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Final Report
Human Health Risk Assessment for SWMUs 1, 15, and 24
Naval Air Station, Oceana
Virginia Beach, Virginia

Prepared for

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

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Contents

Section		Page
1.0	**Introduction**	**1-1**
1.1	Report Organization	1-1
2.0	**Facility Background**	**2-1**
2.1	NASO Environmental Setting	2-1
2.1.1	Climate	2-1
2.1.2	Topography	2-1
2.1.3	Soils	2-1
2.1.4	Surface Water Resources.	2-2
2.1.5	Groundwater Resources.	2-3
2.2	SWMU-Specific Overview	2-3
2.2.1	SMWU 1 - West Woods Oil Disposal Pit	2-3
2.2.2	SWMU 15 - Abandoned Tank Farm	2-4
2.2.3	SWMU 24 - Bowser, Building 840	2-6
3.0	**General Methodology**	**3-1**
3.1	Identification of Chemicals of Potential Concern	3-1
3.1.1	Data Evaluation	3-2
3.1.2	Selection of Chemicals of Potential Concern	3-2
3.2	Exposure Assessment	3-3
3.2.1	Characterization of Exposure Setting	3-4
3.2.2	Identification of Exposure Pathways	3-4
3.2.3	Quantification of Exposure	3-5
3.3	Toxicity Assessment	3-7
3.3.1	Toxicity Information for Noncarcinogenic Effects	3-8
3.3.2	Toxicity Information for Carcinogenic Effects	3-9
3.3.3	Derivation of Dermal RfDs and CSFs	3-10
3.3.4	Toxicity Profiles of Selected Chemicals	3-10
3.4	Risk Characterization	3-17
3.4.1	Noncarcinogenic Hazard Estimation	3-17
3.4.2	Carcinogenic Risk Estimation	3-18
3.4.3	Interpretation of Numerical Results	3-18
4.0	**SWMU 1**	**4-1**
4.1	Data Summary	4-1
4.2	Identification of Chemicals of Potential Concern	4-1
4.3	Exposure Assessment	4-1
4.3.1	Exposure Setting	4-2
4.3.2	Potentially Exposed Populations	4-2
4.3.3	Potential Exposure Pathways	4-2
4.4	Risk Characterization	4-4

Contents

Section Page

4.4.1 Soil 4-4
4.4.2 Groundwater 4-6
4.4.3 Surface Water 4-6
4.4.4 Sediment 4-7
4.4.5 Summary of Total Risks Across Pathways and Media 4-7

5.0 SWMU 15 5-1
5.1 Data Summary 5-1
5.2 Identification of Chemicals of Potential Concern 5-1
5.3 Exposure Assessment 5-1
5.3.1 Exposure Setting 5-2
5.3.2 Potentially Exposed Populations 5-2
5.3.3 Potential Exposure Pathways 5-2
5.4 Risk Characterization 5-4
5.4.1 Soil 5-4
5.4.2 Groundwater 5-6
5.4.3 Surface Water 5-7
5.4.4 Sediment 5-7
5.4.5 Summary of Total Risks Across Pathways and Media 5-8

6.0 SWMU 24 6-1
6.1 Data Summary 6-1
6.2 Identification of Chemicals of Potential Concern 6-1
6.3 Exposure Assessment 6-1
6.3.1 Exposure Setting 6-1
6.3.2 Potentially Exposed Populations 6-2
6.3.3 Potential Exposure Pathways 6-2
6.4 Risk Characterization 6-3
6.4.1 Subsurface Soil 6-3
6.4.2 Groundwater 6-4
6.4.3 Summary of Total Risks Across Pathways and Media 6-4

7.0 Uncertainty Assessment 7-1
7.1 Uncertainty in COPC Selection 7-1
7.2 Uncertainty Associated with Exposure Assessment 7-1
7.3 Uncertainty Associated with Toxicity Assessment 7-2
7.4 Uncertainty in Risk Characterization 7-3

8.0 Risk Conclusions 8-1
8.1 SWMU 1 Risk Conclusions 8-1
8.2 SWMU 15 Risk Conclusions 8-2
8.3 SWMU 24 Risk Conclusions 8-3

9.0 References 9-1

Contents

Tables

4-1 Summary of Data Used in the Human Health Risk Assessment, SWMU 01
4-2 Summary of Chemicals of Potential Concern for HHRA, SWMU 01
4-3 Exposure Pathways, SWMU 01
4-4 Summary of Media-Specific Risks and Hazards for RME, SWMU 01
4-5 Summary Table for all Pathways for all RME Exposure Scenarios at SWMU 01
4-6 Summary of Media-Specific Risks and Hazards for CT, SWMU 01
4-7 Summary Table for all Pathways for all CT Exposure Scenarios at SWMU 01

5-1 Summary of Data Used in the Human Health Risk Assessment, SWMU 15
5-2 Summary of Chemicals of Potential Concern for HHRA, SWMU 15
5-3 Exposure Pathways, SWMU 15
5-4 Summary of Media-Specific Risks and Hazards for RME, SWMU 15
5-5 Summary Table for all Pathways for all RME Exposure Scenarios at SWMU 15
5-6 Summary of Media-Specific Risks and Hazards for CT, SWMU 15
5-7 Summary Table for all Pathways for all CT Exposure Scenarios at SWMU 15

6-1 Summary of Data Used in the Human Health Risk Assessment, SWMU 24
6-2 Summary of Chemicals of Potential Concern for HHRA, SWMU 24
6-3 Exposure Pathways, SWMU 24
6-4 Summary of Media-Specific Risks and Hazards for RME, SWMU 24
6-5 Summary Table for all Pathways for all RME Exposure Scenarios at SWMU 24
6-6 Summary of Media-Specific Risks and Hazards for CT, SWMU 24
6-7 Summary Table for all Pathways for all CT Exposure Scenarios at SWMU 24

Figures

2-1 Base Map, NAS Oceana

4-1 Surface Soil Sampling Locations, SWMU 1
4-2 Subsurface Soil Sampling Locations, SWMU 1
4-3 Groundwater Sampling Locations, SWMU 1
4-4 Surface Water and Sediment Sampling Locations, SWMU 1
4-5 Conceptual Exposure Model, SWMU 1

5-1 Surface Soil Sampling Locations, SWMU 15
5-2 Subsurface Soil Sampling Locations, SWMU 15
5-3 Groundwater Sampling Locations, SWMU 15
5-4 Surface Water and Sediment Sampling Locations, SWMU 15
5-5 Conceptual Exposure Model, SWMU 15

6-1 Subsurface Soil Sampling Locations, SWMU 24
6-2 Groundwater Sampling Locations, SWMU 24
6-3 Conceptual Exposure Model, SWMU 24

Contents

Appendices

A SWMU 1
A.1 Summary of Analytical Results for Samples used in HHRA, SWMU 1
A.2 Summary of Constituents Detected in Samples used in HHRA, SWMU 1
A.3 Summary of Statistics for Constituents Detected in Samples used in HHRA, SWMU 1
A.4 RAGS Part D Standard Tables, SWMU 1

B SWMU 15
B.1 Summary of Analytical Results for Samples used in HHRA, SWMU 15
B.2 Summary of Constituents Detected in Samples used in HHRA, SWMU 15
B.3 Summary of Statistics for Constituents Detected in Samples used in HHRA, SWMU 15
B.4 RAGS Part D Standard Tables, SWMU 15

C SWMU 24
C.1 Summary of Analytical Results for Samples used in HHRA, SWMU 24
C.2 Summary of Constituents Detected in Samples used in HHRA, SWMU 24
C.3 Summary of Statistics for Constituents Detected in Samples used in HHRA, SWMU 24
C.4 RAGS Part D Standard Tables, SWMU 24

1.0 Introduction

This document presents an assessment of the potential human health risks for Solid Waste Management Units (SWMUs) 1, 15, and 24, at Naval Air Station Oceana (NASO). The risk assessment was prepared using conservative assumptions. The likely exposure pathways were considered for current and potential future site uses based on current site conditions (without remediation). The risk assessment follows the general methodology described in the *Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual, Part A* (USEPA, 1989) and *RAGS, Volume 1, Human Health Evaluation Manual, Part D* (USEPA, 1998). Technical Guidance Manuals for Risk Assessment published by Region III of the United States Environmental Protection Agency (USEPA) were also followed. The standard tables required for RAGS Part D are included in Appendices A.4, B.4, and C.4, for SWMUs 1, 15, and 24, respectively.

The results of the human health risk assessment will be used to help determine whether remediation is necessary, to document the potential for endangerment to human health, to provide a basis to select remediation goals, and to assist in identifying the exposure media that may need to be addressed through remedial action.

1.1 Report Organization

This report is divided into the following sections:

- **Section 1.0 - Introduction.** Describes the purpose and scope of the human health risk assessment (HHRA) and outlines the report organization.
- **Section 2.0 - Facility Background.** Describes the environmental setting of NASO and the site history for SWMUs 1, 15, and 24.
- **Section 3.0 - General Approach and Methodology.** Outlines and describes the specific technical approaches, methodologies, models, and parameter values that are used in the HHRA. This section includes those items that are common to all three of the SWMUs evaluated in this HHRA.
- **Section 4.0 – SWMU 1 (West Woods Oil Pit).** Includes the SWMU specific information used in the HHRA and presents the results of the risk evaluation for SWMU 1.
- **Section 5.0 – SWMU 15 (Abandoned Tank Farm).** Includes the SWMU specific information used in the HHRA and presents the results of the risk evaluation for SWMU 15.
- **Section 6.0 – SWMU 24 (Bowser Building, 840).** Includes the SWMU specific information used in the HHRA and presents the results of the risk evaluation for SWMU 24.

- **Section 7.0 - Uncertainty Assessment.** Identifies and discusses the sources of uncertainty in the risk assessment and evaluates their potential impacts on the risk conclusions.
- **Section 8.0 - Risk Conclusions.** Summarizes the results of the HHRA and presents the risk conclusions for each site.
- **Section 9.0 - References.** Lists the citations for all references cited in the HHRA.

Supporting technical data for the HHRA are provided in appendices.

2.0 Facility Background

NASO was established in 1940 as a small auxiliary airfield. Since 1940, NASO has grown to more than 16 times it original size and is now a 6,000-acre master jet base supporting a community of more than 9,100 Navy personnel and 11,000 dependents. The primary mission of NASO is to provide the personnel, operations, maintenance, and training facilities to ensure that fighter and attack squadrons on aircraft carriers of the U.S. Atlantic Fleet are ready for deployment.

In 1981, NASO initiated a comprehensive hazardous waste collection and recycling program to prevent releases of hazardous wastes to the environment. The program involved constructing waste controls, such as oil and water separators near aircraft cleaning and maintenance areas, and working closely with various shops to ensure that wastes were properly contained, segregated, labeled, and collected. NASO also monitors discharges within drainage ditches on and off the station as part of its National Pollution Discharge Elimination System (NPDES) monitoring to prevent the discharge of contamination beyond the limits of the station.

2.1 NASO Environmental Setting

This section discusses the general physiographic and environmental features of NASO.

2.1.1 Climate

NASO is near the Atlantic Ocean, which accounts for the mild year-round temperatures. The Virginia Beach area climate is characterized by hot, humid summers and mild winters. The annual average temperature is 68.2 degrees. The average annual precipitation is 44.62 inches. Seasonal snowfall is approximately 7 inches annually. Average wind speed at the station is approximately 10 mph. Coastal storms, in the form of severe thunderstorms, northeasters, and hurricanes, frequently impact the station.

2.1.2 Topography

The elevation of NASO ranges from approximately 5 feet above mean sea level (MSL) in the drainage ditches to approximately 25 feet above MSL in the open fields. Elevations in the developed area of the station range from 10 to 25 feet above MSL. Topography of the station is generally flat with a gradual easterly slope to the land surface.

2.1.3 Soils

NASO is on the outer edge of the Atlantic Coastal Plain physiographic province. The Atlantic Coastal Plain is a broad wedge of unconsolidated sediments that dip and thicken to the east. In the vicinity of NASO, the sediments consist of several thousand feet of unconsolidated sand, clay, silt, and gravel, and are underlain by granite basement rock. The sediments range in age from early Cretaceous to Recent. From oldest to youngest, the four geologic units underlying NASO are (1) the Potomac Formation, (2) the Pamunkey Group, (3) the Chesapeake Group, and (4) the Columbia Group (Meng and Harsh 1984). The

geologic units of concern in the environmental investigations at the NASO are in the Chesapeake Group (only the youngest unit, the Yorktown Formation) and the Columbia Group.

The Chesapeake Group has been differentiated into several units, which are, from oldest to youngest, the Calvert, Choptank, St. Marys, Eastover, and Yorktown Formations. As mentioned above, only the Yorktown Formation is of potential concern at NASO. The Yorktown Formation consists of interbedded layers of shelly, very fine to coarse sands, clayey sands, and sandy clay. Shelly layers are common in the Yorktown (Meng and Harsh 1984). Siudyla *et al.* (1981) divided the Yorktown into three sand units each overlain by a confining layer of silt and clay. Regionally, the uppermost of these silt and clay beds, which is referred to as the Yorktown confining unit, separates the Yorktown Formation from the sediments of the Columbia Group that overlie it. This uppermost bed consists of massive, well-bedded yellow-gray to greenish-gray clays and silty clays, which commonly contain shells, fine sand, and mica. The clay layers within the confining bed are generally extensive but are a series of coalescing clay beds rather than a single deposited unit. This unit was deposited in a shallow open-marine environment of broad lagoons and quiet bays (Meng and Harsh 1984). The Yorktown confining unit has not been encountered while drilling at NASO.

The sediments of the Columbia Group consist of interbedded gravel, sands, silts, and clays of Pleistocene and Holocene age. The Pleistocene and Holocene sediments were deposited in fluvial-marine terrace and near-shore marine environments, including lagoons, beaches, tidal flats and barrier islands (Oaks and Coch 1973; Hamilton and Larson 1988). The Columbia Group sediments are, from oldest to youngest, (1) the Great Bridge Formation, (2) the Norfolk Formation, (3) the Londonbridge Formation, and (4) the Sand Bridge Formation (Oaks and Coch 1973).

The Sand Bridge Formation consists of a pale, yellowish-brown silt to sandy silt, often characterized as being clayey. This formation extends from the surface to a depth of three to six feet. Underlying the Sandbridge Formation is the Londonbridge Formation, a bluish-gray, fine silty sand, which is generally four to five feet thick. The third member of the Columbia Group encountered while drilling at the NASO is the Norfolk Formation. This formation, which is approximately 8 to 11 feet thick, is a bluish-gray to gray, fine to medium sand with trace shell fragments. The Great Bridge Formation underlies the Norfolk. The Great Bridge has an upper and lower member. The upper member is a white to light gray, well-graded sand. The lower member exhibits similar grain sizes and colors, but contains minor amounts of pebble gravel and bluish shell fragments. The Great Bridge Formation ranges in thickness from 0 to 55 feet.

2.1.4 Surface Water Resources

Surface runoff from the station is facilitated by a system of drainage ditches and surface canals that flow southwest to West Neck Creek, north to London Bridge and Great Neck Creek, and east to Owls Creek and Lake Rudee. The presence of iron precipitate, organic odors, high turbidity, and thick brown algae mats in many ditches was noted during early field investigations.

2.1.5 Groundwater Resources

Groundwater at NASO is generally within 4 to 10 feet of the ground surface. Aquifer conditions are unconfined in the Columbia Group and unconfined to semiconfined within the upper Yorktown Formation (Siudyla *et al.* 1981). When the clay confining unit overlying the Yorktown is absent, the upper Yorktown is generally unconfined. Natural groundwater flow directions are generally south to southeast, but flow direction is controlled locally in the Columbia Group by drainage ditches. The flow direction in the Virginia Beach area is therefore highly variable because of the complexity of the drainage patterns. Groundwater from the Columbia Group sediments is not used as a water supply in the area of NASO.

2.2 SWMU-Specific Overview

This HHRA focuses on investigation activities at SWMUs 1, 15, and 24. The following subsections discuss each SWMU and the previous investigations conducted at the SWMUs.

2.2.1 SMWU 1 - West Woods Oil Disposal Pit

SWMU 1, the West Woods Oil Disposal Pit, is located in the northwest part of NASO, approximately 1,000 feet west of abandoned Runway 9 and the fire fighting training area (Figure 2-1). According to the Initial Assessment Study (IAS), the SWMU was originally an open pit where about 110,000 gallons of waste oil, fuels, PD 680, various chlorinated and aromatic hydrocarbons, aircraft-maintenance chemicals, paints, paint thinners and strippers, and agitine, were disposed of from the mid-1950s to the late 1960s (RGH, 1984). Drilling at this unit has shown that metal, concrete, and other debris were also disposed of in the pit or were included in the fill material. A 1958 aerial photograph of the unit shows that the pit was approximately 50 to 100 feet in diameter.

In the late 1960s, the oil disposal pit flooded and its contents are believed to have washed into the main drainage ditch, 100 feet west of the pit. Waste disposal was discontinued and the pit was filled with soil (RGH, 1984). The NAS boundary is approximately 1,000 to 2,000 feet west or northwest of the oil pit.

SWMU 1 has been investigated previously, including the IAS in 1984, the Phase I Verification Study in 1986, the Interim RCRA Facility Investigation (RFI) in 1991, the Phase I RFI in 1993, the Corrective Measures Study (CMS) in 1994 through 1995, the Phase III RFI in 1997, and groundwater sampling in 1998.

The IAS, conducted in 1984, identified the site and inventoried the types of waste liquids disposed of in the pit. The Phase I Verification Study (CH2M HILL, 1986), and Interim RFI (CH2M HILL, 1991), showed that the groundwater is contaminated locally with compounds associated with petroleum hydrocarbons. Sediment samples collected from the drainage ditch west of the former oil disposal pit also contained petroleum constituents.

The Phase I RFI investigation (CH2M HILL, 1993) was conducted to determine the vertical and lateral extent of groundwater contamination and the hydraulic characteristics and flow regime of the shallow aquifer. The groundwater was sampled for Polycyclic Aromatic Hydrocarbons (PAHs) and Volatile Organic Compounds (VOCs). PAHs were not detected in groundwater. Benzene, toluene, ethylbenzene, and xylene were detected in groundwater in two of the six wells. Summing of the benzene, toluene, ethylbenzene and xylene to

determine total BTEX indicated a detection of 67 parts per billion (ppb) in 1-MW4 and 16 ppb in 1-MW5. 1,1-Dichloroethane (1,1-DCA) was also detected in 1-MW4 at two ppb. Only one BTEX constituent, benzene, was detected in groundwater at concentrations that exceed an MCL. Benzene was detected at 6 ppb (MCL = 5 ppb) in well 1-MW4. Well 1-MW4 also was reported to contain free product. However, other wells that contained free product were not reported to contain BTEX constituents at concentrations above the MCLs.

The Phase I RFI also characterized the type and extent of soil contamination around the pit and the extent of sediment and surface water contamination. High concentrations of petroleum hydrocarbon products were detected in several borings, including those north of the pit.

A CMS field investigation was performed (CH2M HILL, 1995b) to determine the extent of contamination in soil. The field investigation included trenching at the site to determine the thickness of free product in the subsurface. The trenching confirmed the presence of free product contamination in soil on top of the water table. Product thickness was determined to be approximately 0.04 feet. An extraction well and monitoring system were installed at SWMU 1 to test the viability of extracting free product from the top of the water table. Two pilot tests were completed, however, no free product was recovered during either test due to the tightness of the silts that contained the product.

Groundwater sampling completed during the CMS indicated that groundwater is essentially not contaminated with dissolved-phase VOCs, however benzene was detected. BTEX constituents were not detected at concentrations above MCLs in the groundwater samples collected during the CMS.

As part of the Phase III RFI in 1997 (CH2M HILL, 1999b), the Navy installed two solar-powered skimmers and began recovering the free phase petroleum product found in 1-MW4, 1-MW5, 1-PZ3, and 1-PZ5. Free-product removal will continue until no additional free product is recoverable from existing wells at the SWMU.

In November 1998, groundwater samples were collected from monitoring wells and piezometers in support of risk assessment and long-term monitoring. Analytical results indicate that the shallow groundwater at SWMU 1 contains low concentrations of benzene and one PAH [benzo(a)pyrene] at concentrations that exceed MCLs and USEPA Region III RBCs for tap water. The waste-oil product floating on the water table was sampled and a fingerprint analysis indicated that it is degraded kerosene.

In July 1999, surface soil, surface water, and sediment samples were collected at SWMU 1 in support of ecological and human health risk assessment. The analytical results of that sampling event are documented in this human health risk assessment and the *Draft Screening Ecological Risk Assessment SWMU 01 and 15, Naval Air Station Oceana, Virginia Beach, Virginia,* March 2000 (CH2M HILL, 2000c).

2.2.2 SWMU 15 - Abandoned Tank Farm

SWMU 15 is located in the former 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 (Figure 2-1). The abandoned tank farm 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 have been used for automotive fuel, kerosene, or lube oil (RGH, 1984).

According to a report by R.E. Wright Associates (R.E. Wright Associates, 1983), the tanks were emptied of fuel and filled with water after they were abandoned. Tank G-5 was later used to store waste oil. The tanks and their associated piping were dismantled and removed in the mid-1980s. With the exception of some mounded earth near the former location of tank G-9, no signs of the locations of the tanks or their associated piping were observed during the RFI (CH2M HILL, 1993). Their locations were inferred from historical maps of the North Station area.

The tank farm has been investigated on a number of occasions, including and investigation in 1982, the IAS in 1984, the RCRA Facility Investigation (RFA) in 1988, the Phase I RFI in 1993, the Phase II RFI in 1995, and the CMS in 1994 through 1995.

In 1982, free-phase product was discovered in test pits and well borings. The 1984 IAS identified the tank farm as a potential hazard. The 1988 RFA identified the tank farm as SWMU 15 and documented recommendations for additional investigation.

SWMU 15 was investigated during two phases of the RFI. Phase I was completed in 1993 (CH2M HILL, 1993) and Phase II was completed in 1995 (CH2M HILL, 1995a). The purpose of the RFIs was to characterize the extent of soil and groundwater contamination. A CMS was initiated in 1995 (CH2M HILL, 1995b) to define the extent of the groundwater contaminant plume, characterize surface soil contamination, and obtain treatability data on contaminated soil and groundwater.

Results of the investigations conducted as SWMU 15 indicated that surface soils contain elevated levels Total Petroleum Hydrocarbon (TPH) and PAHs, and subsurface soils contain elevated concentrations of BTEX, TPH, and PAHs. Groundwater was found to contain free-phase product and elevated concentrations of BTEX, TPH, and PAHs. Vinyl chloride and isomers of 1,2-dichloroethylene were also detected at low concentrations in a few monitoring wells.

Based on recommendations from the CMS, a soil removal action was conducted at SWMU 15 in 1997 to remediate the BTEX contamination in the soil. Approximately 18,000 cubic yards of soil were treated on site by bioremediation and aeration. Confirmatory soil samples were collected and a human health risk assessment was conducted on the soil. The human health risk assessment of the biopile soil determined that the noncarcinogenic and carcinogenic risks for the exposure pathways evaluated in the assessment were within the USEPA's target risk levels based on a residential exposure scenario. Currently, the Navy proposes to remove the upper six feet of biopile soil and distribute it as clean fill. The soil at the base of the biopiles is proposed for re-treatment to reduce the TPH to a level below the 50 parts per million (ppm) Virginia Department of Environmental Quality (VADEQ) solid waste threshold. Once re-treatment is accomplished, the soil will be sampled to confirm that the TPH cleanup goal of 50 ppm has been achieved and if so, the soil will be used as clean fill per VADEQ solid waste regulations.

Confirmatory subsurface soil samples were collected from the area around the excavation in 1998 to evaluate the efficiency of the removal action. Additionally, surface soil, sediment,

surface water, and groundwater samples were collected in July of 1999 for use in the HHRA.

2.2.3 SWMU 24 - Bowser, Building 840

SWMU 24 is an area near Building 840 which contained a waste-oil bowser. Building 840 is in an industrial area of NASO, in southern portion of the station (Figure 2-1). The Naval Construction Battalion (SEABEEs) has been based in Building 840 since 1972. The SEABEEs are involved in construction at NASO and other local naval installations (USEPA, 1988). Waste solvents and oils generated at the equipment maintenance garage in Building 840 were hand carried and poured into the bowser, which was typically located in the southern-most corner of the SEABEE compound (USEPA, 1988). The bowser was then transported to the tank farm for disposal. During the visual site inspection, heavy staining of the ground was observed in the area surrounding the waste oil bowser at Building 840 (USEPA, 1988). Current practice is to dispose of waste oil in drums that are transported to the base hazardous waste lot, where they are transferred to the DRMO and disposed or recycled appropriately. The bowsers are no longer used.

The 1993 RFI field investigation was the first investigation conducted at SWMU 24. However, environmental problems at this SWMU were first recognized during the RFA in 1988 when oil staining was observed in surface soil surrounding a used oil bowser. SWMU 24 was investigated during three phases of the RFI. Phase I was completed in 1993, Phase II was completed in 1995, and Phase III was completed in 1997.

The Phase I RFI (CH2M HILL, 1993) was conducted to delineate the source area and the extent of POL-contaminated soil. Soil sampling results indicated that the SWMU should be characterized for soil removal. The POL-CMS (CH2M HILL, 1994) delineated the soils for removal at SWMU 24. The USEPA requested additional confirmatory sampling at SWMU 24 after reviewing the POL-CMS and the *Excavation, Transportation and Disposal of Petroleum Contaminated Soils* report (ENSCI Env. Inc., 1995). After excavation of the contaminated soils in 1994, confirmatory subsurface soil sampling was performed at SWMU 24 in 1997 (CH2M HILL, 1999).

During the POL CMS (CH2M HILL, 1994), groundwater contamination was discovered. The SWMU was added to the 1995 Phase II RFI scope of work to address groundwater contamination. CH2M HILL conducted the CMS for groundwater in 1995 (CH2M HILL, 1996). Results of the investigations indicated that groundwater at SWMU 24 is contaminated with chlorinated VOCs and BTEX. Chlorinated VOCs are widely distributed across the SWMU and consist of vinyl chloride, 1,2-dichloroethelene, and trichloroethene.

In late 1996 and early 1997 an in-well aeration pilot study was initiated at SWMU 24. Contaminant concentrations in the source area were dramatically reduced using in-well aeration (CH2M HILL, 1997). However, some outlying areas of the contaminant plume were not treated and additional remediation was recommended. A direct push technology (DPT) investigation was conducted to provide additional characterization of SWMU 24 to determine the current plume boundaries (CH2M HILL, 2000b). Additionally, monitoring wells were sampled as part of this investigation.

Groundwater was sampled again in July of 1999 to determine any changes in groundwater concentrations and to provide data for use in this human health risk assessment. Results are

documented in the *Final Technical Memorandum for the Groundwater Sampling at SWMU 24, Oceana Naval Air Station, Virginia Beach, Virginia,* dated January 2000.

3.0 General Methodology

This section describes the methodology used to evaluate the human health risks for SWMUs 1, 15, and 24. The HHRA is comprised of the following components:

- **Identification of Chemicals of Potential Concern** - Identification of the contaminants found onsite and selection of the chemicals of potential concern (COPCs). COPCs represent the subset of all chemicals detected at the site that provides the largest contribution to total site risks. COPCs are the focus of the subsequent evaluation in the risk assessment.
- **Exposure Assessment** - Identification of the potential pathways of human exposure, and estimation of the magnitude, frequency, and duration of these exposures.
- **Toxicity Assessment** - Assessment of the potential adverse effects of the COPCs and development of toxicity values used for developing numerical risk estimates.
- **Risk Characterization** - Integration of the results of the exposure assessment and toxicity assessment to develop numerical estimates of health risk, and characterization of the potential health risks associated with exposure to site-related contamination.
- **Uncertainty Assessment** - Identification and discussion of sources of uncertainty in the risk assessment.

These components are described in the following sections. Spreadsheets prepared in accordance with USEPA RAGS Part D were used to screen for COPCs, and to calculate estimated exposures and health risks associated with the COPCs.

3.1 Identification of Chemicals of Potential Concern

The identification of COPCs includes data collection, data evaluation, and data screening steps. The data collection and evaluation steps involve gathering and reviewing the available site data and identifying a set of data that is of acceptable quality for the risk assessment. This data set is then further screened against concentrations that are protective of human health to focus on those chemicals and media that need to be evaluated quantitatively in the risk assessment. The majority of the data used for the quantitative risk analysis were validated prior to use in the risk assessment. The only data that were not validated are some of the 1993 surface soil samples collected at SWMU 1. Although not validated, this data was conservatively used in the risk assessment, as described in Section 3.2.3, since there were some constituents detected in these samples that were not detected in the other surface soil samples collected at SWMU 1.

Section 2.2, presented previously, included a discussion of the data that have been collected at each SWMU. Sections 4, 5, and 6 identify the data sets used for the risk assessment for SWMUs 1, 15, and 24, respectively. Section 3.1.1 discusses how the different data qualifiers and sample types were evaluated in the HHRA. Section 3.1.2 discusses the screening methodology used to focus the risk assessment data set on the constituents and media that

are of primary concern to human health. The COPCs for SWMU 1, 15, and 24 are identified in Sections 4, 5, and 6, respectively.

3.1.1 Data Evaluation

Available data for each SWMU were reviewed to determine their reliability for the quantitative risk assessment. The following bullets discuss how data with different qualifiers were handled in the HHRA:

- Estimated values flagged with a J qualifier were treated as detected concentrations.
- Data qualified with an R (rejected) were not used in the risk assessment.
- One-half of the sample quantitation limit (SQL) or sample detection limit (DL) was used as the sample concentration for samples where no detectable contaminant quantities were found in that sample, but the contaminant was detected in that medium at the SWMU.
- Data qualified with a B (blank contamination) were used in the risk assessment as if they were non-detects. One-half of the SQL or DL was used as the sample concentration.
- For duplicate samples, the higher of the two concentrations was used as the sample concentration.

Analytical results for polyaromatic hydrocarbon (PAH) compounds were elevated in a number of samples. The analytical results for constituents that were detected in at least one sample were included in the determination of the exposure point concentration using one-half the SQL. If the constituent was not detected in any of the samples, the constituent was not included in the evaluation.

Elevated quantitation limits for organic compounds are potentially caused by interferences in the matrix, by high concentrations of non-target compounds, or by high concentrations of target compounds. Additional sampling at these locations will produce similar results for the non-detects.

3.1.2 Selection of Chemicals of Potential Concern

All of the constituents detected in the data used for the risk assessment for each SWMU were screened using the method described below. The purpose of the screening was to reduce the list of detected constituents to only those constituents of greatest potential concern for human health. The constituents that were selected as COPCs were evaluated quantitatively in the risk assessment. Constituents that were not detected in any of the samples collected from a medium were not retained as COPCs for that medium.

The selection of COPCs was based on the criteria presented in USEPA Region III guidelines (USEPA, 1993) and USEPA's *RAGS Part D* (USEPA, 1998). The maximum concentration of each detected constituent in each media at each SWMU was compared to the following criteria to select the COPCs by media. If the maximum concentration of a constituent exceeded the criteria, the constituent was selected as a COPC.

Constituents detected in each media were selected or eliminated as COPCs based on the following criteria:

- **Comparison with Risk-based Concentrations:** The maximum detected chemical concentrations in groundwater, soil, surface water, and sediment were compared with the risk-based concentrations (RBCs) in USEPA Region III's *Updated Risk-Based Concentration Table* (USEPA, 1999a). The RBCs based on noncarcinogenic effects were divided by ten to reflect a target hazard quotient of 0.1. The RBCs based on carcinogenic endpoints are based on a target cancer risk of $1x10^{-6}$ and were not adjusted from the values presented in the RBC table.

  Groundwater data were compared to the tap water RBCs.

  Soil data were screened against the residential soil ingestion RBCs.

  Surface water data were compared to ten times the tap water RBCs. The use of ten times is a conservative estimate assuming that a receptor is in contact with surface water at much lower exposure parameters (ingestion rate, exposure frequency, and exposure duration).

  Sediment data were conservatively compared to ten times the residential soil RBCs. The use of ten times is a conservative estimate assuming that a receptor is in contact with sediment at much lower exposure parameters (ingestion rate, exposure frequency, and exposure duration).

- **Comparison with Recommended Dietary Allowances:** Chemicals that are essential in human nutrition, present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and toxic only at very high doses were eliminated as COPCs. These constituents are calcium, magnesium, potassium, and sodium. All of the human nutrients detected in groundwater, soil, sediment, and surface water result in intakes below RDAs.

- Constituents were considered for inclusion in the risk assessment even if they were eliminated through one of the methods above, based on historical information, exceptional toxicity, mobility, persistence, or bioaccumulation, special treatability problems, or ARARs exceedance.

- Lead concentrations in soil and sediment were compared to the USEPA residential child soil screening value of 400 ppm, as determined by the Integrated Exposure Uptake Biokinetic Model (IEUBK). Lead concentrations in groundwater and surface water were compared to the Safe Drinking Water Act action level of 15 ppb.

A number of detected constituents do not have RBCs listed on the USEPA Region III RBC table because there are no published toxicity values for these constituents. Appropriate surrogate constituents were selected, and their RBCs were used to screen the constituents without available RBCs. These constituents and the selected surrogate constituents are indicated on the COPC screening tables in Appendices A.4, B.4, and C.4.

3.2 Exposure Assessment

Exposure assessment evaluates potential human exposure to site-related COPCs present at or migrating from the site. The purpose of exposure assessment is to identify and evaluate the contaminant sources, release mechanisms, exposure pathways, exposure routes, and receptors for the site. Exposure can occur when contaminants migrate from a source to an exposure

point, or when a receptor comes into direct contact with contaminated media. A conceptual exposure model showing potential exposure scenarios identified under current and potential future conditions is presented in Sections 4, 5, and 6 for each SWMU.

The following sections discuss the three components of exposure assessment:

- Characterization of exposure setting
- Identification of exposure pathways
- Quantification of exposure

3.2.1 Characterization of Exposure Setting

Characterizing an exposure setting consists of two parts: (1) characterization of the site with respect to the physical characteristics, and (2) characterization of the site with respect to human populations at or near the site.

Physical Characteristics

Basic site characteristics such as physical setting, climate, groundwater hydrology, and the presence and location of surface water were discussed in Section 2.

Potentially Exposed Populations

Potentially exposed populations are identified for current and future land use based on their locations relative to the site, their activity patterns, and the presence of potential sensitive subpopulations. Table 1 in Appendices A.4, B.4, and C.4 summarizes the potentially exposed populations for each of the SWMUs. Sections 4, 5, and 6 discuss the current and future land use for SWMUs 1, 15, and 24, respectively. Potentially exposed populations considered for evaluation for these SWMUs include current and future industrial site workers and trespasser/visitors, and future residents and construction workers. Although it is unlikely any of the SWMUs will be used for residential development in the future the residential exposure was conservatively evaluated in the HHRA.

3.2.2 Identification of Exposure Pathways

Potential exposure pathways need to be identified to evaluate the potential health risks associated with site-related contamination. The exposure pathway describes a mechanism through which a receptor may become exposed to a chemical or physical agent at or originating from the site. An exposure pathway must be complete to be considered to contribute to potential human exposure. A complete exposure pathway has five elements:

- A source (e.g., chemical residues in soil)
- A mechanism for release and migration of chemical (e.g., leaching)
- An environmental transport medium (e.g., groundwater)
- A point or site of potential human contact (exposure point, e.g., drinking water)
- A route of intake (e.g., ingestion of groundwater used as a drinking water source)

All five elements must be present for a pathway to be considered complete. If one or more elements are not present, then the pathway is incomplete and there is no exposure or health risk. The elements, as they pertain to the SWMUs 1, 15, and 24 at NASO, are discussed in Sections 4, 5, and 6, respectively.

3.2.3 Quantification of Exposure

Exposure is quantified by estimating the exposure point concentrations and the chemical intake by the receptor.

Exposure Point Concentrations

Exposure point concentrations are estimated chemical concentrations that a receptor may contact and are specific to each exposure medium. Exposure point concentrations may be directly monitored or estimated using environmental fate and transport models. For this assessment, fate and transport modeling was used to estimate constituent concentrations in fugitive dust emissions from soils, in vapors from groundwater while showering, and in vapors volatilized from groundwater from an open excavation. Fugitive emissions from soils were estimated following USEPA' Soil Screening Guidance Document (USEPA, 1996). Per discussions with USEPA, volatilization while showering was estimated using the Foster and Chrostowski shower model (Foster and Chrostowski, 1987). Volatilization from groundwater in an open excavation was calculated using a Two-Film Volatilization Model. The model calculations are included in Appendices A.4, B.4, and C.4.

The exposure point concentrations for the reasonable maximum exposure (RME) scenario and the central tendency (CT) exposure scenario are based on the 95 percent upper confidence limit of the mean (95% UCL). The 95% UCL was calculated for all SWMUs and media except SWMU 1 surface soil, as discussed below. The maximum detected concentration was used as the exposure point concentration when the calculated 95% UCL was greater than the maximum detected value. 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. The 95% UCL was selected based on the correct distribution. If the W-test was inconclusive, the larger of the 95% UCL from the lognormal or normal distribution was selected.

The 95% UCL for a lognormal distribution was calculated as follows:

$$95\%\ UCL = \exp(TM + 0.5*s^2 + (s*H/(n-1)^{0.5}))$$

Where:

exp= natural log
TM = transformed mean
s= standard deviation of the transformed data
H= H-statistic
n= sample size

The 95% UCL for a normal distribution was calculated as follows:

$$95\%\ UCL = NM+(t*s/(n)^{0.5})$$

Where:

NM= normal arithmetic mean
t= t-statistic
s= standard deviation
n= sample size

For constituents that have data sets of more than five samples, the 95% UCL will be calculated. For constituents with data sets of five or fewer samples, the maximum detected concentration was used as the exposure point concentration. With the exception of a single sample, the SWMU 1 surface soil data was historic data obtained directly from the RFI report (CH2M HILL 1999b). Therefore, a 95% UCL for surface soil was not calculated, since only one sample was available. The 95% UCL was calculated for combined surface and subsurface soil for SWMU 1 since there were sufficient numbers of subsurface soil samples for calculating summary statistics. The 95% UCL for the combined surface and subsurface soil was calculated using only the detected constituents from the 1993 surface soil data and not the samples in which a constituent was not detected. All of the samples from the more recent surface and subsurface soil data were used for constituents that were detected in at least one of the samples in the full data set.

All of the monitoring wells were included in the determination of the exposure point concentration. At SWMU 24, both total and dissolved groundwater samples were collected. The dissolved groundwater data was used in the evaluation for the residential scenario because the groundwater is assumed to be filtered prior to use as a potable supply. However, the total groundwater was used for evaluating potential exposures to the construction worker. At SWMU 15, dissolved groundwater data were not collected. Therefore, the total groundwater data was used for both the residential and construction worker exposures.

Estimation of Chemical Intakes for Individual Pathways

Chemical intake is the amount of the chemical contaminant entering the receptor's body. Chemical intakes are generally expressed as follows:

$$I = \frac{C \; x \; CR \; x \; EF \; x \; ED}{BW \; x \; AT} = (mg/kg/day)$$

Where:

I = intake (mg/kg-day)

C = chemical concentration at exposure point (mg/L, mg/kg, mg/m^3)

CR= contact rate, or amount of contaminated medium contacted per unit time or event (L/day, mg/event, m^3/day)

EF= exposure frequency (days/year)

ED= exposure duration (years)

BW= body weight of exposed individual (kg)

AT= averaging time, or period over which exposure is averaged (days)

The intake equation requires specific exposure parameters for each exposure pathway. Exposure parameters are often assumed values, and their magnitude influences the estimates of potential exposure (and risk). The reliability of the values chosen can also contribute substantially to the uncertainty of the resulting risk estimates. Many of the exposure parameters have default values, which were used for this assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and duration are provided by USEPA guidance. Other assumptions

(e.g., exposure duration for the construction worker) required consideration of location-specific information and were determined using professional judgment. The Table 4 series in Appendices A.4, B.4, and C.4 presents the exposure factors used for different scenarios at the SWMUs. RME and appropriate central tendency (CT) intakes were included in this evaluation. CT intakes were calculated for exposure scenarios with RME cancer risks greater than $1x10^{-5}$ or noncancer hazard greater than 1.

For residential exposure to groundwater and soil, lifetime age-adjusted intakes were calculated for carcinogenic constituents. This involved determining age-adjusted factors for ingestion, dermal contact, and inhalation. These factors were calculated using the equations presented in USEPA Region III RBC table (USEPA, 1999a) for calculating age-adjusted factors.

For dermal exposure to groundwater during construction and bathing, the non-steady state model or pseudo steady-state model was used to estimate the absorbed dose for organic constituents (USEPA, 1992a). If the exposure time was shorter than the lag time (time to reach pseudo steady-state), the non-steady state model was used. If the exposure time was greater than the lag time, the pseudo-steady state model was used. These models are shown for the groundwater exposure pathways in the Table 4 series in Appendices A.4, B.4, and C.4, for SWMUs 1, 15, and 24, respectively.

For the dermal contact with soil scenario, an absorption factor is required. The absorption factors used for this evaluation were 3 percent for VOCs with vapor pressures lower than benzene, 0.05 percent for VOCs with vapor pressures equal to or greater than benzene, 10 percent for semivolatile organic constituents (SVOCs), 10 percent for pesticides, 3.2 percent for arsenic, and 1 percent for other metals (USEPA, December 1995). For the dermal contact with water scenario, skin permeability rates were obtained from the USEPA's *Dermal Exposure Assessment Guidance* (USEPA, January 1992a).

3.3 Toxicity Assessment

The toxicity assessment weighs the available evidence regarding the potential for a particular chemical to cause adverse effects in exposed individuals and provides a numerical estimate of the relationship between the extent of exposure and possible severity of adverse effects. The toxicity assessment consists of two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining the potential adverse effects from exposure to a chemical. Dose-response assessment is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the contaminant administered or received and the incidence of adverse health effects in the exposed population. From this quantitative dose-response relationship, toxicity values (e.g., reference doses [RfDs] and cancer slope factors [CSFs]) are derived.

USEPA has assessed the toxicity of many chemicals and has published the resulting toxicity information and toxicity values in the Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST) databases. IRIS includes only those noncarcinogenic RfDs and carcinogenic slope factors (CSFs) that have been verified by USEPA workgroups. IRIS is USEPA's preferred source of toxicity information. HEAST, which is issued by USEPA's Office of Research and Development, was consulted when data were not available in IRIS. If data were not available from either of these sources, USEPA's National

Center for Environmental Assessment (NCEA) data were used. If no toxicity values were available, the chemical was evaluated qualitatively and a toxicity profile prepared.

Health effects are divided into two broad groups: noncarcinogenic and carcinogenic effects. This division is based on the different mechanisms of action currently associated with each category. Chemicals causing noncarcinogenic health effects were evaluated independently from those having carcinogenic effects. Some chemicals may produce both noncarcinogenic and carcinogenic effects, and were evaluated in both groups. This section discusses both noncarcinogenic and carcinogenic effects separately, and concludes with a brief discussion of the toxicological properties of selected COPCs.

3.3.1 Toxicity Information for Noncarcinogenic Effects

Noncarcinogenic health effects include a variety of toxic effects on body systems, ranging from renal toxicity (toxicity to the kidneys) to central nervous system disorders. Noncarcinogenic health effects are grouped into two basic categories: acute toxicity and chronic toxicity. Acute toxicity can occur after a single exposure (usually at high doses), and the effect is most often seen immediately. Chronic toxicity describes effects that occur after repeated exposure (usually at low doses) and is seen weeks, months, or years after the initial exposure. The toxicity of a chemical is assessed through a review of toxic effects noted in short-term (acute) animal studies, long-term (chronic) animal studies, and epidemiological investigations.

USEPA (USEPA, 1989) defines the chronic RfD as an estimate of a daily exposure to the human population, including sensitive subpopulations, which is likely to be without appreciable risk of deleterious effects during a lifetime. Chronic RfDs are developed to be protective for long-term exposure to a compound (7 years to a lifetime). Chronic RfDs may be overly protective if used to evaluate the potential for adverse health effects resulting from short-term exposure. NCEA develops subchronic RfDs for short-term exposure (2 weeks to 7 years). Subchronic RfDs have been peer-reviewed by Agency and outside reviewers, but they have not undergone verification by an intra-Agency workgroup, and as a result are considered interim rather than verified toxicity values. Chronic and subchronic RfDs are developed for both inhalation and oral exposures. Chronic RfDs were used to evaluate the noncarcinogenic risks to all potential receptors except the construction scenario. Subchronic RfDs were used to evaluate the noncarcinogenic risks to the construction worker. If a subchronic RfD was not available, the chronic RfD was used to evaluate noncarcinogenic risks to the construction worker.

In the development of RfDs, all available studies examining the toxicity of a chemical following exposure are considered based on their scientific merit. The lowest dose level at which a toxic effect is observed is identified as the "lowest-observed-adverse-effect-level" (LOAEL) and the dose at which no effect is observed is identified as the "no-observed-adverse-effect-level" (NOAEL). Several uncertainty factors (UFs) are applied to the LOAEL or NOAEL to extrapolate these dose points to humans. These UFs range between 10 to 10,000. Additional modification factors (MFs) also are used based on the professional judgment of the agency.

USEPA-derived oral and inhalation RfDs, and associated UFs and MFs, for the COPCs at SWMUs 1, 15, and 24, are listed in Tables 5.1 and 5.2 in Appendices A.4, B.4, and C.4, respectively.

3.3.2 Toxicity Information for Carcinogenic Effects

Potential carcinogenic effects from human exposure to chemicals are estimated quantitatively using oral CSFs, inhalation CSFs, or unit risk factors that convert estimated exposures directly to incremental lifetime cancer risks. CSFs may be derived from the results of chronic animal bioassays, human epidemiological studies, or both. Animal bioassays are usually conducted at dose levels that are much higher than levels likely to be produced by human exposure to environmental media. This extrapolation detects possible adverse effects in the relatively small test populations used in the studies. These high dose levels must be extrapolated to lower doses. A number of mathematical models and procedures have been developed to extrapolate from the high doses used in the studies to the low doses typically associated with environmental exposures.

The USEPA-preferred linearized multistage model (LMS) is usually used to estimate the largest linear slope (within the 95% UCL) at low extrapolated doses that is consistent with the data. The 95% UCL slope of the dose-response curve is subjected to various adjustments, including an inter-species scaling factor, to derive a CSF or inhalation unit risk factor for humans. It is assumed that if a cancer response occurs at the dose level in the study, there is some probability that a response will occur at all lower exposure levels (i.e., a dose-response relationship with no threshold is assumed). Conservative (e.g., health protective) assumptions are applied and the models are believed to provide rough estimates of the upper limits on potential lifetime risk. The actual risks associated with exposure to a potential carcinogen that are quantitatively evaluated using the CSF are not likely to exceed the estimated risks, and are probably much lower or may even be zero.

In addition to deriving a quantitative estimate of carcinogenic potency, USEPA also assigns weight-of-evidence classifications to potential carcinogens. Chemicals are classified as Group A, Group B1, Group B2, Group C, Group D, or Group E carcinogens. The classifications are described as follows:

- Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents and cancer in humans.
- Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.
- Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.
- Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.
- Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.
- Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both.

USEPA-derived oral and inhalation CSFs for the COPCs at SWMUs 1, 15, and 24 are listed in Tables 6.1 and 6.2 included in Appendices A.4, B.4, and C.4, respectively.

3.3.3 Derivation of Dermal RfDs and CSFs

Oral RfDs and CSFs were converted to dermal RfDs and CSFs using an oral to dermal adjustment factor. This factor was designed to convert the oral administered dose toxicity factors to dermal absorbed dose toxicity factors. The values used for this conversion were obtained from USEPA Region III (USEPA, 1999c). The oral RfDs were converted to dermal RfDs by multiplying by the absorption efficiency and the oral CSFs were converted to dermal CSFs by dividing by the absorption factor. If a chemical-specific absorption factor was not available, a dermal absorption factor of 20% was assumed for VOCs, 50% was assumed for SVOCs and pesticides, and 20% was assumed for inorganics.

3.3.4 Toxicity Profiles of Selected Chemicals

Below are toxicological profiles of selected constituents, including the main risk drivers at the SWMUs 1, 15, and 24. Toxicological profiles are provided for arsenic, benzene, benzo(a)pyrene, chloroform, dibenz(a,h)anthracene, cis-1,2-dichloroethene, iron, manganese, and naphthalene. More detailed toxicity information can be found in USEPA's IRIS database, ATSDR's toxicological profiles, and other published literature.

Arsenic

Inorganic arsenic has been recognized as a human poison since ancient times, and large oral doses (above 60,000 ppb in food or water) can produce death. If lower levels of inorganic arsenic are ingested (ranging from about 300 to 30,000 ppb in food or water), irritation of the stomach and intestines may be experienced, with symptoms such as pain, nausea, vomiting, and diarrhea. Other effects experienced from ingesting arsenic include decreased production of red and white blood cells, abnormal heart rhythm, blood-vessel damage, and impaired nerve function causing a "pins and needles" sensation in the hands and feet. Ingesting arsenic has also been reported to increase the risk of cancer in the liver, bladder, kidney, and lung. There is no evidence indicating that arsenic can harm pregnant women or their fetuses. However, studies in animals show that maternally toxic doses of arsenic may cause low birth weight, fetal malformations, or even fetal death.

Perhaps the single most characteristic effect of long-term oral exposure to inorganic arsenic is a pattern of skin changes (0.01-0.1 mg/kg/day for months to years). This includes a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. While these skin changes are not considered to be a health concern, a small number of the corns may ultimately develop into skin cancer. Direct skin contact with inorganic arsenic compounds may result in irritation with some redness and swelling. However, it does not appear that skin contact is likely to lead to any serious internal effects.

If high levels of inorganic arsenic are inhaled, some of the short-term effects from exposure include a sore throat, irritated lungs or some of the skin effects described above, however these effects are typically not serious. The exposure level that produces these health effects is uncertain, however it is likely to be above 100 micrograms per cubic meter ($\mu g/m^3$). Inhalation of inorganic arsenic is also known to increase the risk of lung cancer. An increase of lung cancer has been observed in workers exposed to arsenic in or around smelters.

Almost no information is available on the effects of organic arsenic compounds in humans. Studies in animals show that most organic arsenic compounds are less toxic than the inorganic forms.

Benzene

Benzene is absorbed via ingestion, inhalation, and skin application. Experimental data indicate that animals can absorb up to 95% of oral doses and that humans can absorb up to 80% of inhaled benzene (after 5 minutes of exposure) (Sabourin et al., 1987; Srobova et al., 1950). Humans may absorb benzene vapors through the skin as well as the lungs; of the total dose absorbed by the two routes, an estimated 22-36% enters the body through the skin (Susten et al., 1985).

Autopsy of a youth who died while sniffing benzene revealed that the chemical was distributed to the urine, stomach, bile, liver, kidney, abdominal fat, and brain (Winek and Collum, 1971). The depots for benzene and its metabolites in animals are similar to those in humans, and in addition, include the fetus and placenta, bone marrow, Zymbal gland, and oral and nasal cavities (Ghantous and Danielsson, 1986; Rickert et al., 1979; Low et al., 1989).

Numerous studies indicate that the metabolism of benzene is required for its toxicity (Kalf et al., 1987). The liver is the main site for the metabolism of benzene; the bone marrow, a minor site (ATSDR, 1992). Phenol, hydroquinone, catechol, and benzene oxide are the major metabolites (Kalf et al, 1987; Snyder, 1987). The metabolite(s) of benzene that are responsible for its toxicity have not been positively identified, but likely candidates include muconaldehyde, quinones, and free radicals generated by oxidizing enzymes (Henderson et al., 1989; Snyder, 1987).

Benzene is eliminated either unchanged in expired air or as metabolites in the urine (ATSDR, 1992). The proportions of the administered dose excreted by each route and the half-times for excretion are dependent on route, dose, and duration of exposure.

Lethal oral doses of benzene are estimated to be 10 mL in humans; oral LD50 values for benzene in rats range from 0.93 to 5.96 g/kg (Cornish and Ryan, 1965; Withey and Hall, 1975). These data indicate that benzene is of low acute toxicity (O'Bryan and Ross, 1988).

Limited data show that nonlethal oral doses of benzene can impact the nervous, hematological, and immunological systems. Ingested benzene produces symptoms of neurotoxicity at acute doses of 2 mL for humans and 325 mg/kg for rats (Thienes and Haley, 1972; Clayton and Clayton, 1981; Cornish and Ryan, 1965). A four week exposure of mice to >=8 mg of benzene/kg/day in the drinking water induced the synthesis and catabolism of monoamine neurotransmitters and produced dose-related decreases in red-blood cell parameters and lymphocyte numbers (Hsieh et al., 1988b). Rats and mice that were treated with benzene by gavage for 103 weeks developed a dose-related lymphocytopenia (LOAEL, 25 mg/kg/day) and mice had hyperplasia of the bone marrow and lymphoid depletion of the splenic follicles and thymus (100 mg/kg/day) (Huff et al., 1989).

Inhalation of benzene vapor concentrations of 20,000 ppm for 5 to 10 minutes can be fatal to humans; death results from central nervous system depression (Clayton and Clayton, 1981). The estimated LC 50 value for the rat is 13,700 ppm (Drew and Fouts, 1974).

As with orally administered benzene, the targets for nonlethal concentrations of inhaled benzene include the nervous, hematological, and immunological systems. Neurological symptoms in humans may appear at exposure concentrations of 700 ppm (Clayton and Clayton, 1981). In animals, 1 week of exposure to 300 ppm induced behavioral effects (Drew and Fouts, 1974), and one to four weeks of exposure to benzene concentrations ranging from 21-50 ppm suppressed the bone marrow (NOAEL, 10 ppm) (Cronkite et al., 1985; Toft et al., 1982), the cellular immune response (NOAEL, 10 ppm) (Rosenthal and Snyder, 1985), and the humoral immune response (LOAEL, 50 ppm).

Subchronic and chronic exposures to benzene vapors induce a progressive depletion of the bone marrow and dysfunction of the hematopoietic system. Early symptoms of bone marrow depression include leukopenia, anemia, or thrombocytopenia, or a combination of the three (Snyder, 1984). A group of workers exposed to benzene concentrations of 30 and 150 ppm for 4 months to 1 year had increased incidences of pancytopenia (Aksoy et al., 1971; Aksoy et al., 1972; Aksoy and Erdem, 1978). A group of patients who had been exposed to benzene concentrations of 150 to 650 ppm for 4 months to 15 years exhibited severe blood dyscrasias and eight of the 32 patients died with thrombocytopenic hemorrhage and infection (Aksoy et al., 1972). The human data are supported by animal data showing bone marrow suppression in mice and rats exposed to benzene concentrations ranging from 10 ppm for 24 weeks to 300 ppm for 13 weeks (Baarson et al., 1984; Ward et al., 1985).

Benzene may also have long-term effects on the central nervous system. Workers exposed to benzene for 0.5 to 4 years exhibited EEG changes and atypical sleep activity consistent with neurotoxicity (Kellerova, 1985). Others exposed to benzene concentrations of 210 ppm for 6-8 years had peripheral nerve damage (Baslo and Aksoy, 1982).

In humans, benzene crosses the placenta and is present in the cord blood in amounts equal to those in maternal blood (Dowty et al., 1976); however, studies of the effects of benzene on human reproduction and development have been confounded by the presence of other chemicals in the environment (USAF, 1989). Benzene does produce developmental effects (fetal toxicity, but not malformations) in the offspring of treated animals, mostly at maternally toxic doses (Nawrot and Staples, 1979; Seidenberg et al., 1986; Keller and Snyder, 1988).

Reference doses/concentrations for benzene have not been established. An oral risk assessment for benzene will be reviewed by an USEPA work group and an inhalation risk assessment is currently under review (IRIS, 1997).

Benzene is carcinogenic in humans and animals by inhalation and in animals by the oral route of exposure. Occupational exposure to benzene has been associated mainly with increased incidences of acute myeloblastic or erythroblastic leukemias and chronic myeloid and lymphoid leukemias among workers (Aksoy, 1989). Workers at risk were exposed in one study to 8-hour TWA concentrations ranging from 10 to 100 ppm (Rinsky et al., 1981) and in another to 8-hour TWA concentrations ranging from <2 to >25 ppm (Ott et al., 1978). In a historical prospective mortality study of chemical workers, Yin et al. (1987) described a dose-response relationship between exposure to benzene and lymphatic and hematopoietic cancers, which adds strength to the association between exposure in the workplace and cancer development. Studies in animals have demonstrated an association between oral and inhalation exposure to benzene and the development of a variety of tumors, including

lymphoma and carcinomas of the Zymbal gland, oral cavity, mammary gland, ovaries, lung, and skin (Huff et al., 1989; Maltoni et al., 1983). In one study C57BI/BNL mice had increased incidences of leukemia, lymphoma, and solid tumors after exposure to 300 ppm for only 16 weeks (Cronkite et al., 1985).

Chloroform

Chloroform is a colorless liquid with a sweet, penetrating odor. Chloroform is a liquid that volatilizes readily at room temperature. Chloroform is likely to enter the environment associated with its use as an industrial solvent, extractant, and chemical intermediate as well as from its indirect production in the chlorination of drinking water, municipal sewage, and cooling water. The majority of the environmental releases from industrial uses are to the atmosphere; releases to water and land will be primarily lost by evaporation and will end up in the atmosphere. (Howard, 1990).

Adverse effects in humans have been observed from inhalation exposure in the workplace and from the use of chloroform as a general anesthetic in surgery. Central nervous system effects, cardiac depression, and delayed renal and hepatic toxicity may occur as a result of acute exposure to chloroform. Dry mouth, headache, hallucinations, ataxia, loss of reflexes, gastrointestinal distress, hepatotoxicity, and psychotic behavior may also occur as a result of chronic exposure to chloroform (HSDB, 2000; ATSDR, 1995).

The USEPA considers the evidence for the carcinogenicity of chloroform is sufficient in animals and is classified as a B2 carcinogen (IRIS, 2000). An increased incidence of kidney and liver tumors and cirrhosis of the liver have been observed in several strains of rats and mice when chloroform is administered by gavage. When administered orally in drinking water, chloroform induced increased incidences of renal and kidney cancers (Tumasonis et al., 1987). Developmental effects in the fetuses and offspring of laboratory animals have been observed from oral exposure to chloroform. Several epidemiological and ecological studies indicate that there is an association between cancer of the large intestine, rectum, and/or urinary bladder and the constituents of chlorinated water. Although data may suggest a possible increased risk of cancer from exposure to chloroform in chlorinated drinking water, the data are insufficient to evaluate the carcinogenic potential of chloroform. There is no direct evidence that chloroform can cause birth defects or affect reproduction in humans (ATSDR, 1995).

An oral cancer slope factor of 6.1×10^{-3} kg-day/mg and an inhalation unit risk of 2.3×10^{-5} $\mu g/m^3$ has been published in IRIS by USEPA for chloroform. An oral reference dose of 1.0×10^{-2} mg/kg-day was published in IRIS based on fatty cyst formation in the liver as the critical effect. An inhalation reference concentration has not been published in IRIS or in HEAST (USEPA, 2000; USEPA, 1997).

1,2-Dichloroethene

1,2-Dichloroethene is commonly used to produce solvents and is used as an intermediate in chemical synthesis. Low levels of trans-1,2-dichloroethen have been reported to cause neurological effects. Inhalation of high levels (1,700-2,220 ppm for 5 minutes) of trans-1,2-DCE can cause nausea, drowsiness, and fatigue. One human fatality has been reported as a result of inhaling 1,2-DCE, however the level of exposure is unknown. When animals have inhaled high levels (200 ppm) of trans-1,2-DCE for short (8 hours) or long periods of time

(8 hours/day, 5 days/week for 8 or 16 weeks), their livers and lungs were damaged. The effects were more severe with longer exposure times. Animals inhaling very high levels (3,000 ppm) of trans-1,2-DCE had damaged hearts. Ingestion of extremely high doses (1,000-4,900 ppm) of cis-or trans-1,2-DCE caused animals to die. Lower oral doses (480 mg/kg/day for 30 days) of cis-1,2-DCE caused decreased numbers of red blood cells. A recent animal study suggests fetuses exposed to 1,2-DCE (12,000 ppm 6 hr/day on days 7-16 of gestations) may not grow as quickly as those that have not been exposed. Exposure to 1,2-DCE has not been shown to affect human or animal fertility. No studies have been conducted to determine whether cancer in humans or animals is caused by exposure to 1,2-DCE.

Fluorene

Fluorene is a solid at room temperature and appears as small white crystalline plates. Fluorene occurs ubiquitously in products of incomplete combustion, in cigarette smoke, in exhaust from gasoline engines and in sewage sludge. Fluorene is released to the atmosphere in emissions from the combustion of biomass, coal, polymers, tobacco, refuse and wood; it is also released in emissions from asphalt paving and diesel exhaust. Human exposure to fluorene occurs primarily through the smoking of tobacco, inhalation of polluted air and by ingestion of food and water contaminated by combustion effluents (HSDB, 2000).

According to USEPA, fluorene is not classifiable as to human carcinogenicity (and is assigned a weight-of-evidence classification of D) based on lack of human data and inadequate data from animal bioassays. Signs of labored respiration, decreased red blood cell count and packed cell volume, an increase in total serum bilirubin levels, and increased liver and spleen weights were observed in one strain of mice when administered by gavage (short-term, high-dose study). Fluorene was not mutagenic in cellular or bacterial systems. No studies were available regarding the genotoxicity, reproductive or developmental toxicity of fluorene (USEPA, 2000).

An oral reference dose of 4.0×10^{-2} mg/kg-day was published in IRIS based on decreased red blood cell count and decreased packed cell volume as the critical effect. An oral cancer slope factor, an inhalation unit risk, and an inhalation reference concentration have not been published in IRIS or in HEAST (USEPA, 2000; USEPA, 1997).

Iron

Iron is an essential human nutrient with a recommended daily dose of 18 mg/day for females. Oral intakes ranging between 20 mg/kg-60 mg/kg are potentially toxic. Toxicity is likely following an ingestion of 60 mg/kg or greater. Symptoms of acute oral exposure include: vomiting, diarrhea, mild lethargy stupor, shock, acidosis, hematemesis, bloody diarrhea, or coma. With less serious overdoses, the initial gastrointestinal symptoms may be the only findings to develop even without treatment. Although serious iron poisoning in adults is rare, deaths have been reported. Effects from chronic over-exposure to iron include disturbances in liver function, diabetes, mettitus, possible endocrine disturbances, and cardiovascular effects. These health effects occur when body iron content reaches 20-40 g.

Inhalation of iron oxide fumes or dust by workers in metal industries may result in deposition of iron particles in lungs, producing an X-ray appearance resembling silicosis. Inhalation of some iron dusts and fumes can cause siderosis, a type of benign

pneumoconiosis. Levels of iron among iron workers developing pneumoconiosis have been reported to exceed 10 mg iron/m^3.

Manganese

Manganese is an essential nutrient with a typical intake ranging between 2,000 ug/day to 9,000 ug/day in a normal diet. No cases of illness from eating too little manganese have been reported in humans. In animals, eating too little manganese can interfere with normal growth, bone formation, and reproduction. Manganese miners and steel workers exposed to high levels of manganese dust in air (1,000-22,000 ug/m^3) may have mental and emotional disturbances, and their body movements may become slow and clumsy which is known as manganism. Workers usually do not develop symptoms of manganism unless they have been exposed to manganese dust over a period of many months or years. Inhaling high levels of manganese dust (970 ug/m3 for 1-19 years) can also cause irritation of the lungs, make breathing difficult, and increases the chance of developing a lung infection, such as pneumonia. However, this can happen from inhaling many different kinds of dust particles, not just those that contain manganese. Impotence is also a common health effect observed in men who are exposed to high levels of manganese dust in air (970 ug/m3, 1-19 years).

It is uncertain whether ingesting or inhaling high concentrations of manganese can cause manganism. In one report, humans who drank water containing high levels of manganese (14 mg/L) developed symptoms similar to those seen in manganese miners and steel workers, but it is not certain if the effects were caused by manganese alone. Although humans are frequently exposed to significant quantities of manganese compounds in food and water, reports of adverse effects in humans are rare.

There is no information on any human or animal health effects from skin contact with manganese. There is not much information on whether manganese can cause birth defects. One study in humans suggests that high exposures to manganese in the environment might increase the chances of birth defects, but other factors besides manganese might have been responsible. One study in animals shows that exposure of pregnant females to high levels of manganese in air (61 mg/m^3 for 16 weeks prior to gestation) can lead to changes in behavior of the offspring.

Naphthalene

Naphthalene is a solid at room temperature and appears as small white crystalline flakes and produces the characteristic odor of mothballs. Naphthalene enters the atmosphere primarily from fugitive emissions and exhaust connected with its presence in fuel oil and gasoline. There are also discharges on land into water from spills during the storage, transport and disposal of fuel oil and coal tar. Human exposure to naphthalene occurs primarily through the inhalation of polluted ambient air particularly in areas with heavy traffic, near petroleum refineries, coal tar distillation facilities or where evaporative losses from the storage, transport, transfer and disposal of fuel oil occurs. Moderate exposure to humans may also occur by ingestion of drinking water supplies (HSDB, 2000).

Hemolytic anemia is the most frequently observed health effect in humans from acute oral and inhalation exposure to naphthalene. Infants exposed to mothballs showed clinical symptoms such as, high serum bilirubin values, methemoglobin, Heinz bodies, and fragmented red blood cells. However, many of the infants exposed to naphthalene also had

a hereditary deficiency of the enzyme glucose-6-dehydrogenase phosphate that increased their sensitivity to hemolysis. Adults and children reported nausea, headache, malaise, and confusion when exposed to large numbers of mothballs. Intentional oral ingestion of naphthalene by several adults has caused death; additional adverse health effects in humans include gastrointestinal disorders, optic atrophy and cataracts have been observed following the ingestion of naphthalene. Transplacental exposure of the fetus to naphthalene ingested by the mother resulted in neonatal hemolytic anemia, particularly in the third trimester (ATSDR, 1995).

Mice of both sexes showed chronic inflammation and metaplasia of the olfactory epithelium and dose related hyperplasia of the respiratory epithelium following long-term exposure to naphthalene vapors. In animal studies, no treatment related effects on hematologic parameters have been observed following inhalation exposure to naphthalene. Eye damage has been observed in several animal studies following acute oral ingestion of naphthalene. Decreased body weight gains were observed in male and female rats and a significant decreases in absolute weights of brain, liver, and spleen and relative weight of spleen were observed in female rats following short-term oral exposure to high concentrations of naphthalene. Naphthalene is generally not mutagenic in cellular or bacterial systems (USEPA, 2000). No animal studies were available regarding the genotoxicity, reproductive or developmental toxicity of naphthalene (ATSDR, 1995).

An oral reference dose of 2.0×10^{-2} was published in IRIS based on decreased mean terminal body weight in male rats as the critical effect. An inhalation reference concentration of 3.0×10^{-3} mg/m^3 was published in IRIS based on nasal effects (hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively) in mice as the critical effect. An oral cancer slope factor and an inhalation unit risk factor have not been published in IRIS or in HEAST (USEPA, 2000; USEPA, 1997).

Polycyclic Aromatic Hydrocarbons

PAHs are a group of more than 100 compounds (including the COPCs benzo(a)pyrene and dibenzo(a,h)anthracene), consisting of 2 to 6 aromatic (benzene) carbon rings (ATSDR, 1994). PAHs are widely distributed in the environment in air, water, and soil. Major sources of PAHs are products of incomplete combustion, vehicle exhaust, and asphalt and coal tar used in construction.

Toxic effects of PAHs vary by orders of magnitude. Acute oral exposure of rats to benzo(a)pyrene and benzo(a)anthracene (the more toxic PAHs) indicated a NOAEL of 150 mg/kg-day for general systemic effects. Adverse developmental and reproductive effects were noted at a dose of 120 to 150 mg/kg-day benzo(a)pyrene in mice (ATSDR, 1994).

Among chronic effects of exposure to PAHs, cancer is the most important. Benzo(a)pyrene is one of the most potent and researched carcinogens and is the reference point for the other carcinogenic PAHs (including benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene). Benzo(a)pyrene is classified as a B2 carcinogen on the basis of reported results of animal studies. Forestomach tumors were caused by ingestion of benzo(a)pyrene by rats and mice, and tumors in the respiratory tract of hamsters were caused by inhalation of benzo(a)pyrene. Cancer has been observed in animals at oral doses of 10 to 100 mg/kg-day and inhalation doses of 1 to 10 mg/m^3. Noncancer effects, including

reproductive, developmental, hematological, and hepatic effects, have been reported at 100 mg/kg-day doses. Respiratory and renal effects have been reported at doses of 1 to 10 mg/m^3.

The skin is susceptible to PAH-induced toxicity in both humans and animals. Benzo[a]pyrene application apparently exacerbated skin lesions in patients with pre-existing skin conditions such as xeroderma pigmentosum. In some cases, though benign and reversible, these skin changes were thought to represent neoplastic proliferation. Workers exposed to substances that contain PAHs (such as coal tar) experienced chronic dermatitis and hyperkeratosis. Coal tar preparations containing PAHs are used in the therapeutic treatment of some skin disorders. Adverse reactions have been noted in these patients, also. Adverse dermatological effects have also been noted in animals in conjunction with acute and intermediate-duration dermal exposure to PAHs. These effects include destruction of sebaceous glands, skin ulcerations, hyperplasia, and hyperkeratosis and alterations in epidermal cell growth.

People with pre-existing skin conditions may have an increased risk of developing adverse dermal effects ranging from rashes to cancer following exposure to some PAHs. Exposure to more than one PAH may enhance or reduce tumor development. Skin cancer induction in laboratory animals has been associated with exposure to benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[1,2,3-c,d]pyrene. People with significant exposure to ultraviolet radiation, such as from sunlight, may also be at increased risk of developing skin cancer due to PAH exposure. Ultraviolet radiation enhances benzo[a]pyrene-induced skin carcinogenesis in the mouse following dermal exposure.

3.4 Risk Characterization

Risk characterization is the final step in the human health risk assessment. Risk characterization combines the results of the previous elements of the risk assessment to evaluate the potential health risks associated with exposure to COPCs. The risk characterization is then used as an integral component in remedial decision making and selection of potential remedies or actions.

Potential human health risks are discussed independently for carcinogenic and noncarcinogenic contaminants because of the different toxicological endpoints, relevant exposure duration, and methods used to characterize risk. Some chemicals may produce both noncarcinogenic and carcinogenic effects, and were evaluated in both groups. The methodology used to estimate noncarcinogenic hazards and carcinogenic risks are described below.

3.4.1 Noncarcinogenic Hazard Estimation

Noncarcinogenic health risks are estimated by comparing calculated exposure to RfDs. The calculated intake divided by the RfD is equal to the hazard quotient (HQ):

$$\text{Hazard Quotient (HQ)} = \text{Intake} / \text{RfD}$$

The intake and RfD are expressed in the same units (mg/kg-day) and represent the same exposure period (i.e., chronic or subchronic). The intake and RfD also represent the same

exposure route (i.e., oral intakes are divided by oral RfDs). A HQ that exceeds unity (i.e., exposure exceeds the RfD), indicates that there is a potential for adverse health effects associated with exposure to that chemical. To assess the potential for noncarcinogenic health effects posed by exposure to multiple chemicals a "hazard index" approach is used (USEPA, 1986). This approach assumes that noncarcinogenic hazards associated with exposure to more than one chemical are additive. Synergistic or antagonistic interactions between chemicals are not accounted for. The hazard index (HI) may exceed unity even if all of the individual HQs are less than one.

3.4.2 Carcinogenic Risk Estimation

The potential for carcinogenic effects due to exposure to site-related contamination is evaluated by estimating the excess lifetime carcinogenic risk (ELCR). ELCR is the incremental increase in the probability of developing cancer during one's lifetime in addition to the background probability of developing cancer. For example, a $2x10^{-6}$ excess lifetime carcinogenic risk means that for every one million people exposed to the carcinogen throughout their lifetimes, the incidence of cancer may increase by two cases. The background probability of developing cancer, from all known causes, is about one in four (American Cancer Society, 1993).

The carcinogenic risk is calculated by multiplying the intake by the CSF.

$$\text{Risk} = \text{Intake} \times \text{CSF}$$

The combined risk from exposure to multiple chemicals was evaluated by adding the risks from different chemicals. Risks were also added across the exposure routes if an individual would be exposed through multiple routes. For example, a person contacting soil could be exposed by both oral and dermal exposure routes.

3.4.3 Interpretation of Numerical Results

The USEPA considers action to be warranted at a site when cumulative cancer risks exceed 10^{-4}. Action is not required for risks falling within $1x10^{-4}$ to $1x10^{-6}$; however, this is judged on a case-by-case basis. Risks less than $1x10^{-6}$ generally are not of concern to regulatory agencies. A hazard index greater than one indicates that there is some potential for adverse noncarcinogenic health effects associated with exposure to the contaminants of concern, possibly warranting remedial action (USEPA, 1991b). A health-risk-based remedial decision can be superseded by the presence of an environmental impact, or an exceedance of a regulatory standard (such as an MCL), which may indicate the need for action at the site.

RME risks were evaluated for all media and exposure scenarios. RME risks were evaluated using upper bound estimates of the exposure parameters and the RME concentration. CT risks were calculated for those scenarios that had an RME HI greater than 1.0 and/or RME carcinogenic risk greater than $1x10^{-5}$. CT risks were evaluated using median estimates of the exposure parameters and the RME exposure point concentration.

4.0 SWMU 1

This section presents the results of the HHRA for SWMU 1, the West Woods Oil Disposal Pit.

4.1 Data Summary

Numerous field investigations have generated information on SWMU 1 soil, groundwater, sediment, and surface water. A summary of the sampling programs for SWMU 1 was presented in Section 2.2.1. Only data used in the risk assessment are presented in this section. Table 4-1 lists the samples that were used to estimate potential exposure and risks in each medium for SWMU 1. Figures 4-1 through 4-4 identify the sampling locations for surface soil, subsurface soil, groundwater, and sediment and surface water, respectively.

Eight surface soil samples were collected in 1993 and analyzed for VOCs and SVOCs (Figure 4-1). Two of these samples were also analyzed for metals and polychlorinated biphenyls (PCBs). An additional surface soil sample was collected in 1999 and analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Nine subsurface soil samples were collected in 1995 and analyzed for VOCs, SVOCs, metals, herbicides, organophosphorus pesticides, dioxin, and furans (Figure 4-2).

Groundwater data collected in 1998 were evaluated in the risk assessment. These are the most current groundwater data, and therefore most representative of current site conditions. Groundwater samples were collected from ten monitoring wells and five piezometers (Figure 4-3). Groundwater samples were analyzed for VOCs and SVOCs.

Sediment and surface water samples were collected in 1999. Five samples were collected from each media (including one duplicate) and analyzed for VOCs, SVOCs, pesticides/ PCBs, and metals (Figure 4-4).

The full set of data used for the HHRA is presented in Appendix A.1. Appendix A.2 is the detected constituents only, and Appendix A.3 is the sample statistics. The sample statistics include frequency of detection, minimum and maximum detected values, normal and lognormal arithmetic mean, normal and lognormal standard deviation, results of W-test, and 95% UCL for normal and lognormal distribution.

4.2 Identification of Chemicals of Potential Concern

Table 4-2 lists the COPCs retained for SWMU 1. There were no constituents retained as COPCs for surface water. Therefore, surface water was eliminated as a media of concern.

4.3 Exposure Assessment

The SWMU specific exposure assessment includes the information necessary to develop the exposure scenarios applicable for SWMU 1. This includes identifying the exposure setting,

the current and future site use, the potentially exposed populations, and the potential exposure pathways.

4.3.1 Exposure Setting

SWMU 1 is located at the edge of the runway. SWMU 1 is covered with trees and surrounded by an open field. The eastern perimeter of the SWMU is comprised of mowed and old field grasses and impervious surfaces. Surface drainage is directed toward north-south and east-west oriented drainage ditches. The north-south (main) drainage ditch has a permanent water flow to the north. The ditch is approximately 12 to 15 feet wide with steep side slopes, about 5 feet high. Water depth has been observed at 6 inches and greater.

4.3.2 Potentially Exposed Populations

SWMU 1 is located at the edge of the runway and is not currently used by the Base. There are no industrial workers at the site on a regular basis. However, it was conservatively assumed an industrial site worker may access the site. Additionally, although the Base is now fenced, it was conservatively assumed adult and adolescent trespassers may access the site.

Because there is no Master Base Plan detailing planned future use of SWMU 1, it was assumed the site could be used for industrial or residential purposes in the future. Potential future exposed populations include industrial workers, trespassers, residents, and construction workers.

Columbia Aquifer groundwater is not currently used as a water supply at SWMU 1 or at NASO. It is not anticipated that Columbia Aquifer groundwater would be used as a future potable water supply. However, the groundwater was conservatively evaluated for the future residential scenario as a potable supply. Groundwater samples have not been collected from the Yorktown at SWMU 1, and because of the confining layer between the Columbia and Yorktown Aquifers, it is assumed that the Yorktown Aquifer has not been impacted by SWMU 1.

4.3.3 Potential Exposure Pathways

As mentioned in Section 3.2.2, a complete exposure pathway has five elements: a source, a mechanism for release and migration, an environmental transport medium, a point of potential human contact, and a route of intake. These elements as they apply to SWMU 1 are discussed below.

Contaminant Sources

SWMU 1 was an open pit in which an estimated 110,000 gallons of different types of liquid wastes were disposed from the mid-1950s through the late 1960s. Based on a 1958 aerial photograph of the unit, the pit appears to have been approximately 50 to 100 feet in diameter. Therefore, the soils in the area of the historic pit are the original source of contamination at the site. Additionally, contaminants may have originally leached through the soil to the shallow groundwater resulting in groundwater contamination beneath the pit. There is pure product (significantly degraded diesel fuel) in the silts above the water table. However, the groundwater sampling results do not indicate the presence of a dissolved phase of the product.

In 1962, the pit flooded and its contents are believed to have washed into the main drainage ditch, 100 feet west of the oil disposal pit. However, any sediment or surface water contamination that may have been associated with this flooding has probably been removed, as this drainage ditch is periodically dredged and maintained.

Release and Transport Mechanisms

The primary transport mechanism for contamination at SWMU 1 appears to be leaching from the soil to the groundwater and transport in the groundwater. Shallow groundwater discharges to the drainage ditch that is 1000 feet west of the pit, and may result in some contamination being transported to the sediment and surface water in the ditch.

Fate and transport modeling was conducted to determine contaminant concentrations in fugitive dust emissions from soil. Transport modeling for chemical volatilization from soil was not conducted because there were no volatile constituents selected as COPCs for soil. Fate and transport modeling was also conducted for volatilization from groundwater during showering and from an open excavation.

Direct contact with COPCs in soil (i.e. ingestion or dermal contact) does not require fate and transport modeling. In these pathways, the receptor is assumed to go to the location of the COPC.

Potential Exposure Points and Exposure Routes

Exposure points are locations where humans could contact contamination. On-site exposure points include surface soil, subsurface soil, groundwater beneath the site, and sediment. Off-site exposure points include groundwater downgradient of the site, and sediment in the drainage ditch downstream from the site. Only contact with groundwater and soil beneath the site, and sediment in the ditch on the site, was evaluated. It is expected that dilution and attenuation of any contamination would occur in downgradient locations, and any associated risks would be less than those calculated at the site.

Potential exposure routes were evaluated for current and potential future site use. Existing and potential exposure pathways are illustrated in the conceptual exposure model (Figure 4-5). Exposure scenarios and potentially complete pathways of exposure evaluated in this risk assessment are presented in Table 4-3 and Appendix A.4, Table 1.

Current Exposure Routes

The only media of potential concern currently accessible at the site are surface soil and sediment. Based on current site use, potential receptors include industrial site workers and trespassers/visitors. The Columbia Aquifer groundwater at NASO is not used as a potable supply and therefore, there is no current exposure to shallow groundwater.

In summary, the current land use exposure routes include:

- Industrial Worker: incidental ingestion of and dermal contact with surface soil, and inhalation of fugitive dust emissions from surface soil.
- Trespassers/Visitors (adult and adolescent): incidental ingestion of and dermal contact with surface soil, inhalation of fugitive dust emissions from surface soil, and incidental ingestion of and dermal contact with sediment.

Future Exposure Routes

As discussed above, potential future site use may be industrial or residential use. The future exposure scenarios assume that the subsurface soil will be excavated and may be placed on the surface. Future industrial workers, trespassers, residents, and/or construction workers may be exposed to this soil. Construction workers may also be exposed to shallow groundwater during excavation activities. It was also conservatively assumed that shallow groundwater may be used as a potable water supply, although this is highly unlikely.

In summary, the future land use exposure routes include the following:

- Industrial Worker: incidental ingestion of and dermal contact with soil, and inhalation of fugitive dust emissions from soil.
- Trespassers/Visitors (adult and adolescent): incidental ingestion of and dermal contact with soil, inhalation of fugitive dust emissions from soil.
- Resident (adult and child): incidental ingestion of and dermal contact with soil, inhalation of fugitive dust emissions from soil, ingestion of and dermal contact with groundwater, and inhalation (adults only) of volatiles from groundwater.
- Construction Worker: incidental ingestion of and dermal contact with soil, inhalation of fugitive dust emissions from soil, and dermal contact with and inhalation of volatiles from groundwater.

The exposure concentrations used to calculate potential risks to each of the receptors are presented in Appendix A.4, Tables 3.1 through 3.4. The exposure parameters and equations used to calculate the risks are presented in Appendix A.4 Tables 4.1 through 4.16.

4.4 Risk Characterization

Risks were evaluated for all of the complete exposure pathways identified in Section 4.3. The calculated risks are discussed below.

4.4.1 Soil

Risks were evaluated for exposure to surface soil for current scenarios and combined surface and subsurface soil for future scenarios.

Surface Soil

RME risk estimates for exposure to surface soil were calculated for an adult industrial worker and an adult and adolescent trespasser/visitor under current site use (Appendix A.4, Tables 7.1.RME through 7.3.RME, and Tables 8.1.RME through 8.3.RME). The risks are summarized in Tables 4-4 and 4-5. Exposure to surface soil via incidental ingestion, dermal contact, and inhalation of fugitive dust from the surface soil was evaluated.

The noncarcinogenic hazard associated with exposure to surface soil by industrial workers (0.34) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to surface soil by an industrial worker ($4x10^{-6}$) is within USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$.

The noncarcinogenic hazard associated with exposure to surface soil by adult and adolescent trespassers (0.053 and 0.049, respectively) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to surface soil by adult and adolescent trespassers ($6x10^{-7}$ and $3x10^{-7}$, respectively), is below USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$

Combined Surface and Subsurface Soil

RME risk estimates for exposure to combined surface and subsurface soil were calculated for an industrial worker, construction worker, adult and adolescent trespasser/visitor, and adult and child resident under potential future site use (Appendix A.4, Tables 7.9.RME through 7.14.RME, and Tables 8.9.RME through 8.13.RME and summarized in Tables 4-4 and 4-5). It was assumed these receptors would be exposed to soil through incidental ingestion, dermal contact, and inhalation of fugitive dust emissions from soil.

The noncarcinogenic hazard associated with exposure to combined surface and subsurface soil for an industrial worker (0.36) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to the soil by an industrial worker ($6x10^{-6}$) is within USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$. This risk is primarily associated with ingestion of arsenic and benzo(a)pyrene in the soil.

The noncarcinogenic hazard associated with exposure to combined surface and subsurface soil for a construction worker (0.62) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to the soil by a construction worker ($1x10^{-6}$) is within USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$.

The noncarcinogenic hazard associated with exposure to combined surface and subsurface soil by adult and adolescent trespassers (0.057 and 0.26, respectively) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to the soil by adult and adolescent trespassers ($1x10^{-6}$ and $8x10^{-7}$, respectively) is below USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

The noncarcinogenic hazard due to exposure to combined surface and subsurface soil by an adult resident (0.39) does not exceed USEPA's target hazard index of 1.0, but the hazard to a child resident (1.7) exceeds USEPA's target hazard index. None of the individual constituents exceeds a HQ of 1.0 for the child resident. The ingestion pathway contributes 99 percent of the total HI for the child resident. This is associated mainly with iron (0.79). The hazard index was separated by target organ and each hazard by target organ was below 1.

As discussed in Section 3.2.3, the carcinogenic risk for the resident is calculated as a lifetime age-adjusted risk. The carcinogenic risk associated with exposure to soil by the resident exposed over his or her lifetime ($2.5x10^{-5}$) is within USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$. This risk is primarily associated with ingestion of the soil, and in particular, ingestion of arsenic, benzo(a)pyrene, and dibenz(a,h)anthracene.

The RME noncarcinogenic hazard for exposure to combined surface and subsurface soil by a future child resident exceeds USEPA benchmark values of 1.0. RME carcinogenic risk for exposure to soil by a resident over his or her lifetime exceeds a risk of $1x10^{-5}$. Therefore, CT noncarcinogenic hazard was calculated for a child resident and CT carcinogenic risk was calculated for a lifetime resident (Appendix A.4, Table 7.17.CT and 8.15.CT, and summarized in Tables 4-6 and 4-7).

The CT noncarcinogenic hazard due to exposure to the soil by a child resident (0.87) is below USEPA's target hazard index of 1.0. The CT risk for the lifetime resident falls within USEPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$.

4.4.2 Groundwater

Columbia Aquifer groundwater beneath the site is not currently used as a potable water supply and will not likely be used as a potable water supply in the future. Additionally, Yorktown Aquifer groundwater beneath the site is not used as a potable water supply. However, Columbia Aquifer groundwater beneath the site was evaluated as a worst-case risk estimate for potable groundwater use. Risk estimates for exposure to groundwater were calculated for child and adult residents under potential future residential use of the site (Appendix A.4, Tables 7.6.RME and 7.7.RME and Table 8.6.RME and 8.7.RME, and summarized in Tables 4-4 and 4-5). It was assumed that a resident would drink the water, and bathe with the water, resulting in inhalation of volatiles (adult only) and dermal absorption.

The RME noncarcinogenic hazards associated with use of the groundwater as a potable residential water supply are above USEPA's benchmark noncarcinogenic HI of 1.0 for both the potential future child and adult resident. The noncarcinogenic hazard to a child and adult resident is 1.3 and 10, respectively. The hazard to the child resident is primarily associated with ingestion of and dermal contact with naphthalene in the groundwater, and the combined HI for naphthalene through these pathways is greater than 1.0. For the adult resident, the inhalation route poses the greatest hazard, associated with inhalation of naphthalene.

As with residential soil exposure, the carcinogenic risk for groundwater for the resident is presented as a lifetime age-adjusted risk. The RME carcinogenic risk associated with use of the groundwater as a potable residential water supply is within USEPA's benchmark of $1x10^{-4}$ to $1x10^{-6}$. The residential lifetime carcinogenic risk is $2x10^{-5}$. This risk is primarily associated with ingestion of benzo(a)pyrene in the groundwater.

Exposure to shallow groundwater by a construction worker during excavation was evaluated as a potential future exposure scenario (Appendix A.4, Tables 7.8.RME and Table 8.8.RME, and summarized in Tables 4-4 and 4-5). The RME noncarcinogenic risk (0.7) is below USEPA's benchmark of 1.0. The RME carcinogenic risk is $1x10^{-8}$, which is below USEPA's target risk range.

The RME noncarcinogenic hazard for exposure to groundwater by a future adult and child resident exceeds USEPA benchmark value of 1.0, and the RME carcinogenic risks for exposure to groundwater by a lifetime resident exceeds a risk of $1x10^{-5}$. Therefore, CT exposure was evaluated for these scenarios. The CT risk estimates are summarized in Tables 4-6 and 4-7 (Appendix A-4 Tables 7.15.CT, 7.16.CT, and 8.14.CT). The calculated CT noncarcinogenic hazard (6.3) for an adult resident exceeds USEPA's target HI. The CT HI is associated with inhalation of naphthalene during showering. The CT noncarcinogenic hazard (0.82) for a child resident is below USEPA's target HI. The CT lifetime carcinogenic risk of ($9x10^{-6}$) is within USEPA's target risk range.

4.4.3 Surface Water

There were no COPCs retained for surface water in the drainage ditch. Therefore, risks were not quantified for this medium.

4.4.4 Sediment

Exposure to drainage ditch sediment was evaluated for adult and adolescent trespassers/visitors who could be exposed to sediment through incidental ingestion and dermal contact while wading (Appendix A.4, Tables 7.4.RME, 7.5.RME, 8.4.RME, and 8.5.RME, and summarized in Tables 4-4 and 4-5).

The RME noncarcinogenic hazards to adult and adolescent trespassers/visitors exposed to sediment (0.0059 and 0.0057, respectively) are below USEPA's target hazard index of 1.0. The carcinogenic risks associated with exposure to the sediment by adult and adolescent trespassers/visitors ($9x10^{-7}$ and $3x10^{-7}$, respectively) are below USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$.

4.4.5 Summary of Total Risks Across Pathways and Media

Table 4-5 and Appendix A.4, Tables 9.1.RME through 9.10.RME summarize the RME potential noncarcinogenic hazards and carcinogenic risks to each receptor. Table 4-7 and Appendix A.4, Tables 9.11.CT, through 9.13.CT summarize the CT potential hazards and risks to each receptor that have HIs in excess of 1.0 or carcinogenic risks greater than $1x10^{-5}$. Potential risks were summarized for a current industrial worker, current adult trespasser/visitor, adolescent trespasser/visitor, future adult resident, future child resident, future lifetime resident, future construction worker, future industrial worker, future adult trespasser/visitor, and adolescent trespasser/visitor. Appendix A.4, Tables 10.1.RME through 10.3.RME and 10.4.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6} for scenarios with total HIs greater than 1.0 or total carcinogenic risks greater than 10^{-5}.

Current Industrial Worker

The risk assessment assumed that a current industrial worker could be exposed to surface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust emissions. The total current RME noncarcinogenic hazard to an adult industrial worker exposed to surface soil at SWMU 1 is below USEPA's acceptable noncarcinogenic hazard level of 1.0 (Appendix A.4, Table 9.1.RME). The carcinogenic risk to an adult industrial worker exposed to surface soil is within USEPA's acceptable carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$.

Current Adult and Adolescent Trespasser/Visitor

The risk assessment assumed that current trespassers may be exposed to surface soil at SWMU 1, and surface water and sediment in the drainage ditch. The total current RME noncarcinogenic hazards and carcinogenic risks to adult and adolescent trespassers/visitors exposed to these media do not exceed target levels (Appendix A.4, Tables 9.2.RME and 9.3.RME).

Future Resident

It was assumed a future child and adult resident may be exposed to groundwater and soil (surface soil and subsurface soil that may be placed on the surface due to disturbance of the site during construction of a residence).

Exposure to groundwater and soil would result in a hazard greater than USEPA's benchmark level for both a child and adult resident (Appendix A.4, Tables 9.4.RME and 9.5.RME). The only media that contributes to an unacceptable hazard for an adult is groundwater (mainly through inhalation of naphthalene while showering). For a child, both

the groundwater and soil contribute to an unacceptable hazard. Naphthalene in groundwater, and metals in soil contribute to the unacceptable hazard. Separating HI by target organ for soil does not exceed the target hazard of 1 for any organ.

Exposure to groundwater and soil would result in a carcinogenic risk less than USEPA's target risk for a resident exposure during his or her lifetime based on RME exposure assumptions (Appendix A.4, Table 9.6.RME).

A CT hazard analysis was conducted for exposure to soil by a child resident, and exposure to groundwater by an adult and child (Appendix A.4, Tables 9.11.CT and 9.12.CT). The resulting hazards for a child exposed to soil and groundwater separately are below USEPA's target HI of 1.0, however the total CT hazard for exposure to both soil and groundwater is greater than 1.0. The CT hazard for an adult exposed to groundwater is above 1.0. The risk drivers are the same as the risk drivers for the RME hazards.

A CT risk evaluation was conducted for groundwater and soil for a lifetime resident. The CT carcinogenic risk for exposure to groundwater and soil is below $1x10^{-4}$.

Construction Worker

Exposure to combined surface soil and subsurface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust emissions, and to groundwater through dermal contact and inhalation of volatiles was evaluated for a future construction worker. The total RME noncarcinogenic hazard exceeds USEPA's target HI (Appendix A.4, Table 9.7.RME). The HIs for groundwater and soil are below 1.0, however, combined, they are slightly greater than 1.0. Separating HI by target organ does not exceed the target hazard of 1 for any organ.

The total potential future RME carcinogenic risk for a construction worker is $1x10^{-6}$ (Appendix A.4, Table 9.7.RME).

Future Industrial Worker

The risk assessment assumed that a future industrial worker may be exposed to site soil (surface soil and subsurface soil that may placed on the surface due to disturbance of the site during construction or maintenance activities). The total future RME noncarcinogenic hazard for an adult industrial worker exposed to SWMU 1 soil does not exceed USEPA's target noncarcinogenic HI (Appendix A.4, Table 9.8.RME). The RME carcinogenic risk is within USEPA's carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$.

Future Adult and Adolescent Trespasser/Visitor

The risk assessment assumed that a future trespasser/visitor may be exposed to site soil (surface soil and subsurface soil that may placed on the surface soil due to disturbance of the site during construction or maintenance activities), and surface water and sediment in the drainage ditch south of the site. There were no COPCs retained for the surface water, therefore this media does not contribute to the risks to trespassers/visitors exposed to SWMU 1 media. The total current RME noncarcinogenic hazards for the adult and adolescent trespassers/visitors do not exceed USEPA's target noncarcinogenic HI (Appendix A.4, Tables 9.9.RME and 9.10.RME). The RME carcinogenic risk is within USEPA's target risk range and is less than $1x10^{-5}$.

5.0 SWMU 15

This section presents the results of the HHRA for SWMU 15, the Abandoned Tank Farm.

5.1 Data Summary

Numerous field investigations have generated information on SWMU 15 media and contaminants. A summary of the sampling and monitoring program for SWMU 15 was presented in Section 2.2.2. Only data used in the risk assessment are presented in this section. Table 5-1 lists the samples that were used to estimate potential exposure and risks in each medium for SWMU 15. Figures 5-1, 5-2, 5-3, and 5-4 identify the sample locations.

Four surface soil samples collected in 1999 were evaluated in the HHRA (Figure 5-1). The samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Ten subsurface soil samples were collected in 1998 and evaluated in the risk assessment (Figure 5-2). These samples were analyzed for VOCs and SVOCs.

The most recent groundwater samples were collected in 1999. Samples were collected from seven monitoring wells and analyzed for VOCs, SVOCs, pesticides/PCBs, and total metals (Figure 5-3). These samples are the groundwater samples most representative of current site conditions and were evaluated in the risk assessment.

Surface water and sediment samples were collected in 1999. Seventeen sediment samples (including one duplicate) and six surface water samples (including one duplicate) were collected at SWMU 15 (Figure 5-4). Six of the sediment samples and two of the surface water samples were analyzed for VOCs, SVOCs, pesticides/PCBs and metals. The remaining samples were analyzed for SVOCs and metals.

The full set of data used for the HHRA is included in Appendix B.1. Appendix B.2 includes the detected constituents only, and Appendix B.3 includes the sample statistics.

5.2 Identification of Chemicals of Potential Concern

Table 5-2 lists the COPCs retained for SWMU 15. It should be noted, that for combined surface and subsurface soil, the PCBs and metals retained as COPCs were only analyzed for in the surface soil, and therefore only detected in the surface soil.

5.3 Exposure Assessment

The SWMU specific exposure assessment includes the information necessary to develop the exposure scenarios applicable for SWMU 15. This includes identifying the exposure setting, the current and future site use, the potentially exposed populations, and the potential exposure pathways.

5.3.1 Exposure Setting

The area around SWMU 15 includes pavement, forests, shrubs, and wetlands. Old paved road surfaces and parking lots cover much of the site. In general, drainage of the site is towards the northeast. A shallow drainage ditch crosses the center of the site, bisecting a small depressional wetland, and drains south to a large emergent wetland. No outlet from the wetland has been observed. Water was observed in most of the ditch during a 1992 ecological survey, but the water did not appear to be flowing.

As part of the soil removal action at SWMU 15, an area measuring approximately 150 feet by 125 feet was excavated to the water table, creating a small pond. The man-made pond is located southwest of the drainage ditch.

5.3.2 Potentially Exposed Populations

SWMU 15 is about 800 feet northwest of Runway 23 R and 1,000 feet northeast of the area used to store recreation vehicles. The SWMU is wooded and is located in an undeveloped area of the Base. There are no industrial workers at the site on a regular basis. However, it was conservatively assumed an industrial worker may work at the site. Additionally, although the Base is now fenced, it was conservatively assumed trespassers may access the site.

The future planned use for SWMU 15 is to construct a hangar at the SWMU and provide access to Runway 23 R through the SWMU. Future industrial workers may be exposed to any potential contamination at SWMU 15. A future residential development was also conservatively included in the SWMU 15 evaluation. Exposed populations would include the residents, and the construction workers who develop the site for future residential use.

Groundwater from the Columbia Aquifer is currently not used at SWMU 15, or at NASO, as a water supply. It is not anticipated that Columbia Aquifer groundwater would be used as a future potable water supply. The Yorktown Aquifer has not been sampled at SWMU 15, and because of the confining layer between the Columbia and Yorktown Aquifers, is not expected that the Yorktown Aquifer had been impacted by SWMU 15. However, the shallow groundwater was conservatively included in this evaluation.

5.3.3 Potential Exposure Pathways

As mentioned in Section 3.2.2, a complete exposure pathway has five elements: a source, a mechanism for release and migration, an environmental transport medium, a point of potential human contact, and a route of intake. These elements are discussed below for SWMU 15.

Contaminant Sources

The abandoned tank farm served as the primary source of aircraft fuel (including JP-3, aviation gas, automotive fuel, kerosene, and lube oil) for the North Station area when it was active from the mid-1950s to the mid-1970s. One of the tanks was used to store waste oil after the tanks were abandoned. The tanks and their associated piping were removed in the mid-1980s.

The surface soil, subsurface soil, and groundwater contaminated with BTEX and PAHs from the tanks in the abandoned tank farm are the contaminant sources at SWMU 15. Free-product has been found in the shallow groundwater.

Release and Transport Mechanisms

The primary transport mechanism from SWMU 15 contaminant sources appears to be leaching from the soil to the groundwater and transport in the groundwater. Most of the groundwater contamination is beneath the site or within 100 yards downgradient of the site and appears to be retained in the silts. When the contaminants move from the silts into the more permeable sands, they appear to degrade rapidly, as the concentrations in the sands are much lower than the concentrations in the silts. The less mobile PAHs were mainly detected in the soils, while the more mobile BTEX were detected in the groundwater.

Fate and transport modeling was conducted to determine contaminant concentrations in fugitive dust emissions from soil. Transport modeling for chemical volatilization from soil was not conducted because there were no volatile constituents selected as COPCs for the soil evaluation. Fate and transport modeling was also conducted for volatilization from groundwater during showering and from an open excavation.

Direct contact with COPCs in soil, sediment, and groundwater (i.e., ingestion or dermal contact) does not require fate and transport modeling. In these pathways, the receptor is assumed to go to the location of the COPC.

Potential Exposure Points and Exposure Routes

Exposure points are locations where humans could contact contamination. On-site exposure points include surface soil, subsurface soil, groundwater, and sediment in the pond. Off-site exposure points include groundwater downgradient of the site. Off-site exposure points were not evaluated in the risk assessment. Dilution and attenuation of any contamination would occur in downgradient locations, and any associated risks would be less than those calculated at the site.

Potential exposure routes were evaluated for both current and potential future site use. Existing and potential future exposure pathways are illustrated in the conceptual exposure model (Figure 5-5). Exposure scenarios and potentially complete pathways of exposure evaluated in this risk assessment are presented in Table 5-3 and Appendix B.4, Table 1.

Current Exposure Routes

The only contaminated media currently accessible at the site are surface soil and sediment. Based on current site use, potential receptors include industrial site workers and trespassers/visitors. The Columbia Aquifer groundwater at NASO is not used as a potable supply, and therefore, there is no current exposure to shallow groundwater.

In summary, the current land use exposure routes include:

- Industrial Worker: incidental ingestion of and dermal contact with surface soil, and inhalation of fugitive dust from surface soil.
- Trespassers/Visitors (adult and adolescent): incidental ingestion of and dermal contact with surface soil, inhalation of fugitive dust from surface soil, and incidental ingestion of and dermal contact with sediment.

Future Exposure Routes

Based on the proposed future use of the site, construction of a hangar and an access to the runway, the future receptors would be industrial workers and construction workers. As discussed above, the most conservative future use of the site is residential development. Future residents and construction workers would be exposed to the site soils. Trespassers may also access the site after it has been converted for industrial or residential use and contact soil. The potential future soil exposure scenarios assume that the subsurface soil will be excavated and placed on the surface.

The construction worker may be exposed to shallow groundwater during excavation activities. It was also conservatively assumed that shallow groundwater may be used as a potable water supply in the future, although this is highly unlikely.

In summary, the future land use exposure routes include the current land use exposure routes and the following:

- Industrial Worker: incidental ingestion of and dermal contact with soil, and inhalation of fugitive dust from soil.
- Resident (adult and child): incidental ingestion of and dermal contact with soil, inhalation of fugitive dust from soil, ingestion of and dermal contact with groundwater, and inhalation (adults only) of volatiles from groundwater.
- Construction Worker: incidental ingestion of and dermal contact with soil, inhalation of fugitive dust from soil, and dermal contact with and inhalation of volatiles from groundwater.
- Trespassers/Visitors (adult and adolescent): incidental ingestion of and dermal contact with soil, and inhalation of fugitive dust from soil.

The exposure concentrations used to calculate potential risks to each of the receptors are presented in Appendix B.4, Tables 3.1 through 3.4. The exposure parameters and equations used to calculate the risks are presented in Appendix B.4, Tables 4.1 through 4.6.

5.4 Risk Characterization

Risks were evaluated for the complete exposure pathways identified in Section 5.3. The results of the risk calculations are discussed below.

5.4.1 Soil

Risks were evaluated for exposure to surface soil and combined surface and subsurface soil.

Surface Soil

RME risk estimates for exposure to surface soil were calculated for an adult industrial worker and an adult and adolescent trespasser/visitor under current site use (Appendix B.4, Tables 7.1.RME through 7.3.RME and Tables 8.1.RME through 8.3.RME). The risks are summarized in Tables 5-4 and 5-5. Exposure to surface soil via incidental ingestion, dermal contact, and inhalation of fugitive dust were evaluated.

The noncarcinogenic hazard associated with exposure to surface soil by industrial workers (0.4) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to surface soil by an industrial worker ($2x10^{-4}$) exceeds USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$. This carcinogenic risk is primary associated with ingestion of dibenz(a,h)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in the surface soil. However, none of the individual constituents pose a carcinogenic risk above USEPA's target risk range. Additionally, the ingestion pathway is the only pathway significantly contributing to a carcinogenic risk greater than $1x10^{-4}$.

The noncarcinogenic hazards associated with exposure to surface soil by adult and adolescent trespassers (0.061 and 0.054, respectively) are below USEPA's target hazard index of 1.0. The carcinogenic risks associated with exposure to surface soil by adult and adolescent trespassers ($4x10^{-5}$ and $2x10^{-5}$, respectively) are within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

CT carcinogenic risk estimates for surface soil were calculated for all receptors since exposure resulted in a RME carcinogenic risk above $1x10^{-5}$. These risks are summarized in Table 5-6. None of the RME HIs are above 1.0, therefore CT HIs were not calculated. The CT carcinogenic risk associated with exposure to surface soil by an industrial worker is $2x10^{-5}$. This risk is an order of magnitude lower than the RME risk. Because the exposure concentrations used in the RME and CT calculations were the same, the same constituents, dibenz(a,h)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, contribute the majority of the risk. The CT carcinogenic risks associated with exposure to surface soil by adult and adolescent trespassers ($4x10^{-6}$ and $5x10^{-6}$, respectively) are also an order of magnitude below the RME risks.

Combined Surface and Subsurface Soil

RME risk estimates for exposure to combined surface and subsurface soil were calculated for an industrial worker, construction worker, adult and adolescent trespasser/visitor, and adult and child resident under potential future site use (Appendix B.4, Tables 7.9.RME through 7.14.RME, and Tables 8.9.RME through 8.13.RME). The calculated RME risks are summarized in Tables 5-4 and 5-6. It was assumed these receptors would be exposed to surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of fugitive emissions from soil.

The noncarcinogenic hazard associated with exposure to combined surface and subsurface soil for an industrial worker (0.4) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to the soil by an industrial worker ($2x10^{-4}$) exceeds USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$. This risk is primarily associated with ingestion of benzo(a)pyrene, dibenz(a,h)anthracene, and benzo(b)fluoranthene in the soil. Benzo(a)pyrene and dibenz(a,h)anthracene were only detected in the surface soil samples, and benzo(b)fluoranthene was only detected in three of the subsurface soil samples. Therefore, the majority of this calculated risk is due to the surface soil, and not the subsurface soil.

The noncarcinogenic hazard associated with exposure to combined surface and subsurface soil for a construction worker (0.35) is below USEPA's target hazard index of 1.0. The carcinogenic risk associated with exposure to the soil by a construction worker ($4x10^{-5}$) is within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

The noncarcinogenic hazards associated with exposure to combined surface and subsurface soil by adult and adolescent trespassers (0.061 and 0.061, respectively) are below USEPA's

target hazard index of 1.0. The carcinogenic risks associated with exposure to the soil by adult and adolescent trespassers ($4x10^{-5}$ and $2x10^{-5}$, respectively) are within USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

The noncarcinogenic hazard due to exposure to combined surface and subsurface soil by an adult resident (0.41) does not exceed USEPA's target hazard index, but the hazard to a child resident (1.8) does exceed USEPA's target hazard index of 1.0. None of the constituents individually exceed a HQ of 1.0 for the child. The ingestion pathway contributes 84 percent of the total HI for the child resident. This is associated mainly with fluorene, iron, Aroclor-1254, and aluminum. Separation of the HI by target organ results in HIs for all target organs below USEPA's target of 1.0.

The carcinogenic risk for the resident is calculated as a lifetime age-adjusted risk. The carcinogenic risks associated with exposure to soil by the resident exposed over his or her lifetime ($8x10^{-4}$) exceed USEPA's target risk of $1x10^{-6}$ to $1x10^{-4}$. This risk is primarily associated with ingestion of the soil, and in particular, ingestion of benzo(a)pyrene, dibenz(a,h)anthracene, and benzo(b)fluoranthene. As mentioned above, benzo(a)pyrene and dibenz(a,h)anthracene were only detected in the surface soil samples, and benzo(b)fluoranthene was only detected in three of the subsurface soil samples. Therefore, the majority of this calculated risk is due to the surface soil, and not the subsurface soil.

The RME noncarcinogenic hazard for exposure to combined surface and subsurface soil by a future child resident exceeds USEPA benchmark values of 1.0. The RME carcinogenic risks for exposure to soil by an industrial worker, a construction worker, a adult and adolescent trespasser, and a lifetime resident exceed a risk of $1x10^{-5}$. Therefore, CT hazard was calculated for a child resident and CT risk carcinogenic estimates were calculated for all receptors (Appendix B.4, Tables 7.18.CT, 8.20.CT through 8.24.CT, and Table 5-6).

The CT noncarcinogenic hazard due to exposure to the soil by a child resident (0.6 5) is below USEPA's target hazard index of 1.0. The CT risk for all receptors except the lifetime resident falls within USEPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$. The lifetime residential CT carcinogenic risk is $2x10^{-4}$. As with the RME risk the CT risk is primarily associated with ingestion of benzo(a)pyrene, and dibenz(a,h)anthracene, benzo(b)fluoranthene in the soil, and primarily the surface soil.

5.4.2 Groundwater

Columbia Aquifer groundwater beneath the site is not currently used as a potable water supply and is not likely to be used as a potable water supply in the future. Additionally, Yorktown Aquifer groundwater beneath the site is not used as a potable water supply. However, Columbia Aquifer groundwater beneath the site was evaluated as a worst-case risk estimate for potable groundwater use. Risk estimates for exposure to groundwater were calculated for child and adult residents under potential future residential use of the site (Appendix B.4, Tables 7.6.RME through 7.7.RME and Table 8.6.RME and 8.7.RME). The risks are summarized in Tables 5-4 and 5-5. It was assumed that a residential user would drink the water, and bathe with the water, resulting in inhalation of volatiles (adult only) and dermal absorption.

The RME noncarcinogenic risks associated with use of the groundwater as a potable residential water supply were above USEPA's benchmark noncarcinogenic hazard index of

1.0 for both the future child and adult resident. The noncarcinogenic hazards to a child and adult resident were 95 and 260, respectively. These constituents each have individual HQs above 1. For the adult resident, all exposure routes pose hazards greater than 1, however the inhalation route poses a much greater hazard. The main drivers of the hazard to the child and adult resident is associated with ingestion of benzene, arsenic, chloroform, iron, and manganese in the groundwater and dermal contact with benzene. The HI associated with the inhalation route alone is 220, and is associated with benzene and chloroform. Naphthalene is the only other constituent which presents an inhalation HQ (1.7) greater than 1.0.

As with residential soil exposure, the carcinogenic risk for groundwater for the resident is presented as a lifetime (age-adjusted) risk. The RME carcinogenic risks associated with use of the groundwater as a potable residential water supply exceeds USEPA's benchmark of $1x10^{-4}$. The residential lifetime carcinogenic risk is $6x10^{-3}$. All of the exposure pathways contribute to this risk and were all over $1x10^{-4}$. The main risk drivers were arsenic, benzene, and chloroform.

Exposure to the shallow groundwater by a construction worker during excavation was also evaluated as a potential future exposure scenario (Appendix B.4, Tables 7.8.RME and Table 8.8.RME, and summarized in Tables 5-4 and 5-5). The RME noncarcinogenic risk (31) exceeds USEPA's benchmark of 1.0. This hazard is primarily associated with inhalation of benzene and chloroform volatilizing from the exposed shallow groundwater and dermal contact with benzene. The RME carcinogenic risk is $2x10^{-5}$, and is within USEPA's target risk range. Dermal contact with benzene in the groundwater was the greatest contributor to this risk.

Because the RME noncarcinogenic and carcinogenic risks for the residents and construction worker exceed the cutoff levels of 1.0 and $1x10^{-5}$, CT exposure risks were evaluated (Table 5-6). The calculated CT noncarcinogenic hazards for the residential receptors exceeded 1.0. As with the RME noncarcinogenic hazards, the main drivers were arsenic, benzene, chloroform, iron, and manganese for the ingestion; benzene for dermal contact; and benzene, chloroform, and napthalene via inhalation. The CT hazard for the construction worker (0.23) is below USEPA's benchmark of 1.0.

The lifetime residential CT carcinogenic risk, $2x10^{-3}$, exceeds USEPA's target range of $1x10^{-4}$ to $1x10^{-6}$. As with the RME carcinogenic risk, ingestion of arsenic and benzene and inhalation of benzene are the main contributors to this risk. The CT carcinogenic risk for a construction worker exposed to groundwater, $1x10^{-5}$, is within USEPA's target range.

5.4.3 Surface Water

There were no COPCs retained for the surface water in the pond. Therefore, risks were not quantified for this medium.

5.4.4 Sediment

Exposure to pond sediment was evaluated for adult and adolescent trespassers/visitors who could be exposed to sediment through incidental ingestion and dermal contact while swimming (Appendix B.4, Tables 7.4.RME, 7.5.RME, 8.4.RME, and 8.5.RME). The risks are summarized in Tables 5-4 and 5-5.

The RME noncarcinogenic hazards to adult and adolescent trespassers/visitors exposed to sediment (0.025 and 0.022, respectively) are below USEPA's target hazard index of 1.0. The carcinogenic risks associated with exposure to the sediment by adult and adolescent trespassers/visitors ($6x10^{-7}$ and $2x10^{-7}$, respectively) are below USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$.

5.4.5 Summary of Total Risks Across Pathways and Media

Appendix B.4, Tables 9.1.RME through 9.10.RME summarize the RME total potential risks to each receptor. Appendix B.4, Tables 9.11.CT through 9.21.CT summarize the CT total potential risks to each receptor that had risks that exceeded an HI of 1.0 or a carcinogenic risk of $1x10^{-5}$. Total potential risks were summarized for a current industrial worker, a current adult and adolescent trespasser/visitor, a future adult, child, and lifetime resident, a future construction worker, a future industrial worker, and a future adult and adolescent trespasser/visitor. Appendix B.4, Tables 10.1.RME through 10.10.RME and 10.11.CT through 10.16.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6}.

Current Industrial Worker

The risk assessment assumed that a current industrial worker could be exposed to site surface soil. The total current RME noncarcinogenic hazard to an adult industrial worker exposed to surface soil at SWMU 15 is below USEPA's target noncarcinogenic hazard level (Appendix B.4, Table 9.1.RME). The carcinogenic risk to an adult industrial worker exposed to surface slightly exceeds USEPA's target carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$. As mentioned above, this carcinogenic risk is primary associated with ingestion of dibenz(a,h)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene, although none of these constituents individually exceed a carcinogenic risk of $1x10^{-4}$.

The CT carcinogenic risk was calculated and is included in Appendix B.4, Table 9.11.CT. As shown in the table, the RME carcinogenic risk is within USEPA's target risk range.

Current Adult and Adolescent Trespasser/Visitor

The risk assessment assumed that a current trespasser may be exposed to surface soil at SWMU 15, and sediment in the pond. The total current RME noncarcinogenic hazards to adult and adolescent trespassers/visitors exposed to these media do not exceed USEPA's target noncarcinogenic hazard level (Appendix B.4, Tables 9.2.RME and 9.3.RME).

The total current RME carcinogenic risks to adult and adolescent trespassers/visitors exposed to the surface soil and sediment are within USEPA's target risk range. However, the carcinogenic risks exceed the carcinogenic risk level of $1x10^{-5}$ used to determine if CT risks must be calculated. This is solely associated with exposure to the surface soil. Therefore, CT risks were calculated for trespasser/visitor exposure to surface soil (Appendix B.4, Tables 9.12.CT and 9.13.CT). The total current CT carcinogenic risks to both the adult and adolescent trespassers/visitors are below $1x10^{-5}$.

Future Resident

It was assumed a future child and adult resident may be exposed to groundwater and soil (current surface soil and subsurface soil that may be placed on the surface during disturbance of the site for construction of the residence).

Exposure to groundwater and soil would result in a hazard greater than USEPA's target level for a child and adult resident (Appendix B.4, Tables 9.4.RME and 9.5.RME). The only media that contributes to this unacceptable hazard for an adult is groundwater (mainly through inhalation while showering, with a slight contribution from ingestion). The majority of the hazard is associated with chloroform. Chloroform was only detected in two of the seven groundwater samples. Both the groundwater and soil contribute to an unacceptable hazard to the child resident. Arsenic, chloroform, and iron in groundwater, and fluorene, iron, Aroclor-1254, and aluminum in soil contribute to the unacceptable hazard. When the HI for soil is separated by target organ the individual HIs are below 1.0.

Exposure to groundwater through potable use and to soil by a lifetime resident would result in a carcinogenic risk greater than USEPA's target risk range, based on RME exposure assumptions (Appendix B.4, Table 9.6.RME). Both groundwater and soil contribute a risk greater than USEPA's target level. The risk drivers for the groundwater are arsenic, benzene, and chloroform, and the risk drivers for soil are of benzo(a)pyrene, dibenz(a,h)anthracene, and benzo(b)fluoranthene. Benzo(a)pyrene and dibenz(a,h)anthracene in soil and benzene in groundwater were the only constituents with individual carcinogenic risks greater than $1x10^{-4}$. The calculated risk associated with the soil is primarily associated with the surface soil. Benzo(a)pyrene and dibenz(a,h)anthracene were only detected in the surface soil, and the highest detected concentrations of benzo(b)fluoranthene were detected in the surface soil.

A CT hazard analysis was conducted for exposure to soil by a child resident, and exposure to groundwater for an adult and child resident (Appendix B.4, Tables 9.14.CT and 9.15.CT). The resulting hazard for a child exposed to soil is below USEPA's target level of 1.0, however the CT hazard for both a residential child and adult exposed to groundwater is greater than 1.0. A CT risk evaluation was conducted for groundwater and soil for a lifetime resident. The CT carcinogenic risk for both groundwater and soil is above $1x10^{-4}$. The risk drivers for the CT risk are the same as the risk drivers for the RME risk.

Construction Worker

Exposure to combined surface soil and subsurface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust, and to groundwater through dermal contact and inhalation of volatiles was evaluated for a future construction worker. The total potential future RME noncarcinogenic hazard exceeds USEPA's target hazard level (Appendix B.4, Table 9.7.RME). The noncarcinogenic hazard is mainly associated with exposure to groundwater, and in particular, inhalation of volatiles from groundwater in an excavation pit. The chloroform detected in the groundwater contributes the majority of this risk. Chloroform was only detected in two of the seven groundwater samples evaluated in the risk assessment. The maximum detected concentration was used as the exposure concentration since the 95%UCL exceeded the maximum detected concentration.

The total potential future RME carcinogenic risk for a construction worker is within USEPA's target risk range, but exceeds $1x10^{-5}$ (Appendix B.4, Table 9.7.RME). This risk is primarily associated with dermal contact with and inhalation of benzene in the groundwater and ingestion of benzo(a)pyrene and dibenz(a,h)anthracene in the soil. Benzo(a)pyrene and dibenz(a,h)anthracene were detected in the surface soil, and but not the subsurface soil.

A CT risk calculation was performed for noncarcinogenic risks for groundwater and carcinogenic risks for both groundwater and soil (Appendix B.4, Table 9.17.CT). The CT noncarcinogenic risk for exposure to groundwater exceeds USEPA's target hazard index of 1.0. As with the RME hazard, this hazard is associated with inhalation of chloroform. The CT carcinogenic risks for exposure to groundwater and soil are below $1x10^{-4}$.

Future Industrial Worker

The risk assessment assumed that a future industrial worker may be exposed to site soil (current surface soil and subsurface soil that may be placed on the surface due to disturbance of the site during construction or maintenance activities). The total future RME noncarcinogenic hazard for an adult industrial worker exposed to SWMU 15 soil does not exceed an USEPA's target noncarcinogenic hazard level (Appendix B.4, Table 9.8.RME). The RME carcinogenic risk slightly exceeds $1x10^{-4}$. This risk is primarily associated with ingestion of benzo(a)pyrene, and dibenz(a,h)anthracene, benzo(b)fluoranthene in the soil (the surface soil).

A CT carcinogenic risk calculation was performed for the soil (Appendix B.4, Table 9.18.CT). The CT carcinogenic risk is below $1x10^{-4}$.

Future Adult and Adolescent Trespasser/Visitor

The risk assessment assumed that a future trespasser may be exposed to site soil (current surface soil and subsurface soil that may placed on the surface due to disturbance of the site during construction or maintenance activities) and sediment in the pond. There were no COPCs retained for the surface water, therefore this media does not contribute to the risks to trespassers/visitors exposed to SWMU 15 media. The total current RME noncarcinogenic hazard for the adult or adolescent trespasser does not exceed USEPA's target noncarcinogenic hazard level (Appendix B.4, Tables 9.9.RME and 9.10.RME). The RME carcinogenic risk is below $1x10^{-4}$, but exceeds $1x10^{-5}$. This risk is primarily associated with ingestion of benzo(a)pyrene and dibenz(a,h)anthracene in the soil (only detected in surface soil). The sediment does not significantly contribute to the overall risk to the trespasser.

Because the RME carcinogenic risks associated with exposure to soil for the adult and adolescent trespasser exceeded a risk level of $1x10^{-5}$, a CT risk calculation was performed (Appendix B.4, Tables 9.19.CT and 9.20.CT). The CT carcinogenic risks for the adult and adolescent trespasser ($4x10^{-6}$ and $5x10^{-6}$, respectively) are below $1x10^{-5}$.

6.0 SWMU 24

This section presents the results of the HHRA for SWMU 24, the Bowser at Building 840.

6.1 Data Summary

Numerous field investigations have generated information on SWMU 24 environmental media. A summary of the sampling and monitoring program for SWMU 24 was presented in Section 2.2.3. Only data used in the risk assessment are discussed in this section. Table 6-1 lists the samples that were used to estimate potential exposure and risks in each medium for SWMU 24. Figures 6-1 and 6-2 identify the sample locations.

Subsurface soil samples collected in 1997 were evaluated in the risk assessment. Eleven samples (including one duplicate) were collected and evaluated for VOCs and PAHs (Figure 6-1). These subsurface soil samples were collected as confirmatory samples to determine if the remedial action (excavation of soil) was effective in removing the POL contaminated soil.

Groundwater samples were collected from twelve monitoring wells and two piezometers in 1999 (Figure 6-2). The samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and total and dissolved metals. The total metals data were used to evaluate non-potable exposure to groundwater and the dissolved metals data were used to evaluate potable uses of groundwater.

The full set of data used for the HHRA is included in Appendix C.1. Appendix C.2 includes the detected constituents only, and Appendix C.3 includes the sample statistics.

6.2 Identification of Chemicals of Potential Concern

Table 6-2 lists the COPCs retained for SWMU 24. There were no COPCs retained for subsurface soil. Therefore, subsurface soil was not carried through the remainder of the risk assessment as a media of potential concern.

6.3 Exposure Assessment

The SWMU specific exposure assessment includes the information necessary to develop the exposure scenarios applicable for SWMU 24. This includes identifying the exposure setting, the current and future site use, the potentially exposed populations, and the potential exposure pathways.

6.3.1 Exposure Setting

SWMU 24 is the site of a former waste-oil bowser near Building 840. Building 840 is used currently used by the SEABEES. The site consists of a fenced gravel area surrounded by a perimeter of brush, forest, and mowed lawn.

6.3.2 Potentially Exposed Populations

SWMU 24 is near Building 840, which has been the base for the SEABEES since 1972. Therefore, the SEABEES who work at Building 840 are a potentially exposed population at SWMU 24. It is expected that Building 840 and the surrounding area will remain an industrial area in the future. However, it was conservatively assumed that the site could be used for residential development in the future. Therefore, potentially exposed populations could include industrial workers, construction workers, and residents.

Most of SWMU 24 is fenced. Additionally, the SWMU is located in the center of NASO. Therefore, trespassers are not considered potential receptors at SWMU 24.

Groundwater from the Columbia Aquifer is not used as a water supply at SWMU 24 or at NASO. It is not anticipated that Columbia Aquifer groundwater would be used as a future potable water supply. The Yorktown Aquifer has not been sampled at SWMU 24, and because of the confining layer between the Columbia and Yorktown Aquifers, it is expected that the Yorktown Aquifer has not been impacted by SWMU 24.

6.3.3 Potential Exposure Pathways

As mentioned in Section 3.2.2, a complete exposure pathway has five elements: a source, a mechanism for release and migration, an environmental transport medium, a point of potential human contact, and a route of intake. These elements are discussed below for SWMU 24.

Contaminant Sources

SWMU 24 contained a waste-oil bowser. Waste solvents and oils generated at the equipment maintenance garage in Building 840 were hand carried and poured into the bowser. The area surrounding the bowser was contaminated with the waste solvents and oils. Media that were contaminated by operations at SWMU 24 were surface soil, subsurface soil, and groundwater. The main source of contamination at SWMU 24, the contaminated soil, was removed in 1997. Therefore, the only remaining source of contamination is the residual contamination in the groundwater.

Release and Transport Mechanisms

The primary transport mechanism from sources at SWMU 24 appears to have been leaching from the soil to the groundwater. The contaminated soil is no longer present, therefore, all that remains is the residual contamination in the Columbia Aquifer groundwater. Based on groundwater monitoring, it appears that the groundwater plume is not migrating significantly and is biodegrading at a rate equivalent to the rate of contaminant migration.

Fate and transport modeling was conducted for volatilization from groundwater during showering and volatilization from groundwater in an open excavation during construction activities. Direct contact with COPCs in groundwater (i.e. ingestion) does not require fate and transport modeling. In these pathways, the receptor is assumed to go to the location of the COPC.

