB5-8	10/30/1998	1,2,4-TRIMETHYLBENZENE	740.0000	J	UG/KG	6.0000
OW15-SBB5-8	10/30/1998	1,3,5-TRIMETHYLBENZENE	1300.0000	J	UG/KG	6.0000
OW15-SBB5-8	10/30/1998	4-ISOPROPYLTOLUENE	90.0000		UG/KG	6.0000
OW15-SBB5-8	10/30/1998	ANTHRACENE	140.0000		UG/KG	84.0000
OW15-SBB5-8	10/30/1998	ETHYLBENZENE	760.0000	J	UG/KG	6.0000
OW15-SBB5-8	10/30/1998	FLUORENE	350.0000		UG/KG	330.0000
OW15-SBB5-8	10/30/1998	ISOPROPYLBENZENE	890.0000	J	UG/KG	6.0000
OW15-SBB5-8	10/30/1998	NAPHTHALENE	560.0000		UG/KG	6.0000
OW15-SBB5-8	10/30/1998	N-BUTYLBENZENE	160.0000		UG/KG	6.0000
OW15-SBB5-8	10/30/1998	N-PROPYLBENZENE	330.0000		UG/KG	6.0000
OW15-SBB5-8	10/30/1998	O-XYLENE	100.0000		UG/KG	6.0000
OW15-SBB5-8	10/30/1998	P&M-XYLENE	1900.0000	J	UG/KG	6.0000
OW15-SBB5-8	10/30/1998	PERCENT SOLIDS	78.6000		%	0.0000
OW15-SBB5-8	10/30/1998	PHENANTHRENE	96.0000		UG/KG	43.0000
OW15-SBB5-8	10/30/1998	TPH-DIESEL RANGE	17.5000		MG/KG	2.2000
OW15-SBB5-8	10/30/1998	TPH-GAS RANGE	137.9400	J	MG/KG	0.6400
OW15-SBB6-1	10/30/1998	1,2,4-TRIMETHYLBENZENE	4.0000	K	UG/KG	6.0000
OW15-SBB6-1	10/30/1998	1,3,5-TRIMETHYLBENZENE	7.0000	K	UG/KG	6.0000
OW15-SBB6-1	10/30/1998	ACENAPHTHENE	570.0000	J	UG/KG	790.0000
OW15-SBB6-1	10/30/1998	ANTHRACENE	450.0000		UG/KG	400.0000
OW15-SBB6-1	10/30/1998	BENZO(A)ANTHRACENE	200.0000		UG/KG	40.0000
OW15-SBB6-1	10/30/1998	BENZO(G,H,I)PERYLENE	2000.0000		UG/KG	790.0000
OW15-SBB6-1	10/30/1998	CHRYSENE	310.0000		UG/KG	40.0000
OW15-SBB6-1	10/30/1998	FLUORENE	8000.0000		UG/KG	1600.0000
OW15-SBB6-1	10/30/1998	METHYLENE CHLORIDE	48.0000	K	UG/KG	6.0000
OW15-SBB6-1	10/30/1998	NAPHTHALENE	5.0000	K	UG/KG	6.0000
OW15-SBB6-1	10/30/1998	P&M-XYLENE	4.0000	K	UG/KG	6.0000
OW15-SBB6-1	10/30/1998	PERCENT SOLIDS	83.5000		%	0.0000
OW15-SBB6-1	10/30/1998	PHENANTHRENE	360.0000		UG/KG	200.0000
OW15-SBB6-1	10/30/1998	PYRENE	26.0000		UG/KG	20.0000
OW15-SBB6-1	10/30/1998	TPH-DIESEL RANGE	24.1000		MG/KG	2.0000
OW15-SBB6-1	10/30/1998	TPH-GAS RANGE	9.2500		MG/KG	0.6000
OW15-SBB6-1P	10/30/1998	1,2,4-TRIMETHYLBENZENE	7.0000		UG/KG	6.0000
OW15-SBB6-1P	10/30/1998	1,3,5-TRIMETHYLBENZENE	8.0000		UG/KG	6.0000
OW15-SBB6-1P	10/30/1998	ACENAPHTHENE	10000.0000		UG/KG	8000.0000
OW15-SBB6-1P	10/30/1998	ANTHRACENE	3400.0000	J	UG/KG	4000.0000
OW15-SBB6-1P	10/30/1998	BENZO(A)ANTHRACENE	2200.0000		UG/KG	400.0000
OW15-SBB6-1P	10/30/1998	BENZO(G,H,I)PERYLENE	21000.0000		UG/KG	8000.0000
OW15-SBB6-1P	10/30/1998	CHRYSENE	4300.0000	J	UG/KG	400.0000
OW15-SBB6-1P	10/30/1998	FLUORENE	140000.0000		UG/KG	16000.0000
OW15-SBB6-1P	10/30/1998	METHYLENE CHLORIDE	56.0000		UG/KG	6.0000
OW15-SBB6-1P	10/30/1998	NAPHTHALENE	5.0000	J	UG/KG	6.0000
OW15-SBB6-1P	10/30/1998	P&M-XYLENE	4.0000	J	UG/KG	6.0000
OW15-SBB6-1P	10/30/1998	PERCENT SOLIDS	82.6000		%	0.0000
OW15-SBB6-1P	10/30/1998	PHENANTHRENE	4100.0000		UG/KG	2100.0000
OW15-SBB6-1P	10/30/1998	PYRENE	400.0000		UG/KG	210.0000
OW15-SBB6-1P	10/30/1998	TPH-DIESEL RANGE	21.1000		MG/KG	2.1000

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SBB6-1P	10/30/1998	TPH-GAS RANGE	8.7000		MG/KG	0.6100
OW15-SBB7-6	10/30/1998	ACENAPHTHENE	100.0000	J	UG/KG	190.0000
OW15-SBB7-6	10/30/1998	ANTHRACENE	60.0000	J	UG/KG	95.0000
OW15-SBB7-6	10/30/1998	BENZO(A)ANTHRACENE	27.0000		UG/KG	9.5000
OW15-SBB7-6	10/30/1998	BENZO(G,H,I)PERYLENE	320.0000		UG/KG	190.0000
OW15-SBB7-6	10/30/1998	CHRYSENE	67.0000		UG/KG	9.5000
OW15-SBB7-6	10/30/1998	FLUORENE	1400.0000		UG/KG	370.0000
OW15-SBB7-6	10/30/1998	METHYLENE CHLORIDE	50.0000	K	UG/KG	6.0000
OW15-SBB7-6	10/30/1998	NAPHTHALENE	2.0000	K	UG/KG	6.0000
OW15-SBB7-6	10/30/1998	PERCENT SOLIDS	80.3000		%	0.0000
OW15-SBB7-6	10/30/1998	PHENANTHRENE	56.0000		UG/KG	49.0000
OW15-SBB7-6	10/30/1998	PYRENE	3.1000	J	UG/KG	4.9000
OW15-SBB7-6	10/30/1998	TPH-DIESEL RANGE	3.1000		MG/KG	2.1000
OW15-SBB7-6	10/30/1998	TPH-GAS RANGE	1.9200		MG/KG	0.6200
OW15-SS01-01	11/04/1998	ACENAPHTHYLENE	72.2620	J	UG/KG	744.8100
OW15-SS01-01	11/04/1998	BENZO(A)ANTHRACENE	29.0140		UG/KG	7.4480
OW15-SS01-01	11/04/1998	BENZO(B)FLUORANTHENE	40.2310	J	UG/KG	293.4100
OW15-SS01-01	11/04/1998	BENZO(K)FLUORANTHENE	568.7660	J	UG/KG	586.8200
OW15-SS01-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS01-01	11/04/1998	CHRYSENE	12.4570		UG/KG	7.4480
OW15-SS01-01	11/04/1998	FLUORANTHENE	457.5110	J	UG/KG	744.8100
OW15-SS01-01	11/04/1998	FLUORENE	714.7500		UG/KG	293.4100
OW15-SS01-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS01-01	11/04/1998	PHENANTHRENE	8.2840	J	UG/KG	38.3690
OW15-SS01-01	11/04/1998	TPH-DIESEL RANGE	7.8000		MG/KG	1.9000
OW15-SS01-01	11/04/1998	TPH-GAS RANGE	0.0100	J	MG/KG	0.1100
OW15-SS02-01	11/04/1998	ACENAPHTHENE	926.1800		UG/KG	739.0680
OW15-SS02-01	11/04/1998	BENZO(A)ANTHRACENE	161.6660		UG/KG	36.9530
OW15-SS02-01	11/04/1998	BENZO(G,H,I)PERYLENE	4070.2380		UG/KG	739.0680
OW15-SS02-01	11/04/1998	BENZO(K)FLUORANTHENE	3663.0600		UG/KG	2911.4800
OW15-SS02-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS02-01	11/04/1998	CHRYSENE	302.3390		UG/KG	36.9530
OW15-SS02-01	11/04/1998	FLUORANTHENE	4468.9780		UG/KG	3695.3400
OW15-SS02-01	11/04/1998	FLUORENE	7220.6210		UG/KG	1455.7400
OW15-SS02-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	228.5300	J	UG/KG	1455.7400
OW15-SS02-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS02-01	11/04/1998	PHENANTHRENE	135.8060	J	UG/KG	190.3660
OW15-SS02-01	11/04/1998	PYRENE	9.0620	J	UG/KG	19.0370
OW15-SS02-01	11/04/1998	TPH-DIESEL RANGE	130.9000		MG/KG	1.9000
OW15-SS03-01	11/04/1998	ACENAPHTHENE	10416.9030		UG/KG	7621.2180
OW15-SS03-01	11/04/1998	BENZO(A)ANTHRACENE	1683.4520		UG/KG	381.0610
OW15-SS03-01	11/04/1998	BENZO(G,H,I)PERYLENE	31720.9590		UG/KG	7621.2180
OW15-SS03-01	11/04/1998	BENZO(K)FLUORANTHENE	18068.8610	J	UG/KG	30022.9800
OW15-SS03-01	11/04/1998	CHLOROFORM	1.0000	B	UG/KG	6.0000
OW15-SS03-01	11/04/1998	CHRYSENE	3048.2060		UG/KG	381.0610
OW15-SS03-01	11/04/1998	FLUORANTHENE	35822.4060	J	UG/KG	38106.0900
OW15-SS03-01	11/04/1998	FLUORENE	94021.3380		UG/KG	15011.4900
OW15-SS03-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	1684.4210	J	UG/KG	15011.4900
OW15-SS03-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS03-01	11/04/1998	PHENANTHRENE	1094.6230	J	UG/KG	1963.0410
OW15-SS03-01	11/04/1998	PYRENE	86.6370	J	UG/KG	196.3040
OW15-SS03-01	11/04/1998	TPH-DIESEL RANGE	6.9000		MG/KG	2.0000
OW15-SS03-01	11/04/1998	TPH-GAS RANGE	0.0300	J	MG/KG	0.1200
OW15-SS04-01	11/04/1998	ACENAPHTHENE	105.5010	J	UG/KG	152.9880
OW15-SS04-01	11/04/1998	BENZO(A)ANTHRACENE	26.0320		UG/KG	7.6490
OW15-SS04-01	11/04/1998	BENZO(G,H,I)PERYLENE	480.2840		UG/KG	152.9880
OW15-SS04-01	11/04/1998	BENZO(K)FLUORANTHENE	621.1000		UG/KG	602.6800