Potential Exposure Points and Exposure Routes

Exposure points are locations where humans could contact contamination. On-site exposure points include the residual contamination in subsurface soil and groundwater beneath the site. There were no COPCs retained for the subsurface soil, so subsurface soil is not considered a potential exposure point. Off-site exposure points include groundwater downgradient of the site. Migration of contaminants in groundwater does not appear to be occurring at SWMU 24.

Potential exposure routes are evaluated for current and potential future site use. Existing and potential exposure pathways are illustrated in the conceptual exposure model (Figure 6-3). Exposure scenarios and potentially complete pathways of exposure evaluated in this risk assessment are presented in Table 6-3 and Appendix C.4, Table 1.

Current Exposure Routes

The contaminated medium at the site is not currently accessible to human receptors. The potentially contaminated medium is Columbia Aquifer groundwater. Columbia Aquifer groundwater at NASO is not used as a potable supply, and therefore, there is no current exposure to shallow groundwater. Therefore, there are no current land use exposure routes.

Future Exposure Routes

Based on potential future site uses, potential future receptors include industrial workers, construction workers, and residents. However, based on the contaminated media, only construction workers and residents are considered potential receptors. Construction workers may be exposed to the shallow groundwater during excavation activities at the site. It was also conservatively assumed that shallow groundwater may be used as a potable water supply in the future, although this is highly unlikely.

In summary, the future land use exposure routes for complete exposure pathways include:

- Resident (adult and child): ingestion of and dermal contact with groundwater, and inhalation (adults only) of volatiles from groundwater.
- Construction Worker: dermal contact with and inhalation of volatiles from groundwater.

The exposure concentrations used to calculate potential risks to each of the receptors are presented in Appendix C.4, Table 3.1. The exposure parameters and equations used to calculate the risks are presented in Appendix C.4 Tables 4.1 through 4.3.

6.4 Risk Characterization

Risks were evaluated for the complete exposure pathways identified in Section 6.3. These risks are discussed below.

6.4.1 Subsurface Soil

RME risk estimates for exposure to subsurface soil were calculated for an industrial worker, construction worker, and adult and child resident under potential future site use (Appendix C.4, Tables 7.4.RME through 7.7.RME, and Tables 8.3.RME through 8.5.RME). The calculated RME risks are summarized in Tables 6-4 and 5-5. It was assumed these receptors

would be exposed to subsurface soil through incidental ingestion, dermal contact, and inhalation of fugitive emissions from soil. The noncarcinogenic hazards and carcinogenic risks for all scenarios were USEPA's target levels.

6.4.2 Groundwater

Columbia Aquifer groundwater beneath the site is not currently used as a potable water supply and will not likely be used as a potable water supply in the future. Additionally, Yorktown Aquifer groundwater beneath the site is not used as a potable water supply. However, Columbia Aquifer groundwater beneath the site was evaluated as a worst-case risk estimate for potable groundwater use. Risk estimates for exposure to groundwater were calculated for child and adult residents under potential future residential use of the site (Appendix C.4, Tables 7.1.RME through 7.2.RME and Table 8.1.RME). The risks are summarized in Tables 6-4 and 6-5. It was assumed that a resident would drink the water, and bathe with the water, resulting in inhalation of volatiles (adult only) and dermal absorption.

The RME noncarcinogenic risks associated with use of the groundwater as a potable residential water supply are above USEPA's target noncarcinogenic HI of 1.0 for both the child and adult resident. The noncarcinogenic hazards to a child and adult resident are 31 and 14, respectively. The hazard to the child resident is primarily associated with ingestion of arsenic, cis-1,2-dichloroethene, iron, and manganese in the groundwater. These four constituents each have individual HQs above 1. For the adult resident, the hazard was also primarily associated with ingestion of the same four constituents. However, the HQ for manganese was not above one for the adult.

The carcinogenic risk for groundwater for the resident is calculated as a lifetime age-adjusted risk. The RME carcinogenic risks associated with use of the groundwater as a potable residential water supply exceed USEPA's target risk range of $1x10^{-4}$ to $1x10^{-6}$. The residential lifetime carcinogenic risk is $2x10^{-3}$. The ingestion exposure pathway is the main route for this risk and was the only pathway with a risk greater than $1x10^{-4}$. The main risk driver is arsenic.

Exposure to the shallow groundwater by a construction worker during excavation was also evaluated as a potential future exposure scenario (Appendix C.4, Tables 7.3.RME and Table 8.2.RME, and summarized in Tables 6-4 and 6-5). The RME noncarcinogenic risk (0.54) is below USEPA's benchmark of 1.0. The RME carcinogenic risk is $2x10^{-6}$, and is within USEPA's target risk range.

Because the RME noncarcinogenic and carcinogenic risks for the resident exceed the cutoff levels of 1.0 and $1x10^{-5}$, CT exposure risks were evaluated for residential exposure to groundwater (Appendix C.4, Tables 7.4.CT, 7.5.CT, and 8.4.CT) and summarized in Tables 6-6 and 6-7). The CT noncarcinogenic hazard to both a child and adult resident (21 and 6.3, respectively) exceeds USEPA's target HI of 1.0. Arsenic, cis-1,2-dichloroethene, and iron are the only constituents with individual CT HQs greater than 1.0. The CT carcinogenic risk for the lifetime resident exceeds USEPA's target risk range, but is an order of magnitude below the RME carcinogenic risk. As with the RME risk, the main risk driver is ingestion of arsenic in the groundwater.

6.4.3 Summary of Total Risks Across Pathways and Media

Appendix C.4, Tables 9.1.RME through 9.5.RME summarize the RME total potential risks to each receptor. Appendix C.4, Tables 9.6.CT through 9.8.CT summarize the CT total potential

risks to each receptor that had risks that exceeded an HI of 1.0 or a carcinogenic risk of $1x10^{-5}$. Total potential risks were summarized for a future adult, child, and lifetime resident, a future construction worker, and a future industrial worker. Appendix C.4, Tables 10.1.RME through 10.3.RME, and 10.4.CT through 10.6.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6}.

Future Resident

It was assumed a future child and adult resident may be exposed to groundwater beneath SWMU 24. Exposure to groundwater would result in a hazard greater than USEPA's benchmark level for a child and adult resident (Appendix C.4, Tables 9.1.RME through 9.3.RME). The majority of the hazard is associated with ingestion of arsenic, cis-1,2-dichloroethene, iron, and manganese. A CT hazard analysis was conducted for the groundwater for the child and adult. The resulting CT hazard is also above USEPA's target level of 1.0 (Appendix B, Tables 9.5.CT and 9.6.CT).

Exposure to groundwater through potable use would result in a carcinogenic risk greater than USEPA's target risk for a lifetime exposure based on RME exposure assumptions (Appendix C.4, Table 9.4.RME). The ingestion exposure pathway was the main route for this risk and was the only pathway with a risk greater than $1x10^{-4}$. The main risk driver was arsenic.

A CT risk was conducted for the groundwater for the lifetime resident. The CT carcinogenic risk is above $1x10^{-4}$. Ingestion of arsenic is the main contributor to this risk.

Construction Worker

Exposure to groundwater through dermal contact and inhalation of volatiles was evaluated for a future construction worker. The total potential future RME noncarcinogenic hazard was below USEPA's target hazard level (Appendix C.4, Table 9.4.RME). The RME carcinogenic risks were within USEPA's target risk range.

Industrial Worker

Exposure to subsurface soil through ingestion, dermal contact and inhalation of dust was evaluated for a future industrial worker. The total potential future RME noncarcinogenic hazard was below USEPA's target hazard level (Appendix C.4, Table 9.5.RME). The RME carcinogenic risks were within USEPA's target risk range.

7.0 Uncertainty Assessment

The risk measures used in Superfund risk assessments are not fully probabilistic estimates of risk but are conditional estimates given that a set of assumptions about exposure and toxicity are realized. Thus, it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective (USEPA, 1989).

Table 7-1 presents the potential uncertainties inherent in the risk assessment process. A site-specific discussion on these individual components is presented in the following sections.

7.1 Uncertainty in COPC Selection

The sampling conducted at SWMUs focused on areas of known or suspected contamination. The uncertainty associated with sampling and the possibility of missing a contaminated location is expected to be minimal based on the methods used to select the sampling locations. The uncertainty associated with the data analysis is minimal because the majority of data were fully validated prior to use in the risk assessment. The exception to this is the surface soil data for SWMU 1 collected in 1993. This data was not validated and was extracted from a previously prepared report (CH2M HILL, 1993). Additionally, detection limits was not available for this data, so only samples in which a given constituent were detected were used in the COPC screening and subsequent risk calculations.

The general assumptions used in the COPC selection process were conservative to ensure that true COPCs were not eliminated from the quantitative risk assessment and that the highest possible risk was estimated.

7.2 Uncertainty Associated with Exposure Assessment

Most of the exposure pathways evaluated at the site were assumed, and the exposure factors used for the quantitation of exposure were conservative and reflect worst-case or upper-bound assumptions on the exposure. The reliability of the values chosen for the exposure factors also contributes substantially to the uncertainty of the resulting risk estimates.

It was assumed that all of the SWMUs may be used for residential purposes in the future. Based on the nature of NASO, this is not a likely scenario. This is particularly true for SWMU 15, where the planned future site use is to construct a hangar and provide access to the runway, and for SWMU 24, which is currently used as an industrial site and is within an industrial area of the Base. It is also not likely that the shallow groundwater would ever be used as a potable or industrial water supply due to the low yield of the shallow aquifer and the availability of better water supplies.

Table 7-1
Summary of Factors Contributing to Uncertainty in Human Health Risk Assessment
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Risk Assessment Component	Potential for Uncertainty
Hazard Identification	• Initial selection of COPCs • Chemical monitoring data
Toxicity Assessment	• Selection of toxicity values • Factors used in the derivation of toxicity values, including inter-species differences extrapolation • Weight of evidence for human toxicity • Derivation of carcinogenic slope factors • Extrapolation of less-than-lifetime exposure to lifetime cancer risks • Interaction of multiple substances
Exposure Assessment	• Selection of site-specific exposure pathways • Estimation of exposure concentrations • Estimation of exposure to multiple substances • Estimation of intake parameters
Risk Characterization	• Addition of risks across multiple exposure pathways • Addition of risks from multiple substances

Site-related contamination would be expected to decrease with time. The risk assessment assumed concentrations would remain constant throughout the exposure period. This will result in an over-estimation of risk.

It was assumed that the receptor would be exposed to the most contaminated location at the site for the full exposure duration. This is not likely since the receptors area of activity is larger than this location. Therefore, this will result in an over-estimation of risk.

There is uncertainty associated with the high quantitation limits of PAHs in soil and sediment data, generally, at all three SWMUs. These high quantitation limits may result in one-half the quantitation limit of the "non-detected" constituents exceeding screening criteria. If the constituent was not detected in any samples, the constituent was not included in the evaluation which may result in an underestimation of the risks. However, if the constituent was detected, the exposure point concentration is calculated using one-half the quantitation limit of the "non-detected" samples. This may result in an elevated 95% UCL.

There is uncertainty associated with the fate and transport modeling conducted for the risk assessment. A 2-film volatilization model was applied to determine volatilization from groundwater in an excavation. This model results in a great degree of uncertainty, and it is not known if it would result in an over- or under-estimation of risk.

7.3 Uncertainty Associated with Toxicity Assessment

Uncertainty associated with the noncarcinogenic toxicity factors is included in Appendices A, B, and C, Tables 5.1 and 5.2. Several uncertainty factors (UFs) were applied to extrapolate

dose points from animal studies to humans. These UFs range between 10 to 10,000. Additional modification factors are also used based on the professional judgment of the Agency. Therefore, there is a high degree of uncertainty in the noncarcinogenic toxicity criteria, based on the available scientific data for each compound. The noncarcinogenic toxicity factors are most likely an overestimate of actual toxicity.

CSFs developed by USEPA represent upper bound estimates. Carcinogenic risks generated in this assessment should be regarded as an upper bound estimate on the potential carcinogenic risks rather than an accurate representation of carcinogenic risk. The true carcinogenic risk is likely to be less than the predicted value (USEPA, 1989a).

The uncertainty associated with CSFs are mostly associated with the low dose extrapolation where carcinogenicity at low doses is assumed to be straight line responses. This is a conservative assumption, which introduces a high uncertainty into slope factors which are extrapolated from this area of the dose-response curve. The CSFs are based on assumption that there is no threshold level for carcinogenicity, however, most of the experimental studies indicate existence of a threshold level.

There is a large degree of uncertainty associated with the oral to dermal adjustment factors (based on chemical-specific gastrointestinal absorption factors) used to transform the oral RfDs based on administered doses to dermal RfDs based on absorbed doses. It is not known if the adjustment factor results in an underestimate or overestimate of the actual toxicity associated with dermal exposure.

7.4 Uncertainty in Risk Characterization

The uncertainties identified in each component of risk assessment ultimately contribute to uncertainty in risk characterization. A number of samples were analyzed for only a limited number of PAHs. It is possible that additional PAHs could be detected; however, generally there are no available toxicity criteria for these additional PAHs. Additionally, there are limitations on the exposure routes (dermal, for noncancer only, and ingestion for noncancer and cancer) that can be evaluated for PAHs. Therefore, the cumulative risk associated with exposure to PAHs may be underestimated in this risk assessment.

The addition of risks and HIs across pathways and chemicals contributes to uncertainty based on the interaction of chemicals, such as additivity, synergism, potentiation, and susceptibility of exposed receptors. The simple assumption of additivity used for this site may or may not be accurate and may over- or under-estimate risk; however, a better alternative is not available at this time.

8.0 Risk Conclusions

Human health risks were estimated for exposure to media of potential concern at NASO SWMUs 1, 15, and 24. Risks were calculated following current USEPA human health risk assessment procedures. Risks were calculated for RME conditions, and if the RME risks exceeded an HI of 1 or a carcinogenic risk of $1x10^{-5}$, risks were calculated for CT conditions. Estimated risks for each SWMU are discussed below.

8.1 SWMU 1 Risk Conclusions

Potential risks were calculated for a current industrial worker, current adult trespasser/visitor, current adolescent trespasser/visitor, future adult resident, future child resident, future lifetime resident, future construction worker, future industrial worker, future adult trespasser/visitor, and adolescent trespasser/visitor. Potential risks were calculated for exposure to surface soil, combined surface and subsurface soil, groundwater, and sediment. Appendix A.4, Tables 9.1.RME through 9.10.RME and Tables 9.11.CT through 9.13.CT summarize the RME and CT potential hazards and risks to each receptor. Appendix A.4, Tables 10.1.RME through 10.3.RME, and 10.4.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6} for scenarios with total HIs greater than 1.0 or total carcinogenic risks greater than 10^{-5}.

Risks associated with potential current exposure to surface soil (industrial workers and trespassers/visitors) are all within USEPA's target risk range for carcinogenic risks and below USEPA's target noncarcinogenic hazard level.

Risks associated with potential future exposure to combined surface and subsurface soil were calculated for an industrial worker, a construction worker, an adult and adolescent trespasser/visitor, and an adult and child resident. All of the exposure scenarios result in a carcinogenic risk below or within USEPA's target risk range. The only scenario resulting in a noncarcinogenic hazard greater than USEPA's target HI is the child resident. This HI of 1.8 slightly exceeds USEPA's target HI of 1.0. This hazard is primarily associated with ingestion of iron. The hazard index was separated by target organ and each HI is below the target HI of 1.0. The CT noncarcinogenic hazard was calculated for the child resident exposed to combined surface and subsurface soil and is below USEPA's target HI.

Although the Columbia Aquifer groundwater is not currently used as a potable water supply and will most likely never be used as a potable water supply, potential future exposure to groundwater was evaluated under a future residential and construction worker exposure scenario. Future residential use of the groundwater would result in a RME noncarcinogenic hazards above USEPA's target HI for both a child and an adult. Additionally, the CT inhalation noncarcinogenic hazard for the residential adult exceeded the target HI of 1. This hazard is primarily associated with the naphthalene detected in the groundwater.

Contact with the groundwater by a construction worker would result in an HI below USEPA's target HI. Future residential use of the groundwater or contact with the

groundwater during construction would result in a RME carcinogenic risk within USEPA's target risk range.

There were no COPCs retained for surface water in the drainage ditch. Therefore, risks were not quantified for this medium.

Exposure to drainage ditch sediment was evaluated for adult and adolescent trespassers/visitors. The RME noncarcinogenic HIs and carcinogenic risks were all below USEPA's target levels.

The only potential scenario resulting in hazards or risks above USEPA's target level is future residential use of the site. Future residential use of the site may result in an unacceptable HI to a child resident exposed to soil and an unacceptable HI to an adult and child resident exposed to groundwater. However, the future use of the site for residential purposes is highly unlikely.

8.2 SWMU 15 Risk Conclusions

Potential risks were calculated for a current industrial worker, current adult trespasser/visitor, current adolescent trespasser/visitor, future adult resident, future child resident, future lifetime resident, future construction worker, future industrial worker, future adult trespasser/visitor, and adolescent trespasser/visitor. Potential risks were calculated for exposure to surface soil, combined surface and subsurface soil, groundwater, and sediment. Appendix B.4, Tables 9.1.RME through 9.10.RME and Tables 9.11.CT and 9.20.CT summarize the RME and CT potential hazards and risks to each receptor. Appendix B.4, Tables 10.1.RME through 10.10.RME, and 10.11.CT through 10.16.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6} for scenarios with total HIs greater than 1.0 or total carcinogenic risks greater than 10^{-5}.

Risks associated with potential current exposure to surface soil were evaluated for an industrial worker and an adult and adolescent trespasser/visitor. The RME noncarcinogenic hazards to all potential current receptors exposed to the surface soil are below USEPA's target noncarcinogenic hazard level. The RME carcinogenic risks for adult and adolescent trespassers/visitors are within USEPA's target risk range, however the RME carcinogenic risk for an industrial worker exceeds the target risk range. This carcinogenic risk is primary associated with ingestion of dibenz(a,h)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in the surface soil. However, none of the individual constituents pose carcinogenic risks above USEPA's target risk range. The CT carcinogenic risk for the industrial worker exposed to surface soil is within USEPA's target risk range.

Risks associated with potential future exposure to combined surface and subsurface soil were calculated for an industrial worker, a construction worker, an adult and adolescent trespasser/visitor, and an adult and child resident. The only scenario resulting in a RME noncarcinogenic hazard greater than USEPA's target HI is the child resident scenario. This HI of 1.8 slightly exceeds USEPA's target HI of 1.0. None of the constituents individually exceed a HQ of 1.0 for the child. The HI is associated mainly with ingestion of fluorene, iron, Aroclor-1254, and aluminum in the soil. Separation of the soil HI by target organ results in HIs for all target organs are below USEPA's target of 1.0. The CT noncarcinogenic hazard was

calculated for the child resident exposed to combined surface and subsurface soil and is below USEPA's target HI.

The only surface and subsurface soil exposure scenarios resulting in RME carcinogenic risks above USEPA's target risk range are the industrial worker and age-adjusted residential scenarios. The carcinogenic risks are primarily associated with ingestion of benzo(a)pyrene, dibenz(a,h)anthracene, and benzo(b)fluoranthene in the soil. Benzo(a)pyrene and dibenz(a,h)anthracene were only detected in the surface soil samples, and benzo(b)fluoranthene was only detected in three of the subsurface soil samples. Therefore, this calculated risk is mainly associated with the surface soil, and not the subsurface soil. The CT risk for all receptors except the lifetime resident falls within USEPA's acceptable risk range. As with the RME risk the CT risk to the future resident is primarily associated with ingestion of benzo(a)pyrene, dibenz(a,h)anthracene, and benzo(b)fluoranthene in the soil, and primarily the surface soil.

Although the Columbia Aquifer groundwater is not currently used as a potable water supply and will most likely never be used as a potable water supply, potential future exposure to groundwater was evaluated under future a residential and construction worker exposure scenario. Future residential use of the groundwater would result in a RME and CT noncarcinogenic hazard above USEPA's target HI for both a child and an adult. The hazard to the child resident is primarily associated with ingestion of arsenic, benzene, chloroform, iron, and manganese in the groundwater. The hazard to the adult is mainly associated with inhalation of benzene and chloroform, however ingestion or arsenic, benzene, chloroform, and iron pose HI's above USEPA's target HI. Future residential use of the groundwater would also result in a RME carcinogenic risk above USEPA's target risk range. The main risk drivers are arsenic, benzene, and chloroform. However, the future use of the site for residential purposes is highly unlikely.

Exposure to the shallow groundwater by a construction worker during excavation was also evaluated as a potential future exposure scenario. The RME noncarcinogenic risk exceeds USEPA's target HI. This hazard is primarily associated with dermal contact with benzene and inhalation of volatilized benzene and chloroform. The RME carcinogenic risk is within USEPA's target risk range.

The calculated CT noncarcinogenic hazards for all of the receptors exceeded USEPA's target HI. The lifetime residential CT carcinogenic risk exceeds USEPA's target risk range.

There were no COPCs retained for the surface water in the pond. Therefore, risks were not quantified for this medium.

Exposure to pond sediment was evaluated for adult and adolescent trespassers/visitors. The RME noncarcinogenic are below USEPA's target HI. The carcinogenic risks are below USEPA's target risk range.

8.3 SWMU 24 Risk Conclusions

Potential risks were calculated for a future adult resident, future child resident, future lifetime resident, and future construction worker. Potential risks were calculated for exposure to groundwater. There were no COPCs retained for subsurface soil, therefore, subsurface soil is not considered a media of potential concern. Appendix C.4, Tables

9.1.RME through 9.5.RME and Tables 9.6.CT through 9.8.CT summarize the RME and CT potential hazards and risks to each receptor. Appendix C.4, Tables 10.1.RME through 10.4.RME, and 10.5.CT through 10.6.CT show only the chemicals that contributed a hazard greater than 0.1 or a carcinogenic risk greater than 10^{-6} for scenarios with total HIs greater than 1.0 or total carcinogenic risks greater than 10^{-5}.

Risks associated with potential future exposure to subsurface soil were calculated for an industrial worker, a construction worker, and an adult and child resident. The RME noncarcinogenic hazards and carcinogenic risks were all below the USEPA's target levels.

Although the Columbia Aquifer groundwater is not currently used as a potable water supply and will most likely never be used as a potable water supply potential future exposure to groundwater was evaluated under a future residential and construction worker exposure scenario. Future residential use of the groundwater would result in a RME and CT noncarcinogenic hazard above USEPA's target HI for both a child and an adult. The hazard is primarily associated with ingestion of arsenic, cis-1,2-dichloroethene, iron, and manganese in the groundwater. Future residential use of the groundwater would also result in a RME and CT carcinogenic risk above USEPA's target risk range. The main risk driver is ingestion of arsenic.

Exposure to the shallow groundwater by a construction worker during excavation was also evaluated as a potential future exposure scenario. The RME noncarcinogenic hazard is below USEPA's benchmark. The RME carcinogenic risk is within USEPA's target risk range.

9.0 References

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Table 4-1
Summary of Data Used in the Human Health Risk Assessment
NAS Oceana
SWMU 1

Medium	Number of Samples	Date of Sampling	Sample ID	Parameters
Surface Soil		1993	1-SS1 --> 1-SS2	TAL Metals
				VOCs
				SVOCs / PAHs
				PCBs
			1-SS3 --> 1-SS8	VOCs
				SVOCs / PAHs
		07/22/1999	OW01-SS09	TCL VOA
				TCL SVOCs / PAHs
				TCL Pesticides/PCBs
				TAL Metals & Cyanide
Subsurface Soil		1995	1-SB7 --> 1-SB15	TAL Metals
				VOCs
				SVOCs / PAHs
				Appendix IX Herbicides
				Appendix IX Organophosphorus Pesticides
				Appendix IX Dioxins
				Appendix IX Furans
Sediment				
		07/22/1999	OW01-SD09	TCL VOA
			OW01-SD09P	TCL SVOCs / PAHs
			OW01-SD10	TCL Pesticides/PCBs
			OW01-SD11	TAL Metals & Cyanide
			OW01-SD12	
Surface Water		07/22/1999	OW01-SW05	TCL VOA
			OW01-SW05P	TCL SVOCs / PAHs
			OW01-SW06	TCL Pesticides/PCBs
			OW01-SW07	TAL Metals & Cyanide
			OW01-SW08	
Groundwater		11/05/1998	OW01-MW02-R01	TCL LC-VOCs
			OW01-MW03-R01	PAHs (SVOCs)
			OW01-MW04-R01	
			OW01-MW04P-R01	
			OW01-MW05-R01	
			OW01-MW06-R01	
			OW01-MW07-R01	
			OW01-MW07D-R01	
			OW01-MW08-R01	
			OW01-MW08D-R01	
			OW01-MW10-R01	
			OW01-PZ01-R01	
			OW01-PZ02-R01	
			OW01-PZ02P-R01	
			OW01-PZ03-R01	
			OW01-PZ04-R01	
			OW01-PZ05-R01	

P = duplicate sample
D = deep well
R01 = round 1

Table 4-2
Summary of Chemicals of Potential Concern for the HHRA
SWMU 1
NAS Oceana

Surface Soil	Surface Water	Sediment	Groundwater	Surface and Subsurface Soil Combined
1,1,2-Trichloroethane Aluminum Antimony Arsenic Benzo(a)pyrene Chromium, total Iron Methylene Chloride Napthalene PCB-1254	None	Arsenic	1,3,5-Trimethylbenzene Benzene Benzo(a)anthracene Benzo(a)pyrene Naphthalene n-Propylbenzene	1-Methylnaphthalene 1,1,2-Trichloroethane 2-Methylnaphthalene Acetone Aluminum Antimony Arsenic Benzene Benzo(a)pyrene Benzo(b)fluoranthene Chromium, Total Dibenzo(a,h,)anthracene Dibenzofuran Ethylbenzene Ideno(1,2,3-cd)pyrene Iron Methylene Chloride Napthalene PCB-1254 Toluene Xylenes, total

Table 4-3
Exposure Pathways
SWMU 1
NAS Oceana

Media	Exposure Route	Current			Future					
		Industrial Worker	Trespasser/Visitor		Resident		Construction Worker	Industrial Worker	Trespasser/Visitor	
			Adult	Adolescent	Adult	Child			Adult	Adolescent
Surface Soil	Ingestion	X	X	X						
	Dermal	X	X	X						
	Inhalation	X	X	X						
Surface Water	Ingestion		X*	X*					X*	X*
	Dermal		X*	X*					X*	X*
	Inhalation									
Sediment	Ingestion		X*	X*					X*	X*
	Dermal		X*	X*					X*	X*
	Inhalation									
Groundwater	Ingestion				X	X				
	Dermal				X	X	X			
	Inhalation				X		X			
Subsurface and Surface Soil Combined	Ingestion				X	X	X	X	X	X
	Dermal				X	X	X	X	X	X
	Inhalation				X	X	X	X	X	X

X Quantitative evaluation.
* C[illegible] and Future are the same.

T[illegible]4-4
Summary of Media-Spec[illegible]isks and Hazards For RME
SWMU 1
NAS Oceana

Media: Current - Surface Soil

	Industrial Worker								Trespasser/Visitor Adult							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	4.9E-07	5.7E-09	4.9E-07	2.0E-15	4.0E-11	4.6E-13	4.0E-11	N/A	1.0E-07	7.4E-10	1.0E-07	8.8E-17	8.0E-12	5.8E-14	8.0E-12
Aluminum	7.7E-04	1.5E-02	1.1E-02	2.7E-02	N/A	N/A	N/A	0.0E+00	3.6E-05	3.2E-03	1.4E-03	4.6E-03	N/A	N/A	N/A	0.0E+00
Antimony	N/A	1.4E-02	2.7E-02	4.1E-02	N/A	N/A	N/A	0.0E+00	N/A	3.0E-03	3.5E-03	6.5E-03	N/A	N/A	N/A	0.0E+00
Arsenic	N/A	1.1E-02	7.1E-03	1.9E-02	9.3E-10	1.8E-06	1.1E-06	3.0E-06	N/A	2.4E-03	9.3E-04	3.3E-03	4.2E-11	3.7E-07	1.4E-07	5.1E-07
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	7.9E-12	3.7E-07	N/A	3.7E-07	N/A	N/A	N/A	0.0E+00	3.5E-13	7.4E-08	N/A	7.4E-08
Chromium, total	3.5E-05	6.7E-03	1.2E-01	1.3E-01	1.5E-08	N/A	N/A	1.5E-08	1.6E-06	1.4E-03	1.6E-02	1.8E-02	6.7E-10	N/A	N/A	6.7E-10
Iron	N/A	5.6E-02	5.2E-02	1.1E-01	N/A	N/A	N/A	0.0E+00	N/A	1.2E-02	6.8E-03	1.9E-02	N/A	N/A	N/A	0.0E+00
Methylene Chloride	1.6E-12	4.6E-07	3.2E-07	7.7E-07	8.1E-16	7.3E-11	5.1E-11	1.2E-10	7.5E-14	9.5E-08	4.1E-08	1.4E-07	3.6E-17	1.5E-11	6.4E-12	2.1E-11
Napthalene	6.2E-09	5.5E-06	1.3E-05	1.8E-05	N/A	N/A	N/A	0.0E+00	2.9E-10	1.1E-06	1.7E-06	2.8E-06	N/A	N/A	N/A	0.0E+00
PCB-1254	N/A	6.8E-03	8.6E-03	1.5E-02	4.9E-12	9.8E-08	1.2E-07	2.2E-07	N/A	1.4E-03	1.1E-03	2.5E-03	2.2E-13	2.0E-08	1.5E-08	3.5E-08
Totals	**8.1E-04**	**1.1E-01**	**2.3E-01**	**3.4E-01**	**1.6E-08**	**2.3E-06**	**1.3E-06**	**3.6E-06**	**3.8E-05**	**2.3E-02**	**3.0E-02**	**5.3E-02**	**7.1E-10**	**4.6E-07**	**1.6E-07**	**6.2E-07**

	Trespasser/Visitor Adolescent							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	1.4E-07	4.2E-10	1.4E-07	4.6E-17	4.1E-12	1.2E-14	4.1E-12
Aluminum	5.0E-05	4.4E-03	7.8E-04	5.2E-03	N/A	N/A	N/A	0.0E+00
Antimony	N/A	4.1E-03	2.0E-03	6.1E-03	N/A	N/A	N/A	0.0E+00
Arsenic	N/A	3.3E-03	5.3E-04	3.8E-03	2.1E-11	1.9E-07	3.1E-08	2.2E-07
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	1.8E-13	3.8E-08	N/A	3.8E-08
Chromium, Total	2.2E-06	1.9E-03	9.2E-03	1.1E-02	3.4E-10	N/A	N/A	3.4E-10
Iron	N/A	1.6E-02	3.9E-03	2.0E-02	N/A	N/A	N/A	0.0E+00
Methylene Chloride	1.0E-13	1.3E-07	2.4E-08	1.5E-07	1.9E-17	7.5E-12	1.4E-12	8.9E-12
Napthalene	4.0E-10	1.6E-06	9.5E-07	2.5E-06	N/A	N/A	N/A	0.0E+00
PCB-1254	N/A	2.0E-03	6.3E-04	2.6E-03	1.1E-13	1.0E-08	3.3E-09	1.3E-08
Totals	**5.2E-05**	**3.2E-02**	**1.7E-02**	**4.9E-02**	**3.7E-10**	**2.4E-07**	**3.4E-08**	**2.7E-07**

Media: Current/Future - Sediment

	Trespasser/Visitor Adult								Trespasser/Visitor Adolescent							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Arsenic	--	3.6E-03	2.3E-03	**5.9E-03**	--	5.5E-07	3.6E-07	**9.2E-07**	--	4.9E-03	8.0E-04	**5.7E-03**	--	2.9E-07	4.7E-08	**3.3E-07**
Totals	**0.0E+00**	**3.6E-03**	**2.3E-03**	**5.9E-03**	**0.0E+00**	**5.5E-07**	**3.6E-07**	**9.2E-07**	**0.0E+00**	**4.9E-03**	**8.0E-04**	**5.7E-03**	**0.0E+00**	**2.9E-07**	**4.7E-08**	**3.3E-07**

Media: Future - Groundwater

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,3,5-Trimethylbenzene	7.6E-02	1.4E-03	1.6E-09	**7.7E-02**	N/A	--	--	--	--	3.2E-03	3.7E-09	**3.2E-03**	--	--	--	--
Benzene	8.4E-02	2.1E-02	2.8E-03	**1.1E-01**	1.3E-06	--	--	**1.3E-06**	--	4.9E-02	6.6E-03	**5.6E-02**	--	--	--	--
Benzo(a)anthracene	N/A	N/A	N/A	--	N/A	--	--	**0.0E+00**	--	N/A	N/A	--	--	--	--	--
Benzo(a)pyrene	N/A	N/A	N/A	--	4.7E-08	--	--	**4.7E-08**	--	N/A	N/A	--	--	--	--	--
Naphthalene	9.3E+00	2.8E-01	2.2E-01	**9.8E+00**	N/A	--	--	--	--	6.6E-01	5.3E-01	**1.2E+00**	--	--	--	--
n-Propylbenzene	N/A	1.4E-02	2.0E-06	**1.4E-02**	N/A	--	--	--	--	3.3E-02	4.7E-06	**3.3E-02**	--	--	--	--
Totals	**9.5E+00**	**3.2E-01**	**2.2E-01**	**1.0E+01**	**1.4E-06**	**0.0E+00**	**0.0E+00**	**1.4E-06**	**0.0E+00**	**7.5E-01**	**5.3E-01**	**1.3E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Table 4-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 1
NAS Oceana

Media: Future - Groundwater

Chemical	Resident Age-Adjusted								Construction Worker							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh*	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,3,5-Trimethylbenzene	--	--	--	--	N/A	N/A	N/A	--	1.8E-03	N/A	2.1E-09	**1.8E-03**	N/A	N/A	N/A	--
Benzene	--	--	--	--	1.3E-06	1.0E-06	1.3E-07	**2.5E-06**	1.8E-03	N/A	8.0E-03	**9.8E-03**	1.2E-09	N/A	9.9E-09	**1.1E-08**
Benzo(a)anthracene	--	--	--	--	N/A	2.5E-06	N/A	**2.5E-06**	N/A	N/A	N/A	--	N/A	N/A	N/A	--
Benzo(a)pyrene	--	--	--	--	4.7E-08	2.2E-05	N/A	**2.2E-05**	N/A	N/A	N/A	--	2.4E-10	N/A	N/A	**2.4E-10**
Naphthalene	--	--	--	--	N/A	N/A	N/A	--	2.7E-01	N/A	4.3E-01	**6.9E-01**	N/A	N/A	N/A	--
n-Propylbenzene	--	--	--	--	N/A	N/A	N/A	--	N/A	N/A	2.7E-06	**2.7E-06**	N/A	N/A	N/A	--
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.4E-06**	**2.5E-05**	**1.3E-07**	**2.7E-05**	**2.7E-01**	**0.0E+00**	**4.3E-01**	**7.0E-01**	**1.5E-09**	**0.0E+00**	**9.9E-09**	**1.1E-08**

Media: Future - Surface and Subsurface Soil

Chemical	Trespasser/Visitor Adult								Trespasser/Visitor Adolescent							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	1.0E-07	7.4E-10	1.0E-07	8.8E-17	8.0E-12	5.8E-14	8.0E-12	N/A	1.4E-07	5.1E-09	1.4E-07	4.6E-17	4.1E-12	1.5E-13	4.2E-12
1-Methylnaphthalene	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00
2-Methylnaphthalene	N/A	4.6E-04	6.6E-04	1.1E-03	N/A	N/A	N/A	0.0E+00	N/A	6.3E-04	4.6E-03	5.2E-03	N/A	N/A	N/A	0.0E+00
Acetone	N/A	4.7E-06	2.0E-06	6.6E-06	N/A	N/A	N/A	0.0E+00	N/A	6.4E-06	1.3E-05	2.0E-05	N/A	N/A	N/A	0.0E+00
Aluminum	5.07E-05	4.5E-03	1.9E-03	6.5E-03	N/A	N/A	N/A	0.0E+00	7.0E-05	6.1E-03	1.3E-02	1.9E-02	N/A	N/A	N/A	0.0E+00
Antimony	N/A	3.8E-03	4.4E-03	8.2E-03	N/A	N/A	N/A	0.0E+00	N/A	5.2E-03	3.0E-02	3.5E-02	N/A	N/A	N/A	0.0E+00
Arsenic	N/A	1.6E-03	6.4E-04	2.3E-03	2.9E-11	2.5E-07	9.8E-08	3.5E-07	N/A	2.2E-03	4.4E-03	6.6E-03	1.5E-11	1.3E-07	2.5E-07	3.8E-07
Benzene	1.22E-11	6.1E-07	3.5E-09	6.1E-07	2.1E-16	1.8E-11	1.1E-13	1.8E-11	1.7E-11	8.4E-07	2.4E-08	8.6E-07	1.1E-16	9.4E-12	2.7E-13	9.6E-12
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	2.7E-12	5.6E-07	N/A	5.6E-07	N/A	N/A	N/A	0.0E+00	1.4E-12	2.9E-07	N/A	2.9E-07
Benzo(b)fluoranthene	N/A	N/A	N/A	0.0E+00	N/A	4.9E-08	N/A	4.9E-08	N/A	N/A	N/A	0.0E+00	N/A	2.5E-08	N/A	2.5E-08
Chromium, total	1.87E-06	1.7E-03	1.9E-02	2.1E-02	7.9E-10	N/A	N/A	7.9E-10	2.6E-06	2.3E-03	1.3E-01	1.3E-01	4.1E-10	N/A	N/A	4.1E-10
Dibenz(a,h)anthracene	N/A	N/A	N/A	0.0E+00	N/A	1.3E-07	N/A	1.3E-07	N/A	N/A	N/A	0.0E+00	N/A	6.8E-08	N/A	6.8E-08
Dibenzofuran	N/A	6.1E-05	1.0E-04	1.6E-04	N/A	N/A	N/A	0.0E+00	N/A	8.4E-05	6.9E-04	7.8E-04	N/A	N/A	N/A	0.0E+00
Ethylbenzene	5.08E-11	1.3E-05	4.9E-06	1.8E-05	N/A	N/A	N/A	0.0E+00	7.0E-11	1.8E-05	3.4E-05	5.2E-05	N/A	N/A	N/A	0.0E+00
Indeno(1,2,3-c,d)pyrene	N/A	N/A	N/A	0.0E+00	N/A	5.6E-08	N/A	5.6E-08	N/A	N/A	N/A	0.0E+00	N/A	2.9E-08	N/A	2.9E-08
Iron	N/A	1.2E-02	6.8E-03	1.9E-02	N/A	N/A	N/A	0.0E+00	N/A	1.6E-02	4.7E-02	6.3E-02	N/A	N/A	N/A	0.0E+00
Methylene Chloride	1.29E-12	1.6E-06	7.1E-07	2.3E-06	6.3E-16	2.5E-10	1.1E-10	3.6E-10	1.8E-12	2.2E-06	4.9E-06	7.1E-06	3.2E-16	1.3E-10	2.8E-10	4.1E-10
Napthalene	7.93E-08	3.2E-04	4.6E-04	7.7E-04	N/A	N/A	N/A	0.0E+00	1.1E-07	4.3E-04	3.1E-03	3.6E-03	N/A	N/A	N/A	0.0E+00
PCB-1254	N/A	4.4E-04	3.4E-04	7.8E-04	6.8E-14	6.0E-09	4.7E-09	1.1E-08	N/A	6.0E-04	2.4E-03	3.0E-03	3.5E-14	3.1E-09	1.2E-08	1.5E-08
Toluene	3.49E-11	1.7E-06	5.9E-07	2.3E-06	N/A	N/A	N/A	0.0E+00	4.8E-11	2.3E-06	4.0E-06	6.4E-06	N/A	N/A	N/A	0.0E+00
Xylenes, total	N/A	4.5E-06	1.7E-06	6.2E-06	N/A	N/A	N/A	0.0E+00	N/A	6.1E-06	1.2E-05	1.8E-05	N/A	N/A	N/A	0.0E+00
Totals	**5.3E-05**	**2.4E-02**	**3.4E-02**	**5.8E-02**	**8.2E-10**	**1.1E-06**	**1.0E-07**	**1.2E-06**	**7.2E-05**	**3.3E-02**	**2.3E-01**	**2.7E-01**	**4.2E-10**	**5.4E-07**	**2.7E-07**	**8.1E-07**

Table 1-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 1
NAS Oceana

Media: Future - Surface and Subsurface Soil

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	6.8E-07	5.0E-09	6.9E-07	--	--	--	--	N/A	6.4E-06	5.2E-09	6.4E-06	--	--	--	--
1-Methylnaphthalene	N/A	N/A	N/A	0.0E+00	--	--	--	--	N/A	N/A	N/A	0.0E+00	--	--	--	--
2-Methylnaphthalene	N/A	3.1E-03	4.5E-03	7.6E-03	--	--	--	--	N/A	2.9E-02	4.7E-03	3.3E-02	--	--	--	--
Acetone	N/A	3.2E-05	1.3E-05	4.5E-05	--	--	--	--	N/A	2.9E-04	1.4E-05	3.1E-04	--	--	--	--
Aluminum	4.5E-03	3.0E-02	1.3E-02	4.8E-02	--	--	--	--	1.3E-02	2.8E-01	1.4E-02	3.1E-01	--	--	--	--
Antimony	N/A	2.6E-02	3.0E-02	5.5E-02	--	--	--	--	N/A	2.4E-01	3.1E-02	2.7E-01	--	--	--	--
Arsenic	N/A	1.1E-02	4.3E-03	1.5E-02	--	--	--	--	N/A	1.0E-01	4.5E-03	1.1E-01	--	--	--	--
Benzene	1.1E-09	4.1E-06	2.4E-08	4.1E-06	--	--	--	--	3.1E-09	3.8E-05	2.5E-08	3.8E-05	--	--	--	--
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	--	--	--	--	N/A	N/A	N/A	0.0E+00	--	--	--	--
Benzo(b)fluoranthene	N/A	N/A	N/A	0.0E+00	--	--	--	--	N/A	N/A	N/A	0.0E+00	--	--	--	--
Chromium, total	1.7E-04	1.1E-02	1.3E-01	1.4E-01	--	--	--	--	4.7E-04	1.0E-01	1.4E-01	2.4E-01	--	--	--	--
Dibenz(a,h)anthracene	N/A	N/A	N/A	0.0E+00	--	--	--	--	N/A	N/A	N/A	0.0E+00	--	--	--	--
Dibenzofuran	N/A	4.1E-04	6.8E-04	1.1E-03	--	--	--	--	N/A	3.8E-03	7.2E-04	4.6E-03	--	--	--	--
Ethylbenzene	4.6E-09	8.8E-05	3.3E-05	1.2E-04	--	--	--	--	1.3E-08	8.2E-04	3.5E-05	8.5E-04	--	--	--	--
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	0.0E+00	--	--	--	--	N/A	N/A	N/A	0.0E+00	--	--	--	--
Iron	1.2E-10	7.9E-02	4.6E-02	1.2E-01	--	--	--	--	N/A	7.4E-01	4.8E-02	7.9E-01	--	--	--	--
Methylene Chloride	7.1E-06	1.1E-05	4.8E-06	2.3E-05	--	--	--	--	3.2E-10	1.0E-04	5.0E-06	1.1E-04	--	--	--	--
Napthalene	N/A	2.1E-03	3.1E-03	5.2E-03	--	--	--	--	2.0E-05	2.0E-02	3.2E-03	2.3E-02	--	--	--	--
PCB-1254	3.1E-09	3.0E-03	2.3E-03	5.3E-03	--	--	--	--	N/A	2.8E-02	2.4E-03	3.0E-02	--	--	--	--
Toluene	N/A	1.1E-05	4.0E-06	1.5E-05	--	--	--	--	8.8E-09	1.1E-04	4.2E-06	1.1E-04	--	--	--	--
Xylenes, total	0.0E+00	3.0E-05	1.2E-05	4.2E-05	--	--	--	--	N/A	2.8E-04	1.2E-05	2.9E-04	--	--	--	--
Totals	**4.7E-03**	**1.6E-01**	**2.3E-01**	**4.0E-01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.3E-02**	**1.5E+00**	**2.4E-01**	**1.8E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Table 4-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 1
NAS Oceana

Media: Future - Surface and Subsurface Soil

Chemical	Resident Age-Adjusted							
	HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	--	--	--	--	1.4E-14	1.8E-10	4.9E-13	1.8E-10
1-Methylnaphthalene	--	--	--	--	N/A	N/A	N/A	0.0E+00
2-Methylnaphthalene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Acetone	--	--	--	--	N/A	N/A	N/A	0.0E+00
Aluminum	--	--	--	--	N/A	N/A	N/A	0.0E+00
Antimony	--	--	--	--	N/A	N/A	N/A	0.0E+00
Arsenic	--	--	--	--	4.4E-09	5.6E-06	8.4E-07	6.5E-06
Benzene	--	--	--	--	3.2E-14	4.1E-10	9.0E-13	4.1E-10
Benzo(a)pyrene	--	--	--	--	4.2E-10	1.3E-05	N/A	1.3E-05
Benzo(b)fluoranthene	--	--	--	--	N/A	1.1E-06	N/A	1.1E-06
Chromium, total	--	--	--	--	1.2E-07	N/A	N/A	1.2E-07
Dibenz(a,h)anthracene	--	--	--	--	N/A	3.0E-06	N/A	3.0E-06
Dibenzofuran	--	--	--	--	N/A	N/A	N/A	0.0E+00
Ethylbenzene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	--	N/A	1.3E-06	N/A	1.3E-06
Iron	--	--	--	--	N/A	N/A	N/A	0.0E+00
Methylene Chloride	--	--	--	--	9.7E-14	5.6E-09	9.3E-10	6.6E-09
Napthalene	--	--	--	--	N/A	N/A	N/A	0.0E+00
PCB-1254	--	--	--	--	1.1E-11	1.4E-07	4.0E-08	1.8E-07
Toluene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Xylenes, total	--	--	--	--	N/A	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.3E-07**	**2.4E-05**	**8.8E-07**	**2.5E-05**

Media: Future - Surface and Subsurface Soil

Chemical	Industrial Worker								Construction Worker							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	4.9E-07	5.7E-09	4.95E-07	2.0E-15	4.0E-11	4.6E-13	4.0E-11	N/A	2.3E-07	4.4E-10	2.4E-07	2.4E-16	7.6E-12	1.4E-14	7.7E-12
1-Methylnaphthalene	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00
2-Methylnaphthalene	N/A	2.2E-03	5.1E-03	7.3E-03	N/A	N/A	N/A	0.0E+00	N/A	1.1E-02	4.0E-03	1.5E-02	N/A	N/A	N/A	0.0E+00
Acetone	N/A	2.3E-05	1.5E-05	3.8E-05	N/A	N/A	N/A	0.0E+00	N/A	1.1E-05	1.2E-06	1.2E-05	N/A	N/A	N/A	0.0E+00
Aluminum	1.1E-03	2.2E-02	1.5E-02	3.7E-02	N/A	N/A	N/A	0.0E+00	3.3E-03	1.0E-01	1.1E-02	1.2E-01	N/A	N/A	N/A	0.0E+00
Antimony	N/A	1.8E-02	3.4E-02	5.2E-02	N/A	N/A	N/A	0.0E+00	N/A	8.8E-02	2.6E-02	1.1E-01	N/A	N/A	N/A	0.0E+00
Arsenic	N/A	7.8E-03	4.9E-03	1.3E-02	6.4E-10	1.3E-06	7.9E-07	2.1E-06	N/A	3.8E-02	3.8E-03	4.1E-02	7.7E-11	2.4E-07	2.4E-08	2.7E-07
Benzene	2.6E-10	2.9E-06	2.7E-08	3.0E-06	4.6E-15	9.1E-11	8.5E-13	9.2E-11	7.8E-10	1.4E-05	2.1E-08	1.4E-05	5.5E-16	1.8E-11	2.6E-14	1.8E-11
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	6.0E-11	2.8E-06	N/A	2.8E-06	N/A	N/A	N/A	0.0E+00	7.2E-12	5.4E-07	N/A	5.4E-07
Benzo(b)fluoranthene	N/A	N/A	N/A	0.0E+00	N/A	2.5E-07	N/A	2.5E-07	N/A	N/A	N/A	0.0E+00	N/A	4.8E-08	N/A	4.8E-08
Chromium, total	4.0E-05	8.0E-03	1.5E-01	1.6E-01	1.8E-08	N/A	N/A	1.8E-08	1.2E-04	5.7E-03	1.7E-02	2.3E-02	2.1E-09	N/A	N/A	2.1E-09
Dibenz(a,h)anthracene	N/A	N/A	N/A	0.0E+00	N/A	6.6E-07	N/A	6.6E 07	N/A	N/A	N/A	0.0E+00	N/A	1.3E-07	N/A	1.3E-07
Dibenzofuran	N/A	2.9E-04	7.8E-04	1.1E-03	N/A	N/A	N/A	0.0E+00	N/A	1.4E-03	6.0E-04	2.0E-03	N/A	N/A	N/A	0.0E+00
Ethylbenzene	1.1E-09	6.3E-05	3.8E-05	1.0E-04	N/A	N/A	N/A	0.0E+00	3.3E-09	3.0E-04	2.9E-05	3.3E-04	N/A	N/A	N/A	0.0E+00
Indeno(1,2,3-c,d)pyrene	N/A	N/A	N/A	0.0E+00	N/A	2.8E-07	N/A	2.8E-07	N/A	N/A	N/A	0.0E+00	N/A	5.4E-08	N/A	5.4E-08
Iron	N/A	5.6E-02	5.2E-02	1.1E-01	N/A	N/A	N/A	0.0E+00	N/A	2.7E-01	4.1E-02	3.1E-01	N/A	N/A	N/A	0.0E+00
Methylene Chloride	2.8E-11	7.8E-06	5.5E-06	1.3E-05	1.4E-14	1.3E-09	8.8E-10	2.1E-09	8.3E-11	3.8E-05	4.2E-06	4.2E-05	1.7E-15	2.4E-10	2.7E-11	2.7E-10
Napthalene	1.7E-06	1.5E-03	3.5E-03	5.0E-03	N/A	N/A	N/A	0.0E+00	5.1E-06	7.3E-03	2.7E-03	1.0E-02	N/A	N/A	N/A	0.0E+00
PCB-1254	N/A	2.1E-03	2.6E-03	4.8E-03	1.5E-12	3.0E-08	3.8E-08	6.8E-08	N/A	4.1E-03	8.2E-04	4.9E-03	1.8E-13	5.8E-09	1.2E-09	7.0E-09
Toluene	7.4E-10	8.1E-06	4.5E-06	1.3E-05	N/A	N/A	N/A	0.0E+00	2.2E-09	3.9E-06	3.5E-07	4.3E-06	N/A	N/A	N/A	0.0E+00
Xylenes, total	N/A	2.2E-05	1.3E-05	3.5E-05	N/A	N/A	N/A	0.0E+00	N/A	1.0E-04	1.0E-05	1.1E-04	N/A	N/A	N/A	0.0E+00
Totals	**1.1E-03**	**1.2E-01**	**2.7E-01**	**3.9E-01**	**1.8E-08**	**5.3E-06**	**8.3E-07**	**6.1E-06**	**3.4E-03**	**5.3E-01**	**1.1E-01**	**6.4E-01**	**2.2E-09**	**1.0E-06**	**2.6E-08**	**1.0E-06**

* Adult inhalation risks used for age-adjusted.

Table 4-5
Summary Table for All Pathways for All RME Exposure Scenarios at SWMU 1
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Surface Soil														
Current Industrial Worker	1.6E-08	8.1E-04	2.3E-06	1.1E-01	1.3E-06	2.3E-01	**3.6E-06**	**3.4E-01**	0%	0%	64%	33%	35%	67%
Current Trespasser/Visitor Adult	7.1E-10	3.8E-05	4.6E-07	2.3E-02	1.6E-07	3.0E-02	**6.2E-07**	**5.3E-02**	0%	0%	74%	44%	26%	56%
Current Trespasser/Visitor Adolescent	3.7E-10	5.2E-05	2.4E-07	3.2E-02	3.4E-08	1.7E-02	**2.7E-07**	**4.9E-02**	0%	0%	87%	65%	12%	35%
Sediment														
Current/Future Trespasser/Visitor Adult	--	--	5.5E-07	3.6E-03	3.6E-07	2.3E-03	**9.2E-07**	**5.9E-03**	--	--	60%	61%	40%	39%
Current/Future Trespasser/Visitor Adolescent	--	--	2.9E-07	4.9E-03	4.7E-08	8.0E-04	**3.3E-07**	**5.7E-03**	--	--	86%	86%	14%	14%
Groundwater														
Future Residential Adult	1.4E-06	9.5E+00	--	3.2E-01	--	2.2E-01	**1.4E-06**	**1.0E+01**	--	95%	--	3%	--	2%
Future Residential Child	--	--	--	7.5E-01	--	5.3E-01	--	**1.3E+00**	--	--	--	59%	--	41%
Future Residential Age-Adjusted	1.4E-06	--	2.5E-05	--	1.3E-07	--	**2.7E-05**	--	5%	--	94%	--	0%	--
Future Construction Worker	1.5E-09	2.7E-01	--	--	9.9E-09	4.3E-01	**1.1E-08**	**7.0E-01**	13%	38%	--	--	87%	62%
Surface and Subsurface Soil														
Future Trespasser/Visitor Adult	8.2E-10	5.3E-05	1.1E-06	2.4E-02	1.0E-07	3.4E-02	**1.2E-06**	**5.8E-02**	0%	0%	91%	42%	9%	58%
Future Trespasser/Visitor Adolescent	4.2E-10	7.2E-05	5.4E-07	3.3E-02	2.7E-07	2.3E-01	**8.1E-07**	**2.7E-01**	0%	0%	67%	12%	33%	88%
Future Resident Adult	--	4.7E-03	--	1.6E-01	--	2.3E-01	--	**4.0E-01**	--	1%	--	41%	--	58%
Future Resident Child	--	1.3E-02	--	1.5E+00	--	2.4E-01	--	**1.8E+00**	--	1%	--	86%	--	14%
Future Residential Age-Adjusted	1.3E-07	--	2.4E-05	--	8.8E-07	--	**2.5E-05**	--	1%	--	96%	--	4%	--
Future Industrial Worker	1.8E-08	1.1E-03	5.3E-06	1.2E-01	8.3E-07	2.7E-01	**6.1E-06**	**3.9E-01**	0%	0%	86%	31%	13%	69%
Future Construction Worker	2.2E-09	3.4E-03	1.0E-06	5.3E-01	2.6E-08	1.1E-01	**1.0E-06**	**6.4E-01**	0%	1%	97%	83%	2%	17%

Age-adjusted is a sum of the child and adult.

Risk = carcinogenic risk as determined by the risk calculations in Appendix A-4.

HI = Hazard index as determined by the risk calculation in Appendix A-4.

0% is <1% contribution by the pathway.

T -6
Summary of Media-Spec isks and Hazards For CT
SWMU 1
NAS Oceana

Media: Future - Groundwater

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,3,5-Trimethylbenzene	5.1E-02	--	--	**5.1E-02**	--	--	--	--	--	2.1E-03	2.2E-09	**2.1E-03**	--	--	--	--
Benzene	5.6E-02	--	--	**5.6E-02**	--	--	--	--	--	3.3E-02	3.9E-03	**3.7E-02**	--	--	--	--
Benzo(a)anthracene	N/A	--	--	**0.0E+00**	--	--	--	--	--	N/A	N/A	**0.0E+00**	--	--	--	--
Benzo(a)pyrene	N/A	--	--	**0.0E+00**	--	--	--	--	--	N/A	N/A	**0.0E+00**	--	--	--	--
Naphthalene	6.2E+00	--	--	**6.2E+00**	--	--	--	--	--	4.4E-01	3.1E-01	**7.5E-01**	--	--	--	--
n-Propylbenzene	N/A	--	--	**0.0E+00**	--	--	--	--	--	2.2E-02	2.7E-06	**2.2E-02**	--	--	--	--
Totals	**6.3E+00**	**0.0E+00**	**0.0E+00**	**6.3E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**5.0E-01**	**3.1E-01**	**8.2E-01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Media: Future - Groundwater

	Resident Age-Adjusted							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,3,5-Trimethylbenzene	--	--	--	--	--	N/A	N/A	**0.0E+00**
Benzene	--	--	--	--	--	3.6E-07	7.0E-08	**4.3E-07**
Benzo(a)anthracene	--	--	--	--	--	8.9E-07	N/A	**8.9E-07**
Benzo(a)pyrene	--	--	--	--	--	7.8E-06	N/A	**7.8E-06**
Naphthalene	--	--	--	--	--	N/A	N/A	**0.0E+00**
n-Propylbenzene	--	--	--	--	--	N/A	N/A	**0.0E+00**
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**9.0E-06**	**7.0E-08**	**9.1E-06**

Media: Future - Surface and Subsurface Soil

	Resident Child								Resident Age-adjusted							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	--	2.1E-06	5.6E-09	**2.1E-06**	--	--	--	--	--	--	--	--	--	4.8E-11	1.4E-13	**4.9E-11**
1-Methylnaphthalene	--	N/A	N/A	**0.0E+00**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
2-Methylnaphthalene	--	9.6E-03	5.0E-03	**1.5E-02**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Acetone	--	9.8E-05	1.5E-05	**1.1E-04**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Aluminum	--	9.4E-02	1.5E-02	**1.1E-01**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Antimony	--	8.0E-02	3.3E-02	**1.1E-01**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Arsenic	--	3.4E-02	4.8E-03	**3.9E-02**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Benzene	--	1.3E-05	2.7E-08	**1.3E-05**	--	--	--	--	--	--	--	--	--	1.5E-06	2.5E-07	**1.8E-06**
Benzo(a)pyrene	--	N/A	N/A	**0.0E+00**	--	--	--	--	--	--	--	--	--	1.1E-10	2.6E-13	**1.1E-10**
Benzo(b)fluoranthene	--	N/A	N/A	**0.0E+00**	--	--	--	--	--	--	--	--	--	3.4E-06	N/A	**3.4E-06**
Chromium, total	--	3.5E-02	1.5E-01	**1.8E-01**	--	--	--	--	--	--	--	--	--	3.0E-07	N/A	**3.0E-07**
Dibenz(a,h)anthracene	--	N/A	N/A	**0.0E+00**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Dibenzofuran	--	1.3E-03	7.7E-04	**2.0E-03**	--	--	--	--	--	--	--	--	--	8.1E-07	N/A	**8.1E-07**
Ethylbenzene	--	2.7E-04	3.7E-05	**3.1E-04**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Indeno(1,2,3-c,d)pyrene	--	N/A	N/A	**0.0E+00**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Iron	--	2.5E-01	5.2E-02	**3.0E-01**	--	--	--	--	--	--	--	--	--	3.4E-07	N/A	**3.4E-07**
Methylene Chloride	--	3.4E-05	5.4E-06	**4.0E-05**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Napthalene	--	6.6E-03	3.5E-03	**1.0E-02**	--	--	--	--	--	--	--	--	--	1.5E-09	2.7E-10	**1.8E-09**
PCB-1254	--	9.2E-03	2.6E-03	**1.2E-02**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Toluene	--	3.6E-05	4.5E-06	**4.0E-05**	--	--	--	--	--	--	--	--	--	3.7E-08	1.2E-08	**4.9E-08**
Xylenes, total	--	9.4E-05	1.3E-05	**1.1E-04**	--	--	--	--	--	--	--	--	--	N/A	N/A	**0.0E+00**
Totals	**0.0E+00**	**5.2E-01**	**2.6E-01**	**7.8E-01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**6.4E-06**	**2.6E-07**	**6.7E-06**

-- all RME risks are below 1E-05 and hazards below 1, therefore, CT's were not calculated.

Table 4-7
Summary Table for All Pathways for All CT Exposure Scenarios at SWMU 1
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Groundwater														
Future Residential Adult	--	6.3E+00	--	--	--	--	--	**6.3E+00**	--	100%	--	--	--	--
Future Residential Child	--	--	--	5.0E-01	--	3.1E-01	--	**8.2E-01**	--	--	--	62%	--	38%
Future Residential Age-Adjusted	--	--	9.0E-06	--	7.0E-08	--	**9.1E-06**	--	--	--	99%	--	1%	--
Surface and Subsurface Soil														
Future Resident Child	--	--	--	5.2E-01	--	2.6E-01	--	**7.8E-01**	--	--	--	66%	--	34%
Future Residential Age-Adjusted	--	--	6.4E-06	--	2.6E-07	--	**6.7E-06**	--	--	--	96%	--	4%	--

Age-adjusted is a sum of the child and adult.

Risk = carcinogenic risk as determined by the risk calculations in Appendix A-4.

HI = Hazard index as determined by the risk calculation in Appendix A-4.

0% is <1% contribution by the pathway.

-- all RME risks are below 1E-05 and hazards below 1, therefore, CT's were not calculated.

Table 5-1
Summary of Data Used in the Human Health Risk Assessment
SWMU 15
NAS Oceana

Medium	Number of Samples	Date of Sampling	Sample ID	Parameters
Surface Soil		07/21/1999	OW15-SS06	TAL Metals & Cyanide
			OW15-SS07	TCL VOCs
			OW15-SS08	TCL SVOCs / PAHs
			OW15-SS09	TCL Pesticides/PCB
Subsurface Soil		11/04/1998	OW15-SB35	TCL VOCs
			OW15-SB36	TCL SVOCs / PAHs
			OW15-SB37	
			OW15-SB38	
			OW15-SB39	
			OW15-SB40	
			OW15-SB41	
			OW15-SB42	
			OW15-SB43	
			OW15-SB44	
Sediment		07/22/1999	OW15-SD01	(SD01 - SD06)
			OW15-SD02	TCL VOA
			OW15-SD03	TCL SVOCs / PAHs
			OW15-SD04	TCL Pesticides/PCBs
			OW15-SD05	TAL Metals & Cyanide
			OW15-SD06	
			OW15-SD07	(SD07 - SD15)
			OW15-SD07P	TCL SVOCs
			OW15-SD08	LC-PAHs
			OW15-SD09	TAL Metals & Cyanide
			OW15-SD10	
			OW15-SD11	
			OW15-SD12	
			OW15-SD13	
			OW15-SD14	
			OW15-SD15	
			OW15-SD16	
Surface Water		07/22/1999	OW15-SW01	(SW01 - SW02)
			OW15-SW01P	TCL VOA
			OW15-SW02	TCL SVOCs / PAHs
			OW15-SW03	TCL Pesticides/PCBs
			OW15-SW04	TAL Metals & Cyanide
			OW15-SW05	
				(SW03 - SW05)
				TCL SVOCs
				LC-PAHs
				TAL Metals & Cyanide
Groundwater		07/28/1999	OW15-MW06-R01	TCL LC-VOCs
			OW15-MW07-R01	TCL SVOCs
			OW15-MW08-R01	LC-PAHs
			OW15-MW18-R01	Pesticides/PCBs
			OW15-MW19-R01	TAL Metals & Cyanide
			OW15-MW20-R01	
			OW15-MW21-R01	
			OW15-MW22-R01 (dup 21)	

P = duplicate sample
D = deep well
R01 = round 1

Table 5-2
Summary of Chemicals of Potential Concern for the HHRA
SWMU 15
NAS Oceana

Surface Soil	Surface Water	Sediment	Groundwater	Surface and Subsurface Soil Combined
Acenaphthene	None	Arsenic	Aluminum	Acenaphthene
Aluminum		Iron	Arsenic	Aluminum
Aroclor-1254			Benzene	Aroclor-1254
Aroclor-1260			Carbon disulfide	Aroclor-1260
Arsenic			Chloroform	Arsenic
Benzo(a)anthracene			Ethylbenzene	Benzo(a)anthracene
Benzo(a)pyrene			Iron	Benzo(a)pyrene
Benzo(b)fluoranthene			Manganese	Benzo(b)fluoranthene
Benzo(g,h,i)perlyene			Methylene Chloride	Benzo(k)fluoranthene
Benzo(k)fluoranthene			Naphthalene	Carbazole
Carbazole			Tetrachloroethene	Chromium
Chromium				Dibenz(a,h)anthracene
Dibenz(a,h)anthracene				Dibenzofuran
Dibenzofuran				Dieldrin
Dieldrin				Fluorene
Fluorene				Indeno(1,2,3-cd)pyrene
Indeno(1,2,3-cd)pyrene				Iron
Iron				Naphthalene
Naphthalene				

Table 5-3
Exposure Pathways
SWMU 15
NAS Oceana

Media	Exposure Route	Current			Future					
		Industrial Worker	Trespasser/Visitor		Resident		Construction Worker	Industrial Worker	Trespasser/Visitor	
			Adult	Adolescent	Adult	Child			Adult	Adolescent
Surface Soil	Ingestion	X	X	X						
	Dermal	X	X	X						
	Inhalation	X	X	X						
Surface Water	Ingestion		X*	X*					X*	X*
	Dermal		X*	X*					X*	X*
	Inhalation									
Sediment	Ingestion		X*	X*					X*	X*
	Dermal		X*	X*					X*	X*
	Inhalation									
Groundwater	Ingestion				X	X				
	Dermal				X	X	X			
	Inhalation				X		X			
Subsurface and Surface Soil Combined	Ingestion				X	X	X	X	X	X
	Dermal				X	X	X	X	X	X
	Inhalation				X	X	X	X	X	X

X Quantitative evaluation.

* Current and Future are the same.

Ta 4
Summary of Media-Specific Risks and Hazards For RME
SWMU 15
NAS Oceana

Media: Current - Surface Soil

Chemical	Industrial Worker								Trespasser/Visitor Adult							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	N/A	5.5E-04	1.5E-03	2.0E-03	N/A	N/A	N/A	0.0E+00	N/A	1.2E-04	1.9E-04	3.1E-04	N/A	N/A	N/A	0.0E+00
Aluminum	7.1E-04	1.4E-02	9.7E-03	2.4E-02	N/A	N/A	N/A	0.0E+00	3.3E-05	2.9E-03	1.3E-03	4.2E-03	N/A	N/A	N/A	0.0E+00
Aroclor-1254	N/A	2.2E-02	2.8E-02	5.0E-02	1.6E-11	3.1E-07	3.9E-07	7.1E-07	N/A	4.6E-03	3.6E-03	8.2E-03	7.1E-13	6.3E-08	4.9E-08	1.1E-07
Aroclor-1260	N/A	N/A	N/A	0.0E+00	1.5E-11	2.9E-07	3.7E-07	6.6E-07	N/A	N/A	N/A	0.0E+00	6.6E-13	5.9E-08	4.6E-08	1.0E-07
Arsenic	N/A	6.5E-03	4.1E-03	1.1E-02	5.3E-10	1.0E-06	6.6E-07	1.7E-06	N/A	1.4E-03	5.3E-04	1.9E-03	2.4E-11	2.1E-07	8.2E-08	2.9E-07
Benzo(a)anthracene	N/A	N/A	N/A	0.0E+00	N/A	5.9E-06	N/A	5.9E-06	N/A	N/A	N/A	0.0E+00	N/A	1.2E-06	N/A	1.2E-06
Benzo(a)pyrene	N/A	N/A	N/A	0.0E+00	1.6E-09	7.4E-05	N/A	7.4E-05	N/A	N/A	N/A	0.0E+00	7.1E-11	1.5E-05	N/A	1.5E-05
Benzo(b)fluoranthene	N/A	N/A	N/A	0.0E+00	N/A	1.2E-05	N/A	1.2E-05	N/A	N/A	N/A	0.0E+00	N/A	2.5E-06	N/A	2.5E-06
Benzo(g,h,I)perylene	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00	N/A	N/A	N/A	0.0E+00
Benzo(k)fluoranthene	N/A	N/A	N/A	0.0E+00	N/A	4.1E-07	N/A	4.1E-07	N/A	N/A	N/A	0.0E+00	N/A	8.2E-08	N/A	8.2E-08
Carbazole	N/A	N/A	N/A	0.0E+00	N/A	1.4E-08	N/A	1.4E-08	N/A	N/A	N/A	0.0E+00	N/A	2.8E-09	N/A	2.8E-09
Chromium	3.22E-05	6.4E-03	1.2E-01	1.3E-01	1.4E-08	N/A	N/A	1.4E-08	1.5E-06	1.3E-03	1.5E-02	1.7E-02	6.3E-10	N/A	N/A	6.3E-10
Dibenz(a,h)anthracene	N/A	N/A	N/A	0.0E+00	N/A	8.6E-05	N/A	8.6E-05	N/A	N/A	N/A	0.0E+00	N/A	1.7E-05	N/A	1.7E-05
Dibenzofuran	N/A	2.0E-04	5.4E-04	7.4E-04	N/A	N/A	N/A	0.0E+00	N/A	4.2E-05	7.0E-05	1.1E-04	N/A	N/A	N/A	0.0E+00
Dieldrin	N/A	2.9E-04	1.1E-03	1.4E-03	4.2E-12	8.4E-08	3.1E-07	4.0E-07	N/A	6.1E-05	1.4E-04	2.0E-04	1.9E-13	1.7E-08	3.9E-08	5.6E-08
Fluorene	N/A	3.8E-02	1.0E-01	1.4E-01	N/A	N/A	N/A	0.0E+00	N/A	7.9E-03	1.3E-02	2.1E-02	N/A	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	0.0E+00	N/A	4.1E-06	N/A	4.1E-06	N/A	N/A	N/A	0.0E+00	N/A	8.2E-07	N/A	8.2E-07
Iron	N/A	2.4E-02	2.3E-02	4.7E-02	N/A	N/A	N/A	0.0E+00	N/A	5.1E-03	2.9E-03	8.0E-03	N/A	N/A	N/A	0.0E+00
Napthalene	1.48E-07	1.3E-04	3.1E-04	4.4E-04	N/A	N/A	N/A	0.0E+00	6.9E-09	2.7E-05	4.0E-05	6.7E-05	N/A	N/A	N/A	0.0E+00
Totals	**7.4E-04**	**1.1E-01**	**2.9E-01**	**4.0E-01**	**1.6E-08**	**1.8E-04**	**1.7E-06**	**1.9E-04**	**3.5E-05**	**2.3E-02**	**3.7E-02**	**6.1E-02**	**7.3E-10**	**3.7E-05**	**2.2E-07**	**3.7E-05**

Chemical	Trespasser/Visitor Adolescent							
	HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	N/A	1.6E-04	1.1E-04	**2.7E-04**	N/A	N/A	N/A	**0.0E+00**
Aluminum	4.6E-05	4.0E-03	7.2E-04	**4.8E-03**	N/A	N/A	N/A	**0.0E+00**
Aroclor-1254	N/A	6.3E-03	2.0E-03	**8.3E-03**	3.7E-13	3.2E-08	1.0E-08	**4.3E-08**
Aroclor-1260	N/A	N/A	N/A	**0.0E+00**	3.4E-13	3.0E-08	9.8E-09	**4.0E-08**
Arsenic	N/A	1.9E-03	3.0E-04	**2.2E-03**	1.2E-11	1.1E-07	1.7E-08	**1.3E-07**
Benzo(a)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	6.0E-07	N/A	**6.0E-07**
Benzo(a)pyrene	N/A	N/A	N/A	**0.0E+00**	3.7E-11	7.6E-06	N/A	**7.6E-06**
Benzo(b)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	1.3E-06	N/A	**1.3E-06**
Benzo(g,h,I)perylene	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Benzo(k)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	4.2E-08	N/A	**4.2E-08**
Carbazole	N/A	N/A	N/A	**0.0E+00**	N/A	1.4E-09	N/A	**1.4E-09**
Chromium	2.1E-06	1.8E-03	8.8E-03	**1.1E-02**	3.3E-10	N/A	N/A	**3.3E-10**
Dibenz(a,h)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	8.8E-06	N/A	**8.8E-06**
Dibenzofuran	N/A	5.8E-05	4.0E-05	**9.8E-05**	N/A	N/A	N/A	**0.0E+00**
Dieldrin	N/A	8.4E-05	8.1E-05	**1.6E-04**	9.8E-14	8.6E-09	8.3E-09	**1.7E-08**
Fluorene	N/A	1.1E-02	7.5E-03	**1.8E-02**	N/A	N/A	N/A	**0.0E+00**
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	**0.0E+00**	N/A	4.2E-07	N/A	**4.2E-07**
Iron	N/A	7.0E-03	1.7E-03	**8.6E-03**	N/A	N/A	N/A	**0.0E+00**
Napthalene	9.5E-09	3.8E-05	2.3E-05	**6.0E-05**	N/A	N/A	N/A	**0.0E+00**
Totals	**4.8E-05**	**3.2E-02**	**2.1E-02**	**5.4E-02**	**3.8E-10**	**1.9E-05**	**4.6E-08**	**1.9E-05**

Table 5-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 15
NAS Oceana

Media: Current/Future - Sediment

	Trespasser/Visitor Adult								Trespasser/Visitor Adolescent							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Arsenic	--	2.3E-03	1.5E-03	**3.7E-03**	--	3.5E-07	2.3E-07	**5.8E-07**	--	3.1E-03	5.0E-04	**3.6E-03**	--	1.8E-07	2.9E-08	**2.1E-07**
Iron	--	1.1E-02	1.0E-02	**2.1E-02**	--	N/A	N/A	--	--	1.5E-02	3.5E-03	**1.8E-02**	--	N/A	N/A	--
Totals	0.0E+00	**1.3E-02**	**1.2E-02**	**2.5E-02**	0.0E+00	**3.5E-07**	**2.3E-07**	**5.8E-07**	0.0E+00	**1.8E-02**	**4.0E-03**	**2.2E-02**	0.0E+00	**1.8E-07**	**2.9E-08**	**2.1E-07**

Media: Future - Groundwater

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Aluminum	N/A	1.6E-02	1.2E-04	**1.6E-02**	N/A	--	--	**0.0E+00**	--	3.7E-02	3.6E-04	**3.8E-02**	--	--	--	--
Arsenic	N/A	1.8E+00	3.7E-03	**1.8E+00**	N/A	--	--	**0.0E+00**	--	4.2E+00	1.1E-02	**4.2E+00**	--	--	--	--
Benzene	9.9E+01	3.1E+01	4.2E+00	**1.3E+02**	1.7E-03	--	--	**1.7E-03**	--	7.3E+01	9.9E+00	**8.3E+01**	--	--	--	--
Carbon disulfide	5.9E-02	5.3E-02	1.0E-02	**1.2E-01**	N/A	--	--	**0.0E+00**	--	1.2E-01	2.4E-02	**1.5E-01**	--	--	--	--
Chloroform	1.2E+02	7.6E-01	7.8E-02	**1.2E+02**	2.8E-04	--	--	**2.8E-04**	--	1.8E+00	1.6E-01	**1.9E+00**	--	--	--	--
Ethylbenzene	4.0E-02	6.7E-02	6.2E-02	**1.7E-01**	N/A	--	--	**0.0E+00**	--	1.6E-01	1.3E-01	**2.8E-01**	--	--	--	--
Iron	N/A	1.4E+00	1.4E-02	**1.4E+00**	N/A	--	--	**0.0E+00**	--	3.3E+00	4.3E-02	**3.3E+00**	--	--	--	--
Manganese	N/A	6.7E-01	3.8E-03	**6.8E-01**	N/A	--	--	**0.0E+00**	--	1.6E+00	1.2E-02	**1.6E+00**	--	--	--	--
Methylene chloride	8.6E-03	9.9E-02	3.7E-03	**1.1E-01**	4.2E-06	--	--	**4.2E-06**	--	2.3E-01	8.8E-03	**2.4E-01**	--	--	--	--
Naphthalene	1.7E+00	3.8E-02	5.2E-02	**1.8E+00**	N/A	--	--	**0.0E+00**	--	8.9E-02	1.0E-01	**1.9E-01**	--	--	--	--
Tetrachloroethene	1.6E-03	1.4E-02	1.8E-02	**3.4E-02**	1.6E-07	--	--	**1.6E-07**	--	3.3E-02	3.5E-02	**6.7E-02**	--	--	--	--
Totals	**2.2E+02**	**3.6E+01**	**4.4E+00**	**2.6E+02**	**1.9E-03**	**0.0E+00**	**0.0E+00**	**1.9E-03**	**0.0E+00**	**8.5E+01**	**1.0E+01**	**9.5E+01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Media: Future - Groundwater

	Resident Age-Adjusted								Construction Worker							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh*	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Aluminum	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	1.0E-03	**1.0E-03**	N/A	--	N/A	**0.0E+00**
Arsenic	--	--	--	--	N/A	4.4E-04	1.0E-06	**4.4E-04**	N/A	--	3.2E-02	**3.2E-02**	N/A	--	2.1E-07	**2.1E-07**
Benzene	--	--	--	--	1.7E-03	2.8E-03	3.8E-04	**4.9E-03**	7.7E+00	--	1.2E+01	**2.0E+01**	5.5E-06	--	1.5E-05	**2.0E-05**
Carbon disulfide	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	3.7E-03	--	2.9E-02	**3.3E-02**	N/A	--	N/A	**0.0E+00**
Chloroform	--	--	--	--	2.8E-04	2.5E-05	2.5E-06	**3.1E-04**	1.1E+01	--	1.3E-01	**1.1E+01**	1.1E-06	--	1.1E-07	**1.2E-06**
Ethylbenzene	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	3.0E-03	--	9.2E-02	**9.5E-02**	N/A	--	N/A	**0.0E+00**
Iron	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	1.2E-01	**1.2E-01**	N/A	--	N/A	**0.0E+00**
Manganese	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	3.3E-02	**3.3E-02**	N/A	--	N/A	**0.0E+00**
Methylene Chloride	--	--	--	--	4.2E-06	2.4E-05	9.1E-07	**2.9E-05**	9.3E-04	--	1.0E-02	**1.1E-02**	1.9E-08	--	6.5E-08	**8.4E-08**
Naphthalene	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	1.1E-01	--	5.7E-02	**1.7E-01**	N/A	--	N/A	**0.0E+00**
Tetrachloroethene	--	--	--	--	1.6E-07	4.0E-06	4.7E-06	**8.8E-06**	1.2E-04	--	1.3E-02	**1.3E-02**	4.7E-10	--	9.3E-08	**9.4E-08**
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.9E-03**	**3.3E-03**	**3.8E-04**	**5.7E-03**	**1.9E+01**	**0.0E+00**	**1.2E+01**	**3.1E+01**	**6.6E-06**	**0.0E+00**	**1.5E-05**	**2.2E-05**

Ta[illegible]4
Summary of Media-Specific Risks and Hazards For RME
SWMU 15
NAS Oceana

Media: Future - Surface and Subsurface Soil

	Trespasser/Visitor Adult								Trespasser/Visitor Adolescent							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	N/A	2.1E-04	3.4E-04	**5.5E-04**	N/A	N/A	N/A	**0.0E+00**	N/A	2.8E-04	2.6E-04	**5.4E-04**	N/A	N/A	N/A	**0.0E+00**
Aluminum	3.3E-05	2.9E-03	1.3E-03	**4.2E-03**	N/A	N/A	N/A	**0.0E+00**	4.6E-05	4.0E-03	9.5E-04	**5.0E-03**	N/A	N/A	N/A	**0.0E+00**
Aroclor-1254	N/A	4.6E-03	3.6E-03	**8.2E-03**	7.1E-13	6.3E-08	4.9E-08	**1.1E-07**	N/A	6.3E-03	2.7E-03	**9.0E-03**	3.7E-13	3.2E-08	1.0E-08	**4.3E-08**
Aroclor-1260	N/A	N/A	N/A	**0.0E+00**	6.6E-13	5.9E-08	4.6E-08	**1.0E-07**	N/A	N/A	N/A	**0.0E+00**	3.4E-13	3.0E-08	9.8E-09	**4.0E-08**
Arsenic	N/A	1.4E-03	5.3E-04	**1.9E-03**	2.4E-11	2.1E-07	8.2E-08	**2.9E-07**	N/A	1.9E-03	4.0E-04	**2.3E-03**	1.2E-11	1.1E-07	1.7E-08	**1.3E-07**
Benzo(a)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	1.2E-06	N/A	**1.2E-06**	N/A	N/A	N/A	**0.0E+00**	N/A	6.0E-07	N/A	**6.0E-07**
Benzo(a)pyrene	N/A	N/A	N/A	**0.0E+00**	N/A	1.5E-05	N/A	**1.5E-05**	N/A	N/A	N/A	**0.0E+00**	3.7E-11	7.6E-06	N/A	**7.6E-06**
Benzo(b)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	2.5E-06	N/A	**2.5E-06**	N/A	N/A	N/A	**0.0E+00**	N/A	1.3E-06	N/A	**1.3E-06**
Benzo(g,h,I)perylene	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Benzo(k)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	4.2E-08	N/A	**4.2E-08**
Carbazole	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**	N/A	1.4E-09	N/A	**1.4E-09**
Chromium	1.5E-06	1.3E-03	1.5E-02	**1.7E-02**	N/A	8.2E-08	N/A	**8.2E-08**	2.1E-06	1.8E-03	1.2E-02	**1.3E-02**	3.3E-10	N/A	N/A	**3.3E-10**
Dibenz(a,h)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	2.8E-09	N/A	**2.8E-09**	N/A	N/A	N/A	**0.0E+00**	N/A	8.8E-06	N/A	**8.8E-06**
Dibenzofuran	N/A	4.2E-05	7.0E-06	**4.9E-05**	N/A	N/A	N/A	**0.0E+00**	N/A	5.8E-05	5.3E-06	**6.3E-05**	N/A	N/A	N/A	**0.0E+00**
Dieldrin	N/A	6.1E-05	1.4E-04	**2.0E-04**	6.3E-10	1.7E-05	N/A	**1.7E-05**	N/A	8.4E-05	1.1E-04	**1.9E-04**	9.8E-14	8.6E-09	8.3E-09	**1.7E-08**
Fluorene	N/A	7.9E-03	1.3E-02	**2.1E-02**	N/A	N/A	N/A	**0.0E+00**	N/A	1.1E-02	9.9E-03	**2.1E-02**	N/A	N/A	N/A	**0.0E+00**
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	**0.0E+00**	N/A	1.7E-08	3.9E-08	**5.6E-08**	N/A	N/A	N/A	**0.0E+00**	N/A	4.2E-07	N/A	**4.2E-07**
Iron	N/A	5.1E-03	2.9E-03	**8.0E-03**	1.9E-13	N/A	N/A	**1.9E-13**	N/A	7.0E-03	2.2E-03	**9.2E-03**	N/A	N/A	N/A	**0.0E+00**
Napthalene	6.9E-09	2.7E-05	4.0E-05	**6.7E-05**	N/A	8.2E-07	N/A	**8.2E-07**	9.5E-09	3.8E-05	2.3E-05	**6.0E-05**	N/A	N/A	N/A	**0.0E+00**
Totals	**3.5E-05**	**2.4E-02**	**3.7E-02**	**6.1E-02**	**6.6E-10**	**3.7E-05**	**2.2E-07**	**3.7E-05**	**4.8E-05**	**3.2E-02**	**2.8E-02**	**6.1E-02**	**3.8E-10**	**1.9E-05**	**4.6E-08**	**1.9E-05**

Media: Future - Surface and Subsurface Soil

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	N/A	1.4E-03	2.3E-03	**3.7E-03**	--	--	--	--	N/A	1.3E-02	2.4E-03	**1.5E-02**	--	--	--	--
Aluminum	3.0E-03	2.0E-02	8.5E-03	**3.1E-02**	--	--	--	--	8.4E-03	1.8E-01	8.9E-03	**2.0E-01**	--	--	--	--
Aroclor-1254	N/A	3.1E-02	2.4E-02	**5.5E-02**	--	--	--	--	N/A	2.9E-01	2.5E-02	**3.1E-01**	--	--	--	--
Aroclor-1260	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Arsenic	N/A	9.1E-03	3.6E-03	**1.3E-02**	--	--	--	--	N/A	8.5E-02	3.8E-03	**8.9E-02**	--	--	--	--
Benzo(a)anthracene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Benzo(a)pyrene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Benzo(b)fluoranthene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Benzo(k)fluoranthene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Carbazole	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Chromium	1.4E-04	8.9E-03	1.0E-01	**1.1E-01**	--	--	--	--	3.8E-04	8.4E-02	1.1E-01	**1.9E-01**	--	--	--	--
Dibenz(a,h)anthracene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Dibenzofuran	N/A	2.8E-04	4.7E-05	**3.3E-04**	--	--	--	--	N/A	2.7E-03	5.0E-05	**2.7E-03**	--	--	--	--
Dieldrin	N/A	4.1E-04	9.5E-04	**1.4E-03**	--	--	--	--	N/A	3.8E-03	1.0E-03	**4.8E-03**	--	--	--	--
Fluorene	N/A	5.3E-02	8.9E-02	**1.4E-01**	--	--	--	--	N/A	5.0E-01	9.3E-02	**5.9E-01**	--	--	--	--
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	**0.0E+00**	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	--	--	--	--
Iron	N/A	3.4E-02	2.0E-02	**5.4E-02**	--	--	--	--	N/A	3.2E-01	2.1E-02	**3.4E-01**	--	--	--	--
Napthalene	6.2E-07	1.8E-04	2.7E-04	**4.5E-04**	--	--	--	--	1.7E-06	1.7E-03	2.8E-04	**2.0E-03**	--	--	--	--
Totals	**3.1E-03**	**1.6E-01**	**2.5E-01**	**4.1E-01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**8.8E-03**	**1.5E+00**	**2.7E-01**	**1.8E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Table 5-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 15
NAS Oceana

Media: Future - Surface and Subsurface Soil

	Resident Age-Adjusted							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Aluminum	--	--	--	--	N/A	N/A	N/A	0.0E+00
Aroclor-1254	--	--	--	--	1.1E-10	1.4E-06	4.2E-07	1.8E-06
Aroclor-1260	--	--	--	--	1.0E-10	1.3E-06	3.9E-07	1.7E-06
Arsenic	--	--	--	--	3.7E-09	4.7E-06	7.0E-07	5.4E-06
Benzo(a)anthracene	--	--	--	--	N/A	2.6E-05	N/A	2.6E-05
Benzo(a)pyrene	--	--	--	--	1.1E-08	3.3E-04	N/A	3.3E-04
Benzo(b)fluoranthene	--	--	--	--	N/A	5.5E-05	N/A	5.5E-05
Benzo(k)fluoranthene	--	--	--	--	N/A	1.1E-05	N/A	1.1E-05
Carbazole	--	--	--	--	N/A	6.3E-08	N/A	6.3E-08
Chromium	--	--	--	--	9.8E-08	N/A	N/A	9.8E-08
Dibenz(a,h)anthracene	--	--	--	--	N/A	3.9E-04	N/A	3.9E-04
Dibenzofuran	--	--	--	--	N/A	N/A	N/A	0.0E+00
Dieldrin	--	--	--	--	2.9E-11	3.8E-07	3.3E-07	7.1E-07
Fluorene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	--	N/A	1.8E-05	N/A	1.8E-05
Iron	--	--	--	--	N/A	N/A	N/A	0.0E+00
Napthalene	--	--	--	--	N/A	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.1E-07**	**8.4E-04**	**1.8E-06**	**8.4E-04**

Media: Future - Surface and Subsurface Soil

	Industrial Worker								Construction Worker							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	NA	9.9E-04	2.6E-03	**3.6E-03**	N/A	N/A	N/A	**0.0E+00**	N/A	4.8E-03	2.0E-03	**6.8E-03**	N/A	N/A	N/A	**0.0E+00**
Aluminum	7.1E-04	1.4E-02	9.7E-03	**2.4E-02**	N/A	N/A	N/A	**0.0E+00**	2.1E-03	6.8E-02	7.5E-03	**7.7E-02**	N/A	N/A	N/A	**0.0E+00**
Aroclor-1254	N/A	2.2E-02	2.8E-02	**5.0E-02**	1.6E-11	3.1E-07	3.9E-07	**7.1E-07**	N/A	4.2E-02	8.5E-03	**5.1E-02**	1.9E-12	6.0E-08	1.2E-08	**7.3E-08**
Aroclor-1260	N/A	N/A	N/A	**0.0E+00**	1.5E-11	2.9E-07	3.7E-07	**6.6E-07**	N/A	N/A	N/A	**0.0E+00**	1.8E-12	5.6E-08	1.1E-08	**6.8E-08**
Arsenic	N/A	6.5E-03	4.1E-03	**1.1E-02**	5.3E-10	1.0E-06	6.6E-07	**1.7E-06**	N/A	3.1E-02	3.2E-03	**3.4E-02**	6.4E-11	2.0E-07	2.0E-08	**2.2E-07**
Benzo(a)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	5.9E-06	N/A	**5.9E-06**	N/A	N/A	N/A	**0.0E+00**	N/A	1.1E-06	N/A	**1.1E-06**
Benzo(a)pyrene	N/A	N/A	N/A	**0.0E+00**	1.6E-09	7.4E-05	N/A	**7.4E-05**	N/A	N/A	N/A	**0.0E+00**	1.9E-10	1.4E-05	N/A	**1.4E-05**
Benzo(b)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	1.2E-05	N/A	**1.2E-05**	N/A	N/A	N/A	**0.0E+00**	N/A	2.4E-06	N/A	**2.4E-06**
Benzo(k)fluoranthene	N/A	N/A	N/A	**0.0E+00**	N/A	2.5E-06	N/A	**2.5E-06**	N/A	N/A	N/A	**0.0E+00**	N/A	4.8E-07	N/A	**4.8E-07**
Carbazole	N/A	N/A	N/A	**0.0E+00**	N/A	1.4E-08	N/A	**1.4E-08**	N/A	N/A	N/A	**0.0E+00**	N/A	2.7E-09	N/A	**2.7E-09**
Chromium	3.2E-05	6.4E-03	1.2E-01	**1.3E-01**	1.4E-08	N/A	N/A	**1.4E-08**	9.7E-05	4.6E-03	1.4E-02	**1.9E-02**	1.7E-09	N/A	N/A	**1.7E-09**
Dibenz(a,h)anthracene	N/A	N/A	N/A	**0.0E+00**	N/A	8.6E-05	N/A	**8.6E-05**	N/A	N/A	N/A	**0.0E+00**	N/A	1.7E-05	N/A	**1.7E-05**
Dibenzofuran	N/A	2.0E-04	5.4E-05	**2.6E-04**	N/A	N/A	N/A	**0.0E+00**	N/A	9.7E-04	4.2E-05	**1.0E-03**	N/A	N/A	N/A	**0.0E+00**
Dieldrin	N/A	2.9E-04	1.1E-03	**1.4E-03**	4.2E-12	8.4E-08	3.1E-07	**4.0E-07**	N/A	1.4E-03	8.5E-04	**2.3E-03**	5.1E-13	N/A	N/A	**5.1E-13**
Fluorene	N/A	3.8E-02	1.0E-01	**1.4E-01**	N/A	N/A	N/A	**0.0E+00**	N/A	1.8E-02	7.9E-03	**2.6E-02**	N/A	N/A	N/A	**0.0E+00**
Indeno(1,2,3-cd)pyrene	N/A	N/A	N/A	**0.0E+00**	N/A	4.1E-06	N/A	**4.1E-06**	N/A	N/A	N/A	**0.0E+00**	N/A	7.8E-07	N/A	**7.8E-07**
Iron	N/A	2.4E-02	2.3E-02	**4.7E-02**	N/A	N/A	N/A	**0.0E+00**	N/A	1.2E-01	1.8E-02	**1.3E-01**	N/A	N/A	N/A	**0.0E+00**
Napthalene	1.5E-07	1.3E-04	3.1E-04	**4.4E-04**	N/A	N/A	N/A	**0.0E+00**	4.4E-07	6.3E-04	2.4E-04	**8.7E-04**	N/A	N/A	N/A	**0.0E+00**
Totals	**7.4E-04**	**1.1E-01**	**2.9E-01**	**4.0E-01**	**1.6E-08**	**1.9E-04**	**1.7E-06**	**1.9E-04**	**2.2E-03**	**2.9E-01**	**6.2E-02**	**3.5E-01**	**2.0E-09**	**3.6E-05**	**4.4E-08**	**3.6E-05**

* Inhalation risk is the adult showering scenario.

Table 5-5
Summary Table for All Pathways for All RME Exposure Scenarios at SWMU 15
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Surface Soil														
Current Industrial Worker	1.6E-08	7.4E-04	1.8E-04	1.1E-01	1.7E-06	2.9E-01	1.9E-04	4.0E-01	0%	0%	99%	28%	1%	72%
Current Trespasser/Visitor Adult	7.3E-10	3.5E-05	3.7E-05	2.3E-02	2.2E-07	3.7E-02	3.7E-05	6.1E-02	0%	0%	99%	39%	1%	61%
Current Trespasser/Visitor Adolescent	3.8E-10	4.8E-05	1.9E-05	3.2E-02	4.6E-08	2.1E-02	1.9E-05	5.4E-02	0%	0%	100%	60%	0%	40%
Sediment														
Current/Future Trespasser/Visitor Adult	--	--	3.5E-07	1.3E-02	2.3E-07	1.2E-02	5.8E-07	2.5E-02	--	--	60%	52%	40%	48%
Current/Future Trespasser/Visitor Adolescent	--	--	1.8E-07	1.8E-02	2.9E-08	4.0E-03	2.1E-07	2.2E-02	--	--	86%	82%	14%	18%
Groundwater														
Future Residential Adult	1.9E-03	2.2E+02	--	3.6E+01	--	4.4E+00	1.9E-03	2.6E+02	100%	84%	--	14%	--	2%
Future Residential Child	--	--	--	8.5E+01	--	1.0E+01	--	9.5E+01	--	--	--	89%	--	11%
Future Residential Age-Adjusted	1.9E-03	--	3.3E-03	--	3.8E-04	--	5.7E-03	--	34%	--	59%	--	7%	--
Future Construction Worker	6.6E-06	1.9E+01	--	--	1.5E-05	1.2E+01	2.2E-05	3.1E+01	30%	60%	--	--	70%	40%
Surface and Subsurface Soil														
Future Trespasser/Visitor Adult	6.6E-10	3.5E-05	3.7E-05	2.4E-02	2.2E-07	3.7E-02	3.7E-05	6.1E-02	0%	0%	99%	39%	1%	61%
Future Trespasser/Visitor Adolescent	3.8E-10	4.8E-05	1.9E-05	3.2E-02	4.6E-08	2.8E-02	1.9E-05	6.1E-02	0%	0%	100%	53%	0%	47%
Future Resident Adult	--	3.1E-03	--	1.6E-01	--	2.5E-01	--	4.1E-01	--	1%	--	38%	--	61%
Future Resident Child	--	8.8E-03	--	1.5E+00	--	2.7E-01	--	1.8E+00	--	0%	--	84%	--	15%
Future Residential Age-Adjusted	1.1E-07	--	8.4E-04	--	1.8E-06	--	8.4E-04	--	0%	--	100%	--	0%	--
Future Industrial Worker	1.6E-08	7.4E-04	1.9E-04	1.1E-01	1.7E-06	2.9E-01	1.9E-04	4.0E-01	0%	0%	99%	28%	1%	72%
Future Construction Worker	2.0E-09	2.2E-03	3.6E-05	2.9E-01	4.4E-08	6.2E-02	3.6E-05	3.5E-01	0%	1%	100%	82%	0%	17%

Age-adjusted is a sum of the child and adult.

Risk = carcinogenic risk as determined by the risk calculations in Appendix B-4.

HI = Hazard index as determined by the risk calculation in Appendix B-4.

0% is <1% contribution by the pathway.

T[illegible]-6

Summary of Media-Specific Risks and Hazards For CT

SWMU 15

NAS Oceana

Media: Current - Surface Soil

	Industrial Worker								Trespasser/Visitor Adult							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Aluminum	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Aroclor-1254	--	--	--	--	--	2.8E-08	5.9E-08	8.7E-08	--	--	--	--	--	5.9E-09	7.9E-09	1.4E-08
Aroclor-1260	--	--	--	--	--	2.6E-08	5.5E-08	8.1E-08	--	--	--	--	--	5.5E-09	7.4E-09	1.3E-08
Arsenic	--	--	--	--	--	9.2E-08	9.9E-08	1.9E-07	--	--	--	--	--	2.0E-08	1.3E-08	3.3E-08
Benzo(a)anthracene	--	--	--	--	--	5.1E-07	N/A	5.1E-07	--	--	--	--	--	1.1E-07	N/A	1.1E-07
Benzo(a)pyrene	--	--	--	--	--	6.5E-06	N/A	6.5E-06	--	--	--	--	--	1.4E-06	N/A	1.4E-06
Benzo(b)fluoranthene	--	--	--	--	--	1.1E-06	N/A	1.1E-06	--	--	--	--	--	2.3E-07	N/A	2.3E-07
Benzo(g,h,i)perylene	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	0.0E+00
Benzo(k)fluoranthene	--	--	--	--	--	3.6E-08	N/A	3.6E-08	--	--	--	--	--	4.7E-08	N/A	4.7E-08
Carbazole	--	--	--	--	--	1.2E-09	N/A	1.2E-09	--	--	--	--	--	2.6E-10	N/A	2.6E-10
Chromium	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Dibenz(a,h)anthracene	--	--	--	--	--	7.5E-06	N/A	7.5E-06	--	--	--	--	--	1.6E-06	N/A	1.6E-06
Dibenzofuran	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Dieldrin	--	--	--	--	--	7.3E-09	4.7E-08	5.4E-08	--	--	--	--	--	1.6E-09	6.3E-09	7.9E-09
Fluorene	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	--	--	3.6E-07	N/A	3.6E-07	--	--	--	--	--	7.6E-08	N/A	7.6E-08
Iron	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Napthalene	--	--	--	--	--	N/A	N/A	0.0E+00	--	--	--	--	--	N/A	N/A	0.0E+00
Totals	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E-05	2.6E-07	1.6E-05	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.5E-06	3.5E-08	3.5E-06

	Trespasser/Visitor Adolescent							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	--	--	--	--	N/A	N/A	0.0E+00
Aluminum	--	--	--	--	--	N/A	N/A	0.0E+00
Aroclor-1254	--	--	--	--	--	8.1E-09	4.0E-09	1.2E-08
Aroclor-1260	--	--	--	--	--	7.5E-09	3.7E-09	1.1E-08
Arsenic	--	--	--	--	--	2.7E-08	6.7E-09	3.4E-08
Benzo(a)anthracene	--	--	--	--	--	1.5E-07	N/A	1.5E-07
Benzo(a)pyrene	--	--	--	--	--	1.9E-06	N/A	1.9E-06
Benzo(b)fluoranthene	--	--	--	--	--	3.2E-07	N/A	3.2E-07
Benzo(k)fluoranthene	--	--	--	--	--	1.0E-08	N/A	1.0E-08
Carbazole	--	--	--	--	--	3.6E-10	N/A	3.6E-10
Chromium	--	--	--	--	--	N/A	N/A	0.0E+00
Dibenz(a,h)anthracene	--	--	--	--	--	2.2E-06	N/A	2.2E-06
Dibenzofuran	--	--	--	--	--	N/A	N/A	0.0E+00
Dieldrin	--	--	--	--	--	2.2E-09	3.2E-09	5.4E-09
Fluorene	--	--	--	--	--	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	--	--	1.0E-07	N/A	1.0E-07
Iron	--	--	--	--	--	N/A	N/A	0.0E+00
Napthalene	--	--	--	--	--	N/A	N/A	0.0E+00
Totals	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.7E-06	1.8E-08	4.8E-06

Table 5-6
Summary of Media-Specific Risks and Hazards For CT
SWMU 15
NAS Oceana

Media: Future - Groundwater

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Aluminum	NA	7.5E-03	6.7E-05	**7.6E-03**	N/A	--	--	**0.0E+00**	--	2.5E-02	2.1E-04	**2.5E-02**	--	--	--	--
Arsenic	N/A	8.4E-01	2.1E-03	**8.4E-01**	N/A	--	--	**0.0E+00**	--	2.8E+00	6.7E-03	**2.8E+00**	--	--	--	--
Benzene	6.6E+01	1.5E+01	2.4E+00	**8.3E+01**	4.2E-04	--	--	**4.2E-04**	--	4.9E+01	5.8E+00	**5.5E+01**	--	--	--	--
Carbon disulfide	4.0E-02	2.5E-02	5.8E-03	**7.0E-02**	N/A	--	--	**0.0E+00**	--	8.3E-02	1.4E-02	**9.7E-02**	--	--	--	--
Chloroform	7.8E+01	3.6E-01	4.5E-02	**7.9E+01**	7.0E-05	--	--	**7.0E-05**	--	1.2E+00	9.5E-02	**1.3E+00**	--	--	--	--
Ethylbenzene	2.7E-02	3.1E-02	3.5E-02	**9.3E-02**	N/A	--	--	**0.0E+00**	--	1.0E-01	7.4E-02	**1.8E-01**	--	--	--	--
Iron	N/A	6.6E-01	8.0E-03	**6.7E-01**	N/A	--	--	**0.0E+00**	--	2.2E+00	2.5E-02	**2.2E+00**	--	--	--	--
Manganese	N/A	3.1E-01	2.2E-03	**3.2E-01**	N/A	--	--	**0.0E+00**	--	1.0E+00	6.9E-03	**1.1E+00**	--	--	--	--
Methylene chloride	5.7E-03	4.6E-02	2.1E-03	**5.4E-02**	1.0E-06	--	--	**1.0E-06**	--	1.5E-01	5.2E-03	**1.6E-01**	--	--	--	--
Naphthalene	1.2E+00	1.8E-02	3.0E-02	**1.2E+00**	N/A	--	--	**0.0E+00**	--	6.0E-02	6.1E-02	**1.2E-01**	--	--	--	--
Tetrachloroethene	1.1E-03	6.5E-03	1.0E-02	**1.8E-02**	3.9E-08	--	--	**3.9E-08**	--	2.2E-02	2.0E-02	**4.2E-02**	--	--	--	--
Totals	**1.5E+02**	**1.7E+01**	**2.5E+00**	**1.6E+02**	**4.9E-04**	**0.0E+00**	**0.0E+00**	**4.9E-04**	**0.0E+00**	**5.7E+01**	**6.1E+00**	**6.3E+01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Media: Future - Groundwater

	Resident Age-Adjusted								Construction Worker							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh*	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Aluminum	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	--	**0.0E+00**	--	--	N/A	**0.0E+00**
Arsenic	--	--	--	--	N/A	1.6E-04	3.9E-07	**1.6E-04**	NA	--	--	**0.0E+00**	--	--	1.5E-07	**1.5E-07**
Benzene	--	--	--	--	4.2E-04	1.0E-03	1.3E-04	**1.6E-03**	9.3E-03	--	--	**9.3E-03**	--	--	1.1E-05	**1.1E-05**
Carbon disulfide	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	4.5E-06	--	--	**4.5E-06**	--	--	N/A	**0.0E+00**
Chloroform	--	--	--	--	7.0E-05	9.0E-06	8.4E-07	**8.0E-05**	1.3E-02	--	--	**1.3E-02**	--	--	8.4E-08	**8.4E-08**
Ethylbenzene	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	3.6E-06	--	--	**3.6E-06**	--	--	N/A	**0.0E+00**
Iron	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	--	**0.0E+00**	--	--	N/A	**0.0E+00**
Manganese	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	N/A	--	--	**0.0E+00**	--	--	N/A	**0.0E+00**
Methylene chloride	--	--	--	--	1.0E-06	8.6E-06	3.2E-07	**1.0E-05**	1.1E-06	--	--	**1.1E-06**	--	--	4.9E-08	**4.9E-08**
Naphthalene	--	--	--	--	N/A	N/A	N/A	**0.0E+00**	1.3E-04	--	--	**1.3E-04**	--	--	N/A	**0.0E+00**
Tetrachloroethene	--	--	--	--	3.9E-08	1.4E-06	1.6E-06	**3.0E-06**	1.4E-07	--	--	**1.4E-07**	--	--	7.0E-08	**7.0E-08**
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**4.9E-04**	**1.2E-03**	**1.4E-04**	**1.8E-03**	**2.3E-02**	**0.0E+00**	**0.0E+00**	**2.3E-02**	**0.0E+00**	**0.0E+00**	**1.1E-05**	**1.1E-05**

Summary of Media-Specific Risks and Hazards For CT

SWMU 15

NAS Oceana

Media: Future - Surface and Subsurface Soil

	Trespasser/Visitor Adult								Trespasser/Visitor Adolescent							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Aluminum	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Aroclor-1254	--	--	--	0.0E+00	--	5.9E-09	7.9E-09	1.4E-08	--	--	--	0.0E+00	--	8.1E-09	6.0E-09	1.4E-08
Aroclor-1260	--	--	--	0.0E+00	--	5.5E-09	7.4E-09	1.3E-08	--	--	--	0.0E+00	--	7.5E-09	5.6E-09	1.3E-08
Arsenic	--	--	--	0.0E+00	--	2.0E-08	1.3E-08	3.3E-08	--	--	--	0.0E+00	--	2.7E-08	1.0E-08	3.7E-08
Benzo(a)anthracene	--	--	--	0.0E+00	--	1.1E-07	N/A	1.1E-07	--	--	--	0.0E+00	--	1.5E-07	N/A	1.5E-07
Benzo(a)pyrene	--	--	--	0.0E+00	--	1.4E-06	N/A	1.4E-06	--	--	--	0.0E+00	--	1.9E-06	N/A	1.9E-06
Benzo(b)fluoranthene	--	--	--	0.0E+00	--	2.3E-07	N/A	2.3E-07	--	--	--	0.0E+00	--	3.2E-07	N/A	3.2E-07
Benzo(k)fluoranthene	--	--	--	0.0E+00	--	4.7E-08	N/A	4.7E-08	--	--	--	0.0E+00	--	6.5E-08	N/A	6.5E-08
Carbazole	--	--	--	0.0E+00	--	2.6E-10	N/A	2.6E-10	--	--	--	0.0E+00	--	3.6E-10	N/A	3.6E-10
Chromium	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Dibenz(a,h)anthracene	--	--	--	0.0E+00	--	1.6E-06	N/A	1.6E-06	--	--	--	0.0E+00	--	2.2E-06	N/A	2.2E-06
Dibenzofuran	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Dieldrin	--	--	--	0.0E+00	--	1.6E-09	6.3E-09	7.9E-09	--	--	--	0.0E+00	--	2.2E-09	4.7E-09	6.9E-09
Fluorene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	0.0E+00	--	7.6E-08	N/A	7.6E-08	--	--	--	0.0E+00	--	1.0E-07	N/A	1.0E-07
Iron	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Napthalene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.5E-06**	**3.5E-08**	**3.5E-06**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**4.8E-06**	**2.6E-08**	**4.8E-06**

Media: Future - Surface and Subsurface Soil

	Resident Child								Resident Age-Adjusted							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	4.3E-03	1.4E-03	5.8E-03	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Aluminum	--	6.2E-02	5.3E-03	6.7E-02	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Aroclor-1254	--	9.6E-02	1.5E-02	1.1E-01	--	--	--	--	--	--	--	--	--	3.8E-07	1.2E-07	5.1E-07
Aroclor-1260	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	3.6E-07	1.1E-07	4.7E-07
Arsenic	--	2.8E-02	2.2E-03	3.1E-02	--	--	--	--	--	--	--	--	--	1.3E-06	2.0E-07	1.5E-06
Benzo(a)anthracene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	7.1E-06	N/A	7.1E-06
Benzo(a)pyrene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	9.0E-05	N/A	9.0E-05
Benzo(b)fluoranthene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	1.5E-05	N/A	1.5E-05
Benzo(k)fluoranthene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	3.1E-06	N/A	3.1E-06
Carbazole	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	1.7E-08	N/A	1.7E-08
Chromium	--	2.8E-02	6.4E-02	9.2E-02	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Dibenz(a,h)anthracene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	1.0E-04	N/A	1.0E-04
Dibenzofuran	--	8.9E-04	2.9E-05	9.2E-04	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Dieldrin	--	1.3E-03	5.9E-04	1.9E-03	--	--	--	--	--	--	--	--	--	1.0E-07	9.7E-08	2.0E-07
Fluorene	--	1.7E-01	5.5E-02	2.2E-01	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	N/A	N/A	0.0E+00	--	--	--	--	--	--	--	--	--	5.0E-06	N/A	5.0E-06
Iron	--	1.1E-01	1.2E-02	1.2E-01	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Napthalene	--	5.8E-04	1.7E-04	7.4E-04	--	--	--	--	--	--	--	--	--	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**4.9E-01**	**1.6E-01**	**6.5E-01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.3E-04**	**5.4E-07**	**2.3E-04**

Table 5-6
Summary of Media-Specific Risks and Hazards For CT
SWMU 15
NAS Oceana

Media: Future - Surface and Subsurface Soil

	Industrial Worker								Construction Worker							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
Acenaphthene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Aluminum	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Aroclor-1254	--	--	--	0.0E+00	--	2.8E-08	5.9E-08	8.7E-08	--	--	--	0.0E+00	--	5.3E-08	9.1E-09	6.2E-08
Aroclor-1260	--	--	--	0.0E+00	--	2.6E-08	5.5E-08	8.1E-08	--	--	--	0.0E+00	--	4.9E-08	8.5E-09	5.8E-08
Arsenic	--	--	--	0.0E+00	--	9.2E-08	9.9E-08	1.9E-07	--	--	--	0.0E+00	--	1.8E-07	1.5E-08	1.9E-07
Benzo(a)anthracene	--	--	--	0.0E+00	--	5.1E-07	N/A	5.1E-07	--	--	--	0.0E+00	--	9.8E-07	N/A	9.8E-07
Benzo(a)pyrene	--	--	--	0.0E+00	--	6.5E-06	N/A	6.5E-06	--	--	--	0.0E+00	--	1.2E-05	N/A	1.2E-05
Benzo(b)fluoranthene	--	--	--	0.0E+00	--	1.1E-06	N/A	1.1E-06	--	--	--	0.0E+00	--	2.1E-06	N/A	2.1E-06
Benzo(k)fluoranthene	--	--	--	0.0E+00	--	2.2E-07	N/A	2.2E-07	--	--	--	0.0E+00	--	4.2E-07	N/A	4.2E-07
Carbazole	--	--	--	0.0E+00	--	1.2E-09	N/A	1.2E-09	--	--	--	0.0E+00	--	2.4E-09	N/A	2.4E-09
Chromium	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Dibenz(a,h)anthracene	--	--	--	0.0E+00	--	7.5E-06	N/A	7.5E-06	--	--	--	0.0E+00	--	1.4E-05	N/A	1.4E-05
Dieldrin	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Fluorene	--	--	--	0.0E+00	--	7.3E-09	4.7E-08	5.4E-08	--	--	--	0.0E+00	--	1.4E-08	7.2E-09	2.1E-08
Fluorene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Indeno(1,2,3-cd)pyrene	--	--	--	0.0E+00	--	3.6E-07	N/A	3.6E-07	--	--	--	0.0E+00	--	6.9E-07	N/A	6.9E-07
Iron	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Napthalene	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00	--	--	--	0.0E+00	--	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.6E-05**	**2.6E-07**	**1.7E-05**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.1E-05**	**4.0E-08**	**3.1E-05**

-- all RME risks are below 1E-05 and hazards below 1, therefore, CT's were not calculated.

* Inhalation risk is the adult showering scenario.

Table 5-7
Summary Table for All Pathways for All CT Exposure Scenarios at SWMU 15
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Surface Soil														
Current Industrial Worker	--	--	1.6E-05	--	2.6E-07	--	1.6E-05	--	--	--	98%	--	2%	--
Current Trespasser/Visitor Adult	--	--	3.5E-06	--	3.5E-08	--	3.5E-06	--	--	--	99%	--	1%	--
Current Trespasser/Visitor Adolescent	--	--	4.7E-06	--	1.8E-08	--	4.8E-06	--	--	--	100%	--	0%	--
Groundwater														
Future Residential Adult	4.9E-04	1.5E+02	--	1.7E+01	--	2.5E+00	4.9E-04	1.6E+02	100%	88%	--	10%	--	2%
Future Residential Child	--	--	--	5.7E+01	--	6.1E+00	--	6.3E+01	--	--	--	90%	--	10%
Future Residential Age-Adjusted	4.9E-04	--	1.2E-03	--	1.4E-04	--	1.3E-03	--	37%	--	90%	--	10%	--
Future Construction Worker	--	2.3E-02	--	--	1.1E-05	--	1.1E-05	2.3E-02	--	100%	--	--	100%	--
Surface and Subsurface Soil														
Future Trespasser/Visitor Adult	--	--	3.5E-06	--	3.5E-08	--	3.5E-06	--	--	--	99%	--	1%	--
Future Trespasser/Visitor Adolescent	--	--	4.8E-06	--	2.6E-08	--	4.8E-06	--	--	--	99%	--	1%	--
Future Resident Child	--	--	--	4.9E-01	--	1.6E-01	--	6.5E-01	--	--	--	76%	--	24%
Future Residential Age-Adjusted	--	--	2.3E-04	--	5.4E-07	--	2.3E-04	--	--	--	100%	--	0%	--
Future Industrial Worker	--	--	1.6E-05	--	2.6E-07	--	1.7E-05	--	--	--	98%	--	2%	--
Future Construction Worker	--	--	3.1E-05	--	4.0E-08	--	3.1E-05	--	--	--	100%	--	0%	--

Age-adjusted is a sum of the child and adult.

Risk = carcinogenic risk as determined by the risk calculations in Appendix B-4.

HI = Hazard index as determined by the risk calculation in Appendix B-4.

0% is <1% contribution by the pathway.

Table 6-1
Summary of Data Used in the Human Health Risk Assessment
NAS Oceana
SWMU 24

Medium	Number of Samples	Date of Sampling	Sample ID	Parameters
Subsurface Soil		12/09/1997	OW24-SB09	TCL VOCs
			OW24-SB10	PAHs
			OW24-SB11	
			OW24-SB12	
			OW24-SB13	
			OW24-SB14	
			OW24-SB15	
			OW24-SB16	
			OW24-SB16P	
			OW24-SB17	
			OW24-SB18	
Groundwater		07/28/1999	OW24-MW01	TCL LC-VOCs
			OW24-MW01D	TCL SVOCs
			OW24-MW02	Pesticides/PCBs
			OW24-MW02P	TAL Filtered Metals
			OW24-MW03	TAL Total Metals & Cyanide
			OW24-MW04	
			OW24-MW05	
			OW24-MW06	
			OW24-MW07	
			OW24-MW08	
			OW24-MW09	
			OW24-MW10	
			OW24-MW11	
			OW24-MW11P	
			OW24-PZ3S	
			OW24-PZ3D	

P = duplicate sample
D = deep well
R01 = round 1

Table 6-2 Summary of Chemicals of Potential Concern for the HHRA *SWMU 24* *NAS Oceana*	
Groundwater	**Subsurface Soil**
1,1,2-Trichloroethane	1,2-Dichloroethene (total)
1,1-Dichloroethene	Acetone
Acenaphthylene	Methylene Chloride
alpha-BHC	Naphthalene
Aluminum (1)	
Antimony (1)	
Arsenic (1)	
Benzene	
cis-1,2-Dichloroethene	
Dibenzofuran	
Iron (1)	
Manganese (1)	
Naphthalene	
trans-1,2-Dichloroethene	
Trichloroethene	
Vinyl chloride	

Table 6-3 Exposure Pathways *SWMU 24* *NAS Oceana*					
Media	**Exposure Route**	**Future**			
		Resident		**Construction Worker**	**Industrial Worker**
		Adult	**Child**		
Groundwater					
	Ingestion	X	X		
	Dermal	X	X	X	
	Inhalation	X		X	
Subsurface Soil					
	Ingestion	X	X	X	X
	Dermal	X	X	X	X
	Inhalation	X	X	X	X

Table 6-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 24
NAS Oceana

Media: Future - Groundwater

	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	5.7E-03	5.5E-04	**6.2E-03**	2.7E-07	--	--	**2.7E-07**	--	1.3E-02	1.3E-03	**1.5E-02**	--	--	--	**0.0E+00**
1,1-Dichloroethene	N/A	6.1E-04	8.8E-05	**7.0E-04**	6.7E-07	--	--	**6.7E-07**	--	1.4E-03	2.1E-04	**1.6E-03**	--	--	--	**0.0E+00**
Acenaphthylene	N/A	9.0E-03	1.8E-02	**2.7E-02**	N/A	--	--	**0.0E+00**	--	N/A	4.3E-02	**4.3E-02**	--	--	--	**0.0E+00**
alpha-BHC	N/A	N/A	N/A	**0.0E+00**	1.4E-08	--	--	**1.4E-08**	--	N/A	N/A	**0.0E+00**	--	--	--	**0.0E+00**
Aluminum (d)	N/A	2.6E-03	1.9E-05	**2.6E-03**	N/A	--	--	**0.0E+00**	--	6.0E-03	5.8E-05	**6.1E-03**	--	--	--	**0.0E+00**
Antimony (d)	N/A	1.8E-01	3.6E-03	**1.8E-01**	N/A	--	--	**0.0E+00**	--	4.2E-01	1.1E-02	**4.3E-01**	--	--	--	**0.0E+00**
Arsenic (d)	N/A	7.7E+00	1.6E-02	**7.7E+00**	N/A	--	--	**0.0E+00**	--	1.8E+01	4.9E-02	**1.8E+01**	--	--	--	**0.0E+00**
Benzene	2.5E-02	8.0E-03	1.1E-03	**3.4E-02**	4.2E-07	--	--	**4.2E-07**	--	1.9E-02	2.5E-03	**2.1E-02**	--	--	--	**0.0E+00**
cis-1,2-Dichloroethene	N/A	1.4E+00	9.9E-02	**1.5E+00**	N/A	--	--	**0.0E+00**	--	3.2E+00	2.3E-01	**3.4E+00**	--	--	--	**0.0E+00**
Dibenzofuran	N/A	2.1E-02	5.3E-02	**7.3E-02**	N/A	--	--	**0.0E+00**	--	4.8E-02	1.3E-01	**1.7E-01**	--	--	--	**0.0E+00**
Iron (d)	N/A	3.3E+00	3.3E-02	**3.3E+00**	N/A	--	--	**0.0E+00**	--	7.6E+00	1.0E-01	**7.7E+00**	--	--	--	**0.0E+00**
Manganese (d)	N/A	4.6E-01	2.6E-03	**4.6E-01**	N/A	--	--	**0.0E+00**	--	1.1E+00	8.0E-03	**1.1E+00**	--	--	--	**0.0E+00**
Naphthalene	1.9E-01	2.1E-02	1.6E-02	**2.2E-01**	N/A	--	--	**0.0E+00**	--	4.8E-02	3.8E-02	**8.6E-02**	--	--	--	**0.0E+00**
trans-1,2-Dichloroethene	N/A	1.7E-02	1.2E-03	**1.8E-02**	N/A	--	--	**0.0E+00**	--	4.0E-02	2.9E-03	**4.3E-02**	--	--	--	**0.0E+00**
Trichloroethene	N/A	1.1E-02	2.1E-03	**1.3E-02**	2.2E-07	--	--	**2.2E-07**	--	2.6E-02	4.9E-03	**3.1E-02**	--	--	--	**0.0E+00**
Vinyl chloride	1.9E-03	7.6E-03	3.2E-04	**9.9E-03**	5.6E-07	--	--	**5.6E-07**	--	1.8E-02	7.5E-04	**1.9E-02**	--	--	--	**0.0E+00**
Totals	**2.1E-01**	**1.3E+01**	**2.5E-01**	**1.4E+01**	**2.2E-06**	**0.0E+00**	**0.0E+00**	**2.2E-06**	**0.0E+00**	**3.1E+01**	**6.2E-01**	**3.1E+01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Media: Future - Groundwater

	Resident Age-Adjusted							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh*	Ing	Der	Total
1,1,2-Trichloroethane	--	--	--	**0.0E+00**	2.7E-07	7.0E-07	6.9E-08	**1.0E-06**
1,1-Dichloroethene	--	--	--	**0.0E+00**	6.7E-07	1.8E-06	2.1E-07	**2.7E-06**
Acenaphthylene	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
alpha-BHC	--	--	--	**0.0E+00**	1.4E-08	3.1E-06	2.5E-06	**5.6E-06**
Aluminum (d)	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Antimony (d)	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Arsenic (d)	--	--	--	**0.0E+00**	N/A	1.9E-03	2.6E-06	**1.9E-03**
Benzene	--	--	--	**0.0E+00**	4.2E-07	7.2E-07	1.3E-07	**1.3E-06**
cis-1,2-Dichloroethene	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Dibenzofuran	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Iron (d)	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Manganese (d)	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Naphthalene	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
trans-1,2-Dichloroethene	--	--	--	**0.0E+00**	N/A	N/A	N/A	**0.0E+00**
Trichloroethene	--	--	--	**0.0E+00**	2.2E-07	4.0E-07	1.2E-07	**7.5E-07**
Vinyl chloride	--	--	--	**0.0E+00**	5.6E-07	1.9E-05	3.5E-06	**2.3E-05**
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.2E-06**	**1.9E-03**	**9.1E-06**	**1.9E-03**

Table 6-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 24
NAS Oceana

Media: Future - Groundwater

Chemical	Construction Worker							
	HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	N/A	1.2E-04	**1.2E-04**	3.1E-10	N/A	3.8E-09	**4.1E-09**
1,1-Dichloroethene	N/A	N/A	1.2E-04	**1.2E-04**	7.1E-08	N/A	9.2E-09	**8.0E-08**
Acenaphthylene	N/A	N/A	2.5E-03	**2.5E-03**	N/A	N/A	N/A	**0.0E+00**
alpha-BHC	N/A	N/A	N/A	**0.0E+00**	2.4E-10	N/A	8.8E-08	**8.8E-08**
Aluminum	N/A	N/A	5.3E-03	**5.3E-03**	N/A	N/A	N/A	**0.0E+00**
Arsenic	N/A	N/A	1.3E-01	**1.3E-01**	N/A	N/A	8.8E-07	**8.8E-07**
Benzene	2.8E-04	N/A	3.0E-03	**3.3E-03**	2.0E-10	N/A	7.1E-09	**7.3E-09**
cis-1,2-Dichloroethene	N/A	N/A	2.5E-02	**2.5E-02**	N/A	N/A	N/A	**0.0E+00**
Dibenzofuran	N/A	N/A	7.1E-02	**7.1E-02**	N/A	N/A	N/A	**0.0E+00**
Iron	N/A	N/A	2.3E-01	**2.3E-01**	N/A	N/A	N/A	**0.0E+00**
Manganese	N/A	N/A	2.4E-02	**2.4E-02**	N/A	N/A	N/A	**0.0E+00**
Naphthalene	8.2E-03	N/A	3.1E-02	**3.9E-02**	N/A	N/A	N/A	**0.0E+00**
trans-1,2-Dichloroethene	N/A	N/A	3.2E-04	**3.2E-04**	N/A	N/A	N/A	**0.0E+00**
Trichloroethene	N/A	N/A	4.3E-03	**4.3E-03**	1.0E-06	N/A	4.1E-09	**1.0E-06**
Vinyl chloride	1.7E-05	N/A	1.0E-03	**1.0E-03**	2.1E-10	N/A	6.4E-08	**6.5E-08**
Totals	**8.5E-03**	**0.0E+00**	**5.3E-01**	**5.4E-01**	**1.1E-06**	**0.0E+00**	**1.1E-06**	**2.1E-06**

Media: Future - Subsurface Soil

Chemical	Industrial Worker							
	HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,2-Dichloroethene (total)	N/A	7.6E-05	4.2E-05	**1.2E-04**	N/A	N/A	N/A	**0.0E+00**
Acetone	N/A	6.8E-06	4.5E-06	**1.1E-05**	N/A	N/A	N/A	**0.0E+00**
Methylene chloride	3.3E-12	9.3E-07	6.5E-07	**1.6E-06**	1.7E-15	1.5E-10	1.0E-10	**2.5E-10**
Naphthalene	3.2E-08	2.9E-05	6.6E-05	**9.5E-05**	N/A	N/A	N/A	**0.0E+00**
Totals	**3.2E-08**	**1.1E-04**	**1.1E-04**	**2.3E-04**	**1.7E-15**	**1.5E-10**	**1.0E-10**	**2.5E-10**

Media: Future - Subsurface Soil

Chemical	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,2-Dichloroethene (total)	N/A	1.1E-04	3.7E-05	**1.4E-04**	--	--	--	**0.0E+00**	N/A	9.9E-04	3.9E-05	**1.0E-03**	--	--	--	**0.0E+00**
Acetone	N/A	9.5E-06	4.0E-06	**1.3E-05**	--	--	--	**0.0E+00**	N/A	8.8E-05	4.2E-06	**9.2E-05**	--	--	--	**0.0E+00**
Methylene chloride	1.4E-11	1.3E-06	5.7E-07	**1.9E-06**	--	--	--	**0.0E+00**	3.9E-11	1.2E-05	6.0E-07	**1.3E-05**	--	--	--	**0.0E+00**
Naphthalene	1.3E-07	4.0E-05	5.8E-05	**9.8E-05**	--	--	--	**0.0E+00**	3.8E-07	3.7E-04	6.1E-05	**4.4E-04**	--	--	--	**0.0E+00**
Totals	**1.3E-07**	**1.6E-04**	**1.0E-04**	**2.6E-04**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.8E-07**	**1.5E-03**	**1.0E-04**	**1.6E-03**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Table 6-4
Summary of Media-Specific Risks and Hazards For RME
SWMU 24
NAS Oceana

Media: Future - Subsurface Soil

	Resident Age-Adjusted							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,2-Dichloroethene (total)	--	--	--	0.0E+00	N/A	N/A	N/A	0.0E+00
Acetone	--	--	--	0.0E+00	N/A	N/A	N/A	0.0E+00
Methylene chloride	--	--	--	0.0E+00	1.1E-14	6.7E-10	1.1E-10	7.8E-10
Naphthalene	--	--	--	0.0E+00	N/A	N/A	N/A	0.0E+00
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.1E-14**	**6.7E-10**	**1.1E-10**	**7.8E-10**

Media: Future - Subsurface Soil

	Construction Worker							
	HQ				CR			
Chemical	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,2-Dichloroethene (total)	N/A	3.7E-04	3.3E-05	4.0E-04	N/A	N/A	N/A	0.0E+00
Acetone	N/A	3.2E-06	3.5E-07	3.6E-06	N/A	N/A	N/A	0.0E+00
Methylene chloride	9.8E-12	4.5E-06	5.0E-07	5.0E-06	2.0E-16	2.9E-11	1.1E-11	3.9E-11
Naphthalene	9.6E-08	1.4E-04	5.1E-05	1.9E-04	N/A	N/A	N/A	0.0E+00
Totals	**9.6E-08**	**5.1E-04**	**8.5E-05**	**6.0E-04**	**2.0E-16**	**2.9E-11**	**1.1E-11**	**3.9E-11**

* Age-adjusted in' alation risks are from adult showering scenario.