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SS04-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS04-01	11/04/1998	CHRYSENE	27.5200		UG/KG	7.6490
OW15-SS04-01	11/04/1998	FLUORANTHENE	715.0180	J	UG/KG	764.9400
OW15-SS04-01	11/04/1998	FLUORENE	920.6130		UG/KG	301.3400
OW15-SS04-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	29.5310	J	UG/KG	301.3400
OW15-SS04-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS04-01	11/04/1998	PHENANTHRENE	23.5400	J	UG/KG	39.4060
OW15-SS04-01	11/04/1998	PYRENE	0.7420	J	UG/KG	3.9410
OW15-SS04-01	11/04/1998	TPH-DIESEL RANGE	2.9000		MG/KG	2.0000
OW15-SS04-01	11/04/1998	TPH-GAS RANGE	0.0100	J	MG/KG	0.1200
OW15-SS05-01	11/04/1998	ACENAPHTHENE	8766.5150		UG/KG	8684.2140
OW15-SS05-01	11/04/1998	ANTHRACENE	1388.6980	J	UG/KG	4342.1070
OW15-SS05-01	11/04/1998	BENZO(A)ANTHRACENE	2759.4590		UG/KG	434.2110
OW15-SS05-01	11/04/1998	BENZO(K)FLUORANTHENE	98737.7690		UG/KG	34210.5400
OW15-SS05-01	11/04/1998	CHRYSENE	2516.5570		UG/KG	434.2110
OW15-SS05-01	11/04/1998	FLUORANTHENE	18866.3890	J	UG/KG	43421.0700
OW15-SS05-01	11/04/1998	FLUORENE	78879.8920		UG/KG	17105.2700
OW15-SS05-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	7.0000
OW15-SS05-01	11/04/1998	PHENANTHRENE	3683.7500		UG/KG	2236.8430
OW15-SS05-01	11/04/1998	PYRENE	115.3620	J	UG/KG	223.6840
OW15-SS05-01	11/04/1998	TPH-DIESEL RANGE	26.4000		MG/KG	2.2000
OW15-SS05-01	11/04/1998	TPH-GAS RANGE	0.0100	J	MG/KG	0.1300
OW15-SS06-01	11/04/1998	ACENAPHTHENE	968.8110		UG/KG	775.5660
OW15-SS06-01	11/04/1998	BENZO(A)ANTHRACENE	238.2880		UG/KG	38.7780
OW15-SS06-01	11/04/1998	BENZO(G,H,I)PERYLENE	3212.5850		UG/KG	775.5660
OW15-SS06-01	11/04/1998	BENZO(K)FLUORANTHENE	6663.5520		UG/KG	3055.2600
OW15-SS06-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS06-01	11/04/1998	CHRYSENE	313.6720		UG/KG	38.7780
OW15-SS06-01	11/04/1998	FLUORANTHENE	3895.3180		UG/KG	3877.8300
OW15-SS06-01	11/04/1998	FLUORENE	9875.1170		UG/KG	1527.6300
OW15-SS06-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	322.5040	J	UG/KG	1527.6300
OW15-SS06-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS06-01	11/04/1998	PHENANTHRENE	209.8600		UG/KG	199.7670
OW15-SS06-01	11/04/1998	PYRENE	53.5760		UG/KG	19.9770
OW15-SS06-01	11/04/1998	TPH-DIESEL RANGE	9.2000		MG/KG	2.0000
OW15-SS06-01	11/04/1998	TPH-GAS RANGE	0.0100	J	MG/KG	0.1200
OW15-SS07-01	11/04/1998	ACENAPHTHENE	1762.9740		UG/KG	792.3300
OW15-SS07-01	11/04/1998	BENZO(A)ANTHRACENE	348.8140		UG/KG	39.6160
OW15-SS07-01	11/04/1998	BENZO(G,H,I)PERYLENE	5840.1700		UG/KG	792.3300
OW15-SS07-01	11/04/1998	BENZO(K)FLUORANTHENE	11427.8970		UG/KG	3121.3000
OW15-SS07-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS07-01	11/04/1998	CHRYSENE	619.3130	J	UG/KG	39.6160
OW15-SS07-01	11/04/1998	FLUORANTHENE	7412.2340		UG/KG	3961.6500
OW15-SS07-01	11/04/1998	FLUORENE	16763.7680		UG/KG	1560.6500
OW15-SS07-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	484.2240	J	UG/KG	1560.6500
OW15-SS07-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS07-01	11/04/1998	PHENANTHRENE	313.0720		UG/KG	204.0850
OW15-SS07-01	11/04/1998	PYRENE	83.3830		UG/KG	20.4080
OW15-SS07-01	11/04/1998	TPH-DIESEL RANGE	15.7000		MG/KG	2.0000
OW15-SS07-01	11/04/1998	TPH-GAS RANGE	0.0100	J	MG/KG	0.1200
OW15-SS08-01	11/04/1998	ACENAPHTHENE	209.7520		UG/KG	163.3500
OW15-SS08-01	11/04/1998	BENZO(A)ANTHRACENE	41.6330		UG/KG	8.1680
OW15-SS08-01	11/04/1998	BENZO(G,H,I)PERYLENE	806.8020		UG/KG	163.3500
OW15-SS08-01	11/04/1998	BENZO(K)FLUORANTHENE	1136.0370		UG/KG	643.5000
OW15-SS08-01	11/04/1998	CHLOROFORM	2.0000	B	UG/KG	6.0000
OW15-SS08-01	11/04/1998	CHRYSENE	68.9370		UG/KG	8.1680
OW15-SS08-01	11/04/1998	FLUORANTHENE	970.6580		UG/KG	816.7500

SAMPLE_ID	DATE_COLL	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	DETECT_LIM
OW15-SS08-01	11/04/1998	FLUORENE	1951.1330		UG/KG	321.7500
OW15-SS08-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	65.2220	J	UG/KG	321.7500
OW15-SS08-01	11/04/1998	METHYLENE CHLORIDE	3.0000	B	UG/KG	6.0000
OW15-SS08-01	11/04/1998	PHENANTHRENE	38.1820	J	UG/KG	42.0750
OW15-SS08-01	11/04/1998	PYRENE	11.8760		UG/KG	4.2080
OW15-SS08-01	11/04/1998	TPH-DIESEL RANGE	2.5000		MG/KG	2.1000
OW15-SS08-01	11/04/1998	TPH-GAS RANGE	0.0200	J	MG/KG	0.1200
OW15-SS09-01	11/04/1998	ACENAPHTHENE	288.0050		UG/KG	146.3220
OW15-SS09-01	11/04/1998	BENZO(A)ANTHRACENE	64.3370		UG/KG	7.3160
OW15-SS09-01	11/04/1998	BENZO(B)FLUORANTHENE	248.1290	J	UG/KG	288.2100
OW15-SS09-01	11/04/1998	BENZO(G,H,I)PERYLENE	760.3670		UG/KG	146.3220
OW15-SS09-01	11/04/1998	CHLOROFORM	1.0000	B	UG/KG	6.0000
OW15-SS09-01	11/04/1998	CHRYSENE	83.7910	J	UG/KG	7.3160
OW15-SS09-01	11/04/1998	FLUORANTHENE	2223.0070		UG/KG	731.6100
OW15-SS09-01	11/04/1998	FLUORENE	2320.5370		UG/KG	288.2100
OW15-SS09-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	34.2360		UG/KG	288.2100
OW15-SS09-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS09-01	11/04/1998	PHENANTHRENE	58.8480		UG/KG	37.6890
OW15-SS09-01	11/04/1998	PYRENE	16.9010		UG/KG	3.7690
OW15-SS09-01	11/04/1998	TPH-DIESEL RANGE	6.0000		MG/KG	1.9000
OW15-SS09-01	11/04/1998	TPH-GAS RANGE	0.0200	J	MG/KG	0.1100
OW15-SS09P-01	11/04/1998	ACENAPHTHENE	73.1970	J	UG/KG	147.5100
OW15-SB21-8	10/29/1998	BENZENE	77.0000	K	UG/KG	6.0000
OW15-SS09P-01	11/04/1998	BENZO(A)ANTHRACENE	21.0520		UG/KG	7.3760
OW15-SS09P-01	11/04/1998	BENZO(B)FLUORANTHENE	498.2920		UG/KG	290.5500
OW15-SS09P-01	11/04/1998	BENZO(G,H,I)PERYLENE	445.9690		UG/KG	147.5100
OW15-SS09P-01	11/04/1998	CHLOROFORM	1.0000	B	UG/KG	6.0000
OW15-SS09P-01	11/04/1998	CHRYSENE	36.8110		UG/KG	7.3760
OW15-SS09P-01	11/04/1998	FLUORANTHENE	774.0560		UG/KG	737.5500
OW15-SS09P-01	11/04/1998	FLUORENE	772.3280		UG/KG	290.5500
OW15-SS09P-01	11/04/1998	INDENO(1,2,3-CD)PYRENE	27.4260	J	UG/KG	290.5500
OW15-SS09P-01	11/04/1998	METHYLENE CHLORIDE	4.0000	B	UG/KG	6.0000
OW15-SS09P-01	11/04/1998	PHENANTHRENE	31.5130	J	UG/KG	37.9950
OW15-SS09P-01	11/04/1998	PYRENE	7.6320		UG/KG	3.8000
OW15-SS09P-01	11/04/1998	TPH-DIESEL RANGE	4.3000		MG/KG	1.9000
OW15-SS09P-01	11/04/1998	TPH-GAS RANGE	0.0200	J	MG/KG	0.1100
OW15-SS10-01	11/04/1998	ACENAPHTHENE	104.7510	J	UG/KG	172.5240
OW15-SS10-01	11/04/1998	ANTHRACENE	490.1340		UG/KG	86.2620
OW15-SB3-8	10/29/1998	BENZENE	103.0000	J	UG/KG	29.0000
OW15-SS10-01	11/04/1998	BENZO(A)ANTHRACENE	2.1150	J	UG/KG	8.6260
OW15-SS10-01	11/04/1998	BENZO(B)FLUORANTHENE	48.0240	J	UG/KG	339.8200
OW15-SS10-01	11/04/1998	BENZO(K)FLUORANTHENE	96.6400	J	UG/KG	679.6400
OW15-SS10-01	11/04/1998	CHRYSENE	3.6450	J	UG/KG	8.6260
OW15-SS10-01	11/04/1998	FLUORANTHENE	696.7230	J	UG/KG	862.6200
OW15-SS10-01	11/04/1998	FLUORENE	370.0520		UG/KG	339.8200
OW15-SS10-01	11/04/1998	METHYLENE CHLORIDE	3.0000	B	UG/KG	7.0000
OW15-SS10-01	11/04/1998	PHENANTHRENE	191.4590		UG/KG	44.4380
OW15-SS10-01	11/04/1998	PYRENE	11.3860		UG/KG	4.4440
OW15-SS10-01	11/04/1998	TPH-DIESEL RANGE	771.9000		MG/KG	22.2200
OW15-SS10-01	11/04/1998	TPH-GAS RANGE	19.0000	K	MG/KG	0.6500