Table 6-5
Summary Table for All Pathways for All RME Exposure Scenarios at SWMU 24
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Groundwater														
Future Residential Child	--	--	--	3.1E+01	--	6.2E-01	--	3.1E+01	--	--	--	98%	--	2%
Future Residential Adult	2.2E-06	2.1E-01	--	1.3E+01	--	2.5E-01	2.2E-06	1.4E+01	100%	2%	--	97%	--	2%
Future Residential Age-Adjusted	2.2E-06	--	1.9E-03	--	9.1E-06	--	1.9E-03	--	0.1%	--	99.4%	--	0.5%	--
Future Construction Worker	1.1E-06	8.5E-03	--	--	1.1E-06	5.3E-01	2.1E-06	5.4E-01	51%	2%	--	--	49%	98%
Subsurface Soil														
Future Industrial Worker	1.7E-15	3.2E-08	1.5E-10	1.1E-04	1.0E-10	1.1E-04	2.5E-10	2.3E-04	0%	0%	59%	50%	41%	50%
Future Residential Child	--	3.8E-07	--	1.5E-03	--	1.0E-04	--	1.6E-03	--	0	--	93%	--	7%
Future Residential Adult	--	1.3E-07	--	1.6E-04	--	1.0E-04	--	2.6E-04	--	0%	--	61%	--	39%
Future Residential Age-Adjusted	1.1E-14	--	6.7E-10	--	1.1E-10	--	7.8E-10	--	0%	--	86%	--	14%	--
Future Construction Worker	2.0E-16	9.6E-08	2.9E-11	5.1E-04	1.1E-11	8.5E-05	3.9E-11	6.0E-04	0%	0%	73%	86%	27%	14%

Risk = carcinogenic risk as determined by the risk calculations in Appendix C-4.
HI = Hazard index as determined by the risk calculation in Appendix C-4.
-- = risks not calculated because not a complete pathway or age-adjusted risks calculated.

Table 6-6
Summary of Media-Specific Risks and Hazards For CT
SWMU 24
NAS Oceana

Media: Future - Groundwater

Chemical	Resident Adult								Resident Child							
	HQ				CR				HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	--	2.7E-03	3.2E-04	**3.0E-03**	--	--	--	**0.0E+00**	--	8.8E-03	7.7E-04	**9.6E-03**	--	--	--	**0.0E+00**
1,1-Dichloroethene	--	2.8E-04	5.0E-05	**3.3E-04**	--	--	--	**0.0E+00**	--	9.5E-04	9.7E-05	**1.0E-03**	--	--	--	**0.0E+00**
Acenaphthylene	--	NA	1.0E-02	**1.0E-02**	--	--	--	**0.0E+00**	--	N/A	N/A	**0.0E+00**	--	--	--	**0.0E+00**
alpha-BHC	--	N/A	N/A	**0.0E+00**	--	--	--	**0.0E+00**	--	N/A	N/A	**0.0E+00**	--	--	--	**0.0E+00**
Aluminum (d)	--	1.2E-03	1.1E-05	**1.2E-03**	--	--	--	**0.0E+00**	--	4.0E-03	3.4E-05	**4.0E-03**	--	--	--	**0.0E+00**
Antimony (d)	--	8.3E-02	2.0E-03	**8.5E-02**	--	--	--	**0.0E+00**	--	2.8E-01	6.3E-03	**2.8E-01**	--	--	--	**0.0E+00**
Arsenic (d)	--	3.6E+00	9.1E-03	**3.6E+00**	--	--	--	**0.0E+00**	--	1.2E+01	2.8E-02	**1.2E+01**	--	--	--	**0.0E+00**
Benzene	--	3.7E-03	6.0E-04	**4.3E-03**	--	--	--	**0.0E+00**	--	1.2E-02	1.5E-03	**1.4E-02**	--	--	--	**0.0E+00**
cis-1,2-Dichloroethene	--	6.4E-01	5.6E-02	**7.0E-01**	--	--	--	**0.0E+00**	--	2.1E+00	1.4E-01	**2.3E+00**	--	--	--	**0.0E+00**
Dibenzofuran	--	9.6E-03	3.0E-02	**4.0E-02**	--	--	--	**0.0E+00**	--	3.2E-02	7.3E-02	**1.0E-01**	--	--	--	**0.0E+00**
Iron (d)	--	1.5E+00	1.9E-02	**1.5E+00**	--	--	--	**0.0E+00**	--	5.1E+00	5.8E-02	**5.2E+00**	--	--	--	**0.0E+00**
Manganese (d)	--	2.1E-01	1.5E-03	**2.2E-01**	--	--	--	**0.0E+00**	--	7.1E-01	4.6E-03	**7.2E-01**	--	--	--	**0.0E+00**
Naphthalene	--	9.6E-03	9.1E-03	**1.9E-02**	--	--	--	**0.0E+00**	--	3.2E-02	2.2E-02	**5.4E-02**	--	--	--	**0.0E+00**
trans-1,2-Dichloroethene	--	8.0E-03	7.0E-04	**8.7E-03**	--	--	--	**0.0E+00**	--	2.7E-02	1.7E-03	**2.8E-02**	--	--	--	**0.0E+00**
Trichloroethene	--	5.3E-03	1.2E-03	**6.4E-03**	--	--	--	**0.0E+00**	--	1.8E-02	2.8E-03	**2.0E-02**	--	--	--	**0.0E+00**
Vinyl chloride	--	3.6E-03	1.8E-04	**3.7E-03**	--	--	--	**0.0E+00**	--	1.2E-02	4.3E-04	**1.2E-02**	--	--	--	**0.0E+00**
Totals	**0.0E+00**	**6.1E+00**	**1.4E-01**	**6.3E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.0E+01**	**3.4E-01**	**2.1E+01**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**

Media: Future - Groundwater

Chemical	Resident Age-Adjusted							
	HQ				CR			
	Inh	Ing	Der	Total	Inh	Ing	Der	Total
1,1,2-Trichloroethane	N/A	N/A	N/A	**0.0E+00**	--	2.5E-07	4.6E-08	**3.0E-07**
1,1-Dichloroethene	N/A	N/A	N/A	**0.0E+00**	--	6.4E-07	1.4E-07	**7.8E-07**
Acenaphthylene	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
alpha-BHC	N/A	N/A	N/A	**0.0E+00**	--	1.1E-06	1.7E-06	**2.8E-06**
Aluminum (d)	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Antimony (d)	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Arsenic (d)	N/A	N/A	N/A	**0.0E+00**	--	6.7E-04	1.7E-06	**6.7E-04**
Benzene	N/A	N/A	N/A	**0.0E+00**	--	2.5E-07	8.4E-08	**3.4E-07**
cis-1,2-Dichloroethene	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Dibenzofuran*	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Iron (d)	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Manganese (d)	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Naphthalene	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
trans-1,2-Dichloroethene	N/A	N/A	N/A	**0.0E+00**	--	N/A	N/A	**0.0E+00**
Trichloroethene	N/A	N/A	N/A	**0.0E+00**	--	1.4E-07	7.9E-08	**2.2E-07**
Vinyl chloride	N/A	N/A	N/A	**0.0E+00**	--	6.6E-06	2.3E-06	**9.0E-06**
Totals	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**0.0E+00**	**6.8E-04**	**6.1E-06**	**6.9E-04**

-- all RME risks are below 1E-05 and hazards below 1, therefore, CT's were not calculated.

Table 6-7
Summary Table for All Pathways for All CT Exposure Scenarios at SWMU 24
NAS Oceana

	Exposure Pathways						Total Risk for Pathways	Total HI for Pathways	Percent Contribution by Pathway					
	Inhalation		Ingestion		Dermal				Inhalation		Ingestion		Dermal	
	Risk	HI	Risk	HI	Risk	HI			% Risk	% HI	% Risk	% HI	% Risk	% HI
Groundwater														
Future Residential Child	--	--	--	2.0E+01	--	3.4E-01	--	2.1E+01	--	--	--	98%	--	2%
Future Residential Adult	--	--	--	6.1E+00	--	1.4E-01	--	6.3E+00	--	--	--	98%	--	2%
Future Residential Age-Adjusted	--	--	6.8E-04	--	6.1E-06	--	6.9E-04	--	--	--	99.1%	--	1%	--
Future Construction Worker	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Risk = carcinogenic risk as determined by the risk calculations in Appendix C-4.
HI = Hazard index as determined by the risk calculation in Appendix C-4.
-- all RME risks are below 1E-05 and hazards below 1, therefore, CT's were not calculated.

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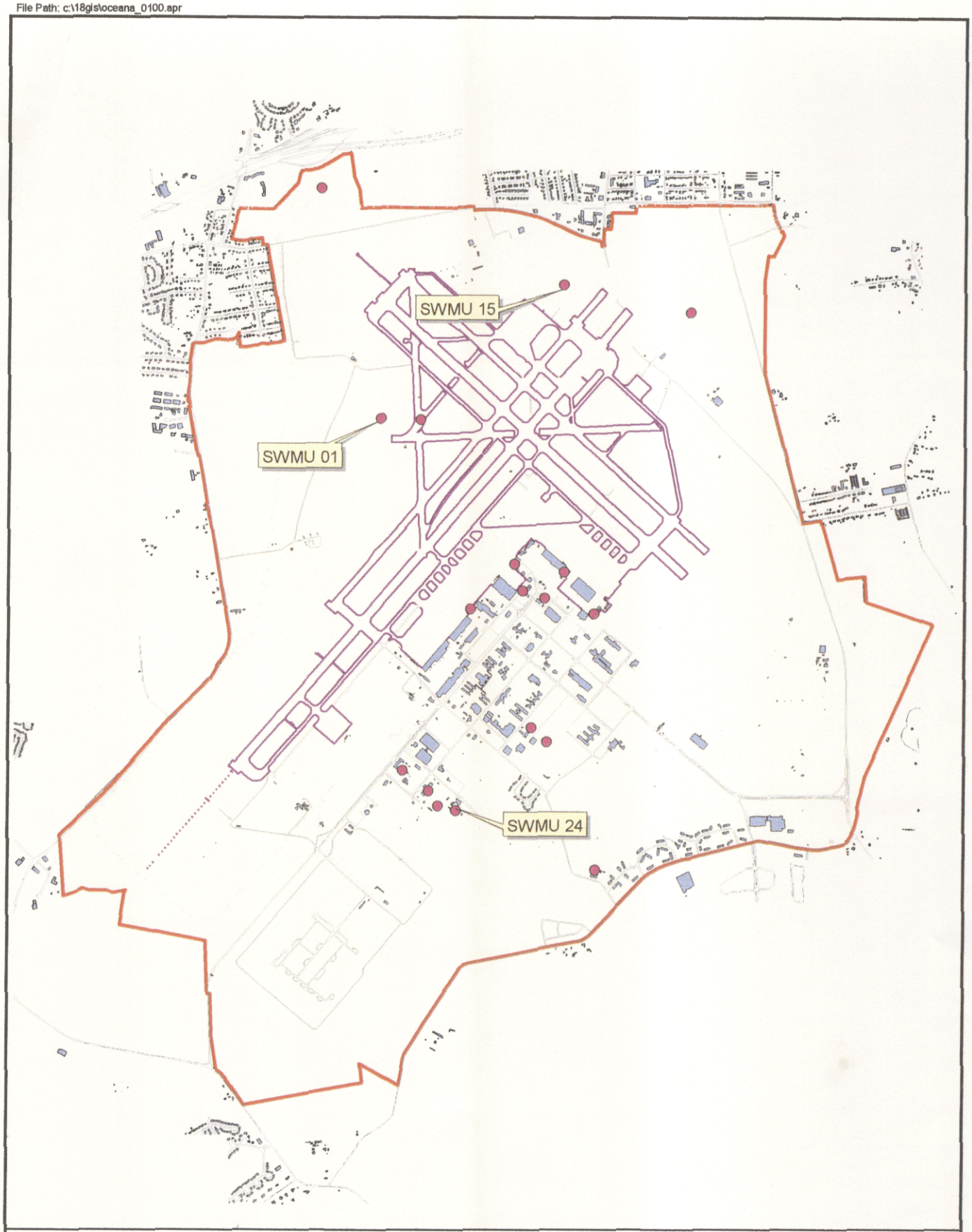

N
W E
S

0 2000 4000 6000 Feet

Figure 2-1
Base Map
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

00525 E B1y

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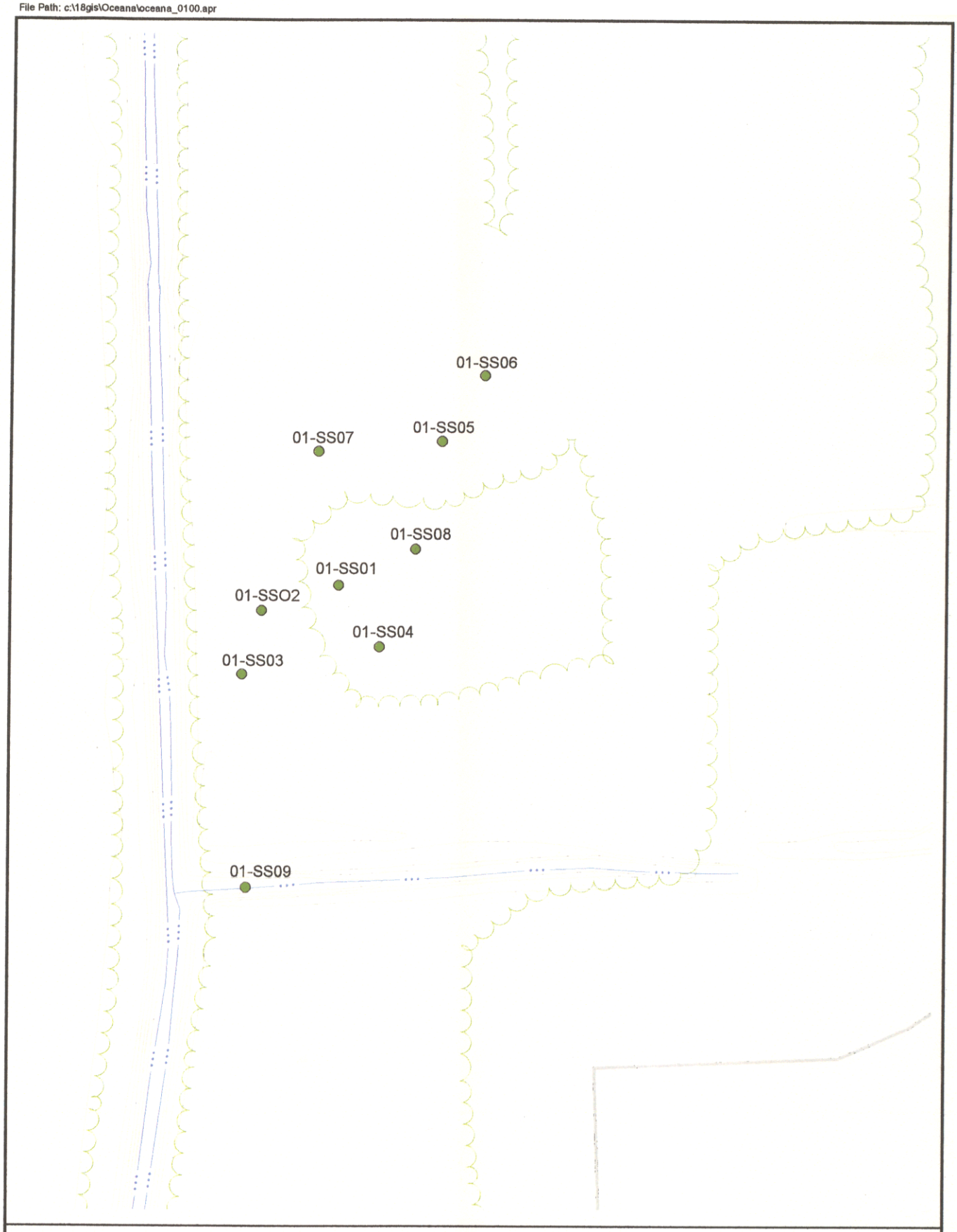

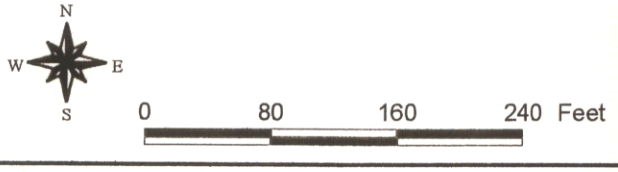

Figure 4-1
SWMU-01 Surface Soil Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

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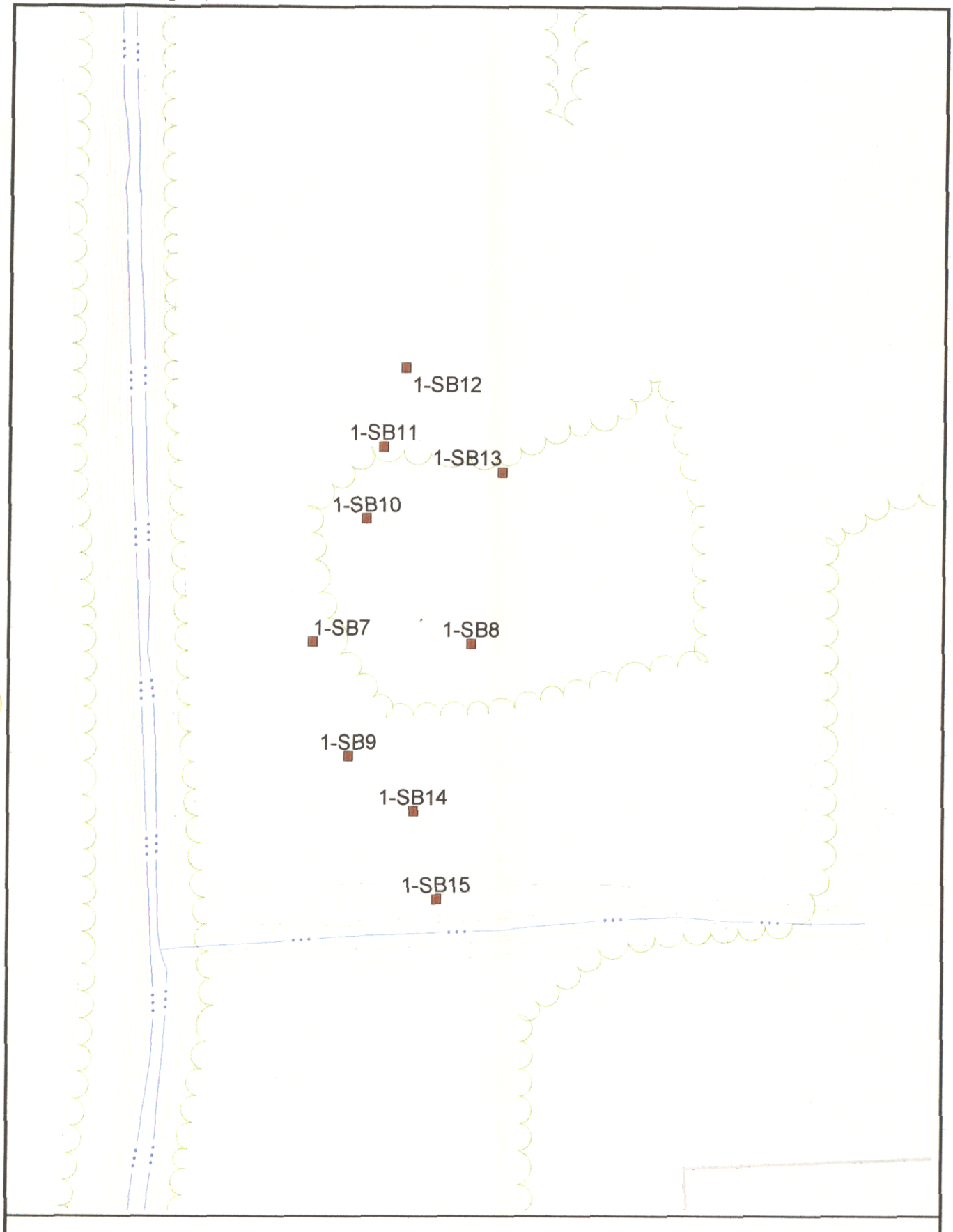

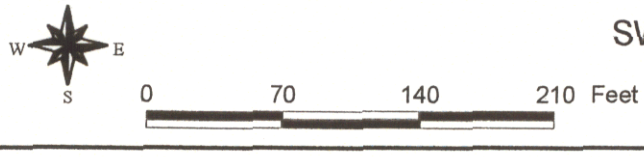

Figure 4-2
SWMU-01 Subsurface Soil Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

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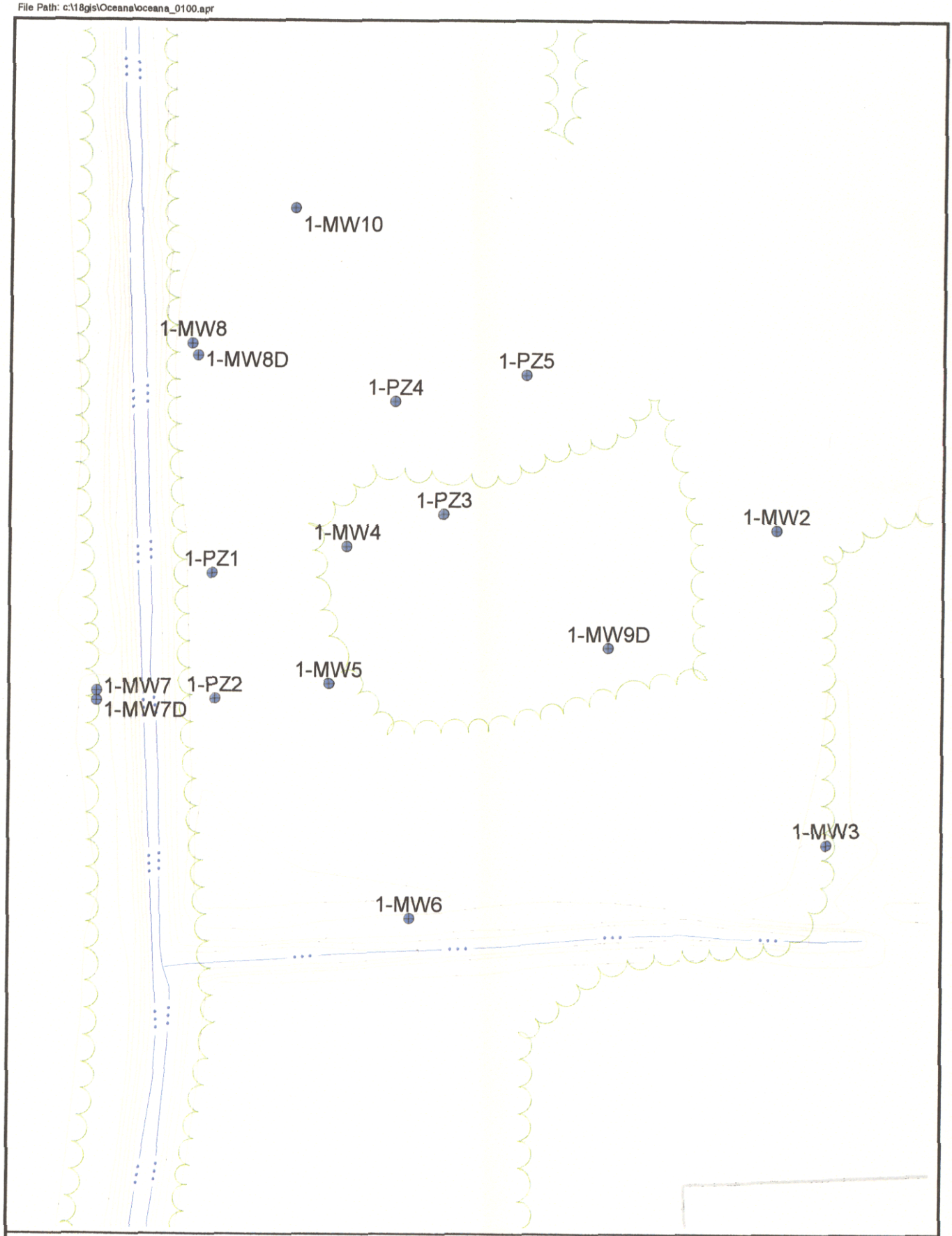

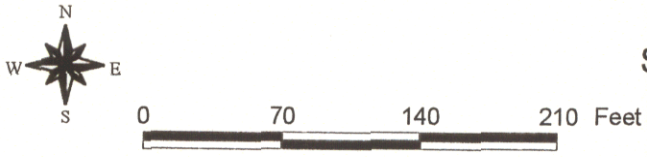

Figure 4-3
SWMU-01 Groundwater Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

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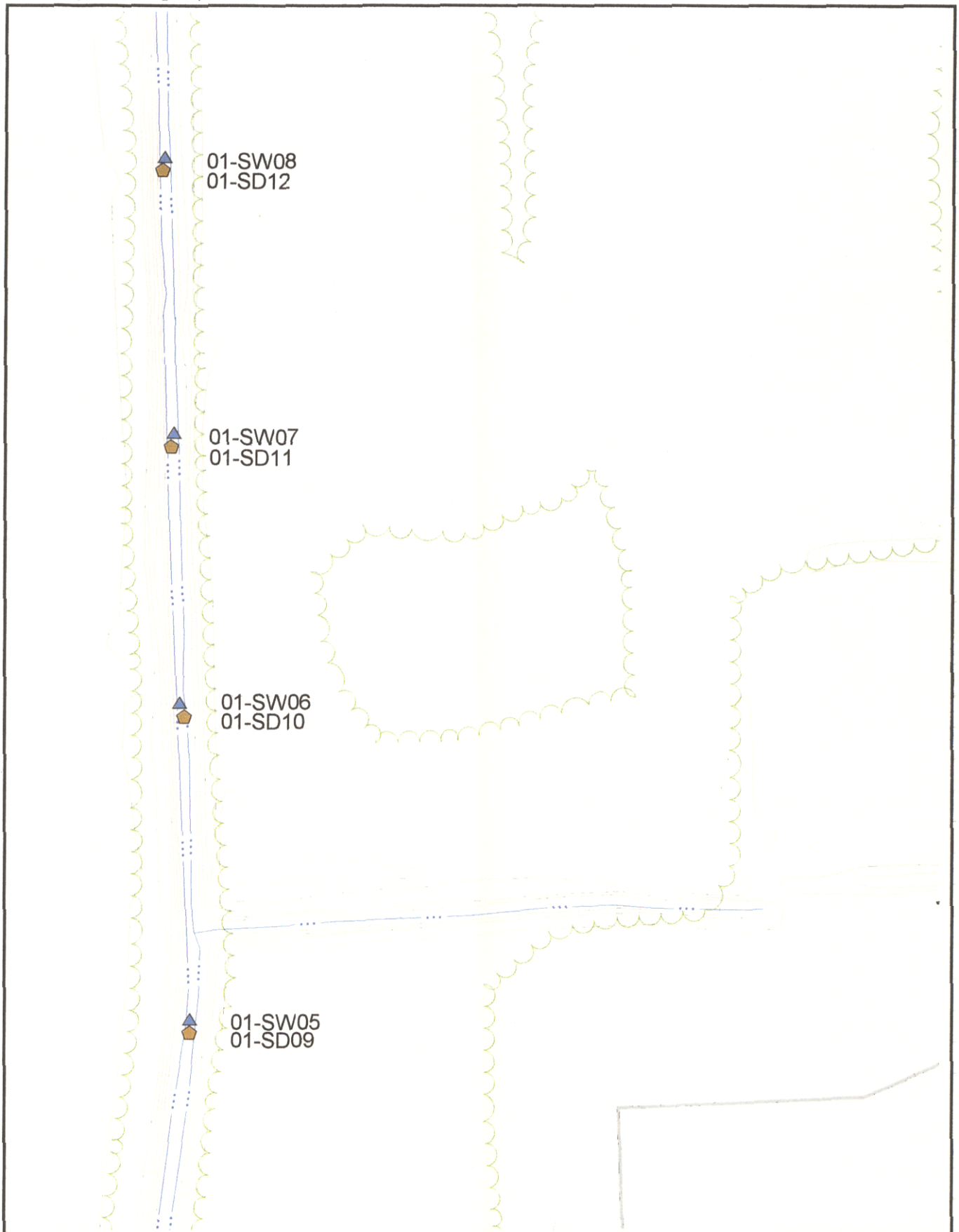


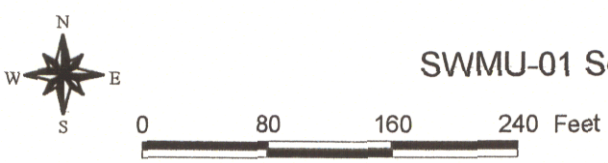


Figure 4-4
SWMU-01 Sediment and Surface Water Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

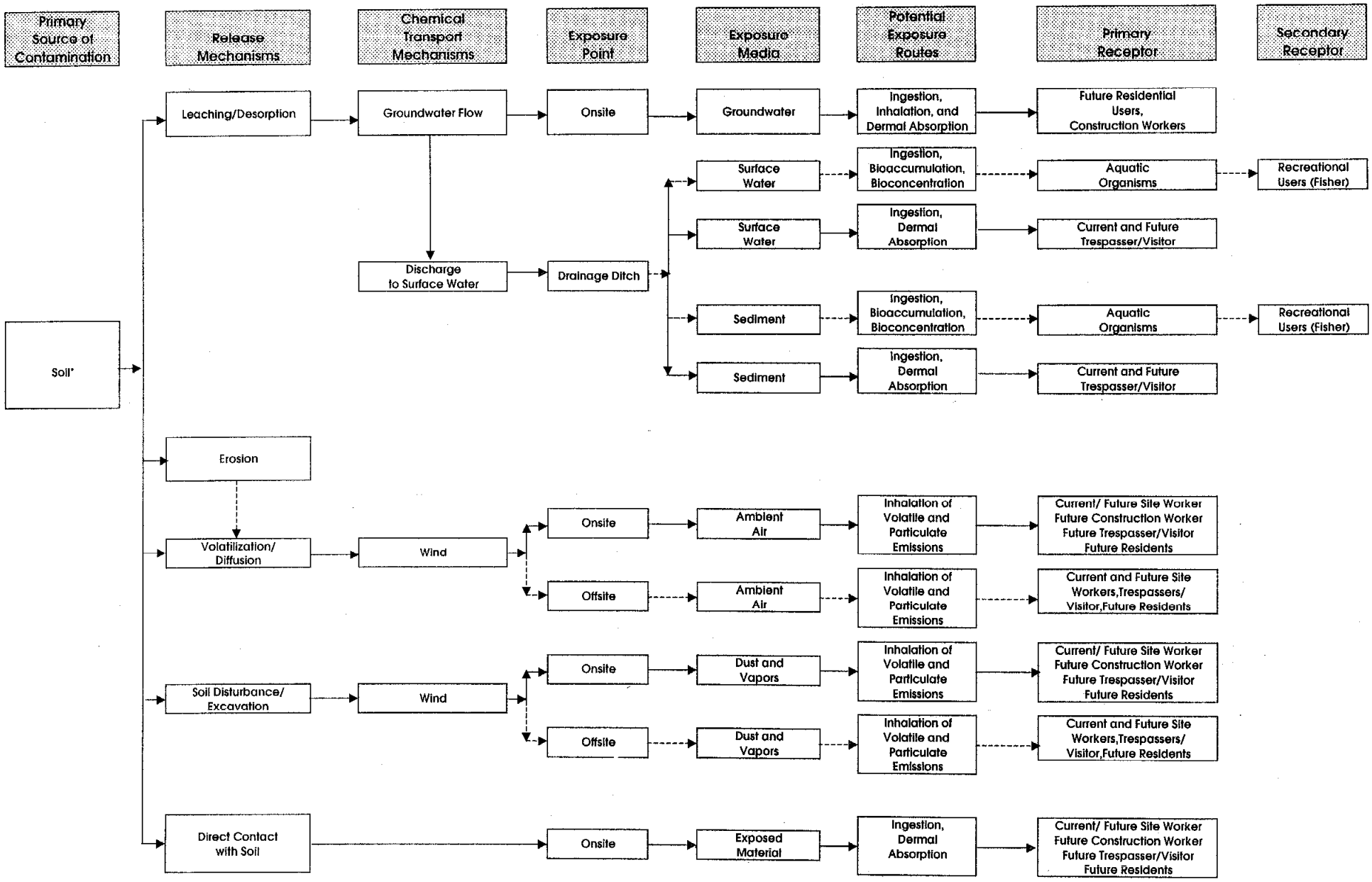
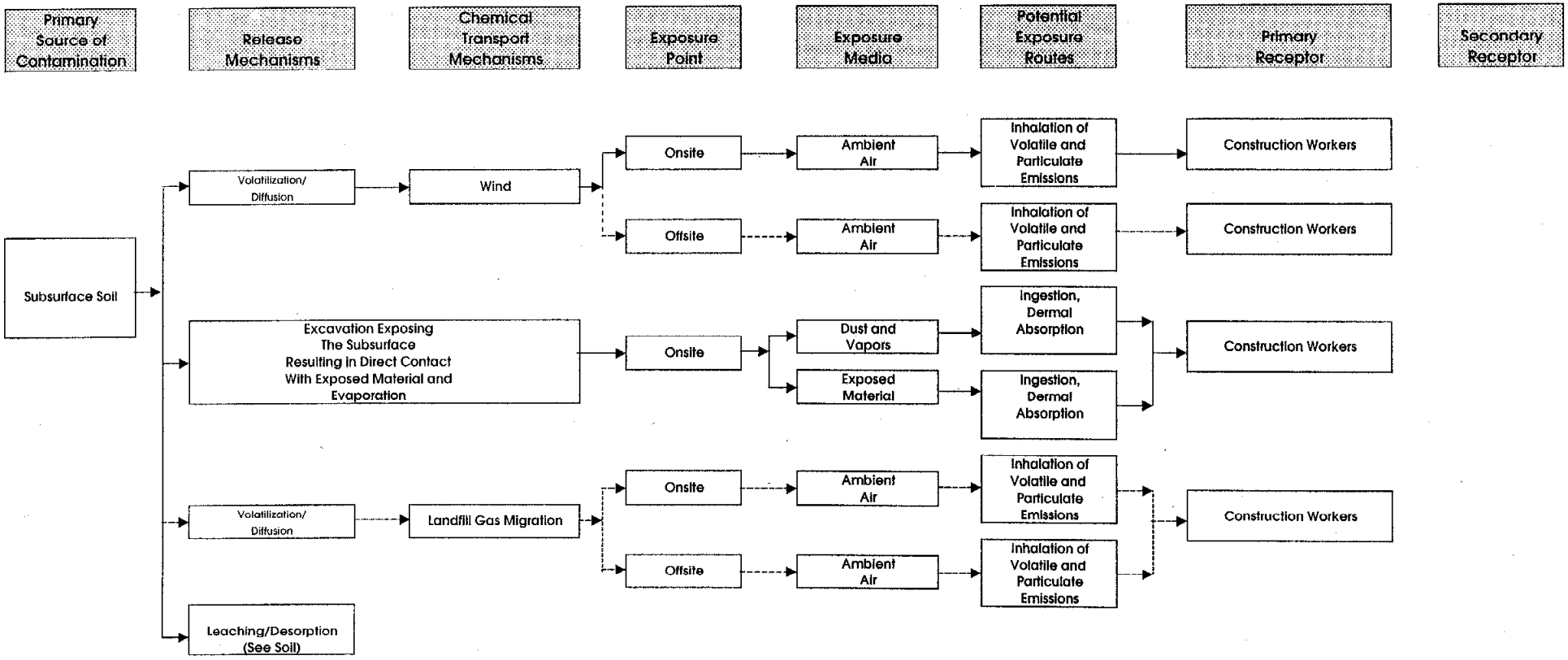


Figure 4-5 (Sheet1of2)
Conceptual Site Model for Potential Human Exposures-SWMU 1
NAS Oceana



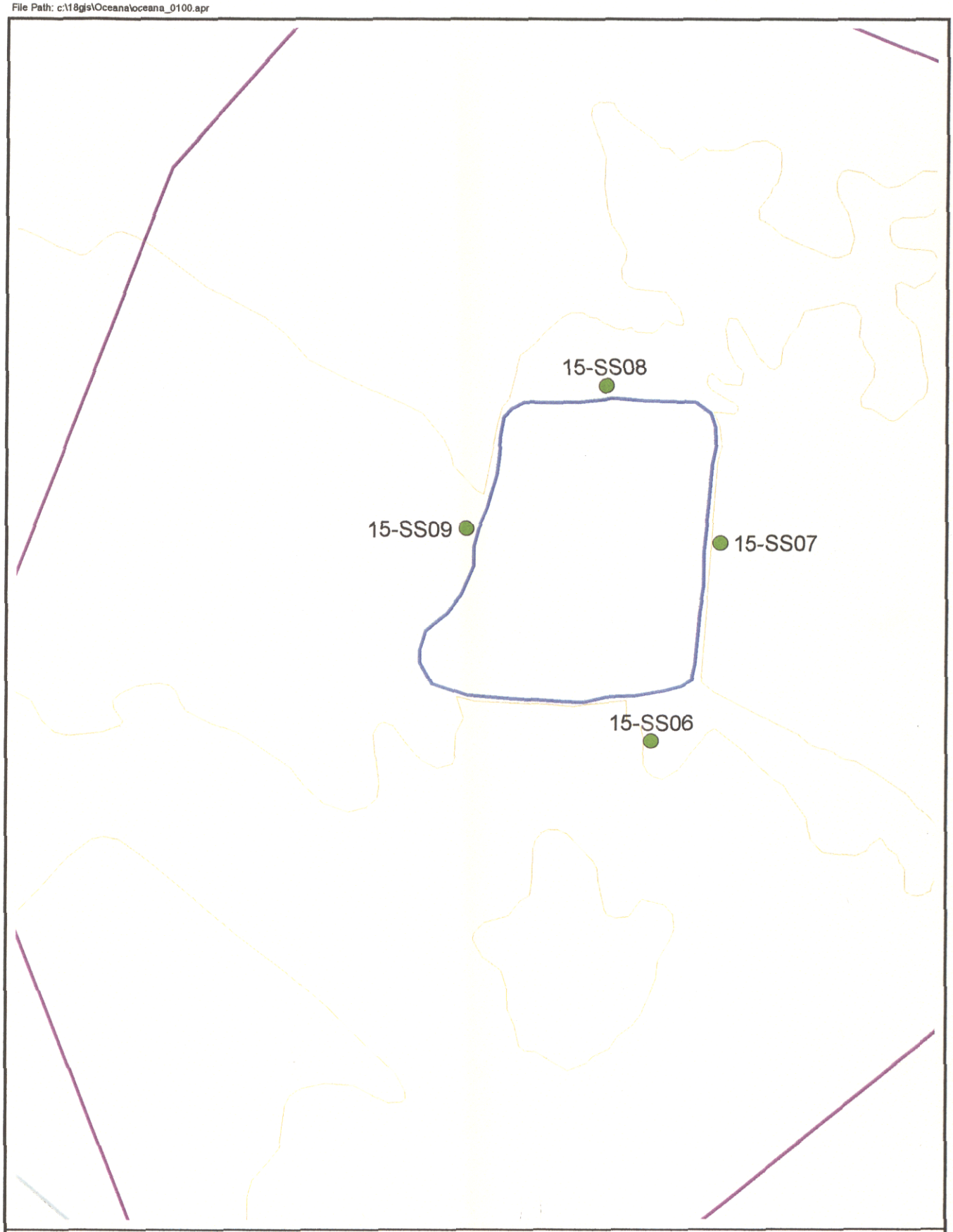
* Current scenario is for surface soil and future scenarios are for subsurface soil.

→ Complete Pathway

--→ Incomplete Pathway

Figure 4-5 (Sheet2of2)
Conceptual Site Model for Potential Human Exposures-SWMU 1
NAS Oceana

File Path: c:\18gis\Oceana\oceana_0100.apr



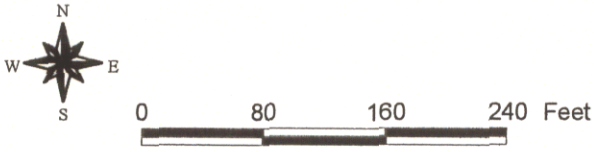
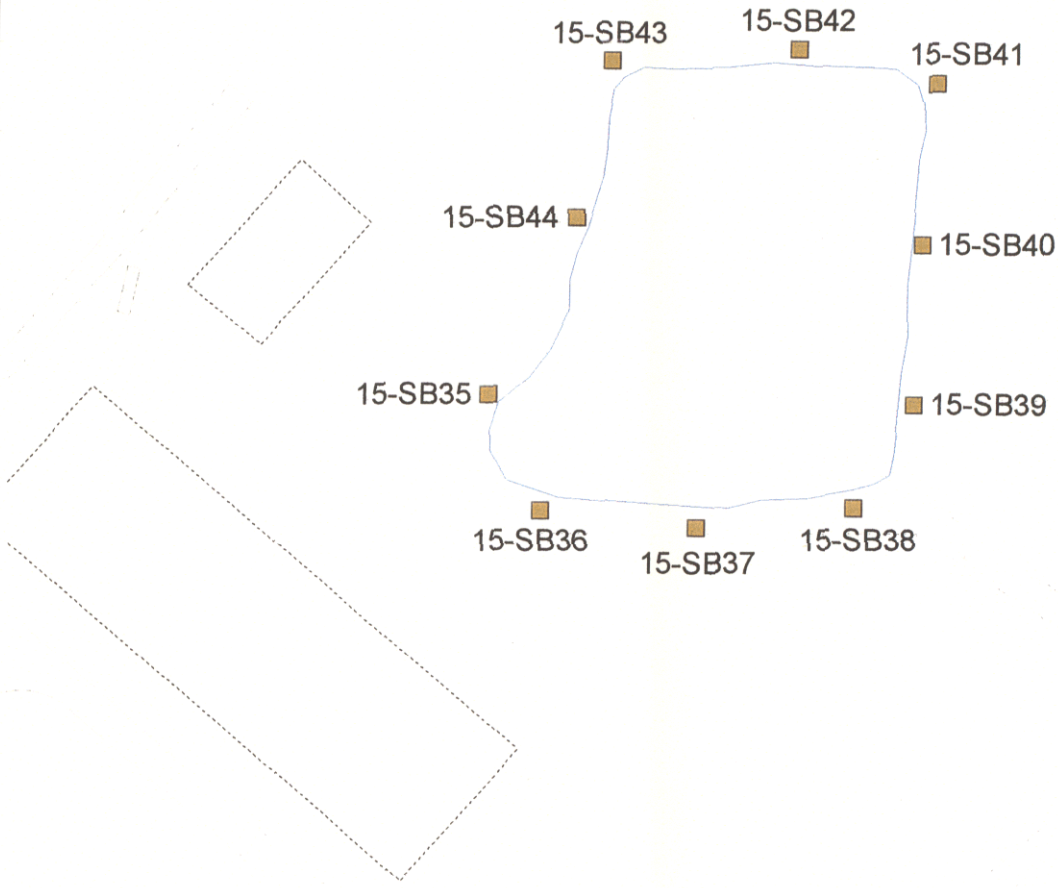


Figure 5-1
SWMU-15 Surface Soil Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

00525 E B24

File Path: c:\@home\@project\@clean\gis\aprs\oceana_0100.apr



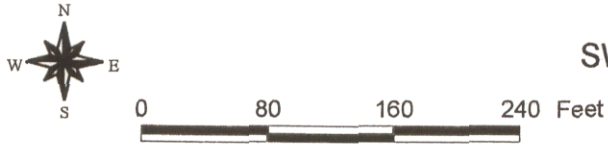
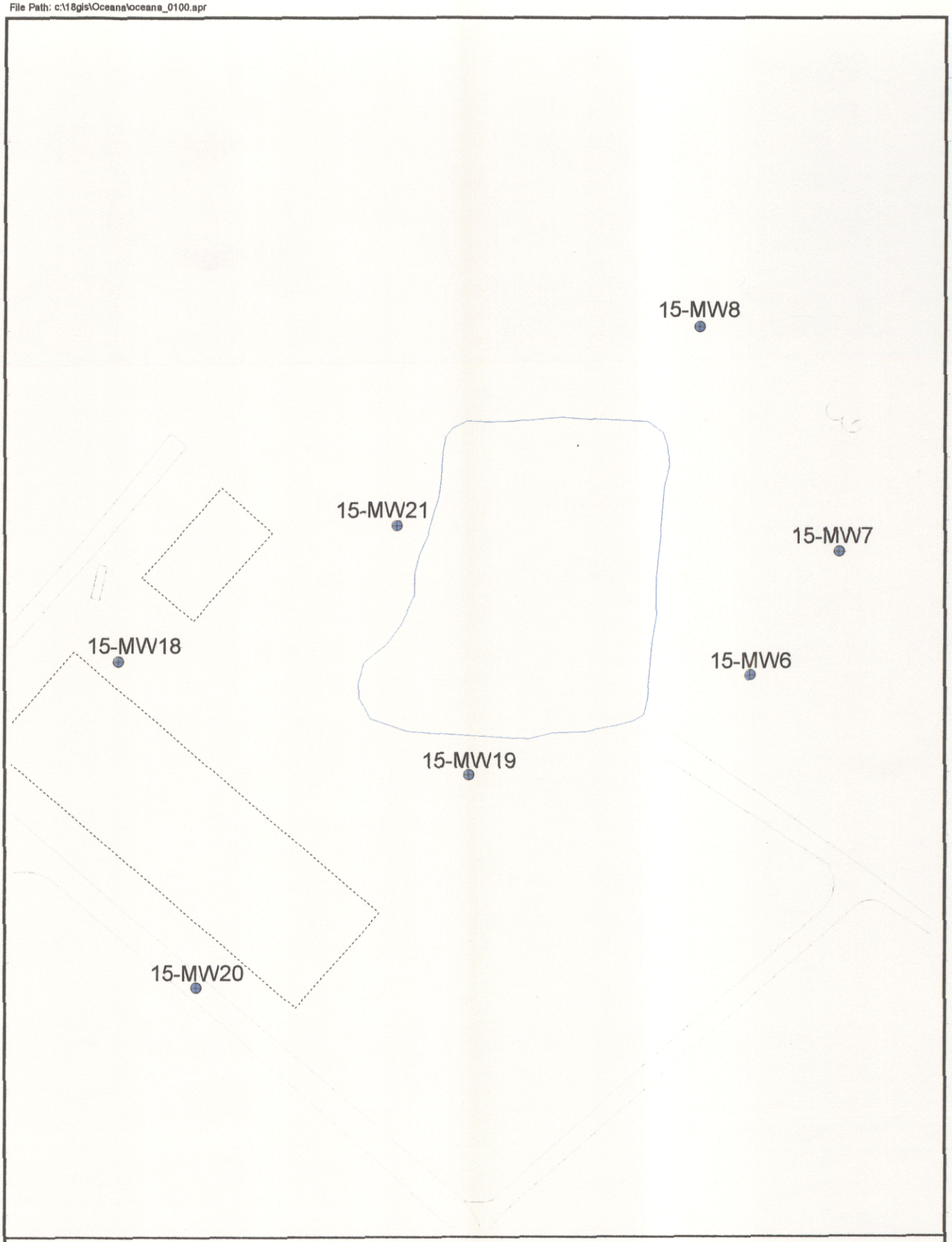


Figure 5-2
SWMU-15 Subsurface Soil Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

File Path: c:\18gis\Oceana\oceana_0100.apr



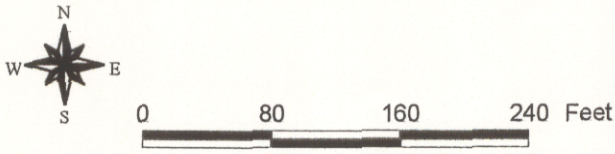
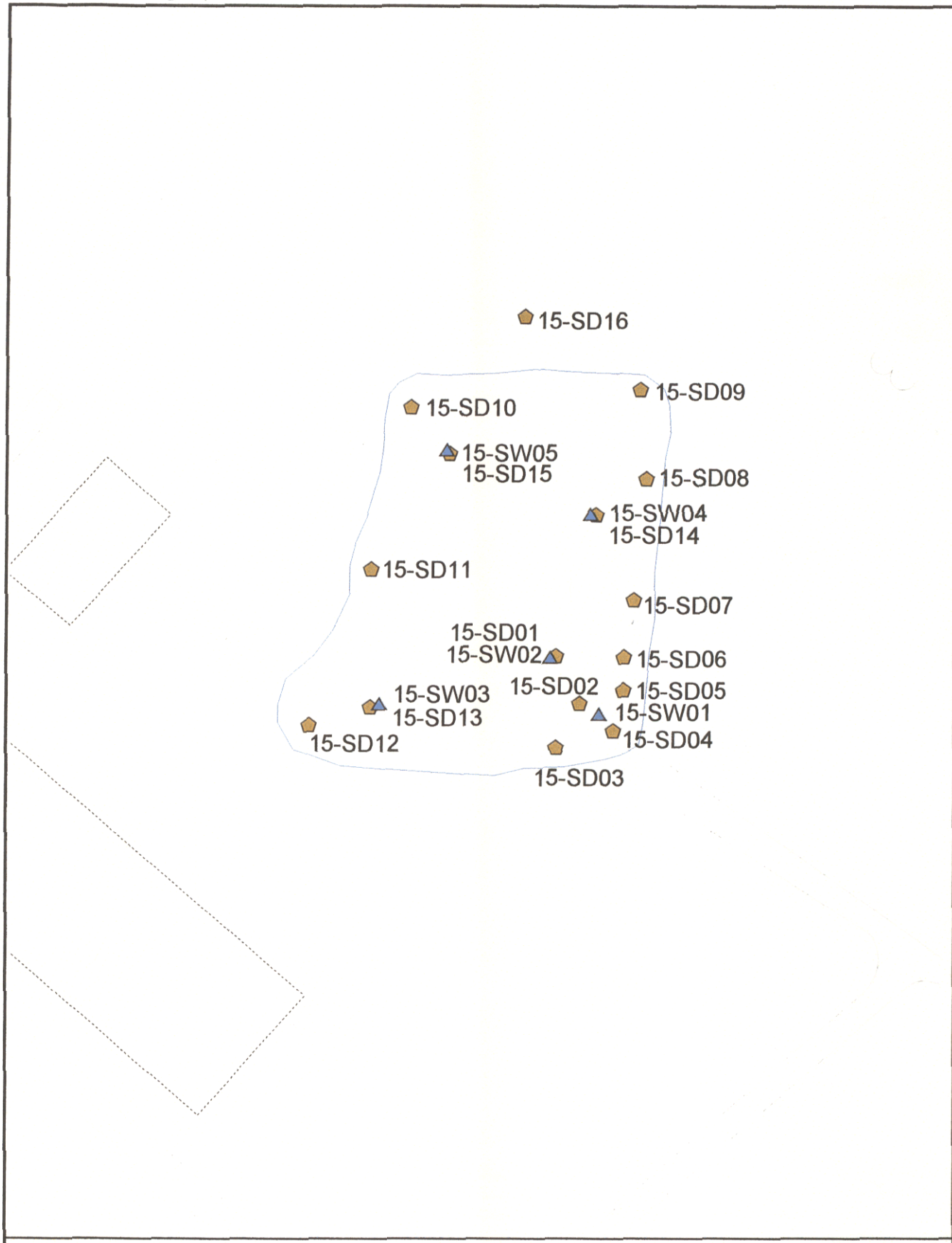


Figure 5-3
SWMU-15 Groundwater Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

File Path: c:\18gis\Oceana\oceana_0100.apr



N
W E
S

0 60 120 180 Feet

Figure 5-4
SWMMU-15 Surface Water & Sediment Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

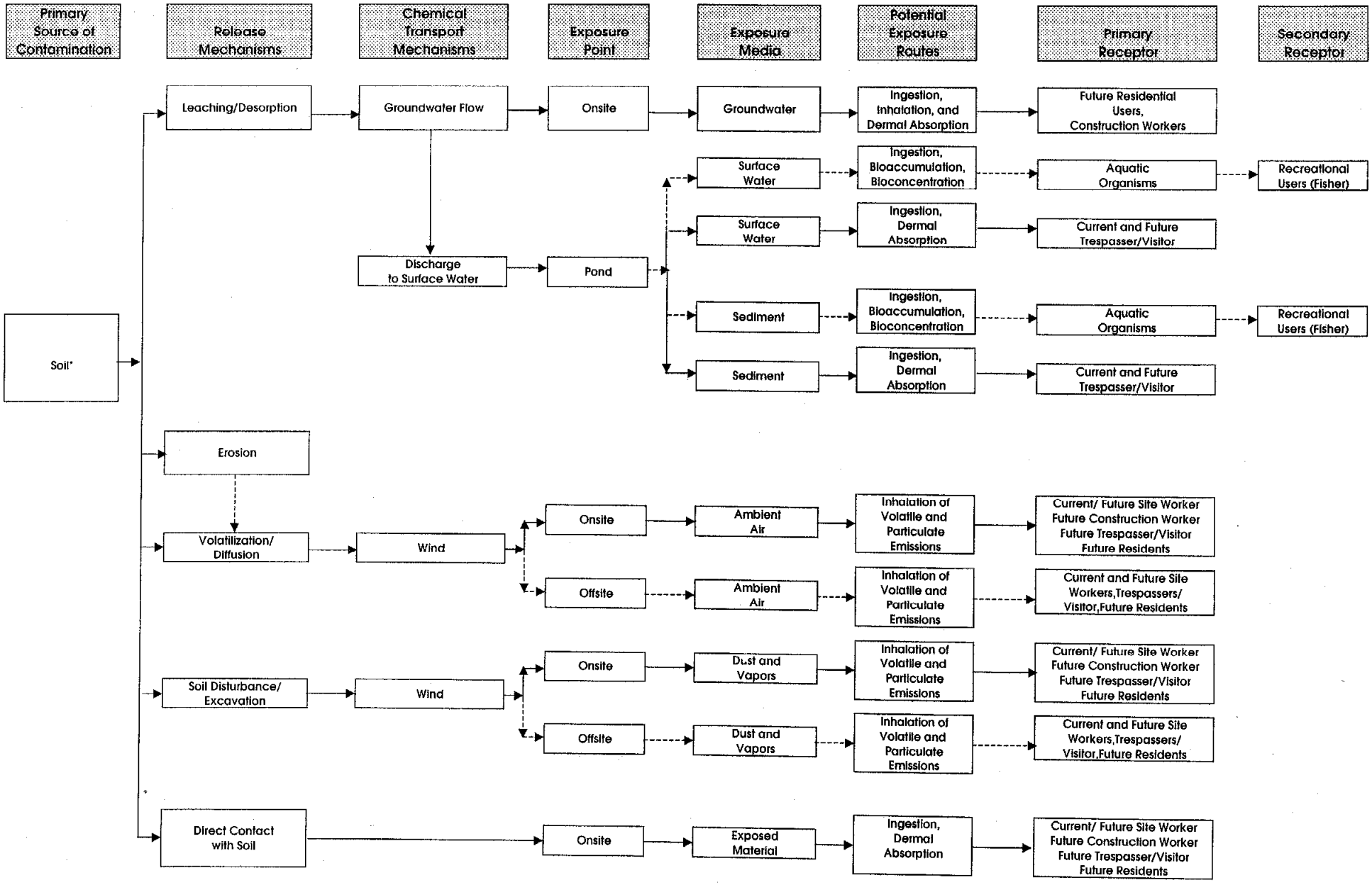
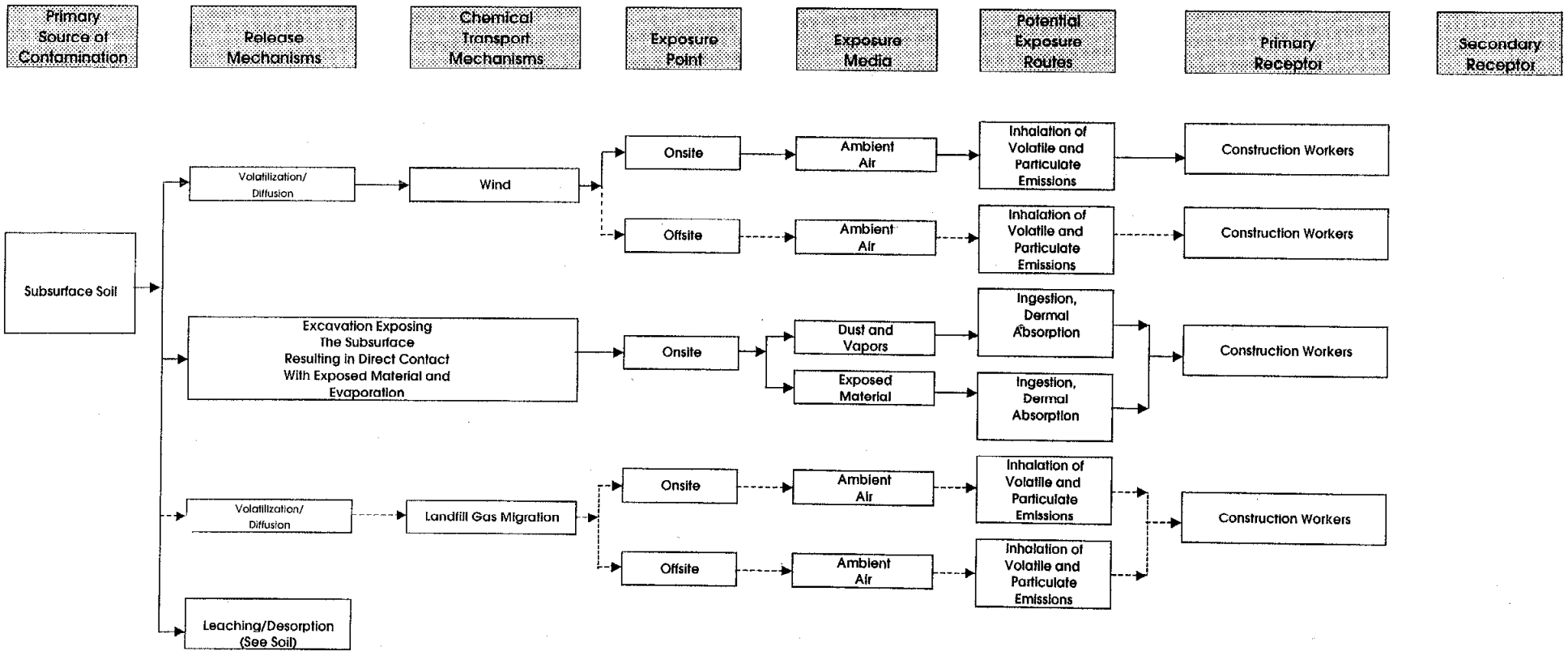


Figure 5-5 (Sheet1of2)
Conceptual Site Model for Potential Human Exposures-SWMU 15
NAS Oceana



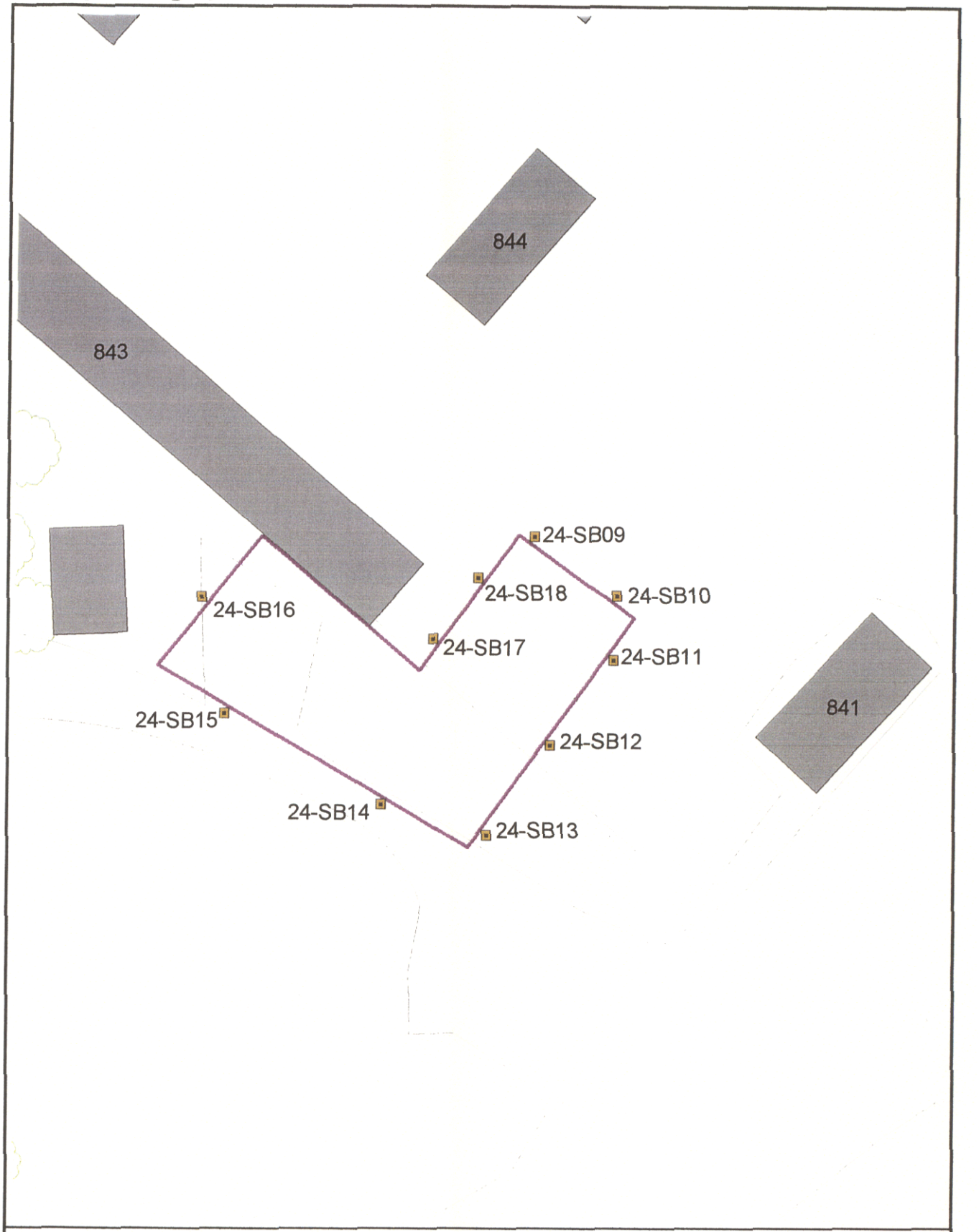
* Current scenario is for surface soil and future scenarios are for subsurface soil.

→ Complete Pathway

⇢ Incomplete Pathway

Figure 5-5 (Sheet2of2)
Conceptual Site Model for Potential Human Exposures-SWMU 15
NAS Oceana

File Path: c:\18gis\Oceana\oceana_0100.apr



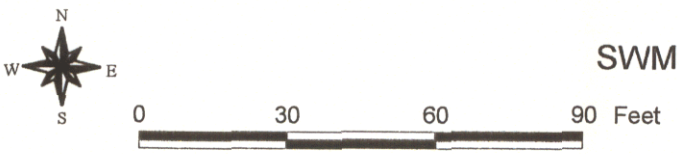
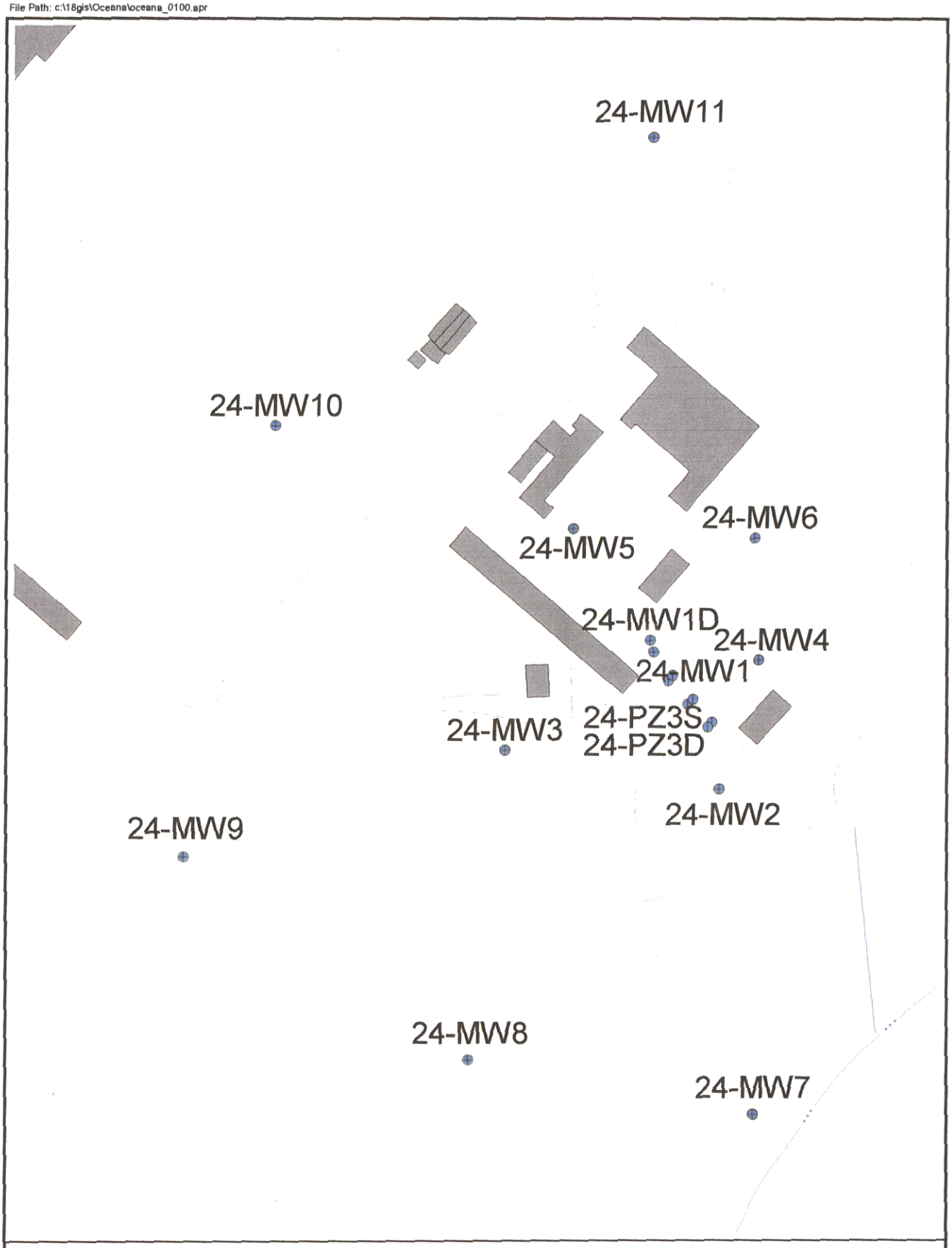


Figure 6-1
SWMU-24 Subsurface Soil Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

00525 E B3y

File Path: c:\18gis\Oceana\oceana_0100.apr



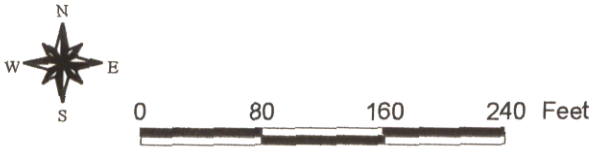


Figure 6-2
SWMU-24 Groundwater Sample Locations
NAS Oceana, Virginia Beach, Virginia

CH2M HILL

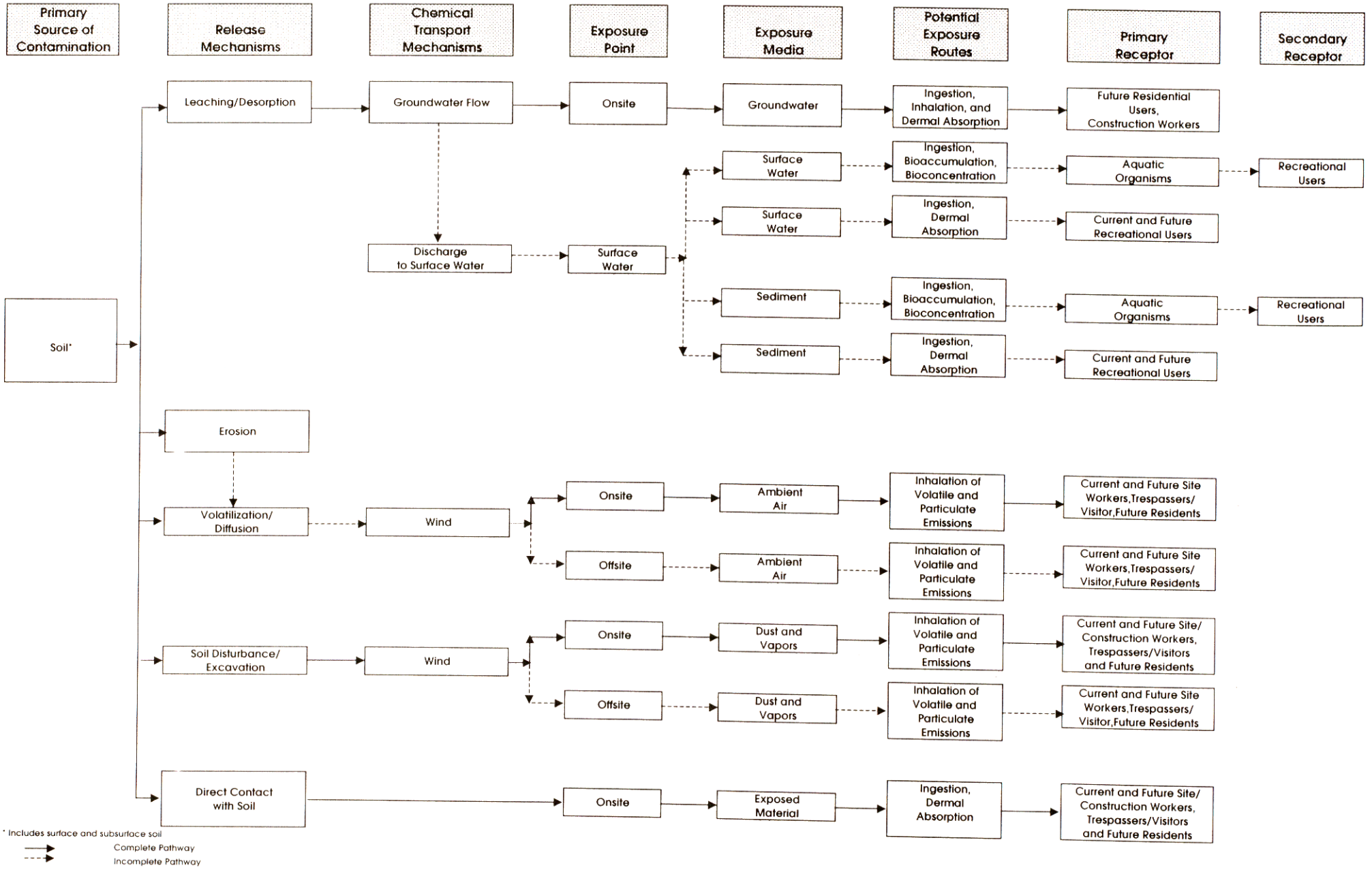


Figure 6-3 (Sheet 1of 1)
Conceptual Site Model for Potential Human Exposures-SWMU24
NAS Oceana

Table A-1-1
Analytical Results for Surface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
1,[illegible]-Dichloroethane										0.014 UL
1,[illegible]-Tetrachloroethane										0.014 UL
1,1,2-Trichloroethane										0.002 L
1,1-Dichloroethane										0.014 UL
1,1-Dichloroethene										0.014 UL
1,2,4-Trichlorobenzene										0.47 U
1,2-Dichlorobenzene										0.47 U
1,2-Dichloroethane										0.014 UL
1,2-Dichloroethene (total)										0.002 L
1,2-Dichloropropane										0.014 UL
1,3-Dichlorobenzene										0.47 U
1,4-Dichlorobenzene										0.47 U
1-Methylnapthalene	0.063 U	0.058 U	0.056 U	0.066 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	
2,2'-Oxybis(1-chloropropane)										0.47 U
2,4,5-Trichlorophenol										1.2 U
2,4,6-Trichlorophenol										0.47 U
2,4-Dichlorophenol										0.47 U
2,4-Dimethylphenol										0.47 U
2,4-Dinitrophenol										1.2 U
2,4-Dinitrotoluene										0.47 U
2,6-Dinitrotoluene										0.47 U
2-Butanone	0.072 =	0.012 U								0.014 UJ
2-Chloronaphthalene										0.47 U
2-Chlorophenol										0.47 U
2-Hexanone										0.014 UJ
2-Methylnaphthalene	0.063 U	0.058 U	0.056 U	0.21 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.47 U
2-Methylphenol										0.47 U
2-Nitroaniline										1.2 U
2-Nitrophenol										0.47 U
3,3'-Dichlorobenzidine										0.47 U
3-Nitroaniline										1.2 U
4,4'-DDD										0.0047 U
4,4'-DDE										0.00073 J
4,[illegible]-DDT										0.0047 U
4,6-Dinitro-2-methylphenol										1.2 U
4-Bromophenyl-phenylether										0.47 U
4-Chloro-3-methylphenol										0.47 U
4-Chloroaniline										0.47 U
4-Chlorophenyl-phenylether										0.47 U
4-Methyl-2-pentanone										0.014 UL
4-Methylphenol										0.47 U
4-Nitroaniline										1.2 U
4-Nitrophenol										1.2 U
Acenaphthene	0.063 U	0.058 U	0.056 U	0.06 U	0.06 U	0.06 U	0.086 =	0.055 U	0.056 U	0.186 U
Acenaphthylene										0.47 U
Acetone	0.02 =	0.008 j								0.014 UJ
Aldrin										0.0023 U
alpha-BHC										0.0023 U
alpha-Chlordane										0.0015 J
Aluminum	15700 =	14900 =								5430 =
Anthracene										0.0928 U
Antimony	4.2 UN	5.9 bn								0.39 U
Aroclor-1016										0.047 U
Aroclor-1221										0.093 U
Aroclor-1232										0.047 U
Aroclor-1242										0.047 U
Aroclor-1248										0.047 U
Aroclor-1254	0.14 =	0.02 U								0.047 U
Aroclor-1260	0.022 U	0.02 U								0.047 U
Arsenic	3 =	3.5 =								0.79 J
Barium	67.2 =	78.8 =								27.3 J
Benzene	0.006 U	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.014 UL
Benzo (a) anthracene	0.063 U	0.19 =	0.22 =	0.18 =	0.079 U	0.063 U	0.12 =	0.072 =	0.072 =	
Benzo (a) pyrene	0.063 U	0.23 =	0.2 =	0.1 =	0.079 =	0.06 U	0.091 =	0.057 U	0.064 =	
Benzo (b) fluoranthene	0.063 U	0.2 =	0.16 =	0.06 U	0.17 =	0.06 U	0.057 U	0.055 U	0.056 U	
Benzo (g,h,i) perylene	0.063 U	0.13 =	0.12 =	0.06 U	0.12 U	0.072 U	0.072 =	0.055 U	0.056 U	
Benzo (k) fluoranthene	0.063 U	0.22 =	0.15 =	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	

NS - Not Sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L -Reported value may be biased low
U - Analyte not detected

Table A-1-1
Analytical Results for Surface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
Benzo(a)anthracene										0.0077
Benzo(a)pyrene										0.092
Benzo(b)fluoranthene										0.366 U
Benzo(g,h,i)perylene										0.186 U
Benzo(k)fluoranthene										0.47 U
Beryllium	0.49 b	0.54 b								0.18 J
beta-BHC										0.0023 U
bis (2-Ethylhexyl)phthalate										
bis(2-Chloroethoxy)methane										0.47 U
bis(2-Chloroethyl)ether										0.47 U
bis(2-Ethylhexyl)phthalate										0.47 U
Bromodichloromethane										0.014 UL
Bromoform										0.014 UL
Bromomethane										0.014 UL
Butylbenzylphthalate										0.47 U
Cadmium	0.7 U	1.3 =								0.42 J
Calcium	1080 =	1040 b								385 J
Carbazole										0.47 U
Carbon Disulfide	0.008 =	0.004 j								0.014 UL
Carbon tetrachloride										0.014 UL
Chlorobenzene										0.014 UL
Chloroethane										0.014 UL
Chloroform										0.004 B
Chloromethane										0.014 UL
Chromium	18.9 =	20.6 =								8.5 =
Chrysene	0.063 U	0.29 =	0.21 =	0.16 =	0.06 U	0.06 U	0.091 =	0.055 U	0.056 U	0.0142 J
cis-1,3-Dichloropropene										0.014 UL
Cobalt	3.1 b	3.9 b								1.2 B
Copper	13.1 =	12 =								5.2 B
Cyanide										0.29 U
delta-BHC										0.0023 U
Di-n-Butylphthalate										0.47 U
Di-n-octyl phthalate										0.47 U
Dibenz(a,h)anthracene										0.186
Dibenzo (a, h) anthracene	0.063 U	0.058 U	0.056 U	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	
Dibenzofuran										0.47 U
Dibromochloromethane										0.014 UL
Dieldrin										0.0047 U
Diethylphthalate										0.048 J
Dimethyl phthalate										0.47 U
Endosulfan I										0.0023 U
Endosulfan II										0.0047 U
Endosulfan sulfate										0.0047 U
Endrin										0.0047 U
Endrin aldehyde										0.0047 U
Endrin ketone										0.0047 U
Ethylbenzene	0.001 j	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.014 UL
Fluoranthene	0.063 U	0.47 =	0.34 =	0.12 =	0.06 U	0.06 U	0.15 =	0.068 =	0.067 =	0.47 U
Fluorene	0.063 U	0.035 j	0.056 U	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.366 U
gamma-BHC (Lindane)										0.0023 U
gamma-Chlordane										0.0023 U
Heptachlor										0.0023 U
Heptachlor epoxide										0.0023 U
Hexachlorinated-Dibenzo Furans (Total)										
Hexachlorobenzene										0.47 U
Hexachlorobutadiene										0.47 U
Hexachlorocyclopentadiene										0.47 U
Hexachloroethane										0.47 U
Indeno (1,2,3-cd) pyrene	0.063 U	0.17 =	0.15 =	0.11 =	0.06 U	0.1 U	0.13 =	0.055 U	0.056 U	
Indeno(1,2,3-cd)pyrene										0.366 U
Iron	6140 =	17300 =								2980 =
Isophorone										0.47 U
Lead	45.5 =	32.7 =								17.8 =
Magnesium	961 b	876 b								425 J
Manganese	27.5 =	36.7 =								12.9 =
Mercury	0.09 b	0.23 =								0.04
Methoxychlor										0.023 U

NS - Not Sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L -Reported value may be biased low
U - Analyte not detected

Table A-1-1
Analytical Results for Surface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
M[illegible]ene Chloride	0.028 b	0.017 b								0.013 B
n[illegible]o-di-n-propylamine										0.47 U
n-Nitrosodiphenylamine										0.47 U
Naphthalene	0.063 U	0.058 U	0.056 U	0.13 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.47 U
Nickel	9.5 b	8.4 b								5.1 B
Nitrobenzene										0.47 U
Pentachlorophenol										1.2 U
pH										-1 =
Phenanthrene	0.063 U	0.26 =	0.12 =	0.11 =	0.06 U	0.06 U	0.075 =	0.055 U	0.056 U	0.0478 UJ
Phenol										0.47 U
Potassium	666 b	587 b								246 B
Pyrene	0.063 U	0.37 =	0.29 =	0.12 =	0.06 U	0.06 U	0.12 =	0.08 =	0.073 =	0.00443 J
Selenium	0.65 b	0.87 b								0.82 J
Silver	0.51 U	0.48 U								0.12 U
Sodium	251 b	262 b								28.9 U
Styrene	0.006 U	0.006 U								0.014 UL
Sulfide										
Tetrachloroethene										0.002 B
Thallium	0.59 U	0.56 U								0.68 U
Tin										
Toluene	0.025 =	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.002 B
Total Petroleum Hydrocarbons			2 =	280 =	68.8 =	16.4 =	26.7 =	19.6 =	23.4 =	
Toxaphene										0.23 U
Trichloroethene										0.014 UL
Vanadium	20 =	19.7 =								10.4 =
Vinyl chloride										0.014 UL
Xylene (Total)	0.015 =	0.005 j	0.0024 U	0.0025 U	0.0025 U	0.0026 U	0.0025 U	0.0025 U	0.0024 U	
Xylene, total										0.014 UL
Zinc	52.9 =	85.1 =								21.9 B

NS - Not Sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L -Reported value may be biased low
U - Analyte not detected

Table A-1-2
Analytical Results for Surface Water
SWMU 1
NAS Oceana

AnalyteName	OW01-SW05P		OW01-SW05		OW01-SW06		OW01-SW07		OW01-SW08	
VOA(UG/L)										
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U
1,2-Dibromo-3-chloropropane	1	U	1	U	1	U	1	U	1	U
1,2-Dibromoethane	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U
2-Hexanone	5	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone	5	U	5	U	5	U	5	U	5	U
Benzene	1	U	1	U	1	U	1	U	1	U
Bromochloromethane	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	0.2	J	0.2	J	0.2	J	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U
Bromomethane	1	U	1	U	1	U	1	U	1	U
Carbon disulfide	1.3	B	0.3	B	0.4	B	0.4	B	0.4	B
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U
Chloroethane	1	U	1	U	1	U	1	U	1	U
Chloroform	1.2	B	1.1	B	1	B	0.8	B	0.7	B
Chloromethane	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U
Methylene chloride	1.1	B	1.2	B	1.1	B	0.9	B	1	B
Styrene	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	1	U	1	U	1	U	1	U	1	U
Xylene, total	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U
SVOA(UG/L)										
1,2,4-Trichlorobenzene	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U
1,3-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U
2,2'-Oxybis(1-chloropropane)	11	U	11	U	11	U	12	U	11	U
2,4,5-Trichlorophenol	28	U	28	U	27	U	30	U	28	U
2,4,6-Trichlorophenol	11	U	11	U	11	U	12	U	11	U
2,4-Dichlorophenol	11	U	11	U	11	U	12	U	11	U
2,4-Dimethylphenol	11	U	11	U	11	U	12	U	11	U
2,4-Dinitrophenol	28	U	28	U	27	U	30	U	28	U
2,4-Dinitrotoluene	11	U	11	U	11	U	12	U	11	U
2,6-Dinitrotoluene	11	U	11	U	11	U	12	U	11	U
2-Chloronaphthalene	11	U	11	U	11	U	12	U	11	U
2-Chlorophenol	11	U	11	U	11	U	12	U	11	U
2-Methylnaphthalene	11	U	11	U	11	U	12	U	11	U
2-Methylphenol	11	U	11	U	11	U	12	U	11	U
2-Nitroaniline	28	U	28	U	27	U	30	U	28	U
2-Nitrophenol	11	U	11	U	11	U	12	U	11	U
3,3'-Dichlorobenzidine	11	U	11	U	11	U	12	U	11	U
3-Nitroaniline	28	U	28	U	27	U	30	U	28	U
4,6-Dinitro-2-methylphenol	28	U	28	U	27	U	30	U	28	U
4-Bromophenyl-phenylether	11	U	11	U	11	U	12	U	11	U
4-Chloro-3-methylphenol	11	U	11	U	11	U	12	U	11	U
4-Chloroaniline	11	U	11	U	11	U	12	U	11	U

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B - Analyte not detected above associated blank

Table A-1-2
Analytical Results for Surface Water
SWMU 1
NAS Oceana

AnalyteName	OW01-SW05P		OW01-SW05		OW01-SW06		OW01-SW07		OW01-SW08	
4-Chlorophenyl-phenylether	11	U	11	U	11	U	12	U	11	U
4-Methylphenol	11	U	11	U	11	U	12	U	11	U
4-Nitroaniline	28	U	28	U	27	U	30	U	28	U
4-Nitrophenol	28	U	28	U	27	U	30	U	28	U
Acenaphthene	0.23	U	0.232	U	0.22	U	0.238	U	0.228	U
Acenaphthylene	1.15	U	1.16	U	1.1	U	1.19	U	1.14	U
Anthracene	0.564		0.275	B	0.11	U	0.252	B	0.214	B
Benzo(a)anthracene	0.012	J	0.011	J	0.015	J	0.019	J	0.015	J
Benzo(a)pyrene	0.115	U	0.116	U	0.11	U	0.119	U	0.114	U
Benzo(b)fluoranthene	0.876		0.447	J	0.675		0.485		0.665	
Benzo(g,h,i)perylene	0.23	U	0.232	U	0.22	U	0.238	U	0.228	U
Benzo(k)fluoranthene	0.92	U	0.928	U	0.88	U	0.952	U	0.912	U
Butylbenzylphthalate	11	U	11	U	11	U	12	U	11	U
Carbazole	11	U	11	U	11	U	12	U	11	U
Chrysene	0.021	J	0.017	J	0.031	J	0.04	J	0.042	J
Di-n-butylphthalate	11	U	11	U	11	U	1	B	11	U
Di-n-octyl phthalate	11	UJ	11	UJ	11	UJ	12	UJ	11	UJ
Dibenz(a,h)anthracene	0.23	U	0.232	U	0.22	U	0.238	U	0.228	U
Dibenzofuran	11	U	11	U	11	U	12	U	11	U
Diethylphthalate	11	U	11	U	11	U	12	U	11	U
Dimethyl phthalate	11	U	11	U	11	U	12	U	11	U
Fluoranthene	3.85	B	1.71	B	1.1	U	4.15	B	3.47	B
Fluorene	0.46	U	0.464	U	0.44	U	0.476	U	0.456	U
Hexachlorobenzene	11	U	11	U	11	U	12	U	11	U
Hexachlorobutadiene	11	U	11	U	11	U	12	U	11	U
Hexachlorocyclopentadiene	11	U	11	U	11	U	12	U	11	U
Hexachloroethane	11	U	11	U	11	U	12	U	11	U
Indeno(1,2,3-cd)pyrene	0.46	U	0.464	U	0.44	U	0.476	U	0.456	U
Isophorone	11	U	11	U	11	U	12	U	11	U
Naphthalene	2.3	U	2.32	U	2.2	U	2.38	U	2.28	U
Nitrobenzene	11	U	11	U	11	U	12	U	11	U
Pentachlorophenol	28	U	28	U	27	U	30	U	28	U
Phenanthrene	0.052	J	0.032	J	0.032	J	0.033	J	0.031	J
Phenol	11	U	11	U	11	U	12	U	11	U
Pyrene	0.006		0.005	J	0.007		0.008		0.008	
bis(2-Chloroethoxy)methane	11	U	11	U	11	U	12	U	11	U
bis(2-Chloroethyl)ether	11	U	11	U	11	U	12	U	11	U
bis(2-Ethylhexyl)phthalate	11	U	11	U	11	U	12	U	11	U
n-Nitroso-di-n-propylamine	11	U	11	U	11	U	12	U	11	U
n-Nitrosodiphenylamine	11	U	11	U	11	U	12	U	11	U
PEST/P(UG/L)										
4,4'-DDD	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
4,4'-DDE	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
4,4'-DDT	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Aldrin	0.055	U	0.057	U	0.054	UJ	0.057	U	0.056	U
Aroclor-1016	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Aroclor-1221	2.2	U	2.3	U	2.2	U	2.3	U	2.2	U
Aroclor-1232	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Aroclor-1242	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Aroclor-1248	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Aroclor-1254	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Aroclor-1260	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Dieldrin	0.11	U	0.11	U	0.11	UJ	0.11	U	0.11	U
Endosulfan I	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
Endosulfan II	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Endosulfan sulfate	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Endrin	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Endrin aldehyde	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Endrin ketone	0.11	U	0.11	U	0.11	U	0.11	U	0.11	U
Heptachlor	0.055	U	0.057	U	0.054	UJ	0.057	U	0.056	U
Heptachlor epoxide	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U

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Table A-1-2
Analytical Results for Surface Water
SWMU 1
NAS Oceana

AnalyteName	OW01-SW05P		OW01-SW05		OW01-SW06		OW01-SW07		OW01-SW08	
Methoxychlor	0.55	UJ	0.57	UJ	0.54	UJ	0.57	UJ	0.56	UJ
Toxaphene	5.5	U	5.7	U	5.4	U	5.7	U	5.6	U
alpha-BHC	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
alpha-Chlordane	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
beta-BHC	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
delta-BHC	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
gamma-BHC (Lindane)	0.055	U	0.057	U	0.054	UJ	0.057	U	0.056	U
gamma-Chlordane	0.055	U	0.057	U	0.054	U	0.057	U	0.056	U
METAL(UG/L)										
Aluminum	548		557		493		371		577	
Antimony	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
Arsenic	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Barium	26	J	27.4	J	26.5	J	27.1	J	28.1	J
Beryllium	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	6070		6510		6290		6640		6720	
Chromium	0.95	J	1.2	J	0.83	J	0.72	J	1.2	J
Cobalt	2.1	B	1.9	B	2	B	1.5	B	2	B
Copper	2.3	B	2.9	B	3.9	B	4.4	B	2.6	B
Cyanide	5	U	5	U	5	U	5	U	5	U
Iron	1290		1320		1330		1260		1260	
Lead	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Magnesium	4040	J	4320	J	4130	J	4210	J	4320	J
Manganese	61.5		65.3		62.4		63.9		63.3	
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	2.5	B	3.3	B	2.6	B	2.1	B	2.4	B
Potassium	907	B	1040	B	896	B	898	B	979	B
Selenium	2.7	UL	2.7	UL	2.7	UL	2.7	UL	3.9	B
Silver	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
Sodium	8150	J	8660	J	8430	J	8450	J	8620	J
Thallium	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
Vanadium	1.6	J	1.4	J	1.3	J	1.2	J	1.4	J
Zinc	14.5	B	16.9	B	16.5	B	15.7	B	17.3	B

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Table A-1-3
Analytical Results for Sediment
SWMU 1
NAS Oceana

AnalyteName	OW01-SD09P		OW01-SD09		OW01-SD10		OW01-SD11		OW01-SD12	
VOA(UG/KG)										
1,1,1-Trichloroethane	2	J	2	J	2	J	1	J	14	UL
1,1,2,2-Tetrachloroethane	12	U	12	U	14	U	13	U	14	UL
1,1,2-Trichloroethane	2	J	2	J	2	J	2	J	2	L
1,1-Dichloroethane	2	J	2	J	2	J	2	J	1	L
1,1-Dichloroethene	2	J	12	U	14	U	1	J	14	UL
1,2-Dichloroethane	2	J	1	J	14	U	13	U	14	UL
1,2-Dichloroethene (total)	4	J	3	J	3	J	3	J	3	L
1,2-Dichloropropane	2	J	2	J	1	J	13	U	14	UL
2-Butanone	12	UJ	12	UJ	14	UJ	13	UJ	14	UJ
2-Hexanone	12	UJ	12	UJ	14	UJ	13	UJ	14	UJ
4-Methyl-2-pentanone	12	U	12	U	14	U	13	U	14	UL
Acetone	12	UJ	12	UJ	12	J	15	J	24	J
Benzene	2	B	2	B	2	B	2	B	14	UL
Bromodichloromethane	1	J	12	U	14	U	13	U	14	UL
Bromoform	12	U	12	U	14	U	13	U	14	UL
Bromomethane	2	J	1	J	14	U	1	J	14	UL
Carbon disulfide	12	U	12	U	3	J	3	J	4	L
Carbon tetrachloride	2	J	1	J	14	U	13	U	14	UL
Chlorobenzene	2	J	2	J	2	J	2	J	2	L
Chloroethane	2	J	2	J	14	U	1	J	14	UL
Chloroform	5	B	5	B	5	B	5	B	5	B
Chloromethane	2	J	1	J	1	J	2	J	14	UL
Dibromochloromethane	12	U	12	U	14	U	13	U	14	UL
Ethylbenzene	2	B	2	B	2	B	2	B	14	UL
Methylene chloride	22	B	12	B	14	B	14	B	14	B
Styrene	12	U	12	U	14	U	13	U	14	UL
Tetrachloroethene	3	B	3	B	3	B	3	B	3	B
Toluene	2	B	2	B	2	B	2	B	2	B
Trichloroethene	2	J	2	J	2	J	2	J	14	UL
Vinyl chloride	2	J	1	J	14	U	1	J	14	UL
Xylene, total	6	B	5	B	5	B	5	B	14	UL
cis-1,3-Dichloropropene	12	U	12	U	14	U	13	U	14	UL
trans-1,3-Dichloropropene	12	U	12	U	14	U	13	U	14	UL
SVOA(UG/KG)										
1,2,4-Trichlorobenzene	NS		410	UL	460	UJ	440	UL	470	UL
1,2-Dichlorobenzene	NS		410	UL	460	UL	440	UL	470	UL
1,3-Dichlorobenzene	NS		410	UL	460	UL	440	UL	470	UL
1,4-Dichlorobenzene	NS		410	UL	460	UJ	440	UL	470	UL
2,2'-Oxybis(1-chloropropane)	NS		410	UL	460	UL	440	UL	470	UL
2,4,5-Trichlorophenol	1000	U	1000	UL	1200	U	1100	UL	1200	U
2,4,6-Trichlorophenol	410	U	410	UL	460	U	440	UL	470	U
2,4-Dichlorophenol	410	U	410	U	460	U	440	UL	470	U
2,4-Dimethylphenol	410	U	410	U	460	U	440	UL	470	U
2,4-Dinitrophenol	1000	U	1000	U	1200	U	1100	UL	1200	U
2,4-Dinitrotoluene	NS		410	UL	460	UL	440	UL	470	UL
2,6-Dinitrotoluene	NS		410	UL	460	UL	440	UL	470	UL
2-Chloronaphthalene	NS		410	UL	460	UL	440	UL	470	UL
2-Chlorophenol	410	U	410	U	460	U	440	UL	470	U
2-Methylnaphthalene	NS		410	UL	460	UL	440	UL	470	UL
2-Methylphenol	410	U	410	U	460	U	440	UL	470	U
2-Nitroaniline	NS		1000	UL	1200	UL	1100	UL	1200	UL
2-Nitrophenol	410	U	410	U	460	U	440	UL	470	U
3,3'-Dichlorobenzidine	NS		410	UL	460	UL	440	UL	470	UL
3-Nitroaniline	NS		1000	UL	1200	UL	1100	UL	1200	UL
4,6-Dinitro-2-methylphenol	1000	U	1000	U	1200	U	1100	UL	1200	U
4-Bromophenyl-phenylether	NS		410	UL	460	UL	440	UL	470	UL
4-Chloro-3-methylphenol	410	U	410	U	460	U	440	UL	470	U
4-Chloroaniline	NS		410	UL	460	UL	440	UL	470	UL
4-Chlorophenyl-phenylether	NS		410	UL	460	UL	440	UL	470	UL
4-Methylphenol	410	U	410	U	460	U	440	UL	470	U
4-Nitroaniline	NS		1000	UL	1200	UL	1100	UL	1200	UL
4-Nitrophenol	1000	U	1000	U	1200	U	1100	UL	1200	U
Acenaphthene	162	U	162	U	183	U	176	U	186	U
Acenaphthylene	811	U	410	UL	460	UL	440	UL	470	UL
Anthracene	81.1	U	81	U	91.7	U	88	U	93.2	U
Benzo(a)anthracene	6.1	J	8.1	UJ	6.86	J	47	L	12.4	J

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Table A-1-3
Analytical Results for Sediment
SWMU 1
NAS Oceana

AnalyteName	OW01-SD09P		OW01-SD09		OW01-SD10		OW01-SD11		OW01-SD12	
Benzo(a)pyrene	81.1	U	81	U	91.7	U	88	U	93.2	U
Benzo(b)fluoranthene	2970		592		1770		1310		2610	
Benzo(g,h,i)perylene	162	U	162	U	183	U	240	L	186	U
Benzo(k)fluoranthene	639	U	410	UL	460	UL	440	UL	470	UL
Butylbenzylphthalate	NS		410	UL	460	UL	440	UL	470	UL
Carbazole	NS		410	UL	460	UL	440	UL	470	UL
Chrysene	17.7	J	7.7	J	14.2	J	57	L	24.5	J
Di-n-butylphthalate	NS		410	UL	460	UL	440	UL	470	UL
Di-n-octylphthalate	NS		410	UL	460	UL	440	UL	470	UL
Dibenz(a,h)anthracene	162	UJ	162	UJ	183	UJ	176	UJ	186	UJ
Dibenzofuran	NS		410	UL	460	UL	440	UL	470	UL
Diethylphthalate	47	L	45	L	110	L	80	L	120	L
Dimethyl phthalate	NS		410	UL	460	UL	440	UL	470	UL
Fluoranthene	811	U	410	UL	460	UL	440	UL	705	J
Fluorene	319	U	319	U	361	U	347	U	367	U
Hexachlorobenzene	NS		410	UL	460	UL	440	UL	470	UL
Hexachlorobutadiene	NS		410	UL	460	UL	440	UL	470	UL
Hexachlorocyclopentadiene	NS		410	UL	460	UL	440	UL	470	UL
Hexachloroethane	NS		410	UL	460	UL	440	UL	470	UL
Indeno(1,2,3-cd)pyrene	319	U	319	U	361	U	347	U	367	U
Isophorone	NS		410	UL	460	UL	440	UL	470	UL
Naphthalene	1620	U	410	UL	460	UL	59	L	470	UL
Nitrobenzene	NS		410	UL	460	UL	440	UL	470	UL
Pentachlorophenol	1000	U	1000	U	1200	U	1100	UL	1200	U
Phenanthrene	41.8	UJ	41.7	UJ	47.2	UJ	45.3	UJ	48	UJ
Phenol	410	U	410	U	460	U	440	UL	470	U
Pyrene	1.98	J	4.17	U	3.74	J	92	L	4.86	
bis(2-Chloroethoxy)methane	NS		410	UL	460	UL	440	UL	470	UL
bis(2-Chloroethyl)ether	NS		410	UL	460	UL	440	UL	470	UL
bis(2-Ethylhexyl)phthalate	NS		410	UL	460	UL	440	UL	470	UL
n-Nitroso-di-n-propylamine	NS		410	UL	460	UL	440	UL	470	UL
n-Nitrosodiphenylamine	NS		410	UL	460	UL	440	UL	470	UL
PEST/P(UG/KG)										
4,4'-DDD	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
4,4'-DDE	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
4,4'-DDT	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Aldrin	2	U	2	U	2.3	U	2.2	U	2.3	U
Aroclor-1016	41	U	41	U	46	U	44	U	47	U
Aroclor-1221	82	U	81	U	92	U	88	U	94	U
Aroclor-1232	41	U	41	U	46	U	44	U	47	U
Aroclor-1242	41	U	41	U	46	U	44	U	47	U
Aroclor-1248	41	U	41	U	46	U	44	U	47	U
Aroclor-1254	41	U	41	U	46	U	44	U	47	U
Aroclor-1260	41	U	41	U	46	U	44	U	47	U
Dieldrin	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Endosulfan I	2	U	2	U	2.3	U	2.2	U	2.3	U
Endosulfan II	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Endosulfan sulfate	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Endrin	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Endrin aldehyde	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Endrin ketone	4.1	U	4.1	U	4.6	U	4.4	U	4.7	U
Heptachlor	2	U	2	U	2.3	U	2.2	U	2.3	U
Heptachlor epoxide	2	U	2	U	2.3	U	2.2	U	2.3	U
Methoxychlor	20	U	20	U	23	U	22	U	23	U
Toxaphene	200	U	200	U	230	U	220	U	230	U
alpha-BHC	2	U	2	U	2.3	U	2.2	U	2.3	U
alpha-Chlordane	2	U	2	U	2.3	U	2.2	U	2.3	U
beta-BHC	2	U	2	U	2.3	U	2.2	U	2.3	U
delta-BHC	2	U	2	U	2.3	U	2.2	U	2.3	U
gamma-BHC (Lindane)	2	U	2	U	2.3	UJ	2.2	U	2.3	U
gamma-Chlordane	2	U	2	U	2.3	U	2.2	U	2.3	U
METAL(MG/KG)										
Aluminum	439		373		754		639		631	
Antimony	0.38	U	0.47	U	0.56	U	0.53	U	0.4	U
Arsenic	0.47	U	0.57	U	0.69	U	2.2	J	5.3	
Barium	2.9	J	2.6	J	6.4	J	6.9	J	7.4	J
Beryllium	0.04	J	0.04	J	0.08	J	0.19	J	0.23	J

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Table A-1-3
Analytical Results for Sediment
SWMU 1
NAS Oceana

AnalyteName	OW01-SD09P		OW01-SD09		OW01-SD10		OW01-SD11		OW01-SD12	
Cadmium	0.1	B	0.09	B	0.13	B	0.17	B	0.13	B
Calcium	75.1	B	66.8	B	186	J	169	J	147	B
Chromium	1.2	J	1	J	2	J	1.6	J	1.5	J
Cobalt	0.33	B	0.26	B	0.57	B	1.1	B	1.4	B
Copper	0.82	B	0.87	B	1.4	B	1.4	B	1.8	J
Cyanide	0.22	U	0.22	U	0.29	U	0.26	U	0.25	U
Iron	463		693		878		2960		5520	
Lead	0.85		0.79		1.5		1.4		1.7	
Magnesium	57.7	B	46.4	B	99.8	J	72.7	J	65.4	J
Manganese	2.9		2.2	J	4.3		11.9		19	
Mercury	0.02	U	0.01	U	0.02	U	0.02	U	0.02	U
Nickel	0.6	B	0.47	B	1	B	1.4	B	1.5	B
Potassium	53	B	46.7	B	70	B	58.9	B	44.6	B
Selenium	0.47	U	0.57	U	0.71	J	0.65	U	0.49	U
Silver	0.12	U	0.15	U	0.18	U	0.17	U	0.13	U
Sodium	28.3	U	34.4	U	41.4	U	39.4	U	29.4	U
Thallium	0.66	U	0.8	U	0.97	U	0.92	U	0.69	U
Vanadium	1.2	J	1.2	J	1.9	J	2.7	J	2.5	J
Zinc	5.4	B	3.5	B	7.5	B	11.8	B	12.2	B

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
b - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-4
Analytical Results for Groundwater
SWMU 1
NAS Oceana

AnalyteName	OW01-MW02-R01		OW01-MW03-R01		OW01-MW04-R01		OW01-MW04P-R01		OW01-MW05-R01		OW01-MW06-R01	
VOA(UG/L)												
1,1,1,2-Tetrachloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,1,1-Trichloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	5	UL	10	U	1	U	1	U
1,1-Dichloropropene	1	U	1	U	5	UL	10	U	1	U	1	U
1,2,3-Trichlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,2,3-Trichloropropane	1	U	1	U	5	UL	10	U	1	U	1	U
1,2,4-Trichlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,2,4-Trimethylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,2-Dibromoethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	5	UL	10	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	5	L	10	U	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,3-Dichlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
1,3-Dichloropropane	1	U	1	U	5	UL	10	U	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
2,2-Dichloropropane	1	U	1	U	3	L	10	U	1	J	1	U
Benzene	1	U	1	U	5	UL	10	U	1	U	1	U
Bromobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
Bromochloromethane	1	U	1	U	5	UL	10	U	1	U	1	U
Bromodichloromethane	1	U	1	U	5	UL	10	U	1	U	1	U
Bromoform	1	U	1	U	5	UL	10	U	1	U	1	U
Bromomethane	1	U	1	U	5	UL	10	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	5	UL	10	U	1	U	1	U
Chlorobenzene	1	U	1	U	5	UL	10	U	1	U	1	U
Chloroethane	1	U	1	U	5	B	9	B	1	U	1	U
Chloroform	1	U	1	U	5	UL	10	U	1	U	1	U
Chloromethane	1	U	1	U	5	L	7	J	1		1	U
Cumene	1	U	1	U	5	UL	10	U	1	U	1	U
Dibromochloromethane	1	U	1	U	5	UL	10	U	1	U	1	U
Dibromomethane	1	U	1	U	5	UL	10	U	1	U	1	U
Dichlorodifluoromethane	1	U	1	U	5	UL	10	U	1	U	1	U
Ethylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
Hexachlorobutadiene	1	U	1	U	4	B	8	B	1	U	1	B
Methylene chloride	1	U	1	U	5	UL	10	U	1	U	1	U
Styrene	1	U	1	U	5	UL	10	U	1	U	1	U
Tetrachloroethene	1	U	1	U	5	UL	10	U	1	U	1	U
Toluene	1	U	1	U	5	UL	10	U	1	U	1	U
Trichloroethene	1	J	1	U	5	UL	10	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	5	UL	10	U	1	U	1	U
Vinyl chloride	1	U	1	U	9	L	12		2		1	U
Xylene, total	1	U	1	U	5	UL	10	U	1	U	1	U
cis-1,2-Dichloroethene	1	U	1	U	5	UL	10	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U	5	UL	10	U	1	U	1	U
n-Butylbenzene	1	U	1	U	7	L	10		1	U	1	U
n-Propylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
o-Chlorotoluene	1	U	1	U	5	UL	10	U	1	U	1	U
o-Xylene	1	U	1	U	5	UL	10	U	1	U	1	U
p-Chlorotoluene	1	U	1	U	5	UL	10	U	1	U	1	U
p-Isopropyltoluene	1	U	1	U	5	UL	10	U	1	U	1	U
sec-Butylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
tert-Butylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U
trans-1,2-Dichloroethene	1	U	1	U	5	UL	10	U	1	U	1	U
trans-1,3-Dichloropropene												
SVOA(UG/L)												
Acenaphthene	0.22	U	0.2	U	36	B	24	B	14	B	0.21	U
Acenaphthylene	1.1	U	1	U	110	U	110	U	21	U	1	U
Anthracene	0.064	B	0.074	B	9.2	B	3.5	B	3.7	B	0.1	U
Benzo(a)anthracene	0.011	U	0.01	U	1.1	U	1.1	U	0.21	U	0.01	U
Benzo(a)pyrene	0.11	U	0.1	U	11	U	11	U	2.1	U	0.1	U
Benzo(b)fluoranthene	0.43	U	0.4	U	42	U	43	U	8.3	U	0.42	U
Benzo(g,h,i)perylene	0.22	U	0.2	U	21	U	22	U	4.2	U	0.21	U
Benzo(k)fluoranthene	0.86	U	0.81	U	84	U	86	U	17	U	0.84	U
Chrysene	0.011	U	0.01	U	1.1	U	1.1	U	0.21	U	0.01	U
Dibenz(a,h)anthracene	0.22	U	0.2	U	21	U	22	U	4.2	U	0.21	U
Fluoranthene	1.1	U	2.1	B	530	B	180	B	180	B	1	U
Fluorene	0.43	U	0.4	U	180	B	120	B	32	B	0.42	U
Indeno(1,2,3-cd)pyrene	0.43	U	0.4	U	42	U	43	U	8.3	U	0.42	U
Naphthalene	1	U	1	U	179	L	208		58		1	U
Phenanthrene	0.061	B	0.018	B	18	B	7.1	B	7.8	B	0.012	B
Pyrene	0.003	J	0.005		0.23	J	0.54	U	0.037	J	0.005	

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-1-4
Analytical Results for Groundwater
SWMU 1
NAS Oceana

AnalyteName	OW01-MW07-R01		OW01-MW07D-R01		OW01-MW08-R01		OW01-MW08D-R01		OW01-PZ01-R01		OW01-PZ02-R01	
VOA(UG/L)												
1,1,1,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1,1-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U
1,2,3-Trichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
1,2,3-Trichloropropane	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-Trichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-Trimethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dibromoethane	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U	1	U	1	U	1	U	3	
1,3-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
1,3-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
2,2-Dichloropropane	1	U	1	U	1	U	1	U	1	U	1	U
Benzene	1	U	1	U	1	J	1	U	1	U	1	
Bromobenzene	1	U	1	U	1	U	1	U	1	U	1	U
Bromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	1	U	1	U	1	U	1	U	1	U
Bromoform	1	U	1	U	1	U	1	U	1	U	1	U
Bromomethane	1	U	1	U	1	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	1	U	1	U	1	U	1	U	1	U
Chlorobenzene	1	U	1	U	1	U	1	U	1	U	1	U
Chloroethane	1	U	1	U	1	U	1	U	1	U	1	U
Chloroform	1	U	1	U	1	U	1	U	1	U	1	U
Chloromethane	1	U	1	U	1	U	1	U	1	U	1	U
Cumene	1	U	1	U	1	U	1	U	1	U	3	
Dibromochloromethane	1	U	1	U	1	U	1	U	1	U	1	U
Dibromomethane	1	U	1	U	1	U	1	U	1	U	1	U
Dichlorodifluoromethane	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
Hexachlorobutadiene	1	U	1	U	1	U	1	U	1	U	1	U
Methylene chloride	1	B	1	B	1	B	1	B	1	B	1	B
Styrene	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	1	U	1	U	1	U	1	U	1	U	1	U
Toluene	1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
Trichlorofluoromethane	1	U	1	U	1	U	1	U	1	U	1	U
Vinyl chloride	1	U	1	U	1	U	1	U	1	U	1	U
Xylene, total	1	U	1	U	1	U	1	U	1	U	1	J
cis-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U
n-Butylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
n-Propylbenzene	1	U	1	U	1	U	1	U	1	U	4	
o-Chlorotoluene	1	U	1	U	1	U	1	U	1	U	1	U
o-Xylene	1	U	1	U	1	U	1	U	1	U	1	U
p-Chlorotoluene	1	U	1	U	1	U	1	U	1	U	1	U
p-Isopropyltoluene	1	U	1	U	1	U	1	U	1	U	1	U
sec-Butylbenzene	1	U	1	U	1	U	1	U	2		4	
tert-Butylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	1	U	1	U	1	U	1	U	1	U
SVOA(UG/L)												
Acenaphthene	0.21	U	0.21	U	0.2	U	1	U	0.13	J	0.15	J
Acenaphthylene	1	U	1	U	1	U	5	U	1	U	1.1	U
Anthracene	0.1	U	0.92	B	0.1	U	0.36	B	0.22	B	0.85	B
Benzo(a)anthracene	0.01	U	0.01	U	0.01	U	0.23		0.01	U	0.011	U
Benzo(a)pyrene	0.1	U	0.1	U	0.1	U	0.5	U	0.2		0.11	U
Benzo(b)fluoranthene	0.42	U	0.42	U	0.41	U	2	U	0.42	U	0.42	U
Benzo(g,h,i)perylene	0.21	U	0.21	U	0.2	U	1	U	0.21	U	0.21	U
Benzo(k)fluoranthene	0.84	U	0.83	U	0.82	U	4	U	0.84	U	0.85	U
Chrysene	0.01	U	0.01	U	0.01	U	0.05	U	0.01	U	0.011	U
Dibenz(a,h)anthracene	0.21	U	0.21	U	0.2	U	1	U	0.21	U	0.21	U
Fluoranthene	1	U	2.4		1	U	6.5		1	U	6.2	
Fluorene	0.42	U	0.42	U	0.41	U	2	U	0.42	U	0.42	U
Indeno(1,2,3-cd)pyrene	0.42	U	0.42	U	0.41	U	2	U	0.42	U	0.42	U
Naphthalene	1	U	1	U	1	U	1	U	1	U	18	
Phenanthrene	0.014	B	0.35		0.016	B	0.25	U	0.052	U	0.053	U
Pyrene	0.002	J	0.005	U	0.005	U	0.01	J	0.003	J	0.005	U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-1-4
Analytical Results for Groundwater
SWMU 1
NAS Oceana

AnalyteName	OW01-PZ02P-R01		OW01-PZ03-R01		OW01-PZ04-R01		OW01-PZ05-R01		OW1-MW10-R01	
VOA(UG/L)										
1,1,1,2-Tetrachloroethane	1	U	10	U	1	U	1	U	1	U
1,1,1-Trichloroethane	1	U	10	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	1	U	10	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	10	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	10	U	1	J	1	U	1	U
1,1-Dichloroethene	1	U	10	U	1	U	1	U	1	U
1,1-Dichloropropene	1	U	10	U	1	U	1	U	1	U
1,2,3-Trichlorobenzene	1	U	10	U	1	U	1	U	1	U
1,2,3-Trichloropropane	1	U	10	U	1	U	1	U	1	U
1,2,4-Trichlorobenzene	1	U	10	U	1	U	1	U	1	U
1,2,4-Trimethylbenzene	1	U	10	U	1	U	1	U	1	U
1,2-Dibromoethane	1	U	10	U	1	U	1	U	1	U
1,2-Dichlorobenzene	1	U	10	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	10	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	10	U	1	U	1	U	1	U
1,3,5-Trimethylbenzene	1	U	10	U	1	U	1	U	1	U
1,3-Dichlorobenzene	1	U	10	U	1	U	1	U	1	U
1,3-Dichloropropane	1	U	10	U	1	U	1	U	1	U
1,4-Dichlorobenzene	1	U	10	U	1	U	1	U	1	U
2,2-Dichloropropane	1	U	10	U	1	U	1	U	1	U
Benzene	1		6	J	2		1	U	1	U
Bromobenzene	1	U	10	U	1	U	1	U	1	U
Bromochloromethane	1	U	10	U	1	U	1	U	1	U
Bromodichloromethane	1	U	10	U	1	U	1	U	1	U
Bromoform	1	U	10	U	1	U	1	U	1	U
Bromomethane	1	U	10	U	1	U	1	U	1	U
Carbon tetrachloride	1	U	10	U	1	U	1	U	1	U
Chlorobenzene	1	U	10	U	1	U	1	U	1	U
Chloroethane	1	U	10	U	1	U	1	U	1	U
Chloroform	1	U	9	B	1	U	1	U	1	U
Chloromethane	1	U	10	U	1	U	1	U	1	U
Cumene	4		10	U	1		1	J	1	U
Dibromochloromethane	1	U	10	U	1	U	1	U	1	U
Dibromomethane	1	U	10	U	1	U	1	U	1	U
Dichlorodifluoromethane	1	U	10	U	1	U	1	U	1	U
Ethylbenzene	1	U	17		6		4		1	U
Hexachlorobutadiene	1	U	10	U	1	U	1	U	1	U
Methylene chloride	1	B	7	B	1	U	1	U	1	B
Styrene	1	U	10	U	1	U	1	U	1	U
Tetrachloroethene	1	U	10	U	1	U	1	U	1	U
Toluene	1	U	35		9		1	J	1	U
Trichloroethene	1	U	10	U	1	U	1	U	1	J
Trichlorofluoromethane	1	U	10	U	1	U	1	U	1	U
Vinyl chloride	1	U	10	U	1	U	1	U	1	U
Xylene, total	1	J	66		12		7		1	U
cis-1,2-Dichloroethene	1	U	10	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	10	U	1	U	1	U	1	U
n-Butylbenzene	1	U	10	U	1	U	1	U	1	U
n-Propylbenzene	5		10	U	2		1	U	1	U
o-Chlorotoluene	1	U	10	U	1	U	1	U	1	U
o-Xylene	1	U	11		4		1	J	1	U
p-Chlorotoluene	1	U	10	U	1	U	1	U	1	U
p-Isopropyltoluene	1	U	10	U	2		1		1	U
sec-Butylbenzene	5		10	U	1	U	1	U	1	U
tert-Butylbenzene	1	U	10	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	1	U	10	U	1	U	1	U	1	U
trans-1,3-Dichloropropene	1	U	10	U	1	U	1	U	1	U
SVOA(UG/L)										
Acenaphthene	0.096	J	9.2	B	3.1	B	0.24	B	0.22	U
Acenaphthylene	1	U	11	U	5.3	U	1	U	1.1	U
Anthracene	0.35	B	1.6	B	0.62	B	0.16	B	0.11	U
Benzo(a)anthracene	0.01	U	0.11	U	0.053	U	0.01	U	0.011	U
Benzo(a)pyrene	0.1	U	1.1	U	0.53	U	0.1	U	0.11	U
Benzo(b)fluoranthene	0.41	U	4.2	U	2.1	U	0.41	U	0.45	U
Benzo(g,h,i)perylene	0.2	U	2.1	U	1.1	U	0.2	U	0.22	U
Benzo(k)fluoranthene	0.82	U	8.4	U	4.3	U	0.82	U	0.9	U
Chrysene	0.01	U	0.11	U	0.053	U	0.01	U	0.011	U
Dibenz(a,h)anthracene	0.2	U	2.1	U	1.1	U	0.2	U	0.22	U
Fluoranthene	2.3		85	B	31	B	8.6	B	1.1	U
Fluorene	0.41	U	45	B	17	B	0.66	B	0.45	U
Indeno(1,2,3-cd)pyrene	0.41	U	4.2	U	2.1	U	0.41	U	0.45	U
Naphthalene	22		10	U	22		13		1	U
Phenanthrene	0.051	U	2.5	B	0.98	B	0.052	B	0.021	B
Pyrene	0.005	U	0.053	U	0.027	U	0.002	J	0.006	U

NA - Not analyzed
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B - Analyte not detected above associated blank

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB10	1-SB11	1-SB12	1-SB13	1-SB13 FD	1-SB14	1-SB15	1-SB16	1-SB17	1-SB18
1,1-Trichloroethane										
1,2,2-Tetrachloroethane										
1,1,2-Trichloroethane										
1,1-Dichloroethane										
1,1-Dichloroethene										
1,2,4-Trichlorobenzene										
1,2-Dichlorobenzene										
1,2-Dichloroethane										
1,2-Dichloroethene (total)										
1,2-Dichloropropane										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
1-Methylnapthalene	26 U	10 U	28 U	2.6 U	5.1 U	10 U	0.054 U	0.062 U	0.054 U	0.055 U
2,2'-Oxybis(1-chloropropane)										
2,4,5-Trichlorophenol										
2,4,6-Trichlorophenol										
2,4-Dichlorophenol										
2,4-Dimethylphenol										
2,4-Dinitrophenol										
2,4-Dinitrotoluene										
2,6-Dinitrotoluene										
2-Butanone	2.8 U	1.5 U	2.9 U	1.4 U	1.5 U	0.73 U	0.012 U			
2-Chloronaphthalene										
2-Chlorophenol										
2-Hexanone										
2-Methylnaphthalene	34 =	12 =	45 =	2.9 =	6.3 =	10 U	0.054 U	0.062 U	0.054 U	0.055 U
2-Methylphenol										
2-Nitroaniline										
2-Nitrophenol										
3,3'-Dichlorobenzidine										
3-Nitroaniline										
4,4'-DDD										
4,4'-DDE										
4,4'-DDT										
4,6-Dinitro-2-methylphenol										
4-Bromophenyl-phenylether										
4-Chloro-3-methylphenol										
4-Chloroaniline										
4-Chlorophenyl-phenylether										
4-Methyl-2-pentanone										
4-Methylphenol										
4-Nitroaniline										
4-Nitrophenol										
Acenaphthene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.062 U	0.054 U	0.055 U
Acenaphthylene										
Acetone	2.8 U	2.1 b	2.9 U	2.1 b	2.3 b	2.2 b	0.023 =	0.019 b	0.01 b	0.012 b
Aldrin										
alpha-BHC										
alpha-Chlordane										
Aluminum	2590 =	5350 =	475 =	7540 =	14300 =	22000 =	7130 =			
Anthracene										
Antimony	2.4 U	2.5 U	2.7 U	2.5 U	2.6 U	3.6 b	2.6 U			
Aroclor-1016										
Aroclor-1221										
Aroclor-1232										
Aroclor-1242										
Aroclor-1248										
Aroclor-1254	0.017 U	0.011 j	0.027 =	0.018 U	0.007 j	0.018 U	0.018 U			
Aroclor-1260	0.014 j	0.018 U	0.018 U	0.018 U	0.017 U	0.018 U	0.018 U			
Arsenic	0.56 b	1.2 b	0.44 b	0.76 b	1.4 b	1.4 b	0.57 b			
Barium	29.6 b	23.9 b	3 b	29.1 b	51.1 =	52.5 =	43.5 b			
Benzene	1.4 U	0.76 U	1.4 U	0.72 U	0.74 U	0.73 U	0.004 j	0.006 U	0.006 U	0.006 U
Benzo (a) anthracene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.45 =	0.054 U	0.055 U
Benzo (a) pyrene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	1.1 =	0.054 U	0.055 U
Benzo (b) fluoranthene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.97 =	0.054 U	0.055 U
Benzo (g,h,i) perylene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.88 =	0.054 U	0.055 U
Benzo (k) fluoranthene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.69 =	0.054 U	0.055 U
Benzo(a)anthracene										
Benzo(a)pyrene										