Notes:

B = Chemical found in the sample at levels nearly equivalent to the blank

K = Biased high so actual value is possbley lower

L = Biased low and actual value possibly higher

Appendix A5-2 to Section 5

Data Quality Objectives Decision Error Feasibility Trials

APPENDIX A-2 to Section 5

Detailed Statistical Calculation – USEPA DQO Model (1994)

As part of USEPA guidance on determining data quality objectives, EPA has developed software to iteratively determine the appropriate number of samples for a given site. The *Data Quality Objectives Decision Error Feasibility Trials (DQO/DEFT)* (EPA QA/G-4D, September 1994) provides a means for estimating the number of samples needed based on several input parameters. The model assumes that the data are normally distributed, and that the data set is intended for use in calculating the population mean. The following sections summarize the input data and the model output for total number of samples required.

Input Parameters

Action Level: The action level is a measurement threshold that provides the criterion for selecting among alternative actions. In this case, we have set the action level equal to the lower limit of a range of values that will represent minimal additional cleanup cost to the Navy.

Null and Alternative Hypotheses: The null (Ho) and alternative (Ha) hypotheses are used to identify which error is a false positive and which error is a false negative. In all of the following calculations, the null hypothesis is selected as:

Mean $\leq$ Action Level

Gray Region: The gray region is a range of possible parameter values where the consequences of a false negative decision are relatively minor. The lower bound on the gray region is defined by the Action Level. The upper range of the gray region is set as the current proposed cleanup goal for benzene of 91 ug/kg.

Standard Deviation: The standard deviation has been estimated based on the analytical results.

Probability Limits on Decision Errors: The acceptable level of probability of a false positive error (α) and of a false negative error (β) must be selected.

The false positive error takes place if we incorrectly determine, based on the complete data set, that the mean is lower than the range of values in the gray area. In other words, we calculate a 95% upper confidence limit of the mean that is lower than it really should be. This error would lead to setting the background level lower than the true background. In all cases, the probability limit on the false positive error is set at 0.05.

The false negative error takes place if we incorrectly determine, based on the complete data set, that the mean is greater than the range of values in the gray area. In other words, we calculate a 95% upper confidence limit of the mean that is higher than it really should be. This error would lead to setting the background level higher than the true background. In all cases, the probability limit on the false positive error is set at 0.05.

Benzene

The range of detected values for benzene concentrations is 2.0 ug/kg to 103 ug/kg. The following input parameters were used for the DEFT model:

Action Level: 50 ppb

Upper Bound on Gray Area: 91 ppb

Standard Deviation: 21 ug/kg

Model Output: 27 samples (total) required for 95% confidence that neither a false negative nor a false positive has occurred.