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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB10	1-SB11	1-SB12	1-SB13	1-SB13 FD	1-SB14	1-SB15	1-SB16	1-SB17	1-SB18
Benzo(b)fluoranthene										
Benzo(g,h,i)perylene										
Benzo(k)fluoranthene										
Beryllium	0.07 b	0.17 b	0.05 U	0.28 b	0.39 b	0.56 b	0.45 b			
beta-BHC										
bis (2-Ethylhexyl)phthalate										
bis(2-Chloroethoxy)methane										
bis(2-Chloroethyl)ether										
bis(2-Ethylhexyl)phthalate										
Bromodichloromethane										
Bromoform										
Bromomethane										
Butylbenzylphthalate										
Cadmium	0.66 U	0.7 U	0.74 U	0.69 U	1.3 =	0.77 U	0.71 U			
Calcium	448 b	284 b	63.4 b	142 b	234 b	344 b	237 b			
Carbazole										
Carbon Disulfide	1.4 U	0.76 U	1.4 U	0.72 U	0.74 U	0.73 U	0.006 U	0.006 U	0.006 U	0.006 U
Carbon tetrachloride										
Chlorobenzene										
Chloroethane										
Chloroform										
Chloromethane										
Chromium	10.1 =	8.5 =	2.9 =	14.2 =	23.7 =	34.3 =	13.9 =			
Chrysene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.71 =	0.054 U	0.055 U
cis-1,3-Dichloropropene										
Cobalt	1.3 b	1.1 b	0.82 U	2.3 b	3.4 b	3 b	2.8 b			
Copper	70.8 =	5.7 b	0.76 b	4.5 b	6.7 =	6.6 =	5.8 b			
Cyanide										
delta-BHC										
Di-n-Butylphthalate										
Di-n-octyl phthalate										
Dibenz(a,h)anthracene										
Dibenzo (a, h) anthracene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.26 =	0.054 U	0.[illegible]
Dibenzofuran										
Dibromochloromethane										
Dieldrin										
Diethylphthalate										
Dimethyl phthalate										
Endosulfan I										
Endosulfan II										
Endosulfan sulfate										
Endrin										
Endrin aldehyde										
Endrin ketone										
Ethylbenzene	4 =	0.46 j	6.4 =	1.8 =	1.3 =	0.73 U	0.006 U	0.006 U	0.006 U	0.006 U
Fluoranthene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.44 =	0.054 U	0.055 U
Fluorene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.062 U	0.054 U	0.055 U
gamma-BHC (Lindane)										
gamma-Chlordane										
Heptachlor										
Heptachlor epoxide										
Hexachlorinated-Dibenzo Furans (Total)										
Hexachlorobenzene										
Hexachlorobutadiene										
Hexachlorocyclopentadiene										
Hexachloroethane										
Indeno (1,2,3-cd) pyrene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	1.1 =	0.054 U	0.055 U
Indeno(1,2,3-cd)pyrene										
Iron	8550 =	2860 =	336 =	5440 =	8360 =	15400 =	6220 =			
Isophorone										
Lead	14.6 =	42.3 =	1.1 =	0.78 =	9.6 =	8.9 =	8.1 =			
Magnesium	195 b	404 b	65 b	815 b	1070 b	1140 b	1230 =			
Manganese	40.1 =	11.6 =	2.3 b	16.7 =	19 =	18.1 =	22.6 =			
Mercury	0.05 b	0.05 b	0.04 b	0.05 b	0.04 b	0.05 b	0.04 b			
Methoxychlor										
Methylene Chloride	0.38 jb	0.54 jb	0.67 jb	0.72 b	0.25 jb	0.19 jb	0.013 b	0.01 b	0.004 jb	0.0[illegible]
n-Nitroso-di-n-propylamine										
n-Nitrosodiphenylamine										
Naphthalene	28 U	10 U	31 =	2 U	5.1 U	10 U	0.054 U	0.062 U	0.054 U	0.055 U

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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB10	1-SB11	1-SB12	1-SB13	1-SB13 FD	1-SB14	1-SB15	1-SB16	1-SB17	1-SB18
Nickel	10.3 =	3.8 b	0.66 U	6.3 b	10.3 =	8.5 b	7.1 b			
obenzene										
ntachlorophenol										
pH										
Phenanthrene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.062 U	0.054 U	0.055 U
Phenol										
Potassium	179 b	296 b	186 =	491 b	642 b	782 b	549 b			
Pyrene	26 U	10 U	26 U	1.1 U	5.1 U	10 U	0.054 U	0.52 =	0.054 U	0.055 U
Selenium	0.41 U	0.62 b	0.46 U	0.43 U	0.45 U	0.48 U	0.44 U			
Silver	0.45 U	0.48 U	0.5 U	0.47 U	0.49 U	0.52 U	0.48 U			
Sodium	169 b	191 b	197 =	186 =	409 b	241 b	435 b			
Styrene	1.4 U	0.76 U	1.4 U	0.72 U	0.74 U	0.73 U	0.006 U	0.006 j	0.006 U	0.006 U
Sulfide										
Tetrachloroethene										
Thallium	0.51 U	0.55 U	0.58 U	0.54 U	0.56 U	0.6 U	0.55 U			
Tin										
Toluene	0.83 j	0.27 j	6.8 =	0.72 U	0.74 U	0.73 U	0.003 j	0.006 U	0.006 U	0.006 U
Total Petroleum Hydrocarbons								2.2 U	1.8 U	1.8 U
Toxaphene										
Trichloroethene										
Vanadium	4 b	7.9 b	1.6 =	13.7 =	19.8 =	52.2 =	12.1 =			
Vinyl chloride										
Xylene (Total)	13 =	2.9 =	44 =	8.3 =	6.1 =	0.73 U	0.002 j	0.003 j	0.006 U	0.006 U
Xylene, total										
Zinc	117 =	26.1 =	2.4 U	16.7 =	25.1 =	23.5 =	24.4 =			

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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB18 FD	1-SB19	1-SB21	1-SB22	1-SB22 FD	1-SB23	1-SB24	1-SB25	1-SB29
1,1,1-Trichloroethane									
1,1,2,2-Tetrachloroethane									
1,1,2-Trichloroethane									
1,1-Dichloroethane									
1,1-Dichloroethene									
1,2,4-Trichlorobenzene									
1,2-Dichlorobenzene									
1,2-Dichloroethane									
1,2-Dichloroethene (total)									
1,2-Dichloropropane									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
1-Methylnapthalene		0.059 U	0.056 U	5.7 U	9.4 =	30 =	0.052 U	0.054 U	24 U
2,2'-Oxybis(1-chloropropane)									
2,4,5-Trichlorophenol									
2,4,6-Trichlorophenol									
2,4-Dichlorophenol									
2,4-Dimethylphenol									
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2,6-Dinitrotoluene									
2-Butanone									1.4 U
2-Chloronaphthalene									
2-Chlorophenol									
2-Hexanone									
2-Methylnaphthalene		0.059 U	0.056 U	10 =	12 =	44 =	0.052 U	0.054 U	40 =
2-Methylphenol									
2-Nitroaniline									
2-Nitrophenol									
3,3'-Dichlorobenzidine									
3-Nitroaniline									
4,4'-DDD									
4,4'-DDE									
4,4'-DDT									
4,6-Dinitro-2-methylphenol									
4-Bromophenyl-phenylether									
4-Chloro-3-methylphenol									
4-Chloroaniline									
4-Chlorophenyl-phenylether									
4-Methyl-2-pentanone									
4-Methylphenol									
4-Nitroaniline									
4-Nitrophenol									
Acenaphthene		0.059 U	0.056 U	5.7 U	5.7 U	5.7 U	0.052 U	0.054 U	24 U
Acenaphthylene									
Acetone		0.012 b	0.018 j	0.042 j		0.033 j	0.012 U	0.011 j	1.4 U
Aldrin									
alpha-BHC									
alpha-Chlordane									
Aluminum									
Anthracene									
Antimony									
Aroclor-1016									
Aroclor-1221									
Aroclor-1232									
Aroclor-1242									
Aroclor-1248									
Aroclor-1254									
Aroclor-1260									
Arsenic									
Barium									
Benzene		0.006 U	0.006 U	0.006 uj		0.005 uj	0.006 U	0.009 =	0.73 U
Benzo (a) anthracene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Benzo (a) pyrene		0.059 U	0.056 U	5.7 U	5.4 U	5.4 U	0.052 U	0.054 U	24 U
Benzo (b) fluoranthene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Benzo (g,h,i) perylene		0.059 U	0.056 U	5.7 U	5.4 U	5.4 U	0.052 U	0.054 U	24 U
Benzo (k) fluoranthene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Benzo(a)anthracene									
Benzo(a)pyrene									

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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB18 FD	1-SB19	1-SB21	1-SB22	1-SB22 FD	1-SB23	1-SB24	1-SB25	1-SB29
Benzo(b)fluoranthene									
Benzo(g,h,i)perylene									
Benzo(k)fluoranthene									
Beryllium									
beta-BHC									
bis (2-Ethylhexyl)phthalate									
bis(2-Chloroethoxy)methane									
bis(2-Chloroethyl)ether									
bis(2-Ethylhexyl)phthalate									
Bromodichloromethane									
Bromoform									
Bromomethane									
Butylbenzylphthalate									
Cadmium									
Calcium									
Carbazole									
Carbon Disulfide		0.006 U	0.002 j	0.007 j		0.005 j	0.003 j	0.005 U	0.73 U
Carbon tetrachloride									
Chlorobenzene									
Chloroethane									
Chloroform									
Chloromethane									
Chromium									
Chrysene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
cis-1,3-Dichloropropene									
Cobalt									
Copper									
Cyanide									
delta-BHC									
Di-n-Butylphthalate									
Di-n-octyl phthalate									
Dibenz(a,h)anthracene									
Dibenzo (a, h) anthracene		0.059 U	0.056 U	5.7 U	5.4 U	5.4 U	0.052 U	0.054 U	24 U
Dibenzofuran									
Dibromochloromethane									
Dieldrin									
Diethylphthalate									
Dimethyl phthalate									
Endosulfan I									
Endosulfan II									
Endosulfan sulfate									
Endrin									
Endrin aldehyde									
Endrin ketone									
Ethylbenzene		0.006 U	0.006 U	0.14 j		0.21 j	0.007 =	0.002 j	0.86 =
Fluoranthene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Fluorene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
gamma-BHC (Lindane)									
gamma-Chlordane									
Heptachlor									
Heptachlor epoxide									
Hexachlorinated-Dibenzo Furans (Tot									
Hexachlorobenzene									
Hexachlorobutadiene									
Hexachlorocyclopentadiene									
Hexachloroethane									
Indeno (1,2,3-cd) pyrene		0.059 U	0.056 U	5.7 U	5.4 U	5.4 U	0.052 U	0.054 U	24 U
Indeno(1,2,3-cd)pyrene									
Iron									
Isophorone									
Lead									
Magnesium									
Manganese									
Mercury									
Methoxychlor									
Methylene Chloride		0.005 jb	0.016 b	0.013 b		0.008 b	0.011 b	0.003 jb	0.73 U
n-Nitroso-di-n-propylamine									
n-Nitrosodiphenylamine									
Naphthalene		0.059 U	0.056 U	5.7 U	5.7 U	19 =	0.052 U	0.054 U	24 U

NA - Not analyzed
J - Reported value is estimated
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B - Analyte not detected above associated blank
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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB18 FD	1-SB19	1-SB21	1-SB22	1-SB22 FD	1-SB23	1-SB24	1-SB25	1-SB29
Nickel									
Nitrobenzene									
Pentachlorophenol									
pH									
Phenanthrene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Phenol									
Potassium									
Pyrene		0.059 U	0.056 U	5.7 U	5.7 U	5.4 U	0.052 U	0.054 U	24 U
Selenium									
Silver									
Sodium									
Styrene		0.011 =	0.006 U	0.006 uj		0.005 uj	0.006 U	0.005 U	0.73 U
Sulfide									
Tetrachloroethene									
Thallium									
Tin									
Toluene		0.006 U	0.004 j	0.008 j		0.18 j	0.006 j	0.005 j	0.73 U
Total Petroleum Hydrocarbons	1.8 U	1.9 U	29900 =	4270 =		14500 =	7 =	1.8 U	13000 =
Toxaphene									
Trichloroethene									
Vanadium									
Vinyl chloride									
Xylene (Total)		0.006 U	0.012 =	0.98 dj		2.1 dj	0.028 =	0.008 =	4.8 =
Xylene, total									
Zinc									

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B - Analyte not detected above associated blank
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Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB29 FD	1-SB30	1-SB30 FD	1-SB31	1-SB32	1-SB7	1-SB8	1-SB9	1-SB9 FD
1,1,1-Trichloroethane									
1,2,2-Tetrachloroethane									
1,2-Trichloroethane									
1,1-Dichloroethane									
1,1-Dichloroethene									
1,2,4-Trichlorobenzene									
1,2-Dichlorobenzene									
1,2-Dichloroethane									
1,2-Dichloroethene (total)									
1,2-Dichloropropane									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
1-Methylnapthalene		0.057 U		0.061 U	0.058 U		0.057 U		
2,2'-Oxybis(1-chloropropane)									
2,4,5-Trichlorophenol									
2,4,6-Trichlorophenol									
2,4-Dichlorophenol									
2,4-Dimethylphenol									
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2,6-Dinitrotoluene									
2-Butanone	1.4 U					0.29 U	0.057 U	0.34 U	0.31 U
2-Chloronaphthalene									
2-Chlorophenol									
2-Hexanone									
2-Methylnaphthalene		0.057 U		0.061 U	0.058 U	38 =	0.057 U	4.8 =	12 =
2-Methylphenol									
2-Nitroaniline									
2-Nitrophenol									
3,3'-Dichlorobenzidine									
3-Nitroaniline									
4,4'-DDD						0.018 =		0.0017 U	0.0017 U
4,4'-DDE						0.002 =		0.00088 U	0.00088 U
4,4'-DDT						0.0034 =		0.0017 U	0.0017 U
4,6-Dinitro-2-methylphenol									
4-Bromophenyl-phenylether									
4-Chloro-3-methylphenol									
4-Chloroaniline									
4-Chlorophenyl-phenylether									
4-Methyl-2-pentanone									
4-Methylphenol									
4-Nitroaniline									
4-Nitrophenol									
Acenaphthene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Acenaphthylene									
Acetone	1.4 U	0.013 b		0.013 b	0.016 b	0.066 =	0.022 =	0.11 =	0.12 =
Aldrin									
alpha-BHC									
alpha-Chlordane									
Aluminum							1010 =		
Anthracene									
Antimony						13 b	2.6 U	4.1 U	4.2 U
Aroclor-1016									
Aroclor-1221									
Aroclor-1232									
Aroclor-1242									
Aroclor-1248									
Aroclor-1254						0.04 U	0.02 U	0.022 U	0.022 U
Aroclor-1260						0.04 U	0.02 U	0.022 U	0.022 U
Arsenic						1.8 b	1.3 b	2.1 b	2.6 =
Barium						24.3 b	6 b	75.9 =	97 =
Benzene	0.74 U	0.004 j		0.005 j	0.007 =	0.14 U	0.029 U	0.17 U	0.15 U
Benzo (a) anthracene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Benzo (a) pyrene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Benzo (b) fluoranthene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Benzo (g,h,i) perylene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Benzo (k) fluoranthene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Benzo(a)anthracene									
Benzo(a)pyrene									

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB29 FD	1-SB30	1-SB30 FD	1-SB31	1-SB32	1-SB7	1-SB8	1-SB9	1-SB9 FD
Benzo(b)fluoranthene									
Benzo(g,h,i)perylene									
Benzo(k)fluoranthene									
Beryllium						0.11 b	0.08 b	0.52 b	0.74 b
beta-BHC									
bis (2-Ethylhexyl)phthalate						2.7 U		0.48 j	2.8 =
bis(2-Chloroethoxy)methane									
bis(2-Chloroethyl)ether									
bis(2-Ethylhexyl)phthalate									
Bromodichloromethane									
Bromoform									
Bromomethane									
Butylbenzylphthalate									
Cadmium						0.72 b	0.73 U	0.7 U	0.72 U
Calcium							126 b		
Carbazole									
Carbon Disulfide	0.74 U	0.006 U		0.006 U	0.006 U	0.01 j	0.006 U	0.034 U	0.031 U
Carbon tetrachloride									
Chlorobenzene									
Chloroethane									
Chloroform									
Chloromethane									
Chromium						15.1 =	8.8 =	23.5 =	42 =
Chrysene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
cis-1,3-Dichloropropene									
Cobalt						1.8 b	0.8 U	3.1 b	4.8 =
Copper						55.9 =	2.3 b	12.9 =	11.7 =
Cyanide						0.1 U		0.11 U	0.11 U
delta-BHC									
Di-n-Butylphthalate						2.7 U		1.3 U	0.23 jb
Di-n-octyl phthalate									
Dibenz(a,h)anthracene									
Dibenzo (a, h) anthracene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	
Dibenzofuran						1.2 j		0.2 j	[illegible]
Dibromochloromethane									
Dieldrin									
Diethylphthalate									
Dimethyl phthalate									
Endosulfan I									
Endosulfan II									
Endosulfan sulfate									
Endrin									
Endrin aldehyde									
Endrin ketone									
Ethylbenzene	1.2 =	0.006 U		0.006 U	0.006 U	0.029 U	0.006 U	0.034 U	0.031 U
Fluoranthene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Fluorene		0.057 U		0.061 U	0.058 U	0.73 j	0.057 U	0.23 j	0.46 j
gamma-BHC (Lindane)									
gamma-Chlordane									
Heptachlor									
Heptachlor epoxide									
Hexachlorinated-Dibenzo Furans (Tot						0.0000003 c		0.00000001 U	9.4E-09 U
Hexachlorobenzene									
Hexachlorobutadiene									
Hexachlorocyclopentadiene									
Hexachloroethane									
Indeno (1,2,3-cd) pyrene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Indeno(1,2,3-cd)pyrene									
Iron							1290 =		
Isophorone									
Lead						138 =	1.7 =	29.6 =	16 =
Magnesium							181 b		
Manganese							10.6 =		
Mercury						0.04 b	0.4 U	0.14 =	0.06 b
Methoxychlor									
Methylene Chloride	0.74 U	0.004 j		0.004 j	0.005 j	0.038 =	0.011 =	0.031 jb	0.0[illegible]
n-Nitroso-di-n-propylamine									
n-Nitrosodiphenylamine									
Naphthalene		0.057 U		0.061 U	0.058 U	21 =	0.057 U	1.2 j	3.9 =

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB29 FD	1-SB30	1-SB30 FD	1-SB31	1-SB32	1-SB7	1-SB8	1-SB9	1-SB9 FD
Nickel						11.7 =	1.3 U	11 =	13.2 =
Nitrobenzene									
Pentachlorophenol									
pH									
Phenanthrene		0.057 U		0.061 U	0.058 U	0.52 j	0.057 U	0.24 j	0.64 j
Phenol									
Potassium							164 U		
Pyrene		0.057 U		0.061 U	0.058 U	2.7 U	0.057 U	1.3 U	2.2 U
Selenium						0.43 U	0.44 U	0.46 U	0.47 U
Silver						0.46 U	0.48 U	0.5 U	0.51 U
Sodium							180 b		
Styrene	0.74 U	0.006 U		0.006 U	0.006 U	0.029 U	0.006 U	0.034 U	0.031 U
Sulfide						18.5 =		5.2 =	5.2 U
Tetrachloroethene									
Thallium						0.54 U	1.56 U	0.5 U	0.6 U
Tin						27.5 b	4.3 b	4.6 b	3.3 U
Toluene	0.74 U	0.002 j		0.003 j	0.003 j	0.029 U	0.006 U	0.034 U	0.031 U
Total Petroleum Hydrocarbons	10400 =	299 =	176 =	2 U	1.9 U				
Toxaphene									
Trichloroethene									
Vanadium						5.2 b	2.8 b	25.6 =	45.7 =
Vinyl chloride									
Xylene (Total)	5.2 =	0.006 U		0.006 U	0.002 j	0.029 U	0.006 U	0.047 =	0.057 =
Xylene, total									
Zinc						257 =	6.1 =	34.4 =	33.6 =

NA - Not analyzed
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U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
1,1,1-Trichloroethane										0.0[illegible]
1,1,2,2-Tetrachloroethane										0.6[illegible]
1,1,2-Trichloroethane										0.002 L
1,1-Dichloroethane										0.014 UL
1,1-Dichloroethene										0.014 UL
1,2,4-Trichlorobenzene										0.47 U
1,2-Dichlorobenzene										0.47 U
1,2-Dichloroethane										0.014 UL
1,2-Dichloroethene (total)										0.002 L
1,2-Dichloropropane										0.014 UL
1,3-Dichlorobenzene										0.47 U
1,4-Dichlorobenzene										0.47 U
1-Methylnapthalene	0.063 U	0.058 U	0.056 U	0.066 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	
2,2'-Oxybis(1-chloropropane)										0.47 U
2,4,5-Trichlorophenol										1.2 U
2,4,6-Trichlorophenol										0.47 U
2,4-Dichlorophenol										0.47 U
2,4-Dimethylphenol										0.47 U
2,4-Dinitrophenol										1.2 U
2,4-Dinitrotoluene										0.47 U
2,6-Dinitrotoluene										0.47 U
2-Butanone	0.072 =	0.012 U								0.014 UJ
2-Chloronaphthalene										0.47 U
2-Chlorophenol										0.47 U
2-Hexanone										0.014 UJ
2-Methylnaphthalene	0.063 U	0.058 U	0.056 U	0.21 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.47 U
2-Methylphenol										0.47 U
2-Nitroaniline										1.2 U
2-Nitrophenol										0.47 U
3,3'-Dichlorobenzidine										0.47 U
3-Nitroaniline										1.2 U
4,4'-DDD										0.0047 U
4,4'-DDE										0.0007[illegible]
4,4'-DDT										0.004
4,6-Dinitro-2-methylphenol										1.2 U
4-Bromophenyl-phenylether										0.47 U
4-Chloro-3-methylphenol										0.47 U
4-Chloroaniline										0.47 U
4-Chlorophenyl-phenylether										0.47 U
4-Methyl-2-pentanone										0.014 UL
4-Methylphenol										0.47 U
4-Nitroaniline										1.2 U
4-Nitrophenol										1.2 U
Acenaphthene	0.063 U	0.058 U	0.056 U	0.06 U	0.06 U	0.06 U	0.086 =	0.055 U	0.056 U	0.186 U
Acenaphthylene										0.47 U
Acetone	0.02 =	0.008 j								0.014 UJ
Aldrin										0.0023 U
alpha-BHC										0.0023 U
alpha-Chlordane										0.0015 J
Aluminum	15700 =	14900 =								5430 =
Anthracene										0.0928 U
Antimony	4.2 UN	5.9 bn								0.39 U
Aroclor-1016										0.047 U
Aroclor-1221										0.093 U
Aroclor-1232										0.047 U
Aroclor-1242										0.047 U
Aroclor-1248										0.047 U
Aroclor-1254	0.14 =	0.02 U								0.047 U
Aroclor-1260	0.022 U	0.02 U								0.047 U
Arsenic	3 =	3.5 =								0.79 J
Barium	67.2 =	78.8 =								27.3 J
Benzene	0.006 U	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.014 UL
Benzo (a) anthracene	0.063 U	0.19 =	0.22 =	0.18 =	0.079 U	0.063 U	0.12 =	0.072 =	0.072 =	
Benzo (a) pyrene	0.063 U	0.23 =	0.2 =	0.1 =	0.079 =	0.06 U	0.091 =	0.057 U	0.064 =	
Benzo (b) fluoranthene	0.063 U	0.2 =	0.16 =	0.06 U	0.17 =	0.06 U	0.057 U	0.055 U	0.056 U	
Benzo (g,h,i) perylene	0.063 U	0.13 =	0.12 =	0.06 U	0.12 U	0.072 U	0.072 =	0.055 U	0.056 U	
Benzo (k) fluoranthene	0.063 U	0.22 =	0.15 =	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	
Benzo(a)anthracene										0.00771 J
Benzo(a)pyrene										0.0928 U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
Benzo(b)fluoranthene										0.366 U
Benzo(g,h,i)perylene										0.186 U
Benzo(k)fluoranthene										0.47 U
Beryllium	0.49 b	0.54 b								0.18 J
beta-BHC										0.0023 U
bis (2-Ethylhexyl)phthalate										
bis(2-Chloroethoxy)methane										0.47 U
bis(2-Chloroethyl)ether										0.47 U
bis(2-Ethylhexyl)phthalate										0.47 U
Bromodichloromethane										0.014 UL
Bromoform										0.014 UL
Bromomethane										0.014 UL
Butylbenzylphthalate										0.47 U
Cadmium	0.7 U	1.3 =								0.42 J
Calcium	1080 =	1040 b								385 J
Carbazole										0.47 U
Carbon Disulfide	0.008 =	0.004 j								0.014 UL
Carbon tetrachloride										0.014 UL
Chlorobenzene										0.014 UL
Chloroethane										0.014 UL
Chloroform										0.004 B
Chloromethane										0.014 UL
Chromium	18.9 =	20.6 =								8.5 =
Chrysene	0.063 U	0.29 =	0.21 =	0.16 =	0.06 U	0.06 U	0.091 =	0.055 U	0.056 U	0.0142 J
cis-1,3-Dichloropropene										0.014 UL
Cobalt	3.1 b	3.9 b								1.2 B
Copper	13.1 =	12 =								5.2 B
Cyanide										0.29 U
delta-BHC										0.0023 U
Di-n-Butylphthalate										0.47 U
Di-n-octyl phthalate										0.47 U
Dibenz(a,h)anthracene										0.186 UJ
Dibenzo (a, h) anthracene	0.063 U	0.058 U	0.056 U	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	
Dibenzofuran										0.47 U
Dibromochloromethane										0.014 UL
Dieldrin										0.0047 U
Diethylphthalate										0.048 J
Dimethyl phthalate										0.47 U
Endosulfan I										0.0023 U
Endosulfan II										0.0047 U
Endosulfan sulfate										0.0047 U
Endrin										0.0047 U
Endrin aldehyde										0.0047 U
Endrin ketone										0.0047 U
Ethylbenzene	0.001 j	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.014 UL
Fluoranthene	0.063 U	0.47 =	0.34 =	0.12 =	0.06 U	0.06 U	0.15 =	0.068 =	0.067 =	0.47 U
Fluorene	0.063 U	0.035 j	0.056 U	0.06 U	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.366 U
gamma-BHC (Lindane)										0.0023 U
gamma-Chlordane										0.0023 U
Heptachlor										0.0023 U
Heptachlor epoxide										0.0023 U
Hexachlorinated-Dibenzo Furans (Tot										
Hexachlorobenzene										0.47 U
Hexachlorobutadiene										0.47 U
Hexachlorocyclopentadiene										0.47 U
Hexachloroethane										0.47 U
Indeno (1,2,3-cd) pyrene	0.063 U	0.17 =	0.15 =	0.11 =	0.06 U	0.1 U	0.13 =	0.055 U	0.056 U	
Indeno(1,2,3-cd)pyrene										0.366 U
Iron	6140 =	17300 =								2980 =
Isophorone										0.47 U
Lead	45.5 =	32.7 =								17.8 =
Magnesium	961 b	876 b								425 J
Manganese	27.5 =	36.7 =								12.9 =
Mercury	0.09 b	0.23 =								0.04 J
Methoxychlor										0.023 U
Methylene Chloride	0.028 b	0.017 b								0.013 B
n-Nitroso-di-n-propylamine										0.47 U
n-Nitrosodiphenylamine										0.47 U
Naphthalene	0.063 U	0.058 U	0.056 U	0.13 =	0.06 U	0.06 U	0.057 U	0.055 U	0.056 U	0.47 U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-1-5
Analytical Results for Surface and Subsurface Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
Nickel	9.5 b	8.4 b								5.[illegible]
Nitrobenzene										0
Pentachlorophenol										1.[illegible]
pH										-1 =
Phenanthrene	0.063 U	0.26 =	0.12 =	0.11 =	0.06 U	0.06 U	0.075 =	0.055 U	0.056 U	0.0478 UJ
Phenol										0.47 U
Potassium	666 b	587 b								246 B
Pyrene	0.063 U	0.37 =	0.29 =	0.12 =	0.06 U	0.06 U	0.12 =	0.08 =	0.073 =	0.00443 J
Selenium	0.65 b	0.87 b								0.82 J
Silver	0.51 U	0.48 U								0.12 U
Sodium	251 b	262 b								28.9 U
Styrene	0.006 U	0.006 U								0.014 UL
Sulfide										
Tetrachloroethene										0.002 B
Thallium	0.59 U	0.56 U								0.68 U
Tin										
Toluene	0.025 =	0.006 U	0.0012 U	0.0012 U	0.0012 U	0.0013 U	0.0012 U	0.0012 U	0.0012 U	0.002 B
Total Petroleum Hydrocarbons			2 =	280 =	68.8 =	16.4 =	26.7 =	19.6 =	23.4 =	
Toxaphene										0.23 U
Trichloroethene										0.014 UL
Vanadium	20 =	19.7 =								10.4 =
Vinyl chloride										0.014 UL
Xylene (Total)	0.015 =	0.005 J	0.0024 U	0.0025 U	0.0025 U	0.0026 U	0.0025 U	0.0025 U	0.0024 U	
Xylene, total										0.014 UL
Zinc	52.9 =	85.1 =								21.9 B

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank
L - Reported value may be biased low

Table A-2-1
Analytical Results for Constituents Detected in Surface Soil
SWMU 1
NAS Oceana

Pa[illegible]mName (MG/KG)	1-SS1	1-SS2	1-SS3	1-SS4	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
1,[illegible]ichloroethane										0.002 L
1,2-Dichloroethene (total)										0.002 L
1-Methylnapthalene				0.066 =						
2-Methylnaphthalene				0.21 =						0.47 U
Acenaphthene							0.086 =			0.186 U
Acetone	0.02 =	0.008 j								0.014 U
alpha-Chlordane										0.0015 J
Aluminum	15700 =	14900 =								5430 =
Antimony		5.9 BN								0.39 U
Aroclor-1254	0.14 =									0.047 U
Arsenic	3 =	3.5 =								0.79 J
Barium	67.2 =	78.8 =								27.3 J
Benzo (a) anthracene		0.19 =	0.22 =	0.18 =			0.12 =	0.072 =	0.072 =	0.00771 J
Benzo (a) pyrene		0.23 =	0.2 =	0.1 =	0.079 =		0.091 =		0.064 =	0.0928 U
Benzo (b) fluoranthene		0.2 =	0.16 =		0.17 =					0.366 U
Benzo (g,h,i) perylene		0.13 =	0.12 =				0.072 =			0.186 U
Benzo (k) fluoranthene		0.22 =	0.15 =							0.47 U
Beryllium	0.49 B	0.54 B								0.18 J
Cadmium		1.3 =								0.42 J
Calcium	1080 =	1040 B								385 J
Carbon Disulfide	0.008 =	0.004 j								0.014 U
Chromium	18.9 =	20.6 =								8.5 =
Chrysene		0.29 =	0.21 =	0.16 =			0.091 =			0.0142 J
Cobalt	3.1 B	3.9 B								1.2 B
Copper	13.1 =	12 =								5.2 B
4,4'-DDE										0.00073 J
Diethylphthalate										0.048 J
Ethylbenzene	0.001 j									0.014 U
Fl[illegible]nthene		0.47 =	0.34 =	0.12 =			0.15 =	0.068 =	0.067 =	0.47 U
Fl[illegible]ne		0.035 j								0.366 U
Indeno (1,2,3-cd) pyrene		0.17 =	0.15 =	0.11 =			0.13 =			0.366 U
Iron	6140 =	17300 =								2980 =
Lead	45.5 =	32.7 =								17.8 =
Magnesium	961 B	876 B								425 J
Manganese	27.5 =	36.7 =								12.9 =
Mercury	0.09 B	0.23 =								0.04 J
2-Butanone	0.072 =									0.014 U
Methylene Chloride	0.028 B	0.017 B								0.013 B
Naphthalene				0.13 =						0.47 U
Nickel	9.5 B	8.4 B								5.1 B
Phenanthrene		0.26 =	0.12 =	0.11 =			0.075 =			0.0478 U
Potassium	666 B	587 B								246 B
Pyrene		0.37 =	0.29 =	0.12 =			0.12 =	0.08 =	0.073 =	0.00443 J
Selenium	0.65 B	0.87 B								0.82 J
Sodium	251 B	262 B								28.9 U
Toluene	0.025 =									0.002 B
Vanadium	20 =	19.7 =								10.4 =
Xylene (Total)	0.015 =	0.005 j								0.014 U
Zinc	52.9 =	85.1 =								21.9 B

NS - Not Sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L -Reported value may be biased
low
U - Analyte not detected

Table A-2-2
Analytical Results for Constituents Detected in the Surface Water
SWMU 1
NAS Oceana

AnalyteName	OW01-SW05P	OW01-SW05	OW01-SW06	OW01-SW07	OW01-SW08
VOA(UG/L)					
Bromodichloromethane	0.2 J	0.2 J	0.2 J	1 U	1 U
SVOA(UG/L)					
Anthracene	0.564	0.275 B	0.11 U	0.252 B	0.214 B
Benzo(a)anthracene	0.012 J	0.011 J	0.015 J	0.019 J	0.015 J
Benzo(b)fluoranthene	0.876	0.447 J	0.675	0.485	0.665
Chrysene	0.021 J	0.017 J	0.031 J	0.04 J	0.042 J
Phenanthrene	0.052 J	0.032 J	0.032 J	0.033 J	0.031 J
Pyrene	0.006	0.005 J	0.007	0.008	0.008
METAL(UG/L)					
Aluminum	548	557	493	371	577
Barium	26 J	27.4 J	26.5 J	27.1 J	28.1 J
Calcium	6070	6510	6290	6640	6720
Chromium	0.95 J	1.2 J	0.83 J	0.72 J	1.2 J
Iron	1290	1320	1330	1260	1260
Magnesium	4040 J	4320 J	4130 J	4210 J	4320 J
Manganese	61.5	65.3	62.4	63.9	63.3
Sodium	8150 J	8660 J	8430 J	8450 J	8620 J
Vanadium	1.6 J	1.4 J	1.3 J	1.2 J	1.4 J

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P

U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Table A-2-3
Analytical Results for Constituents Detected in Sediment
SWMU 1
NAS Oceana

AnalyteName	OW01-SD09P	OW01-SD09	OW01-SD10	OW01-SD11	OW01-SD12
VOA(UG/KG)					
1,1,1-Trichloroethane	2 J	2 J	2 J	1 J	14 UL
1,1,2-Trichloroethane	2 J	2 J	2 J	2 J	2 L
1,1-Dichloroethane	2 J	2 J	2 J	2 J	1 L
1,1-Dichloroethene	2 J	12 U	14 U	1 J	14 UL
1,2-Dichloroethane	2 J	1 J	14 U	13 U	14 UL
1,2-Dichloroethene (total)	4 J	3 J	3 J	3 J	3 L
1,2-Dichloropropane	2 J	2 J	1 J	13 U	14 UL
Acetone	12 UJ	12 UJ	12 J	15 J	24 J
Bromodichloromethane	1 J	12 U	14 U	13 U	14 UL
Bromomethane	2 J	1 J	14 U	1 J	14 UL
Carbon disulfide	12 U	12 U	3 J	3 J	4 L
Carbon tetrachloride	2 J	1 J	14 U	13 U	14 UL
Chlorobenzene	2 J	2 J	2 J	2 J	2 L
Chloroethane	2 J	2 J	14 U	1 J	14 UL
Chloromethane	2 J	1 J	1 J	2 J	14 UL
Trichloroethene	2 J	2 J	2 J	2 J	14 UL
Vinyl chloride	2 J	1 J	14 U	1 J	14 UL
SVOA(UG/KG)					
Benzo(a)anthracene	6.1 J	8.1 UJ	6.86 J	47 L	12.4 J
Benzo(b)fluoranthene	2970	592	1770	1310	2610
Benzo(g,h,i)perylene	162 U	162 U	183 U	240 L	186 U
Chrysene	17.7 J	7.7 J	14.2 J	57 L	24.5 J
Diethylphthalate	47 L	45 L	110 L	80 L	120 L
Fluoranthene	811 U	410 UL	460 UL	440 UL	705 J
Naphthalene	1620 U	410 UL	460 UL	59 L	470 UL
Pyrene	1.98 J	4.17 U	3.74 J	92 L	4.86
METAL(MG/KG)					
Aluminum	439	373	754	639	631
Arsenic	0.47 U	0.57 U	0.69 U	2.2 J	5.3
Barium	2.9 J	2.6 J	6.4 J	6.9 J	7.4 J
Beryllium	0.04 J	0.04 J	0.08 J	0.19 J	0.23 J
Calcium	75.1 B	66.8 B	186 J	169 J	147 B
Chromium	1.2 J	1 J	2 J	1.6 J	1.5 J
Copper	0.82 B	0.87 B	1.4 B	1.4 B	1.8 J
Iron	463	693	878	2960	5520
Lead	0.85	0.79	1.5	1.4	1.7
Magnesium	57.7 B	46.4 B	99.8 J	72.7 J	65.4 J
Manganese	2.9	2.2 J	4.3	11.9	19
Selenium	0.47 U	0.57 U	0.71 J	0.65 U	0.49 U
Vanadium	1.2 J	1.2 J	1.9 J	2.7 J	2.5 J

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P
U - Analyte not detected
UL Not detected, quantitation limit may be inaccurate

Table A-2-4
Analytical Results for Constituents Detected in Groundwaterata
SWMU 1
NAS Oceana

AnalyteName	OW01-MW02-R01		OW01-MW03-R01		OW01-MW04-R01		OW01-MW04P-R01		OW01-MW05-R01		OW01-MW06-R01		OW01-MW07-R01	
VOA(UG/L)														
1,1-Dichloroethane	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U	5	L	10	U	1	U	1	U	1	U
Benzene	1	U	1	U	3	L	10	U	1	J	1	U	1	U
Cumene	1	U	1	U	5	L	7	J	1		1	U	1	U
Ethylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
Toluene	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
Trichloroethene	1	J	1	U	5	UL	10	U	1	U	1	U	1	U
Xylene, total	1	U	1	U	9	L	12		2		1	U	1	U
n-Propylbenzene	1	U	1	U	7	L	10		1	U	1	U	1	U
o-Xylene	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
p-Isopropyltoluene	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
sec-Butylbenzene	1	U	1	U	5	UL	10	U	1	U	1	U	1	U
SVOA(UG/L)														
Acenaphthene	0.22	U	0.2	U	36	B	24	B	14	B	0.21	U	0.21	U
Benzo(a)anthracene	0.011	U	0.01	U	1.1	U	1.1	U	0.21	U	0.01	U	0.01	U
Benzo(a)pyrene	0.11	U	0.1	U	11	U	11	U	2.1	U	0.1	U	0.1	U
Fluoranthene	1.1	U	2.1	B	530	B	180	B	180	B	1	U	1	U
Naphthalene	1	U	1	U	179	L	208		58		1	U	1	U
Phenanthrene	0.061	B	0.018	B	18	B	7.1	B	7.8	B	0.012	B	0.014	B
Pyrene	0.003	J	0.005		0.23	J	0.54	U	0.037	J	0.005		0.002	J

NA - Not analyzed
J - Reporter' e is estimated
U - Analyte tected

Table A-2-4
Analytical Results for Consti[illegible] Detected in Groundwaterata
S[illegible] 1
NAS Oceana

AnalyteName	OW01-MW07D-R01		OW01-MW08-R01		OW01-MW08D-R01		OW01-PZ01-R01		OW01-PZ02-R01		OW01-PZ02P-R01		OW01-PZ03-R01	
VOA(UG/L)														
1,1-Dichloroethane	1	U	1	U	1	U	1	U	1	U	1	U	10	U
1,3,5-Trimethylbenzene	1	U	1	U	1	U	1	U	3		1	U	10	U
Benzene	1	U	1	J	1	U	1	U	1		1		6	J
Cumene	1	U	1	U	1	U	1	U	3		4		10	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U	17	
Toluene	1	U	1	U	1	U	1	U	1	U	1	U	35	
Trichloroethene	1	U	1	U	1	U	1	U	1	U	1	U	10	U
Xylene, total	1	U	1	U	1	U	1	U	1	J	1	J	66	
n-Propylbenzene	1	U	1	U	1	U	1	U	4		5		10	U
o-Xylene	1	U	1	U	1	U	1	U	1	U	1	U	11	
p-Isopropyltoluene	1	U	1	U	1	U	1	U	1	U	1	U	10	U
sec-Butylbenzene	1	U	1	U	1	U	2		4		5		10	U
SVOA(UG/L)														
Acenaphthene	0.21	U	0.2	U	1	U	0.13	J	0.15	J	0.096	J	9.2	B
Benzo(a)anthracene	0.01	U	0.01	U	0.23		0.01	U	0.011	U	0.01	U	0.11	U
Benzo(a)pyrene	0.1	U	0.1	U	0.5	U	0.2		0.11	U	0.1	U	1.1	U
Fluoranthene	2.4		1	U	6.5		1	U	6.2		2.3		85	B
Naphthalene	1	U	1	U	1	U	1	U	18		22		10	U
Phenanthrene	0.35		0.016	B	0.25	U	0.052	U	0.053	U	0.051	U	2.5	B
Pyrene	0.005	U	0.005	U	0.01	J	0.003	J	0.005	U	0.005	U	0.053	U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected

Table A-2-4
Analytical Results for Constituents Detected in Groundwaterata
SWMU 1
NAS Oceana

AnalyteName	OW01-PZ04-R01		OW01-PZ05-R01		OW1-MW10-R01	
VOA(UG/L)						
1,1-Dichloroethane	1	J	1	U	1	U
1,3,5-Trimethylbenzene	1	U	1	U	1	U
Benzene	2		1	U	1	U
Cumene	1		1	J	1	U
Ethylbenzene	6		4		1	U
Toluene	9		1	J	1	U
Trichloroethene	1	U	1	U	1	J
Xylene, total	12		7		1	U
n-Propylbenzene	2		1	U	1	U
o-Xylene	4		1	J	1	U
p-Isopropyltoluene	2		1		1	U
sec-Butylbenzene	1	U	1	U	1	U
SVOA(UG/L)						
Acenaphthene	3.1	B	0.24	B	0.22	U
Benzo(a)anthracene	0.053	U	0.01	U	0.011	U
Benzo(a)pyrene	0.53	U	0.1	U	0.11	U
Fluoranthene	31	B	8.6	B	1.1	U
Naphthalene	22		13		1	U
Phenanthrene	0.98	B	0.052	B	0.021	B
Pyrene	0.027	U	0.002	J	0.006	U

NA - Not analyzed
J - Reporte[illegible]e is estimated
U - Analyte [illegible]tected

Table A-2-5
Analytical Results for Constituents Detected in Soil
SWMU 1
NAS Oceana

P[illegible]mName (MG/KG)	1-SB10	1-SB11	1-SB12	1-SB13	1-SB13 FD	1-SB14	1-SB15	1-SB16	1-SB17	1-SB18
[illegible]richloroethane										
[illegible]chloroethene (total)										
1-Methylnapthalene										
2-Butanone										
2-Methylnaphthalene	34 =	12 =	45 =	2.9 =	6.3 =					
4,4'-DDD										
4,4'-DDE										
4,4'-DDT										
Acenaphthene										
Acetone		2.1 b		2.1 b	2.3 b	2.2 b	0.023 =	0.019 b	0.01 jb	0.012 b
alpha-Chlordane										
Aluminum	2590 =	5350 =	475 =	7540 =	14300 =	22000 =	7130 =			
Antimony						3.6 b				
Aroclor-1254		0.011 j	0.027 =		0.007 j					
Aroclor-1260	0.014 j									
Arsenic	0.56 b	1.2 b	0.44 b	0.76 b	1.4 b	1.4 b	0.57 b			
Barium	29.6 b	23.9 b	3 b	29.1 b	51.1 =	52.5 =	43.5 b			
Benzene							0.004 j			
Benzo (a) anthracene								0.45 =		
Benzo (a) pyrene								1.1 =		
Benzo (b) fluoranthene								0.97 =		
Benzo (g,h,i) perylene								0.88 =		
Benzo (k) fluoranthene								0.69 =		
Benzo(a)anthracene										
Beryllium	0.07 b	0.17 b		0.28 b	0.39 b	0.56 b	0.45 b			
bis (2-Ethylhexyl)phthalate										
Cadmium					1.3 =					
Calcium	448 b	284 b	63.4 b	142 b	234 b	344 b	237 b			
Carbon Disulfide										
Chloroform										
Chromium	10.1 =	8.5 =	2.9 =	14.2 =	23.7 =	34.3 =	13.9 =			
Chrysene								0.71 =		
[illegible]lt	1.3 b	1.1 b		2.3 b	3.4 b	3 b	2.8 b			
[illegible]er	70.8 =	5.7 b	0.76 b	4.5 b	6.7 =	6.6 =	5.8 b			
Di-n-Butylphthalate										
Dibenzo (a, h) anthracene								0.26 =		
Dibenzofuran										
Diethylphthalate										
Ethylbenzene	4 =	0.46 j	6.4 =	1.8 =	1.3 =					
Fluoranthene								0.44 =		
Fluorene										
Hexachlorinated-Dibenzo Furans (Total)										
Indeno (1,2,3-cd) pyrene								1.1 =		
Iron	8550 =	2860 =	336 =	5440 =	8360 =	15400 =	6220 =			
Lead	14.6 =	42.3 =	1.1 =	0.78 =	9.6 =	8.9 =	8.1 =			
Magnesium	195 b	404 b	65 b	815 b	1070 b	1140 b	1230 =			
Manganese	40.1 =	11.6 =	2.3 b	16.7 =	19 =	18.1 =	22.6 =			
Mercury	0.05 b	0.05 b	0.04 b	0.05 b	0.04 b	0.05 b	0.04 b			
Methylene Chloride	0.38 jb	0.54 jb	0.67 jb	0.72 b	0.25 jb	0.19 jb	0.013 b	0.01 b	0.004 jb	0.004 jb
Naphthalene			31 =							
Nickel	10.3 =	3.8 b		6.3 b	10.3 =	8.5 b	7.1 b			
pH										
Phenanthrene										
Potassium	179 b	296 b	186 =	491 b	642 b	782 b	549 b			
Pyrene								0.52 =		
Selenium		0.62 b								
Sodium	169 b	191 b	197 =	186 =	409 b	241 b	435 b			
Styrene								0.006 j		
Sulfide										
Tetrachloroethene										
Tin										
Toluene	0.83 j	0.27 j	6.8 =				0.003 j			
Total Petroleum Hydrocarbons										
Vanadium	4 b	7.9 b	1.6 =	13.7 =	19.8 =	52.2 =	12.1 =			
[illegible]e (Total)	13 =	2.9 =	44 =	8.3 =	6.1 =		0.002 j	0.003 j		
[illegible]	117 =	26.1 =		16.7 =	25.1 =	23.5 =	24.4 =			

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-2-5
Analytical Results for Constituents Detected in Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB19	1-SB21	1-SB22	1-SB22 FD	1-SB23	1-SB24	1-SB25	1-SB29	1-SB29 FD	1-SB30
1,1,2-Trichloroethane										
1,2-Dichloroethene (total)										
1-Methylnapthalene				9.4 =	30 =					
2-Butanone										
2-Methylnaphthalene			10 =	12 =	44 =			40 =		
4,4'-DDD										
4,4'-DDE										
4,4'-DDT										
Acenaphthene										
Acetone	0.012 b	0.018 j	0.042 j		0.033 j		0.011 j			0.013 b
alpha-Chlordane										
Aluminum										
Antimony										
Aroclor-1254										
Aroclor-1260										
Arsenic										
Barium										
Benzene							0.009 =			0.004 j
Benzo (a) anthracene										
Benzo (a) pyrene										
Benzo (b) fluoranthene										
Benzo (g,h,i) perylene										
Benzo (k) fluoranthene										
Benzo(a)anthracene										
Beryllium										
bis (2-Ethylhexyl)phthalate										
Cadmium										
Calcium										
Carbon Disulfide		0.002 j	0.007 j		0.005 j	0.003 j				
Chloroform										
Chromium										
Chrysene										
Cobalt										
Copper										
Di-n-Butylphthalate										
Dibenzo (a, h) anthracene										
Dibenzofuran										
Diethylphthalate										
Ethylbenzene			0.14 j		0.21 j	0.007 =	0.002 j	0.86 =	1.2 =	
Fluoranthene										
Fluorene										
Hexachlorinated-Dibenzo Furans (Total)										
Indeno (1,2,3-cd) pyrene										
Iron										
Lead										
Magnesium										
Manganese										
Mercury										
Methylene Chloride	0.005 jb	0.016 b	0.013 b		0.008 b	0.011 b	0.003 jb			0.004 j
Naphthalene					19 =					
Nickel										
pH										
Phenanthrene										
Potassium										
Pyrene										
Selenium										
Sodium										
Styrene	0.011 =									
Sulfide										
Tetrachloroethene										
Tin										
Toluene		0.004 j	0.008 j		0.18 j	0.006 j	0.005 j			0.002 j
Total Petroleum Hydrocarbons		29900 =	4270 =		14500 =	7 =		13000 =	10400 =	299 =
Vanadium										
Xylene (Total)		0.012 =	0.98 dj		2.1 dj	0.028 =	0.008 =	4.8 =	5.2 =	
Zinc										

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-2-5
Analytical Results for Constituents Detected in Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SB30 FD	1-SB31	1-SB32	1-SB7	1-SB8	1-SB9	1-SB9 FD	1-SS1	1-SS2	1-SS3	1-SS4
1,1 hloroethane											
1,2 oroethene (total)											
1-Methylnapthalene											
2-Butanone											0.066
2-Methylnaphthalene								0.072 =			
4,4'-DDD				38 =		4.8 =	12 =				0.21
4,4'-DDE				0.018 =							
4,4'-DDT				0.002 =							
Acenaphthene				0.0034 =							
Acetone		0.013 b	0.016 b	0.066 =	0.022 =	0.11 =	0.12 =	0.02 =	0.008 j		
alpha-Chlordane											
Aluminum					1010 =			15700 =	14900 =		
Antimony				13 b					5.9 bn		
Aroclor-1254								0.14 =			
Aroclor-1260											
Arsenic				1.8 b	1.3 b	2.1 b	2.6 =	3 =	3.5 =		
Barium				24.3 b	6 b	75.9 =	97 =	67.2 =	78.8 =		
Benzene		0.005 j	0.007 =								
Benzo (a) anthracene											
Benzo (a) pyrene									0.19 =	0.22 =	0.18
Benzo (b) fluoranthene									0.23 =	0.2 =	0.1
Benzo (g,h,i) perylene									0.2 =	0.16 =	
Benzo (k) fluoranthene									0.13 =	0.12 =	
Benzo(a)anthracene									0.22 =	0.15 =	
Beryllium				0.11 b	0.08 b	0.52 b	0.74 b	0.49 b	0.54 b		
bis (2-Ethylhexyl)phthalate						0.48 j	2.8 =				
Cadmium				0.72 b					1.3 =		
Calcium					126 b			1080 =	1040 b		
Carbon Disulfide				0.01 j				0.008 =	0.004 j		
Chloroform											
Chromium				15.1 =	8.8 =	23.5 =	42 =	18.9 =	20.6 =		
Chrysene									0.29 =	0.21 =	0.16
Cob				1.8 b		3.1 b	4.8 =	3.1 b	3.9 b		
Co				55.9 =	2.3 b	12.9 =	11.7 =	13.1 =	12 =		
Di-n ylphthalate							0.23 jb				
Dibenzo (a, h) anthracene											
Dibenzofuran				1.2 j		0.2 j	0.54 j				
Diethylphthalate											
Ethylbenzene								0.001 j			
Fluoranthene									0.47 =	0.34 =	0.12
Fluorene				0.73 j		0.23 j	0.46 j		0.035 j		
Hexachlorinated-Dibenzo Furans (Total)				0.0000003 c							
Indeno (1,2,3-cd) pyrene									0.17 =	0.15 =	0.11
Iron					1290 =			6140 =	17300 =		
Lead				138 =	1.7 =	29.6 =	16 =	45.5 =	32.7 =		
Magnesium					181 b			961 b	876 b		
Manganese					10.6 =			27.5 =	36.7 =		
Mercury				0.04 b		0.14 =	0.06 b	0.09 b	0.23 =		
Methylene Chloride		0.004 j	0.005 j	0.038 =	0.011 =	0.031 jb	0.031 b	0.028 b	0.017 b		
Naphthalene				21 =		1.2 j	3.9 =				0.13
Nickel				11.7 =		11 =	13.2 =	9.5 b	8.4 b		
pH											
Phenanthrene				0.52 j		0.24 j	0.64 j		0.26 =	0.12 =	0.11
Potassium								666 b	587 b		
Pyrene									0.37 =	0.29 =	0.12
Selenium								0.65 b	0.87 b		
Sodium					180 b			251 b	262 b		
Styrene											
Sulfide				18.5 =		5.2 =					
Tetrachloroethene											
Tin				27.5 b	4.3 b	4.6 b					
Toluene		0.003 j	0.003 j					0.025 =			
Total Petroleum Hydrocarbons	176 =										
Vanadium										2 =	280
Xylene (Total)			0.002 j	5.2 b	2.8 b	25.6 =	45.7 =	20 =	19.7 =		
Zi						0.047 =	0.057 =	0.015 =	0.005 j		
				257 =	6.1 =	34.4 =	33.6 =	52.9 =	85.1 =		

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-2-5
Analytical Results for Constituents Detected in Soil
SWMU 1
NAS Oceana

ParamName (MG/KG)	1-SS5	1-SS6	1-SS7	1-SS8	1-SS8 FD	OW01-SS09
1,1,2-Trichloroethane						0.002 L
1,2-Dichloroethene (total)						0.002 L
1-Methylnapthalene	=					
2-Butanone						
2-Methylnaphthalene	=					
4,4'-DDD						0.00073 J
4,4'-DDE						
4,4'-DDT			0.086 =			
Acenaphthene						
Acetone						0.0015 J
alpha-Chlordane						5430 =
Aluminum						
Antimony						
Aroclor-1254						
Aroclor-1260						0.79 J
Arsenic						27.3 J
Barium						
Benzene						
Benzo (a) anthracene	=		0.12 =	0.072 =	0.072 =	
Benzo (a) pyrene	=	0.079 =	0.091 =		0.064 =	
Benzo (b) fluoranthene		0.17 =				
Benzo (g,h,i) perylene			0.072 =			
Benzo (k) fluoranthene						
Benzo(a)anthracene						0.00771 J
Beryllium						0.18 J
bis (2-Ethylhexyl)phthalate						
Cadmium						0.42 J
Calcium						385 J
Carbon Disulfide						
Chloroform						0.004 B
Chromium						8.5 =
Chrysene	=		0.091 =			0.0142 J
Cobalt						1.2 B
Copper						5.2 B
Di-n-Butylphthalate						
Dibenzo (a, h) anthracene						
Dibenzofuran						0.048 J
Diethylphthalate						
Ethylbenzene						
Fluoranthene	=		0.15 =	0.068 =	0.067 =	
Fluorene						
Hexachlorinated-Dibenzo Furans (Total)						
Indeno (1,2,3-cd) pyrene	=		0.13 =			
Iron						2980 =
Lead						17.8 =
Magnesium						425 J
Manganese						12.9 =
Mercury						0.04 J
Methylene Chloride						0.013 B
Naphthalene	=					
Nickel						5.1 B
pH						-1 =
Phenanthrene	=		0.075 =			
Potassium						246 B
Pyrene	=		0.12 =	0.08 =	0.073 =	0.00443 J
Selenium						0.82 J
Sodium						
Styrene						
Sulfide						0.002 B
Tetrachloroethene						
Tin						0.002 B
Toluene						
Total Petroleum Hydrocarbons	=	68.8 =	16.4 =	26.7 =	19.6 =	23.4 =
Vanadium						10.4 =
Xylene (Total)						
Zinc						21.9 B

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected
B - Analyte not detected above associated blank

Table A-3-1
Statistical Analysis for Constituents Detected in Surface Soil
SWMU 1
NAS Oceana

Chemical	Maximum Concentratio	Maximum Qualifier	Units	Location of Maximum Concentration
1,1,2-Trichloroethane	2.00E-03	L	MG/KG	OW01-SS09
1,2-Dichloroethene (total)	2.00E-03	L	MG/KG	SS09
1-Methylnaphthalene	6.60E-02		MG/KG	1-SS4
2-Methylnaphthalene	2.10E-01		MG/KG	1-SS4
Acenaphthene	8.60E-02		MG/KG	1-SS7
Acetone	2.00E-02		MG/KG	1-SS2
alpha-Chlordane	1.50E-03	J	MG/KG	OW01-SS09
Aluminum	1.57E+04		MG/KG	1-SS1
Antimony	5.90E+00		MG/KG	1-SS2
Arsenic	3.50E+00		MG/KG	1-SS2
Barium	7.88E+01		MG/KG	1-SS2
Benzo(a)anthracene	2.20E-01		MG/KG	1-SS3
Benzo(a)pyrene	2.30E-01		MG/KG	1-SS2
Benzo(b)fluoranthene	2.00E-01		MG/KG	1-SS2
Benzo(ghi)perylene	1.30E-01		MG/KG	1-SS2
Benzo(k)fluoranthene	2.20E-01		MG/KG	1-SS2
Beryllium	5.40E-01	B*	MG/KG	1-SS2
Cadmium	1.30E+00		MG/KG	1-SS2
Calcium	1.08E+03		MG/KG	1-SS1
Carbon Disulfide	8.00E-03		MG/KG	1-SS1
Chromium, Total	2.06E+01		MG/KG	1-SS2
Chrysene	2.90E-01		MG/KG	1-SS2
Cobalt	3.90E+00	B*	MG/KG	1-SS2
Copper	1.31E+01		MG/KG	1-SS1
DDE	7.30E-04	J	MG/KG	OW01-SS09
Diethylphthalate	4.80E-02	J	MG/KG	OW01-SS09
Ethylbenzene	1.00E-03	J	MG/KG	1-SS1
Fluoranthene	4.70E-01		MG/KG	1-SS2
Fluorene	3.50E-02	J	MG/KG	1-SS2
Indeno(1,2,3-c,d)pyrene	1.70E-01		MG/KG	1-SS2
Iron	1.73E+04		MG/KG	1-SS2
Lead	4.55E+01		MG/KG	1-SS1
Magnesium	9.61E+02	B*	MG/KG	1-SS1
Manganese	3.67E+01		MG/KG	1-SS2
Mercury	2.30E-01		MG/KG	1-SS2
Methyl ethyl ketone (2-Butanone)	7.20E-02		MG/KG	1-SS1
Methylene Chloride	2.80E-02	B*	MG/KG	1-SS1
Naphthalene	1.30E-01		MG/KG	1-SS4
Nickel	9.50E+00	B*	MG/KG	1-SS1
PCB-1254	1.40E-01		MG/KG	1-SS1
Phenanthrene	2.60E-01		MG/KG	1-SS2
Potassium	6.66E+02	B*	MG/KG	1-SS1
Pyrene	3.70E-01		MG/KG	1-SS2
Selenium	8.70E-01	B*	MG/KG	1-SS2
Sodium	2.62E+02	B*	MG/KG	1-SS2
Toluene	2.50E-02		MG/KG	1-SS1
Vanadium	2.00E+01		MG/KG	1-SS1
Xylenes, total	1.50E-02		MG/KG	1-SS1
Zinc	8.51E+01		MG/KG	1-SS2

Table A-3-2
Statistcal Evaluation for Constituents Detected in Surface Water
SWMU 1
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Wilkes/ DAgastino - Quantile (Norm)	Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/L)																				
Bromodichloromethane	2 - 4	0.2	0.2	OW01-SW05	0.35	-1.151293	0.1732051	0.5290207	1	1	0.748	0.73085401	FALSE	0.748	0.730854014	FALSE	2.353	4.969	0.55377578	1.6591771
Semi-volatile Organic Compounds (UG/L)																				
Anthracene	1 - 4	0.564	0.564	OW01-SW05	0.213	-1.944881	0.2359167	0.9825288	0.11	0.119	0.748	0.74617357	FALSE	0.748	0.914059519	TRUE	2.353	8.804	0.49055594	34.191824
Benzo(a)anthracene	4 - 4	0.012	0.019	OW01-SW07	0.01525	-4.196394	2.87E-03	0.1876422	0.011	0.012	0.748	0.93494743	TRUE	0.748	0.944095539	TRUE	2.353	2.712	0.01862924	2.05E-02
Benzo(b)fluoranthene	4 - 4	0.485	0.876	OW01-SW05	0.67525	-0.414252	0.1597923	0.2419615	0.44	0.476	0.748	0.95431348	TRUE	0.748	0.951440001	TRUE	2.353	2.951	0.86324566	1.0276407
Chrysene	4 - 4	0.021	0.042	OW01-SW08	0.0335	-3.431491	9.61E-03	0.3171363	0.011	0.012	0.748	0.91732688	TRUE	0.748	0.892994907	TRUE	2.353	3.392	4.48E-02	6.33E-02
Phenanthrene	4 - 4	0.031	0.052	OW01-SW05	0.037	-3.320887	0.0100333	0.2442541	0.055	0.06	0.748	0.70572148	FALSE	0.748	0.726595065	FALSE	2.353	2.951	4.88E-02	5.64E-02
Pyrene	4 - 4	0.006	0.009	OW01-SW07	0.00725	-4.933617	9.57E-04	0.1369141	0.006	0.006	0.748	0.86475362	TRUE	0.748	0.861343644	TRUE	2.353	2.535	8.38E-03	8.88E-03
Pesticide/Polychlorinated Biphenyls (UG/L)																				
No Detections																				
Total Metals (UG/L)																				
Aluminum	4 - 4	371	577	OW01-SW08	499.5	6.1992797	92.85652	0.2003962	26.2	28.2	0.748	0.89666649	TRUE	0.748	0.871150724	TRUE	2.353	2.747	608.745696	690.33953
Barium	4 - 4	26.5	28.1	OW01-SW08	27.275	3.3057478	0.6652087	2.44E-02	0.2	0.2	0.748	0.99593903	TRUE	0.748	0.996720755	TRUE	2.353	2.393	28.0576157	28.210892
Calcium	4 - 4	6290	6720	OW01-SW08	6540	8.7853804	187.79421	2.89E-02	30.3	30.3	0.748	0.95158212	TRUE	0.748	0.948169537	TRUE	2.353	2.393	6760.93989	6807.2271
Chromium	4 - 4	0.72	1.2	OW01-SW05	0.9875	-3.75E-02	0.2494494	0.2604334	0.6	0.6	0.748	0.82276433	TRUE	0.748	0.837713718	TRUE	2.353	3.052	1.28097721	1.5765955
Iron	4 - 4	1260	1330	OW01-SW06	1292.5	7.1640138	37.749172	2.92E-02	19	19	0.748	0.79141136	TRUE	0.748	0.79012304	TRUE	2.353	2.393	1336.9119	1345.8525
Magnesium	4 - 4	4130	4320	OW01-SW05	4245	8.353318	92.556289	2.19E-02	28.6	28.6	0.748	0.86402609	TRUE	0.748	0.864427549	TRUE	2.353	2.393	4353.89247	4375.5447
Manganese	4 - 4	62.4	65.3	OW01-SW05	63.725	4.1544405	1.2175796	1.91E-02	0.2	0.2	0.748	0.98543954	TRUE	0.748	0.987141642	TRUE	2.353	2.393	65.1574824	65.428303
Sodium	4 - 4	8430	8660	OW01-SW05	8540	9.052446	116.90452	1.37E-02	162	162	0.748	0.84893901	TRUE	0.748	0.846691306	TRUE	2.353	2.393	8677.53817	8703.2223
Vanadium	4 - 4	1.2	1.6	OW01-SW05	1.375	0.3127904	0.1707825	0.1222589	0.8	0.8	0.748	0.97211114	TRUE	0.748	0.984611313	TRUE	2.353	2.464	1.57592563	1.6391675

Tab 3
Statistical Analysis for Constituents Detected in Sediment
SWMU 1
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Wilkes/ DAgastino - Quantile (Norm)	Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/KG)																				
1,1,1-Trichloroethane	3 - 4	1	2	OW01-SD09	3	0.83305113	2.708012802	0.8106737	12	14	0.748	0.772762669	TRUE	0.748	0.90698153	TRUE	2.353	7.332	6.1859771	98.82355
1,1,2-Trichloroethane	4 - 4	2	2	OW01-SD09	2	0.69314718	0	0	12	14	0.748	-1	FALSE	0.748	-1	FALSE	2.353	2.393	2	2
1,1-Dichloroethane	4 - 4	1	2	OW01-SD09	1.75	0.51986039	0.5	0.3465736	12	14	0.748	0.629658471	FALSE	0.748	0.62965847	FALSE	2.353	3.596	2.33825	3.667302
1,1-Dichloroethene	2 - 4	1	2	OW01-SD09	4.25	1.14624187	3.201562119	0.9657646	12	14	0.748	0.800600556	TRUE	0.748	0.85564814	TRUE	2.353	8.717	8.0166378	647.4596
1,2-Dichloroethane	1 - 4	2	2	OW01-SD09	5.625	1.61419241	2.428133714	0.6150231	12	14	0.748	0.700457631	FALSE	0.748	0.67212373	FALSE	2.353	5.716	8.4816993	46.19992
1,2-Dichloroethene (total)	4 - 4	3	4	OW01-SD09	3.25	1.17053281	0.5	0.143841	12	14	0.748	0.629658471	FALSE	0.748	0.62965847	FALSE	2.353	2.535	3.83825	4.02048
1,2-Dichloropropane	2 - 4	1	2.00E+00	OW01-SD09	4.125	1.12771488	3.07E+00	0.9458152	12	14	0.748	0.844112492	TRUE	0.748	0.87785058	TRUE	2.353	8.544	7.7312812	513.162
Acetone	3 - 4	12	24	OW01-SD12	14.25	2.54069254	7.5	0.5768451	12	1.40E+01	0.748	0.981963907	TRUE	0.748	0.98198137	TRUE	2.353	5.382	23.07375	89.97195
Bromodichloromethane	1 - 4	1	1	OW01-SD09	5.375	1.44090562	2.926174978	0.9612388	12	14	0.748	0.689022683	FALSE	0.748	0.65714808	FALSE	2.353	8.63	8.8176449	806.1739
Bromomethane	2 - 4	1	2	OW01-SD09	4.25	1.14624187	3.201562119	0.9657646	12	14	0.748	0.800600556	TRUE	0.748	0.85564814	TRUE	2.353	8.717	8.0166378	647.4596
Carbon disulfide	3 - 4	3	4	OW01-SD12	4	1.3438196	1.414213562	0.3279774	12	14	0.748	0.828296431	TRUE	0.748	0.8527195	TRUE	2.353	3.46	5.6638223	7.789544
Carbon tetrachloride	1 - 4	2	2	OW01-SD09	5.625	1.61419241	2.428133714	0.6150231	12	14	0.748	0.700457631	FALSE	0.748	0.67212373	FALSE	2.353	5.716	8.4816993	46.19992
Chlorobenzene	4 - 4	2	2	OW01-SD09	2	0.69314718	0	0	12	14	0.748	-1	FALSE	0.748	-1	FALSE	2.353	2.393	2	2
Chloroethane	2 - 4	1	2	OW01-SD09	4.25	1.14624187	3.201562119	0.9657646	12	14	0.748	0.800600556	TRUE	0.748	0.85564814	TRUE	2.353	8.717	8.0166378	647.4596
Chloromethane	3 - 4	1	2	OW01-SD09	3	0.83305113	2.708012802	0.8106737	12	14	0.748	0.772762669	TRUE	0.748	0.90698153	TRUE	2.353	7.332	6.1859771	98.82355
Trichloroethene	3 - 4	2	2	OW01-SD09	3.25	1.00633792	2.5	0.6263815	12	14	0.748	0.629658471	FALSE	0.748	0.62965847	FALSE	2.353	5.8	6.19125	27.11361
Vinyl chloride	2 - 4	1	2	OW01-SD09	4.25	1.14624187	3.201562119	0.9657646	12	1.40E+01	0.748	0.800600556	TRUE	0.748	0.85564814	TRUE	2.353	8.717	8.0166378	647.4596
Semi-volatile Organic Compounds (UG/KG)																				
Benzo(a)anthracene	4 - 4	6.1	47	OW01-SD11	18.09	2.52546007	19.47679987	0.9361081	8.11	440	0.748	0.740803981	FALSE	0.748	0.85866178	TRUE	2.353	8.457	41.004455	1871.131
Benzo(b)fluoranthene	4 - 4	1310	2970	OW01-SD09	2165	7.62998499	760.0657866	0.3731797	319	367	0.748	0.947752496	TRUE	0.748	0.94285704	TRUE	2.353	3.732	3059.2174	4932.968
Benzo(g,h,i)perylene	1 - 4	240	240	OW01-SD11	126.375	4.73100684	75.9378858	0.5035431	162	440	0.748	0.693297567	FALSE	0.748	0.73782009	FALSE	2.353	4.721	215.71592	507.8963
Chrysene	4 - 4	14.2	57	OW01-SD11	28.35	3.19213275	19.57285535	0.6099164	8.11	440	0.748	0.812202752	TRUE	0.748	0.91334488	TRUE	2.353	5.631	51.377464	212.9391
Diethylphthalate	4 - 4	47	120	OW01-SD12	89.25	4.43003659	32.8975683	0.4240638	410	470	0.748	0.938373668	TRUE	0.748	0.90191189	TRUE	2.353	4.093	127.95399	250.1484
Fluoranthene	1 - 4	705	705	OW01-SD12	390.125	5.84875638	226.5429963	0.5488032	440	932	0.748	0.854532335	TRUE	0.748	0.88729008	TRUE	2.353	5.134	656.65284	2050.964
Naphthalene	1 - 4	59	59	OW01-SD11	333.5	5.41805913	328.0330268	1.0700313	440	1620	0.748	0.827751286	TRUE	0.748	0.94716652	TRUE	2.353	9.591	719.43086	149596.6
Pyrene	4 - 4	1.98	92	OW01-SD11	25.645	2.02625237	44.25254607	1.7058789	4.18	440	0.748	0.655359737	FALSE	0.748	0.82387356	TRUE	2.353	15.208	77.70812	1.04E+08
Pesticide/Polychlorinated Biphenyls (UG/KG)																				
No Detections																				
Total Metals (MG/KG)																				
Aluminum	4 - 4	439	754	OW01-SD10	615.75	6.40427552	130.5459689	0.228105	4.8	6.7	0.748	0.927910011	TRUE	0.748	0.89520281	TRUE	2.353	2.9	769.33733	908.8783
Arsenic	2 - 4	2.2	5.3	OW01-SD12	2.0325	3.42E-02	2.352730683	1.4267069	0.49	0.69	0.748	0.850172823	TRUE	0.748	0.88093798	TRUE	2.353	12.746	4.8004876	103872.7
Barium	4 - 4	2.9	7.4	OW01-SD12	5.9	1.71350253	2.041241452	0.4365717	0.04	0.05	0.748	0.807085146	TRUE	0.748	0.75345183	TRUE	2.353	4.25	8.3015206	17.81486
Beryllium	4 - 4	0.04	0.23	OW01-SD12	0.135	-2.2187529	0.089628864	0.8097293	0.02	0.03	0.748	0.921388819	TRUE	0.748	0.92258277	TRUE	2.353	7.332	0.2404484	4.649542
Calcium	2 - 4	169	186	OW01-SD10	111.8188	4.39636425	79.36837997	1.0612236	5.5	7.7	0.748	0.907147229	TRUE	0.748	0.87108751	TRUE	2.353	9.503	205.19565	48142.88
Chromium	4 - 4	1.2	2	OW01-SD10	1.575	0.43773437	0.330403793	0.2102015	0.11	0.15	0.748	0.980019081	TRUE	0.748	0.98785731	TRUE	2.353	2.798	1.9637201	2.224188
Copper	1 - 4	1.8	1.8	OW01-SD12	0.854375	-0.4127799	0.670193924	0.8651976	0.11	0.15	0.748	0.877670547	TRUE	0.748	0.93919221	TRUE	2.353	7.85	1.6428582	48.55764
Iron	4 - 4	693	5520	OW01-SD12	2512.75	7.48193857	2252.959739	0.9880723	3.4	4.8	0.748	0.882713537	TRUE	0.748	0.90694019	TRUE	2.353	8.891	5163.3571	461425.3
Lead	4 - 4	0.85	1.7	OW01-SD12	1.3625	0.27751167	0.363719214	0.3041619	0.29	0.41	0.748	0.909779657	TRUE	0.748	0.85769388	TRUE	2.353	3.256	1.7904157	2.448678
Magnesium	3 - 4	65.4	99.8	OW01-SD10	63.08125	3.93474866	35.65386477	0.8627515	5.2	7.3	0.748	0.94065607	TRUE	0.748	0.81245347	TRUE	2.353	7.764	105.02802	3548.369
Manganese	4 - 4	2.9	19	OW01-SD12	9.525	1.98607578	7.452236801	0.8729532	0.04	0.05	0.748	0.913747005	TRUE	0.748	0.93553885	TRUE	2.353	7.85	18.292557	557.5196
Selenium	1 - 4	0.71	0.71	OW01-SD10	0.39125	-1.0320459	0.214995155	0.4739798	0.49	0.69	0.748	0.767606114	TRUE	0.748	0.84176684	TRUE	2.353	4.486	0.6441918	1.360547
Vanadium	4 - 4	1.2	2.7	OW01-SD11	2.075	0.68342949	0.675154303	0.3665387	0.14	0.2	0.748	0.936095971	TRUE	0.748	0.90302025	TRUE	2.353	3.732	2.869319	4.666341

Table A-3-4
Statistical Evaluation for Constituents Detected in Groundwater
SWMU 1
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/L)																		
1,1-Dichloroethane	1 - 17	1	1	OW01-PZ04-R01	1.176470588	-0.286808635	1.520086104	0.824153065	1	10	FALSE	0.892	0.549695094	FALSE	1.746	2.426	1.820177197	1.737859808
1,3,5-Trimethylbenzene	2 - 17	3	5	OW01-MW04-R01	1.441176471	-0.181411019	1.80175568	0.9573479	1	10	FALSE	0.892	0.549483425	FALSE	1.746	2.625	2.204160906	2.472194066
Benzene	7 - 17	1	6	OW01-PZ03-R01	1.441176471	-6.15E-02	1.675954513	0.85687988	1	10	FALSE	0.892	0.754131192	FALSE	1.746	2.481	2.150888238	2.309680138
Cumene	7 - 17	1	7	OW01-MW04P-R01	1.852941176	8.30E-02	2.104791453	1.009418494	1	10	FALSE	0.892	0.746277938	FALSE	1.746	2.7	2.744251322	3.574559639
Ethylbenzene	3 - 17	4	17	OW01-PZ03-R01	2.382352941	1.29E-02	4.174062064	1.181942258	1	10	FALSE	0.892	0.649006055	FALSE	1.746	2.971	4.149931322	4.900205835
Toluene	3 - 17	1	35	OW01-PZ03-R01	3.441176471	-2.32E-03	8.44075373	1.290918262	1	10	FALSE	0.892	0.620378066	FALSE	1.746	3.152	7.01555883	6.348109738
Trichloroethene	2 - 17	1	1	OW01-MW02-R01	1.205882353	-0.246035271	1.510989158	0.819929061	1	10	FALSE	0.892	0.604416913	FALSE	1.746	2.426	1.845736703	1.799292551
Xylene, total	8 - 17	1	66	OW01-PZ03-R01	6.735294118	0.456319137	15.83323013	1.576819577	1	10	FALSE	0.892	0.75456299	FALSE	1.746	3.655	13.44014777	23.11121511
n-Propylbenzene	5 - 17	2	10	OW01-MW04P-R01	2.264705882	0.113070213	2.899987322	1.165626189	1	10	FALSE	0.892	0.687270994	FALSE	1.746	2.955	3.492755398	5.225334127
o-Xylene	3 - 17	1	11	OW01-PZ03-R01	1.735294118	-0.118108699	2.750668368	1.019493893	1	10	FALSE	0.892	0.63243271	FALSE	1.746	2.716	2.900111953	2.985632368
p-Isopropyltoluene	2 - 17	1	2	OW01-PZ04-R01	1.264705882	-0.205261908	1.521898969	0.849625175	1	10	FALSE	0.892	0.625389888	FALSE	1.746	2.468	1.909180179	1.973657225
sec-Butylbenzene	3 - 17	2	5	OW01-PZ02P-R01	1.705882353	1.17E-02	1.846100819	1.00918806	1	10	FALSE	0.892	0.666195069	FALSE	1.746	2.7	2.4876455	3.327306851
Semi-volatile Organic Compounds (UG/L)																		
Acenaphthene	3 - 17	0.096	0.15	OW01-PZ02-R01	2.640058824	-0.917044919	5.138484157	1.942224346	0.2	22	FALSE	0.892	0.723792639	FALSE	1.746	4.312	4.816038329	21.3871555
Benzo(a)anthracene	1 - 17	0.23	0.23	OW01-MW08D-R01	9.25E-02	-4.085043414	0.181554784	1.796706542	0.01	1.1	FALSE	0.892	0.699809401	FALSE	1.746	4.053	0.169411908	0.521809175
Benzo(a)pyrene	1 - 17	0.2	0.2	OW01-PZ01-R01	0.813529412	-1.831452975	1.782785535	1.648566872	0.1	11	FALSE	0.892	0.735889818	FALSE	1.746	3.781	1.568480613	2.961634121
Fluoranthene	4 - 17	2.3	6.5	OW01-MW08D-R01	31.10882353	1.412562651	67.14375258	2.126318031	1	110	FALSE	0.892	0.874159838	FALSE	1.746	4.671	59.54200052	471.6252548
Naphthalene	7 - 17	13	208	OW01-MW04P-R01	31.14705882	1.2702286	63.07975227	2.310478554	1	10	FALSE	0.892	0.782144307	FALSE	1.746	5.014	57.85926498	930.3675793
Phenanthrene	1 - 17	0.35	0.35	OW01-MW07D-R01	1.108235294	-2.415083536	2.370100829	2.470256046	0.05	5.4	FALSE	0.892	0.872076032	FALSE	1.746	5.319	2.111895259	50.44226232
Pyrene	9 - 17	0.002	0.23	OW01-MW04-R01	3.65E-02	-4.884460651	8.13E-02	1.586993255	0.005	0.54	FALSE	0.892	0.780966608	FALSE	1.746	3.673	7.09E-02	0.114414179

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AnalyteName	Detection Frequency		Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
VOC (mg/kg)																			
1,1,2-TRICHLOROETHANE	1	1	0.002	0.002		0.002	-6.21461					-9999	FALSE	-9999	FALSE	6.31400013	0		0
ACETONE	20	25	0.008	2.2		0.41644	-2.96209	0.76101911	2.06398299	0.012	2.9	-0.5805783	FALSE	-0.7887247	FALSE	1.71099997	4.11607265	0.676860735	2.46443337
BENZENE	5	31	0.004	0.009		0.100279	-4.76635	0.20177366	2.31080177	0.0012	1.4	-0.5523267	FALSE	-0.834636	FALSE	1.69700003	4.29436445	0.161777667	0.75227053
CARBON DISULFIDE	7	25	0.002	0.01		0.1185	-4.37069	0.22080214	2.11732257	0.005	1.4	-0.5782878	FALSE	-0.7092296	FALSE	1.71099997	4.2050004	0.194058489	0.73216819
CHLOROFORM	1	1	0.004	0.004		0.004	-5.52146					-9999	FALSE	-9999	FALSE	6.31400013	0		0
DICHLOROETHYLENES	1	1	0.002	0.002		0.002	-6.21461					-9999	FALSE	-9999	FALSE	6.31400013	0		0
ETHYLBENZENE	10	31	0.001	6.4		0.4619403	-4.55864	1.35072541	2.82713639	0.0012	0.73	-0.4026467	FALSE	-0.8224484	FALSE	1.69700003	5.11141825	0.873628193	7.97105072
METHYL ETHYL KETONE (2-BUTANONE)	1	13	0.072	0.072		0.4461154	-2.02974	0.51698398	2.07088254	0.012	2.9	-0.610324	FALSE	0.8794044	TRUE	1.78199995	4.98069143	0.701618556	22.0152637
METHYLENE CHLORIDE	24	25	0.003	0.72		0.12412	-3.73935	0.22288362	1.81028101	0.73	0.73	-0.5967134	FALSE	-0.8438177	FALSE	1.71099997	3.70342112	0.200390775	0.48083995
STYRENE	2	25	0.006	0.011		0.11866	-4.37227	0.22072521	2.12870591	0.005	1.4	-0.5792748	FALSE	-0.6935502	FALSE	1.71099997	4.22397995	0.194192166	0.7625087
TOLUENE	14	31	0.002	6.8		0.2994887	-4.71726	1.21998782	2.50185475	0.0012	0.73	-0.2624219	FALSE	-0.8496225	FALSE	1.69700003	4.59096766	0.671329044	1.66423216
XYLENES, TOTAL	16	31	0.002	44		2.4714194	-3.77315	8.20873943	3.28662405	0.0024	0.73	-0.3481688	FALSE	-0.7989766	FALSE	1.69700003	5.85405064	4.973362708	170.716385
SVOC (mg/kg)																			
1-METHYLNAPHTHALENE	2	28	0.066	30		2.9914286	-1.95127	6.7172261	2.57135634	0.052	28	-0.5230709	FALSE	-0.6485552	FALSE	1.70299995	4.83369446	5.153278716	42.3626862
2-METHYLNAPHTHALENE	10	31	0.21	45		7.635129	-1.38939	14.8934145	3.00303159	0.052	10	-0.559783	FALSE	-0.6964383	FALSE	1.69700003	5.39292955	12.17449586	435.238681
ACENAPHTHENE	1	31	0.086	0.086		1.8378871	-1.93915	3.85621382	2.32506324	0.052	26	-0.5302032	FALSE	-0.7046076	FALSE	1.69700003	4.31649828	3.013223287	13.4083718
BENZO(a)ANTHRACENE	7	31	0.00771	0.45		1.8629261	-1.69775	3.84155329	2.28437699	0.052	26	-0.5365405	FALSE	-0.84675	FALSE	1.69700003	4.25335312	3.033793934	14.6597292
BENZO(a)PYRENE	6	31	0.079	1.1		1.8820935	-1.64492	3.83618903	2.25492367	0.052	26	-0.5418438	FALSE	-0.8005142	FALSE	1.69700003	4.2076416	3.05132638	13.8653572
BENZO(b)FLUORANTHENE	4	31	0.16	0.97		1.8786774	-1.66914	3.83679391	2.2771214	0.052	26	-0.5407766	FALSE	-0.7871857	FALSE	1.69700003	4.24209213	3.048094611	14.6852593
BENZO(g,h,i)PERYLENE	4	31	0.072	0.88		1.867371	-1.71511	3.84142527	2.26577417	0.052	26	-0.5380675	FALSE	-0.782039	FALSE	1.69700003	4.22448158	3.038199752	13.4507448
BENZO(k)FLUORANTHENE	3	31	0.15	0.69		1.867129	-1.72702	3.84059396	2.29429409	0.052	26	-0.5377122	FALSE	-0.7690613	FALSE	1.69700003	4.26874447	3.037704443	14.7711786
bis(2-ETHYLHEXYL) PHTHALATE	1	3	0.48	0.48		0.6883333	-0.62734	0.58596786	0.87900078	0.47	2.7	0.9051777	TRUE	0.9889454	TRUE	2.92000008	11.4649105	1.676194769	976.766896
CHRYSENE	6	31	0.0142	0.71		1.8710548	-1.70541	3.83889033	2.29798261	0.052	26	-0.538996	FALSE	-0.809575	FALSE	1.69700003	4.2744689	3.041110998	15.3026996
DIBENZ(a,h)ANTHRACENE	1	31	0.26	0.26		1.8385806	-1.90792	3.8525319	2.32507026	0.052	26	-0.5306168	FALSE	-0.7144735	FALSE	1.69700003	4.31650877	3.012794623	13.8340654
DIBENZOFURAN	2	3	0.2	1.2		0.545	-0.95843	0.56751652	0.99120393	0.47	0.47	0.7762018	TRUE	0.8168928	TRUE	2.92000008	12.9347715	1.501755006	5419.3753
DIETHYL PHTHALATE	1	1	0.048	0.048		0.048	-3.03655					-9999	FALSE	-9999	FALSE	6.31400013	0		0
FLUORANTHENE	6	31	0.068	0.47		1.8813871	-1.56316	3.83349349	2.2245523	0.052	26	-0.5397897	FALSE	-0.8225325	FALSE	1.69700003	4.16050529	3.049798354	13.4726568
FLUORENE	3	31	0.035	0.73		1.8007419	-2.00197	3.86362685	2.30189612	0.052	26	-0.5189875	FALSE	-0.6946396	FALSE	1.69700003	4.28054285	2.978337543	11.5434043
INDENO(1,2,3-c,d)PYRENE	5	31	0.11	1.1		1.8835645	-1.62102	3.83542885	2.24484724	0.052	26	-0.5419223	FALSE	-0.8078387	FALSE	1.69700003	4.19200277	3.05256565	13.6874443
NAPHTHALENE	5	31	0.13	31		3.6438387	-1.67836	7.8420893	2.63455205	0.052	26	-0.5572668	FALSE	-0.7118999	FALSE	1.69700003	4.80328321	5.973072652	60.4630676
PHENANTHRENE	6	31	0.075	0.52		1.8034645	-1.89244	3.86147408	2.25359998	0.0478	26	-0.5190388	FALSE	-0.7514142	FALSE	1.69700003	4.20558691	2.980403983	10.7731129
PYRENE	7	31	0.00443	0.52		1.8711106	-1.70067	3.8382521	2.32670732	0.052	26	-0.538733	FALSE	-0.8576946	FALSE	1.69700003	4.31904984	3.040972278	17.1248871
DIOXIN/FURANS (MG/KG)																			
HEXACHLORINATED DIBENZOFURANS, (TC	1	2	0.0000003	0.0000003		1.525E-07	-17.0667	2.086E-07	2.8951388	0.00000001	0.00000001	-9999	FALSE	-9999	FALSE	6.31400013	37.8584137	1.08382E-06	1.0111E+42
PEST/P (MG/KG)																			
ALPHA-CHLORDANE	1	1	0.0015	0.0015		0.0015	-6.50229					-9999	FALSE	-9999	FALSE	6.31400013	0		0
DDD (1,1-bis(CHLOROPHENYL)-2,2-DICHLO	1	3	0.018	0.018		0.0070667	-5.71367	0.0094982	1.55453184	0.0017	0.0047	0.8150367	TRUE	0.964173	TRUE	2.92000008	20.3132763	0.023079332	54927812.2
DDE (1,1-bis(CHLOROPHENYL)-2,2-DICHLO	2	3	0.00073	0.002		0.0010567	-7.05527	0.00082972	0.77078634	0.00088	0.00088	0.8837287	TRUE	0.9646921	TRUE	2.92000008	10.0473013	0.002455459	0.27747673
DDT (1,1-bis(CHLOROPHENYL)-2,2,2-TRICH	1	3	0.0034	0.0034		0.0022	-6.2692	0.0012816	0.71791297	0.0017	0.0047	0.9897071	TRUE	0.9321782	TRUE	2.92000008	9.35466003	0.004360603	0.28292955
PCB-1254 (AROCHLOR 1254)	3	12	0.011	0.14		0.024	-4.19751	0.03708283	0.81158192	0.017	0.047	-0.4581901	FALSE	-0.706656	FALSE	1.796	2.58945751	0.043225985	0.03939165
PCB-1260 (AROCHLOR 1260)	1	12	0.014	0.014		0.0120417	-4.47616	0.00401691	0.32997369	0.018	0.047	-0.6900808	FALSE	-0.7456219	FALSE	1.796	1.95667422	0.014539046	0.01460149
METALS (MG/KG)																			
ALUMINUM	10	10	475	22000		8212.5	8.519435	7085.18143	1.22630817			0.899496	TRUE	0.9215211	TRUE	1.83299994	3.58820462	12319.39937	46027.1219
ANTIMONY	3	12	3.6	13		2.8745833	0.574942	3.51657469	1.02257564	0.39	4.2	-0.6399975	FALSE	0.8916901	TRUE	1.796	2.95780325	4.697788555	7.45964699
ARSENIC	12	12	0.44	3.5		1.4516667	0.165765	0.98791639	0.67520625			0.8778727	TRUE	0.9576252	TRUE	1.796	2.37854505	1.963862333	2.40573508
BARIUM	12	12	3	78.8		38.425	3.329809	25.391091	0.99237741			0.9225546	TRUE	-0.8539112	FALSE	1.796	2.90150809	51.5892788	108.842055
BERYLLIUM	11	12	0.07	0.56		0.2895833	-1.60022	0.20793857	1.00874169	0.05	0.05	0.8654155	TRUE	0.8926364	TRUE	1.796	2.93157411	0.397391275	0.81890206
CADMIUM	3	12	0.42	1.3		0.47	-0.85402	0.28184457	0.40822407	0.66	0.77	-0.529011	FALSE	-0.6119421	FALSE	1.796	2.03545761	0.616125291	0.59445517
CALCIUM	10	10	63.4	1080		414.94	5.688898	360.616374	0.89519376			-0.8043256	FALSE	0.9625462	TRUE	1.83299994	2.89277196	623.9696505	1045.30077
CHROMIUM, TOTAL	12	12	2.9	34.3		14.941667	2.540713	8.45570903	0.63954102			0.9331503	TRUE	0.9408391	TRUE	1.796	2.3275436	19.32561816	24.376599
COBALT	10	12	1.1	3.9		2.0341667	0.492068	1.16048938	0.77217639	0.8	0.82	0.933638	TRUE	0.8680739	TRUE	1.796	2.52659512	2.635834622	3.96813
COPPER	12	12	0.76	70.8		15.296667	2.082898	22.5536662	1.24448312			-0.6436849	FALSE	0.944286	TRUE	1.796	3.37854004	27.98984748	61.8402461
IRON	10	10	336	17300		6651.6	8.345167	5695.35162	1.18325657			0.8793233	TRUE	0.9213837	TRUE	1.83299994	3.49590206	9952.884808	33623.6313
LEAD	12	12	0.78	138		28.423333	2.465043	37.9400099	1.61195835			-0.7008328	FALSE	0.9329427	TRUE	1.796	4.13156033	48.09373146	321.078501
MAGNESIUM	10	10	65	1230		629.2	6.119947	425.251246	0.97373673			0.9168073	TRUE	0.8896474	TRUE	1.83299994	3.05021071	875.6949616	1965.05649
MANGANESE	10	10	2.3	40.1		19.91	2.763961	11.9394258	0.81948232			0.95103	TRUE	0.8797061	TRUE	1.83299994	2.74740601	26.83063418	46.9846289
MERCURY	11	12	0.04	0.23		0.085	-2.69263	0.06762194	0.65733737	0.4	0.4	-0.7073438	FALSE	-0.7719299	FALSE	1.796	2.35299253	0.12005931	0.13398486
NICKEL	10	12	3.8	11.7		6.89	1.577886	3.79540631	1.15286689	0.66	1.3	0.9288821	TRUE	-0.7267152	FALSE	1.796	3.20483565	8.857768418	28.6771295
POTASSIUM	9	10	179	782		408.4	5.805825	238.517272	0.72459888	164	164	0.9372118	TRUE	0.9253977	TRUE	1.83299994	2.57578611	544.6554579	804.153975
SELENIUM	4	12	0.62	0.87		0.3945833	-1.10835	0.26328742	0.59620863	0.41	0.48	-0.7039062	FALSE	-0.7119825	FALSE	1.796	2.26607108	0.531087472	0.59261575
SODIUM	9	10	169	435		212.645	5.140871	104.258142	0.9108387	28.9	28.9	0.8843484	TRUE	-0.6496027	FALSE	1.83299994	2.92378569	273.0777607	628.110406
TIN	3	3	4.3	27.5		12.133333	2.099619	13.308769	1.05238616			-0.7596819	FALSE	0.7772066	TRUE	2.92000008	13.7373066	34.57009237	390292.115
VANADIUM	12	12	1.6	52.2		14.6	2.268989	14.040461	0.99907002			-0.8105963	FALSE	0.9847783	TRUE	1.796	2.91335392	21.87942504	38.2932678
ZINC	11	12	6.1	257		55.525	3.313963	71.7264009	1.39036551	2.4	2.4	-0.6994278	FALSE	0.9437293	TRUE	1.796	3.67366123	92.71230876	336.957629

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 1 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Industrial Worker	Adult	Dermal Absorption	On-site	None	Groundwater not currently used on site as a water supply.
						Ingestion	On-site	None	Groundwater not currently used on site as a water supply.
	Surface Soil	Surface Soil	Direct Contact	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
						Ingestion	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
		Air	Emissions from exposed soil	Industrial Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
					Adolescents	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
Current/Future	Surface Water	Surface Water	Drainage ditch along west side of site	Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
		Animal Tissue	Fish from drainage ditch along west side of site	Fisher	Adult	Ingestion	On-site	None	Fishing does not occur in the drainage ditch.
	Sediment	Sediment	Drainage ditch along west side of site	Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
Future	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Resident	Adult	Dermal Absorption	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
					Child	Dermal Absorption	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
					Adult/Child	Dermal Absorption	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 1 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Groundwater	Groundwater	Columbia Aquifer - Water in Excavation Pit	Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction worker may contact shallow groundwater during construction activities.
						Ingestion	On-site	None	Construction worker not expected to incidentally ingest significant amount of groundwater during construction activities.
		Air	Columbia Aquifer -Water Vapors at Showerhead	Resident	Adult	Inhalation	On-site	Quant	Although unlikely, shallow groundwater could be used as a potable water supply in the future.
					Child	Inhalation	On-site	None	Children are assumed to bathe, not to shower.
			Columbia Aquifer - Volatilization from Water in Excavation Pit	Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker may inhale vapors from shallow groundwater during construction activities.
	Soil*	Soil*	Direct Contact	Resident	Adult	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Adult/Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Exposure to soil during construction activities.
						Ingestion	On-site	Quant	Exposure to soil during construction activities.
				Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
						Ingestion	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
		Air	Emissions from exposed soil	Resident	Adult	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Adult/Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
				Construction Worker	Adult	Inhalation	On-site	Quant	Exposure to emissions from soil during construction activities.
				Industrial Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
					Adolescents	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.

*O[illegible]urface and subsurface soil data.

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
79-00-5	1,1,2-Trichloroethane	2.00E-03	L	2.00E-03	L	MG/KG	OW01-SS09	1/1	- - -	2.00E-03	N/A	7.8E-04 C	N/A	N/A	YES	ASL
540-59-0	1,2-Dichloroethene (total)	2.00E-03	L	2.00E-03	L	MG/KG	SS09	1/1	- - -	2.00E-03	N/A	3.7E-02 N	N/A	N/A	NO	BSL
90-12-0	1-Methylnaphthalene	6.60E-02		6.60E-02		MG/KG	1-SS4	1/8	0.052 - 28	6.60E-02	N/A	2.2E+00 N	N/A	N/A	NO	BSL
91-57-6	2-Methylnaphthalene	2.10E-01		2.10E-01		MG/KG	1-SS4	1/9	0.052 - 10	2.10E-01	N/A	2.2E+00 N	N/A	N/A	NO	BSL
83-32-9	Acenaphthene	8.60E-02		8.60E-02		MG/KG	1-SS7	1/9	0.052 - 26	8.60E-02	N/A	1.0E+01 N	N/A	N/A	NO	BSL
67-64-1	Acetone	8.00E-03	J	2.00E-02		MG/KG	1-SS2	2/3	0.012 - 2.9	2.00E-02	N/A	2.5E-01 N	N/A	N/A	NO	BSL
5103-71-9	alpha-Chlordane	1.50E-03	J	1.50E-03	J	MG/KG	OW01-SS09	1/1	- - -	1.50E-03	N/A	9.2E-01 C	N/A	N/A	NO	BSL
7429-90-5	Aluminum	5.43E+03		1.57E+04		MG/KG	1-SS1	3/3	- - -	1.57E+04	N/A	7.8E+03 N	N/A	N/A	YES	ASL
7440-36-0	Antimony	5.90E+00		5.90E+00		MG/KG	1-SS2	1/3	0.39 - 4.2	5.90E+00	N/A	1.3E+00 N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	7.90E-01	J	3.50E+00		MG/KG	1-SS2	3/3	- - -	3.50E+00	N/A	2.6E-02 C	N/A	N/A	YES	ASL
7440-39-3	Barium	2.73E+01	J	7.88E+01		MG/KG	1-SS2	3/3	- - -	7.88E+01	N/A	2.1E+02 N	N/A	N/A	NO	BSL
56-55-3	Benzo(a)anthracene	7.71E-03	J	2.20E-01		MG/KG	1-SS3	6/9	0.052 - 26	2.20E-01	N/A	8.7E-01 C	N/A	N/A	NO	BSL
50-32-8	Benzo(a)pyrene	6.40E-02		2.30E-01		MG/KG	1-SS2	6/9	0.052 - 26	2.30E-01	N/A	8.7E-02 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)fluoranthene	1.60E-01		2.00E-01		MG/KG	1-SS2	3/9	0.052 - 26	2.00E-01	N/A	8.7E-01 C	N/A	N/A	NO	BSL
191-24-2	Benzo(ghi)perylene	7.20E-02		1.30E-01		MG/KG	1-SS2	3/9	0.052 - 26	1.30E-01	N/A	6.8E+01 N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)fluoranthene	1.50E-01		2.20E-01		MG/KG	1-SS2	2/9	0.052 - 26	2.20E-01	N/A	8.7E+00 C	N/A	N/A	NO	BSL
7440-41-7	Beryllium	1.80E-01	J	5.40E-01	B*	MG/KG	1-SS2	3/3	0.05 - 0.05	5.40E-01	N/A	1.6E+01 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	4.20E-01	J	1.30E+00		MG/KG	1-SS2	2/3	0.66 - 0.77	1.30E+00	N/A	5.5E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	3.85E+02	J	1.08E+03		MG/KG	1-SS1	3/3	- - -	1.08E+03	N/A	N/A	N/A	N/A	NO	NUT
75-15-0	Carbon Disulfide	4.00E-03	J	8.00E-03		MG/KG	1-SS1	2/3	0.005 - 1.4	8.00E-03	N/A	1.9E+00 N	N/A	N/A	NO	BSL
7440-47-3	Chromium, Total	8.50E+00		2.06E+01		MG/KG	1-SS2	3/3	- - -	2.06E+01	N/A	4.2E+00 N	N/A	N/A	YES	ASL
218-01-9	Chrysene	1.42E-02	J	2.90E-01		MG/KG	1-SS2	5/9	0.052 - 26	2.90E-01	N/A	8.7E+01 C	N/A	N/A	NO	BSL
7440-48-4	Cobalt	3.10E+00		3.90E+00	B*	MG/KG	1-SS2	2/3	0.8 - 0.82	3.90E+00	N/A	4.7E+02 N	N/A	N/A	NO	BSL
7440-30-8	Copper	1.20E+01		1.31E+01		MG/KG	1-SS1	2/3	- - -	1.31E+01	N/A	3.1E+02 N	N/A	N/A	NO	BSL
72-55-9	DDE	7.30E-04	J	7.30E-04	J	MG/KG	OW01-SS09	1/1	0.00088 - 0.00088	7.30E-04	N/A	1.9E+00 C	N/A	N/A	NO	BSL
84-66-2	Diethylphthalate	4.80E-02	J	4.80E-02	J	MG/KG	OW01-SS09	1/1	- - -	4.80E-02	N/A	4.5E+01 N	N/A	N/A	NO	BSL
100-41-4	Ethylbenzene	1.00E-03	J	1.00E-03	J	MG/KG	1-SS1	1/9	0.0012 - 0.73	1.00E-03	N/A	1.5E+00 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	6.80E-02		4.70E-01		MG/KG	1-SS2	5/9	0.052 - 26	4.70E-01	N/A	3.1E+02 N	N/A	N/A	NO	BSL
86-73-7	Fluorene	3.50E-02	J	3.50E-02	J	MG/KG	1-SS2	1/9	0.052 - 26	3.50E-02	N/A	1.4E+01 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-c,d)pyrene	1.10E-01		1.70E-01		MG/KG	1-SS2	4/9	0.052 - 26	1.70E-01	N/A	8.7E-01 C	N/A	N/A	NO	BSL
7439-89-6	Iron	2.98E+03		1.73E+04		MG/KG	1-SS2	3/3	- - -	1.73E+04	N/A	2.3E+03 N	N/A	N/A	YES	ASL
7439-92-1	Lead	1.78E+01		4.55E+01		MG/KG	1-SS1	3/3	- - -	4.55E+01	N/A	4.0E+02	4.0E+02	AL	NO	BSL
7439-95-4	Magnesium	4.25E+02	J	9.61E+02	B*	MG/KG	1-SS1	3/3	- - -	9.61E+02	N/A	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	1.29E+01		3.67E+01		MG/KG	1-SS2	3/3	- - -	3.67E+01	N/A	9.5E+01 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	4.00E-02	J	2.30E-01		MG/KG	1-SS2	3/3	0.4 - 0.4	2.30E-01	N/A	2.3E+00 N	N/A	N/A	NO	BSL

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
78-93-3	Methyl ethyl ketone (2-Butanone)	7.20E-02		7.20E-02		MG/KG	1-SS1	1/3	0.012 - 2.9	7.20E-02	N/A	7.9E-01	N	N/A	N/A	NO	BSL
75-09-2	Methylene Chloride	1.70E-02	B*	2.80E-02	B*	MG/KG	1-SS1	2/3	0.73 - 0.73	2.80E-02	N/A	1.9E-02	C	N/A	N/A	YES	ASL
91-20-3	Naphthalene	1.30E-01		1.30E-01		MG/KG	1-SS4	1/9	0.052 - 28	1.30E-01	N/A	1.5E-02	N	N/A	N/A	YES	ASL
7440-02-0	Nickel	8.40E+00	B*	9.50E+00	B*	MG/KG	1-SS1	2/3	0.66 - 1.3	9.50E+00	N/A	1.6E+02	N	N/A	N/A	NO	BSL
11097-69-1	PCB-1254	1.40E-01		1.40E-01		MG/KG	1-SS1	1/3	0.017 - 0.047	1.40E-01	N/A	1.6E-02	N	N/A	N/A	YES	ASL
85-01-8	Phenanthrene	7.50E-02		2.60E-01		MG/KG	1-SS2	4/9	0.0478 - 26	2.60E-01	N/A	6.8E+01	N	N/A	N/A	NO	BSL
7440-09-7	Potassium	5.87E+02		6.66E+02	B*	MG/KG	1-SS1	2/3	164 - 164	6.66E+02	N/A	N/A		N/A	N/A	NO	NUT
129-00-0	Pyrene	4.43E-03	J	3.70E-01		MG/KG	1-SS2	6/9	0.052 - 26	3.70E-01	N/A	6.8E+01	N	N/A	N/A	NO	BSL
7782-49-2	Selenium	6.50E-01	B*	8.70E-01	B*	MG/KG	1-SS2	3/3	0.41 - 0.46	8.70E-01	N/A	1.9E+00	N	N/A	N/A	NO	BSL
7440-23-5	Sodium	2.51E+02	B*	2.62E+02	B*	MG/KG	1-SS2	2/3	28.9 - 28.9	2.62E+02	N/A	N/A		N/A	N/A	NO	NUT
108-88-3	Toluene	2.50E-02		2.50E-02		MG/KG	1-SS1	1/9	0.0012 - 0.73	2.50E-02	N/A	8.8E-01	N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	1.04E+01		2.00E+01		MG/KG	1-SS1	3/3	- - -	2.00E+01	N/A	5.5E+01	N	N/A	N/A	NO	BSL
1330-20-7	Xylenes, total	5.00E-03	J	1.50E-02		MG/KG	1-SS1	2/9	0.0024 - 0.73	1.50E-02	N/A	1.7E+01	N	N/A	N/A	NO	BSL
7440-66-6	Zinc	5.29E+01		8.51E+01		MG/KG	1-SS2	2/3	2.4 - 2.4	8.51E+01	N/A	1.4E+03	N	N/A	N/A	NO	BSL

AL-Residentail soil screening level for lead from USEPA, July 1994. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities.OSWER Directive #9355.4-12

* - Data was not validated, therefore, all data used in the risk assessment.

[1] Minimum/Maximum detected concentrations in soil.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] The most conservative value of residential RBC versus soil screening level, DAF 20; Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III.
Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1)
RBC value for 2-methylnaphthalene used for 1-methylnaphthalene.
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for benzo(g,h,i)perylene and phenanthrene.
RBC value for chlordane used as surrogate for alpha-chlordane.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
B (inorganics) = Below contract required detection limit but above instrument detection limit
B (organics) = Also detected in associated field, trip, or laboratory blank

Table 2.2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana-SWMU 1

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Drainage ditch along west side of site

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7429-90-5	Aluminum	3.71E+02		5.77E+02		UG/L	OW01-SW08	4/4	26.2 - 26.2	5.77E+02	NA	3.7E+04 N	NA	NA	NO	BSL
120-12-7	Anthracene	5.64E-01		5.64E-01	B	UG/L	OW01-SW05	1/4	0.11 - 0.119	5.64E-01	NA	1.8E+03 N	NA	NA	NO	BSL
7440-39-3	Barium	2.65E+01	J	2.81E+01	J	UG/L	OW01-SW08	4/4	0.2 - 0.2	2.81E+01	NA	2.6E+03 N	NA	NA	NO	BSL
56-55-3	Benzo(a)anthracene	1.20E-02	J	1.90E-02	J	UG/L	OW01-SW07	4/4	0.011 - 0.012	1.90E-02	NA	9.2E-01 C	NA	NA	NO	BSL
205-99-2	Benzo(b)fluoranthene	4.85E-01		8.76E-01	J	UG/L	OW01-SW05	4/4	0.44 - 0.476	8.76E-01	NA	9.2E-01 C	NA	NA	NO	BSL
75-27-4	Bromodichloromethane	2.00E-01	J	2.00E-01	J	UG/L	OW01-SW05	2/4	1 - 1	2.00E-01	NA	1.7E+00 C	NA	NA	NO	BSL
7440-70-2	Calcium	6.29E+03		6.72E+03		UG/L	OW01-SW08	4/4	30.3 - 30.3	6.72E+03	NA	NA	NA	NA	NO	NUT
7440-47-3	Chromium	7.20E-01	J	1.20E+00	J	UG/L	OW01-SW05	4/4	0.6 - 0.6	1.20E+00	NA	1.1E+02 N	NA	NA	NO	BSL
218-01-9	Chrysene	2.10E-02	J	4.20E-02	J	UG/L	OW01-SW08	4/4	0.011 - 0.012	4.20E-02	NA	9.2E+01 C	NA	NA	NO	BSL
7439-89-6	Iron	1.26E+03		1.33E+03		UG/L	OW01-SW06	4/4	19 - 19	1.33E+03	NA	1.1E+04 N	NA	NA	NO	BSL
7439-95-4	Magnesium	4.13E+03	J	4.32E+03	J	UG/L	OW01-SW05	4/4	28.6 - 28.6	4.32E+03	NA	NA	NA	NA	NO	NUT
7439-96-5	Manganese	6.24E+01		6.53E+01		UG/L	OW01-SW05	4/4	0.2 - 0.2	6.53E+01	NA	7.3E+02 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	3.10E-02	J	5.20E-02	J	UG/L	OW01-SW05	4/4	0.055 - 0.06	5.20E-02	NA	1.8E+02 N	NA	NA	NO	BSL
129-00-0	Pyrene	6.00E-03		8.00E-03		UG/L	OW01-SW07	4/4	0.006 - 0.006	8.00E-03	NA	1.8E+02 N	NA	NA	NO	BSL
7440-23-5	Sodium	8.43E+03	J	8.66E+03	J	UG/L	OW01-SW05	4/4	162 - 162	8.66E+03	NA	NA	NA	NA	NO	NUT
7440-62-2	Vanadium	1.20E+00	J	1.60E+00	J	UG/L	OW01-SW05	4/4	0.8 - 0.8	1.60E+00	NA	2.6E+02 N	NA	NA	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III, Jennifer Hubbard.
Tap Water RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1) times ten.
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for phenanthrene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
B (organics) = Also detected in associated field, trip, or laboratory blank

Table 2.3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 01

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
71-55-6	1,1,1-Trichloroethane	1.00E-03	J	2.00E-03	J	MG/KG	SD09P OW01-	3/4	12 - 14	2.00E-03	N/A	2.2E+04 N	N/A	N/A	NO	BSL
79-00-5	1,1,2-Trichloroethane	2.00E-03	J	2.00E-03	L	MG/KG	OW01-SD09 OW01-SD09P OW01-SD10 OW01-SD11 OW01-SD12	4/4	12 - 14	2.00E-03	N/A	1.1E+02 C	N/A	N/A	NO	BSL
75-34-3	1,1-Dichloroethane	1.00E-03	L	2.00E-03	J	MG/KG	OW01-SD09 OW01-SD09P OW01-SD10 OW01-SD11	4/4	12 - 14	2.00E-03	N/A	7.8E+03 N	N/A	N/A	NO	BSL
75-35-4	1,1-Dichloroethene	1.00E-03	J	2.00E-03	J	MG/KG	OW01-SD09P	2/4	12 - 14	2.00E-03	N/A	1.1E+01 C	N/A	N/A	NO	BSL
107-06-2	1,2-Dichloroethane	2.00E-03	J	2.00E-03	J	MG/KG	OW01-SD09P	1/4	12 - 14	2.00E-03	N/A	7.0E+01 C	N/A	N/A	NO	BSL
540-59-0	1,2-Dichloroethene (total)	3.00E-03	J	4.00E-03	J	MG/KG	OW01-SD09P	4/4	12 - 14	4.00E-03	N/A	7.0E+02 N	N/A	N/A	NO	BSL
78-87-5	1,2-Dichloropropane	1.00E-03	J	2.00E-03	J	MG/KG	SD09P	2/4	12 - 14	2.00E-03	N/A	9.4E+01 C	N/A	N/A	NO	BSL
67-64-1	Acetone	1.20E-02	UJ	2.40E-02	J	MG/KG	OW01-SD12	3/4	12 - 14	2.40E-02	N/A	7.8E+03 N	N/A	N/A	NO	BSL
7429-90-5	Aluminum	4.39E+02		7.54E+02		MG/KG	OW01-SD10	4/4	4.8 - 6.7	7.54E+02	N/A	7.8E+04 N	N/A	N/A	NO	BSL
7440-38-2	Arsenic	2.20E+00	J	5.30E+00		MG/KG	OW01-SD12	2/4	0.49 - 0.69	5.30E+00	N/A	4.3E+00 C	N/A	N/A	YES	ASL
7440-39-3	Barium	2.90E+00	J	7.40E+00	J	MG/KG	OW01-SD12	4/4	0.04 - 0.05	7.40E+00	N/A	5.5E+03 N	N/A	N/A	NO	BSL
56-55-3	Benzo(a)anthracene	6.10E-03	J	4.70E-02	L	MG/KG	OW01-SD11	4/4	8.11 - 440	4.70E-02	N/A	8.7E+00 C	N/A	N/A	NO	BSL
205-99-2	Benzo(b)fluoranthene	1.31E+00		2.97E+00		MG/KG	OW01-SD09P	4/4	319 - 367	2.97E+00	N/A	8.7E+00 C	N/A	N/A	NO	BSL
191-24-2	Benzo(g,h,i)perylene	2.40E-01	L	2.40E-01	L	MG/KG	OW01-SD11	1/4	162 - 440	2.40E-01	N/A	2.3E+03 N	N/A	N/A	NO	BSL
7440-41-7	Beryllium	4.00E-02	J	2.30E-01	J	MG/KG	OW01-SD12	4/4	0.02 - 0.03	2.30E-01	N/A	1.6E+02 N	N/A	N/A	NO	BSL
75-27-4	Bromodichloromethane	1.00E-03	J	1.00E-03	J	MG/KG	OW01-SD09P	1/4	12 - 14	1.00E-03	N/A	1.0E+02 C	N/A	N/A	NO	BSL
74-83-9	Bromomethane	1.00E-03	J	2.00E-03	J	MG/KG	OW01-SD09P	2/4	12 - 14	2.00E-03	N/A	1.1E+02 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	1.69E+02	J	1.86E+02	J	MG/KG	OW01-SD10	2/4	5.5 - 7.7	1.86E+02	N/A	N/A	N/A	N/A	NO	NUT
75-15-0	Carbon disulfide	3.00E-03	J	4.00E-03	L	MG/KG	OW01-SD12	3/4	12 - 14	4.00E-03	N/A	7.8E+03 N	N/A	N/A	NO	BSL
56-23-5	Carbon tetrachloride	2.00E-03	J	2.00E-03	J	MG/KG	OW01-SD09P	1/4	12 - 14	2.00E-03	N/A	4.9E+01 C	N/A	N/A	NO	BSL
108-90-7	Chlorobenzene	2.00E-03	J	2.00E-03	L	MG/KG	SD09P OW01-	4/4	12 - 14	2.00E-03	N/A	1.6E+03 N	N/A	N/A	NO	BSL
75-00-3	Chloroethane	1.00E-03	J	2.00E-03	J	MG/KG	SD09P	2/4	12 - 14	2.00E-03	N/A	2.2E+03 C	N/A	N/A	NO	BSL
74-87-3	Chloromethane	1.00E-03	J	2.00E-03	J	MG/KG	OW01-SD11	3/4	12 - 14	2.00E-03	N/A	4.9E+02 C	N/A	N/A	NO	BSL
7440-47-3	Chromium	1.20E+00	J	2.00E+00	J	MG/KG	OW01-SD10	4/4	0.11 - 0.15	2.00E+00	N/A	2.3E+02 N	N/A	N/A	NO	BSL
218-01-9	Chrysene	1.42E-02	J	5.70E-02	L	MG/KG	OW01-SD11	4/4	8.11 - 440	5.70E-02	N/A	8.7E+02 C	N/A	N/A	NO	BSL
7440-50-8	Copper	1.80E+00	J	1.80E+00	J	MG/KG	OW01-SD12	1/4	0.11 - 0.15	1.80E+00	N/A	3.1E+03 N	N/A	N/A	NO	BSL
84-66-2	Diethylphthalate	4.70E-02	L	1.20E-01	L	MG/KG	OW01-SD12	4/4	410 - 470	1.20E-01	N/A	6.3E+04 N	N/A	N/A	NO	BSL
206-44-0	Fluoranthene	7.05E-01	J	7.05E-01	J	MG/KG	OW01-SD12	1/4	440 - 932	7.05E-01	N/A	3.1E+03 N	N/A	N/A	NO	BSL
7439-89-6	Iron	6.93E+02		5.52E+03		MG/KG	OW01-SD12	4/4	3.4 - 4.8	5.52E+03	N/A	2.3E+04 N	N/A	N/A	NO	BSL
7439-92-1	Lead	8.50E-01		1.70E+00		MG/KG	OW01-SD12	4/4	0.29 - 0.41	1.70E+00	N/A	N/A	4.0E+02	AL	NO	BSL
7439-95-4	Magnesium	6.54E+01	J	9.98E+01	J	MG/KG	OW01-SD10	3/4	5.2 - 7.3	9.98E+01	N/A	N/A	N/A	N/A	NO	NUT

Table 2.3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 01

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7439-96-5	Manganese	2.90E+00		1.90E+01		MG/KG	OW01-SD12	4/4	0.04 - 0.05	1.90E+01	N/A	1.6E+03 N	N/A	N/A	NO	BSL
91-20-3	Naphthalene	5.90E-02	L	5.90E-02	L	MG/KG	OW01-SD11	1/4	440 - 1620	5.90E-02	N/A	1.6E+03 N	N/A	N/A	NO	BSL
129-00-0	Pyrene	1.98E-03	J	9.20E-02	I.	MG/KG	OW01-SD11	4/4	4.18 - 440	9.20E-02	N/A	2.3E+03 N	N/A	N/A	NO	BSL
7782-49-2	Selenium	7.10E-01	J	7.10E-01	J	MG/KG	OW01-SD10	1/4	0.49 - 0.69	7.10E-01	N/A	3.9E+02 N	N/A	N/A	NO	BSL
79-01-6	Trichloroethene	2.00E-03	J	2.00E-03	J	MG/KG	SD09P OW01-	3/4	12 - 14	2.00E-03	N/A	4.7E+01 N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	1.20E+00	J	2.70E+00	J	MG/KG	OW01-SD11	4/4	0.14 - 0.2	2.70E+00	N/A	5.5E+02 N	N/A	N/A	NO	BSL
75-01-4	Vinyl chloride	1.00E-03	J	2.00E-03	J	MG/KG	OW01-SD09P	2/4	12 - 14	2.00E-03	N/A	4.3E+00 C	N/A	N/A	NO	BSL

AL-Residential soil screening level for lead from USEPA, July 1994. Reivsed Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III, Jennifer Hubbard.
Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1) times ten.
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for benzo(g,h,I)perylene.

[5] Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.
Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic

Table 2.4

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
75-34-3	1,1-Dichloroethane	1.00E+00	J	1.00E+00	J	UG/L	OW01-PZ04-R01	1/17	1 - 10	1.00E+00	NA	8.0E+01 N	NA	NA	NO	BSL
108-67-8	1,3,5-Trimethylbenzene	3.00E+00		5.00E+00	L	UG/L	OW01-MW04-R01	2/17	1 - 10	5.00E+00	NA	1.2E+00 N	NA	NA	YES	ASL
83-32-9	Acenaphthene	9.60E-02	J	1.50E-01	J	UG/L	OW01-PZ02-R01	3/17	0.2 - 22	1.50E-01	NA	3.7E+01 N	NA	NA	NO	BSL
71-43-2	Benzene	1.00E+00	J	6.00E+00	J	UG/L	OW01-PZ03-R01	7/17	1 - 10	6.00E+00	NA	3.2E-01 C	5.0E+00	MCL	YES	ASL
56-55-3	Benzo(a)anthracene	2.30E-01		2.30E-01		UG/L	OW01-MW08D-R01	1/17	0.01 - 1.1	2.30E-01	NA	9.2E-02 C	NA	NA	YES	ASL
50-32-8	Benzo(a)pyrene	2.00E-01		2.00E-01		UG/L	OW01-PZ01-R01	1/17	0.1 - 11	2.00E-01	NA	9.2E-03 C	2.0E-01	MCL	YES	ASL
98-82-8	Cumene	1.00E+00	J	7.00E+00	J	UG/L	OW01-MW04P-R01	7/17	1 - 10	7.00E+00	NA	6.6E+01 N	NA	NA	NO	BSL
100-41-4	Ethylbenzene	4.00E+00		1.70E+01		UG/L	OW01-PZ03-R01	3/17	1 - 10	1.70E+01	NA	1.3E+02 N	7.0E+02	MCL	NO	BSL
206-44-0	Fluoranthene	2.30E+00		6.50E+00		UG/L	OW01-MW08D-R01	4/17	1 - 110	6.50E+00	NA	1.5E+02 N	NA	NA	NO	BSL
91-20-3	Naphthalene	1.30E+01		2.08E+02		UG/L	OW01-MW04P-R01	7/17	1 - 10	2.08E+02	NA	6.5E-01 N	NA	NA	YES	ASL
103-65-1	n-Propylbenzene	2.00E+00		1.00E+01		UG/L	OW01-MW04P-R01	5/17	1 - 10	1.00E+01	NA	6.1E+00 N	NA	NA	YES	ASL
95-47-6	o-Xylene	1.00E+00	J	1.10E+01		UG/L	OW01-PZ03-R01	3/17	1 - 10	1.10E+01	NA	1.2E+03 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	3.50E-01		3.50E-01		UG/L	OW01-MW07D-R01	1/17	0.05 - 5.4	3.50E-01	NA	1.8E+01 N	NA	NA	NO	BSL
99-87-6	p-Isopropyltoluene	1.00E+00	J	2.00E+00		UG/L	OW01-PZ04-R01	2/17	1 - 10	2.00E+00	NA	6.6E+01 N	NA	NA	NO	BSL
129-00-0	Pyrene	2.00E-03	J	2.30E-01	J	UG/L	OW01-MW04-R01	9/17	0.005 - 0.54	2.30E-01	NA	1.8E+01 N	NA	NA	NO	BSL
135-98-8	sec-Butylbenzene	2.00E+00		5.00E+00		UG/L	OW01-PZ02P-R01	3/17	1 - 10	5.00E+00	NA	6.1E+00 N	NA	NA	NO	BSL
108-88-3	Toluene	1.00E+00	J	3.50E+01		UG/L	OW01-PZ03-R01	3/17	1 - 10	3.50E+01	NA	7.5E+01 N	1.0E+03	MCL	NO	BSL
79-01-6	Trichloroethene	1.00E+00	J	1.00E+00	J	UG/L	OW01-MW02-R01	2/17	1 - 10	1.00E+00	NA	1.6E+00 C	5.0E+00	MCL	NO	BSL
1330-20-7	Xylene, total	1.00E+00	J	6.60E+01		UG/L	OW01-PZ03-R01	8/17	1 - 10	6.60E+01	NA	1.2E+03 N	1.0E+04	MCL	NO	BSL

The most conservative value between the screening value and ARAR used for selection of COPC.

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III, Jennifer Hubbard.
Tap Water RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).
RBC value for pyrene used as surrogate for phenanthrene.
RBC value for cumene used as surrogate for p-isopropyltoluene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
SMCL = Secondary Maximum Contaminant Level

Table 2.5

Occurance, Distribution, and Selection of Chemicals of Potential Concern

NAS - Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
79-00-5	1,1,2-Trichloroethane	2.00E-03	L	2.00E-03		MG/KG	1-SS09	1/1	- - -	2.00E-03	N/A	7.8E-04 C	N/A	N/A	YES	ASL
90-12-0	1-Methylnaphthalene	6.60E-02		3.00E+01		MG/KG	1-SB23	3/28	0.052 - 28	3.00E+01	N/A	2.2E+00 N	N/A	N/A	YES	ASL
91-57-6	2-Methylnaphthalene	2.10E-01		4.50E+01		MG/KG	1-SB12	10/31	0.052 - 10	4.50E+01	N/A	2.2E+00 N	N/A	N/A	YES	ASL
83-32-9	Acenaphthene	8.60E-02		8.60E-02		MG/KG	1-SS7	1/31	0.052 - 26	8.60E-02	N/A	1.0E+01 N	N/A	N/A	NO	BSL
67-64-1	Acetone	8.00E-03	J	2.30E+00	B	MG/KG	1-SB13	20/25	0.012 - 2.9	2.20E+00	N/A	2.5E-01 N	N/A	N/A	YES	ASL
5103-71-9	alpha-Chlordane	1.50E-03	J	1.50E-03	J	MG/KG	OW01-SS09	1/1	- - -	1.50E-03	N/A	9.2E-01 C	N/A	N/A	NO	BSL
7429-90-5	Aluminum	4.75E+02		2.20E+04		MG/KG	1-SB14	10/10	- - -	2.20E+04	N/A	7.8E+03 N	N/A	N/A	YES	ASL
7440-36-0	Antimony	3.60E+00		1.30E+01	B	MG/KG	1-SB7	3/12	0.39 - 4.2	1.30E+01	N/A	1.3E+00 N	N/A	N/A	YES	ASL
7440-38-2	Arsenic	4.40E-01	B	3.50E+00		MG/KG	1-SS2	12/12	- - -	3.50E+00	N/A	4.3E-01 C	N/A	N/A	YES	ASL
7440-39-3	Barium	3.00E+00	B	9.70E+01		MG/KG	1-SB9 FD	12/12	- - -	7.88E+01	N/A	2.1E+02 N	N/A	N/A	NO	BSL
71-43-2	Benzene	4.00E-03	J	9.00E-03		MG/KG	1-SB25	5/31	0.0012 - 1.4	9.00E-03	N/A	1.8E-03 C	N/A	N/A	YES	ASL
56-55-3	Benzo(a)anthracene	7.71E-03		4.50E-01		MG/KG	1-SB16	6/31	0.052 - 26	4.50E-01	N/A	8.7E-01 C	N/A	N/A	NO	BSL
50-32-8	Benzo(a)pyrene	6.40E-02		1.10E+00		MG/KG	1-SB6	7/31	0.052 - 26	1.10E+00	N/A	8.7E-02 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)fluoranthene	1.60E-01		9.70E-01		MG/KG	1-SB16	4/31	0.052 - 26	9.70E-01	N/A	8.7E-01 C	N/A	N/A	YES	ASL
191-24-2	Benzo(ghi)perylene	7.20E-02		8.80E-01		MG/KG	1-SB16	4/31	0.052 - 26	8.80E-01	N/A	6.8E+01 N	N/A	N/A	NO	BSL
207-08-9	Benzo(k)fluoranthene	1.50E-01		6.90E-01		MG/KG	1-SB6	3/31	0.052 - 26	6.90E-01	N/A	8.7E+00 C	N/A	N/A	NO	BSL
7440-41-7	Beryllium	7.00E-02	J	5.60E-01	B	MG/KG	1-SB14	11/12	0.05 - 0.05	5.60E-01	N/A	1.6E+01 N	N/A	N/A	NO	BSL
117-81-7	bis(2-ethylhexyl)Phthalate	4.80E-01	J	2.80E+00		MG/KG	1-SB9 FD	1/3	0.47 - 2.7	4.80E-01	N/A	4.6E+01 C	N/A	N/A	NO	BSL
7440-43-9	Cadmium	4.20E-01	J	1.30E+00		MG/KG	1-SS02, 1-SB13 FD	3/12	0.66 - 0.77	1.30E+00	N/A	5.5E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	6.34E+01	B	1.08E+03		MG/KG	1-SB8	10/10	- - -	1.08E+03	N/A	N/A	N/A	N/A	NO	NUT
75-15-0	Carbon Disulfide	2.00E-03	J	1.00E-02	J	MG/KG	1-SB7	7/25	0.005 - 1.4	1.00E-02	N/A	1.9E+00 N	N/A	N/A	NO	BSL
7440-47-3	Chromium, Total	2.90E+00		4.20E+00		MG/KG	1-SB9 FD	12/12	- - -	3.43E+01	N/A	4.2E+00 N	N/A	N/A	YES	ASL
218-01-9	Chrysene	1.42E-02	J	7.10E-01		MG/KG	1-SB16	6/31	0.052 - 26	7.10E-01	N/A	8.7E+01 C	N/A	N/A	NO	BSL
7440-48-4	Cobalt	1.10E+00	B	4.80E+00		MG/KG	1-SB9 FD	10/12	0.8 - 0.82	3.90E+00	N/A	4.7E+02 N	N/A	N/A	NO	BSL
7440-30-8	Copper	7.60E-01	B	7.08E+01		MG/KG	1-SB10	12/12	- - -	7.08E+01	N/A	3.1E+02 N	N/A	N/A	NO	BSL
72-54-8	DDD	1.80E-02		1.80E-02		MG/KG	1-SB7	1/3	0.0017 - 0.0047	1.80E-02	N/A	2.7E+00 C	N/A	N/A	NO	BSL
72-55-9	DDE	7.30E-04	J	2.00E-03		MG/KG	1-SB7	2/3	0.00088 - 0.00088	2.00E-03	N/A	1.9E+00 C	N/A	N/A	NO	BSL
50-29-3	DDT	3.40E-03		3.40E-03		MG/KG	1-SB7	1/3	0.0017 - 0.0047	3.40E-03	N/A	1.2E+00 C	N/A	N/A	NO	BSL
53-70-3	Dibenz(a,h)anthracene	2.60E-01		2.60E-01		MG/KG	1-SB16	1/31	0.052 - 26	2.60E-01	N/A	8.7E-02 C	N/A	N/A	YES	ASL
132-64-9	Dibenzofuran	2.00E-01	J	1.20E+00	J	MG/KG	1-SB7	2/3	0.47 - 0.47	1.20E+00	N/A	7.7E-01 N	N/A	N/A	YES	ASL
540-59-0	1,2-Dichloroethene (total)	2.00E-03	L	2.00E-03		MG/KG	OW01-SS09	1/1	- - -	2.00E-03	N/A	3.7E-02 N	N/A	N/A	NO	BSL
84-66-2	Diethylphthalate	4.80E-02	J	4.80E-02	J	MG/KG	OW01-SS09	1/1	- - -	4.80E-02	N/A	4.5E+01 N	N/A	N/A	NO	BSL
100-41-4	Ethylbenzene	1.00E-03	J	6.40E+00		MG/KG	1-SB12	10/31	0.0012 - 0.73	6.40E+00	N/A	1.5E+00 N	N/A	N/A	YES	ASL
206-44-0	Fluoranthene	6.80E-02		4.70E-01		MG/KG	1-SS2	6/31	0.052 - 26	4.70E-01	N/A	3.1E+02 N	N/A	N/A	NO	BSL
86-73-7	Fluorene	3.50E-02	J	7.30E-01	J	MG/KG	1-SB7	3/31	0.052 - 26	7.30E-01	N/A	1.4E+01 N	N/A	N/A	NO	BSL
34465-46-8	Hexachlorinated Dibenzofurans (total)	3.00E-07	C	3.00E-07	C	MG/KG	1-SB7	1/2	0.00000001 - 0.00000001	3.00E-07	N/A	1.0E-04 C	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-c,d)pyrene	1.10E-01		1.10E+00		MG/KG	1-SB16	5/31	0.052 - 26	1.10E+00	N/A	8.7E-01 C	N/A	N/A	YES	ASL
7439-89-6	Iron	3.36E+02		1.73E+04		MG/KG	1-SS2	10/10	- - -	1.73E+04	N/A	2.3E+03 N	N/A	N/A	YES	ASL

Table 2.5

Occurance, Distribution, and Selection of Chemicals of Potential Concern

NAS - Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7439-92-1	Lead	7.80E-01		1.38E+02		MG/KG	1-SB7	12/12	- - -	1.38E+02	N/A	N/A	4.0E+02	AL	NO	BSL
7439-95-4	Magnesium	6.50E+01	B	1.23E+03		MG/KG	1-SB15	10/10	- - -	1.23E+03	N/A	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	2.30E+00	B	4.01E+01		MG/KG	1-SB10	10/10	- - -	4.01E+01	N/A	9.5E+01 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	4.00E-02	J	2.30E-01		MG/KG	1-SS2	11/12	0.4 - 0.4	2.30E-01	N/A	2.3E+00 N	N/A	N/A	NO	BSL
78-93-3	Methyl ethyl ketone (2-Butanone)	7.20E-02		7.20E-02		MG/KG	1-SS1	1/13	0.012 - 2.9	7.20E-02	N/A	7.9E-01 N	N/A	N/A	NO	BSL
75-09-2	Methylene Chloride	3.00E-03	JB	7.20E-01	B	MG/KG	1-SB13	24/25	0.73 - 0.73	7.20E-01	N/A	1.9E-02 C	N/A	N/A	YES	ASL
91-20-3	Naphthalene	1.30E-01		3.10E+01		MG/KG	1-SB12	5/31	0.052 - 28	3.10E+01	N/A	1.5E-02 N	N/A	N/A	YES	ASL
7440-02-0	Nickel	3.80E+00	B	1.32E+01		MG/KG	1-SB9 FD	10/12	0.66 - 1.3	1.17E+01	N/A	1.6E+02 N	N/A	N/A	NO	BSL
11097-69-1	PCB-1254	7.00E-03	J	1.40E-01		MG/KG	1-SS1	4/12	0.017 - 0.047	1.40E-01	N/A	1.6E-02 N	N/A	N/A	YES	ASL
11096-82-5	PCB-1260	1.40E-02	J	1.40E-02	J	MG/KG	1-SB10	1/12	0.018 - 0.047	1.40E-02	N/A	3.2E-01 C	N/A	N/A	NO	BSL
85-01-8	Phenanthrene	7.50E-02		6.40E-01	J	MG/KG	1-SB9 FD	6/31	0.0478 - 26	5.20E-01	N/A	6.8E+01 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	1.79E+02	B	7.82E+02	B	MG/KG	1-SB14	9/10	164 - 164	7.82E+02	N/A	N/A	N/A	N/A	NO	NUT
129-00-0	Pyrene	4.43E-03	J	5.20E-01		MG/KG	1-SB16	7/31	0.052 - 26	5.20E-01	N/A	6.8E+01 N	N/A	N/A	NO	BSL
7782-49-2	Selenium	6.20E-01	B	8.70E-01	B	MG/KG	1-SS2	4/12	0.41 - 0.48	8.70E-01	N/A	1.9E+00 N	N/A	N/A	NO	BSL
7440-23-5	Sodium	1.69E+02	B	4.35E+02	B	MG/KG	1-SB15	9/10	28.9 - 28.9	4.35E+02	N/A	N/A	N/A	N/A	NO	NUT
100-42-5	Styrene	5.00E-03	J	1.10E-02		MG/KG	1-SB19	2/25	0.005 - 1.4	1.10E-02	N/A	5.7E+00 N	N/A	N/A	NO	BSL
7440-31-5	Tin	4.30E+00	B	2.75E+01	B	MG/KG	1-SB7	3/3	- - -	2.75E+01	N/A	4.7E+03 N	N/A	N/A	NO	BSL
108-88-3	Toluene	2.00E-03	J	6.80E+00		MG/KG	1-SB12	14/31	0.0012 - 0.73	6.80E+00	N/A	8.8E-01 N	N/A	N/A	YES	ASL
7440-62-2	Vanadium	1.60E+00		5.22E+01		MG/KG	1-SB14	12/12	- - -	5.22E+01	N/A	5.5E+01 N	N/A	N/A	NO	BSL
1330-20-7	Xylenes, total	2.00E-03	J	4.40E+01		MG/KG	1-SB12	16/31	0.0024 - 0.73	4.40E+01	N/A	1.7E+01 N	N/A	N/A	YES	ASL
7440-66-6	Zinc	6.10E+00		2.57E+02		MG/KG	1-SB7	11/12	2.4 - 2.4	2.57E+02	N/A	1.4E+03 N	N/A	N/A	NO	BSL

[1] *Minimum/Maximum detected concentrations in soil.*

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] The most conservative value of residential RBC versus soil screening level, DAF 20; Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III.
Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1)
RBC value for 2-methylnaphthalene used for 1-methylnaphthalene.
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for benzo(g,h,i)perylene and phenanthrene.
RBC value for chlordane used as surrogate for alpha-chlordane.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[5] Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
B (inorganics) = Below contract required detection limit but above instrument detection limit
B (organics) = Also detected in associated field, trip, or laboratory blank

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Medium-Specific Exposure Concentration Summary

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,1,2-Trichloroethane	MG/KG	2.00E-03	*	2.00E-03	L	MG/KG	2.00E-03	Max*	W-Test (5)	2.00E-03	Max*	W-Test (5)
Aluminum	MG/KG	1.20E+04	*	1.57E+04		MG/KG	1.57E+04	Max*	W-Test (5)	1.57E+04	Max*	W-Test (5)
Antimony	MG/KG	2.73E+00	*	5.90E+00		MG/KG	5.90E+00	Max*	W-Test (5)	5.90E+00	Max*	W-Test (5)
Arsenic	MG/KG	2.43E+00	*	3.50E+00		MG/KG	3.50E+00	Max*	W-Test (5)	3.50E+00	Max*	W-Test (5)
Benzo(a)pyrene	MG/KG		1.45E-01	2.30E-01		MG/KG	1.45E-01	Max*	W-Test (5)	1.45E-01	Max*	W-Test (5)
Chromium, Total	MG/KG	1.53E-03	*	2.06E+01		MG/KG	2.06E+01	Max*	W-Test (5)	2.06E+01	Max*	W-Test (5)
Iron	MG/KG	8.81E+03	*	1.73E+04		MG/KG	1.73E+04	Max*	W-Test (5)	1.73E+04	Max*	W-Test (5)
Methylene Chloride	MG/KG	1.72E-02	*	2.80E-02		MG/KG	2.80E-02	Max*	W-Test (5)	2.80E-02	Max*	W-Test (5)
Napthalene	MG/KG	5.98E-02	1.13E-01	1.30E-01		MG/KG	1.13E-01	Max	W-Test (2)	1.13E-01	Max	W-Test (2)
PCB-1254	MG/KG	5.78E-02	*	1.40E-01		MG/KG	1.40E-01	Max*	W-Test (5)	1.40E-01	Max*	W-Test (5)

* - Maximum concentration conservatively used as exposure point concentration because of small sample size.

Full statistics for data included in Appendix C.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

(5) Maximum concentration used because of the small sample size.

Table 3.2

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	MG/KG	2.03E+00	4.81E+00	5.30E+00		MG/KG	5.30E+00	Max	W - Test (2)	5.30E+00	Max	W - Test (2)

Full statistics for data included in Appendix C.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

Table 3.3

Medium-Specific Exposure Point Concentration Summary

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,3,5-Trimethylbenzene	UG/L	1.44E+00	2.20E+00	5.00E+00	L	UG/L	2.47E+00	95% UCL-T	W - Test (1)	2.47E+00	95% UCL-T	W - Test (1)
Benzene	UG/L	1.44E+00	2.15E+00	6.00E+00	J	UG/L	2.31E+00	95% UCL-T	W - Test (1)	2.31E+00	95% UCL-T	W - Test (1)
Benzo(a)anthracene	UG/L	9.25E-02	1.69E-01	2.30E-01		UG/L	2.30E-01	Max	W - Test (2)	2.30E-01	Max	W - Test (2)
Benzo(a)pyrene	UG/L	8.14E-01	1.57E+00	2.00E-01		UG/L	2.00E-01	Max	W - Test (2)	2.00E-01	Max	W - Test (2)
Naphthalene	UG/L	3.11E+01	5.79E+01	2.08E+02		UG/L	2.08E+02	Max	W - Test (2)	2.08E+02	Max	W - Test (2)
n-Propylbenzene	UG/L	2.26E+00	3.49E+00	1.00E+01		UG/L	5.23E+00	95% UCL-T	W - Test (1)	5.23E+00	95% UCL-T	W - Test (1)

Full statistics for data included in Appendix C.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

Table 3.4

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,1,2-Trichloroethane	MG/KG	**	**	2.00E-03		MG/KG	2.00E-03	Max**	W-Test (5)	2.00E-03	Max**	W-Test (5)
1-Methylnaphthalene	MG/KG	2.99E+00	5.15E+00	3.00E+01		MG/KG	3.00E+01	Max	W-Test (2)	3.00E+01	Max	W-Test (2)
2-Methylnaphthalene	MG/KG	7.64E+00	1.22E+01	4.50E+01		MG/KG	4.50E+01	Max	W-Test (2)	4.50E+01	Max	W-Test (2)
Acetone	MG/KG	1.00E-01	6.77E-01	2.30E+00	B	MG/KG	2.30E+00	Max	W-Test (2)	2.30E+00	Max	W-Test (2)
Aluminum	MG/KG	8.21E+03	1.23E+04	2.20E+04		MG/KG	2.20E+04	Max	W-Test (2)	2.20E+04	Max	W-Test (2)
Antimony	MG/KG	2.87E+00	4.70E+00	1.30E+01	B	MG/KG	7.46E+00	95% UCL-T	W-Test (1)	7.46E+00	95% UCL-T	W-Test (1)
Arsenic	MG/KG	1.45E+00	1.96E+00	3.50E+00		MG/KG	2.41E+00	95% UCL-T	W-Test (1)	2.41E+00	95% UCL-T	W-Test (1)
Benzene	MG/KG	1.00E-01	1.62E-01	9.00E-03		MG/KG	9.00E-03	Max	W-Test (2)	9.00E-03	Max	W-Test (2)
Benzo(a)pyrene	MG/KG	1.88E+00	3.05E+00	1.10E+00		MG/KG	1.10E+00	Max	W-Test (2)	1.10E+00	Max	W-Test (2)
Benzo(b)fluoranthene	MG/KG	1.88E+00	3.05E+00	9.70E-01		MG/KG	9.70E-01	Max	W-Test (2)	9.70E-01	Max	W-Test (2)
Chromium, total	MG/KG	1.49E+01	1.93E+01	4.20E+00		MG/KG	2.44E+01	95% UCL-T	W-Test (1)	2.44E+01	95% UCL-T	W-Test (1)
Dibenz(a,h)anthracene	MG/KG	1.84E+00	3.01E+00	2.60E-01		MG/KG	2.60E-01	Max	W-Test (2)	2.60E-01	Max	W-Test (2)
Dibenzofuran	MG/KG	**	**	1.20E+00		MG/KG	1.20E+00	Max**	W-Test (5)	1.20E+00	Max**	W-Test (5)
Ethylbenzene	MG/KG	4.62E-01	8.74E-01	6.40E+00		MG/KG	6.40E+00	Max	W-Test (2)	6.40E+00	Max	W-Test (2)
Indeno(1,2,3-c,d)pyrene	MG/KG	1.88E+00	3.05E+00	1.10E+00		MG/KG	1.10E+00	Max	W-Test (2)	1.10E+00	Max	W-Test (2)
Iron	MG/KG	6.65E+03	9.95E+03	1.73E+04		MG/KG	1.73E+04	Max	W-Test (2)	1.73E+04	Max	W-Test (2)
Methylene Chloride	MG/KG	1.24E-01	2.00E-01	7.20E-01		MG/KG	4.81E-01	95% UCL-T	W-Test (4)	4.81E-01	95% UCL-T	W-Test (4)
Napthalene	MG/KG	3.64E+00	5.97E+00	3.10E+01		MG/KG	3.10E+01	Max	W-Test (2)	3.10E+01	Max	W-Test (2)
PCB-1254	MG/KG	2.40E-02	4.32E-02	1.40E-01		MG/KG	4.32E-02	95% UCL-N	W-Test (3)	4.32E-02	95% UCL-N	W-Test (3)
Toluene	MG/KG	2.99E-01	6.71E-01	6.80E+00		MG/KG	1.66E+00	95% UCL-T	W-Test (4)	1.66E+00	95% UCL-T	W-Test (4)
Xylenes, total	MG/KG	2.47E+00	4.97E+00	4.40E+01		MG/KG	4.40E+01	Max	W-Test (2)	4.40E+01	Max	W-Test (2)

* Subsurface soil only

** - Maximum concentration conservatively used as exposure point concentration because of small sample size.

Full statistics for data included in Appendix C

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

(5) Maximum concentration used because of the small sample size.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.32	EPA, 1997	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for utility workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	-	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1): Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,375	EPA, 1997	3,351	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

* Only subsurface soil.

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for soccer players.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Surface area based on 25% of total body surface area for the male child aged 15-18 years for the RME. The CT is based on 25% of the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA., 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

* Only subsurface soil.

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Medium: Air
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

* Only subsurface soil.

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/PEF + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

* Only subsurface soil.

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-SW	Ingestion Rate of Surface Water	l/hour	0.08	EPA, 1989	0.08	(2)	CSW x IR-SW x ET x EF x ED x CF1 x
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	CSW x SA x PC x CF1 x ET x EF x ED x
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	CF2 x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1): Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

Skin surface area in contact with surface water based on contact while wading. Assumed 30 percent of total surface area of 20,000 cm^2 for the RME and 30% of the 17,000 cm^2 for the CT.

Workbook: Tab4_SWMU1.XLS
Worksheet: t47

01/04/2001

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-SW	Ingestion Rate of Surface Water	l/hour	0.08	EPA, 1989	0.08	(2)	CSW x IR-SW x ET x EF x ED x CF1 x
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,375	EPA, 1997	3,351	EPA, 1997	CSW x SA x PC x CF1 x ET x EF x ED x
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	CF2 x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Not available, used RME value.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA. Surface area based on 25% of total body surface area for the male child aged 15-18 years for the RME. The CT is based on 25% of the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-Sed	Ingestion Rate of Sediment	mg/day	100	EPA, 1991	50	EPA, 1993	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,000	EPA, 1997	CSed x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.3	EPA, 1992	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

Skin surface area in contact with surface water based on contact while wading. Assumed 30 percent of total surface area of 20,000 cm^2 for the RME and 30% of the 17,000 cm^2 for the CT.

TABLE 4.10

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-Sed	Ingestion Rate of Sediment	mg/day	100	EPA, 1991	50	EPA, 1993	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,375	EPA, 1996	3,351	EPA, 1996	CSed x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.1	EPA, 1992	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Surface area based on 25% of total body surface area for the male child aged 15-18 years for the RME. The CT is based on 25% of the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

TABLE 4.11

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	2	EPA, 1997	1.4	EPA, 1993	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.2	EPA, 1995	0.2	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x {sqrt((6 x t x ET)/3.1415)}
	SA	Skin Surface Area Available for Contact	cm^2	20,000	EPA, 1992	17,000	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with groundwater are based on ranges. For total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2; the mean value of 20,000 cm^2 is used for the RME value and 17,000 cm^2 is used for the CT value

TABLE 4.12

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	1	EPA, 1997	1	(1)	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.33	EPA, 1992	0.33	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x (sqrt{(6 x t x ET)/3.1415})
	SA	Skin Surface Area Available for Contact	cm^2	7,930	EPA, 1992	6,980	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x {(1 + 3xB)/(1+B)}
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991. Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area for th RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1999). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.13

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	Inorganics: DAevent (mg/cm2-event) =
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t*	Time to Reach Steady-state	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	
	B	Ratio of Permeability of Stratum Corneum to Epidermis	dimensionless	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	8	(1)	4	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	x CF1 x CF2
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	EPA, 1991	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on construction activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with groundwater based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or 5,100 cm^2.

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	InhExp	Inhalation Exposure per Shower	mg/kg-shower	see Table ----		see Table ----	- -	Foster & Chrostowski Shower Inhalation Model for InhExp
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	Chronic Daily Intake (CDI) (mg/kg-day) =
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	InhExp x EF x ED x 1/AT
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

TABLE 4.15

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Air concentration	mg/m^3	see Table --		see Table --		Two-Film Volatilization Model for CA
	IN	Inhalation Rate	m^3/hour	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	CA x IN x ET x EF x ED x 1/BW x 1/AT
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

TABLE 4.16

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1997	5,000	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

* Surface and subsurface soil combined.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285 6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult (25% of 23,000 cm^2 for RME and 24% of 20,000 cm^2 for CT).

TABLE 4.17

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	200	EPA, 1991	100	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	2,379	EPA, 1997	2,094	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

* Surface and subsurface soil combined.
(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for soccer players.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Skin surface area for th RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1999). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.18

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	480	EPA, 1991	480	(1)	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1992	5,100	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.24	EPA, 1997	0.24	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

* Surface and subsurface soil combined.

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for construction workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Skin surface area in contact with soil based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or 5,100 cm^2.

TABLE 4.19

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	24	(1)	24	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA,1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

* Surface and subsurface soil combined

(1) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.20

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.5	EPA, 1999	0.5	EPA, 1999	
	ET	Exposure Time	hr/day	24	(2)	24	(2)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

* Surface and subsurface soil combined.

(1) Not available, used RME value.

(2) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III, Risk-based Concentration Table.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.21

VALUES USED FOR DAILY INTAKE CALCULATIONS

NAS Oceana - SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	--	see Table ---	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	--	see Table ---	--	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	calc	(1)	calc	(1)	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

* Surface and subsurface soil combined.

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

Calc. (1): Calculated in Appendix--- Section Generation of Fugitive Dust During Construction Activites.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 1

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
1,3,5-Trimethylbenzene	Chronic	5.0E-02	mg/kg-day	0.8	4.0E-02	mg/kg-day	N/A	N/A	Reg III RBC:N/A	10/05/2000
1,1,2-Trichloroethane	Chronic	4.0E-03	mg/kg-day	0.8	3.2E-03	mg/kg-day	Blood	1000	IRIS	07/02/1998
	Subchronic	4.0E-02	mg/kg-day	0.8	3.2E-02	mg/kg-day	Blood	100	HEAST	07/08/1998
2-Methylnaphthalene	Chronic	2.0E-02	mg/kg-day	0.8	1.6E-02	mg/kg-day	N/A	N/A	Reg III RBC:N/A	10/05/2000
	Subchronic	N/A								
Acetone	Chronic	1.0E-01	mg/kg-day	0.83	8.3E-02	mg/kg-day	Liver, Kidney	1000	IRIS	02/28/2000
	Subchronic	1.0E+00	mg/kg-day	0.83	8.3E-01	mg/kg-day	Liver, Kidney	100	HEAST	02/28/2000
Aluminum	Chronic	1.0E+00	mg/kg-day	0.27	2.7E-01	mg/kg-day	CNS	100/1	Provisional RfD, ECAO	01/05/95
Antimony	Chronic	4.0E-04	mg/kg-day	0.1	4.0E-05	mg/kg-day	Blood, Whole Body	1000/1	IRIS	01/00/00
	Subchronic	4.0E-04	mg/kg-day	0.1	4.0E-05	mg/kg-day	Blood	1000/1	HEAST	07/00/97
Aroclor 1254	Chronic	2.0E-05	mg/kg-day	0.89	1.8E-05	mg/kg-day	Whole body	300/1	IRIS	01/00/00
	Subchronic	5.0E-05	mg/kg-day	0.89	4.5E-05	mg/kg-day	Immune toxicity	100	HEAST	07/00/97
Arsenic	Chronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin, vascular	3/1	IRIS	01/00/00
	Subchronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin	3/1	HEAST	07/00/97
Benzene	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	N/A	N/A	Reg III RBC:N/A	1[illegible]/00/99
Chromium VI	Chronic	3.0E-03	mg/kg-day	0.01	3.0E-05	mg/kg-day	NOAEL	300/3	IRIS	01/00/00
	Subchronic	2.0E-02	mg/kg-day	0.01	2.0E-04	mg/kg-day		100/1	HEAST	07/00/97
Dibenzofuran	Chronic	4.0E-03	mg/kg-day	0.7	2.8E-03	mg/kg-day	Kidney	3000	NCEA	08/29/1994
	Subchronic	N/A								
Ethylbenzene	Chronic	1.0E-01	mg/kg-day	0.92	9.2E-02	mg/kg-day	Liver & Kidne	1000	IRIS	07/02/1998
	Subchronic	N/A								
Iron	Chronic	3.0E-01	mg/kg-day	0.2	6.0E-02	mg/kg-day	Blood, Liver, GI	N/A	Reg III RBC:N/A	10/00/99
Methylene chloride	Chronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100	IRIS	07/02/1998
	Subchronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100	HEAST	07/08/1998
Naphthalene	Chronic	2.0E-02	mg/kg-day	0.8	1.6E-02	mg/kg-day	Whole Body	3000/1	IRIS	08/22/2000
	Subchronic	N/A								
n-propylbenzene	Chronic	1.0E-02	mg/kg-day	0.8	8.0E-03	mg/kg-day	N/A	N/A	Reg III RBC:N/A	10/00/99
Toluene	Chronic	2.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	Liver, Kidney	1000	IRIS	02/28/2000
	Subchronic	2.0E+00	mg/kg-day	1	2.0E+00	mg/kg-day	Liver, Kidney	100	HEAST	02/28/2000

T[illegible] 5.1

NON-CANCER TOXI[illegible] ATA -- ORAL/DERMAL

NAS Oceana-SWMU 1

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Xylenes	Chronic	2.0E+00	mg/kg-day	0.8	1.8E+00	mg/kg-day	Whole Body	100	IRIS	02/28/2000

N/A = Not Applicable or Not Available. IRIS indicates that calculations of dermal risks may not be appropriate for this chemical.

(1) Refer to RAGS, Part A. Source is EPA Region III fax from Linda Watson dated 06/23/99.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

NCEA = National Center for Environmental Assessment

(2) Provide equation for derivation in text.

(3) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

RESP = Respiratory System

CNS = Central Nervous System

NOAEL = No adverse effect level

GI = Gastrointestinal system

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 1

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
1,1,2-Trichloroethane	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
1,3,5-Trimethylbenzene	Chronic	6.0E-03	mg/m3	1.7E-03	mg/kg-day	N/A	N/A	Reg III RBC:N/A	10/05/2000
Acetone	N/A	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aluminum	Chronic	3.5E-03	mg/m3	1.0E-03	mg/kg-day	N/A	N/A	NA:Reg. III RBC:N/A	10/00/99
Antimony	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aroclor 1254	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Arsenic	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzene	Chronic	6.0E-03	mg/m3	1.7E-03	mg/kg-day	N/A	N/A	NA:Reg. III RBC:N/A	N/A
Chromium VI	Chronic	1.0E-04	mg/m3	2.9E-05	mg/kg-day	Lung	300/1	IRIS:IRIS:IRIS	01/00/00
Ethylbenzene	Chronic	1.0E+00	mg/m^3	2.90E-01	mg/kg-day	Development	300	IRIS	07/02/1998
Iron	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Methylene chloride	Chronic	3.0E+00	mg/m^3	8.60E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
	Subchronic	3.0E+00	mg/m^3	8.60E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
Naphthalene	Chronic	3.2E-03	mg/m^3	9.00E-04	mg/kg-day	Respiratory System	3000/1	IRIS	08/22/2000
n-propylbenzene	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Toluene	Chronic	4.0E-01	mg/m^3	1.1E-01	mg/kg-day	Nervous System	3.0E+02	IRIS	3.7E+04

N/A = Not Applicable

(1) For chemicals that have Inhalation RfCs, Inhalation RfC x 0.286 = Adjusted Inhalation RfD

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

HEAST(3) = Health Effects Assessment Summary Tables, Alternate Methods

HEAST(4)= Health Effects Assessment Summary Tables, Withdrawn

NCEA = National Center for Environmental Assessment

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 1

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	EPA Carcinogen Group	Source (Oral Slope Factor)	Date (2) (MM/DD/YY)
Aroclor 1254	2.0E+00	0.89	2.2E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Arsenic	1.5E+00	0.95	1.6E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzene	2.9E-02	1.00	2.9E-02	(mg/kg-day)-1	A	IRIS	01/00/00
Benzo(a)pyrene	7.3E+00	N/A	N/A	(mg/kg-day)-1	B2	IRIS	01/00/00
Benzo(a)anthracene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Benzo(b)fluoranthene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Chromium VI	N/A	0.01	N/A	(mg/kg-day)-1	A	IRIS	01/00/00
Dibenz(a,h)anthracene	7.3E+00	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Indeno(1,2,3-c,d)pyrene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Methylene chloride	7.5E-03	80%	9.4E-03	(mg/kg-day)-1	B2	IRIS	07/08/1998

N/A-Not available

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

EPA Carcinogen Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

(1) Provide equation for derivation in text. Source is EPA Region III fax from Linda Watson dated 06/23/97.

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SMWU 1

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guidance Description	Source (Unit Risk or Inhal Slope Factor)	Date (2) (MM/DD/YY)
1,1,2-Trichloroethane	1.6E-05	$(ug/m3)^{-1}$	3500	5.6E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	06/13/1998
Aroclor 1254	N/A	$(ug/m3)^{-1}$	N/A	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Arsenic	4.3E-03	$(ug/m3)^{-1}$	3500	1.5E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzene	7.8E-06	$(ug/m3)^{-1}$	3500	2.7E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzo(a)pyrene	N/A	$(ug/m3)^{-1}$	N/A	3.1E+00	$(mg/kg\text{-}day)^{-1}$	B2	Reg 3	10/00/99
Benzo(a)anthracene	N/A	$(ug/m3)^{-1}$	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	N/A	N/A
Benzo(b)fluoranthene	N/A	$(ug/m3)^{-1}$	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	Reg 3	10/00/99
Chromium VI	1.2E-02	$(ug/m3)^{-1}$	3500	4.1E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Dibenz(a,h)anthracene	N/A	$(ug/m3)^{-1}$	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	Reg 3	10/00/99
Indeno(1,2,3-c,d)pyrene	N/A	$(ug/m3)^{-1}$	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	Reg 3	10/00/99
Methylene Chloride	4.7E-07	$(ug/m3)^{-1}$	3500	1.7E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	10/00/99

IRIS = Integrated Risk Information System

Reg 3 = EPA Region III

N/A = Not Available

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor = 70kg x 1/20m3/day x 1000ug/mg

(2) For IRIS values, provide the date IRIS was searched.
For RBC values, provide the date of last change in the Tables.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 7.1a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.0E-09	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.9E-07
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	1.5E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.5E-02
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	5.8E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	1.4E-02
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	2.0E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.7E-03
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.7E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	5.6E-02
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	2.7E-08	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.6E-07
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	1.1E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	5.5E-06
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	1.4E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	6.8E-03
	(Total)												1.1E-01
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.8E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.7E-09
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.9E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.1E-02
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	1.1E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	2.7E-02
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	2.0E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	7.1E-03
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	2.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	3.7E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.2E-01
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.1E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	5.2E-02
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	1.5E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	3.2E-07
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	2.1E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	1.3E-05
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	1.5E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	8.6E-03
	(Total)												2.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	3.4E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.1b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	9.8E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m^3	R	7.7E-07	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	7.7E-04
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m^3	R	2.9E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m^3	R	1.7E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m^3	R	7.1E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m^3	R	1.0E-09	mg/kg-day	2.9E-05	mg/kg-day	1.0E-04	mg/m^3	3.5E-05
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	8.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m^3	R	1.4E-12	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	1.6E-12
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m^3	R	5.6E-12	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	6.2E-09
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m^3	R	6.9E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												8.1E-04
												Total Hazard Index Across All Exposure Routes/Pathways	8.1E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.2a
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	4.1E-10	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.0E-07
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	3.2E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	3.2E-03
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	1.2E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	3.0E-03
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	7.1E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.4E-03
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	2.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	4.2E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.4E-03
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.5E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.2E-02
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	5.7E-09	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	9.5E-08
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	2.3E-08	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.1E-06
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	2.8E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	1.4E-03
	(Total)												2.3E-02
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.4E-12	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	7.4E-10
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	3.7E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.4E-03
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	1.4E-07	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.5E-03
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	2.6E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	9.3E-04
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	3.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	4.9E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.6E-02
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	4.1E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	6.8E-03
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	2.0E-09	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	4.1E-08
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	2.7E-08	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	1.7E-06
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	2.0E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	1.1E-03
	(Total)												3.0E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.3E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.2b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	4.6E-15	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m3	R	3.6E-08	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	3.6E-05
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m3	R	1.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m3	R	8.1E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m3	R	3.3E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m3	R	4.7E-11	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	1.6E-06
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m3	R	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m3	R	6.4E-14	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	7.5E-14
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m3	R	2.6E-13	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	2.9E-10
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m3	R	3.2E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												3.8E-05
												Total Hazard Index Across All Exposure Routes/Pathways	3.8E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABL[illegible]a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	5.6E-10	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.4E-07
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	4.4E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	4.4E-03
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	1.6E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	4.1E-03
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	9.8E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.3E-03
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	5.8E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.9E-03
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	4.8E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.6E-02
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	7.8E-09	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.3E-07
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	3.2E-08	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.6E-06
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	3.9E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.0E-03
	(Total)												3.2E-02
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.3E-12	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	4.2E-10
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.1E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	7.8E-04
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	7.9E-08	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	2.0E-03
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	1.5E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	5.3E-04
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	1.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	2.8E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	9.2E-03
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.3E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	3.9E-03
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	1.1E-09	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	2.4E-08
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	1.5E-08	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	9.5E-07
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	1.1E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	6.3E-04
	(Total)												1.7E-02
Total Hazard Index Across All Exposure Routes/Pathways													4.9E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.3b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	6.3E-15	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m3	R	5.0E-08	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	5.0E-05
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m3	R	1.9E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m3	R	1.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m3	R	4.6E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m3	R	6.5E-11	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	2.17E-06
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m3	R	5.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m3	R	8.9E-14	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	1.03E-13
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m3	R	3.6E-13	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	3.97E-10
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m3	R	4.4E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												5.2E-05

Total Hazard Index Across All Exposure Routes/Pathways 5.2E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 7.4 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	1.1E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.6E-03
	(Total)												3.6E-03
Dermal Absorption	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	6.6E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	2.3E-03
	(Total)												2.3E-03
												Total Hazard Index Across All Exposure Routes/Pathways	5.9E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic.

N/A - not applicable.

TABLE 7.5 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	4.9E-03
	(Total)												4.9E-03
Dermal Absorption	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	2.3E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	8.0E-04
	(Total)												8.0E-04
												Total Hazard Index Across All Exposure Routes/Pathways	5.7E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic.

N/A - not applicable.

TABLE 7.6a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	6.8E-05	mg/kg-day	5.0E-02	mg/kg-day	N/A	N/A	1.4E-03
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	6.3E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.1E-02
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	6.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	5.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	5.7E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.8E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	1.4E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.4E-02
	(Total)												3.2E-01
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	6.3E-11	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	1.6E-09
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	8.4E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.8E-03
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	9.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	3.5E-03	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.2E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	1.6E-08	mg/kg-day	8.0E-03	mg/kg-day	N/A	N/A	2.0E-06
	(Total)												2.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	5.5E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic value used.
Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.

TABLE 7.6b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation													
	1,3,5-Trimethylbenzene	2.47E+00	µg/l	1.35E-04	mg/kg/shower	R	1.3E-04	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	7.6E-02
	Benzene	2.31E+00	µg/l	1.50E-04	mg/kg/shower	R	1.4E-04	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	8.4E-02
	Benzo(a)anthracene	2.30E-01	µg/l	1.63E-07	mg/kg/shower	R	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	4.61E-08	mg/kg/shower	R	4.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	Naphthalene	2.08E+02	µg/l	8.32E-03	mg/kg/shower	R	8.0E-03	mg/kg-day	8.6E-04	mg/kg-day	3.2E-03	mg/m^3	9.3E+00
	n-Propylbenzene	5.23E+00	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	(Total)												9.5E+00
												Total Hazard Index Across All Exposure Routes/Pathways	9.5E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic Inhalation.
N/A - Not applicable.

Table 7.6c RME
Calculation of DAevent (Adult)

NAS Oceana-SWMU 1

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
1,3,5-Trimethylbenzene	2.47E+00	µg/l	3.44E-08	4.7E+00	0.2	2.28E-13
Benzene	2.31E+00	µg/l	2.10E-02	2.60E-01	0.2	3.06E-08
Benzo(a)anthracene	2.30E-01	µg/l	8.10E-01	2.20E+00	0.2	3.42E-07
Benzo(a)pyrene	2.00E-01	µg/l	1.20E+00	2.90E+00	0.2	5.05E-07
Naphthalene	2.08E+02	µg/l	6.90E-02	5.30E-01	0.2	1.29E-05
n-Propylbenzene	5.23E+00	µg/l	4.09E-06	4.7E+00	0.2	5.74E-11

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.
N/A - not applicable.
1 From EPA Dermal Guidance 1992, table 5-7
2 From EPA Dermal Guidance 1992, table 5-8

Table 7.6d RME
Inhalation Exposure Concentrations from Foster and Chrostowski Shower Model
NAS Oceana - SWMU 1

Chemical	Exposure Point Concentration Cwo (µg/l)	Molecular weight (HH) (g/mole)	Henry's Law dimensionless	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl(VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/l)	S (µg/m^3-min)	Calculated Inhalation Exposure (Einh) (mg/kg/shower)
1,3,5-Trimethylbenzene	2.5E+00	120	1.61E-01	3.93E-03	1.16E+03	1.21E+01	1.14E+01	1.54E+01	9.92E-01	6.61E+00	1.35E-04
Benzene	2.3E+00	78	0.228	5.57E-03	1.44E+03	1.50E+01	1.44E+01	1.94E+01	1.10E+00	7.34E+00	1.50E-04
Benzo(a)anthracene	2.3E-01	228	1.37E-04	3.35E-06	8.43E+02	8.79E+00	1.16E-01	1.57E-01	1.20E-03	7.99E-03	1.63E-07
Benzo(a)pyrene	2.0E-01	252	4.63E-05	1.13E-06	8.02E+02	8.36E+00	3.76E-02	5.08E-02	3.39E-04	2.26E-03	4.61E-08
Naphthalene	2.1E+02	128	1.98E-02	4.84E-04	1.13E+03	1.17E+01	7.73E+00	1.04E+01	6.11E+01	4.08E+02	8.32E-03
n-Propylbenzene	5.2E+00	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Variables	Units	Exposure Assumptions	Source
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1	NA
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2	NA
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3	NA
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4	NA
Tl = Calibration temp. of water	K (20C +273)	293	F&C
Ts = Shower water temperature	k (45C)	318	F&C
Us = water viscosity at Ts	centipoise	0.596	F&C
Ul = water viscosity at Tl	cp	1.002	F&C
Cwd = conc. leaving droplets after time sdt	ug/l	Solved by Eq 5	NA
sdt = shower droplet drop time	sec	2	F&C
d = shower droplet diameter	mm	1	F&C
FR = shower water flow rate	l/min	20	F&C
SV = shower room air volume	m^3	3	F&C
S = indoor VOC generation rate	ug/m^3-min	Solved by Eq 6	NA
VR = ventilation rate	l/min	13.8	USEPA, 1991
BW = body weight	kg	70	USEPA, 1991
Ds = duration of shower	min	12	USEPA, 1989
Dt = total duration in shower room	min	15	
R = air exchange rate	min^{-1}	0.0083	F&C
Ca = indoor air concentration of VOCs	ug/m^3	Solved by Eq 7	NA
Einh = inhalation exposure per shower	mg/kg/shower	Solved by Eq 8	NA

Equation 1:	Kg(VOC) =	3000 * (18 / HH)$^{0.5}$	
Equation 2:	Kl(VOC) =	20 * (44 / HH)$^{0.5}$	
Equation 3:	KL =	((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))$^{-1}$	
Equation 4:	Kal =	(KL * (((Tl * Us) / (Ts * Ul))$^{-0.5}$))	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	see time series example on Table I-GW-5		
Equation 8:	**Einh =**	**If t>Ds**	(((VR * S) / (BW * R * 1000000)) * ((Ds + (EXP(-R * Dt) / R)-(EXP(R * (Ds - Dt))) / R)))

Henry's Law Constant from USEPA's *Superfund Public Health Evaluation Manual*. USEPA/540/1-86/060, October 1986.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual. Interim Final. OSWER Directive 9285.6-03.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance. Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

F&C. Foster, S. A. [illegible]C. Chrostowski. 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. ICF-[illegible] Associates, Inc. Washington, D.C.

TABLE 7.7RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.6E-04	mg/kg-day	5.0E-02	mg/kg-day	N/A	N/A	3.2E-03
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	1.5E-04	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	4.9E-02
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	1.3E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.6E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	3.3E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	3.3E-02
	(Total)												7.5E-01
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.5E-10	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	3.7E-09
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	2.0E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.6E-03
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	2.2E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	3.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	8.4E-03	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.3E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	3.7E-08	mg/kg-day	8.0E-03	mg/kg-day	N/A	N/A	4.7E-06
	(Total)												5.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.

Table 7.7b RME
Calculation of DAevent (Child)

NAS Oceana-SWMU 1

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
1,3,5-Trimethylbenzene	2.47E+00	µg/l	3.44E-08	4.7E+00	0.33	2.93E-13
Benzene	2.31E+00	µg/l	2.10E-02	2.60E-01	0.33	3.93E-08
Benzo(a)anthracene	2.30E-01	µg/l	8.10E-01	2.20E+00	0.33	4.39E-07
Benzo(a)pyrene	2.00E-01	µg/l	1.20E+00	2.90E+00	0.33	6.49E-07
Naphthalene	2.08E+02	µg/l	6.90E-02	5.30E-01	0.33	1.66E-05
n-Propylbenzene	5.23E+00	µg/l	4.09E-06	4.7E+00	0.33	7.37E-11

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications.
ORD, EPA/600/8-91/001B.
N/A - not applicable.
1 From EPA Dermal Guidance 1992, table 5-7
2 From EPA Dermal Guidance 1992, table 5-8

TABLE 7.8a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												0.0E+00
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	8.5E-11	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	2.1E-09
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	2.4E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.0E-03
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.9E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	6.8E-03	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.3E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	2.1E-08	mg/kg-day	8.0E-03	mg/kg-day	N/A	N/A	2.7E-06
	(Total)												4.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.

TABLE 7.8b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,3,5-Trimethylbenzene	2.47E+00	µg/l	1.58E-05	µg/l	R	3.1E-06	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	1.8E-03
	Benzene	2.31E+00	µg/l	1.58E-05	µg/l	R	3.1E-06	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	1.8E-03
	Benzo(a)anthracene	2.30E-01	µg/l	9.30E-08	µg/l	R	1.8E-08	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.82E-08	µg/l	R	5.5E-09	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	Naphthalene	2.08E+02	µg/l	1.17E-03	µg/l	R	2.3E-04	mg/kg-day	8.6E-04	mg/kg-day	3.2E-03	mg/m^3	2.7E-01
	n-Propylbenzene	5.23E+00	µg/l	N/A	µg/l	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	mg/m^3	N/A
	(Total)												2.7E-01
												Total Hazard Index Across All Exposure Routes/Pathways	2.7E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
N/A - Not applicable.

Table 7.8c RME
Calculation of DAevent (Adult)

NAS Oceana-SWMU 1

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
1,3,5-Trimethylbenzene	2.47E+00	µg/l	3.44E-08	4.7E+00	8	1.44E-12
Benzene	2.31E+00	µg/l	2.10E-02	2.60E-01	8	4.09E-07
Benzo(a)anthracene	2.30E-01	µg/l	8.10E-01	2.20E+00	8	2.16E-06
Benzo(a)pyrene	2.00E-01	µg/l	1.20E+00	2.90E+00	8	3.20E-06
Naphthalene	2.08E+02	µg/l	6.90E-02	5.30E-01	8	1.16E-04
n-Propylbenzene	5.23E+00	µg/l	4.09E-06	4.7E+00	8	3.63E-10

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications.
ORD, EPA/600/8-91/001B.
N/A - not applicable.

Table 7.8d RME
Inhalation of Volatiles from Groundwater During Construction
Inhalation Exposure Concentrations Calculated Using a Two-Film Volatilization Model
Future Construction Worker Senario
NAS Oceana - SWMU 1

Chemical	Cw (µg/L)	MW (mol/gram)	K_H (unitless)	k_l (cm/hr)	k_g (cm/hr)	K_v (cm/hr)	ER (mg/hr)	ERa (g/sec-m^2)	Ca (mg/m^3)
1,3,5-Trimethylbenzene	2.5E+00	120	0.1608283	3.1618762	1916.7856	3.1297749	7.737411	7.96E-10	1.58E-05
Benzene	2.3E+00	78	0.228	3.52E+00	2.13E+03	3.50E+00	8.07E+00	8.31E-10	1.58E-05
Benzo(a)anthracene	2.3E-01	228	1.37E-04	2.69E+00	1.63E+03	2.07E-01	4.75E-02	4.89E-12	9.30E-08
Benzo(a)pyrene	2.0E-01	252	4.63E-05	2.63E+00	1.59E+03	7.17E-02	1.43E-02	1.48E-12	2.82E-08
Naphthalene	2.1E+02	128	1.98E-02	3.11E+00	1.89E+03	2.87E+00	5.97E+02	6.15E-08	1.17E-03
n-Propylbenzene	5.2E+00	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Equations

Equation 1 $Kv = 1/(1/k_l + 1/K_H{*}K_g)$

Equation 2 $k_g = 700(18/MW)^{1/4}V$

Equation 3 $k_l = (32/MW)^{1/4}Ka'$

Equation 4 $ER = Kv * Cw * L/1000\ cm^3 * mg/1000\ \mu g$

Equation 5 $ERa = ER * g/1000\ mg * hr/60\ min * min/60\ sec * 1/A$

Variables	Units	Exposure Assumptions
Cw = groundwater concentration	(µg/L)	chem-specific
MW = molecular weight	(mol/gram)	chem-specific
K_H - Henry's Law Constant	(unitless)	chem-specific
Kv = volatilization rate	(cm/hr)	Solved by Eq 1
k_g = gas phase transfer coefficient	(cm/hr)	Solved by Eq 2
k_l = liquid phase transfer coefficient	(cm/hr)	Solved by Eq 3
V = wind speed	(m/s)	4.4
Ka' = aeration rate	(cm/hr)	0.0633
ER = emission rate	(mg/hr)	Solved by Eq 4
A = area of excavation (utility ditch)	(m^2)	2,700
Era = area emission rate	(g/sec-m^2)	Solved by Eq 5
Ca = air concentration	(mg/m^3)	Solved using SCREEN3 model

Note: aeration rate based on aeration rate for small pond (0.1/day) multiplied by depth of water in excavation (1/2 ft)

TABLE 7.9a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.7E-09	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	6.8E-07
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	4.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	6.2E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.1E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	3.2E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	3.2E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.0E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	3.0E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.0E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	2.6E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	3.3E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.1E-02
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	1.2E-08	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	4.1E-06
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.3E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.1E-02
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	3.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.6E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.1E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	8.8E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	8.8E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.4E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	7.9E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	6.6E-07	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.1E-05
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.2E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.1E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	5.9E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	3.0E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	2.3E-06	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	1.1E-05
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	6.0E-05	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	3.0E-05
	(Total)												1.7E-01
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.6E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.0E-09
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	7.2E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.5E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.1E-06	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	1.3E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.5E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.3E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.2E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.0E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.3E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	7.2E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.4E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.9E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.3E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.9a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.9E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	6.8E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.1E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.3E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.7E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.6E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.3E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	4.8E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.9E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.1E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.3E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	7.9E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	4.0E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.1E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.2E-05
	(Total)												2.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.0E-01

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.9b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	4.1E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	6.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	9.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	4.8E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	4.5E-06	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	4.5E-03
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	1.5E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	5.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	1.9E-12	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	1.1E-09
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	2.3E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	2.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	5.0E-09	mg/kg-day	2.9E-05	mg/kg-day	1.0E-04	mg/m^3	1.7E-04
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	5.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	2.5E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	1.3E-09	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	4.6E-09
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	2.3E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	9.9E-11	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	1.2E-10
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	6.4E-09	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	7.1E-06
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	8.9E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	3.4E-10	mg/kg-day	1.1E-01	mg/kg-day	4.0E-01	mg/m^3	3.1E-09
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	9.1E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												4.7E-03

Total Hazard Index Across All Exposure Routes/Pathways 4.7E-03

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 mg^3/kg

N/A Not applicable.

TABLE 7.10a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.6E-08	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	6.4E-06
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	3.8E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	5.8E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.9E-02
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	2.9E-05	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	2.9E-04
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	2.8E-01	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.8E-01
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	9.5E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	2.4E-01
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	3.1E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.0E-01
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	1.2E-07	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.8E-05
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.1E-04	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.0E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.5E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	3.8E-03
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	8.2E-05	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	8.2E-04
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.2E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	7.4E-01
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	6.1E-06	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.0E-04
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.0E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.0E-02
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	5.5E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.8E-02
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	2.1E-05	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	1.1E-04
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	5.6E-04	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	2.8E-04
	(Total)												1.5E+00
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.7E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.2E-09
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	5.0E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	7.5E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.7E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.2E-06	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	1.4E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.7E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.4E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.2E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.1E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.3E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.5E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	7.5E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.5E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	4.1E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.4E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.3E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.10a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.0E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.2E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.2E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.5E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.9E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.8E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.4E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.0E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	5.2E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.2E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.3E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.4E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	8.4E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	4.2E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.2E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.2E-05
	(Total)												2.4E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.8E+00

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.10b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	1.2E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	1.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	1.3E-05	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	1.3E-02
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	4.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	1.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	5.2E-12	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	3.1E-09
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	6.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	5.6E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	1.4E-08	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	4.7E-04
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	1.5E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	7.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	3.7E-09	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	1.3E-08
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	6.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	2.8E-10	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	3.2E-10
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	1.8E-08	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	2.0E-05
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	2.5E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	9.7E-10	mg/kg-day	1.1E-01	mg/kg-day	4.0E-01	mg/m^3	8.8E-09
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												1.3E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-02

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 7.11a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	9.4E-09	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	2.3E-07
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	2.1E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.1E-02
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.1E-05	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.1E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.0E-01	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.0E-01
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	3.5E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	8.8E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.1E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.8E-02
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	4.2E-08	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.4E-05
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	4.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.1E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	5.7E-03
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	5.6E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.4E-03
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.0E-05	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	3.0E-04
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	5.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	8.1E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.7E-01
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.3E-06	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	3.8E-05
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.5E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	7.3E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	2.0E-07	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	4.1E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	7.8E-06	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	3.9E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.1E-04	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	1.0E-04
	(Total)												5.3E-01
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.4E-11	mg/kg-day	3.2E-02	mg/kg-day	N/A	N/A	4.4E-10
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	4.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	6.3E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.0E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	9.7E-07	mg/kg-day	8.3E-01	mg/kg-day	N/A	N/A	1.2E-06
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.1E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.1E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.1E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	2.6E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.1E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.8E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	6.3E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.1E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.4E-06	mg/kg-day	2.0E-04	mg/kg-day	N/A	N/A	1.7E-02
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	3.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.11a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.7E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	6.0E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.7E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	2.9E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.4E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.1E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.0E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	4.2E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.4E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.7E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	3.7E-08	mg/kg-day	4.5E-05	mg/kg-day	N/A	N/A	8.2E-04
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	7.0E-07	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	3.5E-07
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.9E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.0E-05
	(Total)												1.1E-01
												Total Hazard Index Across All Exposure Routes/Pathways	6.4E-01

* Surface and subsurface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic if available, otherwise used chronic RfD.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.11b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	3.0E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	4.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	6.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	3.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	3.3E-06	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	3.3E-03
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	1.1E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	3.6E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	1.3E-12	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	7.8E-10
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.6E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	3.6E-09	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	1.2E-04
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	3.9E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	1.8E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	9.5E-10	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	3.27E-09
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.6E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	2.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	7.1E-11	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	8.3E-11
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	4.6E-09	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	5.11E-06
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	6.4E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	2.5E-10	mg/kg-day	1.1E-01	mg/kg-day	4.0E-01	mg/m^3	2.24E-09
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	6.5E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												3.4E-03
												Total Hazard Index Across All Exposure Routes/Pathways	3.4E-03

* Surface and subsurface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic if available, otherwise used chronic RfD.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF= 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 7.12a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.0E-09	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.9E-07
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	4.4E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.2E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	2.3E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	2.3E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	2.2E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.2E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	7.3E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	1.8E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	7.8E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	8.8E-09	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.9E-06
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	9.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	2.4E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.0E-03
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.2E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.9E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	6.3E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	6.3E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.7E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	5.6E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	4.7E-07	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	7.8E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	3.0E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.5E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.2E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.1E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.6E-06	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	8.1E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	4.3E-05	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	2.2E-05
	(Total)												1.2E-01
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.8E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.7E-09
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	5.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	8.2E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.1E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.3E-06	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	1.5E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	4.0E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.5E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.4E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.4E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.4E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.9E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	8.2E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.7E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	4.4E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.5E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.12a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.2E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.8E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.5E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.8E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.1E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	5.2E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.6E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.5E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	5.6E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.5E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.7E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.6E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	9.1E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	4.5E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.4E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.3E-05
	(Total)												2.7E-01
												Total Hazard Index Across All Exposure Routes/Pathways	3.8E-01

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.12b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	9.8E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	1.5E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	2.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	1.1E-06	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	1.1E-03
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	3.7E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	1.2E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	4.4E-13	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	2.6E-10
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	5.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	4.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	1.2E-09	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	4.0E-05
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	1.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	5.9E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	3.2E-10	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	1.09E-09
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	5.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	8.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	2.4E-11	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	2.8E-11
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	1.5E-09	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	1.70E-06
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	2.1E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	8.2E-11	mg/kg-day	1.1E-01	mg/kg-day	4.0E-01	mg/m^3	7.45E-10
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	2.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												1.1E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E-03

* Surface and subsurface soil combined.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.13a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	4.1E-10	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.0E-07
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	6.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	9.2E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.6E-04
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	4.7E-07	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	4.7E-06
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	4.5E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	4.5E-03
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.5E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	3.8E-03
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	4.9E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.6E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	1.8E-09	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.1E-07
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	5.0E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.7E-03
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	5.3E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.4E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	6.1E-05
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.3E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.3E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.5E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.2E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	9.8E-08	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.6E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.3E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.2E-04
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	8.8E-09	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	4.4E-04
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	3.4E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	1.7E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	9.0E-06	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	4.5E-06
	(Total)												2.5E-02
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.4E-12	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	7.4E-10
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	7.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.1E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	6.6E-04
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.6E-07	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	2.0E-06
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	5.2E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.9E-03
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.8E-07	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	4.4E-03
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.8E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	6.4E-04
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	1.1E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.5E-09
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	5.8E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.9E-02
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	6.1E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.13a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.8E-07	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	1.0E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.5E-07	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	4.9E-06
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	4.1E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	6.8E-03
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	3.4E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	7.1E-07
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	7.3E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.6E-04
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	6.1E-09	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	3.4E-04
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.2E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	5.9E-07
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	3.1E-06	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.7E-06
	(Total)												3.5E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.9E-02

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.13b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	4.6E-15	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m3	R	6.9E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m3	R	5.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m3	R	5.1E-08	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	5.1E-05
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m3	R	1.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m3	R	5.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m3	R	2.1E-14	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m^3	1.2E-11
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m3	R	2.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m3	R	2.2E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m3	R	5.6E-11	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	1.9E-06
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m3	R	6.0E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m3	R	2.8E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m3	R	1.5E-11	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	5.08E-11
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m3	R	2.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m3	R	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m3	R	1.1E-12	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	1.3E-12
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m3	R	7.1E-11	mg/kg-day	9.0E-04	mg/kg-day	3.2E-03	mg/m^3	7.93E-08
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m3	R	1.0E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m3	R	3.8E-12	mg/kg-day	1.1E-01	mg/kg-day	4.0E-01	mg/m^3	3.49E-11
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												5.3E-05
												Total Hazard Index Across All Exposure Routes/Pathways	5.3E-05

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 7.14a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	5.6E-10	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.4E-07
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	8.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.3E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.3E-04
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	6.4E-07	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	6.4E-06
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	6.1E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	6.1E-03
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	2.1E-06	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	5.2E-03
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	6.7E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.2E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	2.5E-09	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.4E-07
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	6.8E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.3E-03
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	7.3E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	3.4E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	8.4E-05
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.8E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.8E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	4.8E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.6E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	1.3E-07	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.2E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	8.7E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.3E-04
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.2E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	6.0E-04
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	4.6E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	2.3E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.2E-05	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	6.1E-06
	(Total)												3.4E-02
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.6E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.1E-09
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	4.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	7.3E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.6E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.1E-06	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	1.3E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.6E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.3E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.2E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.0E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.4E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	7.3E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.4E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.9E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.3E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.14a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.9E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	6.9E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.1E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.4E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.8E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.7E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.3E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	4.9E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	5.0E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.2E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.4E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	8.1E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	4.0E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.1E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.2E-05
	(Total)												2.4E-01
												Total Hazard Index Across All Exposure Routes/Pathways	2.7E-01

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.14b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	6.3E-15	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	9.5E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	7.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	7.0E-08	mg/kg-day	1.0E-03	mg/kg-day	N/A	N/A	7.0E-05
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	2.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	7.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	2.8E-14	mg/kg-day	1.7E-03	mg/kg-day	N/A	N/A	1.7E-11
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	3.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	3.1E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	7.7E-11	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	2.6E-06
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	8.2E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	3.8E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	2.0E-11	mg/kg-day	2.9E-01	mg/kg-day	N/A	N/A	6.98E-11
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	3.5E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	5.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	1.5E-12	mg/kg-day	8.6E-01	mg/kg-day	N/A	N/A	1.8E-12
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	9.8E-11	mg/kg-day	9.0E-04	mg/kg-day	N/A	N/A	1.09E-07
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	1.4E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	5.3E-12	mg/kg-day	1.1E-01	mg/kg-day	N/A	N/A	4.78E-11
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	(Total)												7.2E-05
												Total Hazard Index Across All Exposure Routes/Pathways	7.2E-05

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 7.15 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation													
	1,3,5-Trimethylbenzene	2.47E+00	µg/l	1.35E-04	mg/kg/shower	R	8.6E-05	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m3	5.1E-02
	Benzene	2.31E+00	µg/l	1.50E-04	mg/kg/shower	R	9.6E-05	mg/kg-day	1.7E-03	mg/kg-day	6.0E-03	mg/m3	5.6E-02
	Benzo(a)anthracene	2.30E-01	µg/l	1.63E-07	mg/kg/shower	R	1.0E-07	mg/kg-day	N/A	mg/kg-day	N/A	mg/m3	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	4.61E-08	mg/kg/shower	R	3.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	mg/m3	N/A
	Naphthalene	2.08E+02	µg/l	8.32E-03	mg/kg/shower	R	5.3E-03	mg/kg-day	8.6E-04	mg/kg-day	3.2E-03	mg/m3	6.2E+00
	n-Propylbenzene	5.23E+00	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	mg/m3	N/A
	(Total)												6.3E+00
												Total Hazard Index Across All Exposure Routes/Pathways	6.3E+00

(1) Specify Medium-Specific (M) or Route Specific (R) EPC selected for hazard calculation.
(2) Chronic Inhalation.
N/A - Not applicable.

TABLE 7.16 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.1E-04	mg/kg-day	5.0E-02	mg/kg-day	N/A	N/A	2.1E-03
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	9.9E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.3E-02
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	9.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	8.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	8.9E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.4E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	2.2E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	2.2E-02
	(Total)												5.0E-01
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	8.8E-11	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	2.2E-09
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	1.2E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.9E-03
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.9E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	4.9E-03	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-01
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	2.2E-08	mg/kg-day	8.0E-03	mg/kg-day	N/A	N/A	2.7E-06
	(Total)												3.1E-01
												Total Hazard Index Across All Exposure Routes/Pathways	8.2E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.

TABLE 7.17 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	8.5E-09	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.1E-06
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.9E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	9.6E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	9.8E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	9.8E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	9.4E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	9.4E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	3.2E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	8.0E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.0E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.4E-02
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.8E-08	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.3E-05
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	4.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.0E-04	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.5E-02
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	5.1E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.3E-03
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.7E-05	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	2.7E-04
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	7.4E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.5E-01
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.1E-06	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	3.4E-05
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.3E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.6E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.8E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	9.2E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	7.1E-06	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	3.6E-05
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.9E-04	mg/kg-day	2.0E+00	mg/kg-day	N/A	N/A	9.4E-05
	(Total)												5.2E-01
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.8E-11	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.6E-09
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	5.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	8.1E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.0E-03
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.2E-06	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	1.5E-05
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.9E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.5E-02
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.3E-06	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.3E-02
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.4E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.8E-03
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	8.1E-11	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.7E-08
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	4.4E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.5E-01
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.17 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.1E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.7E-04
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.4E-06	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.7E-05
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.1E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	5.2E-02
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.6E-07	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.4E-06
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	5.5E-05	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.5E-03
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	4.6E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.6E-03
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	8.9E-07	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	4.5E-06
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.4E-05	mg/kg-day	1.8E+00	mg/kg-day	N/A	N/A	1.3E-05
	(Total)												2.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	7.8E-01

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm g, 3% for VOCs with lower vapor press

N/A - not applicable.

TABLE 8.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	7.0E-10	mg/kg-day	5.7E-02	mg/kg-day	4.0E-11
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	5.5E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	2.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	1.2E-06	mg/kg-day	1.5E+00	mg/kg-day	1.8E-06
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	5.1E-08	mg/kg-day	7.3E+00	mg/kg-day	3.7E-07
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	7.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	6.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	9.8E-09	mg/kg-day	7.5E-03	mg/kg-day	7.3E-11
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	3.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	4.9E-08	mg/kg-day	2.0E+00	mg/kg-day	9.8E-08
	(Total)										2.3E-06
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	6.5E-12	mg/kg-day	7.1E-02	mg/kg-day	4.6E-13
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	3.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	7.3E-07	mg/kg-day	1.6E+00	mg/kg-day	1.1E-06
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	9.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	5.4E-09	mg/kg-day	9.4E-03	mg/kg-day	5.1E-11
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	7.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	5.4E-08	mg/kg-day	2.2E+00	mg/kg-day	1.2E-07
	(Total)										1.3E-06
									Total Risk Across All Exposure Routes/Pathways		3.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.1b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	3.5E-14	mg/kg-day	5.6E-02	mg/kg-day	2.0E-15
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m^3	R	2.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m^3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m^3	R	6.2E-11	mg/kg-day	1.5E+01	mg/kg-day	9.3E-10
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m^3	R	2.5E-12	mg/kg-day	3.1E+00	mg/kg-day	7.9E-12
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m^3	R	3.6E-10	mg/kg-day	4.1E+01	mg/kg-day	1.5E-08
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	3.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m^3	R	4.9E-13	mg/kg-day	1.7E-03	mg/kg-day	8.1E-16
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m^3	R	2.0E-12	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m^3	R	2.5E-12	mg/kg-day	2.0E+00	mg/kg-day	4.9E-12
	(Total)										1.6E-08
										Total Risk Across All Exposure Routes/Pathways	1.6E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 8.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.4E-10	mg/kg-day	5.7E-02	mg/kg-day	8.0E-12
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	1.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	2.4E-07	mg/kg-day	1.5E+00	mg/kg-day	3.7E-07
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	1.0E-08	mg/kg-day	7.3E+00	mg/kg-day	7.4E-08
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.2E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	2.0E-09	mg/kg-day	7.5E-03	mg/kg-day	1.5E-11
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	7.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	9.8E-09	mg/kg-day	2.0E+00	mg/kg-day	2.0E-08
	(Total)										4.6E-07
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	8.1E-13	mg/kg-day	7.1E-02	mg/kg-day	5.8E-14
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	4.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	9.1E-08	mg/kg-day	1.6E+00	mg/kg-day	1.4E-07
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	1.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	1.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	6.8E-10	mg/kg-day	9.4E-03	mg/kg-day	6.4E-12
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	9.1E-09	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	6.8E-09	mg/kg-day	2.2E+00	mg/kg-day	1.5E-08
	(Total)										1.6E-07
						Total Risk Across All Exposure Routes/Pathways					6.2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c -95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.2b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	1.6E-15	mg/kg-day	5.6E-02	mg/kg-day	8.8E-17
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m^3	R	1.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m^3	R	4.7E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m^3	R	2.8E-12	mg/kg-day	1.5E+01	mg/kg-day	4.2E-11
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m^3	R	1.1E-13	mg/kg-day	3.1E+00	mg/kg-day	3.5E-13
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m^3	R	1.6E-11	mg/kg-day	4.1E+01	mg/kg-day	6.7E-10
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	1.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m^3	R	2.2E-14	mg/kg-day	1.7E-03	mg/kg-day	3.6E-17
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m^3	R	8.9E-14	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m^3	R	1.1E-13	mg/kg-day	2.0E+00	mg/kg-day	2.2E-13
	(Total)										7.1E-10
										Total Risk Across All Exposure Routes/Pathways	7.1E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.3a H..
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	7.2E-11	mg/kg-day	5.7E-02	mg/kg-day	4.1E-12
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	5.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	2.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	1.3E-07	mg/kg-day	1.5E+00	mg/kg-day	1.9E-07
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	5.2E-09	mg/kg-day	7.3E+00	mg/kg-day	3.8E-08
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	7.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	6.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	1.0E-09	mg/kg-day	7.5E-03	mg/kg-day	7.5E-12
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	4.1E-09	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	5.0E-09	mg/kg-day	2.0E+00	mg/kg-day	1.0E-08
	(Total)										2.4E-07
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.7E-13	mg/kg-day	7.1E-02	mg/kg-day	1.2E-14
	Aluminum	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	5.90E+00	mg/kg	M	1.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	3.50E+00	mg/kg	M	1.9E-08	mg/kg-day	1.6E+00	mg/kg-day	3.1E-08
	Benzo(a)pyrene	1.45E-01	mg/kg	1.45E-01	mg/kg	M	2.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, Total	2.06E+01	mg/kg	2.06E+01	mg/kg	M	3.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.80E-02	mg/kg	M	1.5E-10	mg/kg-day	9.4E-03	mg/kg-day	1.4E-12
	Napthalene	1.13E-01	mg/kg	1.13E-01	mg/kg	M	2.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.40E-01	mg/kg	M	1.5E-09	mg/kg-day	2.2E+00	mg/kg-day	3.3E-09
	(Total)										3.4E-08
							Total Risk Across All Exposure Routes/Pathways				2.7E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.3b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	8.1E-16	mg/kg-day	5.6E-02	mg/kg-day	4.6E-17
	Aluminum	1.57E+04	mg/kg	1.19E-05	mg/m^3	R	6.4E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	5.90E+00	mg/kg	4.47E-09	mg/m^3	R	2.4E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	3.50E+00	mg/kg	2.65E-09	mg/m^3	R	1.4E-12	mg/kg-day	1.5E+01	mg/kg-day	2.1E-11
	Benzo(a)pyrene	1.45E-01	mg/kg	1.10E-10	mg/m^3	R	5.9E-14	mg/kg-day	3.1E+00	mg/kg-day	1.8E-13
	Chromium, Total	2.06E+01	mg/kg	1.56E-08	mg/m^3	R	8.4E-12	mg/kg-day	4.1E+01	mg/kg-day	3.4E-10
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	7.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	2.80E-02	mg/kg	2.12E-11	mg/m^3	R	1.1E-14	mg/kg-day	1.7E-03	mg/kg-day	1.9E-17
	Napthalene	1.13E-01	mg/kg	8.56E-11	mg/m^3	R	4.6E-14	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	1.40E-01	mg/kg	1.06E-10	mg/m^3	R	5.7E-14	mg/kg-day	2.0E+00	mg/kg-day	1.1E-13
	(Total)										3.7E-10
										Total Risk Across All Exposure Routes/Pathways	3.7E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.4 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	3.7E-07	mg/kg-day	1.5E+00	mg/kg-day	5.5E-07
	(Total)										5.5E-07
Dermal Absorption	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	2.3E-07	mg/kg-day	1.6E+00	mg/kg-day	3.6E-07
	(Total)										3.6E-07
										Total Risk Across All Exposure Routes/Pathways	9.2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic.

N/A - not applicable.

TABLE 8.5 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Drainage ditch along west side of site
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	1.9E-07	mg/kg-day	1.5E+00	mg/kg-day	2.9E-07
	(Total)										2.9E-07
Dermal Absorption	Arsenic	5.30E+00	mg/kg	5.30E+00	mg/kg	M	2.9E-08	mg/kg-day	1.6E+00	mg/kg-day	4.7E-08
	(Total)										4.7E-08
						Total Risk Across All Exposure Routes/Pathways					3.3E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic.

N/A - not applicable.

TABLE 8.6 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,3,5-Trimethylbenzene	2.47E+00	mg/kg	1.35E-04	mg/kg/shower	R	4.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	mg/kg	1.50E-04	mg/kg/shower	R	4.9E-05	mg/kg-day	2.7E-02	mg/kg-day	1.3E-06
	Benzo(a)anthracene	2.30E-01	mg/kg	1.63E-07	mg/kg/shower	R	5.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	mg/kg	4.61E-08	mg/kg/shower	R	1.5E-08	mg/kg-day	3.1E+00	mg/kg-day	4.7E-08
	Naphthalene	2.08E+02	mg/kg	8.32E-03	mg/kg/shower	R	2.7E-03	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.4E-06
						Total Risk Across All Exposure Routes/Pathways					1.4E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

N/A Not applicable.

TABLE 8.7a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	3.69E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	3.45E-05	mg/kg-day	2.9E-02	mg/kg-day	1.0E-06
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	3.43E-06	mg/kg-day	7.3E-01	mg/kg-day	2.5E-06
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	2.99E-06	mg/kg-day	7.3E+00	mg/kg-day	2.2E-05
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	3.11E-03	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	7.80E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.5E-05
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	3.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	4.6E-06	mg/kg-day	2.9E-02	mg/kg-day	1.3E-07
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	5.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	7.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	1.9E-03	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	8.6E-09	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.3E-07
										Total Risk Across All Exposure Routes/Pathways	2.5E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.
N/A - not applicable.

TABLE 8.8a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										0.0E+00
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.2E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	3.4E-07	mg/kg-day	2.9E-02	mg/kg-day	9.9E-09
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	9.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	3.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										9.9E-09
										Total Risk Across All Exposure Routes/Pathways	9.9E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B.

N/A - not applicable.

TABLE 8.8b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,3,5-Trimethylbenzene	2.47E+00	µg/l	N/A	µg/l	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	1.58E-05	µg/l	R	4.4E-08	mg/kg-day	2.7E-02	mg/kg-day	1.2E-09
	Benzo(a)anthracene	2.30E-01	µg/l	9.30E-08	µg/l	R	2.6E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.82E-08	µg/l	R	7.9E-11	mg/kg-day	3.1E+00	mg/kg-day	2.4E-10
	Naphthalene	2.08E+02	µg/l	1.17E-03	µg/l	R	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	N/A	µg/l	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.5E-09
										Total Risk Across All Exposure Routes/Pathways	1.5E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
N/A - Not applicable.

TABLE 8.9a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	3.1E-09	mg/kg-day	5.7E-02	mg/kg-day	1.8E-10
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	4.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	7.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	3.4E-02	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	3.8E-06	mg/kg-day	1.5E+00	mg/kg-day	5.6E-06
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	1.4E-08	mg/kg-day	2.9E-02	mg/kg-day	4.1E-10
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.7E-06	mg/kg-day	7.3E+00	mg/kg-day	1.3E-05
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	1.5E-06	mg/kg-day	7.3E-01	mg/kg-day	1.1E-06
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	3.8E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	4.1E-07	mg/kg-day	7.3E+00	mg/kg-day	3.0E-06
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	1.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	1.7E-06	mg/kg-day	7.3E-01	mg/kg-day	1.3E-06
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	2.7E-02	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	7.5E-07	mg/kg-day	7.5E-03	mg/kg-day	5.6E-09
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	4.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	6.8E-08	mg/kg-day	2.0E+00	mg/kg-day	1.4E-07
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	2.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	6.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.4E-05
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	6.9E-12	mg/kg-day	7.1E-02	mg/kg-day	4.9E-13
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	2.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	4.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.5E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	5.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	5.3E-07	mg/kg-day	1.6E+00	mg/kg-day	8.4E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.1E-11	mg/kg-day	2.9E-02	mg/kg-day	9.0E-13
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	6.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.8E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.9a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	8.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.2E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	9.9E-08	mg/kg-day	9.4E-03	mg/kg-day	9.3E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	2.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.8E-08	mg/kg-day	2.2E+00	mg/kg-day	4.0E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	3.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	9.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										8.8E-07
										Total Risk Across All Exposure Routes/Pathways	2.5E-05

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.9b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	2.4E-13	mg/kg-day	5.6E-02	mg/kg-day	1.4E-14
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	3.7E-09	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	5.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	2.8E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	9.1E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	2.9E-10	mg/kg-day	1.5E+01	mg/kg-day	4.4E-09
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	1.1E-12	mg/kg-day	2.9E-02	mg/kg-day	3.2E-14
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.3E-10	mg/kg-day	3.1E+00	mg/kg-day	4.2E-10
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	1.2E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	3.0E-09	mg/kg-day	4.1E+01	mg/kg-day	1.2E-07
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	3.2E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	1.5E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	7.8E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	2.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	5.9E-11	mg/kg-day	1.7E-03	mg/kg-day	9.7E-14
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	3.8E-09	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	5.3E-12	mg/kg-day	2.0E+00	mg/kg-day	1.1E-11
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	2.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	5.4E-09	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.3E-07
							Total Risk Across All Exposure Routes/Pathways				1.3E-07

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 mg^3/kg

N/A Not applicable.

TABLE 8.10a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.3E-10	mg/kg-day	5.7E-02	mg/kg-day	7.6E-12
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	3.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.5E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	5.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.6E-07	mg/kg-day	1.5E+00	mg/kg-day	2.4E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	6.0E-10	mg/kg-day	2.9E-02	mg/kg-day	1.8E-11
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-08	mg/kg-day	7.3E+00	mg/kg-day	5.4E-07
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	6.5E-08	mg/kg-day	7.3E-01	mg/kg-day	4.8E-08
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.7E-08	mg/kg-day	7.3E+00	mg/kg-day	1.3E-07
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	8.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.4E-08	mg/kg-day	7.3E-01	mg/kg-day	5.4E-08
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.2E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	3.2E-08	mg/kg-day	7.5E-03	mg/kg-day	2.4E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	2.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	2.9E-09	mg/kg-day	2.0E+00	mg/kg-day	5.8E-09
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	3.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.0E-06
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.0E-13	mg/kg-day	7.1E-02	mg/kg-day	1.4E-14
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	6.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	4.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.5E-08	mg/kg-day	1.6E+00	mg/kg-day	2.4E-08
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	9.1E-13	mg/kg-day	2.9E-02	mg/kg-day	2.6E-14
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	4.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	5.2E-09	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.10a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.9E-09	mg/kg-day	9.4E-03	mg/kg-day	2.7E-11
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	5.2E-10	mg/kg-day	2.2E+00	mg/kg-day	1.2E-09
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.6E-08
						Total Risk Across All Exposure Routes/Pathways					1.0E-06

* Surface and subsurface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.10bRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	4.2E-15	mg/kg-day	5.6E-02	mg/kg-day	2.4E-16
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	6.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	9.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	4.9E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	4.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	1.6E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	5.1E-12	mg/kg-day	1.5E+01	mg/kg-day	7.7E-11
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	1.9E-14	mg/kg-day	2.9E-02	mg/kg-day	5.5E-16
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	2.3E-12	mg/kg-day	3.1E+00	mg/kg-day	7.2E-12
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	2.1E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	5.2E-11	mg/kg-day	4.1E+01	mg/kg-day	2.1E-09
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	5.5E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	2.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	1.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	2.3E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	3.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	1.0E-12	mg/kg-day	1.7E-03	mg/kg-day	1.7E-15
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	6.6E-11	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	9.2E-14	mg/kg-day	2.0E+00	mg/kg-day	1.8E-13
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	3.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	9.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.2E-09

Total Risk Across All Exposure Routes/Pathways 2.2E-09

* Surface and subsurface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF= 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.11a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	7.0E-10	mg/kg-day	5.7E-02	mg/kg-day	4.0E-11
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	8.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	7.7E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	2.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	8.4E-07	mg/kg-day	1.5E+00	mg/kg-day	1.3E-06
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.1E-09	mg/kg-day	2.9E-02	mg/kg-day	9.1E-11
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E+00	mg/kg-day	2.8E-06
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	3.4E-07	mg/kg-day	7.3E-01	mg/kg-day	2.5E-07
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	8.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	9.1E-08	mg/kg-day	7.3E+00	mg/kg-day	6.6E-07
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	4.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	3.8E-07	mg/kg-day	7.3E-01	mg/kg-day	2.8E-07
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	6.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	1.7E-07	mg/kg-day	7.5E-03	mg/kg-day	1.3E-09
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.5E-08	mg/kg-day	2.0E+00	mg/kg-day	3.0E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	5.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										5.3E-06
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	6.5E-12	mg/kg-day	7.1E-02	mg/kg-day	4.6E-13
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	4.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	4.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	5.0E-07	mg/kg-day	1.6E+00	mg/kg-day	7.9E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	2.9E-11	mg/kg-day	2.9E-02	mg/kg-day	8.5E-13
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	6.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.7E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.11a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	7.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	9.4E-08	mg/kg-day	9.4E-03	mg/kg-day	8.8E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.7E-08	mg/kg-day	2.2E+00	mg/kg-day	3.8E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	3.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	8.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										8.3E-07
						Total Risk Across All Exposure Routes/Pathways					6.1E-06

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.11b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	3.5E-14	mg/kg-day	5.6E-02	mg/kg-day	2.0E-15
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	5.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	7.9E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	4.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	3.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	1.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	4.2E-11	mg/kg-day	1.5E+01	mg/kg-day	6.4E-10
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	1.6E-13	mg/kg-day	2.9E-02	mg/kg-day	4.6E-15
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.9E-11	mg/kg-day	3.1E+00	mg/kg-day	6.0E-11
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	1.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	4.3E-10	mg/kg-day	4.1E+01	mg/kg-day	1.8E-08
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	4.6E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	2.1E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	1.9E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	3.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	8.5E-12	mg/kg-day	1.7E-03	mg/kg-day	1.4E-14
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	5.4E-10	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	7.6E-13	mg/kg-day	2.0E+00	mg/kg-day	1.5E-12
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	2.9E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	7.7E-10	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.8E-08
										Total Risk Across All Exposure Routes/Pathways	1.8E-08

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.12a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	1.4E-10	mg/kg-day	5.7E-02	mg/kg-day	8.0E-12
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	2.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	3.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.5E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	5.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.7E-07	mg/kg-day	1.5E+00	mg/kg-day	2.5E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	6.3E-10	mg/kg-day	2.9E-02	mg/kg-day	1.8E-11
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.7E-08	mg/kg-day	7.3E+00	mg/kg-day	5.6E-07
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	6.8E-08	mg/kg-day	7.3E-01	mg/kg-day	4.9E-08
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.8E-08	mg/kg-day	7.3E+00	mg/kg-day	1.3E-07
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	8.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	7.7E-08	mg/kg-day	7.3E-01	mg/kg-day	5.6E-08
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.2E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	3.4E-08	mg/kg-day	7.5E-03	mg/kg-day	2.5E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	3.0E-09	mg/kg-day	2.0E+00	mg/kg-day	6.0E-09
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	3.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.1E-06
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	8.1E-13	mg/kg-day	7.1E-02	mg/kg-day	5.8E-14
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	5.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	1.8E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	6.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	6.2E-08	mg/kg-day	1.6E+00	mg/kg-day	9.8E-08
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.6E-12	mg/kg-day	2.9E-02	mg/kg-day	1.1E-13
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	7.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	2.1E-08	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.12a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	9.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	8.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	1.2E-08	mg/kg-day	9.4E-03	mg/kg-day	1.1E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	2.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	2.1E-09	mg/kg-day	2.2E+00	mg/kg-day	4.7E-09
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.0E-07
							Total Risk Across All Exposure Routes/Pathways				1.2E-06

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.12b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	1.6E-15	mg/kg-day	5.6E-02	mg/kg-day	8.8E-17
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m3	R	2.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m3	R	3.6E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m3	R	1.8E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m3	R	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m3	R	5.9E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m3	R	1.9E-12	mg/kg-day	1.5E+01	mg/kg-day	2.9E-11
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m3	R	7.1E-15	mg/kg-day	2.9E-02	mg/kg-day	2.1E-16
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m3	R	8.7E-13	mg/kg-day	3.1E+00	mg/kg-day	2.7E-12
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m3	R	7.7E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m3	R	1.9E-11	mg/kg-day	4.1E+01	mg/kg-day	7.9E-10
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m3	R	2.1E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m3	R	9.5E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m3	R	5.1E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m3	R	8.7E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m3	R	1.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m3	R	3.8E-13	mg/kg-day	1.7E-03	mg/kg-day	6.3E-16
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m3	R	2.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m3	R	3.4E 14	mg/kg day	2.0E+00	mg/kg-day	6.8E-14
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m3	R	1.3E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m3	R	3.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										8.2E-10
										Total Risk Across All Exposure Routes/Pathways	8.2E-10

* Surface and subsurface soil combined.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.13a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	7.2E-11	mg/kg-day	5.7E-02	mg/kg-day	4.1E-12
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	8.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	7.9E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	2.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	8.6E-08	mg/kg-day	1.5E+00	mg/kg-day	1.3E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.2E-10	mg/kg-day	2.9E-02	mg/kg-day	9.4E-12
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.0E-08	mg/kg-day	7.3E+00	mg/kg-day	2.9E-07
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	3.5E-08	mg/kg-day	7.3E-01	mg/kg-day	2.5E-08
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	8.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	9.3E-09	mg/kg-day	7.3E+00	mg/kg-day	6.8E-08
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	4.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.0E-08	mg/kg-day	7.3E-01	mg/kg-day	2.9E-08
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	6.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	1.7E-08	mg/kg-day	7.5E-03	mg/kg-day	1.3E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.6E-09	mg/kg-day	2.0E+00	mg/kg-day	3.1E-09
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	6.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										5.4E-07
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.1E-12	mg/kg-day	7.1E-02	mg/kg-day	1.5E-13
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	6.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	9.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	4.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.6E-07	mg/kg-day	1.6E+00	mg/kg-day	2.5E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	9.4E-12	mg/kg-day	2.9E-02	mg/kg-day	2.7E-13
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	5.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	5.4E-08	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.13a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	3.0E-08	mg/kg-day	9.4E-03	mg/kg-day	2.8E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	5.4E-09	mg/kg-day	2.2E+00	mg/kg-day	1.2E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.0E 07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.7E-07
						Total Risk Across All Exposure Routes/Pathways					8.1E-07

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.13b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	2.00E-03	mg/kg	1.52E-12	mg/m^3	R	8.1E-16	mg/kg-day	5.6E-02	mg/kg-day	4.6E-17
	1-Methylnaphthalene	3.00E+01	mg/kg	2.27E-08	mg/m^3	R	1.2E-11	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	3.41E-08	mg/m^3	R	1.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	1.74E-09	mg/m^3	R	9.3E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	1.67E-05	mg/m^3	R	8.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	5.65E-09	mg/m^3	R	3.0E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	1.82E-09	mg/m^3	R	9.8E-13	mg/kg-day	1.5E+01	mg/kg-day	1.5E-11
	Benzene	9.00E-03	mg/kg	6.82E-12	mg/m^3	R	3.7E-15	mg/kg-day	2.9E-02	mg/kg-day	1.1E-16
	Benzo(a)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	4.5E-13	mg/kg-day	3.1E+00	mg/kg-day	1.4E-12
	Benzo(b)fluoranthene	9.70E-01	mg/kg	7.35E-10	mg/m^3	R	3.9E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	1.85E-08	mg/m^3	R	9.9E-12	mg/kg-day	4.1E+01	mg/kg-day	4.1E-10
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	1.97E-10	mg/m^3	R	1.1E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	1.20E+00	mg/kg	9.09E-10	mg/m^3	R	4.9E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	4.85E-09	mg/m^3	R	2.6E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	8.33E-10	mg/m^3	R	4.5E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.31E-05	mg/m^3	R	7.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	3.64E-10	mg/m^3	R	2.0E-13	mg/kg-day	1.7E-03	mg/kg-day	3.2E-16
	Napthalene	3.10E+01	mg/kg	2.35E-08	mg/m^3	R	1.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	3.28E-11	mg/m^3	R	1.8E-14	mg/kg-day	2.0E+00	mg/kg-day	3.5E-14
	Toluene	1.66E+00	mg/kg	1.26E-09	mg/m^3	R	6.8E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	3.33E-08	mg/m^3	R	1.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.2E-10
										Total Risk Across All Exposure Routes/Pathways	4.2E-10

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 8.14a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.31E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	1.23E-05	mg/kg-day	2.9E-02	mg/kg-day	3.6E-07
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	1.22E-06	mg/kg-day	7.3E-01	mg/kg-day	8.9E-07
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.06E-06	mg/kg-day	7.3E+00	mg/kg-day	7.8E-06
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	1.10E-03	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	2.78E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										9.0E-06
Dermal Absorption	1,3,5-Trimethylbenzene	2.47E+00	µg/l	2.47E+00	µg/l	M	1.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzene	2.31E+00	µg/l	2.31E+00	µg/l	M	2.4E-06	mg/kg-day	2.9E-02	mg/kg-day	7.0E-08
	Benzo(a)anthracene	2.30E-01	µg/l	2.30E-01	µg/l	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.00E-01	µg/l	2.00E-01	µg/l	M	4.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	2.08E+02	µg/l	2.08E+02	µg/l	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	n-Propylbenzene	5.23E+00	µg/l	5.23E+00	µg/l	M	4.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										7.0E-08
										Total Risk Across All Exposure Routes/Pathways	9.1E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

N/A - not applicable.

TABLE 8.15a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	8.5E-10	mg/kg-day	5.7E-02	mg/kg-day	4.8E-11
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	1.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	9.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	9.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	3.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.0E-06	mg/kg-day	1.5E+00	mg/kg-day	1.5E-06
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	3.8E-09	mg/kg-day	2.9E-02	mg/kg-day	1.1E-10
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day	7.3E+00	mg/kg-day	3.4E-06
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	4.1E-07	mg/kg-day	7.3E-01	mg/kg-day	3.0E-07
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	1.1E-07	mg/kg-day	7.3E+00	mg/kg-day	8.1E-07
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	5.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	4.7E-07	mg/kg-day	7.3E-01	mg/kg-day	3.4E-07
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	7.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.0E-07	mg/kg-day	7.5E-03	mg/kg-day	1.5E-09
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	1.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	1.8E-08	mg/kg-day	2.0E+00	mg/kg-day	3.7E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	7.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										6.4E-06
Dermal Absorption	1,1,2-Trichloroethane	2.00E-03	mg/kg	2.00E-03	mg/kg	M	2.0E-12	mg/kg-day	7.1E-02	mg/kg-day	1.4E-13
	1-Methylnaphthalene	3.00E+01	mg/kg	3.00E+01	mg/kg	M	6.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	2-Methylnaphthalene	4.50E+01	mg/kg	4.50E+01	mg/kg	M	9.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	2.30E+00	mg/kg	2.30E+00	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	2.20E+04	mg/kg	2.20E+04	mg/kg	M	4.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony	7.46E+00	mg/kg	7.46E+00	mg/kg	M	1.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	2.41E+00	mg/kg	2.41E+00	mg/kg	M	1.6E-07	mg/kg-day	1.6E+00	mg/kg-day	2.5E-07
	Benzene	9.00E-03	mg/kg	9.00E-03	mg/kg	M	9.1E-12	mg/kg-day	2.9E-02	mg/kg-day	2.6E-13
	Benzo(a)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	9.70E-01	mg/kg	9.70E-01	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium, total	2.44E+01	mg/kg	2.44E+01	mg/kg	M	4.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	2.60E-01	mg/kg	2.60E-01	mg/kg	M	5.3E-08	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.15a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	1.20E+00	mg/kg	1.20E+00	mg/kg	M	2.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Ethylbenzene	6.40E+00	mg/kg	6.40E+00	mg/kg	M	3.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-c,d)pyrene	1.10E+00	mg/kg	1.10E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.73E+04	mg/kg	1.73E+04	mg/kg	M	3.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene Chloride	4.81E-01	mg/kg	4.81E-01	mg/kg	M	2.9E-08	mg/kg-day	9.4E-03	mg/kg-day	2.7E-10
	Napthalene	3.10E+01	mg/kg	3.10E+01	mg/kg	M	6.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	PCB-1254	4.32E-02	mg/kg	4.32E-02	mg/kg	M	5.2E-09	mg/kg-day	2.2E+00	mg/kg-day	1.2E-08
	Toluene	1.66E+00	mg/kg	1.66E+00	mg/kg	M	1.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Xylenes, total	4.40E+01	mg/kg	4.40E+01	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.6E-07
						Total Risk Across All Exposure Routes/Pathways					6.7E-06

* Surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c
~95.2 mm Hg, 3% for VOCs with lower vapor press

N/A - not applicable.

TAB ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact	1,1,2-Trichloroethane	4.0E-11	--	4.6E-13	4.0E-11	1,1,2-Trichloroethane	Blood	4.9E-07	--	5.7E-09	4.9E-07
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	1.5E-02	--	1.1E-02	2.6E-02
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Blood/Whole Body	1.4E-02	--	2.7E-02	4.1E-02
			Arsenic	1.8E-06	--	1.1E-08	3.0E-06	Arsenic	Skin/vascular	1.1E-02	--	7.1E-03	1.9E-02
			Benzo(a)pyrene	3.7E-07	--	N/A	3.7E-07	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Chromium, total	N/A	--	N/A	0.0E+00	Chromium, total	NOAEL	6.7E-03	--	1.2E-01	1.3E-01
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	5.6E-02	--	5.2E-02	1.1E-01
			Methylene Chloride	7.3E-11	--	5.1E-11	1.2E-10	Methylene Chloride	Liver	4.6E-07	--	3.2E-07	7.7E-07
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	5.5E-06	--	1.3E-05	1.8E-05
			PCB-1254	9.8E-08	--	1.2E-07	2.2E-07	PCB-1254	Immune System	6.8E-03	--	8.6E-03	1.5E-02
			(Total)	2.3E-06	0.0E+00	1.3E-06	3.6E-06	(Total)		1.1E-01	0.0E+00	2.3E-01	3.4E-01
	Air	Emissions from exposed soil	1,1,2-Trichloroethane	--	2.0E-15	--	2.0E-15	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	7.7E-04	--	7.7E-04
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	9.3E-10	--	9.3E-10	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	7.9E-12	--	7.9E-12	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Chromium, total	--	1.5E-08	--	1.5E-08	Chromium, total	Lung	--	3.5E-05	--	3.5E-05
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	8.1E-16	--	8.1E-16	Methylene Chloride	N/A	--	1.6E-12	--	1.6E-12
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	6.2E-09	--	6.2E-09
			PCB-1254	--	4.9E-12	--	4.9E-12	PCB-1254	N/A	--	N/A	--	0.0E+00
			(Total)	--	1.6E-08	--	1.6E-08	(Total)		--	8.1E-04	--	8.1E-04
			Total Risk Across Surface Soil				3.6E-06	Total Risk Across Surface Soil					3.4E-01
			Total Risk Across All Media and All Exposure Routes				3.6E-06	Total Hazard Index Across All Media and All Exposure Routes					3.4E-01

Total Liver HI =	1.1E-01
Total Blood HI =	1.5E-01
Total NOAEL HI =	1.3E-01
Total Neural HI =	2.7E-02
Total Skin HI =	1.9E-02
Total Lung and Respiratory HI =	3.5E-05
Total Gastrointestinal HI =	1.1E-01
Total Immune system HI =	1.5E-02
Total Body HI =	4.1E-02

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)	N/A	0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	5.5E-07	--	3.6E-07	9.2E-07	Arsenic	Skin/Vascular	3.6E-03	--	2.3E-03	5.9E-03
			(Total)	5.5E-07	0.0E+00	3.6E-07	9.2E-07	(Total)		3.6E-03	0.0E+00	2.3E-03	5.9E-03
			Total Risk Across Sediment				9.2E-07	Total Risk Across Sediment					5.9E-03
Surface Soil	Surface Soil	Direct Contact	1,1,2-Trichloroethane	8.0E-12	--	5.8E-14	8.0E-12	1,1,2-Trichloroethane	Blood	1.0E-07	--	7.4E-10	1.0E-07
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	3.2E-03	--	1.4E-03	4.6E-03
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	3.0E-03	--	3.5E-03	6.5E-03
			Arsenic	3.7E-07	--	1.4E-07	5.1E-07	Arsenic	Skin/Vascular	2.4E-03	--	9.3E-04	3.3E-03
			Benzo(a)pyrene	7.4E-08	--	N/A	7.4E-08	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Chromium, Total	N/A	--	N/A	0.0E+00	Chromium, Total	NOAEL	1.4E-03	--	1.6E-02	1.8E-02
			Iron	N/A	--	N/A	0.0E+00	Iron	Blood/Liver/GI	1.2E-02	--	6.8E-03	1.9E-02
			Methylene Chloride	1.5E-11	--	6.4E-12	2.1E-11	Methylene Chloride	Liver	9.5E-08	--	4.1E-08	1.4E-07
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	1.1E-06	--	1.7E-06	2.8E-06
			PCB-1254	2.0E-08	--	1.5E-08	3.5E-08	PCB-1254	Immune System	1.4E-03	--	1.1E-03	2.5E-03
			(Total)	4.6E-07	0.0E+00	1.6E-07	6.2E-07	(Total)		2.3E-02	0.0E+00	3.0E-02	5.3E-02
	Air	Emissions from exposed soil	1,1,2-Trichloroethane	--	8.8E-17	--	8.8E-17	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	3.6E-05	--	3.6E-05
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	4.2E-11	--	4.2E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	3.5E-13	--	3.5E-13	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Chromium, Total	--	6.7E-10	--	6.7E-10	Chromium, Total	Lung	--	1.6E-06	--	1.6E-06
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	3.6E-17	--	3.6E-17	Methylene Chloride	N/A	--	7.5E-14	--	7.5E-14
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	2.9E-10	--	2.9E-10
			PCB-1254	--	2.2E-13	--	2.2E-13	PCB-1254	N/A	--	N/A	--	0.0E+00
			(Total)	--	7.1E-10	--	7.1E-10	(Total)		--	3.8E-05	--	3.8E-05
			Total Risk Across Surface Soil				6.2E-07	Total Risk Across Surface Soil					5.3E-02
			Total Risk Across All Media and All Exposure Routes				1.5E-06	Total Hazard Index Across All Media and All Exposure Routes					5.9E-02

Total Vascular HI =	9.2E-03
Total Liver HI =	1.9E-02
Total Blood HI =	2.5E-02
Total Gastrointestinal HI =	1.9E-02
Total NOAEL HI =	1.8E-02
Total Neural HI =	4.6E-03
Total Skin HI =	9.2E-03
Total Lung and Respiratory HI =	1.6E-06
Total Immune system HI =	2.5E-03
Total Body HI =	6.5E-03

TABLE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)					(Total)					
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	2.9E-07	--	4.7E-08	3.3E-07	Arsenic	Skin/vascular	4.9E-03	--	8.0E-04	5.7E-03
			(Total)	2.9E-07	0.0E+00	4.7E-08	3.3E-07	(Total)		4.9E-03	0.0E+00	8.0E-04	5.7E-03
			Total Risk Across Sediment				3.3E-07	Total Risk Across Sediment					5.7E-03
Surface Soil	Surface Soil	Direct Contact	1,1,2-Trichloroethane	4.1E-12	--	1.2E-14	4.1E-12	1,1,2-Trichloroethane	Blood	1.4E-07	--	4.2E-10	1.4E-07
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	4.4E-03	--	7.8E-04	5.2E-03
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	4.1E-03	--	2.0E-03	6.1E-03
			Arsenic	1.9E-07	--	3.1E-08	2.2E-07	Arsenic	Skin/vascular	3.3E-03	--	5.3E-04	3.8E-03
			Benzo(a)pyrene	3.8E-08	--	N/A	3.8E-08	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Chromium, Total	N/A	--	N/A	0.0E+00	Chromium, Total	NOAEL	1.9E-03	--	9.2E-03	1.1E-02
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	1.6E-02	--	3.9E-03	2.0E-02
			Methylene Chloride	7.5E-12	--	1.4E-12	8.9E-12	Methylene Chloride	Liver	1.3E-07	--	2.4E-08	1.5E-07
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	1.6E-06	--	9.5E-07	2.5E-06
			PCB-1254	1.0E-08	--	3.3E-09	1.3E-08	PCB-1254	Immune System	2.0E-03	--	6.3E-04	2.6E-03
			(Total)	2.4E-07	0.0E+00	3.4E-08	2.7E-07	(Total)		3.2E-02	0.0E+00	1.7E-02	4.9E-02
	Air	Emissions from exposed soil	1,1,2-Trichloroethane	--	4.6E-17	--	4.6E-17	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	5.0E-05	--	5.0E-05
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	2.1E-11	--	2.1E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	1.8E-13	--	1.8E-13	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Chromium, Total	--	3.4E-10	--	3.4E-10	Chromium, Total	Lung	--	2.2E-06	--	2.2E-06
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	1.9E-17	--	1.9E-17	Methylene Chloride	N/A	--	1.0E-13	--	1.0E-13
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	4.0E-10	--	4.0E-10
			PCB-1254	--	1.1E-13	--	1.1E-13	PCB-1254	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	3.7E-10	0.0E+00	3.7E-10	(Total)		0.0E+00	5.2E-05	0.0E+00	5.2E-05
			Total Risk Across Surface Soil				2.7E-07	Total Risk Across Surface Soil					4.9E-02
			Total Risk Across All Media and All Exposure Routes				6.0E-07	Total Hazard Index Across All Media and All Exposure Routes					5.5E-02

Total Vascular HI =	9.5E-03
Total Blood HI =	2.6E-02
Total Liver HI =	2.0E-02
Total NOAEL HI =	1.1E-02
Total Neural HI =	5.2E-03
Total Skin HI =	9.5E-03
Total Lung and Respiratory HI =	2.2E-06
Total Gastrointestinal HI =	2.0E-02
Total Immune system HI =	2.6E-03
Total Body HI =	6.1E-03

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Residen
Receptor Age: Adult

M· ium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						1,3,5-Trimethylbenzene	Liver	1.4E-03	--	1.6E-09	1.4E-03
								Benzene	Blood	2.1E-02	--	2.8E-03	2.4E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Naphthalene	Whole Body	2.8E-01	--	2.2E-01	5.1E-01
								n-Propylbenzene	N/A	1.4E-02	--	2.0E-06	1.4E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		3.2E-01	0.0E+00	2.2E-01	5.5E-01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					5.5E-01
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			1,3,5-Trimethylbenzene	--	N/A	--	0.0E+00	1,3,5-Trimethylbenzene	Liver	--	7.6E-02	--	7.6E-02
			Benzene	--	1.34E-06	--	1.3E-06	Benzene	Blood	--	8.4E-02	--	8.4E-02
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	4.69E-08	--	4.7E-08	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	9.3E+00	--	9.3E+00
			n-Propylbenzene	--	N/A	--	0.0E+00	n-Propylbenzene	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	1.4E-06	0.0E+00	1.4E-06	(Total)		0.0E+00	9.5E+00	0.0E+00	9.5E+00
			Total Risk Across Vapors at Showerhead				1.4E-06	Total Hazard Index Across Vapors at Showerhead					9.5E+00
	All Media		Total Risk Across Groundwater				1.4E-06		Total Hazard Index Across Groundwater				1.0E+01

TAB ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Residen
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes-Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact											
								1,1,2-Trichloroethane	Blood	6.8E-07	--	5.0E-09	6.9E-07
								2-Methylnaphthalene	Whole Body	3.1E-03	--	4.5E-03	7.6E-03
								Acetone	Liver, Kidney	3.2E-05	--	1.3E-05	4.5E-05
								Aluminum	CNS	3.0E-02	--	1.3E-02	4.3E-02
								Antimony	Whole Body/Blood	2.6E-02	--	3.0E-02	5.5E-02
								Arsenic	Skin/Vascular	1.1E-02	--	4.3E-03	1.5E-02
								Benzene	Liver	4.1E-06	--	2.4E-08	4.1E-06
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Chromium, total	NOAEL	1.1E-02	--	1.3E-01	1.4E-01
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	4.1E-04	--	6.8E-04	1.1E-03
								Ethylbenzene	Liver, Kidney	8.8E-05	--	3.3E-05	1.2E-04
								Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/Blood/Liver	7.9E-02	--	4.6E-02	1.2E-01
								Methylene Chloride	Liver	1.1E-05	--	4.8E-06	1.6E-05
								Napthalene	Whole Body	2.1E-03	--	3.1E-03	5.2E-03
								PCB-1254	Immune System	3.0E-03	--	2.3E-03	5.3E-03
								Toluene	Liver, Kidney	1.1E-05	--	4.0E-06	1.5E-05
								Xylenes, total	Whole Body	3.0E-05	--	1.2E-05	4.2E-05
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.7E-01	0.0E+00	2.3E-01	3.9E-01
	Air	Emissions from exposed soil											
								1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
								2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
								Acetone	N/A	--	N/A	--	0.0E+00
								Aluminum	N/A	--	4.5E-03	--	4.5E-03
								Antimony	N/A	--	N/A	--	0.0E+00
								Arsenic	N/A	--	N/A	--	0.0E+00
								Benzene	N/A	--	1.1E-09	--	1.1E-09
								Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
								Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
								Chromium, total	Lung	--	1.7E-04	--	1.7E-04
								Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
								Dibenzofuran	N/A	--	N/A	--	0.0E+00
								Ethylbenzene	N/A	--	4.6E-09	--	4.6E-09
								Iron	N/A	--	N/A	--	0.0E+00

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Residen
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil				0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.4E-06

Chemical	Non-Carcinogenic Hazard Quotient				
	Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Methylene Chloride	N/A	--	1.2E-10	--	1.2E-10
Napthalene	Respiratory	--	7.1E-06	--	7.1E-06
PCB-1254	N/A	--	N/A	--	0.0E+00
Toluene	N/A	--	3.1E-09	--	3.1E-09
Xylenes, total	N/A	--	N/A	--	0.0E+00
(Total)		0	4.7E-03	0	4.7E-03
Total Hazard Index Across Soil					4.0E-01
Total Hazard Index Across All Media and All Exposure Routes					1.0E+01

* surface and subsurface combined

Total Vascular HI =	1.5E-02
Total Lung and Respiratory HI =	9.3E+00
Total NOAEL HI =	1.4E-01
Total Neural HI =	4.8E-02
Total Liver HI =	2.0E-01
Total Skin HI =	1.5E-02
Total Blood HI =	2.9E-01
Total Gastrointestinal HI =	1.2E-01
Total Immune System HI =	5.3E-03
Total Body HI =	5.7E-01
Total Kidney HI =	1.3E-03

TABLE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
								1,3,5-Trimethylbenzene	Liver	3.2E-03	--	3.7E-09	3.2E-03
								Benzene	Blood	4.9E-02	--	6.6E-03	5.6E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Naphthalene	Whole Body	6.6E-01	--	5.3E-01	1.2E+00
								n-Propylbenzene	N/A	3.3E-02	--	4.7E-06	3.3E-02
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		7.5E-01	0.0E+00	5.3E-01	1.3E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					1.3E+00
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					1.3E+00
Soil*	Soil*	Direct Contact											
								1,1,2-Trichloroethane	Blood	6.4E-06	--	5.2E-09	6.4E-06
								2-Methylnaphthalene	Whole Body	2.9E-02	--	4.7E-03	3.3E-02
								Acetone	Liver, Kidney	2.9E-04	--	1.4E-05	3.1E-04
								Aluminum	CNS	2.8E-01	--	1.4E-02	2.9E-01
								Antimony	Whole Body/Blood	2.4E-01	--	3.1E-02	2.7E-01
								Arsenic	Skin/Vascular	1.0E-01	--	4.5E-03	1.1E-01
								Benzene	Liver	3.8E-05	--	2.5E-08	3.8E-05
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Chromium, total	NOAEL	1.0E-01	--	1.4E-01	2.4E-01
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	3.8E-03	--	7.2E-04	4.6E-03
								Ethylbenzene	Liver, Kidney	8.2E-04	--	3.5E-05	8.5E-04
								Indeno(1,2,3-c,d)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/Blood/Liver	7.4E-01	--	4.8E-02	7.9E-01
								Methylene Chloride	Liver	1.0E-04	--	5.0E-06	1.1E-04
								Napthalene	Whole Body	2.0E-02	--	3.2E-03	2.3E-02
								PCB-1254	Immune System	2.8E-02	--	2.4E-03	3.0E-02
								Toluene	Liver, Kidney	1.1E-04	--	4.2E-06	1.1E-04
								Xylenes, total	Whole Body	2.8E-04	--	1.2E-05	2.9E-04
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.5E+00	0.0E+00	2.4E-01	1.8E+00

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil						1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
								2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
								Acetone	N/A	--	N/A	--	0.0E+00
								Aluminum	CNS	--	1.3E-02	--	1.3E-02
								Antimony	N/A	--	N/A	--	0.0E+00
								Arsenic	N/A	--	N/A	--	0.0E+00
								Benzene	N/A	--	3.1E-09	--	3.1E-09
								Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
								Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
								Chromium, total	Lung	--	4.7E-04	--	4.7E-04
								Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
								Dibenzofuran	N/A	--	N/A	--	0.0E+00
								Ethylbenzene	Development	--	1.3E-08	--	1.3E-08
								Indeno(1,2,3-c,d)pyrene	N/A	--	N/A	--	0.0E+00
								Iron	N/A	--	N/A	--	0.0E+00
								Methylene Chloride	Liver	--	3.2E-10	--	3.2E-10
								Napthalene	Respiratory	--	2.0E-05	--	2.0E-05
								PCB-1254	N/A	--	N/A	--	0.0E+00
								Toluene	Nervous System	--	8.8E-09	--	8.8E-09
								Xylenes, total	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	1.3E-02	0.0E+00	1.3E-02
						Total Risk Across Soil	0.0E+00					Total Hazard Index Across Soil	1.8E+00
						Total Risk Across All Media and All Exposure Routes	0.0E+00					Total Hazard Index Across All Media and All Exposure Routes	3.1E+00

* surface and subsurface combined

Total Vascular HI =	1.1E-01
Total NOAEL HI =	2.4E-01
Total Neural HI =	3.1E-01
Total Liver HI =	7.9E-01
Total Skin HI =	1.1E-01
Total Lung and Respiratory HI =	4.9E-04
Total Blood HI =	1.1E+00
Total Gastrointestinal HI =	7.9E-01
Total Immune System HI =	3.0E-02
Total Body HI =	1.5E+00
Total Kidney HI =	5.8E-r

TA[illegible]RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
			1,3,5-Trimethylbenzene	N/A	--	N/A	0.0E+00						
			Benzene	1.0E-06	--	1.3E-07	1.1E-06						
			Benzo(a)anthracene	2.5E-06	--	N/A	2.5E-06						
			Benzo(a)pyrene	2.2E-05	--	N/A	2.2E-05						
			Naphthalene	N/A	--	N/A	0.0E+00						
			n-Propylbenzene	N/A	--	N/A	0.0E+00						
			(Total)	2.5E-05	0	1.3E-07	2.5E-05	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Tap water				2.5E-05	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				2.5E-05	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact											
			1,1,2-Trichloroethane	1.8E-10	--	4.9E-13	1.8E-10						
			1-Methylnaphthalene	N/A	--	N/A	0.0E+00						
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00						
			Acetone	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Antimony	N/A	--	N/A	0.0E+00						
			Arsenic	5.6E-06	--	8.4E-07	6.5E-06						
			Benzene	4.1E-10	--	9.0E-13	4.1E-10						
			Benzo(a)pyrene	1.3E-05	--	N/A	1.3E-05						
			Benzo(b)fluoranthene	1.1E-06	--	N/A	1.1E-06						
			Chromium, total	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	3.0E-06	--	N/A	3.0E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Ethylbenzene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-c,d)pyrene	1.3E-06	--	N/A	1.3E-06						
			Iron	N/A	--	N/A	0.0E+00						
			Methylene Chloride	5.6E-09	--	9.3E-10	6.6E-09						
			Napthalene	N/A	--	N/A	0.0E+00						
			PCB-1254	1.4E-07	--	4.0E-08	1.8E-07						
			Toluene	N/A	--	N/A	0.0E+00						
			Xylenes, total	N/A	--	N/A	0.0E+00						
			(Total)	2.4E-05	0.0E+00	8.8E-07	2.5E-05	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil											
			1,1,2-Trichloroethane	--	1.4E-14	--	1.4E-14						
			1-Methylnaphthalene	--	N/A	--	0.0E+00						
			2-Methylnaphthalene	--	N/A	--	0.0E+00						
			Acetone	--	N/A	--	0.0E+00						
			Aluminum	--	N/A	--	0.0E+00						
			Antimony	--	N/A	--	0.0E+00						
			Arsenic	--	4.4E-09	--	4.4E-09						
			Benzene	--	3.2E-14	--	3.2E-14						
			Benzo(a)pyrene	--	4.2E-10	--	4.2E-10						
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00						
			Chromium, total	--	1.2E-07	--	1.2E-07						
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00						
			Dibenzofuran	--	N/A	--	0.0E+00						
			Ethylbenzene	--	N/A	--	0.0E+00						
			Indeno(1,2,3-c,d)pyrene	--	N/A	--	0.0E+00						
			Iron	--	N/A	--	0.0E+00						
			Methylene Chloride	--	9.7E-14	--	9.7E-14						
			Napthalene	--	N/A	--	0.0E+00						
			PCB-1254	--	1.1E-11	--	1.1E-11						
			Toluene	--	N/A	--	0.0E+00						
			Xylenes, total	--	N/A	--	0.0E+00						
			(Total)	0.0E+00	1.3E-07	0.0E+00	1.3E-07	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
						Total Risk Across Soil	2.5E-05					Total Hazard Index Across Soil	0.0E+00
						Total Risk Across All Media and All Exposure Routes	5.0E-05					Total Hazard Index Across All Media and All Exposure Routes	0.0E+00

* surface and subsurface combined

TAB[illegible]ME
SUMMARY OF RECEPTOR Ri[illegible] AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit											
			1,3,5-Trimethylbenzene	N/A	--	N/A	0.0E+00	1,3,5-Trimethylbenzene	Liver	N/A	--	2.1E-09	2.1E-09
			Benzene	N/A	--	9.9E-09	9.9E-09	Benzene	Blood	N/A	--	8.0E-03	8.0E-03
			Benzo(a)anthracene	N/A	--	N/A	0.0E+00	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	N/A	--	N/A	0.0E+00	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Naphthalene	N/A	--	N/A	0.0E+00	Naphthalene	Whole Body	N/A	--	4.3E-01	4.3E-01
			n-Propylbenzene	N/A	--	N/A	0.0E+00	n-Propylbenzene	N/A	N/A	--	2.7E-06	2.7E-06
			(Total)	0.0E+00	--	9.9E-09	9.9E-09	(Total)		0.0E+00	--	4.3E-01	4.3E-01
			Total Risk Across Water in Pit				9.9E-09	Total Hazard Index Across Water in Pit					4.3E-01
Groundwater	Air	Columbia Aquifer-Volatilization from water in Excavation Pit											
			1,3,5-Trimethylbenzene	--	N/A	--	0.0E+00	1,3,5-Trimethylbenzene	Liver	--	1.8E-03	--	1.8E-03
			Benzene	--	1.2E-09	--	1.2E-09	Benzene	Blood	--	1.8E-03	--	1.8E-03
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	2.4E-10	--	2.4E-10	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	2.7E-01	--	2.7E-01
			n-Propylbenzene	--	N/A	--	0.0E+00	n-Propylbenzene	N/A	--	N/A	--	0.0E+00
			(Total)	--	1.5E-09	--	1.5E-09	(Total)		--	2.7E-01	--	2.7E-01
			Total Risk Across Vapors at Pit				1.5E-09	Total Risk Across Vapors at Pit					2.7E-01
	All Media		Total Risk Across Groundwater				1.1E-08	Total Hazard Index Across Groundwater					7.0E-01

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil	Direct Contact											
			1,1,2-Trichloroethane	7.6E-12	--	1.4E-14	7.7E-12	1,1,2-Trichloroethane	Blood	2.3E-07	--	4.4E-10	2.4E-07
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00	2-Methylnaphthalene	Whole Body	1.1E-02	--	4.0E-03	1.5E-02
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	1.1E-05	--	1.2E-06	1.2E-05
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	1.0E-01	--	1.1E-02	1.1E-01
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	8.8E-02	--	2.6E-02	1.1E-01
			Arsenic	2.4E-07	--	2.4E-08	2.7E-07	Arsenic	Skin/Vascular	3.8E-02	--	3.8E-03	4.1E-02
			Benzene	1.8E-11	--	2.6E-14	1.8E-11	Benzene	Liver	1.4E-05	--	2.1E-08	1.4E-05
			Benzo(a)pyrene	5.4E-07	--	N/A	5.4E-07	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	4.8E-08	--	N/A	4.8E-08	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Chromium, total	N/A	--	N/A	0.0E+00	Chromium, total	NOAEL	5.7E-03	--	1.7E-02	2.3E-02
			Dibenz(a,h)anthracene	1.3E-07	--	N/A	1.3E-07	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	1.4E-03	--	6.0E-04	2.0E-03
			Ethylbenzene	N/A	--	N/A	0.0E+00	Ethylbenzene	Liver, Kidney	3.0E-04	--	2.9E-05	3.3E-04
			Indeno(1,2,3-c,d)pyrene	5.4E-08	--	N/A	5.4E-08	Indeno(1,2,3-c,d)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	2.7E-01	--	4.1E-02	3.1E-01
			Methylene Chloride	2.4E-10	--	2.7E-11	2.7E-10	Methylene Chloride	Liver	3.8E-05	--	4.2E-06	4.2E-05
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	7.3E-03	--	2.7E-03	1.0E-02
			PCB-1254	5.8E-09	--	1.2E-09	7.0E-09	PCB-1254	Immune System	4.1E-03	--	8.2E-04	4.9E-03
			Toluene	N/A	--	N/A	0.0E+00	Toluene	Liver, Kidney	3.9E-06	--	3.5E-07	4.3E-06
			Xylenes, total	N/A	--	N/A	0.0E+00	Xylenes, total	Whole Body	1.0E-04	--	1.0E-05	1.1E-04
			(Total)	1.0E-06	0.0E+00	2.6E-08	1.0E-06	(Total)		5.3E-01	0.0E+00	1.1E-01	6.4E-01

TAB[illegible]ME
SUMMARY OF RECEPTOR R[illegible] AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
	Air	Emissions from exposed soil											
			1,1,2-Trichloroethane	--	2.4E-16	--	2.4E-16	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			2-Methylnaphthalene	--	N/A	--	0.0E+00	2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	3.3E-03	--	3.3E-03
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	7.7E-11	--	7.7E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	5.5E-16	--	5.5E-16	Benzene	N/A	--	7.8E-10	--	7.8E-10
			Benzo(a)pyrene	--	7.2E-12	--	7.2E-12	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Chromium, total	--	2.1E-09	--	2.1E-09	Chromium, total	Lung	--	1.2E-04	--	1.2E-04
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	3.3E-09	--	3.3E-09
			Indeno(1,2,3-c,d)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-c,d)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	1.7E-15	--	1.7E-15	Methylene Chloride	Liver	--	8.3E-11	--	8.3E-11
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	5.1E-06	--	5.1E-06
			PCB-1254	--	1.8E-13	--	1.8E-13	PCB-1254	N/A	--	N/A	--	0.0E+00
			Toluene	--	N/A	--	0.0E+00	Toluene	Nervous System	--	2.2E-09	--	2.2E-09
			Xylenes, total	--	N/A	--	0.0E+00	Xylenes, total	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	2.2E-09	0.0E+00	2.2E-09	(Total)		0.0E+00	3.4E-03	0.0E+00	3.4E-03
						Total Risk Across Soil	1.0E-06					Total Risk Across Soil	6.4E-01
			Total Risk Across All Media and All Exposure Routes				1.1E-06	Total Hazard Index Across All Media and All Exposure Routes					1.3E+00

Total Vascular HI =	4.1E-02
Total NOAEL HI =	2.3E-02
Total Neural HI =	1.2E-01
Total Liver HI =	3.1E-01
Total Skin HI =	4.1E-02
Total Lung and Respiratory HI =	2.7E-01
Total Blood HI =	4.4E-01
Total Gastrointestinal HI =	3.1E-01
Total Immune System HI =	4.9E-03
Total Body HI =	5.6E-01
Total Kidney HI =	2.4E-03

TABLE 9.8 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact											
			1,1,2-Trichloroethane	4.0E-11	--	4.6E-13	4.0E-11	1,1,2-Trichloroethane	Blood	4.9E-07	--	5.7E-09	4.9E-07
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00	2-Methylnaphthalene	Whole Body	2.2E-03	--	5.1E-03	7.3E-03
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	2.3E-05	--	1.5E-05	3.8E-05
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	2.2E-02	--	1.5E-02	3.6E-02
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	1.8E-02	--	3.4E-02	5.2E-02
			Arsenic	1.3E-06	--	7.9E-07	2.0E-06	Arsenic	Skin/Vascular	7.8E-03	--	4.9E-03	1.3E-02
			Benzene	9.1E-11	--	8.5E-13	9.2E-11	Benzene	Liver	2.9E-06	--	2.7E-08	3.0E-06
			Benzo(a)pyrene	2.8E-06	--	N/A	2.8E-06	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	2.5E-07	--	N/A	2.5E-07	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Chromium, total	N/A	--	N/A	0.0E+00	Chromium, total	NOAEL	8.0E-03	--	1.5E-01	1.6E-01
			Dibenz(a,h)anthracene	6.6E-07	--	N/A	6.6E-07	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	2.9E-04	--	7.8E-04	1.1E-03
			Ethylbenzene	N/A	--	N/A	0.0E+00	Ethylbenzene	Liver, Kidney	6.3E-05	--	3.8E-05	1.0E-04
			Indeno(1,2,3-c,d)pyrene	2.8E-07	--	N/A	2.8E-07	Indeno(1,2,3-c,d)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	5.6E-02	--	5.2E-02	1.1E-01
			Methylene Chloride	1.3E-09	--	8.8E-10	2.1E-09	Methylene Chloride	Liver	7.8E-06	--	5.5E-06	1.3E-05
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	1.5E-03	--	3.5E-03	5.0E-03
			PCB-1254	3.0E-08	--	3.8E-08	6.8E-08	PCB-1254	Immune System	2.1E-03	--	2.6E-03	4.8E-03
			Toluene	N/A	--	N/A	0.0E+00	Toluene	Liver, Kidney	8.1E-06	--	4.5E-06	1.3E-05
			Xylenes, total	N/A	--	N/A	0.0E+00	Xylenes, total	Whole Body	2.2E-05	--	1.3E-05	3.5E-05
			(Total)	5.3E-06	0.0E+00	8.3E-07	6.1E-06	(Total)		1.2E-01	0.0E+00	2.7E-01	3.8E-01
	Air	Emissions from exposed soil											
			1,1,2-Trichloroethane	--	2.0E-15	--	2.0E-15	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			2-Methylnaphthalene	--	N/A	--	0.0E+00	2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	1.1E-03	--	1.1E-03
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	6.4E-10	--	6.4E-10	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	4.6E-15	--	4.6E-15	Benzene	N/A	--	2.6E-10	--	2.6E-10
			Benzo(a)pyrene	--	6.0E-11	--	6.0E-11	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00

TABL ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Chromium, total	--	1.8E-08	--	1.8E-08	Chromium, total	Lung	--	4.0E-05	--	4.0E-05
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	1.1E-09	--	1.1E-09
			Indeno(1,2,3-c,d)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-c,d)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	1.4E-14	--	1.4E-14	Methylene Chloride	Liver	--	2.8E-11	--	2.8E-11
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	1.7E-06	--	1.7E-06
			PCB-1254	--	1.5E-12	--	1.5E-12	PCB-1254	N/A	--	N/A	--	0.0E+00
			Toluene	--	N/A	--	0.0E+00	Toluene	Nervous System	--	7.4E-10	--	7.4E-10
			Xylenes, total	--	N/A	--	0.0E+00	Xylenes, total	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	1.8E-08	0.0E+00	1.8E-08	(Total)		0.0E+00	1.1E-03	0.0E+00	1.1E-03
			Total Risk Across Subsurface Soil				6.1E-06	Total Risk Across Subsurface Soil					3.9E-01
			Total Risk Across All Media and All Exposure Routes				6.1E-06	Total Hazard Index Across All Media and All Exposure Routes					3.9E-01

Total Blood HI =	1.6E-01
Total Liver HI =	1.1E-01
Total Vascular HI =	1.3E-02
Total NOAEL HI =	1.6E-01
Total Neural HI =	3.7E-02
Total Skin HI =	1.3E-02
Total Lung and Respiratory HI =	4.2E-05
Total Gastrointestinal HI =	1.1E-01
Total Immune System HI =	4.8E-03
Total Body HI =	6.4E-02
Total Kidney HI =	1.2E-03

TABLE 9.9 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)	N/A	0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	5.5E-07	--	3.6E-07	9.2E-07	Arsenic	Skin/Vascular	3.6E-03	--	2.3E-03	5.9E-03
			(Total)	5.5E-07	0.0E+00	3.6E-07	9.2E-07	(Total)		3.6E-03	0.0E+00	2.3E-03	5.9E-03
			Total Risk Across Sediment				9.2E-07	Total Risk Across Sediment					5.9E-03
Soil*	Soil*	Direct Contact	1,1,2-Trichloroethane	8.0E-12	--	5.8E-14	8.0E-12	1,1,2-Trichloroethane	Blood	1.0E-07	--	7.4E-10	1.0E-07
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00	2-Methylnaphthalene	Whole Body	4.6E-04	--	6.6E-04	1.1E-03
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	4.7E-06	--	2.0E-06	6.6E-06
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	4.5E-03	--	1.9E-03	6.4E-03
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	3.8E-03	--	4.4E-03	8.2E-03
			Arsenic	2.5E-07	--	9.8E-08	3.5E-07	Arsenic	Skin/Vascular	1.6E-03	--	6.4E-04	2.3E-03
			Benzene	1.8E-11	--	1.1E-13	1.8E-11	Benzene	Liver	6.1E-07	--	3.5E-09	6.1E-07
			Benzo(a)pyrene	5.6E-07	--	N/A	5.6E-07	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	4.9E-08	--	N/A	4.9E-08	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Chromium, total	N/A	--	N/A	0.0E+00	Chromium, total	NOAEL	1.7E-03	--	1.9E-02	2.1E-02
			Dibenz(a,h)anthracene	1.3E-07	--	N/A	1.3E-07	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	6.1E-05	--	1.0E-04	1.6E-04
			Ethylbenzene	N/A	--	N/A	0.0E+00	Ethylbenzene	Liver, Kidney	1.3E-05	--	4.9E-06	1.8E-05
			Indeno(1,2,3-c,d)pyrene	5.6E-08	--	N/A	5.6E-08	Indeno(1,2,3-c,d)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	1.2E-02	--	6.8E-03	1.9E-02
			Methylene Chloride	2.5E-10	--	1.1E-10	3.6E-10	Methylene Chloride	Liver	1.6E-06	--	7.1E-07	2.3E-06
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	3.2E-04	--	4.6E-04	7.7E-04
			PCB-1254	6.0E-09	--	4.7E-09	1.1E-08	PCB-1254	Immune System	4.4E-04	--	3.4E-04	7.8E-04
			Toluene	N/A	--	N/A	0.0E+00	Toluene	Liver, Kidney	1.7E-06	--	5.9E-07	2.3E-06
			Xylenes, total	N/A	--	N/A	0.0E+00	Xylenes, total	Whole Body	4.5E-06	--	1.7E-06	6.2E-06
			(Total)	1.1E-06	0.0E+00	1.0E-07	1.2E-06	(Total)		2.5E-02	0.0E+00	3.5E-02	5.9E-02