Appendix A5-3 to Section 5

Non-Detected Chemicals that have Detection Limits that Exceed Regulatory Limits from Excavation Perimeter Soil Sampling

SAMPLE_ID	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	RegCritValue	Criteria	Exceedance Quotient
OW15-SS01-01	DIBENZ(A,H)ANTHRACENE	148.962	U	UG/KG	87	Res RBC	1.7
OW15-SS02-01	BENZO(A)PYRENE	369.534	U	UG/KG	87	Res RBC	4.2
OW15-SS02-01	BENZO(B)FLUORANTHENE	1455.74	U	UG/KG	870	Res RBC	1.7
OW15-SS02-01	DIBENZ(A,H)ANTHRACENE	739.068	U	UG/KG	87	Res RBC	8.5
OW15-SS03-01	BENZO(A)PYRENE	3810.609	U	UG/KG	780	Ind RBC	4.9
OW15-SS03-01	BENZO(A)PYRENE	3810.609	U	UG/KG	87	Res RBC	43.8
OW15-SS03-01	BENZO(B)FLUORANTHENE	15011.49	U	UG/KG	7800	Ind RBC	1.9
OW15-SS03-01	BENZO(B)FLUORANTHENE	15011.49	U	UG/KG	870	Res RBC	17.3
OW15-SS03-01	DIBENZ(A,H)ANTHRACENE	7621.218	U	UG/KG	780	Ind RBC	9.8
OW15-SS03-01	DIBENZ(A,H)ANTHRACENE	7621.218	U	UG/KG	87	Res RBC	87.6
OW15-SS04-01	DIBENZ(A,H)ANTHRACENE	152.988	U	UG/KG	87	Res RBC	1.8
OW15-SS05-01	BENZO(A)PYRENE	4342.107	U	UG/KG	780	Ind RBC	5.6
OW15-SS05-01	BENZO(A)PYRENE	4342.107	U	UG/KG	87	Res RBC	49.9
OW15-SS05-01	BENZO(B)FLUORANTHENE	17105.27	U	UG/KG	7800	Ind RBC	2.2
OW15-SS05-01	BENZO(B)FLUORANTHENE	17105.27	U	UG/KG	870	Res RBC	19.7
OW15-SS05-01	DIBENZ(A,H)ANTHRACENE	8684.214	U	UG/KG	780	Ind RBC	11.1
OW15-SS05-01	DIBENZ(A,H)ANTHRACENE	8684.214	U	UG/KG	87	Res RBC	99.8
OW15-SS05-01	INDENO(1,2,3-CD)PYRENE	17105.27	U	UG/KG	7800	Ind RBC	2.2
OW15-SS05-01	INDENO(1,2,3-CD)PYRENE	17105.27	U	UG/KG	870	Res RBC	19.7
OW15-SS06-01	BENZO(A)PYRENE	387.783	U	UG/KG	87	Res RBC	4.5
OW15-SS06-01	BENZO(B)FLUORANTHENE	1527.63	U	UG/KG	870	Res RBC	1.8
OW15-SS06-01	DIBENZ(A,H)ANTHRACENE	775.566	U	UG/KG	87	Res RBC	8.9
OW15-SS07-01	BENZO(A)PYRENE	396.165	U	UG/KG	87	Res RBC	4.6
OW15-SS07-01	BENZO(B)FLUORANTHENE	1560.65	U	UG/KG	870	Res RBC	1.8
OW15-SS07-01	DIBENZ(A,H)ANTHRACENE	792.33	U	UG/KG	780	Ind RBC	1.0
OW15-SS07-01	DIBENZ(A,H)ANTHRACENE	792.33	U	UG/KG	87	Res RBC	9.1
OW15-SS08-01	DIBENZ(A,H)ANTHRACENE	163.35	U	UG/KG	87	Res RBC	1.9
OW15-SS09-01	DIBENZ(A,H)ANTHRACENE	146.322	U	UG/KG	87	Res RBC	1.7
OW15-SS09P-01	DIBENZ(A,H)ANTHRACENE	147.51	U	UG/KG	87	Res RBC	1.7
OW15-SS10-01	DIBENZ(A,H)ANTHRACENE	172.524	U	UG/KG	87	Res RBC	2.0

Appendix A5-4 to Section 5

Non-Detected Chemicals that have Detection Limits that Exceed Regulatory Limits from Biopile Soil Sampling