TAB ME

SUMMARY OF RECEPTOR RIS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Tota
Soil*	Air	Emissions from exposed soil											
			1,1,2-Trichloroethane	--	8.8E-17	--	8.8E-17	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			2-Methylnaphthalene	--	N/A	--	0.0E+00	2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	5.1E-05	--	5.1E-05
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	2.9E-11	--	2.9E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	2.1E-16	--	2.1E-16	Benzene	N/A	--	1.2E-11	--	1.2E-11
			Benzo(a)pyrene	--	2.7E-12	--	2.7E-12	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Chromium, total	--	7.9E-10	--	7.9E-10	Chromium, total	Lung	--	1.9E-06	--	1.9E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	5.1E-11	--	5.1E-11
			Indeno(1,2,3-c,d)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-c,d)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	6.3E-16	--	6.3E-16	Methylene Chloride	Liver	--	1.3E-12	--	1.3E-12
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	7.9E-08	--	7.9E-08
			PCB-1254	--	6.8E-14	--	6.8E-14	PCB-1254	N/A	--	N/A	--	0.0E+00
			Toluene	--	N/A	--	0.0E+00	Toluene	Nervous System	--	3.5E-11	--	3.5E-11
			Xylenes, total	--	N/A	--	0.0E+00	Xylenes, total	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	8.2E-10	0.0E+00	8.2E-10	(Total)		0.0E+00	5.3E-05	0.0E+00	5.3E-05
			Total Risk Across Subsurface Soil				1.2E-06	Total Risk Across Subsurface Soil					5.9E-02
			Total Risk Across All Media and All Exposure Routes				2.1E-06	Total Hazard Index Across All Media and All Exposure Routes					6.5E-02

* surface and subsurface combined

Total Vascular HI =	8.2E-03
Total Blood HI =	2.7E-02
Total Liver HI =	1.9E-02
Total NOAEL HI =	2.1E-02
Total Neural HI =	6.5E-03
Total Skin HI =	8.2E-03
Total Lung and Respiratory HI =	2.0E-05
Total Gastrointestinal HI =	1.9E-02
Total Immune System HI =	7.8E-04
Total Body HI =	1.0E-02
Total Kidney HI =	1.7E-04

TABLE 9.10 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)					(Total)					
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	2.9E-07	--	4.7E-08	3.3E-07	Arsenic	Skin/Vascular	4.9E-03	--	8.0E-04	5.7E-03
			(Total)	2.9E-07	0.0E+00	4.7E-08	3.3E-07	(Total)		4.9E-03	0.0E+00	8.0E-04	5.7E-03
			Total Risk Across Sediment				3.3E-07	Total Risk Across Sediment					5.7E-03
Soil*	Soil	Direct Contact	1,1,2-Trichloroethane	4.1E-12	--	1.5E-13	4.2E-12	1,1,2-Trichloroethane	Blood	1.4E-07	--	5.1E-09	1.4E-07
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00	2-Methylnaphthalene	Whole Body	6.3E-04	--	4.6E-03	5.2E-03
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	6.4E-06	--	1.3E-05	2.0E-05
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	6.1E-03	--	1.3E-02	1.9E-02
			Antimony	N/A	--	N/A	0.0E+00	Antimony	Whole Body/Blood	5.2E-03	--	3.0E-02	3.5E-02
			Arsenic	1.3E-07	--	2.5E-07	3.8E-07	Arsenic	Skin/Vascular	2.2E-03	--	4.4E-03	6.6E-03
			Benzene	9.4E-12	--	2.7E-13	9.6E-12	Benzene	Liver	8.4E-07	--	2.4E-08	8.6E-07
			Benzo(a)pyrene	2.9E-07	--	N/A	2.9E-07	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	2.5E-08	--	N/A	2.5E-08	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Chromium, total	N/A	--	N/A	0.0E+00	Chromium, total	NOAEL	2.3E-03	--	1.3E-01	1.3E-01
			Dibenz(a,h)anthracene	6.8E-08	--	N/A	6.8E-08	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	8.4E-05	--	6.9E-04	7.8E-04
			Ethylbenzene	N/A	--	N/A	0.0E+00	Ethylbenzene	Liver, Kidney	1.8E-05	--	3.4E-05	5.2E-05
			Indeno(1,2,3-c,d)pyrene	2.9E-08	--	N/A	2.9E-08	Indeno(1,2,3-c,d)pyren	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	1.6E-02	--	4.7E-02	6.3E-02
			Methylene Chloride	1.3E-10	--	2.8E-10	4.1E-10	Methylene Chloride	Liver	2.2E-06	--	4.9E-06	7.1E-06
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	4.3E-04	--	3.1E-03	3.6E-03
			PCB-1254	3.1E-09	--	1.2E-08	1.5E-08	PCB-1254	Immune System	6.0E-04	--	2.4E-03	3.0E-03
			Toluene	N/A	--	N/A	0.0E+00	Toluene	Liver, Kidney	2.3E-06	--	4.0E-06	6.4E-06
			Xylenes, total	N/A	--	N/A	0.0E+00	Xylenes, total	Whole Body	6.1E-06	--	1.2E-05	1.8E-05
			(Total)	5.4E-07	0.0E+00	2.7E-07	8.1E-07	(Total)		3.4E-02	0.0E+00	2.3E-01	2.7E-01

TABL ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil											
			1,1,2-Trichloroethane	--	4.6E-17	--	4.6E-17	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			2-Methylnaphthalene	--	N/A	--	0.0E+00	2-Methylnaphthalene	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	7.0E-05	--	7.0E-05
			Antimony	--	N/A	--	0.0E+00	Antimony	N/A	--	N/A	--	0.0E+00
			Arsenic	--	1.5E-11	--	1.5E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	1.1E-16	--	1.1E-16	Benzene	N/A	--	1.7E-11	--	1.7E-11
			Benzo(a)pyrene	--	1.4E-12	--	1.4E-12	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Chromium, total	--	4.1E-10	--	4.1E-10	Chromium, total	Lung	--	2.6E-06	--	2.6E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	7.0E-11	--	7.0E-11
			Indeno(1,2,3-c,d)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-c,d)pyren	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Methylene Chloride	--	3.2E-16	--	3.2E-16	Methylene Chloride	Liver	--	1.8E-12	--	1.8E-12
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	1.1E-07	--	1.1E-07
			PCB-1254	--	3.5E-14	--	3.5E-14	PCB-1254	N/A	--	N/A	--	0.0E+00
			Toluene	--	N/A	--	0.0E+00	Toluene	Nervous System	--	4.8E-11	--	4.8E-11
			Xylenes, total	--	N/A	--	0.0E+00	Xylenes, total	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	4.2E-10	0.0E+00	4.2E-10	(Total)		0.0E+00	7.2E-05	0.0E+00	7.2E-05
			Total Risk Across Subsurface Soil				8.1E-07	Total Risk Across Subsurface Soil					2.7E-01
			Total Risk Across All Media and All Exposure Routes				1.1E-06	Total Hazard Index Across All Media and All Exposure Routes					2.7E-01

* surface and subsurface combined

Total vascular HI =	1.2E-02
Total Blood HI =	9.8E-02
Total Liver HI =	6.3E-02
Total NOAEL HI =	1.3E-01
Total Neural HI =	1.9E-02
Total Skin HI =	1.2E-02
Total Lung and Respiratory HI =	2.7E-06
Total Gastrointestinal HI =	6.3E-02
Total Immune System HI =	3.0E-03
Total Body HI =	4.4E-02
Total Kidney HI =	8.6E-04

TABLE 9.11.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead						1,3,5-Trimethylbenzene	N/A	--	5.1E-02	--	5.1E-02
								Benzene	Blood	--	5.6E-02	--	5.6E-02
								Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
								Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
								Naphthalene	Respiratory	--	6.2E+00	--	6.2E+00
								n-Propylbenzene	N/A	--	N/A	--	0.0E+00
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	6.3E+00	0.0E+00	6.3E+00
			Total Risk Across Vapors at Showerhead				0.0E+00	Total Hazard Index Across Vapors at Showerhead					6.3E+00
	All Media		Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					6.3E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					6.3E+00

Total Blood HI =	5.6E-02
Total Respiratory HI =	6.2E+00

TAB CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						1,3,5-Trimethylbenzene	N/A	2.1E-03	--	2.2E-09	2.1E-03
								Benzene	Blood	3.3E-02	--	3.9E-03	3.7E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Naphthalene	Whole Body	4.4E-01	--	3.1E-01	7.5E-01
								n-Propylbenzene	N/A	2.2E-02	--	2.7E-06	2.2E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		5.0E-01	0.0E+00	3.1E-01	8.2E-01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					8.2E-01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					8.2E-01
Soil*	Soil*	Direct Contact						1,1,2-Trichloroethane	Blood	2.1E-06	--	5.6E-09	2.1E-06
								2-Methylnaphthalene	Whole Body	9.6E-03	--	5.0E-03	1.5E-02
								Acetone	Liver, Kidney	9.8E-05	--	1.5E-05	1.1E-04
								Aluminum	CNS	9.4E-02	--	1.5E-02	1.1E-01
								Antimony	Whole Body/Blood	8.0E-02	--	3.3E-02	1.1E-01
								Arsenic	Skin/Vascular	3.4E-02	--	4.8E-03	3.9E-02
								Benzene	Liver	1.3E-05	--	2.7E-08	1.3E-05
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Chromium, total	NOAEL	3.5E-02	--	1.5E-01	1.8E-01
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	1.3E-03	--	7.7E-04	2.0E-03
								Ethylbenzene	Liver, Kidney	2.7E-04	--	3.7E-05	3.1E-04
								Indeno(1,2,3-c,d)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/Blood/Liver	2.5E-01	--	5.2E-02	3.0E-01
								Methylene Chloride	Liver	3.4E-05	--	5.4E-06	4.0E-05
								Napthalene	Whole Body	6.6E-03	--	3.5E-03	1.0E-02
								PCB-1254	Immune System	9.2E-03	--	2.6E-03	1.2E-02
								Toluene	Liver, Kidney	3.6E-05	--	4.5E-06	4.0E-05
								Xylenes, total	Whole Body	9.4E-05	--	1.3E-05	1.1E-04
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		5.2E-01	0.0E+00	2.6E-01	7.8E-01
			Total Risk Across Subsurface Soil				0.0E+00	Total Hazard Index Across Subsurface Soil					7.8E-01

TABLE 9.12.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Total Risk Across All Media and All Exposure Routes							0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					1.6E+00

* surface and subsurface combined

Total Liver HI =	3.0E-01
Total Vascular HI =	3.9E-02
Total NOAEL HI =	1.8E-01
Total Neural HI =	1.1E-01
Total Skin HI =	3.9E-02
Total Blood HI =	4.5E-01
Total Gastrointestinal HI =	3.0E-01
Total Immune System HI =	1.2E-02
Total Body HI =	7.8E-01
Total Kidney HI =	2.5E-03

TABL[illegible]CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
			1,3,5-Trimethylbenzene	N/A	--	N/A	0.0E+00						
			Benzene	3.6E-07	--	7.0E-08	4.3E-07						
			Benzo(a)anthracene	8.9E-07	--	N/A	8.9E-07						
			Benzo(a)pyrene	7.8E-06	--	N/A	7.8E-06						
			Naphthalene	N/A	--	N/A	0.0E+00						
			n-Propylbenzene	N/A	--	N/A	0.0E+00						
			(Total)	9.0E-06	0.0E+00	7.0E-08	9.1E-06	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Tap water				9.1E-06	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				9.1E-06	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact											
			1,1,2-Trichloroethane	4.8E-11	--	1.4E-13	4.9E-11						
			1-Methylnaphthalene	N/A	--	N/A	0.0E+00						
			2-Methylnaphthalene	N/A	--	N/A	0.0E+00						
			Acetone	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Antimony	N/A	--	N/A	0.0E+00						
			Arsenic	1.5E-06	--	2.5E-07	1.8E-06						
			Benzene	1.1E-10	--	2.6E-13	1.1E-10						
			Benzo(a)pyrene	3.4E-06	--	N/A	3.4E-06						
			Benzo(b)fluoranthene	3.0E-07	--	N/A	3.0E-07						
			Chromium, total	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	8.1E-07	--	N/A	8.1E-07						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Ethylbenzene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-c,d)pyrene	3.4E-07	--	N/A	3.4E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Methylene Chloride	1.5E-09	--	2.7E-10	1.8E-09						
			Napthalene	N/A	--	N/A	0.0E+00						
			PCB-1254	3.7E-08	--	1.2E-08	4.9E-08						
			Toluene	N/A	--	N/A	0.0E+00						
			Xylenes, total	N/A	--	N/A	0.0E+00						
			(Total)	6.4E-06	0.0E+00	2.6E-07	6.7E-06	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil				6.7E-06	Total Hazard Index Across Soil					0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.6E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABLE 10.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead						Naphthalene	Respiratory	--	9.3E+00	--	9.3E+00
			(Total)	0	0.0E+00	0	0.0E+00	(Total)		0	9.3E+00	0	9.3E+00
			Total Risk Across Vapors at Showerhead				0.0E+00	Total Hazard Index Across Vapors at Showerhead					9.3E+00
	All Media		Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					9.3E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					9.3E+00

Total Respiratory HI = 9.3E+00

TABL RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Naphthalene	Whole Body	6.6E-01	--	5.3E-01	1.2E+00
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		6.6E-01	0	5.3E-01	1.2E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					1.2E+00
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					1.2E+00
Soil*	Soil*	Direct Contact						Aluminum	CNS	2.8E-01	--	1.4E-02	2.9E-01
								Antimony	Whole Body	2.4E-01	--	3.1E-02	2.7E-01
								Arsenic	Skin	1.0E-01	--	4.5E-03	1.1E-01
								Chromium, total	NOEL	1.0E-01	--	1.4E-01	2.4E-01
								Iron	Gastrointestinal	7.4E-01	--	4.8E-02	7.9E-01
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.5E+00	0.0E+00	2.3E-01	1.7E+00
			Total Risk Across Subsurface Soil				0.0E+00	Total Hazard Index Across Subsurface Soil					1.7E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					2.9E+00

* surface and subsurface combined

Total NOEL HI =	2.4E-01
Total Neural HI =	2.9E-01
Total Skin HI =	1.1E-01
Total Gastrointestinal HI =	7.9E-01
Total Body HI =	1.5E+00

TABLE 10.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Tota
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
			Benzo(a)anthracene	2.5E-06	--	N/A	2.5E-06						
			Benzo(a)pyrene	2.2E-05	--	N/A	2.2E-05						
			(Total)	2.4E-05	0	0.0E+00	2.4E-05	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				2.4E-05	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				2.4E-05	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact											
			Arsenic	5.6E-06	--	8.4E-07	6.5E-06						
			Benzo(a)pyrene	1.3E-05	--	N/A	1.3E-05						
			Dibenz(a,h)anthracene	3.0E-06	--	N/A	3.0E-06						
			(Total)	1.6E-05	0.0E+00	8.4E-07	2.2E-05	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Subsurface Soil				2.2E-05	Total Hazard Index Across Subsurface Soil					0.0E+00
			Total Risk Across All Media and All Exposure Routes				4.6E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TA J.4.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 1

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead						Naphthalene	Respiratory	--	6.2E+00	--	6.2E+00
			(Total)	0	0.0E+00	0	0.0E+00	(Total)		0	6.2E+00	0	6.2E+00
			Total Risk Across Vapors at Showerhead				0.0E+00	Total Hazard Index Across Vapors at Showerhead					6.2E+00
	All Media		Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					6.2E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					6.2E+00

Total Respiratory HI = 6.2E+00

Table B-1-1
Summary of the Analtyical Results for All Constituents Sampled in the Surface Soil
SWMU 15
NAS Oceana

AnalyteName	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09
VOA (ug/kg)				
1,1,1-Trichloroethane	12 U	12 U	12 U	11 U
1,1,2,2-Tetrachloroethane	12 U	12 U	12 U	11 U
1,1,2-Trichloroethane	12 U	12 U	12 U	11 U
1,1-Dichloroethane	12 U	12 U	12 U	11 U
1,1-Dichloroethene	12 U	12 U	12 U	11 U
1,2-Dichloroethane	12 U	12 U	12 U	11 U
1,2-Dichloroethene (total)	12 U	12 U	12 U	11 U
1,2-Dichloropropane	12 U	12 U	12 U	11 U
2-Butanone	12 U	12 U	12 U	11 U
2-Hexanone	12 U	12 U	12 U	11 U
4-Methyl-2-pentanone	12 U	12 U	12 U	11 U
Acetone	12 UJ	12 UJ	12 UJ	11 UJ
Benzene	12 U	12 U	12 U	11 U
Bromodichloromethane	12 U	12 U	12 U	11 U
Bromoform	12 U	12 U	12 U	11 U
Bromomethane	12 U	12 U	12 U	11 U
Carbon disulfide	12 U	12 U	12 U	11 U
Carbon tetrachloride	12 U	12 U	12 U	11 U
Chlorobenzene	12 U	12 U	12 U	11 U
Chloroethane	12 U	12 U	12 U	11 U
Chloroform	1 B	1 B	12 U	2 B
Chloromethane	12 U	12 U	12 U	11 U
Dibromochloromethane	12 U	12 U	12 U	11 U
Ethylbenzene	12 U	12 U	12 U	11 U
Methylene chloride	10 B	11 B	11 B	10 B
Styrene	12 U	12 U	12 U	11 U
Tetrachloroethene	12 U	12 U	12 U	11 U
Toluene	12 U	12 U	12 U	11 U
Trichloroethene	12 U	12 U	12 U	11 U
Vinyl chloride	12 U	12 U	12 U	11 U
Xylene, total	12 U	12 U	12 U	11 U
cis-1,3-Dichloropropene	12 U	12 U	12 U	11 U
trans-1,3-Dichloropropene	12 U	12 U	12 U	11 U
SVOA (ug/kg)				
1,2,4-Trichlorobenzene	390 U	4200 U	420 U	380 U
1,2-Dichlorobenzene	390 U	4200 U	420 U	380 U
1,3-Dichlorobenzene	390 U	4200 U	420 U	380 U
1,4-Dichlorobenzene	390 U	4200 U	420 U	380 U
2,2'-Oxybis(1-chloropropane)	390 U	4200 U	420 U	380 U
2,4,5-Trichlorophenol	980 U	10000 U	1000 U	950 U
2,4,6-Trichlorophenol	390 U	4200 U	420 U	380 U
2,4-Dichlorophenol	390 U	4200 U	420 U	380 U
2,4-Dimethylphenol	390 U	4200 U	420 U	380 U
2,4-Dinitrophenol	980 U	10000 U	1000 U	950 U
2,4-Dinitrotoluene	390 U	4200 U	420 U	380 U
2,6-Dinitrotoluene	390 U	4200 U	420 U	380 U
2-Chloronaphthalene	390 U	4200 U	420 U	380 U
2-Chlorophenol	390 U	4200 U	420 U	380 U
2-Methylnaphthalene	390 U	700 J	420 U	380 U
2-Methylphenol	390 U	4200 U	420 U	380 U
2-Nitroaniline	980 U	10000 U	1000 U	950 U
2-Nitrophenol	390 U	4200 U	420 U	380 U
3,3'-Dichlorobenzidine	390 U	4200 U	420 U	380 U
3-Nitroaniline	980 U	10000 U	1000 U	950 U
4,6-Dinitro-2-methylphenol	980 U	10000 U	1000 U	950 U
4-Bromophenyl-phenylether	390 U	4200 U	420 U	380 U
4-Chloro-3-methylphenol	390 U	4200 U	420 U	380 U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected

Table B-1-1
Summary of the Analtyical Results for All Constituents Sampled in the Surface Soil
SWMU 15
NAS Oceana

AnalyteName	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09
4-Chloroaniline	390 U	4200 U	420 U	380 U
4-Chlorophenyl-phenylether	390 U	4200 U	420 U	380 U
4-Methylphenol	390 U	4200 U	420 U	380 U
4-Nitroaniline	980 U	10000 U	1000 U	950 U
4-Nitrophenol	980 U	10000 U	1000 U	950 U
Acenaphthene	3670.941	33939.031 J	420 U	717.392 J
Acenaphthylene	390 U	4099.26 U	420 U	380 U
Anthracene	389.136 U	3200 J	413.523 UJ	70 J
Benzo(a)anthracene	1107.893 J	22953.562 J	174.251 J	320 J
Benzo(a)pyrene	250 J	29000 J	413.523 U	460 J
Benzo(b)fluoranthene	48510.421 J	40000	420 U	420 J
Benzo(g,h,i)perylene	160 J	203419.32	420 U	400 J
Benzo(k)fluoranthene	150 J	16000 J	420 U	280 J
Butylbenzylphthalate	390 U	4200 U	420 U	380 U
Carbazole	390 U	2000 J	420 U	44 J
Chrysene	2016.482 J	44087.385 J	345.952 J	330 J
Di-n-butylphthalate	65 J	4200 U	420 U	380 U
Di-n-octyl phthalate	390 U	4200 UJ	420 U	380 UJ
Dibenz(a,h)anthracene	390 U	33753.476 J	420 U	380 UJ
Dibenzofuran	390 U	830 J	420 U	380 U
Diethylphthalate	70 J	4200 U	57 J	130 J
Dimethyl phthalate	390 U	4200 U	420 U	380 U
Fluoranthene	95662.473 J	279887.93 J	14611.16	410 J
Fluorene	1532.96 U	1561140.92 J	420 U	380 U
Hexachlorobenzene	390 U	4200 U	420 U	380 U
Hexachlorobutadiene	390 U	4200 U	420 U	380 U
Hexachlorocyclopentadiene	390 U	4200 U	420 U	380 U
Hexachloroethane	390 U	4200 U	420 U	380 U
Indeno(1,2,3-cd)pyrene	140 J	16000 J	420 U	340 J
Isophorone	390 U	4200 U	420 U	380 U
Naphthalene	390 U	2700 J	420 U	380 U
Nitrobenzene	390 U	4200 U	420 U	380 U
Pentachlorophenol	980 U	10000 U	1000 U	950 U
Phenanthrene	1742.926	16278.944 J	213.027 U	290 J
Phenol	390 U	4200 U	420 U	380 U
Pyrene	320.575 J	21000	46.414	710
bis(2-Chloroethoxy)methane	390 U	4200 U	420 U	380 U
bis(2-Chloroethyl)ether	390 U	4200 U	420 U	380 U
bis(2-Ethylhexyl)phthalate	51 B	4200 U	420 U	380 U
n-Nitroso-di-n-propylamine	390 U	4200 U	420 U	380 U
n-Nitrosodiphenylamine	390 U	4200 U	420 U	380 U
Pesticides/ PCBs (ug/kg)				
4,4'-DDD	3.9 U	4.1 U	4.2 U	3.8 U
4,4'-DDE	3.9 U	4.1 U	4.2 U	0.67 J
4,4'-DDT	3.9 U	4.1 U	4.2 U	1.7 J
Aldrin	2 U	2.1 U	2.1 U	1.9 U
Aroclor-1016	39 U	41 U	42 U	38 U
Aroclor-1221	79 U	83 U	83 U	75 U
Aroclor-1232	39 U	41 U	42 U	38 U
Aroclor-1242	39 U	41 U	42 U	38 U
Aroclor-1248	39 U	41 U	42 U	38 U
Aroclor-1254	39 U	41 U	450	38 U
Aroclor-1260	39 U	41 U	420	38 U
Dieldrin	9.2	2.1 J	4.2 U	15
Endosulfan I	2 U	2.1 U	2.1 U	1.9 U
Endosulfan II	3.9 U	4.1 U	4.2 U	3.8 U
Endosulfan sulfate	3.9 U	4.1 U	4.2 U	3.8 U
Endrin	3.9 U	4.1 U	4.2 U	3.8 U

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected

Table B-1-1
Summary of the Analtyical Results for All Constituents Sampled in the Surface Soil
SWMU 15
NAS Oceana

AnalyteName	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09
Endrin aldehyde	3.9 U	4.1 U	4.2 U	3.8 U
Endrin ketone	3.9 U	4.1 U	4.2 U	3.8 U
Heptachlor	2 U	2.1 U	2.1 U	1.9 U
Heptachlor epoxide	2 U	2.1 U	2.1 U	1.9 U
Methoxychlor	20 U	21 U	21 U	19 U
Toxaphene	200 U	210 U	210 U	190 U
alpha-BHC	2 U	2.1 U	2.1 U	1.9 U
alpha-Chlordane	2 U	2.1 U	2.1 U	1.9 U
beta-BHC	2 U	2.1 U	2.1 U	1.9 U
delta-BHC	2 U	2.1 U	2.1 U	1.9 U
gamma-BHC (Lindane)	2 U	2.1 U	2.1 U	1.9 U
gamma-Chlordane	2 U	2.1 U	2.1 U	1.9 U
METAL (MG/KG)				
Aluminum	14400	14300	13100	9220
Antimony	0.48 U	0.55 U	0.52 U	0.39 U
Arsenic	1.8 J	1.7 J	2 J	1.5 J
Barium	63.4	55.7	58.8	46.4
Beryllium	0.47 J	0.47 J	0.44 J	0.31 J
Cadmium	0.17 B	0.1 B	0.19 B	0.73 B
Calcium	1230	925 J	850 J	14300
Chromium	19	19.6	19.3	10.8
Cobalt	2.8 J	2.8 J	2.9 J	1.7 J
Copper	8.1 B	8.9 B	8.5 B	8.4 B
Cyanide	0.27 U	0.28 U	0.26 U	0.2 U
Iron	6970	6980	7470	5270
Lead	22.3 J	20 J	16 J	118 J
Magnesium	954 J	1050 J	984 J	1270
Manganese	37.2	30.5	31.1	52.4
Mercury	0.05	0.05	0.04	0.03 J
Nickel	9.1	10.3	9.5	6.2 J
Potassium	422 J	443 J	503 J	311 J
Selenium	0.76 B	0.86 B	0.81 B	0.55 B
Silver	0.62 J	0.17 U	0.16 U	0.12 U
Sodium	35.5 U	40.4 U	38 U	42.8 J
Vanadium	20.1	19.6	19.7	13.1
Zinc	20 J	20.9 J	22 J	18.2 J
Other				
%Solids	848000	805000	798000	883000

NA - Not analyzed
J - Reported value is estimated
U - Analyte not detected

Table B-1-2
Analytical Results for All Constituents Sampled in the Surface Water
SWMU 15
NAS Oceana

Sample Date	OW15-SW01P	OW15-SW01	OW15-SW02	OW15-SW03	OW15-SW04	OW15-SW05
Chemical Name						
Volatile Organic Compounds (UG/L)						
1,1,1-Trichloroethane	1 U	1 U	1 U	NS	NS	NS
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	NS	NS	NS
1,1,2-Trichloroethane	1 U	1 U	1 U	NS	NS	NS
1,1-Dichloroethane	1 U	1 U	1 U	NS	NS	NS
1,1-Dichloroethene	1 U	1 U	1 U	NS	NS	NS
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	NS	NS	NS
1,2-Dibromoethane	1 U	1 U	1 U	NS	NS	NS
1,2-Dichloroethane	1 U	1 U	1 U	NS	NS	NS
1,2-Dichloropropane	1 U	1 U	1 U	NS	NS	NS
2-Hexanone	5 U	5 U	5 U	NS	NS	NS
4-Methyl-2-pentanone	5 U	5 U	5 U	NS	NS	NS
Acetone	6.4 L	6.9 L	7.2 L	NS	NS	NS
Benzene	1 U	1 U	1 U	NS	NS	NS
Bromochloromethane	1 U	1 U	1 U	NS	NS	NS
Bromodichloromethane	1 U	1 U	1 U	NS	NS	NS
Bromoform	1 U	1 U	1 U	NS	NS	NS
Bromomethane	1 U	1 U	1 U	NS	NS	NS
Carbon disulfide	0.5 B	0.2 B	0.3 B	NS	NS	NS
Carbon tetrachloride	1 U	1 U	1 U	NS	NS	NS
Chlorobenzene	1 U	1 U	1 U	NS	NS	NS
Chloroethane	1 U	1 U	1 U	NS	NS	NS
Chloroform	1 U	1 U	1 U	NS	NS	NS
Chloromethane	1 U	1 U	1 U	NS	NS	NS
Dibromochloromethane	1 U	1 U	1 U	NS	NS	NS
Ethylbenzene	1 U	1 U	1 U	NS	NS	NS
Methylene chloride	1.2 B	1.1 B	1.2 B	NS	NS	NS
Styrene	1 U	1 U	1 U	NS	NS	NS
Tetrachloroethene	1 U	1 U	1 U	NS	NS	NS
Toluene	1 U	1 U	1 U	NS	NS	NS
Trichloroethene	1 U	1 U	1 U	NS	NS	NS
Vinyl chloride	1 U	1 U	1 U	NS	NS	NS
Xylene, total	1 U	1 U	1 U	NS	NS	NS
cis-1,2-Dichloroethene	1 U	1 U	1 U	NS	NS	NS
cis-1,3-Dichloropropene	1 U	1 U	1 U	NS	NS	NS
trans-1,2-Dichloroethene	1 U	1 U	1 U	NS	NS	NS
trans-1,3-Dichloropropene	1 U	1 U	1 U	NS	NS	NS
Semi-volatile Organic Compounds (UG/L)						
1,2,4-Trichlorobenzene	1 U	1 U	1 U	10 U	10 U	10 U
1,2-Dichlorobenzene	1 U	1 U	1 U	10 U	10 U	10 U
1,3-Dichlorobenzene	1 U	1 U	1 U	10 U	10 U	10 U
1,4-Dichlorobenzene	1 U	1 U	1 U	10 U	10 U	10 U
2,2'-Oxybis(1-chloropropane)	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	26 U	26 U	26 U	26 U	26 U	26 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	26 U	26 U	26 U	26 U	26 U	26 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	26 U	26 U	26 U	26 U	26 U	26 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	26 U	26 U	26 U	26 U	26 U	26 U
4,6-Dinitro-2-methylphenol	26 U	26 U	26 U	26 U	26 U	26 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Table B-1-2
Analytical Results for All Constituents Sampled in the Surface Water
SWMU 15
NAS Oceana

Sample Date	OW15-SW01P	OW15-SW01	OW15-SW02	OW15-SW03	OW15-SW04	OW15-SW05
Chemical Name						
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	26 U	26 U	26 U	26 U	26 U	26 U
4-Nitrophenol	26 U	26 U	26 U	26 U	26 U	26 U
Acenaphthene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Acenaphthylene	1 U	1 U	1 U	1 U	1 UJ	1 U
Anthracene	0.1 U	0.411 J	0.665 J	0.1 U	0.132 J	0.198 J
Benzo(a)anthracene	0.01 U	0.01 U	0.01 U	0.01 UJ	0.012 J	0.01 U
Benzo(a)pyrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UJ	0.1 U
Benzo(b)fluoranthene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Benzo(g,h,i)perylene	0.2 U	0.2 U	0.2 U	0.2 UJ	1.86 J	0.2 U
Benzo(k)fluoranthene	0.8 U	0.8 U	0.8 U	0.8 U	0.8 UJ	0.8 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.01 U	0.01 U	0.01 U	0.005 J	0.039 J	0.041 J
Di-n-butylphthalate	10 U	3 B	1 B	3 B	10 U	10 U
Di-n-octyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	1 U	2.99	4.06 J	1 U	1.82 J	2.89
Fluorene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 UJ	0.4 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.4 U	0.4 U	0.4 U	0.4 U	0.095 J	0.4 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	2 U	2 U	2 U	2 U	2 UJ	2 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	26 U	26 U	26 U	26 U	26 U	26 U
Phenanthrene	0.05 U	0.029 J	0.033 J	0.05 UJ	0.026 J	0.049 J
Phenol	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	0.005 U	0.005 U	0.005 U	0.005 U	0.013 J	0.005 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10 U	2 J	10 U	2 J	1 J	10 U
n-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U
n-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)						
4,4'-DDD	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
4,4'-DDE	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
4,4'-DDT	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Aldrin	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
Aroclor-1016	1 U	1 UJ	1.1 U	NS	NS	NS
Aroclor-1221	2.1 U	2 UJ	2.1 U	NS	NS	NS
Aroclor-1232	1 U	1 UJ	1.1 U	NS	NS	NS
Aroclor-1242	1 U	1 UJ	1.1 U	NS	NS	NS
Aroclor-1248	1 U	1 UJ	1.1 U	NS	NS	NS
Aroclor-1254	1 U	1 UJ	1.1 U	NS	NS	NS
Aroclor-1260	1 U	1 UJ	1.1 U	NS	NS	NS
Dieldrin	0.1 UJ	0.1 UJ	0.11 U	NS	NS	NS
Endosulfan I	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
Endosulfan II	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Endosulfan sulfate	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Endrin	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Endrin aldehyde	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Endrin ketone	0.1 U	0.1 UJ	0.11 U	NS	NS	NS
Heptachlor	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
Heptachlor epoxide	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
Methoxychlor	0.52 U	0.51 UJ	0.53 U	NS	NS	NS

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
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Table B-1-2
Analytical Results for All Constituents Sampled in the Surface Water
SWMU 15
NAS Oceana

Sample Date	OW15-SW01P	OW15-SW01	OW15-SW02	OW15-SW03	OW15-SW04	OW15-SW05
Chemical Name						
Toxaphene	5.2 U	5.1 UJ	5.3 U	NS	NS	NS
alpha-BHC	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
alpha-Chlordane	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
beta-BHC	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
delta-BHC	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
gamma-BHC (Lindane)	0.052 UJ	0.051 UJ	0.053 U	NS	NS	NS
gamma-Chlordane	0.052 U	0.051 UJ	0.053 U	NS	NS	NS
Total Metals (UG/L)						
Aluminum	113 J	114 J	120 J	113 J	191 J	104 J
Antimony	2.8 B	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Arsenic	2 U	2 U	2 U	2 U	2 U	2 U
Barium	84.6 J	84.9 J	89.7 J	85.2 J	92.3 J	84 J
Beryllium	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	0.3 U	0.3 U	0.3 U	0.4 J	0.3 U	0.3 U
Calcium	61,700	61,900	65,300	62,200	67,400	61,500
Chromium	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Cobalt	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Copper	1.8 B	3 B	2.9 B	2 B	2.9 B	2.8 B
Cyanide	5 U	5 U	5 U	5.6	5 U	5 U
Iron	30.8 U	124	30.8 U	30.8 U	33.4 J	30.8 U
Lead	1 U	1 U	1 U	1 U	1 J	1 U
Magnesium	21,900	21,900	23,200	22,100	23,900	21,700
Manganese	10.7 J	11.3 J	10.6 J	10.7 J	12.2 J	12.3 J
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Potassium	3,800 J	3,870 J	4,190 J	4,000 J	4,310 J	3,970 J
Selenium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Silver	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Sodium	10,500	10,500	11,300	10,600	11,400	10,300
Thallium	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U
Vanadium	0.6 U	0.76 J	0.6 U	0.6 U	0.64 J	0.6 U
Zinc	6.5 B	12.1 B	17.7 B	9.5 B	11.6 B	13.3 B

NS - Not sampled
B - Analyte not detected above associated blank
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Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

Sample Date	OW15-SD01-7.0	OW15-SD02-7.0	OW15-SD03-2.5	OW15-SD04-5.5	OW15-SD05-2.5	OW15-SD06-5.5	OW15-SD07-7.0P	OW15-SD07-7.0	OW15-SD08-
Ch[illegible] Name									
Vola[illegible]rganic Compounds (UG/KG)									
1,1,1-Trichloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,1,2,2-Tetrachloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,1,2-Trichloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,1-Dichloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,1-Dichloroethene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,2-Dichloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,2-Dichloroethene (total)	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,2-Dichloropropane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
2-Butanone	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
2-Hexanone	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
4-Methyl-2-pentanone	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Acetone	13 U	13 U	15 U	12 U	14 UJ	13 UJ	NS	NS	NS
Benzene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Bromodichloromethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Bromoform	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Bromomethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Carbon disulfide	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Carbon tetrachloride	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Chlorobenzene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Chloroethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Chloroform	2 B	2 B	2 B	12 U	14 U	13 UJ	NS	NS	NS
Chloromethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Dibromochloromethane	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Ethylbenzene	26 J	13 U	61	12 U	14 U	13 UJ	NS	NS	NS
Methylene chloride	13 U	13 U	16 B	12 U	23 B	13 UJ	NS	NS	NS
Styrene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Tetrachloroethene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Toluene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Trichloroethene	13 U	13 U	15 U	12 UJ	14 U	13 UJ	NS	NS	NS
Vinyl chloride	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
Xylene, total	13 U	13 U	94	12 U	14 U	13 UJ	NS	NS	NS
cis-1,3-Dichloropropene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
trans-1,3-Dichloropropene	13 U	13 U	15 U	12 U	14 U	13 UJ	NS	NS	NS
1,1,1,2-Tetrachloroethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloropropene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichlorobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-T[illegible]hloropropane	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2[illegible]robenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2[illegible]ylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromo-3-chloropropane	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromoethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-Trimethylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichlorobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichloropropane	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,2-Dichloropropane	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bromobenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Bromochloromethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cumene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibromomethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dichlorodifluoromethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Trichlorofluoromethane	NS	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Butylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Propylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
o-Chlorotoluene	NS	NS	NS	NS	NS	NS	NS	NS	NS
o-Xylene	NS	NS	NS	NS	NS	NS	NS	NS	NS
p-Chlorotoluene	NS	NS	NS	NS	NS	NS	NS	NS	NS
p-Isopropyltoluene	NS	NS	NS	NS	NS	NS	NS	NS	NS
sec-Butylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
tert-Butylbenzene	NS	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Thallium	NS	NS	NS	NS	NS	NS	NS	NS	0.87
Semi-volatile Organic Compounds (UG/KG)									
1,2,4-Trichlorobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
1,2-Dichlorobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
1,3-Dichlorobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
1,4-Dichlorobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
2,2'-Oxybis(1-chloropropane)	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
2,4,5-Trichlorophenol	1,100 UJ	1,100 UJ	1,200 UJ	1,000 U	1,200 UJ	1,100 UJ	1,100 U	1,500 UJ	1,100
2,4,6-Trichlorophenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
2,4-Dichlorophenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
2,4-[illegible]phenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
2,4-[illegible]enol	1,100 UJ	1,100 UJ	1,200 UJ	1,000 U	1,200 UJ	1,100 UJ	1,100 U	1,500 UJ	1,100
2,4-D[illegible]otoluene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
2,6-Dinitrotoluene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460

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UL

Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

Sample Date	OW15-SD01-7.0	OW15-SD02-7.0	OW15-SD03-2.5	OW15-SD04-5.5	OW15-SD05-2.5	OW15-SD06-5.5	OW15-SD07-7.0P	OW15-SD07-7.0	OW15-SD08-
Chemical Name									
2-Chloronaphthalene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
2-Chlorophenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
2-Methylnaphthalene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	250 L	250 J	460
2-Methylphenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
2-Nitroaniline	1,100 UJ	1,100 UJ	1,200 UJ	NS	1,200 UJ	1,100 UJ	NS	1,500 UJ	1,100
2-Nitrophenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
3,3'-Dichlorobenzidine	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
3-Nitroaniline	1,100 UJ	1,100 UJ	1,200 UJ	NS	1,200 UJ	1,100 UJ	NS	1,500 UJ	1,100
4,6-Dinitro-2-methylphenol	1,100 UJ	1,100 UJ	1,200 UJ	1,000 U	1,200 UJ	1,100 UJ	1,100 U	1,500 UJ	1,100
4-Bromophenyl-phenylether	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
4-Chloro-3-methylphenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
4-Chloroaniline	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
4-Chlorophenyl-phenylether	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
4-Methylphenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
4-Nitroaniline	1,100 UJ	1,100 UJ	1,200 UJ	NS	1,200 UJ	1,100 UJ	NS	1,500 UJ	1,100
4-Nitrophenol	1,100 UJ	1,100 UJ	1,200 UJ	1,000 U	1,200 UJ	1,100 UJ	1,100 U	1,500 UJ	1,100
Acenaphthene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	520.803 J	115.96 U	8.98
Acenaphthylene	430 UJ	432.3 U	48.5 U	407.88 U	37.62 U	420 UJ	4,220 U	579.81 U	44.9
Anthracene	85.8 UJ	43.23 UJ	4.851 UJ	40.788 UJ	3.76 UJ	83.226 UJ	422.004 UJ	57.981 UJ	8.08
Benzo(a)anthracene	5.495 J	4.323 U	1.118 J	4.079 U	0.575 J	15.855 J	108.787 J	5.355 J	1.1
Benzo(a)pyrene	85.8 U	43.23 U	4.851 U	40.788 U	3.76 U	83.226 U	422.004 U	57.981 U	4.49
Benzo(b)fluoranthene	338 U	170.3 U	19.1 U	145.853 J	14.82 U	327.86 U	1,662 U	228.41 U	17.7
Benzo(g,h,i)perylene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	844.008 U	115.96 U	8.98
Benzo(k)fluoranthene	430 UJ	340.6 U	38.2 U	321.36 U	29.64 U	420 UJ	3,325 U	456.82 U	35.4
Butylbenzylphthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Carbazole	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Chrysene	20.542 J	4.323 U	1.972 J	3.198 J	0.817 J	33.312 J	233.186 J	17.386 J	1.73
Di-n-butylphthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	51
Di-n-octyl phthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Dibenz(a,h)anthracene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	844.008 U	115.96 U	8.98
Dibenzofuran	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Diethylphthalate	430 UJ	440 UJ	490 UJ	55 L	470 UJ	420 UJ	280 L	950 J	460
Dimethyl phthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Fluoranthene	430 UJ	2,010	48.5 U	407.88 U	37.62 U	832.26 U	4,220 U	579.81 U	44.9
Fluorene	338 U	170.3 U	19.1 U	160.68 U	14.82 U	327.86 U	1,662 U	228.41 U	17.7
Hexachlorobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Hexachlorobutadiene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Hexachlorocyclopentadiene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	[illegible]
Hexachloroethane	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	[illegible]
Indeno(1,2,3-cd)pyrene	338 U	170.3 U	19.1 U	160.68 U	14.82 U	327.86 U	1,662 U	228.41 U	[illegible]7
Isophorone	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Naphthalene	430 UJ	440 UJ	97 U	815.76 U	75.24 U	420 UJ	98 L	75 J	89.8
Nitrobenzene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Pentachlorophenol	1,100 UJ	1,100 UJ	1,200 UJ	1,000 U	1,200 UJ	1,100 UJ	1,100 U	1,500 UJ	1,100
Phenanthrene	44.2 U	22.27 U	1.41 J	21.012 U	1.94 U	42.874 U	217.396 U	29.869 U	2.01
Phenol	430 UJ	440 UJ	490 UJ	410 U	470 UJ	420 UJ	430 U	580 UJ	460
Pyrene	3.252 J	1.165 J	0.337	2.101 U	0.194 U	3.087 J	27.879	1.74 J	0.202
bis(2-Chloroethoxy)methane	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
bis(2-Chloroethyl)ether	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
bis(2-Ethylhexyl)phthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
n-Nitroso-di-n-propylamine	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
n-Nitrosodiphenylamine	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	460
Pesticide/Polychlorinated Biphenyls (UG/KG)									
4,4'-DDD	4.3 U	4.4 U	4.9 U	0.54 J	4.7 U	4.2 U	NS	NS	NS
4,4'-DDE	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
4,4'-DDT	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Aldrin	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
Aroclor-1016	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Aroclor-1221	87 U	87 U	98 U	82 U	93 U	84 U	NS	NS	NS
Aroclor-1232	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Aroclor-1242	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Aroclor-1248	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Aroclor-1254	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Aroclor-1260	43 U	44 U	49 U	41 U	47 U	42 U	NS	NS	NS
Dieldrin	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Endosulfan I	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
Endosulfan II	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Endosulfan sulfate	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Endrin	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Endrin aldehyde	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Endrin ketone	4.3 U	4.4 U	4.9 U	4.1 U	4.7 U	4.2 U	NS	NS	NS
Heptachlor	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
Heptachlor epoxide	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
Methoxychlor	22 U	22 U	24 U	21 U	23 U	21 U	NS	NS	NS
Toxaphene	220 U	220 U	240 U	210 U	230 U	210 U	NS	NS	NS
alpha-BHC	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	[illegible]
alpha-Chlordane	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	[illegible]
beta-BHC	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	[illegible]
delta-BHC	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
gamma-BHC (Lindane)	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS

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UL

Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

Sa[illegible]te	OW15-SD01-7.0	OW15-SD02-7.0	OW15-SD03-2.5	OW15-SD04-5.5	OW15-SD05-2.5	OW15-SD06-5.5	OW15-SD07-7.0P	OW15-SD07-7.0	OW15-SD08-
Che[illegible] Name									
gamma-Chlordane	2.2 U	2.2 U	2.4 U	2.1 U	2.3 U	2.1 U	NS	NS	NS
Total Metals (MG/KG)									
%Solids	768,000	763,000	679,000	809,000	714,000	793,000	782,000	569,000	733,000
Aluminum	6,690	3,860	19,800	3,830	28,200	13,600	6,300	9,330	5,630
Antimony	0.54 U	0.57 U	0.52 U	0.49 U	0.47 U	0.54 U	0.41 U	0.69 U	0.74
Arsenic	2.9	2.8	2.8	2.5	3.2	1.5 J	1.9	2.6 J	1.5
Barium	32.8 J	17.9 J	89.1	17.8 J	101	54.5	29.7 J	49.4 J	27.4
Beryllium	0.28 J	0.16 J	0.83 J	0.15 J	0.62 J	0.39 J	0.27 J	0.31 J	0.23
Cadmium	0.11 B	0.09 B	0.14 B	0.12 B	0.11 B	0.1 B	0.06 U	0.15 B	0.08
Calcium	456 B	232 B	468 B	285 B	676 B	1,200 J	1,040	3,210	399
Chromium	13.1	8.7	33.2	8.7	43.1	20.4	12.2	13.4	11.1
Cobalt	4.6 J	6.3 J	2.6 J	5.9 J	3.7 J	2.3 J	2.1 J	3.3 J	1.4
Copper	5.2 B	3.7 B	11.4	3.7 B	11.4	6.1 B	4.4 B	5.9 B	4.3
Cyanide	0.25 U	0.33	0.28 U	0.22 U	0.29 U	1.2	0.25 U	1.1	0.28
Iron	6,310	4,130	16,300	3,790	21,100	9,410	5,490	6,550	4,360
Lead	7.2 J	3.7 J	27.9 J	3 J	15 J	9.5 J	5.8 J	14.6 J	3.9
Magnesium	881 J	591 J	1,320	534 J	1,560	960 J	850 J	1,180 J	744
Manganese	29.6	22.2	23	19.5	27.9	26.2	27.9	74	21.5
Mercury	0.02 U	0.02 U	0.04	0.02 U	0.04 B	0.04	0.03 J	0.03 U	0.02
Nickel	7.6 J	7.9 J	9.6	7.3 J	12.3	6.6 J	5.1 J	6.5 J	3.9
Potassium	486 J	328 J	458 J	290 J	532 J	377 J	431 J	456 J	505
Selenium	0.66 U	0.72 B	0.81 B	0.6 U	1 B	0.83 B	0.51 U	0.85 U	0.71
Silver	0.17 U	0.18 U	0.17 U	0.15 U	0.15 U	0.17 U	0.13 U	0.22 U	0.25
Sodium	39.9 U	41.8 U	38.6 U	35.9 U	35 U	40.2 U	30.6 U	51 U	59.4
Vanadium	14	9 J	28.2	8.7 J	54.6	26.7	11.8	14.8 J	10.3
Zinc	22.1 J	15.9 J	20.7 J	16.1 J	28.8 J	15.3 J	16 J	17.9 J	13.2
pH	-1	-1	-1	-1	-1	-1	-1	-1	-1

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
U - Analyte not detected

UJ - Not detected, quantitation limit may be inaccurate
UL

Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

Sample Date	5.5	OW15-SD09-2.5	OW15-SD10-5.5	OW15-SD11-2.5	OW15-SD12-5.5	OW15-SD13-7.0	OW15-SD14-7.0	OW15-SD15-7.0	OW15-SD16-0.0
Chemical Name									
Volatile Organic Compounds (UG/KG)									
1,1,1-Trichloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,1,2,2-Tetrachloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethene		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloroethene (total)		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloropropane		NS	NS	NS	NS	NS	NS	NS	NS
2-Butanone		NS	NS	NS	NS	NS	NS	NS	NS
2-Hexanone		NS	NS	NS	NS	NS	NS	NS	NS
4-Methyl-2-pentanone		NS	NS	NS	NS	NS	NS	NS	NS
Acetone		NS	NS	NS	NS	NS	NS	NS	NS
Benzene		NS	NS	NS	NS	NS	NS	NS	NS
Bromodichloromethane		NS	NS	NS	NS	NS	NS	NS	NS
Bromoform		NS	NS	NS	NS	NS	NS	NS	NS
Bromomethane		NS	NS	NS	NS	NS	NS	NS	NS
Carbon disulfide		NS	NS	NS	NS	NS	NS	NS	NS
Carbon tetrachloride		NS	NS	NS	NS	NS	NS	NS	NS
Chlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
Chloroethane		NS	NS	NS	NS	NS	NS	NS	NS
Chloroform		NS	NS	NS	NS	NS	NS	NS	NS
Chloromethane		NS	NS	NS	NS	NS	NS	NS	NS
Dibromochloromethane		NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
Methylene chloride		NS	NS	NS	NS	NS	NS	NS	NS
Styrene		NS	NS	NS	NS	NS	NS	NS	NS
Tetrachloroethene		NS	NS	NS	NS	NS	NS	NS	NS
Toluene		NS	NS	NS	NS	NS	NS	NS	NS
Trichloroethene		NS	NS	NS	NS	NS	NS	NS	NS
Vinyl chloride		NS	NS	NS	NS	NS	NS	NS	NS
Xylene, total		NS	NS	NS	NS	NS	NS	NS	NS
cis-1,3-Dichloropropene		NS	NS	NS	NS	NS	NS	NS	NS
trans-1,3-Dichloropropene		NS	NS	NS	NS	NS	NS	NS	NS
1,1,1,2-Tetrachloroethane		NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloropropene		NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichloropropane		NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trichlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trimethylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromo-3-chloropropane		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromoethane		NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,3,5-Trimethylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichloropropane		NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene		NS	NS	NS	NS	NS	NS	NS	NS
2,2-Dichloropropane		NS	NS	NS	NS	NS	NS	NS	NS
Bromobenzene		NS	NS	NS	NS	NS	NS	NS	NS
Bromochloromethane		NS	NS	NS	NS	NS	NS	NS	NS
Cumene		NS	NS	NS	NS	NS	NS	NS	NS
Dibromomethane		NS	NS	NS	NS	NS	NS	NS	NS
Dichlorodifluoromethane		NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorobutadiene		NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene		NS	NS	NS	NS	NS	NS	NS	NS
Trichlorofluoromethane		NS	NS	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene		NS	NS	NS	NS	NS	NS	NS	NS
n-Butylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
n-Propylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
o-Chlorotoluene		NS	NS	NS	NS	NS	NS	NS	NS
o-Xylene		NS	NS	NS	NS	NS	NS	NS	NS
p-Chlorotoluene		NS	NS	NS	NS	NS	NS	NS	NS
p-Isopropyltoluene		NS	NS	NS	NS	NS	NS	NS	NS
sec-Butylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
tert-Butylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene		NS	NS	NS	NS	NS	NS	NS	NS
Thallium	U	0.94 U	0.62 U	0.87 J	0.88 U	0.75 U	NS	0.8 U	NS
Semi-volatile Organic Compounds (UG/KG)									
1,2,4-Trichlorobenzene	UL	NS	440 UJ	510 UL	480 U	460 U	460 UJ	440 U	510 U
1,2-Dichlorobenzene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
1,3-Dichlorobenzene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
1,4-Dichlorobenzene	UL	NS	440 UJ	510 UL	480 U	460 U	460 UJ	440 U	510 U
2,2'-Oxybis(1-chloropropane)	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
2,4,5-Trichlorophenol	U	1,300 U	1,100 U	1,300 U	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
2,4,6-Trichlorophenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
2,4-Dichlorophenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
2,4-Dimethylphenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
2,4-Dinitrophenol	U	1,300 U	1,100 U	1,300 U	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
2,4-Dinitrotoluene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
2,6-Dinitrotoluene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

Sample Date	5.5	OW15-SD09-2.5	OW15-SD10-5.5	OW15-SD11-2.5	OW15-SD12-5.5	OW15-SD13-7.0	OW15-SD14-7.0	OW15-SD15-7.0	OW15-SD16-0.0
Chemical Name									
2-Chloronaphthalene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
2-Chlorophenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
2-Methylnaphthalene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
2-Methylphenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
2-Nitroaniline	UL	NS	1,100 U	1,300 UL	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
2-Nitrophenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
3,3'-Dichlorobenzidine	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
3-Nitroaniline	UL	NS	1,100 U	1,300 UL	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
4,6-Dinitro-2-methylphenol	U	1,300 U	1,100 U	1,300 U	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
4-Bromophenyl-phenylether	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
4-Chloro-3-methylphenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
4-Chloroaniline	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
4-Chlorophenyl-phenylether	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
4-Methylphenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
4-Nitroaniline	UL	NS	1,100 U	1,300 UL	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
4-Nitrophenol	U	1,300 U	1,100 U	1,300 U	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
Acenaphthene	U	6.6 U	17	6.6 U	18.8 U	90 U	9.108 U	6.6 UJ	1,132
Acenaphthylene	U	33 U	43.6 U	33 U	10.8 J	450 U	45.54 U	33 UJ	510 U
Anthracene		14.2	4.36 U	2.94 J	9.4 U	45 U	10.706 J	7.39 J	497.739 UJ
Benzo(a)anthracene		2.01	3.3	0.746	8.31	7.55	2.061 J	1.73 J	189.241 J
Benzo(a)pyrene	U	3.3 U	7.55	3.3 U	9.4 U	24.2 J	4.554 U	3.3 UJ	497.739 U
Benzo(b)fluoranthene	U	13 U	17.2 U	13 U	37 U	177 U	17.94 U	13 UJ	85 J
Benzo(g,h,i)perylene	U	6.6 U	61.3	6.6 U	47.2	133	9.108 U	6.6 UJ	510 U
Benzo(k)fluoranthene	U	26 U	34.3 U	26 U	74.1 U	355 U	35.88 U	26 UJ	510 U
Butylbenzylphthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Carbazole	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Chrysene		3.62	11.7	1.15	13.9	16.7	2.875 J	3.22 J	355.972 J
Di-n-butylphthalate	L	52 L	440 U	87 L	480 U	46 J	460 UJ	440 U	92 J
Di-n-octyl phthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Dibenz(a,h)anthracene	U	6.6 U	8.71 U	6.6 U	58.2	90 U	9.108 U	6.6 UJ	510 U
Dibenzofuran	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Diethylphthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	110 J
Dimethyl phthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Fluoranthene	U	33 U	43.6 U	33 U	1,490	155 J	45.54 U	33 UJ	510 U
Fluorene	U	13 U	17.2 U	13 U	66.3	177 U	17.94 U	13 UJ	510 U
Hexachlorobenzene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Hexachlorobutadiene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Hexachlorocyclopentadiene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Hexachloroethane	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Indeno(1,2,3-cd)pyrene	U	26.4	1.97 J	13 U	37 U	8.83 J	17.94 U	13 UJ	510 U
Isophorone	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Naphthalene	U	66 U	87.1 U	66 U	188 U	460 U	91.08 U	66 UJ	510 U
Nitrobenzene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Pentachlorophenol	U	1,300 U	1,100 U	1,300 U	1,200 U	1,100 U	1,200 UJ	1,100 U	1,300 U
Phenanthrene	J	1.7 U	6.18	1.7 U	8.64	23.2 U	2.141 J	1.96 J	256.411 U
Phenol	U	510 U	440 U	510 U	480 U	460 U	460 UJ	440 U	510 U
Pyrene	J	0.566	1.15	0.17 U	2.09	2.02 J	0.235 U	0.287 J	51.363
bis(2-Chloroethoxy)methane	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
bis(2-Chloroethyl)ether	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
bis(2-Ethylhexyl)phthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	83 B
n-Nitroso-di-n-propylamine	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
n-Nitrosodiphenylamine	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Pesticide/Polychlorinated Biphenyls (UG/KG)									
4,4'-DDD		NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDE		NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDT		NS	NS	NS	NS	NS	NS	NS	NS
Aldrin		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1016		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1221		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1232		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1242		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1248		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260		NS	NS	NS	NS	NS	NS	NS	NS
Dieldrin		NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan I		NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan II		NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan sulfate		NS	NS	NS	NS	NS	NS	NS	NS
Endrin		NS	NS	NS	NS	NS	NS	NS	NS
Endrin aldehyde		NS	NS	NS	NS	NS	NS	NS	NS
Endrin ketone		NS	NS	NS	NS	NS	NS	NS	NS
Heptachlor		NS	NS	NS	NS	NS	NS	NS	NS
Heptachlor epoxide		NS	NS	NS	NS	NS	NS	NS	NS
Methoxychlor		NS	NS	NS	NS	NS	NS	NS	NS
Toxaphene		NS	NS	NS	NS	NS	NS	NS	NS
alpha-BHC		NS	NS	NS	NS	NS	NS	NS	NS
gamma-Chlordane		NS	NS	NS	NS	NS	NS	NS	NS
beta-BHC		NS	NS	NS	NS	NS	NS	NS	NS
delta-BHC		NS	NS	NS	NS	NS	NS	NS	NS
gamma-BHC (Lindane)		NS	NS	NS	NS	NS	NS	NS	NS

NS - Not sampled
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J - Reported value is estimated
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UL

Table B-1-3
Analytical Results for All Constituents Sampled in the Sediment
SWMU 15
NAS Oceana

	5.5	OW15-SD09-2.5	OW15-SD10-5.5	OW15-SD11-2.5	OW15-SD12-5.5	OW15-SD13-7.0	OW15-SD14-7.0	OW15-SD15-7.0	OW15-SD16-0.0
Sample Date									
Chemical Name									
gamma-Chlordane		NS	NS	NS	NS	NS	NS	NS	NS
Total Metals (MG/KG)									
%Solids		656,000	758,000	656,000	702,000	733,000	723,000	759,000	663,000
Aluminum		24,200	4,950	22,500	9,990	2,690	3,880	3,100	29,500
Antimony	UL	0.79 UL	0.52 UL	0.74 UL	0.85 L	0.63 UL	0.6 U	0.68 UL	0.65 U
Arsenic	J	3.4	4.7	4.1	2.6 J	2.1 J	3.1	4.1	3.2
Barium	J	74.8	23.9 J	88.7	47.1 J	13.3 J	20.6 J	14.8 J	150
Beryllium	J	0.5 J	0.16 J	0.79 J	0.37 J	0.1 J	0.16 J	0.13 J	0.98 J
Cadmium	U	0.09 U	0.06 U	0.08 U	0.15 J	0.07 U	0.08 U	0.08 U	0.46 B
Calcium	J	452 J	352 J	1,090 J	693 J	233 J	328 B	255 J	2,610
Chromium		39.9	10.2	41.2	15.1	6.8	8.3	6.8	37.1
Cobalt	J	4 J	1.9 J	3.5 J	2.9 J	1.9 J	0.97 J	1.4 J	5.9 J
Copper	J	8.8	4.4 J	11.9	7.8	2.8 J	3.5 B	3.8 J	16
Cyanide	U	0.42	0.27 U	0.32 U	0.32 U	0.28 U	0.4	0.27 U	0.31 U
Iron		24,700	5,000	25,600	6,280	2,400	3,410	3,660	13,100
Lead		8	3.7	9.6	13.1	2.4	3 J	2.4	72.7 J
Magnesium	J	2,060	662 J	1,670	883 J	416 J	495 J	471 J	2,100
Manganese		46.3	20	35.1	28.1	15.6	14.7	16.4	60.7
Mercury	U	0.03 J	0.02 U	0.02 U	0.04 J	0.02 U	0.02 U	0.02 U	0.1
Nickel	J	12.1	4.3 J	11.2	6.9 J	3 J	3.1 J	2.7 J	16.9
Potassium	J	848 J	477 J	957 J	474 J	335 J	357 J	355 J	1,070 J
Selenium	U	0.76 U	0.5 U	0.71 U	0.71 U	0.61 U	0.73 U	0.65 U	0.8 U
Silver	U	0.26 U	0.17 U	0.25 U	0.25 U	0.21 U	0.19 U	0.23 U	0.21 U
Sodium	J	52.3 J	42 J	101 J	90.8 J	34.8 U	44.1 U	37.1 U	92.9 J
Vanadium	J	40.3	10.4	41.2	15.7	6.3 J	8 J	7.6 J	41.4
Zinc	J	28.1 J	11.5 J	28.5 J	18.1 J	8.6 J	8.2 J	10.1 J	77.6 J
pH		-1	-1	-1	-1	-1	-1	-1	-1

NS - Not sampled
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UL

Table B-1-4
Summary of the Analytical Results for [illegible]tituents Sampled in the Groundwater
SV[illegible]
NAS [illegible]eana

Sample Date	OW15-MW06-R01	OW15-MW07-R01	OW15-MW08-RO1	OW15-MW18-R01	OW15-MW19-R01	OW15-MW20-R01	OW15-MW22-R01	OW15-MW21-R01
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,1-Trichloroethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	10 U	200 U	10 U	1 U	1 U	3.8	1 U	1 U
1,1-Dichloroethene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	50 U	1,000 U	50 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone	50 U	1,000 U	50 U	5 U	5 U	5 U	5 U	5 U
Benzene	135.7	3,444	180.1	1 U	70 J	115.8 L	1 U	1 U
Bromochloromethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Bromoform	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	10 U	200 U	10 U	1 UJ	1 UJ	1 U	1 U	1 U
Carbon disulfide	10 U	194 J	21.7 J	1.1 B	1 B	5 B	2.5 B	1.4 B
Carbon tetrachloride	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	10 UJ	200 UJ	10 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Chloroform	10 U	278	12.5	1 U	1 U	1 U	1 U	1 U
Chloromethane	10 UJ	200 UJ	10 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Dibromochloromethane	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	10 U	200 U	10 U	1 U	244.1 J	5.1	1 U	1 U
Methane	1,200 L	3,200 L	540 L	530 L	480 L	800 L	20	23
Methylene chloride	54.3 B	216 J	10.8 B	1.1 B	1.9 B	0.9 B	0.5 B	0.5 B
Styrene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5.1 J	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Toluene	2.2 J	200 U	10 U	1 U	3.6	1.8	1 U	1 U
Trichloroethene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	10 U	200 U	10 U	1 U	882.2 J	72.8 L	1 U	1 U
cis-1,2-Dichloroethene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	10 U	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Semi-volatile Organic Compounds (UG/L)								
1,2,4-Trichlorobenzene	10 U	11 U	10 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	10 U	11 U	10 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	10 U	11 U	10 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	10 U	11 U	10 U	1 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-chloropropane)	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2,4,5-Trichlorophenol	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
2,4,6-Trichlorophenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2,4-Dichlorophenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2,4-Dimethylphenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2,4-Dinitrophenol	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
2,4-Dinitrotoluene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
U - Analyte not detected

UJ - Not detected, quantitation limit may be inaccurate

Table B-1-4
Summary of the Analytical Results for All Constituents Sampled in the Groundwater
SWMU 15
NAS Oceana

Sample Date	OW15-MW06-R01	OW15-MW07-R01	OW15-MW08-RO1	OW15-MW18-R01	OW15-MW19-R01	OW15-MW20-R01	OW15-MW22-R01	OW15-MW21-R01
Chemical Name								
2,6-Dinitrotoluene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2-Chloronaphthalene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2-Chlorophenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2-Methylnaphthalene	12 U	11 U	12 U	11 U	4 J	11 U	11 U	11 U
2-Methylphenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
2-Nitroaniline	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
2-Nitrophenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
3,3'-Dichlorobenzidine	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
3-Nitroaniline	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
4,6-Dinitro-2-methylphenol	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
4-Bromophenyl-phenylether	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
4-Chloro-3-methylphenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
4-Chloroaniline	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
4-Chlorophenyl-phenylether	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
4-Methylphenol	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
4-Nitroaniline	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
4-Nitrophenol	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
Acenaphthene	0.2 U	0.222 U	12 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	1 U	1.11 U	12 U	1 UJ	1 U	1 U	1 U	1 U
Anthracene	0.165	0.25	12 U	0.392 J	0.283 J	0.452 J	0.551 J	0.409 J
Benzo(a)anthracene	0.007 J	0.01 J	12 U	0.01 UJ	0.01 U	0.007 J	0.05	0.01 U
Benzo(a)pyrene	0.1 U	0.111 U	12 U	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	0.4 U	0.444 U	12 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Benzo(g,h,i)perylene	0.2 U	0.222 U	12 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.8 U	0.888 U	12 U	0.8 UJ	0.8 U	0.8 U	0.8 U	0.8 U
Butylbenzylphthalate	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Carbazole	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Chrysene	0.023	0.025	12 U	0.015 J	0.01 U	0.015	0.061	0.01 U
Di-n-butylphthalate	12 U	1 J	12 U	1 J	1 J	11 U	11 U	11 U
Di-n-octyl phthalate	12 UJ	11 UJ	12 U	11 U	11 U	11 U	11 U	11 U
Dibenz(a,h)anthracene	0.2 U	0.222 U	12 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Dibenzofuran	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Diethylphthalate	3 J	2 J	12 U	11 U	11 U	11 U	11 U	11 U
Dimethyl phthalate	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Fluoranthene	1 U	3.278	12 U	4.25 J	4.49	6.02	6.54	4.03
Fluorene	0.4 U	0.444 U	12 U	0.4 UJ	0.4 U	0.4 U	0.386 J	0.4 U
Hexachlorobenzene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Hexachlorobutadiene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Hexachlorocyclopentadiene	12 UJ	11 UJ	12 U	11 U	11 U	11 U	11 U	11 U
Hexachloroethane	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Indeno(1,2,3-cd)pyrene	0.4 U	0.444 U	12 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U
Isophorone	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Naphthalene	3 J	28	12 U	2 UJ	13	2 U	2 U	2 U
Nitrobenzene	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Pentachlorophenol	29 U	28 U	29 U	28 U	28 U	28 U	27 U	29 U
Phenanthrene	0.027 J	0.037 J	12 U	0.077 J	0.18 J	0.078 J	0.329 J	0.041 J
Phenol	3 J	34 J	6 J	11 U	11 U	2 J	11 U	11 U
Pyrene	0.005 U	0.003 J	12 U	0.004 J	0.005 U	0.004 J	0.011	0.005
bis(2-Chloroethoxy)methane	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
bis(2-Chloroethyl)ether	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported [illegible] may be biased low
U - Analyte not [illegible]ted

UJ - Not detected, quantitation limit may be inaccurate

Table B-1-4
Summary of the Analytical Results for [illegible]nstituents Sampled in the Groundwater
S[illegible]5
NAS [illegible]eana

Sample Date	OW15-MW06-R01	OW15-MW07-R01	OW15-MW08-RO1	OW15-MW18-R01	OW15-MW19-R01	OW15-MW20-R01	OW15-MW22-R01	OW15-MW21-R01
Chemical Name								
bis(2-Ethylhexyl)phthalate	12 U	11 U	12 U	1 J	1 J	11 U	11 U	11 U
n-Nitroso-di-n-propylamine	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
n-Nitrosodiphenylamine	12 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Aldrin	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
Aroclor-1016	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1221	2 U	2 U	2 U	2.3 U	2.3 U	2.2 U	2.3 U	2.2 U
Aroclor-1232	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1242	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1248	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1254	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1260	1 U	1 U	1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Dieldrin	0.1 U	0.1 U	0.1 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
Endosulfan II	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endosulfan sulfate	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin	0.1 U	0.1 U	0.1 UJ	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin aldehyde	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin ketone	0.1 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.57 UJ	0.57 UJ	0.54 UJ	0.57 UJ	0.54 UJ
Toxaphene	5 U	5 U	5 U	5.7 U	5.7 U	5.4 U	5.7 U	5.4 U
alpha-BHC	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.057 UJ	0.057 UJ	0.054 UJ	0.057 UJ	0.054 UJ
delta-BHC	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 UJ	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.057 U	0.057 U	0.054 U	0.057 U	0.054 U
Total Metals (UG/L)								
Aluminum	177 B	256 B	440	585	126 B	94 B	130 B	72.8 B
Antimony	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Arsenic	8.6 J	2.7 U	2.7 U	7.3 B	5.9 B	5.3 B	19.6	18
Barium	17.7 J	49.6 J	25.5 J	44.5 J	49.2 J	62.3 J	50 J	44.7 J
Beryllium	0.1 U	0.1 U	0.25 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Calcium	8,090	12,400	4,160 J	4,060 J	4,960 J	7,860	7,570	7,520
Chromium	1.7 B	1.7 J	1.3 B	1.6 J	1 J	0.6 U	0.8 J	0.66 J
Cobalt	0.5 U	0.6 J	1.9 J	7.1 J	1.4 J	2.9 J	9.9 J	9.6 J
Copper	13.7 J	7.9 B	6.3 B	4.1 B	3.4 B	3.6 B	4.3 B	3.4 B
Cyanide	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Iron	2,320	3,490	557	2,170	13,900	13,500	15,400	15,200
Lead	2.9 J	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Magnesium	9,520	14,500	3,360 J	7,870	14,700	19,900	20,600	20,700
Manganese	40.4	41.7	24.2	131	241	260	490	490

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J - Reported value is estimated
L - Reported value may be biased low
U - Analyte not detected

UJ - Not detected, quantitation limit may be inaccurate

Table B-1-4
Summary of the Analytical Results for All Constituents Sampled in the Groundwater
SWMU 15
NAS Oceana

Sample Date	OW15-MW06-R01	OW15-MW07-R01	OW15-MW08-RO1	OW15-MW18-R01	OW15-MW19-R01	OW15-MW20-R01	OW15-MW22-R01	OW15-MW21-R01
Chemical Name								
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	1.9 B	2.3 B	3.5 B	9.7 J	4.3 B	5.5 B	10.3 J	9.9 J
Potassium	110 B	472 J	347 J	1,200 J	982 J	1,000 J	843 J	832 J
Selenium	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Silver	0.7 U	0.7 U	0.7 U	0.78 B	0.7 U	0.7 U	1 B	0.7 U
Sodium	15,800	21,800	9,770	15,800	13,500	27,000	12,800	12,600
Sulfate	17,700	1,000 U	18,600	15,700	37,800	86,500	129,000	128,000
Thallium	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
Vanadium	2.4 J	2.9 J	0.87 J	2.5 J	1.3 J	1.4 J	1.5 J	0.87 J
Zinc	112	48.2	33.8	12.8 J	7.2 B	8.4 B	12.6 J	11.1 B

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reporte[illegible] may be biased low
U - Analyte [illegible]ected

UJ - Not detected, quantitation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Consti[illegible]ampled in the Surface and Subsurface Soil
S[illegible]
NAS[illegible]na

Sample Date	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09	OW15-SB35-1	OW15-SB36-1	OW15-SB37-1	OW15-SB38-1	OW15-SB39-1	OW15-SB40-1	OW15-SB41-1	OW15-SB42-1	OW15-SB43-1P
Chemical Name													
Volatile Organic Compounds (UG/KG)													
1,1,1-Trichloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1-Dichloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2-Dichloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	12 U	12 U	12 U	11 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloropropane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
2-Butanone	12 U	12 U	12 U	11 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Hexanone	12 U	12 U	12 U	11 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Methyl-2-pentanone	12 U	12 U	12 U	11 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acetone	12 UJ	12 UJ	12 UJ	11 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Bromodichloromethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Bromoform	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Bromomethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Carbon disulfide	12 U	12 U	12 U	11 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbon tetrachloride	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Chlorobenzene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Chloroethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Chloroform	1 B	1 B	12 U	2 B	2 B	2 B	1 B	2 B	7 U	2 B	2 B	2 B	1 B
Chloromethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Dibromochloromethane	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Ethylbenzene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Methylene chloride	10 B	11 B	11 B	10 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	3 B	4 B
Styrene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Tetrachloroethene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Toluene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Trichloroethene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Vinyl chloride	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Xylene, total	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
trans-1,3-Dichloropropene	12 U	12 U	12 U	11 U	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1,1,2-Tetrachloroethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,1-Dichloropropene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2,3-Trichlorobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2,3-Trichloropropane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2,4-Trichlorobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2,4-Trimethylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2-Dibromo-3-chloropropane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2-Dibromoethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,2-Dichlorobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,3,5-Trimethylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,3-Dichlorobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,3-Dichloropropane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
1,4-Dichlorobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
2,2-Dichloropropane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Bromobenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Bromochloromethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Cumene	NS	NS	NS	NS	6 UJ	6 UJ	6 UJ	6 UJ	7 UJ	6 UJ	6 UJ	6 UJ	6 UJ
Dibromomethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Dichlorodifluoromethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Hexachlorobutadiene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Naphthalene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Trichlorofluoromethane	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
cis-1,2-Dichloroethene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
n-Butylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Constituents Sampled in the Surface and Subsurface Soil
SWMU 15
NAS Oceana

Sample Date	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09	OW15-SB35-1	OW15-SB36-1	OW15-SB37-1	OW15-SB38-1	OW15-SB39-1	OW15-SB40-1	OW15-SB41-1	OW15-SB42-1	OW15-SB43-1P
Chemical Name													
n-Propylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
o-Chlorotoluene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
o-Xylene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
p-Chlorotoluene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
p-Isopropyltoluene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
sec-Butylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
tert-Butylbenzene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
trans-1,2-Dichloroethene	NS	NS	NS	NS	6 U	6 U	6 U	6 U	7 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)													
1,2,4-Trichlorobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichlorobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,2'-Oxybis(1-chloropropane)	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,5-Trichlorophenol	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4,6-Trichlorophenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dichlorophenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dimethylphenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrophenol	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,4-Dinitrotoluene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2,6-Dinitrotoluene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chloronaphthalene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Chlorophenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylnaphthalene	390 U	700 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Methylphenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitroaniline	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
2-Nitrophenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
3,3'-Dichlorobenzidine	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
3-Nitroaniline	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,6-Dinitro-2-methylphenol	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Bromophenyl-phenylether	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloro-3-methylphenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chloroaniline	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Chlorophenyl-phenylether	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Methylphenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitroaniline	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4-Nitrophenol	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Acenaphthene	3,671	33,939 J	420 U	717.392 J	148.962 U	926.18	10,417	105.501 J	8,767	968.811	1,763	209.752	73.197 J
Acenaphthylene	390 U	4,099 U	420 U	380 U	72.262 J	3,695 U	38,106 U	764.94 U	43,421 U	3,878 U	3,962 U	816.75 U	737.55 U
Anthracene	389.136 U	3,200 J	413.523 UJ	70 J	74.481 U	369.534 U	3,811 U	76.494 U	1,389 J	387.783 U	396.165 U	81.675 U	73.755 U
Benzo(a)anthracene	1,108 J	22,954 J	174.251 J	320 J	29.014	161.666	1,683	26.032	2,759	238.288	348.814	41.633	21.052
Benzo(a)pyrene	250 J	29,000 J	413.523 U	460 J	74.481 U	369.534 U	3,811 U	76.494 U	4,342 U	387.783 U	396.165 U	81.675 U	73.755 U
Benzo(b)fluoranthene	48,510 J	40,000	420 U	420 J	40.231 J	1,456 U	15,011 U	301.34 U	17,105 U	1,528 U	1,561 U	321.75 U	498.292
Benzo(g,h,i)perylene	160 J	203,419	420 U	400 J	148.962 U	4,070	31,721	480.284	8,684 U	3,213	5,840	806.802	445.969
Benzo(k)fluoranthene	150 J	16,000 J	420 U	280 J	568.766 J	3,663	18,069 J	621.1	98,738	6,664	11,428	1,136	581.1 U
Butylbenzylphthalate	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbazole	390 U	2,000 J	420 U	44 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene	2,016 J	44,087 J	345.952 J	330 J	12.457	302.339	3,048	27.52	2,517	313.672	619.313 J	68.937	36.811
Di-n-butylphthalate	65 J	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Di-n-octyl phthalate	390 U	4,200 UJ	420 U	380 UJ	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene	390 U	33,753 J	420 U	380 UJ	148.962 U	739.068 U	7,621 U	152.988 U	8,684 U	775.566 U	792.33 U	163.35 U	147.51 U
Dibenzofuran	390 U	830 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	70 J	4,200 U	57 J	130 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dimethyl phthalate	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fluoranthene	95,662 J	279,888 J	14,611	410 J	457.511 J	4,469	35,822 J	715.018 J	18,966 J	3,095	7,412	970.658	774.056
Fluorene	1,533 U	1,561,141 J	420 U	380 U	714.75	7,221	94,021	920.613	78,880	9,875	16,764	1,951	772.328
Hexachlorobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported valu[illegible]stimated
U - Analyte not [illegible]
UJ - Not detecte[illegible]itation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Constituents Sampled in the Surface and Subsurface Soil
S
NAS ia

Sample Date	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09	OW15-SB35-1	OW15-SB36-1	OW15-SB37-1	OW15-SB38-1	OW15-SB39-1	OW15-SB40-1	OW15-SB41-1	OW15-SB42-1	OW15-SB43-1P
Chemical Name													
Hexachlorobutadiene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachlorocyclopentadiene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Hexachloroethane	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene	140 J	16,000 J	420 U	340 J	293.41 U	228.53 J	1,684 J	29.531 J	17,105 U	322.504 J	484.224 J	65.222 J	27.426 J
Isophorone	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Naphthalene	390 U	2,700 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrobenzene	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pentachlorophenol	980 U	10,000 U	1,000 U	950 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Phenanthrene	1,743	16,279 J	213.027 U	290 J	8.284 J	135.806 J	1,095 J	23.54 J	3,684	209.86	313.072	38.182 J	31.513 J
Phenol	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pyrene	320.575 J	21,000	46.414	710	3.837 U	9.062 J	86.637 J	0.742 J	115.362 J	53.576	83.383	11.876	7.632
bis(2-Chloroethoxy)methane	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Chloroethyl)ether	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
bis(2-Ethylhexyl)phthalate	51 B	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitroso-di-n-propylamine	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
n-Nitrosodiphenylamine	390 U	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Pesticide/Polychlorinated Biphenyls (UG/KG)													
4,4'-DDD	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDE	3.9 U	4.1 U	4.2 U	0.67 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDT	3.9 U	4.1 U	4.2 U	1.7 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aldrin	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1016	39 U	41 U	42 U	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1221	79 U	83 U	83 U	75 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1232	39 U	41 U	42 U	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1242	39 U	41 U	42 U	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1248	39 U	41 U	42 U	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254	39 U	41 U	450	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260	39 U	41 U	420	38 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dieldrin	9.2	2.1 J	4.2 U	15	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan I	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan II	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endosulfan sulfate	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endrin	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endrin aldehyde	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Endrin ketone	3.9 U	4.1 U	4.2 U	3.8 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Heptachlor	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Heptachlor epoxide	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Methoxychlor	20 U	21 U	21 U	19 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Toxaphene	200 U	210 U	210 U	190 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
alpha-BHC	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
alpha-Chlordane	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
beta-BHC	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
delta-BHC	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
gamma-BHC (Lindane)	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
gamma-Chlordane	2 U	2.1 U	2.1 U	1.9 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Metals (MG/KG)													
%Solids	848,000	805,000	798,000	883,000	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aluminum	14,400	14,300	13,100	9,220	NS	NS	NS	NS	NS	NS	NS	NS	NS
Antimony	0.48 U	0.55 U	0.52 U	0.39 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arsenic	1.8 J	1.7 J	2 J	1.5 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Barium	63.4	55.7	58.8	46.4	NS	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	0.47 J	0.47 J	0.44 J	0.31 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cadmium	0.17 B	0.1 B	0.19 B	0.73 B	NS	NS	NS	NS	NS	NS	NS	NS	NS
Calcium	1,230	925 J	860 J	14,300	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chromium	19	19.6	19.3	10.8	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cobalt	2.8 J	2.8 J	2.9 J	1.7 J	NS	NS	NS	NS	NS	NS	NS	NS	NS

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UJ - Not detected, quantitation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Constituents Sampled in the Surface and Subsurface Soil
SWMU 15
NAS Oceana

Sample Date	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09	OW15-SB35-1	OW15-SB36-1	OW15-SB37-1	OW15-SB38-1	OW15-SB39-1	OW15-SB40-1	OW15-SB41-1	OW15-SB42-1	OW15-SB43-1P
Chemical Name													
Copper	8.1 B	8.9 B	8.5 B	8.4 B	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cyanide	0.27 U	0.28 U	0.26 U	0.2 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Iron	6,970	6,980	7,470	5,270	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead	22.3 J	20 J	16 J	118 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Magnesium	954 J	1,050 J	984 J	1,270	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese	37.2	30.5	31.1	52.4	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mercury	0.05	0.05	0.04	0.03 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nickel	9.1	10.3	9.5	6.2 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Potassium	422 J	443 J	503 J	311 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Selenium	0.76 B	0.86 B	0.81 B	0.55 B	NS	NS	NS	NS	NS	NS	NS	NS	NS
Silver	0.62 J	0.17 U	0.16 U	0.12 U	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sodium	35.5 U	40.4 U	38 U	42.8 J	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vanadium	20.1	19.6	19.7	13.1	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc	20 J	20.9 J	22 J	18.2 J	NS	NS	NS	NS	NS	NS	NS	NS	NS

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J - Reported val[illegible] estimated
U - Analyte not [illegible]
UJ - Not detect[illegible] [illegible]itation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Const[illegible] Sampled in the Surface and Subsurface Soil
[illegible]
NA[illegible]ana

Sample Date	OW15-SB43-1		OW15-SB44-1	
Chemical Name				
Volatile Organic Compounds (UG/KG)				
1,1,1-Trichloroethane	6	U	7	U
1,1,2,2-Tetrachloroethane	6	U	7	U
1,1,2-Trichloroethane	6	U	7	U
1,1-Dichloroethane	6	U	7	U
1,1-Dichloroethene	6	U	7	U
1,2-Dichloroethane	6	U	7	U
1,2-Dichloroethene (total)	NS		NS	
1,2-Dichloropropane	6	U	7	U
2-Butanone	NS		NS	
2-Hexanone	NS		NS	
4-Methyl-2-pentanone	NS		NS	
Acetone	NS		NS	
Benzene	6	U	7	U
Bromodichloromethane	6	U	7	U
Bromoform	6	U	7	U
Bromomethane	6	U	7	U
Carbon disulfide	NS		NS	
Carbon tetrachloride	6	U	7	U
Chlorobenzene	6	U	7	U
Chloroethane	6	U	7	U
Chloroform	1	B	7	U
Chloromethane	6	U	7	U
Dibromochloromethane	6	U	7	U
Ethylbenzene	6	U	7	U
Methylene chloride	4	B	3	B
Styrene	6	U	7	U
Tetrachloroethene	6	U	7	U
Toluene	6	U	7	U
Trichloroethene	6	U	7	U
Vinyl chloride	6	U	7	U
Xylene, total	6	U	7	U
cis-1,3-Dichloropropene	6	U	7	U
trans-1,3-Dichloropropene	6	U	7	U
1,1,1,2-Tetrachloroethane	6	U	7	U
1,1-Dichloropropene	6	U	7	U
1,2,3-Trichlorobenzene	6	U	7	U
1,2,3-Trichloropropane	6	U	7	U
1,2,4-Trichlorobenzene	6	U	7	U
1,2,4-Trimethylbenzene	6	U	7	U
1,2-Dibromo-3-chloropropane	6	U	7	U
1,2-Dibromoethane	6	U	7	U
1,2-Dichlorobenzene	6	U	7	U
1,3,5-Trimethylbenzene	6	U	7	U
1,3-Dichlorobenzene	6	U	7	U
1,3-Dichloropropane	6	U	7	U
1,4-Dichlorobenzene	6	U	7	U
2,2-Dichloropropane	6	U	7	U
Bromobenzene	6	U	7	U
Bromochloromethane	6	U	7	U
Cumene	6	UJ	7	UJ
Dibromomethane	6	U	7	U
Dichlorodifluoromethane	6	U	7	U
Hexachlorobutadiene	6	U	7	U
Naphthalene	6	U	7	U
Trichlorofluoromethane	6	U	7	U
cis-1,2-Dichloroethene	6	U	7	U
n-Butylbenzene	6	U	7	U

NS - Not sampled
B - Analyte not detected above associated blank
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Table B-1-5
Summary of Analytical Results for All Constituents Sampled in the Surface and Subsurface Soil
SWMU 15
NAS Oceana

Sample Date	OW15-SB43-1		OW15-SB44-1	
Chemical Name				
n-Propylbenzene	6	U	7	U
o-Chlorotoluene	6	U	7	U
o-Xylene	6	U	7	U
p-Chlorotoluene	6	U	7	U
p-Isopropyltoluene	6	U	7	U
sec-Butylbenzene	6	U	7	U
tert-Butylbenzene	6	U	7	U
trans-1,2-Dichloroethene	6	U	7	U
Semi-volatile Organic Compounds (UG/KG)				
1,2,4-Trichlorobenzene	NS		NS	
1,2-Dichlorobenzene	NS		NS	
1,3-Dichlorobenzene	NS		NS	
1,4-Dichlorobenzene	NS		NS	
2,2'-Oxybis(1-chloropropane)	NS		NS	
2,4,5-Trichlorophenol	NS		NS	
2,4,6-Trichlorophenol	NS		NS	
2,4-Dichlorophenol	NS		NS	
2,4-Dimethylphenol	NS		NS	
2,4-Dinitrophenol	NS		NS	
2,4-Dinitrotoluene	NS		NS	
2,6-Dinitrotoluene	NS		NS	
2-Chloronaphthalene	NS		NS	
2-Chlorophenol	NS		NS	
2-Methylnaphthalene	NS		NS	
2-Methylphenol	NS		NS	
2-Nitroaniline	NS		NS	
2-Nitrophenol	NS		NS	
3,3'-Dichlorobenzidine	NS		NS	
3-Nitroaniline	NS		NS	
4,6-Dinitro-2-methylphenol	NS		NS	
4-Bromophenyl-phenylether	NS		NS	
4-Chloro-3-methylphenol	NS		NS	
4-Chloroaniline	NS		NS	
4-Chlorophenyl-phenylether	NS		NS	
4-Methylphenol	NS		NS	
4-Nitroaniline	NS		NS	
4-Nitrophenol	NS		NS	
Acenaphthene	288.005		104.751	J
Acenaphthylene	731.61	U	862.62	U
Anthracene	73.161	U	490.134	
Benzo(a)anthracene	64.337		2.115	J
Benzo(a)pyrene	73.161	U	86.262	U
Benzo(b)fluoranthene	248.129	J	48.024	J
Benzo(g,h,i)perylene	760.367		172.524	U
Benzo(k)fluoranthene	576.42	U	96.64	J
Butylbenzylphthalate	NS		NS	
Carbazole	NS		NS	
Chrysene	83.791	J	3.645	J
Di-n-butylphthalate	NS		NS	
Di-n-octyl phthalate	NS		NS	
Dibenz(a,h)anthracene	146.322	U	172.524	U
Dibenzofuran	NS		NS	
Diethylphthalate	NS		NS	
Dimethyl phthalate	NS		NS	
Fluoranthene	2,223		696.723	J
Fluorene	2,321		370.052	
Hexachlorobenzene	NS		NS	

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported v[illegible] estimated
U - Analyte r[illegible]ed
UJ - Not dete[illegible] antitation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Cons[illegible] Sampled in the Surface and Subsurface Soil
5
NA[illegible]ana

Sample Date	OW15-SB43-1		OW15-SB44-1	
Chemical Name				
Hexachlorobutadiene	NS		NS	
Hexachlorocyclopentadiene	NS		NS	
Hexachloroethane	NS		NS	
Indeno(1,2,3-cd)pyrene	34.236		339.82	U
Isophorone	NS		NS	
Naphthalene	NS		NS	
Nitrobenzene	NS		NS	
Pentachlorophenol	NS		NS	
Phenanthrene	58.848		191.459	
Phenol	NS		NS	
Pyrene	16.901		11.386	
bis(2-Chloroethoxy)methane	NS		NS	
bis(2-Chloroethyl)ether	NS		NS	
bis(2-Ethylhexyl)phthalate	NS		NS	
n-Nitroso-di-n-propylamine	NS		NS	
n-Nitrosodiphenylamine	NS		NS	
Pesticide/Polychlorinated Biphenyls (UG/KG)				
4,4'-DDD	NS		NS	
4,4'-DDE	NS		NS	
4,4'-DDT	NS		NS	
Aldrin	NS		NS	
Aroclor-1016	NS		NS	
Aroclor-1221	NS		NS	
Aroclor-1232	NS		NS	
Aroclor-1242	NS		NS	
Aroclor-1248	NS		NS	
Aroclor-1254	NS		NS	
Aroclor 1260	NS		NS	
Dieldrin	NS		NS	
Endosulfan I	NS		NS	
Endosulfan II	NS		NS	
Endosulfan sulfate	NS		NS	
Endrin	NS		NS	
Endrin aldehyde	NS		NS	
Endrin ketone	NS		NS	
Heptachlor	NS		NS	
Heptachlor epoxide	NS		NS	
Methoxychlor	NS		NS	
Toxaphene	NS		NS	
alpha-BHC	NS		NS	
alpha-Chlordane	NS		NS	
beta-BHC	NS		NS	
delta-BHC	NS		NS	
gamma-BHC (Lindane)	NS		NS	
gamma-Chlordane	NS		NS	
Total Metals (MG/KG)				
%Solids	NS		NS	
Aluminum	NS		NS	
Antimony	NS		NS	
Arsenic	NS		NS	
Barium	NS		NS	
Beryllium	NS		NS	
Cadmium	NS		NS	
Calcium	NS		NS	
Chromium	NS		NS	
Cobalt	NS		NS	

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Table B-1-5
Summary of Analytical Results for All Constituents Sampled in the Surface and Subsurface Soil
SWMU 15
NAS Oceana

Sample Date	OW15-SB43-1		OW15-SB44-1	
Chemical Name				
Copper	NS		NS	
Cyanide	NS		NS	
Iron	NS		NS	
Lead	NS		NS	
Magnesium	NS		NS	
Manganese	NS		NS	
Mercury	NS		NS	
Nickel	NS		NS	
Potassium	NS		NS	
Selenium	NS		NS	
Silver	NS		NS	
Sodium	NS		NS	
Vanadium	NS		NS	
Zinc	NS		NS	

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported y[illegible] is estimated
U - Analyte n[illegible]ed
UJ - Not dete[illegible]ant tation limit may be inaccurate

Table B-2-1
Summary of Constituents Detected in Surface Soil
at SWMU 15
NAS Oceana

AnalyteName	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09
SVOA (ug/kg)				
2-Methylnaphthalene	390 U	700 J	420 U	380 U
Acenaphthene	3670.941	33939.031 J	420 U	717.392 J
Anthracene	389.136 U	3200 J	413.523 UJ	70 J
Benzo(a)anthracene	1107.893 J	22953.562 J	174.251 J	320 J
Benzo(a)pyrene	250 J	29000 J	413.523 U	460 J
Benzo(b)fluoranthene	48510.421 J	40000	420 U	420 J
Benzo(g,h,i)perylene	160 J	203419.32	420 U	400 J
Benzo(k)fluoranthene	150 J	16000 J	420 U	280 J
Carbazole	390 U	2000 J	420 U	44 J
Chrysene	2016.482 J	44087.385 J	345.952 J	330 J
Di-n-butylphthalate	65 J	4200 U	420 U	380 U
Dibenz(a,h)anthracene	390 U	33753.476 J	420 U	380 UJ
Dibenzofuran	390 U	830 J	420 U	380 U
Diethylphthalate	70 J	4200 U	57 J	130 J
Fluoranthene	95662.473 J	279887.93 J	14611.16	410 J
Fluorene	1532.96 U	1561140.92 J	420 U	380 U
Indeno(1,2,3-cd)pyrene	140 J	16000 J	420 U	340 J
Naphthalene	390 U	2700 J	420 U	380 U
Phenanthrene	1742.926	16278.944 J	213.027 U	290 J
Pyrene	320.575 J	21000	46.414	710
Pesticides/PCBs (ug/kg)				
4,4'-DDE	3.9 U	4.1 U	4.2 U	0.67 J
4,4'-DDT	3.9 U	4.1 U	4.2 U	1.7 J
Aroclor-1254	39 U	41 U	450	38 U
Aroclor-1260	39 U	41 U	420	38 U
Dieldrin	9.2	2.1 J	4.2 U	15
METAL (mg/kg)				
Aluminum	14400	14300	13100	9220
Arsenic	1.8 J	1.7 J	2 J	1.5 J
Barium	63.4	55.7	58.8	46.4
Beryllium	0.47 J	0.47 J	0.44 J	0.31 J
Calcium	1230	925 J	850 J	14300
Chromium	19	19.6	19.3	10.8
Cobalt	2.8 J	2.8 J	2.9 J	1.7 J
Iron	6970	6980	7470	5270
Lead	22.3 J	20 J	16 J	118 J
Magnesium	954 J	1050 J	984 J	1270
Manganese	37.2	30.5	31.1	52.4
Mercury	0.05	0.05	0.04	0.03 J
Nickel	9.1	10.3	9.5	6.2 J
Potassium	422 J	443 J	503 J	311 J
Silver	0.62 J	0.17 U	0.16 U	0.12 U
Sodium	35.5 U	40.4 U	38 U	42.8 J
Vanadium	20.1	19.6	19.7	13.1
Zinc	20 J	20.9 J	22 J	18.2 J
Other				
%Solids	848000	805000	798000	883000

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P

U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Table B-2-2
Summary of Constituents Detected in Surface Water
SWMU 15
NAS Oceana

Sample Date	OW15-SW01P	OW15-SW01	OW15-SW02	OW15-SW03	OW15-SW04	OW15-SW05
Chemical Name						
Volatile Organic Compounds (UG/L)						
Acetone	6.4 L	6.9 L	7.2 L	NS	NS	NS
Semi-volatile Organic Compounds (UG/L)						
Anthracene	0.1 U	0.411 J	0.665 J	0.1 U	0.132 J	0.198 J
Benzo(a)anthracene	0.01 U	0.01 U	0.01 U	0.01 UJ	0.012 J	0.01 U
Benzo(g,h,i)perylene	0.2 U	0.2 U	0.2 U	0.2 UJ	1.86 J	0.2 U
Chrysene	0.01 U	0.01 U	0.01 U	0.005 J	0.039 J	0.041 J
Fluoranthene	1 U	2.99	4.06 J	1 U	1.82 J	2.89
Indeno(1,2,3-cd)pyrene	0.4 U	0.4 U	0.4 U	0.4 U	0.095 J	0.4 U
Phenanthrene	0.05 U	0.029 J	0.033 J	0.05 UJ	0.026 J	0.049 J
Pyrene	0.005 U	0.005 U	0.005 U	0.005 U	0.013 J	0.005 U
bis(2-Ethylhexyl)phthalate	10 U	2 J	10 U	2 J	1 J	10 U
Total Metals (UG/L)						
Aluminum	113 J	114 J	120 J	113 J	191 J	104 J
Barium	84.6 J	84.9 J	89.7 J	85.2 J	92.3 J	84 J
Cadmium	0.3 U	0.3 U	0.3 U	0.4 J	0.3 U	0.3 U
Calcium	61,700	61,900	65,300	62,200	67,400	61,500
Cyanide	5 U	5 U	5 U	5.6	5 U	5 U
Iron	30.8 U	124	30.8 U	30.8 U	33.4 J	30.8 U
Lead	1 U	1 U	1 U	1 U	1 J	1 U
Magnesium	21,900	21,900	23,200	22,100	23,900	21,700
Manganese	10.7 J	11.3 J	10.6 J	10.7 J	12.2 J	12.3 J
Potassium	3,800 J	3,870 J	4,190 J	4,000 J	4,310 J	3,970 J
Sodium	10,500	10,500	11,300	10,600	11,400	10,300
Vanadium	0.6 U	0.76 J	0.6 U	0.6 U	0.64 J	0.6 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P

U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Table B-2-3
Summary of Constituents Detected in Sediment
SWMU 15
NAS Oceana

Sample Date	OW15-SD01-7.0	OW15-SD02-7.0	OW15-SD03-2.5	OW15-SD04-5.5	OW15-SD05-2.5	OW15-SD06-5.5	OW15-SD07-7.0P	OW15-SD07-7.0	OW15-SD08-
Chemical Name									
Volatile Organic Compounds (UG/KG)									
Ethylbenzene	26 J	13 U	61	12 U	14 U	13 UJ	NS	NS	NS
Xylene, total	13 U	13 U	94	12 U	14 U	13 UJ	NS	NS	NS
Semi-volatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	250 L	250 J	460
Acenaphthene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	520.803 J	115.96 U	8.98
Anthracene	85.8 UJ	43.23 UJ	4.851 UJ	40.788 UJ	3.76 UJ	83.226 UJ	422.004 UJ	57.981 UJ	8.08
Benzo(a)anthracene	5.495 J	4.323 U	1.118 J	4.079 U	0.575 J	15.855 J	108.787 J	5.355 J	1.1
Benzo(a)pyrene	85.8 U	43.23 U	4.851 U	40.788 U	3.76 U	83.226 U	422.004 U	57.981 U	4.49
Benzo(b)fluoranthene	338 U	170.3 U	19.1 U	145.853 J	14.82 U	327.86 U	1,662 U	228.41 U	17.7
Benzo(g,h,i)perylene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	844.008 U	115.96 U	8.98
Benzo(k)fluoranthene	NS	NS	NS	NS	NS	NS	NS	NS	NS
Carbazole	NS	NS	NS	NS	NS	NS	NS	NS	NS
Chrysene	20.542 J	4.323 U	1.972 J	3.198 J	0.817 J	33.312 J	233.186 J	17.386 J	1.73
Di-n-butylphthalate	430 UJ	440 UJ	490 UJ	NS	470 UJ	420 UJ	NS	580 UJ	51
Dibenz(a,h)anthracene	171.6 U	86.46 U	9.702 U	81.576 U	7.52 U	166.45 U	844.008 U	115.96 U	8.98
Dibenzofuran	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	430 UJ	440 UJ	490 UJ	55 L	470 UJ	420 UJ	280 L	950 J	460
Fluoranthene	430 UJ	2,010	48.5 U	407.88 U	37.62 U	832.26 U	4,220 U	579.81 U	44.9
Fluorene	338 U	170.3 U	19.1 U	160.68 U	14.82 U	327.86 U	1,662 U	228.41 U	17.7
Indeno(1,2,3-cd)pyrene	338 U	170.3 U	19.1 U	160.68 U	14.82 U	327.86 U	1,662 U	228.41 U	17.7
Naphthalene	430 UJ	440 UJ	97 U	815.76 U	75.24 U	420 UJ	98 L	75 J	89.8
Phenanthrene	44.2 U	22.27 U	1.41 J	21.012 U	1.94 U	42.874 U	217.396 U	29.869 U	2.01
Pyrene	3.252 J	1.165 J	0.337	2.101 U	0.194 U	3.087 J	27.879	1.74 J	0.202
Acenaphthylene	430 UJ	432.3 U	48.5 U	407.88 U	37.62 U	420 UJ	4,220 U	579.81 U	44.9
Antimony	0.54 U	0.57 U	0.52 U	0.49 U	0.47 U	0.54 U	0.41 U	0.69 U	0.74
Cadmium	0.11 B	0.09 B	0.14 B	0.12 B	0.11 B	0.1 B	0.06 U	0.15 B	0.08
Copper	5.2 B	3.7 B	11.4	3.7 B	11.4	6.1 B	4.4 B	5.9 B	4.3
Cyanide	0.25 U	0.33	0.28 U	0.22 U	0.29 U	1.2	0.25 U	1.1	0.28
Thallium	NS	NS	NS	NS	NS	NS	NS	NS	0.87
4,4'-DDD	4.3 U	4.4 U	4.9 U	0.54 J	4.7 U	4.2 U	NS	NS	NS
Pesticide/Polychlorinated Biphenyls (UG/KG)									
4,4'-DDE	NS	NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDT	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254	NS	NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dieldrin	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Metals (MG/KG)									
%Solids	768,000	763,000	679,000	809,000	714,000	793,000	782,000	569,000	733,000
Aluminum	6,690	3,860	19,800	3,830	28,200	13,600	6,300	9,330	5,630
Arsenic	2.9	2.8	2.8	2.5	3.2	1.5 J	1.9	2.6 J	1.5
Barium	32.8 J	17.9 J	89.1	17.8 J	101	54.5	29.7 J	49.4 J	27.4
Beryllium	0.28 J	0.16 J	0.83 J	0.15 J	0.62 J	0.39 J	0.27 J	0.31 J	0.23
Calcium	456 B	232 B	468 B	285 B	676 B	1,200 J	1,040	3,210	399
Chromium	13.1	8.7	33.2	8.7	43.1	20.4	12.2	13.4	11.1
Cobalt	4.6 J	6.3 J	2.6 J	5.9 J	3.7 J	2.3 J	2.1 J	3.3 J	1.4
Iron	6,310	4,130	16,300	3,790	21,100	9,410	5,490	6,550	4,360
Lead	7.2 J	3.7 J	27.9 J	3 J	15 J	9.5 J	5.8 J	14.6 J	3.9
Magnesium	881 J	591 J	1,320	534 J	1,560	960 J	850 J	1,180 J	744
Manganese	29.6	22.2	23	19.5	27.9	26.2	27.9	74	21.5
Mercury	0.02 U	0.02 U	0.04	0.02 U	0.04 B	0.04	0.03 J	0.03 U	0.02
Nickel	7.6 J	7.9 J	9.6	7.3 J	12.3	6.6 J	5.1 J	6.5 J	3.9
Potassium	486 J	328 J	458 J	290 J	532 J	377 J	431 J	456 J	505
Silver	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sodium	39.9 U	41.6 U	38.6 U	35.9 U	35 U	40.2 U	30.6 U	51 U	59.4
Vanadium	14	9 J	28.2	8.7 J	54.6	26.7	11.8	14.8 J	10.3
Zinc	22.1 J	15.9 J	20.7 J	16.1 J	28.8 J	15.3 J	16 J	17.9 J	13.2
pH	-1	-1	-1	-1	-1	-1	-1	-1	-1

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P

U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Table B-2-3
Summary of Constituents Detected in Sediment
SWMU 15
NAS Oceana

Sample Date	5.5	OW15-SD09-2.5	OW15-SD10-5.5	OW15-SD11-2.5	OW15-SD12-5.5	OW15-SD13-7.0	OW15-SD14-7.0	OW15-SD15-7.0	OW15-SD16-0.0
Chemical Name									
Volatile Organic Compounds (UG/KG)									
Ethylbenzene		NS	NS	NS	NS	NS	NS	NS	NS
Xylene, total		NS	NS	NS	NS	NS	NS	NS	NS
Semi-volatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	510 U
Acenaphthene	U	6.6 U	17	6.6 U	18.8 U	90 U	9.108 U	6.6 UJ	1,132
Anthracene		14.2	4.36 U	2.94 J	9.4 U	45 U	10.706 J	7.39 J	497.739 UJ
Benzo(a)anthracene		2.01	3.3	0.746	8.31	7.55	2.061 J	1.73 J	189.241 J
Benzo(a)pyrene	U	3.3 U	7.55	3.3 U	9.4 U	24.2 J	4.554 U	3.3 UJ	497.739 U
Benzo(b)fluoranthene	U	13 U	17.2 U	13 U	37 U	177 U	17.94 U	13 UJ	85 J
Benzo(g,h,i)perylene	U	6.6 U	61.3	6.6 U	47.2	133	9.108 U	6.6 UJ	510 U
Benzo(k)fluoranthene		NS	NS	NS	NS	NS	NS	NS	NS
Carbazole		NS	NS	NS	NS	NS	NS	NS	NS
Chrysene		3.62	11.7	1.15	13.9	16.7	2.875 J	3.22 J	355.972 J
Di-n-butylphthalate	L	52 L	440 U	87 L	480 U	46 J	460 UJ	440 U	92 J
Dibenz(a,h)anthracene	U	6.6 U	8.71 U	6.6 U	58.2	90 U	9.108 U	6.6 UJ	510 U
Dibenzofuran		NS	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	UL	NS	440 U	510 UL	480 U	460 U	460 UJ	440 U	110 J
Fluoranthene	U	33 U	43.6 U	33 U	1,490	155 J	45.54 U	33 UJ	510 U
Fluorene	U	13 U	17.2 U	13 U	66.3	177 U	17.94 U	13 UJ	510 U
Indeno(1,2,3-cd)pyrene	U	26.4	1.97 J	13 U	37 U	8.83 J	17.94 U	13 UJ	510 U
Naphthalene	U	66 U	87.1 U	66 U	188 U	460 U	91.08 U	66 UJ	510 U
Phenanthrene	J	1.7 U	6.18	1.7 U	8.64	23.2 U	2.141 J	1.96 J	256.411 U
Pyrene	J	0.566	1.15	0.17 U	2.09	2.02 J	0.235 U	0.287 J	51.363
Acenaphthylene	U	33 U	43.6 U	33 U	10.8 J	450 U	45.54 U	33 UJ	510 U
Antimony	UL	0.79 UL	0.52 UL	0.74 UL	0.85 L	0.63 UL	0.6 U	0.68 UL	0.65 U
Cadmium	U	0.09 U	0.06 U	0.08 U	0.15 J	0.07 U	0.08 U	0.08 U	0.46 B
Copper	J	8.8	4.4 J	11.9	7.8	2.8 J	3.5 B	3.8 J	16
Cyanide	U	0.42	0.27 U	0.32 U	0.32 U	0.28 U	0.4	0.27 U	0.31 U
Thallium	U	0.94 U	0.62 U	0.87 J	0.88 U	0.75 U	NS	0.8 U	NS
4,4'-DDD		NS	NS	NS	NS	NS	NS	NS	NS
Pesticide/Polychlorinated Biphenyls (UG/KG)									
4,4'-DDE		NS	NS	NS	NS	NS	NS	NS	NS
4,4'-DDT		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254		NS	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260		NS	NS	NS	NS	NS	NS	NS	NS
Dieldrin		NS	NS	NS	NS	NS	NS	NS	NS
Total Metals (MG/KG)									
%Solids		656,000	758,000	656,000	702,000	733,000	723,000	759,000	663,000
Aluminum		24,200	4,950	22,500	9,990	2,690	3,880	3,100	29,500
Arsenic	J	3.4	4.7	4.1	2.6 J	2.1 J	3.1	4.1	3.2
Barium	J	74.8	23.9 J	88.7	47.1 J	13.3 J	20.6 J	14.8 J	150
Beryllium	J	0.5 J	0.16 J	0.79 J	0.37 J	0.1 J	0.16 J	0.13 J	0.98 J
Calcium	J	452 J	352 J	1,090 J	693 J	233 J	328 B	255 J	2,610
Chromium		39.9	10.2	41.2	15.1	6.8	8.3	6.8	37.1
Cobalt	J	4 J	1.9 J	3.5 J	2.9 J	1.9 J	0.97 J	1.4 J	5.9 J
Iron		24,700	5,000	25,600	6,280	2,400	3,410	3,660	13,100
Lead		8	3.7	9.6	13.1	2.4	3 J	2.4	72.7 J
Magnesium	J	2,060	662 J	1,670	883 J	416 J	495 J	471 J	2,100
Manganese		46.3	20	35.1	28.1	15.6	14.7	16.4	60.7
Mercury	U	0.03 J	0.02 U	0.02 U	0.04 J	0.02 U	0.02 U	0.02 U	0.1
Nickel	J	12.1	4.3 J	11.2	6.9 J	3 J	3.1 J	2.7 J	16.9
Potassium	J	848 J	477 J	957 J	474 J	335 J	357 J	355 J	1,070 J
Silver		NS	NS	NS	NS	NS	NS	NS	NS
Sodium	J	52.3 J	42 J	101 J	90.8 J	34.8 U	44.1 U	37.1 U	92.9 J
Vanadium	J	40.3	10.4	41.2	15.7	6.3 J	8 J	7.6 J	41.4
Zinc	J	28.1 J	11.5 J	28.5 J	18.1 J	8.6 J	8.2 J	10.1 J	77.6 J
pH		-1	-1	-1	-1	-1	-1	-1	-1

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
L - Reported value may be biased low
P

U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate
UL

Tab 4
Summary of Constituents Detected in the Groundwater
SWMU 15
NAS Oceana

Sample Date	OW15-MW06-R01	OW15-MW07-R01	OW15-MW08-RO1	OW15-MW18-R01	OW15-MW19-R01	OW15-MW20-R01	OW15-MW22-R01	OW15-MW21-R01
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1-Dichloroethane	10 U	200 U	10 U	1 U	1 U	3.8	1 U	1 U
Benzene	135.7	3,444	180.1	1 U	70 J	115.8 L	1 U	1 U
Carbon disulfide	10 U	194 J	21.7 J	1.1 B	1 B	5 B	2.5 B	1.4 B
Chloroform	10 U	278	12.5	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	10 U	200 U	10 U	1 U	244.1 J	5.1	1 U	1 U
Methane	1,200 L	3,200 L	540 L	530 L	480 L	800 L	20	23
Methylene chloride	54.3 B	216 J	10.8 B	1.1 B	1.9 B	0.9 B	0.5 B	0.5 B
Tetrachloroethene	5.1 J	200 U	10 U	1 U	1 U	1 U	1 U	1 U
Toluene	2.2 J	200 U	10 U	1 U	3.6	1.8	1 U	1 U
Xylene, total	10 U	200 U	10 U	1 U	882.2 J	72.8 L	1 U	1 U
Semi-volatile Organic Compounds (UG/L)								
2-Methylnaphthalene	12 U	11 U	12 U	11 U	4 J	11 U	11 U	11 U
Anthracene	0.165	0.25	12 U	0.392 J	0.283 J	0.452 J	0.551 J	0.409 J
Benzo(a)anthracene	0.007 J	0.01 J	12 U	0.01 UJ	0.01 U	0.007 J	0.05	0.01 U
Chrysene	0.023	0.025	12 U	0.015 J	0.01 U	0.015	0.061	0.01 U
Di-n-butylphthalate	12 U	1 J	12 U	1 J	1 J	11 U	11 U	11 U
Diethylphthalate	3 J	2 J	12 U	11 U	11 U	11 U	11 U	11 U
Fluoranthene	1 U	3.278	12 U	4.25 J	4.49	6.02	6.54	4.03
Fluorene	0.4 U	0.444 U	12 U	0.4 UJ	0.4 U	0.4 U	0.386 J	0.4 U
Naphthalene	3 J	28	12 U	2 UJ	13	2 U	2 U	2 U
Phenanthrene	0.027 J	0.037 J	12 U	0.077 J	0.18 J	0.078 J	0.329 J	0.041 J
Phenol	3 J	34 J	6 J	11 U	11 U	2 J	11 U	11 U
Pyrene	0.005 U	0.003 J	12 U	0.004 J	0.005 U	0.004 J	0.011	0.005
bis(2-Ethylhexyl)phthalate	12 U	11 U	12 U	1 J	1 J	11 U	11 U	11 U
Total Metals (UG/L)								
Aluminum	177 B	256 B	440	585	126 B	94 B	130 B	72.8 B
Arsenic	8.6 J	2.7 U	2.7 U	7.3 B	5.9 B	5.3 B	19.6	18
Barium	17.7 J	49.6 J	25.5 J	44.5 J	49.2 J	62.3 J	50 J	44.7 J
Beryllium	0.1 U	0.1 U	0.25 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Calcium	8,090	12,400	4,160 J	4,060 J	4,960 J	7,660	7,570	7,520
Chromium	1.7 B	1.7 J	1.3 B	1.6 J	1 J	0.6 U	0.8 J	0.66 J
Cobalt	0.5 U	0.6 J	1.9 J	7.1 J	1.4 J	2.9 J	9.9 J	9.6 J
Copper	13.7 J	7.9 B	6.3 B	4.1 B	3.4 B	3.6 B	4.3 B	3.4 B
Iron	2,320	3,490	557	2,170	13,900	13,500	15,400	15,200
Lead	2.9 J	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Magnesium	9,520	14,500	3,360 J	7,870	14,700	19,900	20,600	20,700
Manganese	40.4	41.7	24.2	131	241	260	490	490
Nickel	1.9 B	2.3 B	3.5 B	9.7 J	4.3 B	5.5 B	10.3 J	9.9 J
Potassium	110 B	472 J	347 J	1,200 J	982 J	1,000 J	843 J	832 J
Sodium	15,800	21,800	9,770	15,800	13,500	27,000	12,800	12,600
Sulfate	17,700	1,000 U	18,600	15,700	37,800	86,500	129,000	128,000
Vanadium	2.4 J	2.9 J	0.87 J	2.5 J	1.3 J	1.4 J	1.5 J	0.87 J
Zinc	112	48.2	33.8	12.8 J	7.2 B	8.4 B	12.6 J	11.1 B

Table B-2-5
Summary of Constituents Detected in the Surface and Subsurface Soil
SWMU 15
NAS Oceana

Sample Date	OW15-SS06	OW15-SS07	OW15-SS08	OW15-SS09	OW15-SB35-1	OW15-SB36-1	OW15-SB37-1	OW15-SB38-1	OW15-SB39-1	OW15-SB40-1	OW15-SB41-1
Chemical Name											
Semi-volatile Organic Compounds (UG/KG)											
2-Methylnaphthalene	390 U	700 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS
Acenaphthene	3,671	33,939 J	420 U	717.392 J	148.962 U	926.18	10,417	105.501 J	8,767	968.811	1,763
Anthracene	389.136 U	3,200 J	413.523 UJ	70 J	74.481 U	369.534 U	3,811 U	76.494 U	1,389 J	387.783 U	396.165 U
Benzo(a)anthracene	1,108 J	22,954 J	174.251 J	320 J	29.014	161.666	1,683	26.032	2,759	238.288	348.814
Benzo(a)pyrene	250 J	29,000 J	413.523 U	460 J	74.481 U	369.534 U	3,811 U	76.494 U	4,342 U	387.783 U	396.165 U
Benzo(b)fluoranthene	48,510 J	40,000	420 U	420 J	40.231 J	1,456 U	15,011 U	301.34 U	17,105 U	1,528 U	1,561 U
Benzo(g,h,i)perylene	160 J	203,419	420 U	400 J	148.962 U	4,070	31,721	480.284	8,684 U	3,213	5,840
Benzo(k)fluoranthene	150 J	16,000 J	420 U	280 J	568.766 J	3,663	18,069 J	621.1	98,738	6,664	11,428
Carbazole	390 U	2,000 J	420 U	44 J	NS	NS	NS	NS	NS	NS	NS
Chrysene	2,016 J	44,087 J	345.952 J	330 J	12.457	302.339	3,048	27.52	2,517	313.672	619.313 J
Di-n-butylphthalate	65 J	4,200 U	420 U	380 U	NS	NS	NS	NS	NS	NS	NS
Dibenz(a,h)anthracene	390 U	33,753 J	420 U	380 UJ	148.962 U	739.068 U	7,621 U	152.988 U	8,684 U	775.566 U	792.33 U
Dibenzofuran	390 U	830 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS
Diethylphthalate	70 J	4,200 U	57 J	130 J	NS	NS	NS	NS	NS	NS	NS
Fluoranthene	95,662 J	279,888 J	14,611	410 J	457.511 J	4,469	35,822 J	715.018 J	18,866 J	3,895	7,412
Fluorene	1,533 U	1,561,141 J	420 U	380 U	714.75	7,221	94,021	920.613	78,880	9,875	16,764
Indeno(1,2,3-cd)pyrene	140 J	16,000 J	420 U	340 J	293.41 U	228.53 J	1,684 J	29.531 J	17,105 U	322.504 J	484.224 J
Naphthalene	390 U	2,700 J	420 U	380 U	NS	NS	NS	NS	NS	NS	NS
Phenanthrene	1,743	16,279 J	213.027 U	290 J	8.284 J	135.806 J	1,095 J	23.54 J	3,684	209.86	313.072
Pyrene	320.575 J	21,000	46.414	710	3.837 U	9.062 J	86.637 J	0.742 J	115.362 J	53.576	83.383
Acenaphthylene	390 U	4,099 U	420 U	380 U	72.262 J	3,695 U	38,106 U	764.94 U	43,421 U	3,878 U	3,962 U
Pesticide/Polychlorinated Biphenyls (UG/KG)											
4,4'-DDE	3.9 U	4.1 U	4.2 U	0.67 J	NS	NS	NS	NS	NS	NS	NS
4,4'-DDT	3.9 U	4.1 U	4.2 U	1.7 J	NS	NS	NS	NS	NS	NS	NS
Aroclor-1254	39 U	41 U	450	38 U	NS	NS	NS	NS	NS	NS	NS
Aroclor-1260	39 U	41 U	420	38 U	NS	NS	NS	NS	NS	NS	NS
Dieldrin	9.2	2.1 J	4.2 U	15	NS	NS	NS	NS	NS	NS	NS
Total Metals (MG/KG)											
%Solids	848,000	805,000	798,000	883,000	NS	NS	NS	NS	NS	NS	NS
Aluminum	14,400	14,300	13,100	9,220	NS	NS	NS	NS	NS	NS	NS
Arsenic	1.8 J	1.7 J	2 J	1.5 J	NS	NS	NS	NS	NS	NS	NS
Barium	63.4	55.7	58.8	46.4	NS	NS	NS	NS	NS	NS	NS
Beryllium	0.47 J	0.47 J	0.44 J	0.31 J	NS	NS	NS	NS	NS	NS	NS
Calcium	1,230	925 J	850 J	14,300	NS	NS	NS	NS	NS	NS	NS
Chromium	19	19.6	19.3	10.8	NS	NS	NS	NS	NS	NS	NS
Cobalt	2.8 J	2.8 J	2.9 J	1.7 J	NS	NS	NS	NS	NS	NS	NS
Iron	6,970	6,980	7,470	5,270	NS	NS	NS	NS	NS	NS	NS
Lead	22.3 J	20 J	16 J	118 J	NS	NS	NS	NS	NS	NS	NS
Magnesium	954 J	1,050 J	984 J	1,270	NS	NS	NS	NS	NS	NS	NS
Manganese	37.2	30.5	31.1	52.4	NS	NS	NS	NS	NS	NS	NS
Mercury	0.05	0.05	0.04	0.03 J	NS	NS	NS	NS	NS	NS	NS
Nickel	9.1	10.3	9.5	6.2 J	NS	NS	NS	NS	NS	NS	NS
Potassium	422 J	443 J	503 J	311 J	NS	NS	NS	NS	NS	NS	NS
Silver	0.62 J	0.17 U	0.16 U	0.12 U	NS	NS	NS	NS	NS	NS	NS
Sodium	35.5 U	40.4 U	38 U	42.8 J	NS	NS	NS	NS	NS	NS	NS
Vanadium	20.1	19.6	19.7	13.1	NS	NS	NS	NS	NS	NS	NS
Zinc	20 J	20.9 J	22 J	18.2 J	NS	NS	NS	NS	NS	NS	NS

NS - Not sampled
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected; quantitation limit may be inaccurate

Table B-2-5
Summary of Constituents Deter[illegible] the Surface and Subsurface Soil
S[illegible]5
NAS [illegible]eana

Sample Date	OW15-SB42-1		OW15-SB43-1P		OW15-SB43-1		OW15-SB44-1	
Chemical Name								
Semi-volatile Organic Compounds (UG/KG)								
2-Methylnaphthalene	NS		NS		NS		NS	
Acenaphthene	209.752		73.197	J	288.005		104.751	J
Anthracene	81.675	U	73.755	U	73.161	U	490.134	
Benzo(a)anthracene	41.633		21.052		64.337		2.115	J
Benzo(a)pyrene	81.675	U	73.755	U	73.161	U	86.262	U
Benzo(b)fluoranthene	321.75	U	498.292		248.129	J	48.024	J
Benzo(g,h,i)perylene	806.802		445.969		760.367		172.524	U
Benzo(k)fluoranthene	1,136		581.1	U	576.42	U	96.64	J
Carbazole	NS		NS		NS		NS	
Chrysene	68.937		36.811		83.791	J	3.645	J
Di-n-butylphthalate	NS		NS		NS		NS	
Dibenz(a,h)anthracene	163.35	U	147.51	U	146.322	U	172.524	U
Dibenzofuran	NS		NS		NS		NS	
Diethylphthalate	NS		NS		NS		NS	
Fluoranthene	970.658		774.056		2,223		696.723	J
Fluorene	1,951		772.328		2,321		370.052	
Indeno(1,2,3-cd)pyrene	65.222	J	27.426	J	34.236		339.82	U
Naphthalene	NS		NS		NS		NS	
Phenanthrene	38.182	J	31.513	J	58.848		191.459	
Pyrene	11.876		7.632		16.901		11.386	
Acenaphthylene	816.75	U	737.55	U	731.61	U	862.62	U
Pesticide/Polychlorinated Biphenyls (UG/KG)								
4,4'-DDE	NS		NS		NS		NS	
4,4'-DDT	NS		NS		NS		NS	
Aroclor-1254	NS		NS		NS		NS	
Aroclor-1260	NS		NS		NS		NS	
Dieldrin	NS		NS		NS		NS	
Total Metals (MG/KG)								
%Solids	NS		NS		NS		NS	
Aluminum	NS		NS		NS		NS	
Arsenic	NS		NS		NS		NS	
Barium	NS		NS		NS		NS	
Beryllium	NS		NS		NS		NS	
Calcium	NS		NS		NS		NS	
Chromium	NS		NS		NS		NS	
Cobalt	NS		NS		NS		NS	
Iron	NS		NS		NS		NS	
Lead	NS		NS		NS		NS	
Magnesium	NS		NS		NS		NS	
Manganese	NS		NS		NS		NS	
Mercury	NS		NS		NS		NS	
Nickel	NS		NS		NS		NS	
Potassium	NS		NS		NS		NS	
Silver	NS		NS		NS		NS	
Sodium	NS		NS		NS		NS	
Vanadium	NS		NS		NS		NS	
Zinc	NS		NS		NS		NS	

NS - Not sampled
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Table
Summary of the Statistics for Consistents Detected in the Surface Soil
at SWMU 15
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/KG)																				
No Detections																				
Semi-volatile Organic Compounds (UG/KG)																				
2-Methylnaphthalene	1 - 4	700	700	OW15-SS07	323.75	5.6045529	250.9772566	0.632441508	380	4200	0.748	0.65936923	FALSE	0.748	0.68795486	FALSE	2.353	5.8	619.024742	2758.26647
Acenaphthene	3 - 4	717	33939	OW15-SS07	9634.341	7.6408136	16274.83004	2.199254751	420	820	0.748	0.7053188	FALSE	0.748	0.97865228	TRUE	2.353	19.53	28781.6785	1.37E+15
Anthracene	2 - 4	70	3200	OW15-SS07	917.83238	5.7304373	1522.699571	1.637511122	380	4200	0.748	0.66639333	FALSE	0.748	0.86440134	TRUE	2.353	14.592	2709.28842	1154219924
Benzo(a)anthracene	4 - 4	174	22954	OW15-SS07	6138.9265	6.9950654	11217.25642	2.171779795	39	380	0.748	0.66016672	FALSE	0.748	0.89682817	TRUE	2.353	19.265	19336.0287	3.5721E+14
Benzo(a)pyrene	3 - 4	250	29000	OW15-SS07	7479.1904	6.8146261	14347.63274	2.331903349	380	4200	0.748	0.63622415	FALSE	0.748	0.75067158	TRUE	2.353	20.679	24359.1803	1.70E+16
Benzo(b)fluoranthene	3 - 4	420	48510	OW15-SS06	22285.105	8.1933827	25605.84427	2.901319723	380	4200	0.748	0.8065156	TRUE	0.748	0.80336553	TRUE	2.353	25.718	52410.381	1.24E+24
Benzo(g,h,i)perylene	3 - 4	160	203419	OW15-SS07	51047.33	7.1591927	101581.3793	3.397684083	380	820	0.748	0.63054473	FALSE	0.748	0.72766401	FALSE	2.353	30.136	170557.823	1.95E+31
Benzo(k)fluoranthene	3 - 4	150	16000	OW15-SS07	4160	6.4182191	7893.512104	2.18965696	380	4200	0.748	0.63606083	FALSE	0.748	0.73762157	FALSE	2.353	19.442	13446.717	3.1832E+14
Carbazole	2 - 4	44	2000	OW15-SS07	612.25	5.5012998	928.1991076	1.574028262	380	4200	0.748	0.70165633	FALSE	0.748	0.93433995	TRUE	2.353	13.976	1704.27625	277405452
Chrysene	4 - 4	330	44087	OW15-SS07	11694.955	7.4871078	21609.44571	2.297841864	39	380	0.748	0.65752954	FALSE	0.748	0.84537128	TRUE	2.353	20.414	37118.4676	1.45E+16
Di-n-butylphthalate	1 - 4	65	65	OW15-SS06	641.25	5.6045529	974.6142399	1.463110294	380	4200	0.748	0.68958703	FALSE	0.748	0.90065774	TRUE	2.353	13.009	1787.88365	46919959.9
Dibenz(a,h)anthracene	1 - 4	33753	33753	OW15-SS07	8587.119	8.5734925	16777.57349	2.589247444	380	820	0.748	0.63010852	FALSE	0.748	0.6443012	FALSE	2.353	22.799	28325.9342	9.45E+18
Dibenzofuran	1 - 4	830	830	OW15-SS07	356.25	5.6471392	315.9476486	0.717445253	380	4200	0.748	0.65332387	FALSE	0.748	0.68122148	FALSE	2.353	6.562	727.962409	5555.79225
Diethylphthalate	3 - 4	57	130	OW15-SS09	589.25	5.2021934	1007.66839	1.668871847	380	4200	0.748	0.65637107	FALSE	0.748	0.79807756	TRUE	2.353	14.856	1774.77186	1203941643
Fluoranthene	4 - 4	410	279888	OW15-SS07	97842.891	9.904106	128537.5169	2.864840192	380	4135	0.748	0.85324632	TRUE	0.748	0.93566301	TRUE	2.353	25.362	248867.279	2.00E+24
Fluorene	1 - 4	1561141	1561141	OW15-SS07	390576.85	7.8742169	780376.0924	4.304932289	380	1615	0.748	0.62992843	FALSE	0.748	0.7393705	FALSE	2.353	38.097	1308689.32	3.69E+48
Indeno(1,2,3-cd)pyrene	3 - 4	140	16000	OW15-SS07	4172.5	6.4495099	7885.435414	2.184211659	380	4200	0.748	0.6393457	FALSE	0.748	0.77815141	TRUE	2.353	19.354	13449.7148	2.7324E+14
Naphthalene	1 - 4	2700	2700	OW15-SS07	823.75	5.9420346	1250.862203	1.306669918	380	4200	0.748	0.63568119	FALSE	0.748	0.65827632	FALSE	2.353	11.693	2295.38938	6058662.27
Phenanthrene	3 - 4	290	18279	OW15-SS07	4604.5959	6.8747753	7817.246771	2.208718336	200	380	0.748	0.70359886	FALSE	0.748	0.96441743	TRUE	2.353	19.619	13801.5867	8.1338E+14
Pyrene	4 - 4	46	21000	OW15-SS07	5519.2473	6.531315	10324.09256	2.55210006	20	4200	0.748	0.65431743	FALSE	0.748	0.96190428	TRUE	2.353	22.622	17665.5422	5.33E+18
Pesticide/Polychlorinated Biphenyls (UG/KG)																				
4,4'-DDE	1 - 4	0.67	0.67	OW15-SS09	1.6925	0.4317822	0.684513209	0.555697684	3.8	4.2	0.748	0.71064244	FALSE	0.748	0.67958752	FALSE	2.353	5.217	2.49782979	9.58274247
4,4'-DDT	1 - 4	1.7	1.7	OW15-SS09	1.95	0.6645587	0.177951304	9.45E-02	3.8	4.2	0.748	0.89536552	TRUE	0.748	0.88115748	TRUE	2.353	2.393	2.15935971	2.22452262
Aroclor-1254	1 - 4	450	450	OW15-SS08	127.25	3.7611315	215.1675704	1.585728321	38	42	0.748	0.63232103	FALSE	0.748	0.64811218	FALSE	2.353	13.976	380.394647	44939149.3
Aroclor-1260	1 - 4	420	420	OW15-SS08	119.75	3.7438833	200.1676381	1.53123904	38	42	0.748	0.63252035	FALSE	0.748	0.64852492	FALSE	2.353	13.624	355.247226	23223614.2
Dieldrin	3 - 4	2.1	15	OW15-SS09	7.1	1.6027821	6.240192305	1.013854079	3.8	4.2	0.748	0.86555459	TRUE	0.748	0.82897883	TRUE	2.353	9.068	14.4415862	1674.89458
Total Metals (MG/KG)																				
Aluminum	4 - 4	9220	14400	OW15-SS06	12755	9.438124	2429.561003	0.210446948	4.6	6.5	0.748	0.79875764	TRUE	0.748	0.77596776	TRUE	2.353	2.798	15613.3785	18037.8839
Arsenic	4 - 4	1.5	2	OW15-SS08	1.75	0.5542568	0.2081666	0.119877807	0.47	0.67	0.748	0.99897338	TRUE	0.748	0.99859438	TRUE	2.353	2.464	1.994908	2.07919176
Barium	4 - 4	46.4	63.4	OW15-SS06	56.075	4.0202213	7.183952023	0.133005669	0.04	0.05	0.748	0.96168573	TRUE	0.748	0.94208691	TRUE	2.353	2.499	64.5269196	68.0993008
Beryllium	4 - 4	0.31	0.47	OW15-SS06	0.4225	-0.875552	7.63E-02	0.199524769	0.02	0.02	0.748	0.75657171	TRUE	0.748	0.73881248	FALSE	2.353	2.747	0.51229247	0.58321197
Calcium	4 - 4	850	14300	OW15-SS09	4326.25	7.5644536	6651.197104	1.345029789	5.3	7.5	0.748	0.65085371	FALSE	0.748	0.7279048	FALSE	2.353	12.044	12151.3834	54943391.9
Chromium	4 - 4	10.8	19.6	OW15-SS07	17.175	2.8149049	4.257052971	0.290516616	0.11	0.15	0.748	0.66369351	FALSE	0.748	0.6710045	FALSE	2.353	3.205	22.1834228	29.8050857
Cobalt	4 - 4	1.7	2.9	OW15-SS08	2.55	0.9136445	0.56862407	0.25587941	0.09	0.12	0.748	0.70106304	FALSE	0.748	0.68578985	FALSE	2.353	3.052	3.21898622	4.04410314
Iron	4 - 4	5270	7470	OW15-SS08	6672.5	8.7971527	963.6864981	0.154986691	3.3	4.7	0.748	0.82220822	TRUE	0.748	0.79917299	TRUE	2.353	2.57	7806.27717	8426.44975
Lead	4 - 4	16	118	OW15-SS09	44.075	3.4108981	49.3520263	0.916996475	0.28	0.4	0.748	0.67983251	FALSE	0.748	0.76738615	TRUE	2.353	8.283	102.137659	3701.86787
Magnesium	4 - 4	954	1270	OW15-SS09	1064.5	6.9639018	142.7400296	0.128293425	5	7.1	0.748	0.85203778	TRUE	0.748	0.87198577	TRUE	2.353	2.499	1232.44306	1283.3549
Manganese	4 - 4	30.5	52.4	OW15-SS09	37.8	3.6075375	10.19313494	0.250717317	0.04	0.05	0.748	0.82877794	TRUE	0.748	0.85668214	TRUE	2.353	3.002	49.7922233	58.7629585
Mercury	4 - 4	0.03	0.05	OW15-SS08	0.0425	-3.179225	9.57E-03	0.242252055	0.02	0.02	0.748	0.86475362	TRUE	0.748	0.85711212	TRUE	2.353	2.951	5.38E-02	6.48E-02
Nickel	4 - 4	6.2	10.3	OW15-SS07	8.775	2.1540648	1.787689384	0.225598763	0.23	0.32	0.748	0.86789229	TRUE	0.748	0.83020606	TRUE	2.353	2.9	10.8782166	12.9001099
Potassium	4 - 4	311	503	OW15-SS08	419.75	6.0247395	80.21377687	0.203879337	2.1	3	0.748	0.95086884	TRUE	0.748	0.91912204	TRUE	2.353	2.747	514.121508	583.399222
Silver	1 - 4	0.62	0.62	OW15-SS06	0.21125	-2.07057	0.272713983	1.072505477	0.12	0.17	0.748	0.66664832	FALSE	0.748	0.75586519	TRUE	2.353	9.591	0.532098	85.0653497
Sodium	1 - 4	42.8	42.8	OW15-SS09	24.9375	3.1457613	11.95027022	0.410594826	28.5	40.4	0.748	0.70794609	FALSE	0.748	0.74809953	TRUE	2.353	4.015	38.9969929	65.4861921
Vanadium	4 - 4	13.1	20.1	OW15-SS06	18.125	2.8823701	3.356957948	0.206791404	0.14	0.2	0.748	0.68924265	FALSE	0.748	0.67858147	FALSE	2.353	2.798	22.074461	25.4778039
Zinc	4 - 4	18.2	22	OW15-SS08	20.275	3.0069864	1.607015868	8.04E-02	0.19	0.27	0.748	0.9848656	TRUE	0.748	0.9767578	TRUE	2.353	2.393	22.1656542	22.6769796

Table B-3-2
Summary of that Statistics for Constituents Detected in Surface Water
at SWMU 15
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/L)																				
Acetone	2 / 2	6.9	7.2	OW15-SW02	7.05	1.95280122	0.212132034	3.01E-02	5	5	Error!	0.999980747	FALSE	Error!	0.999980747	FALSE	6.314	Error!	7.9971	
Semi-volatile Organic Compounds (UG/L)																				
Anthracene	4 / 5	0.132	0.665	OW15-SW02	0.2912	-1.58746084	0.248136454	1.006786703	0.1	0.1	0.762	0.920187992	TRUE	0.762	0.980549219	TRUE	2.132	4.949	0.62779803	4.09858804
Benzo(a)anthracene	1 / 5	0.012	0.012	OW15-SW04	0.0059	-5.26185306	3.58E-03	0.556832626	0.01	0.01	0.762	0.778570497	TRUE	0.762	0.876283411	TRUE	2.132	3.151	0.0093112	1.46E-02
Benzo(g,h,i)perylene	1 / 5	1.86	1.86	OW15-SW04	0.442	-1.85658221	0.792981715	1.416927468	0.2	0.2	0.762	0.5752962	FALSE	0.762	0.719277492	FALSE	2.132	6.762	1.19807586	51.3102912
Chrysene	3 / 5	0.005	0.041	OW15-SW05	0.0185	-4.60529523	1.97E-02	1.296713097	0.01	0.01	0.762	0.738107303	FALSE	0.762	0.824395584	TRUE	2.132	6.225	3.73E-02	1.31187401
Fluoranthene	4 / 5	1.82	4.06	OW15-SW02	2.452	0.69268044	1.348766103	0.826019085	1	1	0.762	0.963829286	TRUE	0.762	0.837299383	TRUE	2.132	4.187	3.73799937	15.6489788
Indeno(1,2,3-cd)pyrene	1 / 5	0.095	0.095	OW15-SW04	0.159	-1.89695544	5.62E-02	0.394117045	0.4	0.4	0.762	0.698863066	FALSE	0.762	0.705376078	FALSE	2.132	2.626	0.21255523	0.27203742
Phenanthrene	4 / 5	0.026	0.049	OW15-SW05	0.0324	-3.46123607	9.79E-03	0.271289906	0.05	0.05	0.762	0.811983228	TRUE	0.762	0.86547691	TRUE	2.132	2.341	4.17E-02	4.47E-02
Pyrene	1 / 5	0.013	0.013	OW15-SW04	0.00435	-5.80036226	4.87E-03	0.868321348	0.005	0.005	0.762	0.643941548	FALSE	0.762	0.803158947	TRUE	2.132	4.353	8.99E-03	2.92E-02
bis(2-Ethylhexyl)phthalate	3 / 5	1	2	OW15-SW01	3	0.92103404	1.870828693	0.689196693	10	10	0.762	0.817139552	TRUE	0.762	0.876852906	TRUE	2.132	3.625	4.78375918	11.1083723
Pesticide/Polychlorinated Biphenyls (UG/L)																				
No Detections																				
Total Metals (UG/L)																				
Aluminum	5 / 5	104	191	OW15-SW04	128.4	4.82954847	35.45842636	0.241815792	38.2	38.2	0.762	0.704159099	FALSE	0.762	0.748799213	FALSE	2.132	2.28	162.208169	169.771923
Barium	5 / 5	84	92.3	OW15-SW04	87.22	4.46776145	3.599103991	4.09E-02	0.2	0.2	0.762	0.860197036	TRUE	0.762	0.862331522	TRUE	2.132	2.035	90.6507316	90.9377817
Cadmium	1 / 5	0.4	0.4	OW15-SW03	0.185	-1.83958357	0.124498996	0.597060894	0.3	0.3	0.762	0.752481324	FALSE	0.762	0.868004802	TRUE	2.132	3.287	0.30370474	0.50657993
Calcium	5 / 5	61500	67400	OW15-SW04	63660	11.0606652	2577.401793	4.01E-02	57.9	57.9	0.762	0.846093336	TRUE	0.762	0.848030717	TRUE	2.132	2.035	66117.4479	66318.9454
Cyanide	1 / 5	5.6	5.6	OW15-SW03	2.87	0.93895647	1.61925909	0.531104429	5	5	0.762	0.796904957	TRUE	0.762	0.880369661	TRUE	2.132	3.049	4.41389778	6.61712599
Iron	2 / 5	33.4	124	OW15-SW01	40.72	3.306388	47.20288127	0.910270278	30.8	30.8	0.762	0.656963327	FALSE	0.762	0.746650849	FALSE	2.132	4.521	85.7260302	323.225399
Lead	1 / 5	1	1	OW15-SW04	0.55	-0.69314718	0.273861279	0.490129072	1	1	0.762	0.828174712	TRUE	0.762	0.883386359	TRUE	2.132	2.917	0.81111561	1.15246844
Magnesium	5 / 5	21700	23900	OW15-SW04	22560	10.0232367	947.6286192	4.16E-02	24.3	24.3	0.762	0.877923519	TRUE	0.762	0.880519447	TRUE	2.132	2.035	23463.5254	235[illegible].5591
Manganese	5 / 5	10.6	12.3	OW15-SW05	11.42	2.43338714	0.804363102	7.03E-02	0.3	0.3	0.762	0.859863236	TRUE	0.762	0.861990219	TRUE	2.132	2.035	12.1869275	12.2726566
Potassium	5 / 5	3870	4310	OW15-SW04	4068	8.310146	178.1010949	4.35E-02	13.5	13.5	0.762	0.940866684	TRUE	0.762	0.944030686	TRUE	2.132	2.035	4237.81216	4253.00457
Sodium	5 / 5	10300	11400	OW15-SW04	10820	9.28831313	496.9909456	4.57E-02	148	148	0.762	0.864332836	TRUE	0.762	0.867769127	TRUE	2.132	2.035	11293.8607	11337.4178
Vanadium	2 / 5	0.64	0.76	OW15-SW01	0.46	-0.86652847	0.223159136	0.466042202	0.6	0.6	0.762	0.754800564	FALSE	0.762	0.737767963	FALSE	2.132	2.858	0.67277317	0.91214484

Tab)

Summary of Statistics for Constituents Detected in Sediment

SWMU 15

NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/KG)																				
Ethylbenzene	2 - 6	26	61	OW15-SD03-2.5	18.8333333	2.47504073	22.0831761	0.97609143	12	15	0.788	0.685575269	FALSE	0.788	0.747390046	FALSE	2.015	4.231	36.999402	121.30885
Xylene, total	1 - 6	94	94	OW15-SD03-2.5	21.0833333	2.31606182	35.7231251	1.092206187	12	15	0.788	0.504433787	FALSE	0.788	0.53737296	FALSE	2.015	4.63	50.469901	176.62698
Semi-volatile Organic Compounds (UG/KG)																				
2-Methylnaphthalene	1 - 14	250	250	OW15-SD07-7.0	232.5	5.44702406	14.77393755	6.33E-02	420	580	0.874	0.939438565	TRUE	0.874	0.943111177	TRUE	1.771	1.758	239.4928	239.82502
Acenaphthene	3 - 16	17	1132.111	OW15-SD16-0.0	125.307	3.00121975	296.8743512	1.868786766	6.6	995.478	0.887	0.471151067	FALSE	0.887	0.86623436	FALSE	1.753	4.248	255.41218	895.28411
Acenaphthylene	1 - 16	10.8	10.8	OW15-SD12-5.5	159.405	4.09758065	258.7337326	1.447631912	33	4220.04	0.887	0.56885665	FALSE	0.887	0.823242116	FALSE	1.753	3.474	272.79506	628.85509
Anthracene	5 - 16	2.94	14.2	OW15-SD09-2.5	34.868375	2.55632809	62.7461114	1.419389887	3.3	497.739	0.887	0.557055552	FALSE	0.887	0.957604217	TRUE	1.753	3.422	62.366858	123.68935
Benzo(a)anthracene	14 - 16	0.575	189.241	OW15-SD16-0.0	22.0049375	1.40912859	51.85960222	1.654722051	0.33	49.774	0.887	0.467420543	FALSE	0.887	0.869293928	FALSE	1.753	3.837	44.732408	82.891236
Benzo(a)pyrene	2 - 16	7.55	24.2	OW15-SD13-7.0	33.195	2.19738901	63.55243403	1.660379301	3.3	497.739	0.887	0.555835279	FALSE	0.887	0.879810562	FALSE	1.753	3.856	61.046854	186.59064
Benzo(b)fluoranthene	2 - 16	85	145.853	OW15-SD04-5.5	77.1514375	3.37064795	108.7372773	1.497472342	13	1662.44	0.887	0.693678206	FALSE	0.887	0.827816209	FALSE	1.753	3.562	124.80555	353.92734
Benzo(g,h,i)perylene	3 - 16	47.2	133	OW15-SD13-7.0	61.75625	3.10033583	77.51636243	1.666410594	6.6	844.008	0.887	0.772409551	FALSE	0.887	0.842539937	FALSE	1.753	3.874	95.727796	471.37126
Chrysene	15 - 16	0.817	355.972	OW15-SD16-0.0	44.1284688	2.02325098	100.7077587	1.788382435	0.33	49.774	0.887	0.483435119	FALSE	0.887	0.895277568	TRUE	1.753	4.097	88.263644	248.19901
Di-n-butylphthalate	5 - 15	46	92	OW15-SD16-0.0	176.866667	5.0098319	84.34695919	0.664523888	420	580	0.881	0.811295296	FALSE	0.881	0.757716735	FALSE	1.761	2.256	215.21824	279.02373
Dibenz(a,h)anthracene	1 - 16	58.2	58.2	OW15-SD12-5.5	53.3846875	2.88042018	76.2937418	1.636198493	6.6	844.008	0.887	0.696835064	FALSE	0.887	0.829019968	FALSE	1.753	3.819	86.82042	341.17153
Diethylphthalate	3 - 15	55	950	OW15-SD07-7.0	257.666667	5.38399252	198.8975568	0.572879933	410	580	0.881	0.498857653	FALSE	0.881	0.720242441	FALSE	1.761	2.147	348.10305	356.67051
Fluoranthene	3 - 16	155	2009.548	OW15-SD02-7.0	372.4505	4.56432395	605.8166009	1.775762517	33	4220.04	0.887	0.654187743	FALSE	0.887	0.84112152	FALSE	1.753	4.078	637.94963	3013.1848
Fluorene	1 - 16	66.3	66.3	OW15-SD12-5.5	86.669375	3.48181669	115.3094417	1.547195662	13	1662.44	0.887	0.741231862	FALSE	0.887	0.83150441	FALSE	1.753	3.654	137.20374	463.32984
Indeno(1,2,3-cd)pyrene	3 - 16	1.97	26.4	OW15-SD09-2.5	79.531875	3.25347709	117.5304507	1.61501881	13	1662.44	0.887	0.702956579	FALSE	0.887	0.908363767	TRUE	1.753	3.782	131.0396	461.60018
Naphthalene	1 - 16	98	98	OW15-SD07-7.0	128.061875	4.47659451	113.1605384	0.900434825	66	815.76	0.887	0.804123425	FALSE	0.887	0.852783086	FALSE	1.753	2.563	177.65448	239.33424
Phenanthrene	6 - 16	1.41	8.64	OW15-SD12-5.5	17.7714688	1.77006046	32.4384784	1.535695611	1.7	256.411	0.887	0.560510053	FALSE	0.887	0.934663863	TRUE	1.753	3.635	31.987632	80.686609
Pyrene	12 - 16	0.202	51.363	OW15-SD16-0.0	5.92175	-5.55E-03	13.87382867	1.863012232	0.17	25.641	0.887	0.471174188	FALSE	0.887	0.935271254	TRUE	1.753	4.229	12.001955	43.125922
Pesticide/Polychlorinated Biphenyls (UG/KG)																				
4,4'-DDD	1 - 6	0.54	0.54	OW15-SD04-5.5	1.965	0.57169663	0.710176035	0.584763116	4.1	4.9	0.788	0.673107097	FALSE	0.788	0.59206114	FALSE	2.015	2.925	2.5492052	4.5158754
Total Metals (MG/KG)																				
%Solids	16 - 16	656000	809000	OW15-SD04-5.5	730887.5	13.4995956	49134.80606	6.79E-02	Error!	Error!	0.887	0.946230885	TRUE	0.887	0.940309292	TRUE	1.753	1.745	752220.83	753495.31
Aluminum	16 - 16	2680	29500	OW15-SD16-0.0	11984.375	9.06729108	9611.276689	0.845684637	5.6	11.2	0.887	0.836517296	FALSE	0.887	0.908416923	TRUE	1.753	2.492	16196.517	21354.603
Antimony	1 - 16	0.85	0.85	OW15-SD12-5.5	0.32890625	-1.1763683	0.150003362	0.339922171	0.47	0.79	0.887	0.646079801	FALSE	0.887	0.854729038	FALSE	1.753	1.908	0.394803	0.3863026
Arsenic	16 - 16	1.5	4.7	OW15-SD10-5.5	2.94375	1.03469665	0.874809503	0.319312753	0.39	0.85	0.887	0.959555426	TRUE	0.887	0.932439171	TRUE	1.753	1.891	3.3271353	3.4610871
Barium	16 - 16	13.3	150	OW15-SD16-0.0	51.44375	3.66953428	39.36458592	0.767009172	0.04	0.06	0.887	0.863616881	FALSE	0.887	0.942981138	TRUE	1.753	2.38	68.69528	84.354084
Beryllium	16 - 16	0.1	0.98	OW15-SD16-0.0	0.385	-1.2000496	0.280333135	0.726797073	0.02	0.03	0.887	0.860185371	FALSE	0.887	0.940601711	TRUE	1.753	2.327	0.507856	0.6069845
Cadmium	1 - 16	0.15	0.15	OW15-SD12-5.5	0.05390625	-2.928507	5.23E-02	0.536681555	0.06	0.09	0.887	0.586978119	FALSE	0.887	0.780161331	FALSE	1.753	2.699	8.68E-02	8.26E-02
Calcium	10 - 16	233	3210	OW15-SD07-7.0	732.28125	6.06532872	914.0802658	0.994387148	6.5	17	0.887	0.671824464	FALSE	0.887	0.918913847	TRUE	1.753	2.699	1132.8769	1411.9103
Chromium	16 - 16	6.8	43.1	OW15-SD05-2.5	19.81875	2.76179254	13.84604288	0.685934743	0.13	0.32	0.887	0.799543165	FALSE	0.887	0.875341767	FALSE	1.753	2.275	25.887655	29.963068
Cobalt	16 - 16	0.97	6.3	OW15-SD02-7.0	3.285625	1.05232172	1.695397569	0.560913269	0.1	0.16	0.887	0.932012868	TRUE	0.887	0.960427291	TRUE	1.753	2.121	4.028603	4.5576723
Copper	10 - 16	2.8	16	OW15-SD16-0.0	5.9484375	1.49371046	4.603933723	0.794078125	0.13	0.32	0.887	0.849240415	FALSE	0.887	0.920419925	TRUE	1.753	2.407	7.9661115	9.9991285
Cyanide	5 - 16	0.33	1.2	OW15-SD06-5.5	0.3121875	-1.5165846	0.342067093	0.765820723	0.22	0.37	0.887	0.599759944	FALSE	0.887	0.749119394	FALSE	1.753	2.38	0.4620984	0.4710756
Iron	16 - 16	2400	25600	OW15-SD11-2.5	9756.25	8.90121698	7924.345504	0.763760106	4.1	9	0.887	0.800226822	FALSE	0.887	0.917388405	TRUE	1.753	2.367	13229.094	15672.438
Lead	16 - 16	2.4	72.7	OW15-SD16-0.0	12.48125	2.00431461	17.41900184	0.964132323	0.19	0.5	0.887	0.582935031	FALSE	0.887	0.9180609/	TRUE	1.753	2.654	20.115128	22.86875
Magnesium	16 - 16	416	2100	OW15-SD16-0.0	1032.9375	6.80642289	558.7564131	0.533246151	4.7	9	0.887	0.888430264	TRUE	0.887	0.94532189	TRUE	1.753	2.088	1277.8125	1388.6125
Manganese	16 - 16	14.7	74	OW15-SD07-7.0	30.05	3.28896674	16.75613321	0.467244478	0.04	0.09	0.887	0.794244105	FALSE	0.887	0.924014097	TRUE	1.753	2.026	37.393375	38.188948
Mercury	6 - 16	0.03	0.1	OW15-SD16-0.0	0.024375	-4.0206802	2.37E-02	0.752579047	0.02	0.03	0.887	0.65682331	FALSE	0.887	0.764822539	FALSE	1.753	2.354	3.47E-02	3.76E-02
Nickel	16 - 16	2.7	16.9	OW15-SD16-0.0	7.61875	1.89524572	3.988854263	0.552241475	0.17	0.41	0.887	0.930011121	TRUE	0.887	0.950002755	TRUE	1.753	2.11	9.3668654	10.470816
Potassium	16 - 16	290	1070	OW15-SD16-0.0	519.0625	6.17541988	232.7661112	0.385240207	2.6	4	0.887	0.785305066	FALSE	0.887	0.885474709	FALSE	1.753	1.95	621.07225	628.6588
Sodium	6 - 16	42	101	OW15-SD11-2.5	39.053125	3.41210261	30.80773425	0.703594807	28.5	51	0.887	0.749240777	FALSE	0.887	0.827873273	FALSE	1.753	2.287	52.554615	58.856293
Thallium	1 - 7	0.87	0.87	OW15-SD11-2.5	0.47142857	-0.8022825	0.183319264	0.322503544	0.62	0.94	0.803	0.729192371	FALSE	0.803	0.842258357	TRUE	1.943	2.156	0.6060555	0.6272463
Vanadium	16 - 16	6.3	54.6	OW15-SD05-2.5	21.075	2.8020045	15.51818288	0.718210338	0.12	0.25	0.887	0.831177526	FALSE	0.887	0.905196766	TRUE	1.753	2.314	27.875844	32.754104
Zinc	16 - 16	8.2	77.6	OW15-SD16-0.0	21.29375	2.88550171	16.44994301	0.558309746	0.24	0.56	0.887	0.655660186	FALSE	0.887	0.92833735	TRUE	1.753	2.121	28.502938	28.420459
pH	16 - 16	-1	-1	OW15-SD01-7.0	-1	-1	0	0	Error!	Error!	0.887	-1	FALSE	0.887	-1	FALSE	1.753	1.745	-1	0.3678794

Table B-3-4
Statistics for Constituents Detected in Groundwater SWMU 15
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/L)																				
1,1-Dichloroethane	1 - 7	3.8	3.8	OW15-MW20-R01	16.435714	0.91235	36.90996607	2.050464429	1	200	0.803	0.503739804	FALSE	0.803	0.8962779	TRUE	1.943	6.906	43.5418386	6604.8296
Benzene	5 - 7	70	3444	OW15-MW07-R01	563.76429	3.59561	1271.84153	3.414417201	1	200	0.803	0.503290442	FALSE	0.803	0.87366915	TRUE	1.943	11.269	1497.78559	8.224E+10
Carbon disulfide	2 - 7	21.7	194	OW15-MW07-R01	32.125	1.30142	71.78088621	2.230584439	1	200	0.803	0.526927232	FALSE	0.803	0.87837634	TRUE	1.943	7.479	84.839804	40126.342
Chloroform	2 - 7	12.5	278	OW15-MW07-R01	42.464286	0.89956	103.9579671	2.527785317	1	200	0.803	0.485274741	FALSE	0.803	0.83856276	TRUE	1.943	8.435	118.809454	361871.77
Ethylbenzene	2 - 7	5.1	244.1	OW15-MW19-R01	51.421429	1.83877	92.33272198	2.516630669	1	200	0.803	0.648729102	FALSE	0.803	0.91585609	TRUE	1.943	8.403	119.229192	838036.72
Methane	7 - 7	23	3200	OW15-MW07-R01	967.57143	6.24562	1046.427869	1.523066378	3	3	0.803	0.761173631	FALSE	0.803	0.83625949	TRUE	1.943	5.246	1736.05233	42932.705
Methylene chloride	1 - 7	216	216	OW15-MW07-R01	35.803571	0.97657	80.05251978	2.623057641	2	400	0.803	0.534263667	FALSE	0.803	0.93391569	TRUE	1.943	8.724	94.5929368	945014.6
Tetrachloroethene	1 - 7	5.1	5.1	OW15-MW06-R01	15.978571	0.62544	37.11383229	2.124351327	1	200	0.803	0.498691699	FALSE	0.803	0.83712479	TRUE	1.943	7.129	43.2344121	8643.7829
Toluene	3 - 7	1.8	3.6	OW15 MW19-R01	16.192857	0.97033	36.99299966	1.924285522	1	200	0.803	0.495586002	FALSE	0.803	0.92344472	TRUE	1.943	6.495	43.3599601	2763.2286
Xylene, total	2 - 7	72.8	882.2	OW15-MW19-R01	152.25	2.40211	324.3882846	2.966068435	1	200	0.803	0.550179394	FALSE	0.803	0.94767101	TRUE	1.943	9.849	390.475881	135836904
Semi-volatile Organic Compounds (UG/L)																				
2-Methylnaphthalene	1 - 7	4	4	OW15-MW19-R01	5.0357143	1.58509	1.211305868	0.287746461	11	12	0.803	0.786843093	FALSE	0.803	0.74697282	FALSE	1.943	2.112	5.92527911	6.5181719
Anthracene	6 - 7	0.165	0.551	OW15-MW21-R01	1.1561429	-0.71218	2.139887603	1.175059816	0.1	12	0.803	0.512343565	FALSE	0.803	0.78181786	FALSE	1.943	4.222	2.7276443	7.4154623
Benzo(a)anthracene	4 - 7	0.007	0.05	OW15-MW21-R01	0.6691429	-3.76135	2.262553235	2.573653119	0.01	12	0.803	0.458021477	FALSE	0.803	0.67181126	FALSE	1.943	8.564	2.53072795	5159.5132
Chrysene	5 - 7	0.015	0.061	OW15-MW21-R01	0.8777143	-3.16628	2.258785567	2.310860303	0.01	12	0.803	0.45986536	FALSE	0.803	0.75426932	FALSE	1.943	7.734	2.53653246	897.88865
Di-n-butylphthalate	3 - 7	1	1	OW15-MW07-R01	3.3214286	0.89998	2.435476877	0.88322743	11	12	0.803	0.778138135	FALSE	0.803	0.77023997	FALSE	1.943	3.367	5.11000619	12.232376
Diethylphthalate	2 - 7	2	3	OW15-MW06-R01	4.3214286	1.38705	1.662793118	0.442011584	11	12	0.803	0.814992622	TRUE	0.803	0.81891052	TRUE	1.943	2.355	5.54255885	6.7510632
Fluoranthene	5 - 7	3.278	6.54	OW15-MW21-R01	4.4397143	1.27252	2.091747413	0.900309749	1	12	0.803	0.892692197	TRUE	0.803	0.69245066	FALSE	1.943	3.42	5.97586215	18.818112
Fluorene	1 - 7	0.386	0.386	OW15-MW21-R01	1.0562857	-1.01471	2.1801567	1.260653241	0.4	12	0.803	0.473470809	FALSE	0.803	0.57123535	FALSE	1.943	4.456	2.65936003	7.9504897
Naphthalene	3 - 7	3	28	OW15-MW07-R01	7.5	1.15634	10.05402075	1.48439125	2	12	0.803	0.760632858	FALSE	0.803	0.94653328	TRUE	1.943	5.123	14.8835217	213.27609
Phenanthrene	6 - 7	0.027	0.329	OW15-MW21-R01	0.9611429	-1.8655	2.224416885	1.826790721	0.05	12	0.803	0.493043328	FALSE	0.803	0.85988546	TRUE	1.943	6.212	2.59472119	84.427662
Phenol	4 - 7	2	34	OW15-MW07-R01	8.3928571	1.64728	11.40162374	0.928611571	11	12	0.803	0.580625843	FALSE	0.803	0.84209638	TRUE	1.943	3.503	16.7660383	30.157804
Pyrene	4 - 7	0.003	0.011	OW15-MW21-R01	0.861	-4.50758	2.268087947	2.823575892	0.005	12	0.803	0.454214466	FALSE	0.803	0.596265	FALSE	1.943	9.367	2.52518093	29034.312
bis(2-Ethylhexyl)phthalate	2 - 7	1	1	OW15-MW18-R01	3.9642857	1.14352	2.311333361	0.826948345	11	12	0.803	0.785343026	FALSE	0.803	0.75237349	FALSE	1.943	3.235	5.6616942	13.165176
Pesticide/Polychlorinated Biphenyls (UG/L)																				
No Detections																				
Total Metals (UG/L)																				
Aluminum	2 - 7	440	585	OW15-MW18-R01	197.71429	4.75256	221.2234649	1.10196907	26.2	26.2	0.803	0.760624358	FALSE	0.803	0.91274091	TRUE	1.943	3.988	360.177474	1279.0085
Arsenic	2 - 7	8.6	19.6	OW15-MW21-R01	5.7357143	1.29694	6.58943057	0.97347852	2.7	2.7	0.803	0.721780716	FALSE	0.803	0.90919432	TRUE	1.943	3.613	10.5748931	24.696311
Barium	7 - 7	17.7	62.3	OW15-MW20-R01	42.685714	3.6788	15.5530735	0.449688064	0.2	0.2	0.803	0.889946209	TRUE	0.803	0.83021596	TRUE	1.943	2.374	54.1076577	67.744223
Beryllium	1 - 7	0.25	0.25	OW15-MW08-R01	0.075	-2.86483	7.77E-02	0.701284793	0.1	0.1	0.803	0.542564409	FALSE	0.803	0.69804844	FALSE	1.943	2.904	0.13208239	0.1673742
Calcium	7 - 7	4060	12400	OW15-MW07-R01	6985.7143	8.7787	2943.296662	0.410084561	30.3	30.3	0.803	0.881195986	TRUE	0.803	0.91033662	TRUE	1.943	2.3	9147.22712	10362.17
Chromium	4 - 7	0.8	1.7	OW15-MW07-R01	0.9857143	-0.14568	0.503913258	0.58669034	0.6	0.6	0.803	0.927251789	TRUE	0.803	0.92944494	TRUE	1.943	2.652	1.35578061	1.9379169
Cobalt	6 - 7	0.6	9.9	OW15-MW21-R01	3.4357143	0.62836	3.655898691	1.302264294	0.5	0.5	0.803	0.837478639	TRUE	0.803	0.97142448	TRUE	1.943	4.578	6.12055134	49.908469
Copper	1 - 7	13.7	13.7	OW15-MW06-R01	3.9178571	1.00673	4.420706822	0.827393129	0.6	0.6	0.803	0.651501299	FALSE	0.803	0.89775403	TRUE	1.943	3.235	7.16435779	11.493032
Iron	7 - 7	557	15400	OW15-MW21-R01	7333.0571	8.37203	6566.371713	1.25046319	19	19	0.803	0.798568536	FALSE	0.803	0.88329453	TRUE	1.943	4.426	12156.1018	90520.707
Lead	1 - 7	2.9	2.9	OW15-MW06-R01	1.0428571	-0.13819	0.832380408	0.589985376	1.6	1.6	0.803	0.584089426	FALSE	0.803	0.73001222	FALSE	1.943	2.652	1.6541448	1.963283
Magnesium	7 - 7	3360	20700	OW15-MW21-R01	12935.714	9.32365	6368.777636	0.63884939	28.6	28.6	0.803	0.946851821	TRUE	0.803	0.88884207	TRUE	1.943	2.765	17612.8489	28250.003
Manganese	7 - 7	24.2	490	OW15-MW21-R01	175.47143	4.67582	169.0005593	1.143818705	0.2	0.2	0.803	0.864128516	TRUE	0.803	0.91839715	TRUE	1.943	4.105	299.582899	1403.695
Nickel	2 - 7	9.7	10.3	OW15-MW21-R01	4.1071429	1.0042	4.073739945	0.956303058	1.3	1.3	0.803	0.735791703	FALSE	0.803	0.87825635	TRUE	1.943	3.586	7.09583625	17.48718
Potassium	6 - 7	347	1200	OW15-MW18-R01	699.85714	6.234	414.8475337	1.07869843	12.2	12.2	0.803	0.935893236	TRUE	0.803	0.78760051	FALSE	1.943	3.93	1004.51494	5148.5988
Sodium	7 - 7	9770	27000	OW15-MW20-R01	16638.571	9.66907	5876.059985	0.339330608	162	162	0.803	0.917865328	TRUE	0.803	0.96622078	TRUE	1.943	2.188	20953.8616	22691.618
Sulfate	6 - 7	15700	129000	OW15-MW21-R01	43685.714	9.88054	46724.3487	1.812340285	1000	5000	0.803	0.831591012	TRUE	0.803	0.84662005	TRUE	1.943	6.149	77999.3738	9553158.2
Vanadium	7 - 7	0.87	2.9	OW15-MW07-R01	1.8385714	0.53164	0.754374544	0.433391348	0.8	0.8	0.803	0.916618893	TRUE	0.803	0.93072091	TRUE	1.943	2.337	2.39257276	2.8265211
Zinc	5 - 7	12.6	112	OW15-MW06-R01	32.457143	2.84478	38.7053337	1.267958438	1.1	1.1	0.803	0.782606796	FALSE	0.803	0.94581065	TRUE	1.943	4.487	60.8817582	392.01538

Tabl

Summary of the Statistics for Constituents D[illegible]ted in the Surface and Subsurface Soil

SWMU 15

NAS Oceana

nalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
olatile Organic Compounds (UG/KG)																				
o Detections																				
emi-volatile Organic Compounds (UG/KG)																				
-Methylnaphthalene	1 - 4	700	700	OW15-SS07	323.75	5.60455287	250.9772566	0.632441508	380	4200	0.748	0.659369227	FALSE	0.748	0.687954864	FALSE	2.353	5.8	619.02474	2758.2665
cenaphthene	12 - 14	104.751	33939.031	OW15-SS07	4440.0884	6.76462742	9115.97806	1.917302315	147.51	8684.214	0.874	0.542336444	FALSE	0.874	0.939868669	TRUE	1.771	4.536	8754.86	60762.786
cenaphthylene	1 - 14	72.262	72.262	OW15-SB35-1	3618.1732	6.68135108	7163.174133	1.738698844	380	43421.07	0.874	0.525562935	FALSE	0.874	0.894472856	TRUE	1.771	4.175	7008.6443	27070.264
nthracene	4 - 14	70	3200	OW15-SS07	583.35505	5.25468157	939.5575427	1.573340521	73.755	4342.107	0.874	0.645433582	FALSE	0.874	0.934621125	TRUE	1.771	3.844	1028.0661	3532.543
enzo(a)anthracene	14 - 14	2.115	22953.562	OW15-SS07	2130.4654	5.35817088	6044.6036	2.316439058	7.376	434.211	0.874	0.389758296	FALSE	0.874	0.983696126	TRUE	1.771	5.356	4997.4951	96969.929
enzo(a)pyrene	3 - 14	250	29000	OW15-SS07	2481.9825	5.42282189	7663.775304	2.003698776	73.755	4342.107	0.874	0.356063955	FALSE	0.874	0.895989642	TRUE	1.771	4.697	6109.398	22936.196
enzo(b)fluoranthene	6 - 14	40.231	48510.421	OW15-SS06	7740.6359	6.75088235	15802.0055	2.27649341	290.55	17105.27	0.874	0.548586524	FALSE	0.874	0.916589018	TRUE	1.771	5.274	15220.036	318705.13
enzo(g,h,i)perylene	10 - 14	160	203419.32	OW15-SS07	18255.97	7.193258	53923.92395	2.282152582	147.51	8684.214	0.874	0.381381377	FALSE	0.874	0.938867	TRUE	1.771	5.274	43779.223	506649.26
enzo(k)fluoranthene	12 - 14	96.64	98737.769	OW15-SB39-1	11269.211	7.33494307	25935.26277	2.205157731	380	34210.54	0.874	0.478618122	FALSE	0.874	0.925958394	TRUE	1.771	5.13	23544.881	401842.34
arbazole	2 - 4	44	2000	OW15-SS07	612.25	5.5012998	928.1991076	1.574028262	380	4200	0.748	0.701656329	FALSE	0.748	0.934339948	TRUE	2.353	13.976	1704.2763	277405452
hrysene	14 - 14	3.645	44087.385	OW15-SS07	3841.1611	5.67728322	11627.6848	2.450241058	7.376	434.211	0.874	0.360983096	FALSE	0.874	0.978595498	TRUE	1.771	5.624	9344.773	268619.57
i-n-butylphthalate	1 - 4	65	65	OW15-SS06	641.25	5.60455287	974.6142399	1.463110294	380	4200	0.748	0.689587025	FALSE	0.748	0.900657736	TRUE	2.353	13.009	1787.8837	46919960
ibenz(a,h)anthracene	1 - 14	33753.476	33753.476	OW15-SS07	3143.6045	5.84897455	8922.354195	1.916946577	147.51	8684.214	0.874	0.392196155	FALSE	0.874	0.860713283	FALSE	1.771	4.536	7366.7302	24293.167
ibenzofuran	1 - 4	830	830	OW15-SS07	356.25	5.64713922	315.9476486	0.717445253	380	4200	0.748	0.653323875	FALSE	0.748	0.681221481	FALSE	2.353	6.562	727.96241	5555.7922
iethylphthalate	3 - 4	57	130	OW15-SS09	589.25	5.2021934	1007.66839	1.668871847	380	4200	0.748	0.656371071	FALSE	0.748	0.798077557	TRUE	2.353	14.856	1774.7719	1.204E+09
luoranthene	14 - 14	410	279887.93	OW15-SS07	33292.843	8.52573641	75406.99329	2.055300131	380	43421.07	0.874	0.5004487	FALSE	0.874	0.940226431	TRUE	1.771	4.821	68984.456	650038.94
luorene	11 - 14	370.052	1561140.92	OW15-SS07	126810.37	8.33354334	413942.8487	2.630581102	290.55	17105.27	0.874	0.343382896	FALSE	0.874	0.923968934	TRUE	1.771	6	322737.66	10544061
ndeno(1,2,3-cd)pyrene	10 - 14	29.531	16000	OW15-SS07	2029.137	5.77798213	4599.063279	1.844294428	290.55	17105.27	0.874	0.498551233	FALSE	0.874	0.901445658	TRUE	1.771	4.376	4205.9641	16598.768
aphthalene	1 - 4	2700	2700	OW15-SS07	823.75	5.94203455	1250.862203	1.306669916	380	4200	0.748	0.635681194	FALSE	0.748	0.658276317	FALSE	2.353	11.693	2295.3894	6058662.3
henanthrene	13 - 14	8.284	16278.944	OW15-SS07	1726.8434	5.49700549	4308.848971	2.051455934	37.995	2236.843	0.874	0.448252459	FALSE	0.874	0.978407571	TRUE	1.771	4.8	3766.3063	30708.8
yrene	13 - 14	0.742	21000	OW15-SS07	1604.8452	3.85936515	5585.57834	2.555819403	3.8	4200	0.874	0.318816119	FALSE	0.874	0.954961428	TRUE	1.771	5.853	4248.6092	78779.674
esticide/Polychlorinated Biphenyls (UG/KG)																				
,4'-DDE	1 - 4	0.67	0.67	OW15-SS09	1.6925	0.43178224	0.684513209	0.555697684	3.8	4.2	0.748	0.71064244	FALSE	0.748	0.679587516	FALSE	2.353	5.217	2.4978298	9.5827425
,4'-DDT	1 - 4	1.7	1.7	OW15-SS09	1.95	0.66455869	0.177951304	9.45E-02	3.8	4.2	0.748	0.89536552	TRUE	0.748	0.881157477	TRUE	2.353	2.393	2.1593597	2.2245226
roclor-1254	1 - 4	450	450	OW15-SS08	127.25	3.76113148	215.1675704	1.565728321	38	42	0.748	0.632321031	FALSE	0.748	0.64811218	FALSE	2.353	13.976	380.39465	44939149
roclor 1260	1 - 4	420	420	OW15-SS08	119.75	3.74388326	200.1676381	1.53123904	38	42	0.748	0.632520354	FALSE	0.748	0.648524925	FALSE	2.353	13.624	355.24723	23223014
ieldrin	3 - 4	2.1	15	OW15-SS09	7.1	1.60278209	6.240192305	1.013854079	3.8	4.2	0.748	0.865554591	TRUE	0.748	0.828978834	TRUE	2.353	9.066	14.441586	1674.8946
otal Metals (MG/KG)																				
-Solids	4 - 4	798000	883000	OW15-SS09	833500	13.6325445	39719.8523	4.74E-02	Error!	Error!	0.748	0.909865058	TRUE	0.748	0.910879953	TRUE	2.353	2.393	880230.41	890103.35
luminum	4 - 4	9220	14400	OW15-SS06	12755	9.43812403	2429.561003	0.210446948	4.6	6.5	0.748	0.79875764	TRUE	0.748	0.775967755	TRUE	2.353	2.798	15613.379	18037.884
rsenic	4 - 4	1.5	2	OW15-SS08	1.75	0.5542568	0.2081666	0.119877807	0.47	0.67	0.748	0.998973384	TRUE	0.748	0.996594384	TRUE	2.353	2.464	1.994908	2.0791918
arium	4 - 4	46.4	63.4	OW15-SS06	56.075	4.02022133	7.183952023	0.133005869	0.04	0.05	0.748	0.981685726	TRUE	0.748	0.942086907	TRUE	2.353	2.499	64.52692	68.099301
eryllium	4 - 4	0.31	0.47	OW15-SS06	0.4225	-0.8755522	7.63E-02	0.199524769	0.02	0.02	0.748	0.756571708	TRUE	0.748	0.738812483	FALSE	2.353	2.747	0.5122925	0.583212
alcium	4 - 4	850	14300	OW15-SS09	4326.25	7.56445359	6651.197104	1.345029789	5.3	7.5	0.748	0.650853707	FALSE	0.748	0.727904799	FALSE	2.353	12.044	12151.383	54943392
hromium	4 - 4	10.8	19.6	OW15-SS07	17.175	2.81490494	4.257052971	0.290516616	0.11	0.15	0.748	0.683893511	FALSE	0.748	0.671004497	FALSE	2.353	3.205	22.183423	29.805086
obalt	4 - 4	1.7	2.9	OW15-SS08	2.55	0.91364446	0.56862407	0.25587941	0.09	0.12	0.748	0.70106304	FALSE	0.748	0.685709845	FALSE	2.353	3.052	3.2189862	4.0441031
on	4 - 4	5270	7470	OW15-SS08	6672.5	8.79715265	963.6864981	0.154986691	3.3	4.7	0.748	0.822208223	TRUE	0.748	0.799172995	TRUE	2.353	2.57	7806.2772	8426.4497
ead	4 - 4	16	118	OW15-SS09	44.075	3.41089807	49.3520263	0.916996475	0.28	0.4	0.748	0.679832506	FALSE	0.748	0.767386146	TRUE	2.353	8.283	102.13766	3701.8679
lagnesium	4 - 4	954	1270	OW15-SS09	1064.5	6.9639018	142.7480298	0.128293425	5	7.1	0.748	0.85203778	TRUE	0.748	0.87198577	TRUE	2.353	2.499	1232.4431	1283.3549
langanese	4 - 4	30.5	52.4	OW15-SS09	37.8	3.60753746	10.19313494	0.250717317	0.04	0.05	0.748	0.828777939	TRUE	0.748	0.856682136	TRUE	2.353	3.002	49.792223	58.762959
lercury	4 - 4	0.03	0.05	OW15-SS06	0.0425	-3.1792246	9.57E-03	0.242252055	0.02	0.02	0.748	0.864753617	TRUE	0.748	0.85711212	TRUE	2.353	2.951	5.38E-02	6.48E-02
ickel	4 - 4	6.2	10.3	OW15-SS07	8.775	2.15406485	1.787689384	0.225598763	0.23	0.32	0.748	0.867892295	TRUE	0.748	0.830206065	TRUE	2.353	2.9	10.878217	12.90011
otassium	4 - 4	311	503	OW15-SS08	419.75	6.02473954	80.21377687	0.203879337	2.1	3	0.748	0.950668835	TRUE	0.748	0.919122044	TRUE	2.353	2.747	514.12151	583.39922
iver	1 - 4	0.62	0.62	OW15-SS06	0.21125	-2.0705698	0.272713983	1.072505477	0.12	0.17	0.748	0.666648315	FALSE	0.748	0.755865191	TRUE	2.353	9.591	0.532098	85.06535
odium	1 - 4	42.8	42.8	OW15-SS09	24.9375	3.1457613	11.95027022	0.410594826	28.5	40.4	0.748	0.707946091	FALSE	0.748	0.748099532	TRUE	2.353	4.015	38.996993	65.486192
anadium	4 - 4	13.1	20.1	OW15-SS06	18.125	2.88237006	3.356957948	0.206791404	0.14	0.2	0.748	0.689242649	FALSE	0.748	0.678581474	FALSE	2.353	2.798	22.074461	25.477804
inc	4 - 4	18.2	22	OW15-SS08	20.275	3.00698637	1.607015868	8.04E-02	0.19	0.27	0.748	0.984865597	TRUE	0.748	0.976757799	TRUE	2.353	2.393	22.165654	22.67698

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 15 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Industrial Worker	Adult	Dermal Absorption	On-site	None	Groundwater not currently used on site as a water supply.
						Ingestion	On-site	None	Groundwater not currently used on site as a water supply.
	Surface Soil	Surface Soil	Direct Contact	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
						Ingestion	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
		Air	Emissions from exposed soil	Industrial Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
					Adolescents	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
Current/Future	Surface Water	Surface Water	Pond	Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact surface water.
		Animal Tissue	Fish from the Pond	Fisher	Adult	Ingestion	On-site	None	Fishing does not occur in the pond because there are no fish in the pond.
	Sediment	Sediment	Pond	Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact sediment.
Future	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Resident	Adult	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Child	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Adult/Child	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
			Columbia Aquifer - Water in Excavation Pit	Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction worker may contact shallow groundwater during construction activities.
						Ingestion	On-site	None	Construction worker not expected to incidentally ingest significant amount of groundwater during construction activities.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 15 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Groundwater	Air	Columbia Aquifer -Water Vapors at Showerhead	Resident	Adult	Inhalation	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Child	Inhalation	On-site	None	Children are assumed not to shower.
			Columbia Aquifer - Volatilization from Water in Excavation Pit	Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker may inhale vapors from groundwater during construction activities.
	Soil*	Soil*	Direct Contact	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
						Ingestion	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
					Adolescents	Dermal Absorption	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
						Ingestion	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may contact soil.
				Resident	Adult	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Adult/Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Exposure to soil during construction activities.
						Ingestion	On-site	Quant	Exposure to soil during construction activities.
		Air	Emissions from exposed soil	Industrial Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
					Adolescents	Inhalation	On-site	Quant	Site is not fenced and the site is located at the perimeter of the Base. General public can access the site and may inhale vapors and dust from soil.
				Resident	Adult	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Adult/Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
				Construction Worker	Adult	Inhalation	On-site	Quant	Exposure to emissions from soil during construction activities.

* - surface and subsurface combined.

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum Concentration [1]	Minimum Qualifier	Maximum Concentration [1]	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening [2]	Background Value [3]	Screening Toxicity Value [4]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection [5]
91-57-6	2-Methylnaphthalene	7.00E-01	J	7.00E-01	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	7.00E-01	NA	2.2E+00	N	NA	NA	NO	BSL
72-55-9	4,4'-DDE	6.70E-04	J	6.70E-04	J	MG/KG	OW15-SS09	1/4	0.0038 - 0.0042	6.70E-04	NA	1.9E+00	C	NA	NA	NO	BSL
50-29-3	4,4'-DDT	1.70E-03	J	1.70E-03	J	MG/KG	OW15-SS09	1/4	0.0038 - 0.0042	1.70E-03	NA	1.2E+00	C	NA	NA	NO	BSL
83-32-9	Acenaphthene	7.17E-01	J	3.39E+01	J	MG/KG	OW15-SS07	3/4	0.420 - 0.820	3.39E+01	NA	1.0E+01	N	NA	NA	YES	ASL
7429-90-5	Aluminum	9.22E+03		1.44E+04		MG/KG	OW15-SS06	4/4	4.6 - 6.5	1.44E+04	NA	7.8E+03	N	NA	NA	YES	ASL
120-12-7	Anthracene	7.00E-02	J	3.20E+00	J	MG/KG	OW15-SS07	2/4	0.38 - 4.2	3.20E+00	NA	4.7E+01	N	NA	NA	NO	BSL
11097-69-1	Aroclor-1254	4.50E-01		4.50E-01		MG/KG	OW15-SS08	1/4	0.038 - 0.042	4.50E-01	NA	1.6E-01	N*	NA	NA	YES	ASL
11096-82-5	Aroclor-1260	4.20E-01		4.20E-01		MG/KG	OW15-SS08	1/4	0.038 - 0.042	4.20E-01	NA	3.2E-01	C	NA	NA	YES	ASL
7440-38-2	Arsenic	1.50E+00	J	2.00E+00	J	MG/KG	OW15-SS08	4/4	0.47 - 0.67	2.00E+00	NA	2.6E-02	C	NA	NA	YES	ASL
7440-39-3	Barium	4.64E+01		6.34E+01		MG/KG	OW15-SS06	4/4	0.04 - 0.05	6.34E+01	NA	2.1E+02	N	NA	NA	NO	BSL
56-55-3	Benzo(a)anthracene	1.74E-01	J	2.30E+01	J	MG/KG	OW15-SS07	4/4	0.039 - 0.38	2.30E+01	NA	8.7E-01	C	NA	NA	YES	ASL
50-32-8	Benzo(a)pyrene	2.50E-01	J	2.90E+01	J	MG/KG	OW15-SS07	3/4	0.38 - 4.2	2.90E+01	NA	8.7E-02	C	NA	NA	YES	ASL
205-99-2	Benzo(b)fluoranthene	4.20E-01	J	4.85E+01	J	MG/KG	OW15-SS06	3/4	0.38 - 4.2	4.85E+01	NA	8.7E-01	C	NA	NA	YES	ASL
191-24-2	Benzo(g,h,i)perylene	1.60E-01	J	2.03E+02		MG/KG	OW15-SS07	3/4	0.38 - 0.819	2.03E+02	NA	6.8E+01	N	NA	NA	YES	ASL
207-08-9	Benzo(k)fluoranthene	1.50E-01	J	1.60E+01	J	MG/KG	OW15-SS07	3/4	0.38 - 4.2	1.60E+01	NA	8.7E+00	C	NA	NA	YES	ASL
7440-41-7	Beryllium	3.10E-01	J	4.70E-01	J	MG/KG	OW15-SS06	4/4	0.02 - 0.02	4.70E-01	NA	1.6E+01	N	NA	NA	NO	BSL
7440-70-2	Calcium	8.50E+02	J	1.43E+04		MG/KG	OW15-SS09	4/4	5.3 - 7.5	1.43E+04	NA	N/A		NA	NA	NO	NUT
86-74-8	Carbazole	4.40E-02	J	2.00E+00	J	MG/KG	OW15-SS07	2/4	0.38 - 4.2	2.00E+00	NA	4.7E-01	C	NA	NA	YES	ASL
7440-47-3	Chromium	1.08E+01		1.96E+01		MG/KG	OW15-SS07	4/4	0.11 - 0.15	1.96E+01	NA	4.2E+00	N	NA	NA	YES	ASL
218-01-9	Chrysene	3.30E-01	J	4.41E+01	J	MG/KG	OW15-SS07	4/4	0.039 - 0.38	4.41E+01	NA	8.7E+01	C	NA	NA	NO	BSL
7440-48-4	Cobalt	1.70E+00	J	2.90E+00	J	MG/KG	OW15-SS08	4/4	0.09 - 0.12	2.90E+00	NA	4.7E+02	N	NA	NA	NO	BSL
53-70-3	Dibenz(a,h)anthracene	3.38E+01	J	3.38E+01	J	MG/KG	OW15-SS07	1/4	0.38 - 0.819	3.38E+01	NA	8.7E-02	C	NA	NA	YES	ASL
132-64-9	Dibenzofuran	8.30E-01	J	8.30E-01	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	8.30E-01	NA	7.7E-01	N	NA	NA	YES	ASL
60-57-1	Dieldrin	2.10E-03	J	1.50E-02		MG/KG	OW15-SS09	3/4	0.0038 - 0.0042	1.50E-02	NA	2.2E-03	C	NA	NA	YES	ASL
84-66-2	Diethylphthalate	5.70E-02	J	1.30E-01	J	MG/KG	OW15-SS09	3/4	0.38 - 4.2	1.30E-01	NA	4.5E+01	N	NA	NA	NO	BSL
84-74-2	Di n-butylphthalate	6.50E-02	J	6.50E-02	J	MG/KG	OW15-SS06	1/4	0.38 - 4.2	6.50E-02	NA	5.0E+02	N	NA	NA	NO	BSL
206-44-0	Fluoranthene	4.10E-01	J	2.80E+02	J	MG/KG	OW15-SS07	4/4	0.038 - 4.135	2.80E+02	NA	3.1E+02	N	NA	NA	NO	BSL
86-73-7	Fluorene	1.56E+03	J	1.56E+03	J	MG/KG	OW15-SS07	1/4	0.38 - 1.614	1.56E+03	NA	3.1E+02	N	NA	NA	YES	ASL
193-39-5	Indeno(1,2,3-cd)pyrene	1.40E-01	J	1.60E+01	J	MG/KG	OW15-SS07	3/4	0.38 - 4.2	1.60E+01	NA	8.7E-01	C	NA	NA	YES	ASL
7439-89-6	Iron	5.27E+03		7.47E+03		MG/KG	OW15-SS08	4/4	3.3 - 4.7	7.47E+03	NA	2.3E+03	N	NA	NA	YES	ASL
7439-92-1	Lead	1.60E+01	J	1.18E+02	J	MG/KG	OW15-SS09	4/4	0.28 - 0.4	1.18E+02	NA	N/A		4.0E+02	AL	NO	BSL
7439-95-4	Magnesium	9.54E+02	J	1.27E+03		MG/KG	OW15-SS09	4/4	5 - 7.1	1.27E+03	NA	N/A		NA	NA	NO	NUT
7439-96-5	Manganese	3.05E+01		5.24E+01		MG/KG	OW15-SS09	4/4	0.04 - 0.05	5.24E+01	NA	9.5E+01	N	NA	NA	NO	BSL
7439-97-6	Mercury	3.00E-02	J	5.00E-02		MG/KG	OW15-SS06	4/4	0.02 - 0.02	5.00E-02	NA	2.3E+00	N	NA	NA	NO	BSL
91-20-3	Naphthalene	2.70E+00	J	2.70E+00	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	2.70E+00	NA	1.5E-02	N	NA	NA	YES	ASL

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum Concentration [1]	Minimum Qualifier	Maximum Concentration [1]	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening [2]	Background Value [3]	Screening Toxicity Value [4]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection [5]
7440-02-0	Nickel	6.20E+00	J	1.03E+01		MG/KG	OW15-SS07	4/4	0.23 - 0.32	1.03E+01	NA	1.6E+02	N	NA	NA	NO	BSL
85-01-8	Phenanthrene	2.90E-01	J	1.63E+01	J	MG/KG	OW15-SS07	3/4	0.200 - 0.380	1.63E+01	NA	6.8E+01	N	NA	NA	NO	BSL
7440-09-7	Potassium	3.11E+02	J	5.03E+02	J	MG/KG	OW15-SS08	4/4	2.1 - 3	5.03E+02	NA	N/A		NA	NA	NO	NUT
129-00-0	Pyrene	4.64E-02		2.10E+01		MG/KG	OW15-SS07	4/4	0.020 - 4.20	2.10E+01	NA	6.8E+01	N	NA	NA	NO	BSL
7440-22-4	Silver	6.20E-01	J	6.20E-01	J	MG/KG	OW15-SS06	1/4	0.12 - 0.17	6.20E-01	NA	3.1E+00	N	NA	NA	NO	BSL
7440-23-5	Sodium	4.28E+01	J	4.28E+01	J	MG/KG	OW15-SS09	1/4	28.5 - 40.4	4.28E+01	NA	N/A		NA	NA	NO	NUT
7440-62-2	Vanadium	1.31E+01		2.01E+01		MG/KG	OW15-SS06	4/4	0.14 - 0.2	2.01E+01	NA	5.5E+01	N	NA	NA	NO	BSL
7440-66-6	Zinc	1.82E+01	J	2.20E+01	J	MG/KG	OW15-SS08	4/4	0.19 - 0.27	2.20E+01	NA	1.4E+03	N	NA	NA	NO	BSL

AL-Residential soil screening level for lead from USEPA, July 1994. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12.

* Noncancer RBC at HQ = 0.1 is more conservative than cancer RBC listed in the Region III table.

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] The most conservative value of residential RBC versus soil screening level, DAF 20; Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III.
Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1)
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for benzo(g,h,i)perylene and phenanthrene.
RBC value for mercuric chloride used as surrogate for mercury.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

N = Noncarcinogenic

...e 2.2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - Site 15

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Pond

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
67-64-1	Acetone	6.90E+00	L	7.20E+00	L	UG/L	OW15-SW02	2/2	5 - 5	7.20E+00	N/A	6.1E+02 N	NA	NA	NO	BSL
7429-90-5	Aluminum	1.04E+02	J	1.91E+02	J	UG/L	OW15-SW04	5/5	38.2 - 38.2	1.91E+02	N/A	3.7E+04 N	NA	NA	NO	BSL
120-12-7	Anthracene	1.32E-01	J	6.65E-01	J	UG/L	OW15-SW02	4/5	0.1 - 0.1	6.65E-01	N/A	1.8E+03 N	NA	NA	NO	BSL
7440-39-3	Barium	8.40E+01	J	9.23E+01	J	UG/L	OW15-SW04	5/5	0.2 - 0.2	9.23E+01	N/A	2.6E+03 N	NA	NA	NO	BSL
56-55-3	Benzo(a)anthracene	1.20E-02	J	1.20E-02	J	UG/L	OW15-SW04	1/5	0.01 - 0.01	1.20E-02	N/A	9.2E-01 C	NA	NA	NO	BSL
191-24-2	Benzo(g,h,i)perylene	1.86E+00	J	1.86E+00	J	UG/L	OW15-SW04	1/5	0.2 - 0.2	1.86E+00	N/A	1.8E+02 N	NA	NA	NO	BSL
117-81-7	bis(2-Ethylhexyl)phthalate	1.00E+00	J	2.00E+00	J	UG/L	OW15-SW01	3/5	10 - 10	2.00E+00	N/A	4.8E+01 C	NA	NA	NO	BSL
7440-43-9	Cadmium	4.00E-01	J	4.00E-01	J	UG/L	OW15-SW03	1/5	0.3 - 0.3	4.00E-01	N/A	1.8E+01 N	NA	NA	NO	BSL
7440-70-2	Calcium	6.15E+04		6.74E+04		UG/L	OW15-SW04	5/5	57.9 - 57.9	6.74E+04	N/A	N/A	NA	NA	NO	NUT
218-01-9	Chrysene	5.00E-03	J	4.10E-02	J	UG/L	OW15-SW05	3/5	0.01 - 0.01	4.10E-02	N/A	9.2E+01 C	NA	NA	NO	BSL
57-12-5	Cyanide	5.60E+00		5.60E+00		UG/L	OW15-SW03	1/5	5 - 5	5.60E+00	N/A	7.3E+02 N	NA	NA	NO	BSL
206-44-0	Fluoranthene	1.82E+00	J	4.06E+00	J	UG/L	OW15-SW02	4/5	1 - 1	4.06E+00	N/A	1.5E+03 N	NA	NA	NO	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	9.50E-02	J	9.50E-02	J	UG/L	OW15-SW04	1/5	0.4 - 0.4	9.50E-02	N/A	9.2E-01 C	NA	NA	NO	BSL
7439-89-6	Iron	3.34E+01	J	1.24E+02		UG/L	OW15-SW01	2/5	30.8 - 30.8	1.24E+02	N/A	1.1E+04 N	NA	NA	NO	BSL
7439-92-1	Lead	1.00E+00	J	1.00E+00	J	UG/L	OW15-SW04	1/5	1 - 1	1.00E+00	N/A	N/A	1.5E+02	AL	NO	BSL
7439-95-4	Magnesium	2.17E+04		2.39E+04		UG/L	OW15-SW04	5/5	24.3 - 24.3	2.39E+04	N/A	N/A	NA	NA	NO	NUT
7439-96-5	Manganese	1.06E+01	J	1.23E+01	J	UG/L	OW15-SW05	5/5	0.3 - 0.3	1.23E+01	N/A	7.3E+02 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	2.60E-02	J	4.90E-02	J	UG/L	OW15-SW05	4/5	0.05 - 0.05	4.90E-02	N/A	1.8E+02 N	NA	NA	NO	BSL
7440-09-7	Potassium	3.87E+03	J	4.31E+03	J	UG/L	OW15-SW04	5/5	13.5 - 13.5	4.31E+03	N/A	N/A	NA	NA	NO	NUT
129-00-0	Pyrene	1.30E-02	J	1.30E-02	J	UG/L	OW15-SW04	1/5	0.005 - 0.005	1.30E-02	N/A	1.8E+02 N	NA	NA	NO	BSL
7440-23-5	Sodium	1.03E+04		1.14E+04		UG/L	OW15-SW04	5/5	148 - 148	1.14E+04	N/A	N/A	NA	NA	NO	NUT
7440-62-2	Vanadium	6.40E-01	J	7.60E-01	J	UG/L	OW15-SW01	2/5	0.6 - 0.6	7.60E-01	N/A	2.6E+02 N	NA	NA	NO	BSL

AL-Action level for lead from USEPA, October 1996. Drinking Water Regulations and Health Adviosories. EPA 822-B-96-002. For surface water screening the groundwater action level was multiplied by ten.

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III. Screening value is 10 times the tap wter RBC.
Tap Water RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1) times ten.
RBC value for Chromium VI was used as surrogate for total chromium.
RBC value for pyrene was used as surrogate for benzo(g,h,i)perylene and phenanthrene.
The groundwater MCL for lead of 15 ug/L times ten was used as the surface water screening value .

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic

Table 2.3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
91-57-6	2-Methylnaphthalene	2.50E-01	L	2.50E-01	J	MG/KG	OW15-SD07-7.0	1/14	0.420 - 0.580	2.50E-01	N/A	1.6E+03 N	NA	NA	NO	BSL
72-54-8	4,4'-DDD	5.40E-04	J	5.40E-04	J	MG/KG	OW15-SD04-5.5	1/6	0.0041 - 0.0049	5.40E-04	N/A	2.7E+01 C	NA	NA	NO	BSL
83-32-9	Acenaphthene	1.70E-02		1.13E+00		MG/KG	OW15-SD16-0.0	3/16	0.0066 - 0.995	1.13E+00	N/A	4.7E+03 N	NA	NA	NO	BSL
208-96-8	Acenaphthylene	1.08E-02	J	1.08E-02	J	MG/KG	OW15-SD12-5.5	1/16	0.033 - 4.22	1.08E-02	N/A	2.3E+04 N	NA	NA	NO	BSL
7429-90-5	Aluminum	2.69E+03		2.95E+04		MG/KG	OW15-SD16-0.0	16/16	5.6 - 11.2	2.95E+04	N/A	7.8E+04 N	NA	NA	NO	BSL
120-12-7	Anthracene	2.94E-03	J	1.42E-02		MG/KG	OW15-SD09-2.5	5/16	0.0033 - 0.497	1.42E-02	N/A	2.3E+04 N	NA	NA	NO	BSL
7440-36-0	Antimony	8.50E-01	L	8.50E-01	L	MG/KG	OW15-SD12-5.5	1/16	0.47 - 0.79	8.50E-01	N/A	3.1E+01 N	NA	NA	NO	BSL
7440-38-2	Arsenic	1.50E+00	J	4.70E+00		MG/KG	OW15-SD10-5.5	16/16	0.39 - 0.85	4.70E+00	N/A	4.3E+00 C	NA	NA	YES	ASL
7440-39-3	Barium	1.33E+01	J	1.50E+02		MG/KG	OW15-SD16-0.0	16/16	0.04 - 0.06	1.50E+02	N/A	5.5E+03 N	NA	NA	NO	BSL
56-55-3	Benzo(a)anthracene	5.75E-04	J	1.89E-01	J	MG/KG	OW15-SD16-0.0	14/16	0.00033 - 0.0497	1.89E-01	N/A	8.7E+00 C	NA	NA	NO	BSL
50-32-8	Benzo(a)pyrene	7.55E-03		2.42E-02	J	MG/KG	OW15-SD13-7.0	2/16	0.0033 - 0.497	2.42E-02	N/A	8.7E-01 C	NA	NA	NO	BSL
205-99-2	Benzo(b)fluoranthene	8.50E-02	J	1.46E-01	J	MG/KG	OW15-SD04-5.5	2/16	0.013 - 1.662	1.46E-01	N/A	8.7E+00 C	NA	NA	NO	BSL
191-24-2	Benzo(g,h,i)perylene	4.72E-02		1.33E-01		MG/KG	OW15-SD13-7.0	3/16	0.0066 -0.844	1.33E-01	N/A	2.30E+03 N	NA	NA	NO	BSL
7440-41-7	Beryllium	1.00E-01	J	9.80E-01	J	MG/KG	OW15-SD16-0.0	16/16	0.02 - 0.03	9.80E-01	N/A	1.6E+02 N	NA	NA	NO	BSL
7440-43-9	Cadmium	1.50E-01	J	1.50E-01	J	MG/KG	OW15-SD12-5.5	1/16	0.06 - 0.09	1.50E-01	N/A	3.9E+01 N	NA	NA	NO	BSL
7440-70-2	Calcium	2.33E+02	J	3.21E+03		MG/KG	OW15-SD07-7.0	10/16	6.5 - 17	3.21E+03	N/A	N/A	NA	NA	NO	NUT
7440-47-3	Chromium	6.80E+00		4.31E+01		MG/KG	OW15-SD05-2.5	16/16	0.13 - 0.32	4.31E+01	N/A	2.3E+02 N	NA	NA	NO	BSL
218-01-9	Chrysene	8.17E-04	J	3.56E-01	J	MG/KG	OW15-SD16-0.0	15/16	0.00033 - 0.0497	3.56E-01	N/A	8.7E+02 C	NA	NA	NO	BSL
7440-48-4	Cobalt	9.70E-01	J	6.30E+00	J	MG/KG	OW15-SD02-7.0	16/16	0.1 - 0.16	6.30E+00	N/A	4.7E+03 N	NA	NA	NO	BSL
7440-50-8	Copper	2.80E+00	J	1.60E+01		MG/KG	OW15-SD16-0.0	10/16	0.13 - 0.32	1.60E+01	N/A	3.1E+03 N	NA	NA	NO	BSL
57-12-5	Cyanide	3.30E-01		1.20E+00		MG/KG	OW15-SD06-5.5	5/16	0.22 - 0.37	1.20E+00	N/A	1.6E+03 N	NA	NA	NO	BSL
53-70-3	Dibenz(a,h)anthracene	5.82E-02		5.82E-02		MG/KG	OW15-SD12-5.5	1/16	0.0066 -0.844	5.82E-02	N/A	8.7E-01 C	NA	NA	NO	BSL
84-66-2	Diethylphthalate	5.50E-02	L	9.50E-01	J	MG/KG	OW15-SD07-7.0	3/15	0.410 - 0.580	9.50E-01	N/A	6.3E+04 N	NA	NA	NO	BSL
84-74-2	Di-n-butylphthalate	4.60E-02	J	9.20E-02	J	MG/KG	OW15-SD16-0.0	5/15	0.420 - 0.580	9.20E-02	N/A	7.80E+03 N	NA	NA	NO	BSL
100-41-4	Ethylbenzene	2.60E-02	J	6.10E-02		MG/KG	OW15-SD03-2.5	2/6	0.012 - 0.015	6.10E-02	N/A	7.8E+03 N	NA	NA	NO	BSL
206-44-0	Fluoranthene	1.55E-01	J	2.01E+00		MG/KG	OW15-SD02-7.0	3/16	0.033 - 4.22	2.01E+00	N/A	3.1E+03 N	NA	NA	NO	BSL
86-73-7	Fluorene	6.63E-02		6.63E-02		MG/KG	OW15-SD12-5.5	1/16	0.013 - 1.662	6.63E-02	N/A	3.1E+03 N	NA	NA	NO	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	1.97E-03	J	2.64E-02		MG/KG	OW15-SD09-2.5	3/16	0.013 - 1.662	2.64E-02	N/A	8.7E+00 C	NA	NA	NO	BSL
7439-89-6	Iron	2.40E+03		2.56E+04		MG/KG	OW15-SD11-2.5	16/16	4.1 - 9	2.56E+04	N/A	2.3E+04 N	NA	NA	YES	ASL
7439-92-1	Lead	2.40E+00		7.27E+01	J	MG/KG	OW15-SD16-0.0	16/16	0.19 - 0.5	7.27E+01	N/A	N/A	400	AL	NO	BSL
7439-95-4	Magnesium	4.16E+02	J	2.10E+03		MG/KG	OW15-SD16-0.0	16/16	4.7 - 9	2.10E+03	N/A	N/A	NA	NA	NO	NUT
7439-96-5	Manganese	1.47E+01		7.40E+01		MG/KG	OW15-SD07-7.0	16/16	0.04 - 0.09	7.40E+01	N/A	1.6E+03 N	NA	NA	NO	BSL
7439-97-6	Mercury	3.00E-02	J	1.00E-01		MG/KG	OW15-SD16-0.0	6/16	0.02 - 0.03	1.00E-01	N/A	2.3E+01 N	NA	NA	NO	BSL
91-20-3	Naphthalene	9.80E-02	L	9.80E-02	J	MG/KG	OW15-SD07-7.0	1/16	0.066 - 0.815	9.80E-02	N/A	1.6E+03 N	NA	NA	NO	BSL

Table 2.3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7440-02-0	Nickel	2.70E+00	J	1.69E+01		MG/KG	OW15-SD16-0.0	16/16	0.17 - 0.41	1.69E+01	N/A	1.6E+03 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	1.41E-03	J	8.64E-03		MG/KG	OW15-SD12-5.5	6/16	0.0017 - 0.256	8.64E-03	N/A	2.3E+03 N	NA	NA	NO	BSL
2023695	Potassium	2.90E+02	J	1.07E+03	J	MG/KG	OW15-SD16-0.0	16/16	2.6 - 4	1.07E+03	N/A	N/A	NA	NA	NO	NUT
129-00-0	Pyrene	1.41E-06	J	5.14E-02		MG/KG	OW15-SD16-0.0	12/16	0.00017 - 0.025	5.14E-02	N/A	2.3E+03 N	NA	NA	NO	BSL
7440-23-5	Sodium	4.20E+01	J	1.01E+02	J	MG/KG	OW15-SD11-2.5	6/16	28.5 - 51	1.01E+02	N/A	N/A	NA	NA	NO	NUT
7440-28-0	Thallium	8.70E-01	J	8.70E-01	J	MG/KG	OW15-SD11-2.5	1/7	0.62 - 0.94	8.70E-01	N/A	5.5E+00 N	NA	NA	NO	BSL
7440-62-2	Vanadium	6.30E+00	J	5.46E+01		MG/KG	OW15-SD05-2.5	16/16	0.12 - 0.25	5.46E+01	N/A	5.5E+02 N	NA	NA	NO	BSL
1330-20-7	Xylene, total	9.40E-02		9.40E-02		MG/KG	OW15-SD03-2.5	1/6	0.012 - 0.015	9.40E-02	N/A	1.6E+05 N	NA	NA	NO	BSL
7440-66-6	Zinc	8.20E+00	J	7.76E+01	J	MG/KG	OW15-SD16-0.0	16/16	0.24 - 0.56	7.76E+01	N/A	2.3E+04 N	NA	NA	NO	BSL

AL-Residential soil screening level for lead from USEPA, July 1994. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III.

Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1) times ten.

RBC value for Chromium VI used for total chromium.

RBC value for pyrene used as surrogate for phenanthrene and benzo(g,h,I)perylene

RBC value for anthracene used as surrogate for acenaphthylene.

Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

N = Noncarcinogenic

Table 2.4

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
75-34-3	1,1-Dichloroethane	3.80E+00		3.80E+00		UG/L	OW15-MW20-R01	1/7	1 - 200	3.80E+00	N/A	8.0E+01 N	NA	NA	NO	BSL
91-57-6	2-Methylnaphthalene	4.00E+00	J	4.00E+00	J	UG/L	OW15-MW19-R01	1/7	11 - 12	4.00E+00	N/A	1.2E+01 N	NA	NA	NO	BSL
7429-90-5	Aluminum	4.40E+02		5.85E+02		UG/L	OW15-MW18-R01	2/7	26.2 - 26.2	5.85E+02	N/A	3.7E+03 N	5.0E+01	SMCL	YES	ASL
120-12-7	Anthracene	1.65E-01		5.51E-01	J	UG/L	OW15-MW21-R01	6/7	0.1 - 12	5.51E-01	N/A	1.8E+02 N	NA	NA	NO	BSL
7440-38-2	Arsenic	8.60E+00	J	1.96E+01		UG/L	OW15-MW21-R01	2/7	2.7 - 2.7	1.96E+01	N/A	4.5E-02 C	5.0E+01	NA	YES	ASL
7440-39-3	Barium	1.77E+01	J	6.23E+01	J	UG/L	OW15-MW20-R01	7/7	0.2 - 0.2	6.23E+01	N/A	2.6E+02 N	2.0E+03	MCL	NO	BSL
71-43-2	Benzene	7.00E+01	J	3.44E+03		UG/L	OW15-MW07-R01	5/7	1 - 200	3.44E+03	N/A	3.2E-01 C	5.0E+00	MCL	YES	ASL
56-55-3	Benzo(a)anthracene	7.00E-03	J	5.00E-02		UG/L	OW15-MW21-R01	4/7	0.01 - 12	5.00E-02	N/A	9.2E-02 C	NA	NA	NO	BSL
7440-41-7	Beryllium	2.50E-01	J	2.50E-01	J	UG/L	OW15-MW08-RO1	1/7	0.1 - 0.1	2.50E-01	N/A	7.3E+00 N	4.0E+00	MCL	NO	BSL
117-81-7	bis(2-Ethylhexyl)phthalate	1.00E+00	J	1.00E+00	J	UG/L	OW15-MW18-R01	2/7	11 - 12	1.00E+00	N/A	4.8E+00 C	NA	NA	NO	BSL
7440-70-2	Calcium	4.06E+03	J	1.24E+04		UG/L	OW15-MW07-R01	7/7	30.3 - 30.3	1.24E+04	N/A	N/A	NA	NA	NO	NUT
75-15-0	Carbon disulfide	2.17E+01	J	1.94E+02	J	UG/L	OW15-MW07-R01	2/7	1 - 200	1.94E+02	N/A	1.0E+02 N	NA	NA	YES	ASL
67-66-3	Chloroform	1.25E+01		2.78E+02		UG/L	OW15-MW07-R01	2/7	1 - 200	2.78E+02	N/A	6.3E-02 N*	8.0E+01	MCL	YES	ASL
7440-47-3	Chromium	8.00E-01	J	1.70E+00	J	UG/L	OW15-MW07-R01	4/7	0.6 - 0.6	1.70E+00	N/A	1.1E+01 N	1.0E+02	MCL	NO	BSL
218-01-9	Chrysene	1.50E-02	J	6.10E-02		UG/L	OW15-MW21-R01	5/7	0.01 - 12	6.10E-02	N/A	9.2E+00 C	NA	NA	NO	BSL
7440-48-4	Cobalt	6.00E-01	J	9.90E+00	J	UG/L	OW15-MW21-R01	6/7	0.5 - 0.5	9.90E+00	N/A	2.2E+02 N	NA	NA	NO	BSL
7440-50-8	Copper	1.37E+01	J	1.37E+01	J	UG/L	OW15-MW06-R01	1/7	0.6 - 0.6	1.37E+01	N/A	1.5E+02 N	1.3E+03	MCL	NO	BSL
84-66-2	Diethylphthalate	2.00E+00	J	3.00E+00	J	UG/L	OW15-MW06-R01	2/7	11 - 12	3.00E+00	N/A	2.9E+03 N	6.0E+00	MCL	NO	BSL
84-74-2	Di-n-butylphthalate	1.00E+00	J	1.00E+00	J	UG/L	OW15-MW07-R01	3/7	11 - 12	1.00E+00	N/A	3.7E+02 N	NA	NA	NO	BSL
100-41-4	Ethylbenzene	5.10E+00		2.44E+02	J	UG/L	OW15-MW19-R01	2/7	1 - 200	2.44E+02	N/A	1.3E+02 N	7.0E+02	MCL	YES	ASL
206-44-0	Fluoranthene	3.28E+00		6.54E+00		UG/L	OW15-MW21-R01	5/7	1 - 12	6.54E+00	N/A	1.5E+02 N	NA	NA	NO	BSL
86-73-7	Fluorene	3.86E-01	J	3.86E-01	J	UG/L	OW15-MW21-R01	1/7	0.4 - 12	3.86E-01	N/A	2.4E+01 N	NA	NA	NO	BSL
7439-89-6	Iron	5.57E+02		1.54E+04		UG/L	OW15-MW21-R01	7/7	19 - 19	1.54E+04	N/A	1.1E+03 N	NA	NA	YES	ASL
7439-92-1	Lead	2.90E+00	J	2.90E+00	J	UG/L	OW15-MW06-R01	1/7	1.6 - 1.6	2.90E+00	N/A	N/A	1.5E+01	AL	NO	BSL
7439-95-4	Magnesium	3.36E+03	J	2.07E+04		UG/L	OW15-MW21-R01	7/7	28.6 - 28.6	2.07E+04	N/A	N/A	NA	NA	NO	NUT
7439-96-5	Manganese	2.42E+01		4.90E+02		UG/L	OW15-MW21-R01	7/7	0.2 - 0.2	4.90E+02	N/A	7.3E+01 N	5.0E+01	SMCL	YES	ASL
74-80-8	Methane	2.30E+01		3.20E+03	L	UG/L	OW15-MW07-R01	7/7	3 - 3	3.20E+03	N/A	N/A	NA	NA	NO	NTX
75-09-2	Methylene chloride	2.16E+02	J	2.16E+02	J	UG/L	OW15-MW07-R01	1/7	2 - 400	2.16E+02	N/A	4.1E+00 C	NA	NA	YES	ASL
91-20-3	Naphthalene	3.00E+00	J	2.80E+01		UG/L	OW15-MW07-R01	3/7	2 - 12	2.80E+01	N/A	6.5E-01 N	NA	NA	YES	ASL
7440-02-0	Nickel	9.70E+00	J	1.03E+01	J	UG/L	OW15-MW21-R01	2/7	1.3 - 1.3	1.03E+01	N/A	7.3E+01 N	1.0E+02	MCL	NO	BSL
85-01-8	Phenanthrene	2.70E-02	J	3.29E-01	J	UG/L	OW15-MW21-R01	6/7	0.05 - 12	3.29E-01	N/A	1.8E+01 N	NA	NA	NO	BSL
108-95-2	Phenol	2.00E+00	J	3.40E+01	J	UG/L	OW15-MW07-R01	4/7	11 - 12	3.40E+01	N/A	2.2E+03 N	NA	NA	NO	BSL
7440-09-7	Potassium	3.47E+02	J	1.20E+03	J	UG/L	OW15-MW18-R01	6/7	12.2 - 12.2	1.20E+03	N/A	N/A	NA	NA	NO	NUT
129-00-0	Pyrene	3.00E-03	J	1.10E-02		UG/L	OW15-MW21-R01	4/7	0.005 - 12	1.10E-02	N/A	1.8E+01 N	NA	NA	NO	BSL

Table 2.4

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7440-23-5	Sodium	9.77E+03		2.70E+04		UG/L	OW15-MW20-R01	7/7	162 - 162	2.70E+04	N/A	N/A	NA	NA	NO	NUT
127-18-4	Tetrachloroethene	5.10E+00	J	5.10E+00	J	UG/L	OW15-MW06-R01	1/7	1 - 200	5.10E+00	N/A	1.1E+00 C	5.0E+00	MCL	YES	ASL
108-88-3	Toluene	1.80E+00		3.60E+00		UG/L	OW15-MW19-R01	3/7	1 - 200	3.60E+00	N/A	7.5E+01 N	1.0E+03	MCL	NO	BSL
7440-62-2	Vanadium	8.70E-01	J	2.90E+00	J	UG/L	OW15-MW07-R01	7/7	0.8 - 0.8	2.90E+00	N/A	2.6E+01 N	NA	NA	NO	BSL
1330-20-7	Xylene, total	7.28E+01	L	8.82E+02	J	UG/L	OW15-MW19-R01	2/7	1 - 200	8.82E+02	N/A	1.2E+03 N	1.0E+04	MCL	NO	BSL
7440-66-6	Zinc	1.26E+01	J	1.12E+02		UG/L	OW15-MW06-R01	5/7	1.1 - 1.1	1.12E+02	N/A	1.1E+03 N	NA	NA	NO	BSL

The most conservative value between the screening value and ARAR used for selection of COPC.

AL-Action Level for lead from USEPA, October 1996, Drinking Water Regulations and Health Advisories, EPA 822-R-96-002

* Noncancer RBC at HQ = 0.1 is more conservative than cancer RBC listed in the Region III table.

[1] Minimum/maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III.
Tap Water RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for phenanthrene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
SMCL = Secondary Maximum Contaminant Level

Table 2.5

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
91-57-6	2-Methylnaphthalene	7.00E-01	J	7.00E-01	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	7.00E-01	N/A	2.2E+00 N	NA	NA	NO	BSL
72-55-9	4,4'-DDE	6.70E-04	J	6.70E-04	J	MG/KG	OW15-SS09	1/4	0.0038 - .0042	6.70E-04	N/A	1.9E+00 C	NA	NA	NO	BSL
50-29-3	4,4'-DDT	1.70E-03	J	1.70E-03	J	MG/KG	OW15-SS09	1/4	0.0038 - .0042	1.70E-03	N/A	1.2E+00 C	NA	NA	NO	BSL
83-32-9	Acenaphthene	1.05E-01	J	3.39E+01	J	MG/KG	OW15-SS07	12/14	0.147 - 8.684	3.39E+01	N/A	1.0E+01 N	NA	NA	YES	ASL
208-96-8	Acenaphthylene	7.23E-02	J	7.23E-02	J	MG/KG	OW15-SB35-1	1/14	0.38 - 43.4	7.23E-02	N/A	4.7E+01 N	NA	NA	NO	BSL
7429-90-5	Aluminum	9.22E+03		1.44E+04		MG/KG	OW15-SS06	4/4	4.6 - 6.5	1.44E+04	N/A	7.8E+03 N	NA	NA	YES	ASL
120-12-7	Anthracene	7.00E-02	J	3.20E+00	J	MG/KG	OW15-SS07	4/14	0.074 - 4.342	3.20E+00	N/A	4.7E+01 N	NA	NA	NO	BSL
11097-69-1	Aroclor-1254	4.50E-01		4.50E-01		MG/KG	OW15-SS08	1/4	0.038 - 0.042	4.50E-01	N/A	1.1E-01 N**	NA	NA	YES	ASL
11096-82-5	Aroclor-1260	4.20E-01		4.20E-01		MG/KG	OW15-SS08	1/4	0.038 - 0.042	4.20E-01	N/A	3.2E-01 C	NA	NA	YES	ASL
7440-38-2	Arsenic	1.50E+00	J	2.00E+00	J	MG/KG	OW15-SS08	4/4	0.47 - 0.67	2.00E+00	N/A	2.6E-02 C	NA	NA	YES	ASL
7440-39-3	Barium	4.64E+01		6.34E+01		MG/KG	OW15-SS06	4/4	0.04 - 0.05	6.34E+01	N/A	2.1E+02 N	NA	NA	NO	BSL
56-55-3	Benzo(a)anthracene	2.12E-03	J	2.30E+01	J	MG/KG	OW15-SS07	14/14	0.0074 - 0.434	2.30E+01	N/A	8.7E-01 C	NA	NA	YES	ASL
50-32-8	Benzo(a)pyrene	2.50E-01	J	2.90E+01	J	MG/KG	OW15-SS07	3/14	0.073 - 4.342	2.90E+01	N/A	8.7E-02 C	NA	NA	YES	ASL
205-99-2	Benzo(b)fluoranthene	4.02E-02	J	4.85E+01	J	MG/KG	OW15-SS06	6/14	0.290 - 17.1	4.85E+01	N/A	8.7E-01 C	NA	NA	YES	ASL
191-24-2	Benzo(g,h,i)perylene	1.60E-01	J	2.03E+02		MG/KG	OW15-SS07	10/14	0.147 - 8.68	2.03E+02	N/A	6.8E+01 N	NA	NA	NO	BSL
207-08-9	Benzo(k)fluoranthene	9.66E-02	J	9.87E+01		MG/KG	OW15-SB39-1	12/14	0.38 - 34.2	9.87E+01	N/A	8.7E+00 C	NA	NA	YES	ASL
7440-41-7	Beryllium	3.10E-01	J	4.70E-01	J	MG/KG	OW15-SS06	4/4	0.02 - 0.02	4.70E-01	N/A	1.6E+01 N	NA	NA	NO	BSL
7440-70-2	Calcium	8.50E+02	J	1.43E+04		MG/KG	OW15-SS09	4/4	5.3 - 7.5	1.43E+04	N/A	N/A	NA	NA	NO	NUT
86-74-8	Carbazole	4.40E-02	J	2.00E+00	J	MG/KG	OW15-SS07	2/4	0.38 - 4.2	2.00E+00	N/A	4.7E-01 C	NA	NA	YES	ASL
7440-47-3	Chromium	1.08E+01		1.96E+01		MG/KG	OW15-SS07	4/4	0.11 - 0.15	1.96E+01	N/A	4.2E+00 N	NA	NA	YES	ASL
218-01-9	Chrysene	3.65E-03	J	4.41E+01	J	MG/KG	OW15-SS07	14/14	0.00738 - 0.434	4.41E+01	N/A	8.7E+01 C	NA	NA	NO	BSL
7440-48-4	Cobalt	1.70E+00	J	2.90E+00	J	MG/KG	OW15-SS08	4/4	0.09 - 0.12	2.90E+00	N/A	4.7E+02 N	NA	NA	NO	BSL
53-70-3	Dibenz(a,h)anthracene	3.38E+01	J	3.38E+01	J	MG/KG	OW15-SS07	1/14	0.148 - 8.684	3.38E+01	N/A	8.7E-02 C	NA	NA	YES	ASL
132-64-9	Dibenzofuran	8.30E-01	J	8.30E-01	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	8.30E-01	N/A	7.7E-01 N	NA	NA	YES	ASL
60-57-1	Dieldrin	2.10E-03	J	1.50E-02		MG/KG	OW15-SS09	3/4	0.0038 - 0.0042	1.50E-02	N/A	2.2E-03 C	NA	NA	YES	ASL
84-66-2	Diethylphthalate	5.70E-02	J	1.30E-01	J	MG/KG	OW15-SS09	3/4	0.38 - 4.2	1.30E-01	N/A	4.5E+01 N	NA	NA	NO	BSL
84-74-2	Di-n-butylphthalate	6.50E-02	J	6.50E-02	J	MG/KG	OW15-SS06	1/4	0.38 - 4.2	6.50E-02	N/A	5.0E+02 N	NA	NA	NO	BSL
206-44-0	Fluoranthene	4.10E-01	J	2.80E+02	J	MG/KG	OW15-SS07	14/14	0.38 - 43.4	2.80E+02	N/A	3.1E+02 N	NA	NA	NO	BSL
86-73-7	Fluorene	3.70E-01		1.56E+03	J	MG/KG	OW15-SS07	11/14	0.290 - 17.1	1.56E+03	N/A	3.1E+02 N	NA	NA	YES	ASL
193-39-5	Indeno(1,2,3-cd)pyrene	2.95E-02	J	1.60E+01	J	MG/KG	OW15-SS07	10/14	0.290 - 17.1	1.60E+01	N/A	8.7E-01 C	NA	NA	YES	ASL
7439-89-6	Iron	5.27E+03		7.47E+03		MG/KG	OW15-SS08	4/4	3.3 - 4.7	7.47E+03	N/A	2.3E+03 N	NA	NA	YES	ASL
7439-92-1	Lead	1.60E+01	J	1.18E+02	J	MG/KG	OW15-SS09	4/4	0.28 - 0.4	1.18E+02	N/A	N/A	4.0E+02	AL	NO	BSL
7439-95-4	Magnesium	9.54E+02	J	1.27E+03		MG/KG	OW15-SS09	4/4	5 - 7.1	1.27E+03	N/A	N/A	NA	NA	NO	NUT
7439-96-5	Manganese	3.05E+01		5.24E+01		MG/KG	OW15-SS09	4/4	0.04 - 0.05	5.24E+01	N/A	9.5E+01 N	NA	NA	NO	BSL

Table 2.5

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
7439-97-6	Mercury	3.00E-02	J	5.00E-02		MG/KG	OW15-SS06	4/4	0.02 - 0.02	5.00E-02	N/A	2.3E+00 N	NA	NA	NO	BSL
91-20-3	Naphthalene	2.70E+00	J	2.70E+00	J	MG/KG	OW15-SS07	1/4	0.38 - 4.2	2.70E+00	N/A	1.5E-02 N	NA	NA	YES	ASL
7440-02-0	Nickel	6.20E+00	J	1.03E+01		MG/KG	OW15-SS07	4/4	0.23 - 0.32	1.03E+01	N/A	1.6E+02 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	8.28E-03	J	1.63E+01	J	MG/KG	OW15-SS07	13/14	0.038 - 2.237	1.63E+01	N/A	6.8E+01 N	NA	NA	NO	BSL
7440-09-7	Potassium	3.11E+02	J	5.03E+02	J	MG/KG	OW15-SS08	4/4	2.1 - 3	5.03E+02	N/A	N/A	NA	NA	NO	NUT
129-00-0	Pyrene	7.42E-04	J	2.10E+01		MG/KG	OW15-SS07	13/14	0.0038- 4.2	2.10E+01	N/A	6.8E+01 N	NA	NA	NO	BSL
7440-22-4	Silver	6.20E-01	J	6.20E-01	J	MG/KG	OW15-SS06	1/4	0.12 - 0.17	6.20E-01	N/A	3.1E+00 N	NA	NA	NO	BSL
7440-23-5	Sodium	4.28E+01	J	4.28E+01	J	MG/KG	OW15-SS09	1/4	28.5 - 40.4	4.28E+01	N/A	N/A	NA	NA	NO	NUT
7440-62-2	Vanadium	1.31E+01		2.01E+01		MG/KG	OW15-SS06	4/4	0.14 - 0.2	2.01E+01	N/A	5.5E+01 N	NA	NA	NO	BSL
7440-66-6	Zinc	1.82E+01	J	2.20E+01	J	MG/KG	OW15-SS08	4/4	0.19 - 0.27	2.20E+01	N/A	1.4E+03 N	NA	NA	NO	BSL

AL-Residential soil screening level for lead from USEPA, July 1994. Reivsed Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12.

*surface and subsurface soil combined.

** Noncancer RBC at HQ = 0.1 is more conservative than cancer RBC listed in the Region III table.

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] The most conservative value of residential RBC versus soil screening level, DAF 20; Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III.
Residential Soil Ingestion RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1)
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for benzo(g,h,i)perylene and phenanthrene.
RBC value for anthracene was used as surrogate for acenaphthylene.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

J = Estimated Value
K = Biased High
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic

Table 3.1

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acenaphthene	MG/KG	9.63E+00	2.88E+01	3.39E+01	J	MG/KG	3.39E+01	Max	W-Test (2)	3.39E+01	Max	W-Test (2)
Aluminum	MG/KG	1.28E+04	1.56E+04	1.44E+04		MG/KG	1.44E+04	Max	W-Test (4,2)	1.44E+04	Max	W-Test (4,2)
Aroclor-1254	MG/KG	1.27E-01	3.80E-01	4.50E-01		MG/KG	4.50E-01	Max	W-Test (4,2)	4.50E-01	Max	W-Test (4,2)
Aroclor-1260	MG/KG	1.20E-01	3.55E-01	4.20E-01		MG/KG	4.20E-01	Max	W-Test (4,2)	4.20E-01	Max	W-Test (4,2)
Arsenic	MG/KG	1.75E+00	1.99E+00	2.00E+00	J	MG/KG	2.00E+00	Max	W-Test (4,2)	2.00E+00	Max	W-Test (4,2)
Benzo(a)anthracene	MG/KG	6.14E+00	1.93E+01	2.30E+01	J	MG/KG	2.30E+01	Max	W-Test (2)	2.30E+01	Max	W-Test (2)
Benzo(a)pyrene	MG/KG	7.48E+00	2.44E+01	2.90E+01	J	MG/KG	2.90E+01	Max	W-Test (2)	2.90E+01	Max	W-Test (2)
Benzo(b)fluoranthene	MG/KG	2.23E+01	5.24E+01	4.85E+01	J	MG/KG	4.85E+01	Max	W-Test (4,2)	4.85E+01	Max	W-Test (4,2)
Benzo(g,h,I)perylene	MG/KG	5.10E+01	1.71E+02	2.03E+02		MG/KG	2.03E+02	Max	W-Test (4,2)	2.03E+02	Max	W-Test (4,2)
Benzo(k)fluoranthene	MG/KG	4.16E+00	1.34E+01	1.60E+01	J	MG/KG	1.60E+01	Max	W-Test (4,2)	1.60E+01	Max	W-Test (4,2)
Carbazole	MG/KG	6.12E-01	1.70E+00	2.00E+00	J	MG/KG	2.00E+00	Max	W-Test (4,2)	2.00E+00	Max	W-Test (4,2)
Chromium	MG/KG	1.72E+01	2.22E+01	1.96E+01		MG/KG	1.96E+01	Max	W-Test (4,2)	1.96E+01	Max	W-Test (4,2)
Dibenz(a,h)anthracene	MG/KG	8.59E+00	2.83E+01	3.38E+01	J	MG/KG	3.38E+01	Max	W-Test (4,2)	3.38E+01	Max	W-Test (4,2)
Dibenzofuran	MG/KG	3.56E-01	7.28E-01	8.30E-01	J	MG/KG	8.30E-01	Max	W-Test (4,2)	8.30E-01	Max	W-Test (4,2)
Dieldrin	MG/KG	7.10E-03	1.67E+00	1.50E-02		MG/KG	1.50E-02	Max	W-Test (4,2)	1.50E-02	Max	W-Test (4,2)
Fluorene	MG/KG	3.91E+02	1.31E+03	1.56E+03	J	MG/KG	1.56E+03	Max	W-Test (4,2)	1.56E+03	Max	W-Test (4,2)
Indeno(1,2,3-cd)pyrene	MG/KG	4.17E+00	1.34E+01	1.60E+01	J	MG/KG	1.60E+01	Max	W-Test (2)	1.60E+01	Max	W-Test (2)
Iron	MG/KG	6.67E+03	7.81E+03	7.47E+03		MG/KG	7.47E+03	Max	W-Test (4,2)	7.47E+03	Max	W-Test (4,2)
Napthalene	MG/KG	8.24E-01	2.30E+00	2.70E+00	J	MG/KG	2.70E+00	Max	W-Test (4,2)	2.70E+00	Max	W-Test (4,2)

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.

Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).

Table 3.2

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Arsenic	MG/KG	2.9E+00	3.3E+00	4.7E+00		MG/KG	3.3E+00	95% UCL-N	W - Test (3)	3.3E+00	95% UCL-N	W - Test (3)
Iron	MG/KG	9.8E+03	1.3E+04	2.6E+04		MG/KG	1.6E+04	95% UCL-T	W - Test (1)	1.6E+04	95% UCL-T	W - Test (1)

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.

Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).

Table 3.3

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	UG/L	1.98E+02	3.60E+02	5.85E+02		UG/L	5.85E+02	Max	W-Test (2)	5.85E+02	Max	W-Test (2)
Arsenic	UG/L	5.74E+00	1.06E+01	1.96E+01		UG/L	1.96E+01	Max	W-Test (2)	1.96E+01	Max	W-Test (2)
Benzene	UG/L	5.64E+02	1.50E+03	3.44E+03		UG/L	3.44E+03	Max	W-Test (2)	3.44E+03	Max	W-Test (2)
Carbon disulfide	UG/L	3.21E+01	8.48E+01	1.94E+02	J	UG/L	1.94E+02	Max	W-Test (2)	1.94E+02	Max	W-Test (2)
Chloroform	UG/L	4.25E+01	1.19E+02	2.78E+02		UG/L	2.78E+02	Max	W-Test (2)	2.78E+02	Max	W-Test (2)
Ethylbenzene	UG/L	5.14E+01	1.19E+02	2.44E+02	J	UG/L	2.44E+02	Max	W-Test (2)	2.44E+02	Max	W-Test (2)
Iron	UG/L	7.33E+03	1.22E+04	1.54E+04		UG/L	1.54E+04	Max	W-Test (2)	1.54E+04	Max	W-Test (2)
Manganese	UG/L	1.75E+02	3.00E+02	4.90E+02		UG/L	4.90E+02	Max	W-Test (2)	4.90E+02	Max	W-Test (2)
Methylene chloride	UG/L	3.58E+01	9.46E+01	2.16E+02	J	UG/L	2.16E+02	Max	W-Test (2)	2.16E+02	Max	W-Test (2)
Naphthalene	UG/L	7.50E+00	1.49E+01	2.80E+01		UG/L	2.80E+01	Max	W-Test (2)	2.80E+01	Max	W-Test (2)
Tetrachloroethene	UG/L	1.60E+01	4.32E+01	5.10E+00	J	UG/L	5.10E+00	Max	W-Test (2)	5.10E+00	Max	W-Test (2)

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.

Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).

Table 3.4

Medium-Specific Exposure Point Concentration Summary

NAS Oceana - SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acenaphthene	MG/KG	4.44E+00	8.75E+00	3.39E+01	J	MG/KG	6.08E+01	95% UCL-T	W-Test (1)	6.08E+01	95% UCL-T	W-Test (1)
Aluminum	MG/KG	1.28E+04	1.56E+04	1.44E+04		MG/KG	1.44E+04	Max	W-Test (2)	1.44E+04	Max	W-Test (2)
Aroclor-1254	MG/KG	1.27E-01	3.80E-01	4.50E-01		MG/KG	4.50E-01	Max	W-Test (2)	4.50E-01	Max	W-Test (2)
Aroclor-1260	MG/KG	1.20E-01	3.55E-01	4.20E-01		MG/KG	4.20E-01	Max	W-Test (2)	4.20E-01	Max	W-Test (2)
Arsenic	MG/KG	1.75E+00	1.99E+00	2.00E+00	J	MG/KG	2.00E+00	Max	W-Test (2)	2.00E+00	Max	W-Test (2)
Benzo(a)anthracene	MG/KG	2.14E+00	5.00E+00	2.30E+01	J	MG/KG	2.30E+01	Max	W-Test (2)	2.30E+01	Max	W-Test (2)
Benzo(a)pyrene	MG/KG	2.48E+00	6.11E+00	2.90E+01	J	MG/KG	2.90E+01	Max	W-Test (2)	2.90E+01	Max	W-Test (2)
Benzo(b)fluoranthene	MG/KG	7.74E+00	1.52E+01	4.85E+01	J	MG/KG	4.85E+01	Max	W-Test (2)	4.85E+01	Max	W-Test (2)
Benzo(k)fluoranthene	MG/KG	1.13E+01	2.35E+01	9.87E+01		MG/KG	9.87E+01	Max	W-Test (2)	9.87E+01	Max	W-Test (2)
Carbazole	MG/KG	**	**	2.00E+00	J	MG/KG	2.00E+00	Max**	W-Test (5)	2.00E+00	Max**	W-Test (5)
Chromium	MG/KG	**	**	1.96E+01		MG/KG	1.96E+01	Max**	W-Test (5)	1.96E+01	Max**	W-Test (5)
Dibenz(a,h)anthracene	MG/KG	3.14E+00	7.37E+00	3.38E+01	J	MG/KG	3.38E+01	Max	W-Test (2)	3.38E+01	Max	W-Test (2)
Dibenzofuran	MG/KG	**	**	8.30E-01	J	MG/KG	8.30E-01	Max**	W-Test (5)	8.30E-01	Max**	W-Test (5)
Dieldrin	MG/KG	**	**	1.50E-02	J	MG/KG	1.50E-02	Max**	W-Test (5)	1.50E-02	Max**	W-Test (5)
Fluorene	MG/KG	1.27E+02	3.23E+02	1.56E+03	J	MG/KG	1.56E+03	Max	W-Test (2)	1.56E+03	Max	W-Test (2)
Indeno(1,2,3-cd)pyrene	MG/KG	2.03E+00	4.21E+00	1.60E+01	J	MG/KG	1.60E+01	Max	W-Test (2)	1.60E+01	Max	W-Test (2)
Iron	MG/KG	6.67E+03	7.81E+03	7.47E+03		MG/KG	7.47E+03	Max	W-Test (2)	7.47E+03	Max	W-Test (2)
Napthalene	MG/KG	**	**	2.70E+00	J	MG/KG	2.70E+00	Max**	W-Test (5)	2.70E+00	Max**	W-Test (5)

*surface and subsurface soil combined.

** - Maximum concentration conservatively used as exposure point concentration because of small sample size.

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);
Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.

Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).

(5) Maximum concentration used because of the small sample size.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.32	EPA, 1997	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for utility workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

Workbook: Tab4_SWMU15.XLS
Worksheet: t41

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	500	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1): Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,375	EPA, 1997	3,351	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for soccer players.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Surface area based on 25% of total body surface area for the male child aged 15-18 years for the RME. The CT is based on 25% of the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

Workbook: Tab4_SWMU15.XLS
Worksheet: t43

01/08/2001

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA., 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

Workbook: Tab4_SWMU15.XLS
Worksheet: t45

01/08/2001

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	m^3/hour	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	--	see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-SW	Ingestion Rate of Surface Water	l/hour	0.08	EPA, 1989	0.08	(2)	CSW x IR-SW x ET x EF x ED x CF1 x
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	--	0.001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	--	see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	20,000	EPA, 1997	17,000	EPA, 1997	CSW x SA x PC x CF1 x ET x EF x ED x
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	CF2 x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	--	0.001	--	
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF2	Conversion Factor 2	l/cm^3	0.001	--	0.001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1): Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with surface water are based on ranges. For total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2; the mean value of 20,000 cm^2 is used for the RME value and 17,000 cm^2 is used for the CT value.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-SW	Ingestion Rate of Surface Water	l/hour	0.08	EPA, 1989	0.08	(2)	CSW x IR-SW x ET x EF x ED x CF1 x
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSW	Chemical Concentration in Surface Water	µg/l	see Table ----	- -	see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	17,500	EPA, 1997	14,550	EPA, 1997	CSW x SA x PC x CF1 x ET x EF x ED x CF2 x 1/BW x 1/AT
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	ET	Exposure Time	hr/day	2.6	EPA, 1989	2.6	(2)	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Not available, used RME value.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Surface area based on total body surface area for the male child aged 15-18 years for the RME. The CT is based on the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-Sed	Ingestion Rate of Sediment	mg/day	100	EPA, 1991	50	EPA, 1993	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,000	EPA, 1997	CSed x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.32	EPA, 1992	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

Skin surface area in contact with surface water based on contact while wading. Assumed 30 percent of total surface area of 20,000 cm^2 for the RME and 30% of the 17,000 cm^2 for the CT.

Workbook: Tab4_SWMU15.XLS
Worksheet: t49

01/08/2001

TABLE 4.10

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-Sed	Ingestion Rate of Sediment	mg/day	100	EPA, 1991	50	EPA, 1993	CSed x IR-Sed x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CSed	Chemical Concentration in Sediment	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	4,375	EPA, 1996	3,351	EPA, 1996	CSed x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1992	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Surface area based on 25% of total body surface area for the male child aged 15-18 years for the RME. The CT is based on 25% of the average surface area between the 9-12 years and 15-18 year old male child. (Table 6-6 of EPA, 1997).

TABLE 4.11

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	2	EPA, 1997	1.4	EPA, 1993	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.2	EPA, 1995	0.2	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm^2	20,000	EPA, 1992	17,000	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with groundwater are based on ranges. For total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2; the mean value of 20,000 cm^2 is used for the RME value and 17,000 cm^2 is used for the CT value.

TABLE 4.12

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	1	EPA, 1997	1	(1)	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm²-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.33	EPA, 1992	0.33	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm³	0.001	- -	0.001	- -	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm²	7,930	EPA, 1992	6,980	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area for the RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1999). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.13

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t*	Time to Reach Steady-state	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	B	Ratio of Permeability of Stratum Corneum to Epidermis	dimensionless	chem specific	EPA, 1992	chem specific	EPA, 1992	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	ET<t*: DAevent (mg/cm2-event) = 2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	x CF1 x CF2
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	ET>t*: DAevent (mg/cm2-event) =
	ED	Exposure Duration	years	1	EPA, 1991	1	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	x CF1 x CF2
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on construction activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

Skin surface area in contact with groundwater based on contact during construction activities. Assumed 30 percent of total surface area (hands, forearms, lower legs, and feet).

SA: Skin surface area in contact with groundwater based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or ,5100 cm^2.

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	InhExp	Inhalation Exposure per Shower	mg/kg-shower	see Table ----		see Table ----	- -	Foster & Chrostowski Shower Inhalation Model for InhExp
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	Chronic Daily Intake (CDI) (mg/kg-day) =
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	InhExp x EF x ED x 1/AT
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

TABLE 4.15

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Air concentration	mg/m^3	see Table --		see Table --		Two-Film Volatilization Model for CA
	IN	Inhalation Rate	m^3/hour	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	EF	Exposure Frequency	days/year	250	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	CA x IN x ET x EF x ED x 1/BW x 1/AT
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

TABLE 4.16

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.32	EPA, 1997	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment. Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for utility workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.17

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1): Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

Workbook: Tab4_SWMU15.XLS
Worksheet: t417

TABLE 4.18

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1997	5,000	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	52	(1)	26	(1)	
	ED	Exposure Duration	years	9	(2)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(2) Professional Judgement assuming adolescents from 9 to 18 years of age.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for soccer players.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.19

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1997	5,000	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992 Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Based on 25% of total body surface area for adult (25% of 23,000 cm^2 for RME and 24% of 20,000 cm^2 for CT).

Workbook: Tab4_SWMU15.XLS
Worksheet: t419

01/08/2001

TABLE 4.20

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	200	EPA, 1991	100	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	2,379	EPA, 1997	2,094	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for soccer players.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Skin surface area for the RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1999). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.21

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	480	EPA, 1991	480	(1)	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.24	EPA, 1997	0.24	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for construction workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Skin surface area in contact with soil based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or 51,000 cm^2.

TABLE 4.22

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA., 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.23

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.24

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	1.8	(1)	1.8	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	52	(2)	26	(2)	
	ED	Exposure Duration	years	9	(3)	9	EPA, 1993	
	BW	Body Weight	kg	51	EPA, 1997,(3)	51	EPA, 1997,(3)	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement assuming trespasser would spend a maximum of 1.8 hours at the site.

(2) Professional Judgement assuming 1 day per week for 52 weeks per year for the RME and 1/2 the RME value for the CT.

(3) Body weight is average value for the 9 year old and 18 year old male body weight.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.25

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	24	(1)	24	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA,1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

Workbook: Tab4_SWMU15.XLS
Worksheet: t425

01/08/2001

TABLE 4.26

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.5	EPA, 1999	0.5	EPA, 1999	
	ET	Exposure Time	hr/day	24	(2)	24	(2)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

(2) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.27

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 15 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	calc	(1)	calc	(1)	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/FDC + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

Calc. (1): Calculated in Appendix--- Section Generation of Fugitive Dust During Construction Activites.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

Workbook: Tab4_SWMU15.XLS
Worksheet: t427

01/08/2001

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 15

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Acenaphthene	Chronic	6.0E-02	mg/kg-day	0.7	4.2E-02	mg/kg-day	NOAEL	3000/1	IRIS	04/01/94
Aluminum	Chronic	1.0E+00	mg/kg-day	0.27	2.7E-01	mg/kg-day	CNS	100/1	Region III RBC	10/05/00
Aroclor 1254	Chronic	2.0E-05	mg/kg-day	0.89	1.8E-05	mg/kg-day	Whole body	300/1	IRIS	01/00/00
	Subchronic	5.0E-05	mg/kg-day	0.89	4.5E-05	mg/kg-day	Immune toxicity	100	HEAST	07/00/97
Arsenic	Chronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin/vascular	3/1	IRIS	01/00/00
	Subchronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin	3	HEAST	07/00/97
Benzene	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Blood/Immune System	N/A	Reg III RBC	10/05/00
Carbon disulfide	Chronic	1.0E-01	mg/kg-day	0.8	8.0E-02	mg/kg-day	Fetus	100/1	IRIS	01/00/00
	Subchronic	1.0E-01	mg/kg-day	0.8	8.0E-02	mg/kg-day	Fetus	100/1	HEAST	07/00/97
Chloroform	Chronic	1.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Liver	1000/1	IRIS	01/00/00
	Subchronic	1.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Liver	1000/1	HEAST	07/00/97
Chromium VI	Chronic	3.0E-03	mg/kg-day	0.01	3.0E-05	mg/kg-day	NOAEL	300/3	IRIS:IRIS	01/00/00
	Subchronic	2.0E-02	mg/kg-day	0.01	2.0E-04	mg/kg-day		100/1	HEAST:HEAST	07/00/97
Dibenzofuran	Chronic	4.0E-03	mg/kg-day	0.7	2.8E-03	mg/kg-day	Kidney	3000	Reg III RBC	10/05/2000
Dieldrin	Chronic	5.0E-05	mg/kg-day	0.5	2.5E-05	mg/kg-day	Liver	100/1	IRIS	09/01/90
Ethylbenzene	Chronic	1.0E-01	mg/kg-day	0.92	9.2E-02	mg/kg-day	Liver and kidney	1000/1	IRIS	01/00/00
	Subchronic	1.0E+00	mg/kg-day	0.92	9.2E-01	mg/kg-day	N/A	N/A	HEAST	07/00/97
Fluoranthene	Chronic	4.0E-02	mg/kg-day	0.7	2.8E-02	mg/kg-day	NOAEL	3000/1	IRIS	07/01/93
Fluorene	Chronic	4.0E-02	mg/kg-day	0.7	2.8E-02	mg/kg-day	Blood	3000/1	IRIS	01/00/00
	Subchronic	4.0E-01	mg/kg-day	0.7	2.8E-01	mg/kg-day	Blood	300/1	HEAST	07/00/9
Iron	Chronic	3.0E-01	mg/kg-day	0.2	6.0E-02	mg/kg-day	Blood/Liver/GI	N/A	Reg III RBC	10/05/00
Manganese (nondietary)	Chronic	2.0E-02	mg/kg-day	0.35	7.0E-03	mg/kg-day	CNS	1/1	IRIS	01/00/00
Methylene chloride	Chronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100/1	IRIS	01/00/00
	Subchronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100/1	HEAST	07/00/97
Naphthalene	Chronic	2.0E-02	mg/kg-day	0.8	1.6E-02	mg/kg-day	Decreased body weight gain	3000/1	IRIS	01/00/00
Tetrachloroethene	Chronic	1.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Liver/decreased body weight gain	1000/1	IRIS	01/00/00
	Subchronic	1.0E-01	mg/kg-day	1	1.0E-01	mg/kg-day	Liver	100/1	HEAST	07/00/97

N/A = Not Applicable or Not Available. IRIS indicates that calculations of dermal risks may not be appropriate for this chemical.

(1) Refer to RAGS, Part A. Source is EPA Region III fax from Linda Watson dated 06/23/99.
ATSDR = Agency for Toxic Substances and Disease Registry
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
Region III RBC Table, 10/5/2000.

(2) Provide equation for derivation in text.

(3) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide the date of the article provided by NCEA.

RESP = Respiratory System
CNS = Central Nervous System
NOAEL = No adverse effect level
GI = Gastrointestinal system

TA[illegible].2

NON-CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 15

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
Aluminum	Chronic	3.5E-03	mg/m3	1.0E-03	mg/kg-day	CNS	N/A	NA:Reg. III RBC:N/A	10/00/99
Aroclor 1254	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Arsenic	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzene	Chronic	5.9E-03	mg/m3	1.7E-03	mg/kg-day	Blood	N/A	NA:Reg. III RBC:N/A	N/A
Carbon disulfide	Chronic	7.0E-01	mg/m3	2.0E-01	mg/kg-day	CNS	100/1	IRIS:IRIS:IRIS	01/00/00
	Subchronic	7.0E-01	mg/m3	2.0E-01	mg/kg-day	CNS	30/1	HEAST:HEAST:HEAST	07/00/97
Chloroform	Chronic	3.0E-04	mg/m3	8.6E-05	mg/kg-day	Liver	N/A	N/A:Reg. III RBC:N/A	10/00/99
Chromium VI	Chronic	1.0E-04	mg/m3	3.0E-05	mg/kg-day	Lung	300/1	IRIS:IRIS:IRIS	01/00/00
Ethylbenzene	Chronic	1.0E+00	mg/m3	2.9E-01	mg/kg-day	Developmental toxicity	300/1	IRIS:IRIS:IRIS	01/00/00
	Subchronic	1.0E+00	mg/m3	2.9E-01	mg/kg-day	N/A	N/A	HEAST:HEAST:HEAST	07/00/97
Fluorene	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Iron	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Lead	Chronic	N/A	mg/m3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Manganese (nondietary)	Chronic	4.9E-05	mg/m3	1.4E-05	mg/kg-day	RSP and psychomotor disturbances	1000/1	IRIS:IRIS:IRIS	01/00/00
Methylene chloride	Chronic	3.0E+00	mg/m3	8.6E-01	mg/kg-day	Liver	100/1	HEAST:HEAST:HEAST	07/00/97
	Subchronic	3.0E+00	mg/m3	8.6E-01	mg/kg-day	Liver	100/1	HEAST:HEAST:HEAST	07/00/97
Naphthalene	Chronic	3.1E-03	mg/m3	9.0E-04	mg/kg-day	Nasal effects	3000/1	IRIS:IRIS:IRIS	01/00/00
Tetrachloroethene	Chronic	N/A	mg/m3	1.4E-01	mg/kg-day	Liver/Whole Body	N/A	N/A:Reg. III RBC:N/A	10/00/99

N/A = Not Applicable

(1) For chemicals that have Inhalation RfCs, Inhalation RfC x 0.286 = Adjusted Inhalation RfD

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

HEAST(3) = Health Effects Assessment Summary Tables, Alternate Methods

HEAST(4)= Health Effects Assessment Summary Tables, Withdrawn

NCEA = National Center for Environmental Assessment

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 15

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	EPA Carcinogen Group	Source (Oral Slope Factor)	Date (2) (MM/DD/YY)
Aroclor 1254	2.0E+00	0.89	2.2E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Aroclor 1260	2.0E+00	0.89	2.2E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Arsenic	1.5E+00	0.95	1.6E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benz(a)anthracene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Benzene	5.5E-02	1.0	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzo(a)pyrene	7.3E+00	N/A	N/A	(mg/kg-day)-1	B2	IRIS	01/00/00
Benzo(b)fluoranthene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Benzo(k)fluoranthene	7.3E-02	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Carbazole	2.0E-02	0.5	4.0E-02	(mg/kg-day)-1	B2	HEAST	07/01/97
Chloroform	6.1E-03	1.0	6.1E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Dibenz(a,h)anthracene	7.3E+00	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Dieldrin	1.6E+01	0.5	3.2E+01	(mg/kg-day)-1	B2	IRIS	07/08/1998
Indeno(1,2,3-c,d)pyrene	7.3E-01	N/A	N/A	(mg/kg-day)-1	B2	EPA	07/00/93
Methylene chloride	7.5E-03	0.8	9.4E-03	(mg/kg-day)-1	B2	IRIS	01/00/00
Tetrachloroethene	5.1E-02	1.0	5.1E-02	$(mg/kg\text{-}day)^{-1}$	C-B2	HEAST	07/00/97

N/A-Not available

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

EPA Carcinogen Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

(1) Provide equation for derivation in text. Source is EPA Region III fax from Linda Watson dated 06/23/97.