SAMPLE_ID	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	RegCritValue	Criteria	Exceedance Quotient
OW15-SB10-3	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB10-3	DIBENZ(A,H)ANTHRACENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SB11-3	1,2-DIBROMOETHANE	30	U	UG/KG	7.5	Res RBC	4.0
OW15-SB11-3	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB11-3	DIBENZ(A,H)ANTHRACENE	390	U	UG/KG	87	Res RBC	4.5
OW15-SB12-4	1,2-DIBROMOETHANE	30	U	UG/KG	7.5	Res RBC	4.0
OW15-SB12-4	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB12-4	DIBENZ(A,H)ANTHRACENE	390	U	UG/KG	87	Res RBC	4.5
OW15-SB13-5	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB14-4	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB14-4	DIBENZ(A,H)ANTHRACENE	390	U	UG/KG	87	Res RBC	4.5
OW15-SB15-8	BENZO(A)PYRENE	780	U	UG/KG	780	Ind RBC	1.0
OW15-SB15-8	BENZO(A)PYRENE	780	U	UG/KG	87	Res RBC	9.0
OW15-SB15-8	BENZO(B)FLUORANTHENE	3100	U	UG/KG	870	Res RBC	3.6
OW15-SB15-8	DIBENZ(A,H)ANTHRACENE	1600	U	UG/KG	780	Ind RBC	2.1
OW15-SB15-8	DIBENZ(A,H)ANTHRACENE	1600	U	UG/KG	87	Res RBC	18.4
OW15-SB16-3	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB16-3	DIBENZ(A,H)ANTHRACENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SB1-7	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB1-7	DIBENZ(A,H)ANTHRACENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SB17-3	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB18-3	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB19-3	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB19-3	DIBENZ(A,H)ANTHRACENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SB20-2	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB20-2P	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB21-8	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB22-6	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB23-4	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB2-4	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB2-4	DIBENZ(A,H)ANTHRACENE	410	U	UG/KG	87	Res RBC	4.7
OW15-SB24-9	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB25-4	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB26-0	BENZO(A)PYRENE	1900	U	UG/KG	780	Ind RBC	2.4
OW15-SB26-0	BENZO(A)PYRENE	1900	U	UG/KG	87	Res RBC	21.8
OW15-SB26-0	BENZO(B)FLUORANTHENE	7400	U	UG/KG	870	Res RBC	8.5
OW15-SB26-0	BENZO(K)FLUORANTHENE	15000	U	UG/KG	8700	Res RBC	1.7
OW15-SB26-0	DIBENZ(A,H)ANTHRACENE	3800	U	UG/KG	780	Ind RBC	4.9
OW15-SB26-0	DIBENZ(A,H)ANTHRACENE	3800	U	UG/KG	87	Res RBC	43.7
OW15-SB27-8	BENZO(A)PYRENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB27-8	DIBENZ(A,H)ANTHRACENE	320	U	UG/KG	87	Res RBC	3.7
OW15-SB3-8	1,2-DIBROMOETHANE	29	U	UG/KG	7.5	Res RBC	3.9
OW15-SB3-8	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB3-8	DIBENZ(A,H)ANTHRACENE	390	U	UG/KG	87	Res RBC	4.5
OW15-SB4-2	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB4-2P	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB5-8	BENZO(A)PYRENE	4000	U	UG/KG	780	Ind RBC	5.1
OW15-SB5-8	BENZO(A)PYRENE	4000	U	UG/KG	87	Res RBC	46.0
OW15-SB5-8	BENZO(K)FLUORANTHENE	32000	U	UG/KG	8700	Res RBC	3.7
OW15-SB5-8	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	780	Ind RBC	10.3
OW15-SB5-8	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	87	Res RBC	92.0
OW15-SB6-1	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB6-1P	BENZO(A)PYRENE	200	U	UG/KG	87	Res RBC	2.3
OW15-SB6-1P	DIBENZ(A,H)ANTHRACENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SB7-6	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SB8-2	BENZO(A)PYRENE	790	U	UG/KG	780	Ind RBC	1.0
OW15-SB8-2	BENZO(A)PYRENE	790	U	UG/KG	87	Res RBC	9.1
OW15-SB8-2	BENZO(B)FLUORANTHENE	3100	U	UG/KG	870	Res RBC	3.6
OW15-SB8-2	DIBENZ(A,H)ANTHRACENE	1600	U	UG/KG	780	Ind RBC	2.1
OW15-SB8-2	DIBENZ(A,H)ANTHRACENE	1600	U	UG/KG	87	Res RBC	18.4
OW15-SB9-3	DIBENZ(A,H)ANTHRACENE	160	U	UG/KG	87	Res RBC	1.8
OW15-SBB1-7	BENZO(A)PYRENE	410	U	UG/KG	87	Res RBC	4.7
OW15-SBB1-7	BENZO(B)FLUORANTHENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB1-7	DIBENZ(A,H)ANTHRACENE	810	U	UG/KG	780	Ind RBC	1.0
OW15-SBB1-7	DIBENZ(A,H)ANTHRACENE	810	U	UG/KG	87	Res RBC	9.3
OW15-SBB1-7	INDENO(1,2,3-CD)PYRENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB2-4	BENZO(A)PYRENE	4000	U	UG/KG	780	Ind RBC	5.1
OW15-SBB2-4	BENZO(A)PYRENE	4000	U	UG/KG	87	Res RBC	46.0
OW15-SBB2-4	BENZO(B)FLUORANTHENE	16000	U	UG/KG	7800	Ind RBC	2.1

SAMPLE_ID	CHEM_NAME	ANA_VALUE	DV_QUAL	UNITS	RegCritValue	Criteria	Exceedance Quotient
OW15-SBB2-4	BENZO(B)FLUORANTHENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB2-4	BENZO(K)FLUORANTHENE	31000	U	UG/KG	8700	Res RBC	3.6
OW15-SBB2-4	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	780	Ind RBC	10.3
OW15-SBB2-4	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	87	Res RBC	92.0
OW15-SBB2-4	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	7800	Ind RBC	2.1
OW15-SBB2-4	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB3-8	BENZO(A)PYRENE	4000	U	UG/KG	780	Ind RBC	5.1
OW15-SBB3-8	BENZO(A)PYRENE	4000	U	UG/KG	87	Res RBC	46.0
OW15-SBB3-8	BENZO(B)FLUORANTHENE	16000	U	UG/KG	7800	Ind RBC	2.1
OW15-SBB3-8	BENZO(B)FLUORANTHENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB3-8	BENZO(K)FLUORANTHENE	31000	U	UG/KG	8700	Res RBC	3.6
OW15-SBB3-8	DIBENZ(A,H)ANTHRACENE	7900	U	UG/KG	780	Ind RBC	10.1
OW15-SBB3-8	DIBENZ(A,H)ANTHRACENE	7900	U	UG/KG	87	Res RBC	90.8
OW15-SBB3-8	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	7800	Ind RBC	2.1
OW15-SBB3-8	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB4-2	BENZO(A)PYRENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SBB4-2	BENZO(B)FLUORANTHENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB4-2	DIBENZ(A,H)ANTHRACENE	790	U	UG/KG	780	Ind RBC	1.0
OW15-SBB4-2	DIBENZ(A,H)ANTHRACENE	790	U	UG/KG	87	Res RBC	9.1
OW15-SBB4-2	INDENO(1,2,3-CD)PYRENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB5-8	DIBENZ(A,H)ANTHRACENE	170	U	UG/KG	87	Res RBC	2.0
OW15-SBB6-1	BENZO(A)PYRENE	400	U	UG/KG	87	Res RBC	4.6
OW15-SBB6-1	BENZO(B)FLUORANTHENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB6-1	DIBENZ(A,H)ANTHRACENE	790	U	UG/KG	780	Ind RBC	1.0
OW15-SBB6-1	DIBENZ(A,H)ANTHRACENE	790	U	UG/KG	87	Res RBC	9.1
OW15-SBB6-1	INDENO(1,2,3-CD)PYRENE	1600	U	UG/KG	870	Res RBC	1.8
OW15-SBB6-1P	BENZO(A)PYRENE	4000	U	UG/KG	780	Ind RBC	5.1
OW15-SBB6-1P	BENZO(A)PYRENE	4000	U	UG/KG	87	Res RBC	46.0
OW15-SBB6-1P	BENZO(B)FLUORANTHENE	16000	U	UG/KG	7800	Ind RBC	2.1
OW15-SBB6-1P	BENZO(B)FLUORANTHENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB6-1P	BENZO(K)FLUORANTHENE	31000	U	UG/KG	8700	Res RBC	3.6
OW15-SBB6-1P	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	780	Ind RBC	10.3
OW15-SBB6-1P	DIBENZ(A,H)ANTHRACENE	8000	U	UG/KG	87	Res RBC	92.0
OW15-SBB6-1P	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	7800	Ind RBC	2.1
OW15-SBB6-1P	INDENO(1,2,3-CD)PYRENE	16000	U	UG/KG	870	Res RBC	18.4
OW15-SBB7-6	BENZO(A)PYRENE	95	U	UG/KG	87	Res RBC	1.1
OW15-SBB7-6	DIBENZ(A,H)ANTHRACENE	190	U	UG/KG	87	Res RBC	2.2

Appendix A5-5 to Section 5

SW-846 Statistics for Derivation of Confirmatory Samples

Appendix A-5
SW-846 Statistical Derivation of Samples Required to Characterize Re-treated Biopile Soil

Samples from initial confirmatory sampling (7 - 9 ft interval)		x_i	$(x_i)^2$		
(OW15-SBB3-8)	1	8.54	72.9316		
(OW15-SBB5-8)	2	155.4	24149.16		
(OW15-SB1-7)	3	18.5	342.25		
(OW15-SB3-8)	4	268	71824		
(OW15-SB21-8)	5	201.4	40561.96		
(OW15-SB5-8)	6	67.3	4529.29		
(OW15-SB15-8)	7	63.9	4083.21		
(OW15-SB24-9)	8	16.6	275.56		
(OW15-SB27-8)	9	80	6400		
	sum	879.64	152238.4	879.64	
	mean	97.73778		97.73778	
	s^2	8283.038		8283.038	
	RT	50		50	
	t	1.397	(from SW-846 Table 9-2)	1.860	(95% one-tailed value)
	n	7.09		12.57 *	

* Thirteen samples will be collected and analyzed for TOTAL TPH (sum of TPH-DRO & TPH-GRO); the results of these 13 samples will be evaluated statistically to determine if the DEQ SW requirement of 50 ppm TPH has been achieved with the additional treatment of these soils. The volume of the re-treated soils will be divided into 13 cells, each cell having approximately 575 yd^3 of soil. Each cell will be divided into sub-cells, each being an equal quadrant of the original cell. A grab sample from each of the four sub-cells will be composited for the sample submitted for analysis from that particular cell. As the soil depth for re-treatment is 18", all these confirmatory samples will be collected from the center of the retreated soil layer, approximately 9 inches from the surface.