(2) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 15

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guidance Description	Source (Unit Risk or Inhal Slope Factor)	Date (2) (MM/DD/YY)
Aroclor 1254	5.7E-04	(ug/m3) $^{-1}$	N/A	2.0E+00	(mg/kg-day) $^{-1}$	B2	IRIS	01/00/00
Aroclor 1260	5.7E-04	(ug/m3) $^{-1}$	N/A	2.0E+00	(mg/kg-day) $^{-1}$	B2	IRIS	01/00/00
Arsenic	4.3E-03	(ug/m3) $^{-1}$	3500	1.5E+01	(mg/kg-day) $^{-1}$	A	IRIS	01/00/00
Benzo(a)anthracene	N/A	(ug/m3) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	N/A	10/00/99
Benzene	8.3E-06	(ug/m3) $^{-1}$	3500	2.9E-02	(mg/kg-day) $^{-1}$	A	IRIS	01/00/00
Benzo(a)pyrene	8.9E-04	(ug/m3) $^{-1}$	N/A	3.1E+00	(mg/kg-day) $^{-1}$	B2	Reg 3	10/00/99
Benzo(b)fluoranthene	N/A	(ug/m3) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	N/A	10/00/99
Benzo(k)fluoranthene	N/A	(ug/m3) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	N/A	10/00/99
Chloroform	2.3E-05	(ug/m3) $^{-1}$	3500	8.1E-02	(mg/kg-day) $^{-1}$	B2	IRIS	01/00/00
Chromium	1.2E-02	(ug/m3) $^{-1}$	3500	4.1E+01	(mg/kg-day) $^{-1}$	A	HEAST	06/13/1998
Dibenz(a,h)anthracene	N/A	(ug/m3) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	N/A	10/00/99
Dieldrin	4.6E-03	(ug/m3) $^{-1}$	3500	1.6E+01	(mg/kg-day) $^{-1}$	B2	IRIS	07/01/93
Indeno(1,2,3-c,d)pyrene	N/A	(ug/m3) $^{-1}$	N/A	N/A	(mg/kg-day) $^{-1}$	B2	N/A	10/00/99
Methylene chloride	4.6E-07	(ug/m3) $^{-1}$	3500	1.6E-03	(mg/kg-day) $^{-1}$	B2	IRIS	01/00/00
Tetrachloroethene	5.7E-07	(ug/m3) $^{-1}$	3500	2.0E-03	(mg/kg-day) $^{-1}$	C-B2	ECAO	06/08/93

IRIS = Integrated Risk Information System

ECAO = Memo from ECAO to Edward Hanlon, Region 5 EPA, June 8, 1993

N/A = Not Available

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor = 70kg x 1/20m3/day x 1000ug/mg

(2) For IRIS values, provide the date IRIS was searched.
For RBC values, provide the date of last change in the Tables.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 7.1aRME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	3.3E-05	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	5.5E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.4E-02
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.4E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.2E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	6.5E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.0E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.4E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.1E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.0E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-08	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	2.9E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	3.8E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.3E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.4E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.6E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.3E-04
	(Total)												1.1E-01
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	6.2E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	1.5E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.6E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	9.7E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.9E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.8E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.1E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	8.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	3.7E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.6E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.2E-01
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.5E-06	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	5.4E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.7E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.1E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.8E-03	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	1.0E-01
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.4E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.3E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.9E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-04
	(Total)												2.9E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.0E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.1b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	1.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	7.1E-07	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	7.1E-04
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	2.2E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	2.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	9.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	1.1E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	1.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	2.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	1.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	7.9E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	9.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	9.6E-10	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	3.2E-05
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	4.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	7.4E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	7.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	7.9E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	3.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	1.3E-10	mg/kg-day	9.0E-04	mg/kg-day	3.1E-03	mg/m^3	1.5E-07
	(Total)												7.4E-04
												Total Hazard Index Across All Exposure Routes/Pathways	7.4E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.2a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	6.9E-06	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.2E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.9E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.9E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	9.2E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	4.6E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	8.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.1E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.4E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	9.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	4.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.0E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.3E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.7E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.2E-05
	Dieldrin	1.50E 02	mg/kg	1.50E-02	mg/kg	M	3.1E-09	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	6.1E-05
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.2E-04	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	7.9E-03
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.5E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	5.1E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	5.5E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.7E-05
	(Total)												2.3E-02
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	8.0E-06	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	1.9E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	3.4E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.3E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	6.4E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	3.6E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.5E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	5.3E-04
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	5.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	6.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.6E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.5E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	8.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.0E-07	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.0E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.5E-09	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.4E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.7E-04	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	1.3E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.8E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.9E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	6.4E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.0E-05
	(Total)												3.7E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.1E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.
N/A Not applicable.

TABLE 7.2bRME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	7.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	3.3E-08	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	3.3E-05
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.0E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	9.7E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	5.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ben >(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	6.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	4.7E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	3.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	4.5E-11	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	1.5E-06
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	7.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.9E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	3.5E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	3.6E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	3.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	6.2E-12	mg/kg-day	9.0E-04	mg/kg-day	3.1E-03	mg/m^3	6.9E-09
	(Total)												3.5E-05
												Total Hazard Index Across All Exposure Routes/Pathways	3.5E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable

TABLE 7.3a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	9.5E-06	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.6E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	4.0E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	4.0E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.3E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	6.3E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.6E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.9E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	6.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	8.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	5.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	5.5E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.8E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	9.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.3E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	5.8E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	4.2E-09	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	8.4E-05
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	4.4E-04	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	1.1E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.1E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	7.0E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	7.5E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.8E-05
	(Total)												3.2E-02
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	4.6E-06	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	1.1E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.9E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	7.2E-04
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.6E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.0E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.6E-08	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.0E-04
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	3.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.6E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	8.8E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.1E-07	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	4.0E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.0E-09	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	8.1E-05
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.1E-04	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	7.5E-03
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.0E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.7E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.6E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.3E-05
	(Total)												2.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.3E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil, EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.3b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	4.6E-08	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	4.6E-05
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.4E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	1.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	6.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	7.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	9.2E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.5E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	6.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	5.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	6.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	6.2E-11	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	2.1E-06
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	2.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	4.7E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	4.9E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	5.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	2.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	8.5E-12	mg/kg-day	9.0E-04	mg/kg-day	3.1E-03	mg/m^3	9.5E-09
	(Total)												4.8E-05
												Total Hazard Index Across All Exposure Routes/Pathways	4.8E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 7.4 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	6.8E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.3E-03
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	3.2E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.1E-02
	(Total)												1.3E-02
Dermal Absorption	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	4.2E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	1.5E-03
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	6.1E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.0E-02
	(Total)												1.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.5E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.5 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	9.3E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.1E-03
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	4.4E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.5E-02
	(Total)												1.8E-02
Dermal Absorption	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	1.4E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	5.0E-04
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.1E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	3.5E-03
	(Total)												4.0E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.2E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic.
Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic and 1% for all other inorganics.
N/A - not applicable.

TABLE 7.6a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	1.6E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.6E-02
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	5.4E-04	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.8E+00
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	9.4E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.1E+01
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	5.3E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	5.3E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	7.6E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	7.6E-01
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	6.7E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	6.7E-02
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	4.2E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.4E+00
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	1.3E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.7E-01
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	5.9E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	9.9E-02
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	7.7E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.8E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.4E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.4E-02
	(Total)												3.6E+01
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	3.2E-05	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.2E-04
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	1.1E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.7E-03
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	1.2E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	4.2E+00
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	8.2E-04	mg/kg-day	8.0E-02	mg/kg-day	N/A	N/A	1.0E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	7.8E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	7.8E-02
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	5.7E-03	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	6.2E-02
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	8.4E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.4E-02
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	2.7E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	3.8E-03
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	1.8E-04	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	3.7E-03
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	8.4E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.2E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.8E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.8E-02
	(Total)												4.4E+00
												Total Hazard Index Across All Exposure Routes/Pathways	4.1E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

TABLE 7.6b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	5.85E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	N/A
	Arsenic	1.96E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	3.44E+03	µg/l	1.75E-01	mg/kg/shower	R	1.7E-01	mg/kg-day	1.7E-03	mg/kg-day	5.9E-03	mg/m^3	9.9E+01
	Carbon disulfide	1.94E+02	µg/l	1.24E-02	mg/kg/shower	R	1.2E-02	mg/kg-day	2.0E-01	mg/kg-day	7.0E-01	mg/m^3	5.9E-02
	Chloroform	2.78E+02	µg/l	1.05E-02	mg/kg/shower	R	1.0E-02	mg/kg-day	8.6E-05	mg/kg-day	3.0E-04	mg/m^3	1.2E+02
	Ethylbenzene	2.44E+02	µg/l	1.18E-02	mg/kg/shower	R	1.1E-02	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	4.0E-02
	Iron	1.54E+04	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese	4.90E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	4.9E-05	mg/m^3	N/A
	Methylene chloride	2.16E+02	µg/l	7.68E-03	mg/kg/shower	R	7.4E-03	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	8.6E-03
	Naphthalene	2.80E+01	µg/l	1.56E-03	mg/kg/shower	R	1.5E-03	mg/kg-day	8.6E-04	mg/kg-day	3.1E-03	mg/m^3	1.7E+00
	Tetrachloroethene	5.10E+00	µg/l	2.33E-04	mg/kg/shower	R	2.2E-04	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	1.6E-03
	(Total)												2.2E+02
												Total Hazard Index Across All Exposure Routes/Pathways	2.2E+02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC calculated using Foster and Chrostowski shower model as shown in Table 7.6d.
(2) Chronic Inhalation.
N/A - Not applicable; metals are not volatile.

Table 7.6c RME
Calculation of DAevent (Adult)

NAS Oceana-SWMU 15

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
Aluminum	5.85E+02	µg/l	1.00E-03	N/A	0.2	1.17E-07
Arsenic	1.96E+01	µg/l	1.00E-03	N/A	0.2	3.92E-09
Benzene	3.44E+03	µg/l	2.10E-02	2.60E-01	0.2	4.56E-05
Carbon disulfide	1.94E+02	µg/l	2.40E-02	2.70E-01	0.2	2.99E-06
Chloroform	2.78E+02	µg/l	8.90E-03	4.70E-01	0.2	2.86E-06
Ethylbenzene	2.44E+02	µg/l	7.40E-02	3.90E-01	0.2	2.07E-05
Iron	1.54E+04	µg/l	1.00E-03	N/A	0.2	3.08E-06
Manganese	4.90E+02	µg/l	1.00E-03	N/A	0.2	9.80E-08
Methylene chloride	2.16E+02	µg/l	4.50E-03	2.90E-01	0.2	6.47E-07
Naphthalene	2.80E+01	µg/l	6.90E-02	5.30E-01	0.2	3.05E-06
Tetrachloroethene	5.10E+00	µg/l	4.80E-02	9.00E-01	0.2	6.56E-07

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications.
ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.
N/A - not applicable.

Table 7.6d RM

Inhalation Exposure Concentrations from Foste and Chrostowski Shower Mode

NAS Oceana - SWMU 15

Chemical	Exposure Point Concentration Cwo (µg/l)	Molecular weight (HH) (g/mole)	Henry's Law dimensionless	Henry's Law Constant (H) (atm-m^3/mole)	Kg (VOC) (cm/hr)	Kl(VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/l)	S (µg/m^3-min)	Calculated Inhalation Exposure (Einh) (mg/kg/shower)
Aluminum	5.85E+02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	1.96E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	3.44E+03	78	0.228	5.57E-04	1.44E+03	1.50E+01	1.04E+01	1.40E+01	1.28E+03	8.56E+03	1.75E-01
Carbon disulfide	1.94E+02	76	1.24	3.03E-03	1.46E+03	1.52E+01	1.41E+01	1.90E+01	9.10E+01	6.07E+02	1.24E-02
Chloroform	2.78E+02	119	0.15	3.67E-04	1.17E+03	1.22E+01	7.23E+00	9.76E+00	7.72E+01	5.15E+02	1.05E-02
Ethylbenzene	2.44E+02	106	0.323	7.89E-04	1.24E+03	1.29E+01	9.78E+00	1.32E+01	8.70E+01	5.80E+02	1.18E-02
Iron	1.54E+04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	4.90E+02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	2.16E+02	85	0.0898	2.19E-04	1.38E+03	1.44E+01	6.72E+00	9.08E+00	5.64E+01	3.76E+02	7.68E-03
Naphthalene	2.80E+01	128	198	4.84E-01	1.13E+03	1.17E+01	1.17E+01	1.58E+01	1.15E+01	7.65E+01	1.56E-03
Tetrachloroethene	5.10E+00	166	0.754	1.84E-03	9.88E+02	1.03E+01	9.07E+00	1.22E+01	1.71E+00	1.14E+01	2.33E-04

Variables	Units	Exposure Assumptions	Source
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1	NA
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2	NA
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3	NA
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4	NA
Tl = Cal ration temp. of water	K (20C +273)	293	F&C
Ts = Shower water temperature	k (45C)	318	F&C
Us = water viscosity at Ts	centipoise	0.596	F&C
Ul = water viscosity at Tl	cp	1.002	F&C
Cwd = conc. leaving droplets after time sdt	ug/l	Solved by Eq 5	NA
sdt = shower droplet drop time	sec	2	F&C
d = shower droplet diameter	mm	1	F&C
FR = shower water flow rate	l/min	20	F&C
SV = shower room air volume	m^3	3	F&C
S = indoor VOC generation rate	ug/m^3-min	Solved by Eq 6	NA
VR = ventilation rate	l/min	13.8	ISEPA, 1991
BW = body weight	kg	70	ISEPA, 1991
Ds = duration of shower	min	12	ISEPA, 1989
Dt = total duration in shower room	min	15	
R = air exchange rate	min^{-1}	0.0083	F&C
Ca = indoor air concentration of VOCs	ug/m^3	Solved by Eq 7	NA
Einh = inhalation exposure per shower	mg/kg/shower	Solved by Eq 8	NA

Equation 1:	Kg(VOC) =	$3000 * (18 / HH)^{0.5}$	
Equation 2:	Kl(VOC) =	$20 * (44 / HH)^{0.5}$	
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$	
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	see time series example on Table I-GW-5		
Equation 8:	**Einh =**	**If t>Ds**	(((VR * S) / (BW * R * 1000000)) * ((Ds + (EXP(-R * Dt) / R)-(EXP(R * (Ds - Dt))) / R)))

Henry's Law Constant from USEPA's *Superfund Public Health Evaluation Manual.* USEPA/540/1-86/060, October 1986.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual. Interim Final. OSWER Directive 9285.6-03.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

F&C. Foster, S. A. and P. C. Chrostowski. 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower. ICF-Clement Associates, Inc. Washington, D.C.

TABLE 7.7a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	3.7E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	3.7E-02
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	1.3E-03	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	4.2E+00
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	2.2E-01	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	7.3E+01
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	1.2E-02	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.2E-01
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.8E-02	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.8E+00
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.6E-02	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.6E-01
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	9.8E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	3.3E+00
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	3.1E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.6E+00
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	1.4E-02	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.3E-01
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.8E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	8.9E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	3.3E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	3.3E-02
	(Total)												8.5E+01
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	9.8E-05	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	3.6E-04
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	3.3E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	1E-02
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	3.0E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	9.9E+00
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	1.9E-03	mg/kg-day	8.0E-02	mg/kg-day	N/A	N/A	2.4E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.6E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.6E-01
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.2E-02	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	1.3E-01
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	2.6E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.3E-02
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	8.2E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	1.2E-02
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	4.2E-04	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	8.8E-03
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.7E-03	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	1.0E-01
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	3.5E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	3.5E-02
	(Total)												1.0E+01
												Total Hazard Index Across All Exposure Routes/Pathways	9.5E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

Table 7.7b RME
Calculation of DAevent (Child)

NAS Oceana-SWMU 15

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
Aluminum	5.85E+02	µg/l	1.00E-03	N/A	0.33	1.93E-07
Arsenic	1.96E+01	µg/l	1.00E-03	N/A	0.33	6.47E-09
Benzene	3.44E+03	µg/l	2.10E-02	2.60E-01	0.33	5.86E-05
Carbon disulfide	1.94E+02	µg/l	2.40E-02	2.70E-01	0.33	3.84E-06
Chloroform	2.78E+02	µg/l	8.90E-03	4.70E-01	0.33	3.18E-06
Ethylbenzene	2.44E+02	µg/l	7.40E-02	3.90E-01	0.33	2.28E-05
Iron	1.54E+04	µg/l	1.00E-03	N/A	0.33	5.08E-06
Manganese	4.90E+02	µg/l	1.00E-03	N/A	0.33	1.62E-07
Methylene chloride	2.16E+02	µg/l	4.50E-03	2.90E-01	0.33	8.31E-07
Naphthalene	2.80E+01	µg/l	6.90E-02	5.30E-01	0.33	3.26E-06
Tetrachloroethene	5.10E+00	µg/l	4.80E-02	9.00E-01	0.33	6.82E-07

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications.
ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.
N/A - not applicable.

TABLE 7.8a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	2.7E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.0E-03
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	9.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.2E-02
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	3.6E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.2E+01
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	2.3E-03	mg/kg-day	8.0E-02	mg/kg-day	N/A	N/A	2.9E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.3E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.3E-01
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	8.5E-03	mg/kg-day	9.2E-01	mg/kg-day	N/A	N/A	9.2E-03
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	7.2E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.2E-01
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	2.3E-04	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	3.3E-02
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	4.9E-04	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	1.0E-02
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	9.2E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.7E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.3E-04	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.3E-03
	(Total)												1.2E+01
												Total Hazard Index Across All Exposure Routes/Pathways	1.2E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic value used if available. Chronic value used if no subchronic value available.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

Nonfood reference dose for manganese used because the construction worker is exposed through incidental ingestion while excavating.

Ingestion pathway not quantitatively evaluated per dicussion in Table 1.

Table 7.8bRME
Calculation of DAevent (Adult)

NAS Oceana-SWMU 15

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[2]	Duration of Event (ET)	DAevent
Aluminum	5.85E+02	µg/l	1.00E-03	N/A	8	4.68E-06
Arsenic	1.96E+01	µg/l	1.00E-03	N/A	8	1.57E-07
Benzene	3.44E+03	µg/l	2.10E-02	2.60E-01	8	6.10E-04
Carbon disulfide	1.94E+02	µg/l	2.40E-02	2.70E-01	8	3.92E-05
Chloroform	2.78E+02	µg/l	8.90E-03	4.70E-01	8	2.20E-05
Ethylbenzene	2.44E+02	µg/l	7.40E-02	3.90E-01	8	1.44E-04
Iron	1.54E+04	µg/l	1.00E-03	N/A	8	1.23E-04
Manganese	4.90E+02	µg/l	1.00E-03	N/A	8	3.92E-06
Methylene chloride	2.16E+02	µg/l	4.50E-03	2.90E-01	8	8.33E-06
Naphthalene	2.80E+01	µg/l	6.90E-02	5.30E-01	8	1.56E-05
Tetrachloroethene	5.10E+00	µg/l	4.80E-02	9.00E-01	8	2.18E-06

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications.
ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.
N/A - not applicable.

TABLE 7.8c RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	5.85E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	N/A
	Arsenic	1.96E+01	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	3.44E+03	µg/l	6.73E-02	mg/m^3	R	1.3E-02	mg/kg-day	1.7E-03	mg/kg-day	5.9E-03	mg/m^3	7.7E+00
	Carbon disulfide	1.94E+02	µg/l	3.83E-03	mg/m^3	R	7.5E-04	mg/kg-day	2.0E-01	mg/kg-day	7.0E-01	mg/m^3	3.7E-03
	Chloroform	2.78E+02	µg/l	4.86E-03	mg/m^3	R	9.5E-04	mg/kg-day	8.6E-05	mg/kg-day	3.0E-04	mg/m^3	1.1E+01
	Ethylbenzene	2.44E+02	µg/l	4.42E-03	mg/m^3	R	8.6E-04	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	3.0E-03
	Iron	1.54E+04	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese	4.90E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	4.9E-05	mg/m^3	N/A
	Methylene chloride	2.16E+02	µg/l	4.08E-03	mg/m^3	R	8.0E-04	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	9.3E-04
	Naphthalene	2.80E+01	µg/l	4.86E-04	mg/m^3	R	9.5E-05	mg/kg-day	8.6E-04	mg/kg-day	3.1E-03	mg/m^3	1.1E-01
	Tetrachloroethene	5.10E+00	µg/l	8.30E-05	mg/m^3	R	1.6E-05	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	1.2E-04
	(Total)												1.9E+01
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
Route EPC value calculated using a two film volatilization model, Table 7.8d
N/A - Not applicable; metals are not volatile.

Tabl J RME
Inhalation of Volatiles from Groundwater During Construction
Inhalation Exposure Concentrations Calculated Using a Two-Film Volatilization Model
Future Construction Worker Senario
NAS Oceana - SWMU 15

Chemical	Cw (µg/L)	MW (mol/gram)	K_H (unitless)	k_l (cm/hr)	k_g (cm/hr)	K_v (cm/hr)	ER (mg/hr)	ERa (g/sec-m^2)	Ca (mg/m^3)
Aluminum	585	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	19.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	3444	78	2.28E-01	3.52E+00	2.13E+03	3.50E+00	1.20E+04	1.24E-06	6.73E-02
Carbon disulfide	194	76	1.24E+00	3.54E+00	2.15E+03	3.54E+00	6.87E+02	7.06E-08	3.83E-03
Chloroform	278	119	1.50E-01	3.17E+00	1.92E+03	3.13E+00	8.71E+02	8.96E-08	4.86E-03
Ethylbenzene	244.1	106	3.23E-01	3.26E+00	1.98E+03	3.24E+00	7.92E+02	8.15E-08	4.42E-03
Iron	15400	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	490	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Methylene chloride	216	85	8.98E-02	3.45E+00	2.09E+03	3.38E+00	7.31E+02	7.52E-08	4.08E-03
Naphthalene	28	128	1.98E+02	3.11E+00	1.89E+03	3.11E+00	8.71E+01	8.96E-09	4.86E-04
Tetrachloroethene	5.1	166	7.54E-01	2.92E+00	1.77E+03	2.91E+00	1.48E+01	1.53E-09	8.30E-05

Equations

Equation 1 $Kv = 1/(1/k_l + 1/K_H{*}K_g)$

Equation 2 $k_g = 700(18/MW)^{1/4}V$

Equation 3 $k_l = (32/MW)^{1/4}Ka'$

Equation 4 $ER = Kv * Cw * L/1000\ cm^3 * mg/1000\ \mu g$

Equation 5 $ERa = ER * g/1000\ mg * hr/60\ min * min/60\ sec * 1/A$

Variables	Units	Exposure Assumptions
Cw = groundwater concentration	(µg/L)	chem-specific
MW = molecular weight	(mol/gram)	chem-specific
K_H - Henry's Law Constant	(unitless)	chem-specific
Kv = volatilization rate	(cm/hr)	Solved by Eq 1
k_g = gas phase transfer coefficient	(cm/hr)	Solved by Eq 2
k_l = liquid phase transfer coefficient	(cm/hr)	Solved by Eq 3
V = wind speed	(m/s)	4.4
Ka' = aeration rate	(cm/hr)	0.0633
ER = emission rate	(mg/hr)	Solved by Eq 4
A = area of excavation (utility ditch)	(m^2)	2,700
Era = area emission rate	(g/sec-m^2)	Solved by Eq 5
Ca = air concentration	(mg/m^3)	Solved using SCREEN3 model

Note: aeration rate based on aeration rate for small pond (0.1/day) multiplied by depth of water in excavation (1/2 ft)

TABLE 7.9a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	5.95E-05	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	9.9E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.4E-02
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.4E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.2E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	6.5E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	9.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.4E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.1E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.0E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-08	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	2.9E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	3.8E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.3E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.4E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.6E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.3E-04
	(Total)												1.1E-01
Dermal Absorption	Acenapthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.1E-04	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	2.6E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.6E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	9.7E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.9E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.8E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.1E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	8.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.8E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.6E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.2E-01
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.9a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.5E-06	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	5.4E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.7E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.1E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.8E-03	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	1.0E-01
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.4E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.3E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.9E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-04
	(Total)												2.9E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.0E-01

*surface and subsurface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.9bRME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenapthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	3.0E-09	mg/kg-day	NA	mg/kg-day	NA	NA	NA
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	7.1E-07	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	7.1E-04
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	2.2E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	2.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	9.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	1.1E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	1.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	2.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	4.9E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	9.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	9.6E-10	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	3.2E-05
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	4.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	7.4E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	7.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	7.9E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	3.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	1.3E-10	mg/kg-day	9.0E-04	mg/kg-day	3.1E-03	mg/m^3	1.5E-07
	(Total)												7.4E-04

Total Hazard Index Across All Exposure Routes/Pathways 7.4E-04

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 7.10a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.24E-05	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.1E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.9E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.9E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	9.2E-08	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	4.6E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	8.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.1E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.4E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	9.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.0E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.3E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.7E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.2E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.1E-09	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	6.1E-05
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.2E-04	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	7.9E-03
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.5E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	5.1E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	5.5E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.7E-05
	(Total)												2.4E-02
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.4E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	3.4E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	3.4E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.3E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	6.4E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	3.6E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.9E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.5E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	5.3E-04
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	5.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	6.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.7E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.6E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.5E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	8.0E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.10a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.0E-07	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	7.0E-06
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.5E-09	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.4E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.7E-04	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	1.3E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.8E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.9E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	6.4E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	4.0E-05
	(Total)												3.7E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.1E-02

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.10b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	NA	NA	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	3.3E-08	mg/kg-day	1.0E-03	mg/kg-day	3.50E-03	mg/m3	3.3E-05
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.0E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	9.7E-13	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	5.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	6.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	2.3E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	4.5E-11	mg/kg-day	3.0E-05	mg/kg-day	1.00E-04	mg/m3	1.5E-06
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	7.8E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.9E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	3.5E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	3.6E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	3.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	6.2E-12	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m3	6.9E-09
	(Total)												3.5E-05
												Total Hazard Index Across All Exposure Routes/Pathways	3.5E-05

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 7.11aRME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.70E-05	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.8E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	4.0E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	4.0E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.3E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	6.3E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.6E-07	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.9E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	6.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	8.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	5.5E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.8E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	9.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.3E-07	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	5.8E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	4.2E-09	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	8.4E-05
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	4.4E-04	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	1.1E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.1E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	7.0E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	7.5E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.8E-05
	(Total)												3.2E-02
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.1E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	2.6E-04
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.6E-04	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	9.5E-04
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.8E-08	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.7E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.1E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.0E-04
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	8.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.5E-07	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.2E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.11aRME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.5E-07	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	5.3E-06
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.7E-09	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.1E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.8E-04	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	9.9E-03
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.9E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.3E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.2E-03
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.8E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.0E-05
	(Total)												2.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.0E-02

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.11b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	1.9E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	4.6E-08	mg/kg-day	1.0E-03	mg/kg-day	N/A	N/A	4.6E-05
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.4E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	1.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	6.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	7.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	9.2E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.5E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	3.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	6.3E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	6.2E-11	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	2.1E-06
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	2.6E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	4.7E-14	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	4.9E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	5.1E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	2.4E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	8.5E-12	mg/kg-day	9.0E-04	mg/kg-day	N/A	N/A	9.5E-09
	(Total)												4.8E-05

Total Hazard Index Across All Exposure Routes/Pathways 4.8E-05

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic

Route EPC Value is equal to Medium EPC value multiplied by the 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 7.12a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	8.3E-05	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.4E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.0E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.0E-02
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	6.2E-07	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	3.1E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.8E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.7E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	9.1E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.0E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.7E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.9E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.1E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.8E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.1E-08	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	4.1E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.1E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	5.3E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.0E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	3.4E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.7E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.8E-04
	(Total)												1.6E-01
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	9.7E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	2.3E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.3E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	8.5E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.3E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.4E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.0E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.6E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	7.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.6E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.2E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.1E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.0E-01
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	5.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.12a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.3E-06	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	4.7E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.4E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	9.5E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.5E-03	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	8.9E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.5E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.2E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.0E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.3E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.7E-04
	(Total)												2.5E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.1E-01

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.12b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	1.3E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	3.0E-06	mg/kg-day	1.0E-03	mg/kg-day	N/A	N/A	3.0E-03
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	9.3E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	8.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	4.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	6.0E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	2.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	4.1E-09	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.4E-04
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	7.0E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.7E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	3.1E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	3.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	3.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	5.6E-10	mg/kg-day	9.0E-04	mg/kg-day	N/A	N/A	6.2E-07
	(Total)												3.1E-03

Total Hazard Index Across All Exposure Routes/Pathways 3.1E-03

*subsurface and surface soil combined
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.13a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	7.8E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.3E-02
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.8E-01	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.8E-01
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	5.8E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	2.9E-01
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.6E-05	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	8.5E-02
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.9E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	3.7E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.2E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.3E-03	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.5E-04	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.4E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.1E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.7E-03
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.9E-07	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	3.8E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.0E-02	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	5.0E-01
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.0E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	9.6E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	3.2E-01
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.5E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.7E-03
	(Total)												1.5E+00
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.0E-04	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	2.4E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.4E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	8.9E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.5E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	2.5E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.1E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.8E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	8.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.7E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.3E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	1.1E-01
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	5.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.13a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.4E-06	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	5.0E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.5E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	1.0E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.6E-03	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	9.3E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.2E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.1E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.5E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.8E-04
	(Total)												2.7E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.7E+00

*surface and subsurface combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressur

N/A - not applicable.

TABLE 7.13b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	3.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	8.4E-06	mg/kg-day	1.0E-03	mg/kg-day	N/A	N/A	8.4E-03
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	2.6E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	2.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	1.3E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	2.8E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	5.7E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	1.1E-08	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	3.8E-04
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	2.0E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	4.8E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	8.7E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	9.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	4.3E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	1.6E-09	mg/kg-day	9.0E-04	mg/kg-day	N/A	N/A	1.7E-06
	(Total)												8.8E-03

Total Hazard Index Across All Exposure Routes/Pathways: 8.8E-03

*surface and subsurface combined.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.14a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	2.9E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.8E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	6.8E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	6.8E-02
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.1E-06	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	4.2E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	9.4E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.1E-02
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.1E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	2.3E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	4.6E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	9.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	9.2E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.6E-03
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.6E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	3.9E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	9.7E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	7.0E-08	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	1.4E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	7.3E-03	mg/kg-day	4.0E-01	mg/kg-day	N/A	N/A	1.8E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	7.5E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	3.5E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.2E-01
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.3E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.3E-04
	(Total)												2.9E-01
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	8.6E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	2.0E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.0E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	7.5E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.8E-07	mg/kg-day	4.5E-05	mg/kg-day	N/A	N/A	8.5E-03
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.6E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	9.0E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	3.2E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.2E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.8E-06	mg/kg-day	2.0E-04	mg/kg-day	N/A	N/A	1.4E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.14a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.2E-06	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	4.2E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.1E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	8.5E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.2E-03	mg/kg-day	2.8E-01	mg/kg-day	N/A	N/A	7.9E-03
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.1E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.8E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.8E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.4E-04
	(Total)												6.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.5E-01

*surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic value used if available. Chronic value used if no subchronic value available.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 7.14b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	9.0E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	2.1E-06	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	2.1E-03
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	6.7E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	6.2E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	3.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	4.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ben o(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	7.2E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Ben. o(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	1.5E-08	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	2.9E-09	mg/kg-day	3.0E-05	mg/kg-day	1.0E-04	mg/m^3	9.7E-05
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	5.0E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.2E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	2.2E-12	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	2.4E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	4.0E-10	mg/kg-day	9.0E-04	mg/kg-day	3.1E-03	mg/m^3	4.4E-07
	(Total)												2.2E-03

Total Hazard Index Across All Exposure Routes/Pathways 2.2E-03

*surface and subsurface soil combined.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.15a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	7.5E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	7.5E-03
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	2.5E-04	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	8.4E-01
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	4.4E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.5E+01
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	2.5E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	2.5E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	3.6E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	3.6E-01
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	3.1E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	3.1E-02
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	2.0E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	6.6E-01
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	6.3E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.1E-01
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	2.8E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.6E-02
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	3.6E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.8E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	6.5E-05	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	6.5E-03
	(Total)												1.7E+01
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	1.8E-05	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	6.7E-05
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	6.1E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	2.1E-03
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	7.1E-03	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2 E+00
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	4.7E-04	mg/kg-day	8.0E-02	mg/kg-day	N/A	N/A	5.8E-03
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	4.5E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	4.5E-02
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	3.2E-03	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	3.5E-02
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	4.8E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	8.0E-03
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	1.5E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	2.2E-03
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	1.0E-04	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	2.1E-03
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	4.8E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.0E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.0E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.0E-02
	(Total)												2.5E+00
												Total Hazard Index Across All Exposure Routes/Pathways	2.0E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

TABLE 7.15b CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	5.85E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	N/A	mg/m^3	NA
	Arsenic	1.96E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	3.44E+03	µg/l	1.75E-01	mg/kg/shower	R	1.1E-01	mg/kg-day	1.7E-03	mg/kg-day	N/A	mg/m^3	6.6E+01
	Carbon disulfide	1.94E+02	µg/l	1.24E-02	mg/kg/shower	R	7.9E-03	mg/kg-day	2.0E-01	mg/kg-day	N/A	mg/m^3	4.0E-02
	Chloroform	2.78E+02	µg/l	1.05E-02	mg/kg/shower	R	6.7E-03	mg/kg-day	8.6E-05	mg/kg-day	N/A	mg/m^3	7.8E+01
	Ethylbenzene	2.44E+02	µg/l	1.18E-02	mg/kg/shower	R	7.6E-03	mg/kg-day	2.9E-01	mg/kg-day	N/A	mg/m^3	2.7E-02
	Iron	1.54E+04	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese	4.90E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	N/A	mg/m^3	N/A
	Methylene chloride	2.16E+02	µg/l	7.68E-03	mg/kg/shower	R	4.9E-03	mg/kg-day	8.6E-01	mg/kg-day	N/A	mg/m^3	5.7E-03
	Naphthalene	2.80E+01	µg/l	1.56E-03	mg/kg/shower	R	1.0E-03	mg/kg-day	8.6E-04	mg/kg-day	N/A	mg/m^3	1.2E+00
	Tetrachloroethene	5.10E+00	µg/l	2.33E-04	mg/kg/shower	R	1.5E-04	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	1.1E-03
	(Total)												1.5E+02
												Total Hazard Index Across All Exposure Routes/Pathways	1.5E+02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC calculated using Foster and Chrostowski shower model as shown in Table 7.6d.
(2) Chronic Inhalation.
N/A - Not applicable; metals are not volatile.

TABLE 7.16a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	2.5E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.5E-02
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	8.4E-04	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.8E+00
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	1.5E-01	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	4.9E+01
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	8.3E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	8.3E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.2E-02	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.2E+00
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.0E-02	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	1.0E-01
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	6.6E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.2E+00
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	2.1E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.0E+00
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	9.2E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.5E-01
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.2E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	6.0E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	2.2E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	2.2E-02
	(Total)												5.7E+01
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	5.8E-05	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	2.1E-04
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	1.9E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	6.7E-03
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	1.7E-02	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	5.8E+00
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	1.1E-03	mg/kg-day	8.0E-02	mg/kg-day	N/A	N/A	1.4E-02
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	9.5E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	9.5E-02
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	6.8E-03	mg/kg-day	9.2E-02	mg/kg-day	N/A	N/A	7.4E-02
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	1.5E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.5E-02
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	4.8E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	6.9E-03
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	2.5E-04	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.2E-03
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	9.7E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	6.1E-02
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	2.0E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	2.0E-02
	(Total)												6.1E+00
												Total Hazard Index Across All Exposure Routes/Pathways	6.3E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

TABLE 7.17b CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	5.85E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	3.5E-03	mg/m^3	N/A
	Arsenic	1.96E+01	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	NA
	Benzene	3.44E+03	µg/l	6.73E-02	mg/m^3	R	1.6E-05	mg/kg-day	1.7E-03	mg/kg-day	5.9E-03	mg/m^3	9.3E-03
	Carbon disulfide	1.94E+02	µg/l	3.83E-03	mg/m^3	R	9.0E-07	mg/kg-day	2.0E-01	mg/kg-day	7.0E-01	mg/m^3	4.5E-06
	Chloroform	2.78E+02	µg/l	4.86E-03	mg/m^3	R	1.1E-06	mg/kg-day	8.6E-05	mg/kg-day	3.0E-04	mg/m^3	1.3E-02
	Ethylbenzene	2.44E+02	µg/l	4.42E-03	mg/m^3	R	1.0E-06	mg/kg-day	2.9E-01	mg/kg-day	1.0E+00	mg/m^3	3.6E-06
	Iron	1.54E+04	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese	4.90E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	4.9E-05	mg/m^3	N/A
	Methylene chloride	2.16E+02	µg/l	4.08E-03	mg/m^3	R	9.6E-07	mg/kg-day	8.6E-01	mg/kg-day	3.0E+00	mg/m^3	1.1E-06
	Naphthalene	2.80E+01	µg/l	4.86E-04	mg/m^3	R	1.1E-07	mg/kg-day	8.6E-04	mg/kg-day	3.1E-03	mg/m^3	1.3E-04
	Tetrachloroethene	5.10E+00	µg/l	8.30E-05	mg/m^3	R	1.9E-08	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	1.4E-07
	(Total)												2.3E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.3E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
Route EPC value calculated using a two film volatilization model, Table 7.8d
N/A - Not applicable; metals are not volatile.

TABLE 7.18a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	2.6E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.3E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	6.2E-02	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	6.2E-02
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.9E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	9.6E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.5E-06	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	2.8E-02
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	9.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.2E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	2.1E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	4.2E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.5E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	8.4E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.8E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	3.5E-06	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	8.9E-04
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	6.4E-08	mg/kg-day	5.0E-05	mg/kg-day	N/A	N/A	1.3E-03
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	6.7E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	1.7E-01
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	6.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	3.2E-02	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.1E-01
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.2E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	5.8E-04
	(Total)												4.9E-01
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	6.0E-05	mg/kg-day	4.2E-02	mg/kg-day	N/A	N/A	1.4E-03
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	5.3E-03
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.7E-07	mg/kg-day	1.8E-05	mg/kg-day	N/A	N/A	1.5E-02
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.3E-07	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	2.2E-03
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	9.7E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-06	mg/kg-day	3.0E-05	mg/kg-day	N/A	N/A	6.4E-02
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A

TABLE 7.18a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.2E-07	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	2.9E-05
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-08	mg/kg-day	2.5E-05	mg/kg-day	N/A	N/A	5.9E-04
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-03	mg/kg-day	2.8E-02	mg/kg-day	N/A	N/A	5.5E-02
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.4E-04	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.2E-02
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.7E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	1.7E-04
	(Total)												1.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	6.5E-01

*surface and subsurface combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	1.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	5.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.6E-07	mg/kg-day	2.0E+00	mg/kg-day	3.1E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.5E-07	mg/kg-day	2.0E+00	mg/kg-day	2.9E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.0E-07	mg/kg-day	1.5E+00	mg/kg-day	1.0E-06
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	8.0E-06	mg/kg-day	7.3E-01	mg/kg-day	5.9E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.0E-05	mg/kg-day	7.3E+00	mg/kg-day	7.4E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.7E-05	mg/kg-day	7.3E-01	mg/kg-day	1.2E-05
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	7.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.6E-06	mg/kg-day	7.3E-02	mg/kg-day	4.1E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.0E-07	mg/kg-day	2.0E-02	mg/kg-day	1.4E-08
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	6.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.2E-05	mg/kg-day	7.3E+00	mg/kg-day	8.6E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	5.2E-09	mg/kg-day	1.6E+01	mg/kg-day	8.4E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	5.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.6E-06	mg/kg-day	7.3E-01	mg/kg-day	4.1E-06
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.6E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	9.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.8E-04
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.8E-07	mg/kg-day	2.2E+00	mg/kg-day	3.9E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.6E-07	mg/kg-day	2.2E+00	mg/kg-day	3.7E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.2E-07	mg/kg-day	1.6E+00	mg/kg-day	6.6E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	9.7E-09	mg/kg-day	3.2E+01	mg/kg-day	3.1E-07
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.8E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.7E-06
										Total Risk Across All Exposure Routes/Pathways	1.9E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.1b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	6.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	7.9E-12	mg/kg-day	2.0E+00	mg/kg-day	1.6E-11
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	7.4E-12	mg/kg-day	2.0E+00	mg/kg-day	1.5E-11
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.5E-11	mg/kg-day	1.5E+01	mg/kg-day	5.3E-10
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	4.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	5.1E-10	mg/kg-day	3.1E+00	mg/kg-day	1.6E-09
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	8.5E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	3.6E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	2.8E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	3.4E-10	mg/kg-day	4.1E+01	mg/kg-day	1.4E-08
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	5.9E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	2.6E-13	mg/kg-day	1.6E+01	mg/kg-day	4.2E-12
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	2.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	2.8E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	4.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.6E-08
										Total Risk Across All Exposure Routes/Pathways	1.6E-08

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.1E-08	mg/kg-day	2.0E+00	mg/kg-day	6.3E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.9E-08	mg/kg-day	2.0E+00	mg/kg-day	5.9E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.4E-07	mg/kg-day	1.5E+00	mg/kg-day	2.1E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.6E-06	mg/kg-day	7.3E-01	mg/kg-day	1.2E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.0E-06	mg/kg-day	7.3E+00	mg/kg-day	1.5E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.4E-06	mg/kg-day	7.3E-01	mg/kg-day	2.5E-06
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-06	mg/kg-day	7.3E-02	mg/kg-day	8.2E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.4E-07	mg/kg-day	2.0E-02	mg/kg-day	2.8E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.4E-06	mg/kg-day	7.3E+00	mg/kg-day	1.7E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day	1.7E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day	8.2E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	5.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.7E-05
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.2E-08	mg/kg-day	2.2E+00	mg/kg-day	4.9E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.0E-08	mg/kg-day	2.2E+00	mg/kg-day	4.6E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.2E-08	mg/kg-day	1.6E+00	mg/kg-day	8.2E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	6.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.2E-09	mg/kg-day	3.2E+01	mg/kg-day	3.9E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	6.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.2E-07
										Total Risk Across All Exposure Routes/Pathways	3.7E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.
N/A - not applicable.

TABLE 8.2b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	2.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	1.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	3.6E-13	mg/kg-day	2.0E+00	mg/kg-day	7.1E-13
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	3.3E-13	mg/kg-day	2.0E+00	mg/kg-day	6.6E-13
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.6E-12	mg/kg-day	1.5E+01	mg/kg-day	2.4E-11
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	1.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	2.3E-11	mg/kg-day	3.1E+00	mg/kg-day	7.1E-11
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	3.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	1.6E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	1.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.6E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	1.5E-11	mg/kg-day	4.1E+01	mg/kg-day	6.3E-10
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	2.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	6.6E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	1.2E-14	mg/kg-day	1.6E+01	mg/kg-day	1.9E-13
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	1.2E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	1.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	5.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	2.1E-12	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										7.3E-10
										Total Risk Across All Exposure Routes/Pathways	7.3E-10

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.3a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	5.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.6E-08	mg/kg-day	2.0E+00	mg/kg-day	3.2E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.5E-08	mg/kg-day	2.0E+00	mg/kg-day	3.0E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.2E-08	mg/kg-day	1.5E+00	mg/kg-day	1.1E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	8.2E-07	mg/kg-day	7.3E-01	mg/kg-day	6.0E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.0E-06	mg/kg-day	7.3E+00	mg/kg-day	7.6E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.7E-06	mg/kg-day	7.3E-01	mg/kg-day	1.3E-06
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	7.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.7E-07	mg/kg-day	7.3E-02	mg/kg-day	4.2E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.2E-08	mg/kg-day	2.0E-02	mg/kg-day	1.4E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	7.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.2E-06	mg/kg-day	7.3E+00	mg/kg-day	8.8E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	3.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	5.4E-10	mg/kg-day	1.6E+01	mg/kg-day	8.6E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	5.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.7E-07	mg/kg-day	7.3E-01	mg/kg-day	4.2E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.7E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	9.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.9E-05
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	5.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.7E-09	mg/kg-day	2.2E+00	mg/kg-day	1.0E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	4.4E-09	mg/kg-day	2.2E+00	mg/kg-day	9.8E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.1E-08	mg/kg-day	1.6E+00	mg/kg-day	1.7E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	8.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	3.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	5.8E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.3a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.6E-10	mg/kg-day	3.2E+01	mg/kg-day	8.3E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.6E-08
										Total Risk Across All Exposure Routes/Pathways	1.9E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.3b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	3.39E+01	mg/kg	2.57E-08	mg/m^3	R	1.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	5.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.8E-13	mg/kg-day	2.0E+00	mg/kg-day	3.7E-13
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	1.7E-13	mg/kg-day	2.0E+00	mg/kg-day	3.4E-13
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	8.1E-13	mg/kg-day	1.5E+01	mg/kg-day	1.2E-11
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	9.3E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	1.2E-11	mg/kg-day	3.1E+00	mg/kg-day	3.7E-11
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	2.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	1.54E-07	mg/m^3	R	8.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	6.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	8.1E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	8.0E-12	mg/kg-day	4.1E+01	mg/kg-day	3.3E-10
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	3.4E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	6.1E-15	mg/kg-day	1.6E+01	mg/kg-day	9.8E-14
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	6.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	6.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	3.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	1.1E-12	mg/kg day	N/A	mg/kg-day	N/A
	(Total)										3.8E-10
										Total Risk Across All Exposure Routes/Pathways	3.8E-10

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg

N/A Not applicable.

TABLE 8.4 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	2.3E-07	mg/kg-day	1.5E+00	mg/kg-day	3.5E-07
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	1.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.5E-07
Dermal Absorption	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	1.4E-07	mg/kg-day	1.6E+00	mg/kg-day	2.3E-07
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.3E-07
										Total Risk Across All Exposure Routes/Pathways	5.8E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic and 1% for all other inorganics.
N/A - not applicable.

TABLE 8.5 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Pond
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	1.2E-07	mg/kg-day	1.5E+00	mg/kg-day	1.8E-07
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	5.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.8E-07
Dermal Absorption	Arsenic	3.33E+00	mg/kg	3.33E+00	mg/kg	M	1.8E-08	mg/kg-day	1.6E+00	mg/kg-day	2.9E-08
	Iron	1.57E+04	mg/kg	1.57E+04	mg/kg	M	2.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.9E-08
						Total Risk Across All Exposure Routes/Pathways					2.1E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic and 1% for all other inorganics.
N/A - not applicable.

TABLE 8.6RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	5.85E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.5E+01	mg/kg-day	N/A
	Benzene	3.44E+03	mg/kg	1.75E-01	mg/kg/shower	R	5.7E-02	mg/kg-day	2.9E-02	mg/kg-day	1.7E-03
	Carbon disulfide	1.94E+02	mg/kg	1.24E-02	mg/kg/shower	R	4.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	mg/kg	1.05E-02	mg/kg/shower	R	3.5E-03	mg/kg-day	8.1E-02	mg/kg-day	2.8E-04
	Ethylbenzene	2.44E+02	mg/kg	1.18E-02	mg/kg/shower	R	3.9E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	mg/kg	7.68E-03	mg/kg/shower	R	2.5E-03	mg/kg-day	1.6E-03	mg/kg-day	4.2E-06
	Naphthalene	2.80E+01	mg/kg	1.56E-03	mg/kg/shower	R	5.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	mg/kg	2.33E-04	mg/kg/shower	R	7.6E-05	mg/kg-day	2.0E-03	mg/kg-day	1.6E-07
	(Total)										1.9E-03
										Total Risk Across All Exposure Routes/Pathways	1.9E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC calculated using Foster and Chrostowski shower model as shown in Table 7.6d.
N/A Not applicable.

TABLE 8.7a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	8.73E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	2.93E-04	mg/kg-day	1.5E+00	mg/kg-day	4.4E-04
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	5.14E-02	mg/kg-day	5.5E-02	mg/kg-day	2.8E-03
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	2.90E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	4.15E-03	mg/kg-day	6.1E-03	mg/kg-day	2.5E-05
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	3.64E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	2.30E-01	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	7.32E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	3.23E-03	mg/kg-day	7.5E-03	mg/kg-day	2.4E-05
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	4.18E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	7.62E-05	mg/kg-day	5.2E-02	mg/kg-day	4.0E-06
	(Total)										3.3E-03
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	6.5E-07	mg/kg-day	1.6E+00	mg/kg-day	1.0E-06
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	6.8E-03	mg/kg-day	5.5E-02	mg/kg-day	3.8E-04
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	4.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	4.1E-04	mg/kg-day	6.1E-03	mg/kg-day	2.5E-06
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	2.9E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	5.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	9.7E-05	mg/kg-day	9.4E-03	mg/kg-day	9.1E-07
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	4.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	9.1E-05	mg/kg-day	5.1E-02	mg/kg-day	4.7E-06
	(Total)										3.8E-04
										Total Risk Across All Exposure Routes/Pathways	3.7E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

N/A - not applicable.

TABLE 8.8a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	3.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	1.3E-07	mg/kg-day	1.6E+00	mg/kg-day	2.1E-07
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	5.1E-04	mg/kg-day	2.9E-02	mg/kg-day	1.5E-05
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.8E-05	mg/kg-day	6.1E-03	mg/kg-day	1.1E-07
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	1.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	7.0E-06	mg/kg-day	9.4E-03	mg/kg-day	6.5E-08
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.8E-06	mg/kg-day	5.1E-02	mg/kg-day	9.3E-08
	(Total)										1.5E-05
										Total Risk Across All Exposure Routes/Pathways	1.5E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.specific EPC is the DA event calculated in Table 7.6c.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

N/A - not applicable.

Ingestion pathway not quantitatively evaluated per Table 1.

TABLE 8.8b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	5.85E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	1.5E+01	mg/kg-day	N/A
	Benzene	3.44E+03	µg/l	6.73E-02	mg/m^3	R	1.9E-04	mg/kg-day	2.9E-02	mg/kg-day	5.5E-06
	Carbon disulfide	1.94E+02	µg/l	3.83E-03	mg/m^3	R	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	4.86E-03	mg/m^3	R	1.4E-05	mg/kg-day	8.1E-02	mg/kg-day	1.1E-06
	Ethylbenzene	2.44E+02	µg/l	4.42E-03	mg/m^3	R	1.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	N/A	mg/m^3	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	4.08E-03	mg/m^3	R	1.1E-05	mg/kg-day	1.6E-03	mg/kg-day	1.9E-08
	Naphthalene	2.80E+01	µg/l	4.86E-04	mg/m^3	R	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	8.30E-05	mg/m^3	R	2.3E-07	mg/kg-day	2.0E-03	mg/kg-day	4.7E-10
	(Total)										6.6E-06
										Total Risk Across All Exposure Routes/Pathways	6.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC value calculated using a two film volatilization model, Table 7.8d
N/A - Not applicable; metals are not volatile.

TABLE 8.9aRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenapthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	2.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	5.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.6E-07	mg/kg-day	2.0E+00	mg/kg-day	3.1E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.5E-07	mg/kg-day	2.0E+00	mg/kg-day	2.9E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.0E-07	mg/kg-day	1.5E+00	mg/kg-day	1.0E-06
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	8.0E-06	mg/kg-day	7.3E-01	mg/kg-day	5.9E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.0E-05	mg/kg-day	7.3E+00	mg/kg-day	7.4E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.7E-05	mg/kg-day	7.3E-01	mg/kg-day	1.2E-05
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	3.5E-05	mg/kg-day	7.3E-02	mg/kg-day	2.5E-06
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.0E-07	mg/kg-day	2.0E-02	mg/kg-day	1.4E-08
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	6.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.2E-05	mg/kg-day	7.3E+00	mg/kg-day	8.6E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	5.2E-09	mg/kg-day	1.6E+01	mg/kg-day	8.4E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	5.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.6E-06	mg/kg-day	7.3E-01	mg/kg-day	4.1E-06
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.6E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	9.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.9E-04
Dermal Absorption	Acenapthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	3.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.8E-07	mg/kg-day	2.2E+00	mg/kg-day	3.9E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.6E-07	mg/kg-day	2.2E+00	mg/kg-day	3.7E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.2E-07	mg/kg-day	1.6E+00	mg/kg-day	6.6E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	6.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.9aRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	9.7E-09	mg/kg-day	3.2E+01	mg/kg-day	3.1E-07
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.8E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.7E-06
										Total Risk Across All Exposure Routes/Pathways	1.9E-04

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.9b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenapthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	1.1E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	2.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	7.9E-12	mg/kg-day	2.0E+00	mg/kg-day	1.6E-11
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	7.4E-12	mg/kg-day	2.0E+00	mg/kg-day	1.5E-11
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.5E-11	mg/kg-day	1.5E+01	mg/kg-day	5.3E-10
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	4.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	5.1E-10	mg/kg-day	3.1E+00	mg/kg-day	1.6E-09
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	8.5E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	1.7E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	3.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	3.4E-10	mg/kg-day	4.1E+01	mg/kg-day	1.4E-08
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	5.9E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	2.6E-13	mg/kg-day	1.6E+01	mg/kg-day	4.2E-12
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	2.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	2.8E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	4.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.6E-08
										Total Risk Across All Exposure Routes/Pathways	1.6E-08

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.10a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	4.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
Ingestion	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.1E-08	mg/kg-day	2.0E+00	mg/kg-day	6.3E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.9E-08	mg/kg-day	2.0E+00	mg/kg-day	5.9E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.4E-07	mg/kg-day	1.5E+00	mg/kg-day	2.1E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.6E-06	mg/kg-day	7.3E-01	mg/kg-day	1.2E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.0E-06	mg/kg-day	7.3E+00	mg/kg-day	1.5E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.4E-06	mg/kg-day	7.3E-01	mg/kg-day	2.5E-06
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	6.9E-06	mg/kg-day	7.3E-02	mg/kg-day	5.0E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.4E-07	mg/kg-day	2.0E-02	mg/kg-day	2.8E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.4E-06	mg/kg-day	7.3E+00	mg/kg-day	1.7E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day	1.7E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day	8.2E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	5.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.7E-05
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	4.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.2E-08	mg/kg-day	2.2E+00	mg/kg-day	4.9E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.0E-08	mg/kg-day	2.2E+00	mg/kg-day	4.6E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	5.2E-08	mg/kg-day	1.6E+00	mg/kg-day	8.2E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	8.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.10a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	6.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.2E-09	mg/kg-day	3.2E+01	mg/kg-day	3.9E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	6.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.2E-07
										Total Risk Across All Exposure Routes/Pathways	3.7E-05

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.10b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	4.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	1.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	3.6E-13	mg/kg-day	2.0E+00	mg/kg-day	7.1E-13
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	3.3E-13	mg/kg-day	2.0E+00	mg/kg-day	6.6E-13
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.6E-12	mg/kg-day	1.5E+01	mg/kg-day	2.4E-11
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	1.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	2.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	3.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	7.8E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	1.6E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	1.5E-11	mg/kg-day	4.1E+01	mg/kg-day	6.3E-10
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	2.7E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	6.6E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	1.2E-14	mg/kg-day	1.6E+01	mg/kg-day	1.9E-13
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	1.2E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	1.3E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	5.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	2.1E-12	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										6.6E-10
										Total Risk Across All Exposure Routes/Pathways	6.6E-10

* Includes surface/subsurface soil.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.11a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	5.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.6E-08	mg/kg-day	2.0E+00	mg/kg-day	3.2E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.5E-08	mg/kg-day	2.0E+00	mg/kg-day	3.0E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.2E-08	mg/kg-day	1.5E+00	mg/kg-day	1.1E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	8.2E-07	mg/kg-day	7.3E-01	mg/kg-day	6.0E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.0E-06	mg/kg-day	7.3E+00	mg/kg-day	7.6E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.7E-06	mg/kg-day	7.3E-01	mg/kg-day	1.3E-06
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	3.5E-06	mg/kg-day	7.3E-02	mg/kg-day	2.6E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	7.2E-08	mg/kg-day	2.0E-02	mg/kg-day	1.4E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	7.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.2E-06	mg/kg-day	7.3E+00	mg/kg-day	8.8E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	3.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	5.4E-10	mg/kg-day	1.6E+01	mg/kg-day	8.6E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	5.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	5.7E-07	mg/kg-day	7.3E-01	mg/kg-day	4.2E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.7E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	9.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.9E-05
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	6.2E-09	mg/kg-day	2.2E+00	mg/kg-day	1.4E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.8E-09	mg/kg-day	2.2E+00	mg/kg-day	1.3E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.5E-08	mg/kg-day	1.6E+00	mg/kg-day	2.3E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	5.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	6.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	7.7E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.11a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.4E-10	mg/kg-day	3.2E+01	mg/kg-day	1.1E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	6.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										6.1E-08
										Total Risk Across All Exposure Routes/Pathways	1.9E-05

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.11b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	2.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	5.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	1.8E-13	mg/kg-day	2.0E+00	mg/kg-day	3.7E-13
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	1.7E-13	mg/kg-day	2.0E+00	mg/kg-day	3.4E-13
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	8.1E-13	mg/kg-day	1.5E+01	mg/kg-day	1.2E-11
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	9.3E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	1.2E-11	mg/kg-day	3.1E+00	mg/kg-day	3.7E-11
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	2.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	4.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	8.1E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	8.0E-12	mg/kg-day	4.1E+01	mg/kg-day	3.3E-10
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	1.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	3.4E-13	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	6.1E-15	mg/kg-day	1.6E+01	mg/kg-day	9.8E-14
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	6.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	6.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	3.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	1.1E-12	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.8E-10
										Total Risk Across All Exposure Routes/Pathways	3.8E-10

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by the 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.12a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	9.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.3E-02	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	7.0E-07	mg/kg-day	2.0E+00	mg/kg-day	1.4E-06
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	6.6E-07	mg/kg-day	2.0E+00	mg/kg-day	1.3E-06
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.1E-06	mg/kg-day	1.5E+00	mg/kg-day	4.7E-06
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.6E-05	mg/kg-day	7.3E-01	mg/kg-day	2.6E-05
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.5E-05	mg/kg-day	7.3E+00	mg/kg-day	3.3E-04
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	7.6E-05	mg/kg-day	7.3E-01	mg/kg-day	5.5E-05
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.5E-04	mg/kg-day	7.3E-02	mg/kg-day	1.1E-05
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.1E-06	mg/kg-day	2.0E-02	mg/kg-day	6.3E-08
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	5.3E-05	mg/kg-day	7.3E+00	mg/kg-day	3.9E-04
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.3E-08	mg/kg-day	1.6E+01	mg/kg-day	3.8E-07
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.5E-05	mg/kg-day	7.3E-01	mg/kg-day	1.8E-05
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.2E-02	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										8.4E-04
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	4.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.9E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.9E-07	mg/kg-day	2.2E+00	mg/kg-day	4.2E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.7E-07	mg/kg-day	2.2E+00	mg/kg-day	3.9E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.4E-07	mg/kg-day	1.6E+00	mg/kg-day	7.0E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	6.8E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.12a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.0E-08	mg/kg-day	3.2E+01	mg/kg-day	3.3E-07
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	5.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.8E-06
										Total Risk Across All Exposure Routes/Pathways	8.4E-04

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.12bRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	7.4E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	5.5E-11	mg/kg-day	2.0E+00	mg/kg-day	1.1E-10
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	5.1E-11	mg/kg-day	2.0E+00	mg/kg-day	1.0E-10
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	2.4E-10	mg/kg-day	1.5E+01	mg/kg-day	3.7E-09
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	2.8E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	3.5E-09	mg/kg-day	3.1E+00	mg/kg-day	1.1E-08
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	5.9E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	1.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	2.4E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	2.4E-09	mg/kg-day	4.1E+01	mg/kg-day	9.8E-08
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	4.1E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	1.8E-12	mg/kg-day	1.6E+01	mg/kg-day	2.9E-11
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	2.0E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	3.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.1E-07
										Total Risk Across All Exposure Routes/Pathways	1.1E-07

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.13a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	4.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.7E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.0E-08	mg/kg-day	2.0E+00	mg/kg-day	6.0E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.8E-08	mg/kg-day	2.0E+00	mg/kg-day	5.6E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-07	mg/kg-day	1.5E+00	mg/kg-day	2.0E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-06	mg/kg-day	7.3E-01	mg/kg-day	1.1E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-06	mg/kg-day	7.3E+00	mg/kg-day	1.4E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.3E-06	mg/kg-day	7.3E-01	mg/kg-day	2.4E-06
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	6.6E-06	mg/kg-day	7.3E-02	mg/kg-day	4.8E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-07	mg/kg-day	2.0E-02	mg/kg-day	2.7E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.3E-06	mg/kg-day	7.3E+00	mg/kg-day	1.7E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.0E-09	mg/kg-day	1.6E+01	mg/kg-day	N/A
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-06	mg/kg-day	7.3E-01	mg/kg-day	7.8E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	5.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.6E-05
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	5.4E-09	mg/kg-day	2.2E+00	mg/kg-day	1.2E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.1E-09	mg/kg-day	2.2E+00	mg/kg-day	1.1E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	1.6E+00	mg/kg-day	2.0E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	9.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	3.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.8E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.13a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.0E-10	mg/kg-day	3.2E+01	mg/kg-day	N/A
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	5.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.4E-08
										Total Risk Across All Exposure Routes/Pathways	3.6E-05

*surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 6.13b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Acenaphthene	6.08E+01	mg/kg	4.60E-08	mg/m^3	R	1.3E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.09E-05	mg/m^3	R	3.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	3.41E-10	mg/m^3	R	9.5E-13	mg/kg-day	2.0E+00	mg/kg-day	1.9E-12
	Aroclor-1260	4.20E-01	mg/kg	3.18E-10	mg/m^3	R	8.9E-13	mg/kg-day	2.0E+00	mg/kg-day	1.8E-12
	Arsenic	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.2E-12	mg/kg-day	1.5E+01	mg/kg-day	6.4E-11
	Benzo(a)anthracene	2.30E+01	mg/kg	1.74E-08	mg/m^3	R	4.9E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.20E-08	mg/m^3	R	6.1E-11	mg/kg-day	3.1E+00	mg/kg-day	1.9E-10
	Benzo(b)fluoranthene	4.85E+01	mg/kg	3.68E-08	mg/m^3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	7.48E-08	mg/m^3	R	2.1E-10	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	1.52E-09	mg/m^3	R	4.2E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.48E-08	mg/m^3	R	4.2E-11	mg/kg-day	4.1E+01	mg/kg-day	1.7E-09
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	2.56E-08	mg/m^3	R	7.1E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	6.29E-10	mg/m^3	R	1.8E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.14E-11	mg/m^3	R	3.2E-14	mg/kg-day	1.6E+01	mg/kg-day	5.1E-13
	Fluorene	1.56E+03	mg/kg	1.18E-06	mg/m^3	R	3.3E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.21E-08	mg/m^3	R	3.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	5.66E-06	mg/m^3	R	1.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.05E-09	mg/m^3	R	5.7E-12	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.0E-09
							Total Risk Across All Exposure Routes/Pathways				2.0E-09

*surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.

N/A Not applicable.

TABLE 8.14a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	1.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	4.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.4E-08	mg/kg-day	2.0E+00	mg/kg-day	2.8E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.3E-08	mg/kg-day	2.0E+00	mg/kg-day	2.6E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.1E-08	mg/kg-day	1.5E+00	mg/kg-day	9.2E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	7.0E-07	mg/kg-day	7.3E-01	mg/kg-day	5.1E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	8.9E-07	mg/kg-day	7.3E+00	mg/kg-day	6.5E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.5E-06	mg/kg-day	7.3E-01	mg/kg-day	1.1E-06
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	6.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.9E-07	mg/kg-day	7.3E-02	mg/kg-day	3.6E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.1E-08	mg/kg-day	2.0E-02	mg/kg-day	1.2E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	6.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.0E-06	mg/kg-day	7.3E+00	mg/kg-day	7.5E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	4.6E-10	mg/kg-day	1.6E+01	mg/kg-day	7.3E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.9E-07	mg/kg-day	7.3E-01	mg/kg-day	3.6E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	8.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.6E-05
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.6E-08	mg/kg-day	2.2E+00	mg/kg-day	5.9E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.5E-08	mg/kg-day	2.2E+00	mg/kg-day	5.5E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.3E-08	mg/kg-day	1.6E+00	mg/kg-day	9.9E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-09	mg/kg-day	3.2E+01	mg/kg-day	4.7E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.6E-07
										Total Risk Across All Exposure Routes/Pathways	1.6E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-[illegible]-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.
N/A - not applicable.

TABLE 8.15a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.9E-09	mg/kg-day	2.0E+00	mg/kg-day	5.9E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.7E-09	mg/kg-day	2.0E+00	mg/kg-day	5.5E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	1.5E+00	mg/kg-day	2.0E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-07	mg/kg-day	7.3E-01	mg/kg-day	1.1E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-07	mg/kg-day	7.3E+00	mg/kg-day	1.4E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.2E-07	mg/kg-day	7.3E-01	mg/kg-day	2.3E-07
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-07	mg/kg-day	7.3E-02	mg/kg-day	7.6E-09
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	2.0E-02	mg/kg-day	2.6E-10
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.2E-07	mg/kg-day	7.3E+00	mg/kg-day	1.6E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.4E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	9.8E-11	mg/kg-day	1.6E+01	mg/kg-day	1.6E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day	7.6E-08
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.5E-06
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	4.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.5E-09	mg/kg-day	2.2E+00	mg/kg-day	7.9E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.3E-09	mg/kg-day	2.2E+00	mg/kg-day	7.4E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.4E-09	mg/kg-day	1.6E+00	mg/kg-day	1.3E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	3.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,I)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	2.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.4E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.15a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.0E-10	mg/kg-day	3.2E+01	mg/kg-day	6.3E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	9.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.5E-08
										Total Risk Across All Exposure Routes/Pathways	3.5E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.16a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	3.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.0E-09	mg/kg-day	2.0E+00	mg/kg-day	8.1E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.8E-09	mg/kg-day	2.0E+00	mg/kg-day	7.5E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.8E-08	mg/kg-day	1.5E+00	mg/kg-day	2.7E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.1E-07	mg/kg-day	7.3E-01	mg/kg-day	1.5E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.6E-07	mg/kg-day	7.3E+00	mg/kg-day	1.9E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	mg/kg-day	3.2E-07
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.4E-07	mg/kg-day	7.3E-02	mg/kg-day	1.0E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.8E-08	mg/kg-day	2.0E-02	mg/kg-day	3.6E-10
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.0E-07	mg/kg-day	7.3E+00	mg/kg-day	2.2E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	7.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.3E-10	mg/kg-day	1.6E+01	mg/kg-day	2.2E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day	1.0E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	6.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.7E-06
Dermal Absorption	Acenaphthene	3.39E+01	mg/kg	3.39E+01	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.8E-09	mg/kg-day	2.2E+00	mg/kg-day	4.0E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.7E-09	mg/kg-day	2.2E+00	mg/kg-day	3.7E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.2E-09	mg/kg-day	1.6E+00	mg/kg-day	6.7E-09
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(g,h,i)perylene	2.03E+02	mg/kg	2.03E+02	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.2E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.16a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	9.9E-11	mg/kg-day	3.2E+01	mg/kg-day	3.2E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.8E-08
										Total Risk Across All Exposure Routes/Pathways	4.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressures, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.17a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	3.11E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	1.04E-04	mg/kg-day	1.5E+00	mg/kg-day	1.6E-04
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	1.83E-02	mg/kg-day	5.5E-02	mg/kg-day	1.0E-03
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	1.03E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.48E-03	mg/kg-day	6.1E-03	mg/kg-day	9.0E-06
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.30E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	8.18E-02	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	2.60E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	1.15E-03	mg/kg-day	7.5E-03	mg/kg-day	8.6E-06
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.49E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	2.71E-05	mg/kg-day	5.2E-02	mg/kg-day	1.4E-06
	(Total)										1.2E-03
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	7.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	2.4E-07	mg/kg-day	1.6E+00	mg/kg-day	3.9E-07
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	2.4E-03	mg/kg-day	5.5E-02	mg/kg-day	1.3E-04
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	1.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.4E-04	mg/kg-day	6.1E-03	mg/kg-day	8.4E-07
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	1.9E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	6.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	3.4E-05	mg/kg-day	9.4E-03	mg/kg-day	3.2E-07
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	3.1E-05	mg/kg-day	5.1E-02	mg/kg-day	1.6E-06
	(Total)										1.4E-04
										Total Risk Across All Exposure Routes/Pathways	1.3E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

N/A - not applicable.

TABLE 8.18a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	5.85E+02	µg/l	5.85E+02	µg/l	M	2.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	µg/l	1.96E+01	µg/l	M	9.8E-08	mg/kg-day	1.6E+00	mg/kg-day	1.5E-07
	Benzene	3.44E+03	µg/l	3.44E+03	µg/l	M	3.8E-04	mg/kg-day	2.9E-02	mg/kg-day	1.1E-05
	Carbon disulfide	1.94E+02	µg/l	1.94E+02	µg/l	M	2.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	µg/l	2.78E+02	µg/l	M	1.4E-05	mg/kg-day	6.1E-03	mg/kg-day	8.4E-08
	Ethylbenzene	2.44E+02	µg/l	2.44E+02	µg/l	M	9.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	µg/l	1.54E+04	µg/l	M	7.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	µg/l	4.90E+02	µg/l	M	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	µg/l	2.16E+02	µg/l	M	5.2E-06	mg/kg-day	9.4E-03	mg/kg-day	4.9E-08
	Naphthalene	2.80E+01	µg/l	2.80E+01	µg/l	M	9.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	µg/l	5.10E+00	µg/l	M	1.4E-06	mg/kg-day	5.1E-02	mg/kg-day	7.0E-08
	(Total)										1.1E-05
										Total Risk Across All Exposure Routes/Pathways	1.1E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation. Route specific EPC is the DA event calculated in Table 7.6c.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

N/A - not applicable.

Ingestion pathway not quantitatively evaluated per Table 1.

TABLE 8.19CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	5.85E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	1.96E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.5E+01	mg/kg-day	N/A
	Benzene	3.44E+03	mg/kg	1.75E-01	mg/kg/shower	R	1.4E-02	mg/kg-day	2.9E-02	mg/kg-day	4.2E-04
	Carbon disulfide	1.94E+02	mg/kg	1.24E-02	mg/kg/shower	R	1.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Chloroform	2.78E+02	mg/kg	1.05E-02	mg/kg/shower	R	8.7E-04	mg/kg-day	8.1E-02	mg/kg-day	7.0E-05
	Ethylbenzene	2.44E+02	mg/kg	1.18E-02	mg/kg/shower	R	9.8E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	1.54E+04	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	4.90E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	2.16E+02	mg/kg	7.68E-03	mg/kg/shower	R	6.3E-04	mg/kg-day	1.6E-03	mg/kg-day	1.0E-06
	Naphthalene	2.80E+01	mg/kg	1.56E-03	mg/kg/shower	R	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Tetrachloroethene	5.10E+00	mg/kg	2.33E-04	mg/kg/shower	R	1.9E-05	mg/kg-day	2.0E-03	mg/kg-day	3.9E-08
	(Total)										4.9E-04
							Total Risk Across All Exposure Routes/Pathways				4.9E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC calculated using Foster and Chrostowski shower model as shown in Table 7.6d.
N/A Not applicable.

TABLE 8.20a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenapthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.86E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	4.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.4E-08	mg/kg-day	2.0E+00	mg/kg-day	2.8E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.3E-08	mg/kg-day	2.0E+00	mg/kg-day	2.6E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.1E-08	mg/kg-day	1.5E+00	mg/kg-day	9.2E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	7.0E-07	mg/kg-day	7.3E-01	mg/kg-day	5.1E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	8.9E-07	mg/kg-day	7.3E+00	mg/kg-day	6.5E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	1.5E-06	mg/kg-day	7.3E-01	mg/kg-day	1.1E-06
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	3.0E-06	mg/kg-day	7.3E-02	mg/kg-day	2.2E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.1E-08	mg/kg-day	2.0E-02	mg/kg-day	1.2E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	6.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.0E-06	mg/kg-day	7.3E+00	mg/kg-day	7.5E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	2.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	4.6E-10	mg/kg-day	1.6E+01	mg/kg-day	7.3E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	4.8E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	4.9E-07	mg/kg-day	7.3E-01	mg/kg-day	3.6E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	2.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	8.3E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.6E-05
Dermal Absorption	Acenapthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	6.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.6E-08	mg/kg-day	2.2E+00	mg/kg-day	5.9E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.5E-08	mg/kg-day	2.2E+00	mg/kg-day	5.5E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.3E-08	mg/kg-day	1.6E+00	mg/kg-day	9.9E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	9.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-06	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.20a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-09	mg/kg-day	3.2E+01	mg/kg-day	4.7E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.6E-07
										Total Risk Across All Exposure Routes/Pathways	1.7E-05

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.21a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	9.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.9E-09	mg/kg-day	2.0E+00	mg/kg-day	5.9E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.7E-09	mg/kg-day	2.0E+00	mg/kg-day	5.5E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	1.5E+00	mg/kg-day	2.0E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.5E-07	mg/kg-day	7.3E-01	mg/kg-day	1.1E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.9E-07	mg/kg-day	7.3E+00	mg/kg-day	1.4E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	3.2E-07	mg/kg-day	7.3E-01	mg/kg-day	2.3E-07
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	6.5E-07	mg/kg-day	7.3E-02	mg/kg-day	4.7E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-08	mg/kg-day	2.0E-02	mg/kg-day	2.6E-10
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.2E-07	mg/kg-day	7.3E+00	mg/kg-day	1.6E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	5.4E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	9.8E-11	mg/kg-day	1.6E+01	mg/kg-day	1.6E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.0E-07	mg/kg-day	7.3E-01	mg/kg-day	7.6E-08
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.8E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.5E-06
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	7.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.9E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	3.5E-09	mg/kg-day	2.2E+00	mg/kg-day	7.9E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.3E-09	mg/kg-day	2.2E+00	mg/kg-day	7.4E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.4E-09	mg/kg-day	1.6E+00	mg/kg-day	1.3E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	3.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	6.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	4.4E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.21a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.1E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.0E-10	mg/kg-day	3.2E+01	mg/kg-day	6.3E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	9.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	3.5E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.5E-08
										Total Risk Across All Exposure Routes/Pathways	3.5E-06

* Includes surface/subsurface soil.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.22a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	5.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.0E-09	mg/kg-day	2.0E+00	mg/kg-day	8.1E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.8E-09	mg/kg-day	2.0E+00	mg/kg-day	7.5E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.8E-08	mg/kg-day	1.5E+00	mg/kg-day	2.7E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.1E-07	mg/kg-day	7.3E-01	mg/kg-day	1.5E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.6E-07	mg/kg-day	7.3E+00	mg/kg-day	1.9E-06
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.4E-07	mg/kg-day	7.3E-01	mg/kg-day	3.2E-07
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	8.9E-07	mg/kg-day	7.3E-02	mg/kg-day	6.5E-08
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.8E-08	mg/kg-day	2.0E-02	mg/kg-day	3.6E-10
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.0E-07	mg/kg-day	7.3E+00	mg/kg-day	2.2E-06
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	7.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.3E-10	mg/kg-day	1.6E+01	mg/kg-day	2.2E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.4E-07	mg/kg-day	7.3E-01	mg/kg-day	1.0E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	6.7E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.8E-06
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	6.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.7E-09	mg/kg-day	2.2E+00	mg/kg-day	6.0E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.5E-09	mg/kg-day	2.2E+00	mg/kg-day	5.6E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	6.3E-09	mg/kg-day	1.6E+00	mg/kg-day	1.0E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	2.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	2.9E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	4.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	9.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	2.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	3.3E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.22a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	8.2E-09	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	1.5E-10	mg/kg-day	3.2E+01	mg/kg-day	4.7E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	1.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	7.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	2.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.6E-08
						Total Risk Across All Exposure Routes/Pathways					4.8E-06

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.23a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	2.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	6.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	1.9E-07	mg/kg-day	2.0E+00	mg/kg-day	3.8E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	1.8E-07	mg/kg-day	2.0E+00	mg/kg-day	3.6E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.5E-07	mg/kg-day	1.5E+00	mg/kg-day	1.3E-06
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	9.8E-06	mg/kg-day	7.3E-01	mg/kg-day	7.1E-06
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.2E-05	mg/kg-day	7.3E+00	mg/kg-day	9.0E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	2.1E-05	mg/kg-day	7.3E-01	mg/kg-day	1.5E-05
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	4.2E-05	mg/kg-day	7.3E-02	mg/kg day	3.1E-06
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	8.5E-07	mg/kg-day	2.0E-02	mg/kg-day	1.7E-08
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	8.3E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	1.4E-05	mg/kg-day	7.3E+00	mg/kg-day	1.0E-04
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	3.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	6.4E-09	mg/kg-day	1.6E+01	mg/kg-day	1.0E-07
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	6.6E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	6.8E-06	mg/kg-day	7.3E-01	mg/kg-day	5.0E-06
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	3.2E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.3E-04
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	1.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.9E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	5.5E-08	mg/kg-day	2.2E+00	mg/kg-day	1.2E-07
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	5.1E-08	mg/kg-day	2.2E+00	mg/kg-day	1.1E-07
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.3E-07	mg/kg-day	1.6E+00	mg/kg-day	2.0E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	4.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	5.9E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	9.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	2.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	6.8E-06	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.23a CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.7E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	3.0E-09	mg/kg-day	3.2E+01	mg/kg-day	9.7E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	3.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	3.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	5.5E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										5.4E-07
										Total Risk Across All Exposure Routes/Pathways	2.3E-04

*subsurface and surface soil combined

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 8.24a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	3.6E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	8.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	2.6E-08	mg/kg-day	2.0E+00	mg/kg-day	5.3E-08
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	2.5E-08	mg/kg-day	2.0E+00	mg/kg-day	4.9E-08
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.2E-07	mg/kg-day	1.5E+00	mg/kg-day	1.8E-07
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	1.3E-06	mg/kg-day	7.3E-01	mg/kg-day	9.8E-07
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	1.7E-06	mg/kg-day	7.3E+00	mg/kg-day	1.2E-05
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	2.9E-06	mg/kg-day	7.3E-01	mg/kg-day	2.1E-06
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	5.8E-06	mg/kg-day	7.3E 02	mg/kg-day	4.2E-07
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	1.2E-07	mg/kg-day	2.0E-02	mg/kg-day	2.4E-09
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	2.0E-06	mg/kg-day	7.3E+00	mg/kg-day	1.4E-05
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	4.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	8.8E-10	mg/kg-day	1.6E+01	mg/kg-day	1.4E-08
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	9.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	9.4E-07	mg/kg-day	7.3E-01	mg/kg-day	6.9E-07
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	4.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	1.6E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										3.1E-05
Dermal Absorption	Acenaphthene	6.08E+01	mg/kg	6.08E+01	mg/kg	M	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Aluminum	1.44E+04	mg/kg	1.44E+04	mg/kg	M	2.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Aroclor-1254	4.50E-01	mg/kg	4.50E-01	mg/kg	M	4.0E-09	mg/kg-day	2.2E+00	mg/kg-day	9.1E-09
	Aroclor-1260	4.20E-01	mg/kg	4.20E-01	mg/kg	M	3.8E-09	mg/kg-day	2.2E+00	mg/kg-day	8.5E-09
	Arsenic	2.00E+00	mg/kg	2.00E+00	mg/kg	M	9.6E-09	mg/kg-day	1.6E+00	mg/kg-day	1.5E-08
	Benzo(a)anthracene	2.30E+01	mg/kg	2.30E+01	mg/kg	M	3.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(a)pyrene	2.90E+01	mg/kg	2.90E+01	mg/kg	M	4.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(b)fluoranthene	4.85E+01	mg/kg	4.85E+01	mg/kg	M	7.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Benzo(k)fluoranthene	9.87E+01	mg/kg	9.87E+01	mg/kg	M	1.5E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Carbazole	2.00E+00	mg/kg	2.00E+00	mg/kg	M	3.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Chromium	1.96E+01	mg/kg	1.96E+01	mg/kg	M	2.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenz(a,h)anthracene	3.38E+01	mg/kg	3.38E+01	mg/kg	M	5.1E-07	mg/kg-day	N/A	mg/kg-day	N/A

TABLE 8.24a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Medium: Soil*
Exposure Medium: Soil*
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Dibenzofuran	8.30E-01	mg/kg	8.30E-01	mg/kg	M	1.2E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Dieldrin	1.50E-02	mg/kg	1.50E-02	mg/kg	M	2.2E-10	mg/kg-day	3.2E+01	mg/kg-day	7.2E-09
	Fluorene	1.56E+03	mg/kg	1.56E+03	mg/kg	M	2.3E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Indeno(1,2,3-cd)pyrene	1.60E+01	mg/kg	1.60E+01	mg/kg	M	2.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	7.47E+03	mg/kg	7.47E+03	mg/kg	M	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Napthalene	2.70E+00	mg/kg	2.70E+00	mg/kg	M	4.0E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										4.0E-08
										Total Risk Across All Exposure Routes/Pathways	3.1E-05

*surface and subsurface soil combined.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Skin absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 10% for SVOCs, 10% for pesticides, and 1% for all other inorganics.

N/A - not applicable.

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact											
			Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	5.5E-04	--	1.5E-03	2.0E-03
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	1.4E-02	--	9.7E-03	2.4E-02
			Aroclor-1254	3.1E-07	--	3.9E-07	7.1E-07	Aroclor-1254	Immune System	2.2E-02	--	2.8E-02	5.0E-02
			Aroclor-1260	2.9E-07	--	3.7E-07	6.6E-07	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	1.0E-06	--	6.6E-07	1.7E-06	Arsenic	Skin/vascular	6.5E-03	--	4.1E-03	1.1E-02
			Benzo(a)anthracene	5.9E-06	--	N/A	5.9E-06	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	7.4E-05	--	N/A	7.4E-05	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	1.2E-05	--	N/A	1.2E-05	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(g,h,i)perylene	N/A	--	N/A	0.0E+00	Benzo(g,h,i)perylene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	4.1E-07	--	N/A	4.1E-07	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	1.4E-08	--	N/A	1.4E-08	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	NOAEL	6.4E-03	--	1.2E-01	1.3E-01
			Dibenz(a,h)anthracene	8.6E-05	--	N/A	8.6E-05	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	2.0E-04	--	5.4E-04	7.4E-04
			Dieldrin	8.4E-08	--	3.1E-07	4.0E-07	Dieldrin	Liver	2.9E-04	--	1.1E-03	1.4E-03
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	3.8E-02	--	1.0E-01	1.4E-01
			Indeno(1,2,3-cd)pyrene	4.1E-06	--	N/A	4.1E-06	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Blood/Liver	2.4E-02	--	2.3E-02	4.7E-02
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	1.3E-04	--	3.1E-04	4.4E-04
			(Total)	1.8E-04	0.0E+00	1.7E-06	1.9E-04	(Total)		1.1E-01	0.0E+00	2.9E-01	4.0E-01
	Air	Emissions from exposed soil											
			Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	7.1E-04	--	7.1E-04
			Aroclor-1254	--	1.6E-11	--	1.6E-11	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	1.5E-11	--	1.5E-11	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	5.3E-10	--	5.3E-10	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	1.6E-09	--	1.6E-09	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(g,h,i)perylene	--	N/A	--	0.0E+00	Benzo(g,h,i)perylene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	1.4E-08	--	1.4E-08	Chromium	Respiratory	--	3.2E-05	--	3.2E-05
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	4.2E-12	--	4.2E-12	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	1.5E-07	--	1.5E-07
			(Total)	--	1.6E-08	[illegible]	1.6E-08	(Total)	--	--	7.4E-04	--	7.4E-04

TA[illegible]ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
			Total Risk Across Surface Soil				1.9E-04	Total Risk Across Surface Soil					4.0E-01
			Total Risk Across All Media and All Exposure Routes				1.9E-04	Total Hazard Index Across All Media and All Exposure Routes					4.0E-01

Total Vascular HI =	1.1E-02
Total Liver HI =	4.8E-02
Total Neural HI =	2.4E-02
Total Blood HI =	1.9E-01
Total Skin HI =	1.1E-02
Total Gastrointestinal HI =	4.7E-02
Total Immune System HI =	5.0E-02
Total Respiratory HI =	3.2E-05
Total Body HI =	4.4E-04
Total Kidney HI =	7.4E-04
Total NOAEL HI =	1.3E-01

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)	N/A	0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	3.5E-07	--	2.3E-07	5.8E-07	Arsenic	Skin/Vascular	2.3E-03	--	1.5E-03	3.7E-03
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Blood/Liver	1.1E-02	--	1.0E-02	2.1E-02
			(Total)	3.5E-07	0.0E+00	2.3E-07	5.8E-07	(Total)		1.3E-02	0.0E+00	1.2E-02	2.5E-02
			Total Risk Across Sediment				5.8E-07	Total Risk Across Sediment					2.5E-02
Surface Soil	Surface Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	1.2E-04	--	1.9E-04	3.1E-04
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	2.9E-03	--	1.3E-03	4.2E-03
			Aroclor-1254	6.3E-08	--	4.9E-08	1.1E-07	Aroclor-1254	Immune System	4.6E-03	--	3.6E-03	8.2E-03
			Aroclor-1260	5.9E-08	--	4.6E-08	1.0E-07	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	2.1E-07	--	8.2E-08	2.9E-07	Arsenic	Skin/Vascular	1.4E-03	--	5.3E-04	1.9E-03
			Benzo(a)anthracene	1.2E-06	--	N/A	1.2E-06	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	1.5E-05	--	N/A	1.5E-05	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	2.5E-06	--	N/A	2.5E-06	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(g,h,i)perylene	N/A	--	N/A	0.0E+00	Benzo(g,h,i)perylene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	8.2E-08	--	N/A	8.2E-08	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	2.8E-09	--	N/A	2.8E-09	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	NOAEL	1.3E-03	--	1.5E-02	1.7E-02
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	4.2E-05	--	7.0E-05	1.1E-04
			Dieldrin	1.7E-08	--	3.9E-08	5.6E-08	Dieldrin	Liver	6.1E-05	--	1.4E-04	2.0E-04
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	7.9E-03	--	1.3E-02	2.1E-02
			Indeno(1,2,3-cd)pyrene	8.2E-07	--	N/A	8.2E-07	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Blood/Liver	5.1E-03	--	2.9E-03	8.0E-03
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	2.7E-05	--	4.0E-05	6.7E-05
			(Total)	3.7E-05	0.0E+00	2.2E-07	3.7E-05	(Total)		2.3E-02	0.0E+00	3.7E-02	6.0E-02

TABLE E

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Air	Emissions from exposed soil	Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	3.3E-05	--	3.3E-05
			Aroclor-1254	--	7.1E-13	--	7.1E-13	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	6.6E-13	--	6.6E-13	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	2.4E-11	--	2.4E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	7.1E-11	--	7.1E-11	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(g,h,I)perylene	--	N/A	--	0.0E+00	Benzo(g,h,I)perylene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	6.3E-10	--	6.3E-10	Chromium	Respiratory	--	1.5E-06	--	1.5E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	1.9E-13	--	1.9E-13	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	6.9E-09	--	6.9E-09
			(Total)	--	7.3E-10	--	7.3E-10	(Total)		0.0E+00	3.5E-05	0.0E+00	3.5E-05
			Total Risk Across Surface Soil				3.7E-05	Total Risk Across Surface Soil					6.0E-02
			Total Risk Across All Media and All Exposure Routes				3.8E-05	Total Hazard Index Across All Media and All Exposure Routes					8.5E-02

Total Vascular HI =	5.6E-03
Total Liver HI =	2.9E-02
Total Neural HI =	4.2E-03
Total Blood HI =	5.0E-02
Total Skin HI =	5.6E-03
Total Gastrointestinal HI =	2.9E-02
Total Immune System HI =	8.2E-03
Total Kidney HI =	1.1E-04
Total Respiratory HI =	1.5E-06
Total NOAEL HI =	1.7E-02
Total Body HI =	6.7E-05

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)					(Total)					
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	1.8E-07	--	2.9E-08	2.1E-07	Arsenic	Skin/Vascular	3.1E-03	--	5.0E-04	3.6E-03
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Blood/Liver	1.5E-02	--	3.5E-03	1.8E-02
			(Total)	1.8E-07	0.0E+00	2.9E-08	2.1E-07	(Total)		1.8E-02	0.0E+00	4.0E-03	2.2E-02
			Total Risk Across Sediment				2.1E-07	Total Risk Across Sediment					2.2E-02
Surface Soil	Surface Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	2.8E-04	--	1.1E-04	3.9E-04
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	4.0E-03	--	7.2E-04	4.7E-03
			Aroclor-1254	3.2E-08	--	1.0E-08	4.3E-08	Aroclor-1254	Immune System	6.3E-03	--	2.0E-03	8.3E-03
			Aroclor-1260	3.0E-08	--	9.8E-09	4.0E-08	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	1.1E-07	--	1.7E-08	1.3E-07	Arsenic	Skin/Vascular	1.9E-03	--	3.0E-04	2.2E-03
			Benzo(a)anthracene	6.0E-07	--	N/A	6.0E-07	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	7.6E-06	--	N/A	7.6E-06	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	1.3E-06	--	N/A	1.3E-06	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(g,h,i)perylene	N/A	--	N/A	0.0E+00	Benzo(g,h,i)perylene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	4.2E-08	--	N/A	4.2E-08	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	1.4E-09	--	N/A	1.4E-09	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	NOAEL	1.8E-03	--	8.8E-03	1.1E-02
			Dibenz(a,h)anthracene	8.8E-06	--	N/A	8.8E-06	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	5.8E-05	--	4.0E-05	9.8E-05
			Dieldrin	8.6E-09	--	8.3E-09	1.7E-08	Dieldrin	Liver	8.4E-05	--	8.1E-05	1.6E-04
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	1.1E-02	--	7.5E-03	1.8E-02
			Indeno(1,2,3-cd)pyrene	4.2E-07	--	N/A	4.2E-07	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Blood/Liver	7.0E-03	--	1.7E-03	8.6E-03
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	3.8E-05	--	2.3E-05	6.0E-05
			(Total)	1.9E-05	0.0E+00	4.6E-08	1.9E-05	(Total)		3.2E-02	0.0E+00	2.1E-02	5.4E-02

TABL ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Air	Emissions from exposed soil	Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	4.6E-05	--	4.6E-05
			Aroclor-1254	--	3.7E-13	--	3.7E-13	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	3.4E-13	--	3.4E-13	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	1.2E-11	--	1.2E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	3.7E-11	--	3.7E-11	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(g,h,l)perylene	--	N/A	--	0.0E+00	Benzo(g,h,l)perylene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	3.3E-10	--	3.3E-10	Chromium	Respiratory	--	2.1E-06	--	2.1E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	9.8E-14	--	9.8E-14	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	9.5E-09	--	9.5E-09
			(Total)	0.0E+00	3.8E-10	0.0E+00	3.8E-10	(Total)		0.0E+00	4.8E-05	0.0E+00	4.8E-05
			Total Risk Across Surface Soil				1.9E-05	Total Risk Across Surface Soil					5.4E-02
			Total Risk Across All Media and All Exposure Routes				1.9E-05	Total Hazard Index Across All Media and All Exposure Routes					7.5E-02

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
												Total Vascular HI =	5.8E-03
												Total Liver HI =	2.7E-02
												Total Neural HI =	4.8E-03
												Total Blood HI =	4.5E-02
												Total Skin HI =	5.8E-03
												Total Gastrointestinal HI =	2.7E-02
												Total Immune System HI =	8.3E-03
												Total Respiratory HI =	2.1E-06
												Total Body HI =	6.0E-05
												Total NOAEL HI =	1.1E-02
												Total Kidney HI =	9.8E-05

TA RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Aluminum	CNS	1.6E-02	--	1.2E-04	1.6E-02
								Arsenic	Skin/vascular	1.8E+00	--	3.7E-03	1.8E+00
								Benzene	Blood/Immune System	3.1E+01	--	4.2E+00	3.6E+01
								Carbon disulfide	Fetus	5.3E-02	--	1.0E-02	6.3E-02
								Chloroform	Liver	7.6E-01	--	7.8E-02	8.4E-01
								Ethylbenzene	Liver/kidney	6.7E-02	--	6.2E-02	1.3E-01
								Iron	Gastrointestinal/Blood/ Liver	1.4E+00	--	1.4E-02	1.4E+00
								Manganese	CNS	6.7E-01	--	3.8E-03	6.8E-01
								Methylene chloride	Liver	9.9E-02	--	3.7E-03	1.0E-01
								Naphthalene	Whole Body	3.8E-02	--	5.2E-02	9.1E-02
								Tetrachloroethene	Liver/whole body	1.4E-02	--	1.8E-02	3.2E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		3.6E+01	0.0E+00	4.4E+00	4.1E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					4.1E+01
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			Aluminum	--	N/A	--	0.0E+00	Aluminum	N/A	--	N/A	--	0.0E+00
			Arsenic	--	N/A	--	0.0E+00	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	1.7E-03	--	1.7E-03	Benzene	Blood	--	9.9E+01	--	9.9E+01
			Carbon disulfide	--	N/A	--	0.0E+00	Carbon disulfide	CNS	--	5.9E-02	--	5.9E-02
			Chloroform	--	2.8E-04	--	2.8E-04	Chloroform	Liver	--	1.2E+02	--	1.2E+02
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	4.0E-02	--	4.0E-02
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Manganese	--	N/A	--	0.0E+00	Manganese	N/A	--	N/A	--	0.0E+00
			Methylene chloride	--	4.2E-06	--	4.2E-06	Methylene chloride	Liver	--	8.6E-03	--	8.6E-03
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	1.7E+00	--	1.7E+00
			Tetrachloroethene	--	1.6E-07	--	1.6E-07	Tetrachloroethene	Liver/Whole Body	--	1.6E-03	--	1.6E-03
			(Total)	0.0E+00	1.9E-03	0.0E+00	1.9E-03	(Total)		0.0E+00	2.2E+02	0.0E+00	2.2E+02
			Total Risk Across Vapors at Showerhead				1.9E-03	Total Hazard Index Across Vapors at Showerhead					2.2E+02
	All Media		Total Risk Across Groundwater				1.9E-03	Total Hazard Index Across Groundwater					2.6E+02

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact						Acenaphthene	NOAEL	1.4E-03	--	2.3E-03	3.7E-03
								Aluminum	CNS	2.0E-02	--	8.5E-03	2.8E-02
								Aroclor-1254	Whole body	3.1E-02	--	2.4E-02	5.5E-02
								Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
								Arsenic	Skin/vascular	9.1E-03	--	3.6E-03	1.3E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Carbazole	N/A	N/A	--	N/A	0.0E+00
								Chromium	NOAEL	8.9E-03	--	1.0E-01	1.1E-01
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	2.8E-04	--	4.7E-05	3.3E-04
								Dieldrin	Liver	4.1E-04	--	9.5E-04	1.4E-03
								Fluorene	Blood	5.3E-02	--	8.9E-02	1.4E-01
								Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/Blood/ Liver	3.4E-02	--	2.0E-02	5.4E-02
								Napthalene	Whole Body	1.8E-04	--	2.7E-04	4.5E-04
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.6E-01	0.0E+00	2.5E-01	4.1E-01
	Air	Emissions from exposed soil						Acenaphthene	N/A	--	N/A	--	0.0E+00
								Aluminum	CNS	--	3.0E-03	--	3.0E-03
								Aroclor-1254	N/A	--	N/A	--	0.0E+00
								Aroclor-1260	N/A	--	N/A	--	0.0E+00
								Arsenic	N/A	--	N/A	--	0.0E+00
								Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
								Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
								Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
								Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
								Carbazole	N/A	--	N/A	--	0.0E+00
								Chromium	Respiratory	--	1.4E-04	--	1.4E-04
								Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
								Dibenzofuran	N/A	--	N/A	--	0.0E+00
								Dieldrin	N/A	--	N/A	--	0.0E+00

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
								Fluorene	N/A	--	N/A	--	0.0E+00
								Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
								Iron	N/A	--	N/A	--	0.0E+00
								Napthalene	Respiratory	--	6.2E-07	--	6.2E-07
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	3.1E-03	0.0E+00	3.1E-03
						Total Risk Across Soil*	0.0E+00					Total Risk Across Soil*	4.1E-01
						Total Risk Across All Media and All Exposure Routes	1.9E-03					Total Hazard Index Across All Media and All Exposure Routes	2.6E+02

* surface and subsurface combined

Total Vascular HI =	1.8E+00
Total Kidney HI =	1.3E-01
Total Neural HI =	7.8E-01
Total Blood HI =	1.3E+02
Total Skin HI =	1.8E+00
Total Body HI =	1.8E-01
Total Liver HI =	2.6E+00
Total Immune System HI =	3.6E+01
Total Respiratory HI =	1.7E+00
Total Development HI =	4.0E-02
Total Gastrointestinal HI =	1.5E+00
Total Fetus HI =	6.3E-02
Total NOAEL HI =	1.2E-01

TABLE 9.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Aluminum	CNS	3.7E-02	--	3.6E-04	3.8E-02
								Arsenic	Skin/vascular	4.2E+00	--	1.1E-02	4.2E+00
								Benzene	Blood/Immune System	7.3E+01	--	9.9E+00	8.3E+01
								Carbon disulfide	Fetus	1.2E-01	--	2.4E-02	1.5E-01
								Chloroform	Liver	1.8E+00	--	1.6E-01	1.9E+00
								Ethylbenzene	Liver/kidney	1.6E-01	--	1.3E-01	2.8E-01
								Iron	Gastrointestinal/Blood/ Liver	3.3E+00	--	4.3E-02	3.3E+00
								Manganese	CNS	1.6E+00	--	1.2E-02	1.6E+00
								Methylene chloride	Liver	2.3E-01	--	8.8E-03	2.4E-01
								Naphthalene	Whole Body	8.9E-02	--	1.0E-01	1.9E-01
								Tetrachloroethene	Liver/Whole body	3.3E-02	--	3.5E-02	6.7E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		8.5E+01	0.0E+00	1.0E+01	9.5E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					9.5E+01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					9.5E+01
Soil*	Soil*	Direct Contact						Acenaphthene	NOAEL	1.3E-02	--	2.4E-03	1.5E-02
								Aluminum	CNS	1.8E-01	--	8.9E-03	1.9E-01
								Aroclor-1254	Whole body	2.9E-01	--	2.5E-02	3.1E-01
								Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
								Arsenic	Skin/vascular	8.5E-02	--	3.8E-03	8.9E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Carbazole	N/A	N/A	--	N/A	0.0E+00
								Chromium	NOAEL	8.4E-02	--	1.1E-01	1.9E-01
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	2.7E-03	--	5.0E-05	2.7E-03
								Dieldrin	Liver	3.8E-03	--	1.0E-03	4.8E-03
								Fluorene	Blood	5.0E-01	--	9.3E-02	5.9E-01
								Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/Blood/ Liver	3.2E-01	--	2.1E-02	3.4E-01
								Napthalene	Whole Body	1.7E-03	--	2.8E-04	2.0E-03
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.5E+00	0.0E+00	2.7E-01	1.7E+00

TABLE [illegible]ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil						Acenaphthene	N/A	--	N/A	--	0.0E+00
								Aluminum	CNS	--	8.4E-03	--	8.4E-03
								Aroclor-1254	N/A	--	N/A	--	0.0E+00
								Aroclor-1260	N/A	--	N/A	--	0.0E+00
								Arsenic	N/A	--	N/A	--	0.0E+00
								Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
								Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
								Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
								Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
								Carbazole	N/A	--	N/A	--	0.0E+00
								Chromium	Respiratory	--	3.8E-04	--	3.8E-04
								Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
								Dibenzofuran	N/A	--	N/A	--	0.0E+00
								Dieldrin	N/A	--	N/A	--	0.0E+00
								Fluorene	N/A	--	N/A	--	0.0E+00
								Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
								Iron	N/A	--	N/A	--	0.0E+00
								Napthalene	Respiratory	--	1.7E-06	--	1.7E-06
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	8.8E-03	0.0E+00	8.8E-03
			Total Hazard Index Across Soil*				0.0E+00		Total Hazard Index Across Soil*				1.8E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00		Total Hazard Index Across All Media and All Exposure Routes				9.7E+01

* surface and subsurface combined

Total Vascular HI =	4.3E+00
Total Kidney HI =	2.8E-01
Total Neural HI =	1.8E+00
Total Blood HI =	8.8E+01
Total Skin HI =	4.3E+00
Total Body HI =	5.7E-01
Total Liver HI =	6.2E+00
Total Gastrointestinal HI =	3.7E+00
Total Fetus HI =	1.5E-01
Total Respiratory HI =	3.8E-04
Total Immune System HI =	8.3E+01
Total NOAEL HI =	2.1E-01

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	Aluminum	N/A	--	N/A	0.0E+00						
			Arsenic	4.4E-04	-	1.0E-06	4.4E-04						
			Benzene	2.8E-03	--	3.8E-04	3.2E-03						
			Carbon disulfide	N/A	--	N/A	0.0E+00						
			Chloroform	2.5E-05	--	2.5E-06	2.8E-05						
			Ethylbenzene	N/A	--	N/A	0.0E+00						
			Iron	N/A	--	N/A	0.0E+00						
			Manganese	N/A	--	N/A	0.0E+00						
			Methylene chloride	2.4E-05	--	9.1E-07	2.5E-05						
			Naphthalene	N/A	--	N/A	0.0E+00						
			Tetrachloroethene	4.0E-06	--	4.7E-06	8.6E-06						
			(Total)	3.3E-03	0.0E+00	3.8E-04	3.7E-03	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Tap water				3.7E-03	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				3.7E-03	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	1.4E-06	--	4.2E-07	1.8E-06						
			Aroclor-1260	1.3E-06	--	3.9E-07	1.7E-06						
			Arsenic	4.7E-06	--	7.0E-07	5.4E-06						
			Benzo(a)anthracene	2.6E-05	--	N/A	2.6E-05						
			Benzo(a)pyrene	3.3E-04	--	N/A	3.3E-04						
			Benzo(b)fluoranthene	5.5E-05	--	N/A	5.5E-05						
			Benzo(k)fluoranthene	1.1E-05	--	N/A	1.1E-05						
			Carbazole	6.3E-08		N/A	6.3E-08						
			Chromium	N/A		N/A	0.0E+00						
			Dibenz(a,h)anthracene	3.9E-04	--	N/A	3.9E-04						
			Dibenzofuran	N/A		N/A	0.0E+00						
			Dieldrin	3.8E-07		3.3E-07	7.1E-07						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	1.8E-05	--	N/A	1.8E-05						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A		N/A	0.0E+00						
			(Total)	8.4E-04	0.0E+00	1.8E-06	8.4E-04	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00

TAB RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil	Acenaphthene	--	N/A	--	0.0E+00						
			Aluminum	--	N/A	--	0.0E+00						
			Aroclor-1254	--	1.1E-10	--	1.1E-10						
			Aroclor-1260	--	1.0E-10	--	1.0E-10						
			Arsenic	--	3.7E-09	--	3.7E-09						
			Benzo(a)anthracene	--	N/A	--	0.0E+00						
			Benzo(a)pyrene	--	1.1E-08	--	1.1E-08						
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00						
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00						
			Carbazole	--	N/A	--	0.0E+00						
			Chromium	--	9.8E-08	--	9.8E-08						
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00						
			Dibenzofuran	--	N/A	--	0.0E+00						
			Dieldrin	--	2.9E-11	--	2.9E-11						
			Fluorene	--	N/A	--	0.0E+00						
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00						
			Iron	--	N/A	--	0.0E+00						
			Napthalene	--	N/A	--	0.0E+00						
			(Total)	0.0E+00	1.1E-07	0.0E+00	1.1E-07	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Hazard Index Across Soil*				8.4E-04		Total Hazard Index Across Soil*				0.0E+00
			Total Risk Across All Media and All Exposure Routes				4.5E-03	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit	Aluminum	--	--	N/A	0.0E+00	Aluminum	CNS	--	--	1.0E-03	1.0E-03
			Arsenic	--	--	2.1E-07	2.1E-07	Arsenic	Skin/vascular	--	--	3.2E-02	3.2E-02
			Benzene	--	--	1.5E-05	1.5E-05	Benzene	Blood/Immune System	--	--	1.2E+01	1.2E+01
			Carbon disulfide	--	--	N/A	0.0E+00	Carbon disulfide	Fetus	--	--	2.9E-02	2.9E-02
			Chloroform	--	--	1.1E-07	1.1E-07	Chloroform	Liver	--	--	1.3E-01	1.3E-01
			Ethylbenzene	--	--	N/A	0.0E+00	Ethylbenzene	Liver/kidney	--	--	9.2E-02	9.2E-02
			Iron	--	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood /Liver	--	--	1.2E-01	1.2E-01
			Manganese	--	--	N/A	0.0E+00	Manganese	CNS	--	--	3.3E-02	3.3E-02
			Methylene chloride	--	--	6.5E-08	6.5E-08	Methylene chloride	Liver	--	--	1.0E-02	1.0E-02
			Naphthalene	--	--	N/A	0.0E+00	Naphthalene	Whole Body	--	--	5.7E-02	5.7E-02
			Tetrachloroethene	--	--	9.3E-08	9.3E-08	Tetrachloroethene	Liver/Whole Body	--	--	1.3E-02	1.3E-02
			(Total)	0.0E+00	0.0E+00	1.5E-05	1.5E-05	(Total)		0.0E+00	0.0E+00	1.2E+01	1.2E+01
			Total Risk Across Water in Pit				1.5E-05	Total Hazard Index Across Water in Pit					1.2E+01
Groundwater	Air	Columbia Aquifer-Volatilization from water in Excavation Pit	Aluminum	--	N/A	--	0.0E+00	Aluminum	N/A	--	N/A	--	0.0E+00
			Arsenic	--	N/A	--	0.0E+00	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	5.5E-06	--	5.5E-06	Benzene	Blood	--	7.7E+00	--	7.7E+00
			Carbon disulfide	--	N/A	--	0.0E+00	Carbon disulfide	CNS	--	3.7E-03	--	3.7E-03
			Chloroform	--	1.1E-06	--	1.1E-06	Chloroform	Liver	--	1.1E+01	--	1.1E+01
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	3.0E-03	--	3.0E-03
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Manganese	--	N/A	--	0.0E+00	Manganese	N/A	--	N/A	--	0.0E+00
			Methylene chloride	--	1.9E-08	--	1.9E-08	Methylene chloride	Liver	--	9.3E-04	--	9.3E-04
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	1.1E-01	--	1.1E-01
			Tetrachloroethene	--	4.7E-10	--	4.7E-10	Tetrachloroethene	Liver/Whole Body	--	1.2E-04	--	1.2E-04
			(Total)	--	6.6E-06	--	6.6E-06	(Total)		--	1.9E+01	--	1.9E+01
			Total Risk Across Volatilization from Pit				6.6E-06	Total Risk Across Volatilization from Pit					1.9E+01
	All Media		Total Risk Across Groundwater				2.2E-05		Total Hazard Index Across Groundwater				3.1E+01

TA RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil	Direct Contact											
			Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	4.8E-03	--	2.0E-03	6.8E-03
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	6.8E-02	--	7.5E-03	7.5E-02
			Aroclor-1254	6.0E-08	--	1.2E-08	7.3E-08	Aroclor-1254	Immune system	4.2E-02	--	8.5E-03	5.1E-02
			Aroclor-1260	5.6E-08	--	1.1E-08	6.8E-08	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	2.0E-07	--	2.0E-08	2.2E-07	Arsenic	Skin/vascular	3.1E-02	--	3.2E-03	3.4E-02
			Benzo(a)anthracene	1.1E-06	--	N/A	1.1E-06	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	1.4E-05	--	N/A	1.4E-05	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	2.4E-06	--	N/A	2.4E-06	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	4.8E-07	--	N/A	4.8E-07	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	2.7E-09	--	N/A	2.7E-09	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	NOAEL	4.6E-03	--	1.4E-02	1.8E-02
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	9.7E-04	--	4.2E-05	1.0E-03
			Dieldrin	N/A	--	N/A	0.0E+00	Dieldrin	Liver	1.4E-03	--	8.5E-04	2.3E-03
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	1.8E-02	--	7.9E-03	2.6E-02
			Indeno(1,2,3-cd)pyrene	7.8E-07	--	N/A	7.8E-07	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood /Liver	1.2E-01	--	1.8E-02	1.3E-01
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	6.3E-04	--	2.4E-04	8.7E-04
			(Total)	3.6E-05	0.0E+00	4.4E-08	3.6E-05	(Total)		2.9E-01	0.0E+00	6.2E-02	3.5E-01
	Air	Emissions from exposed soil											
			Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	2.1E-03	--	2.1E-03
			Aroclor-1254	--	1.9E-12	--	1.9E-12	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	1.8E-12	--	1.8E-12	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	6.4E-11	--	6.4E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	1.9E-10	--	1.9E-10	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	1.7E-09	--	1.7E-09	Chromium	Respiratory	--	9.7E-05	--	9.7E-05
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	5.1E-13	--	5.1E-13	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	4.4E-07	--	4.4E-07
			(Total)	0.0E+00	2.0E-09	0.0E+00	2.0E-09	(Total)		0.0E+00	2.2E-03	0.0E+00	2.2E-03
						Total Risk Across Soil*	3.6E-05					Total Risk Across Soil*	3.5E-01

TABLE 9.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Total Risk Across All Media and All Exposure Routes							5.8E-05	Total Hazard Index Across All Media and All Exposure Routes					3.2E+01

Total Vascular HI =	6.6E-02
Total Kidney HI =	9.2E-02
Total Neural HI =	1.1E-01
Total Blood HI =	2.0E+01
Total Skin HI =	6.6E-02
Total Body HI =	7.0E-02
Total Immune System HI =	5.1E-02
Total Liver HI =	1.2E+01
Total Respiratory HI =	1.1E-01
Total Development HI =	3.0E-03
Total Gastrointestinal HI =	2.6E-01
Total Immune System HI =	1.2E+01
Total Fetus HI =	2.9E-02

TABLE

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	9.9E-04	--	2.6E-03	3.6E-03
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	1.4E-02	--	9.7E-03	2.4E-02
			Aroclor-1254	3.1E-07	--	3.9E-07	7.1E-07	Aroclor-1254	Immune System	2.2E-02	--	2.8E-02	5.0E-02
			Aroclor-1260	2.9E-07	--	3.7E-07	6.6E-07	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	1.0E-06	--	6.6E-07	1.7E-06	Arsenic	Skin/vascular	6.5E-03	--	4.1E-03	1.1E-02
			Benzo(a)anthracene	5.9E-06	--	N/A	5.9E-06	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	7.4E-05	--	N/A	7.4E-05	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	1.2E-05	--	N/A	1.2E-05	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	2.5E-06	--	N/A	2.5E-06	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	1.4E-08	--	N/A	1.4E-08	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	Liver	6.4E-03	--	1.2E-01	1.3E-01
			Dibenz(a,h)anthracene	8.6E-05	--	N/A	8.6E-05	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	2.0E-04	--	5.4E-05	2.6E-04
			Dieldrin	8.4E-08	--	3.1E-07	4.0E-07	Dieldrin	Liver	2.9E-04	--	1.1E-03	1.4E-03
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	3.8E-02	--	1.0E-01	1.4E-01
			Indeno(1,2,3-cd)pyrene	4.1E-06	--	N/A	4.1E-06	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/ Liver/Blood	2.4E-02	--	2.3E-02	4.7E-02
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	1.3E-04	--	3.1E-04	4.4E-04
			(Total)	1.9E-04	0.0E+00	1.7E-06	1.9E-04	(Total)		1.1E-01	0.0E+00	2.9E-01	4.0E-01
	Air	Emissions from exposed soil	Acenapthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	NA	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	7.1E-04	--	7.1E-04
			Aroclor-1254	--	1.6E-11	--	1.6E-11	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	1.5E-11	--	1.5E-11	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	5.3E-10	--	5.3E-10	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	1.6E-09	--	1.6E-09	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	1.4E-08	--	1.4E-08	Chromium	Respiratory	--	3.2E-05	--	3.2E-05
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	4.2E-12	--	4.2E-12	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A		0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	1.5E-07	--	1.5E-07
			(Total)	0.0E+00	1.6E-08	0.0E+00	1.6E-08	(Total)		0.0E+00	7.4E-04	0.0E+00	7.4E-04
						Total Risk Across Soil*	1.9E-04					Total Risk Across Soil*	4.0E-01

TABLE 9.8 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
						Total Risk Across All Media and All Exposure Routes	1.9E-04					Total Hazard Index Across All Media and All Exposure Routes	4.0E-01

* surface and subsurface combined

Total Vascular HI =	1.1E-02
Total Liver HI =	1.7E-01
Total Neural HI =	2.4E-02
Total Blood HI =	1.9E-01
Total Skin HI =	1.1E-02
Total Gastrointestinal HI =	4.7E-02
Total NOAEL HI =	5.0E-03
Total Kidney HI =	2.6E-04
Total Whole Body HI =	4.4E-04
Total Immune System HI =	5.0E-02
Total Respiratory HI =	3.2E-05

TABLE 9.9 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)	N/A	0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond	Arsenic	3.5E-07	--	2.3E-07	5.8E-07	Arsenic	Skin/vascular	2.3E-03	--	1.5E-03	3.7E-03
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood /Liver	1.1E-02	--	1.0E-02	2.1E-02
			(Total)	3.5E-07	0.0E+00	2.3E-07	5.8E-07	(Total)		1.3E-02	0.0E+00	1.2E-02	2.5E-02
			Total Risk Across Sediment				5.8E-07	Total Risk Across Sediment					2.5E-02
Soil*	Soil*	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00	Acenaphthene	NOAEL	2.1E-04	--	3.4E-04	5.5E-04
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	2.9E-03	--	1.3E-03	4.2E-03
			Aroclor-1254	6.3E-08	--	4.9E-08	1.1E-07	Aroclor-1254	Immune System	4.6E-03	--	3.6E-03	8.2E-03
			Aroclor-1260	5.9E-08	--	4.6E-08	1.0E-07	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	2.1E-07	--	8.2E-08	2.9E-07	Arsenic	Skin/vascular	1.4E-03	--	5.3E-04	1.9E-03
			Benzo(a)anthracene	1.2E-06	--	N/A	1.2E-06	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	1.5E-05	--	N/A	1.5E-05	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	2.5E-06	--	N/A	2.5E-06	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	5.0E-07	--	N/A	5.0E-07	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	2.8E-09	--	N/A	2.8E-09	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	NOAEL	1.3E-03	--	1.5E-02	1.7E-02
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	4.2E-05	--	7.0E-06	4.9E-05
			Dieldrin	1.7E-08	--	3.9E-08	5.6E-08	Dieldrin	Liver	6.1E-05	--	1.4E-04	2.0E-04
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	7.9E-03	--	1.3E-02	2.1E-02
			Indeno(1,2,3-cd)pyrene	8.2E-07	--	N/A	8.2E-07	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood /Liver	5.1E-03	--	2.9E-03	8.0E-03
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole body	2.7E-05	--	4.0E-05	6.7E-05
			(Total)	3.7E-05	0.0E+00	2.2E-07	3.7E-05	(Total)		2.4E-02	0.0E+00	3.7E-02	6.1E-02

TABLE 9.9 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil	Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	3.3E-05	--	3.3E-05
			Aroclor-1254	--	7.1E-13	--	7.1E-13	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	6.6E-13	--	6.6E-13	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	2.4E-11	--	2.4E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	N/A	--	0.0E+00	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	6.3E-10	--	6.3E-10	Chromium	Respiratory	--	1.5E-06	--	1.5E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	1.9E-13	--	1.9E-13	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	6.9E-09	--	6.9E-09
			(Total)	0.0E+00	6.6E-10	0.0E+00	6.6E-10	(Total)		0.0E+00	3.5E-05	0.0E+00	3.5E-05
						Total Risk Across Soil*	3.7E-05					Total Risk Across Soil*	6.1E-02
						Total Risk Across All Media and All Exposure Routes	3.8E-05					Total Hazard Index Across All Media and All Exposure Routes	8.6E-02

* surface and subsurface combined

Total Vascular HI =	5.6E-03
Total Liver HI =	2.9E-02
Total Neural HI =	4.2E-03
Total Blood HI =	5.0E-02
Total Skin HI =	5.6E-03
Total Gastrointestinal HI =	2.9E-02
Total NOAEL HI =	1.8E-02
Total Whole Body HI =	6.7E-05
Total Kidney HI =	4.9E-05
Total Respiratory HI =	[illegible]
Total Immune System HI =	[illegible]

TAB) RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Water	Surface Water	Pond	No COPCs										
			(Total)					(Total)					
			Total Risk Across Surface Water				0.0E+00	Total Risk Across Surface Water					0.0E+00
Sediment	Sediment	Pond											
			Arsenic	1.8E-07	--	2.9E-08	2.1E-07	Arsenic	Skin/vascular	3.1E-03	--	5.0E-04	3.6E-03
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal /Blood/Liver	1.5E-02	--	3.5E-03	1.8E-02
			(Total)	1.8E-07	0.0E+00	2.9E-08	2.1E-07	(Total)		1.8E-02	0.0E+00	4.0E-03	2.2E-02
			Total Risk Across Sediment				2.1E-07	Total Risk Across Sediment					2.2E-02
Soil*	Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.00E+00	Acenaphthene	NOAEL	2.8E-04	--	2.6E-04	5.4E-04
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	4.0E-03	--	9.5E-04	5.0E-03
			Aroclor-1254	3.2E-08	--	1.4E-08	4.6E-08	Aroclor-1254	Immune System	6.3E-03	--	2.7E-03	9.0E-03
			Aroclor-1260	3.0E-08	--	1.3E-08	4.3E-08	Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
			Arsenic	1.1E-07	--	2.3E-08	1.3E-07	Arsenic	Skin/vascular	1.9E-03	--	4.0E-04	2.3E-03
			Benzo(a)anthracene	6.0E-07	--	N/A	6.0E-07	Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
			Benzo(a)pyrene	7.6E-06	--	N/A	7.6E-06	Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
			Benzo(b)fluoranthene	1.3E-06	--	N/A	1.3E-06	Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Benzo(k)fluoranthene	2.6E-07	--	N/A	2.6E-07	Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
			Carbazole	1.4E-09	--	N/A	1.4E-09	Carbazole	N/A	N/A	--	N/A	0.0E+00
			Chromium	N/A	--	N/A	0.0E+00	Chromium	Liver	1.8E-03	--	1.2E-02	1.3E-02
			Dibenz(a,h)anthracene	8.8E-06	--	N/A	8.8E-06	Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	5.8E-05	--	5.3E-06	6.3E-05
			Dieldrin	8.6E-09	--	1.1E-08	2.0E-08	Dieldrin	Liver	8.4E-05	--	1.1E-04	1.9E-04
			Fluorene	N/A	--	N/A	0.0E+00	Fluorene	Blood	1.1E-02	--	9.9E-03	2.1E-02
			Indeno(1,2,3-cd)pyrene	4.2E-07	--	N/A	4.2E-07	Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal /Blood/Liver	7.0E-03	--	2.2E-03	9.2E-03
			Napthalene	N/A	--	N/A	0.0E+00	Napthalene	Whole Body	3.8E-05	--	3.0E-05	6.8E-05
			(Total)	1.9E-05	0.0E+00	6.1E-08	1.9E-05	(Total)		3.2E-02	0.0E+00	2.8E-02	6.1E-02

TABLE 9.10 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Air	Emissions from exposed soil	Acenaphthene	--	N/A	--	0.0E+00	Acenaphthene	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	4.6E-05	--	4.6E-05
			Aroclor-1254	--	3.7E-13	--	3.7E-13	Aroclor-1254	N/A	--	N/A	--	0.0E+00
			Aroclor-1260	--	3.4E-13	--	3.4E-13	Aroclor-1260	N/A	--	N/A	--	0.0E+00
			Arsenic	--	1.2E-11	--	1.2E-11	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzo(a)anthracene	--	N/A	--	0.0E+00	Benzo(a)anthracene	N/A	--	N/A	--	0.0E+00
			Benzo(a)pyrene	--	3.7E-11	--	3.7E-11	Benzo(a)pyrene	N/A	--	N/A	--	0.0E+00
			Benzo(b)fluoranthene	--	N/A	--	0.0E+00	Benzo(b)fluoranthene	N/A	--	N/A	--	0.0E+00
			Benzo(k)fluoranthene	--	N/A	--	0.0E+00	Benzo(k)fluoranthene	N/A	--	N/A	--	0.0E+00
			Carbazole	--	N/A	--	0.0E+00	Carbazole	N/A	--	N/A	--	0.0E+00
			Chromium	--	3.3E-10	--	3.3E-10	Chromium	Respiratory	--	2.1E-06	--	2.1E-06
			Dibenz(a,h)anthracene	--	N/A	--	0.0E+00	Dibenz(a,h)anthracene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Dieldrin	--	9.8E-14	--	9.8E-14	Dieldrin	N/A	--	N/A	--	0.0E+00
			Fluorene	--	N/A	--	0.0E+00	Fluorene	N/A	--	N/A	--	0.0E+00
			Indeno(1,2,3-cd)pyrene	--	N/A	--	0.0E+00	Indeno(1,2,3-cd)pyrene	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Napthalene	--	N/A	--	0.0E+00	Napthalene	Respiratory	--	9.5E-09	--	9.5E-09
			(Total)	0.0E+00	3.8E-10	0.0E+00	3.8E-10	(Total)		0.0E+00	4.8E-05	0.0E+00	4.8E-05
						Total Risk Across Soil*	1.9E-05					Total Risk Across Soil*	6.1E-02
						Total Risk Across All Media and All Exposure Routes	1.9E-05					Total Hazard Index Across All Media and All Exposure Routes	8.2E-02

* surface and subsurface combined

Total Vascular HI =	5.9E-03
Total Liver HI =	4.1E-02
Total Neural HI =	5.0E-03
Total Blood HI =	4.8E-02
Total Skin HI =	5.9E-03
Total Kidney HI =	6.3E-05
Total NOAEL HI =	7.3E-04
Total Repiratory HI =	2.1E-06
Total Whole Body HI =	6.8E-05
Total Gastrointestinal HI =	2.7E-02
Total Immune System HI =	9.

TAE CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	2.8E-08	--	5.9E-08	8.7E-08						
			Aroclor-1260	2.6E-08	--	5.5E-08	8.1E-08						
			Arsenic	9.2E-08	--	9.9E-08	1.9E-07						
			Benzo(a)anthracene	5.1E-07	--	N/A	5.1E-07						
			Benzo(a)pyrene	6.5E-06	--	N/A	6.5E-06						
			Benzo(b)fluoranthene	1.1E-06	--	N/A	1.1E-06						
			Benzo(g,h,i)perylene	N/A	--	N/A	0.0E+00						
			Benzo(k)fluoranthene	3.6E-08	--	N/A	3.6E-08						
			Carbazole	1.2E-09	--	N/A	1.2E-09						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	7.5E-06	--	N/A	7.5E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	7.3E-09	--	4.7E-08	5.4E-08						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	3.6E-07	--	N/A	3.6E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	1.6E-05	0.0E+00	2.6E-07	1.6E-05						
			Total Risk Across Surface Soil				1.6E-05						
			Total Risk Across All Media and All Exposure Routes				1.6E-05						

TABLE 9.12.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	5.9E-09	--	7.9E-09	1.4E-08						
			Aroclor-1260	5.5E-09	--	7.4E-09	1.3E-08						
			Arsenic	2.0E-08	--	1.3E-08	3.3E-08						
			Benzo(a)anthracene	1.1E-07	--	N/A	1.1E-07						
			Benzo(a)pyrene	1.4E-06	--	N/A	1.4E-06						
			Benzo(b)fluoranthene	2.3E-07	--	N/A	2.3E-07						
			Benzo(k)fluoranthene	4.7E-08	--	N/A	4.7E-08						
			Carbazole	2.6E-10	--	N/A	2.6E-10						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	1.6E-06	--	N/A	1.6E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	1.6E-09	--	6.3E-09	7.9E-09						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	7.6E-08	--	N/A	7.6E-08						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	3.5E-06	0.0E+00	3.5E-08	3.5E-06						
			Total Risk Across Surface Soil				3.5E-06						
			Total Risk Across All Media and All Exposure Routes				3.5E-06						

TABL .CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	8.1E-09	--	4.0E-09	1.2E-08						
			Aroclor-1260	7.5E-09	--	3.7E-09	1.1E-08						
			Arsenic	2.7E-08	--	6.7E-09	3.4E-08						
			Benzo(a)anthracene	1.5E-07	--	N/A	1.5E-07						
			Benzo(a)pyrene	1.9E-06	--	N/A	1.9E-06						
			Benzo(b)fluoranthene	3.2E-07	--	N/A	3.2E-07						
			Benzo(k)fluoranthene	1.0E-08	--	N/A	1.0E-08						
			Carbazole	3.6E-10	--	N/A	3.6E-10						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	2.2E-06	--	N/A	2.2E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	2.2E-09	--	3.2E-09	5.4E-09						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	1.0E-07	--	N/A	1.0E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	4.7E-06	0.0E+00	1.8E-08	4.8E-06						
			Total Risk Across Surface Soil				4.8E-06						
			Total Risk Across All Media and All Exposure Routes				4.8E-06						

TABLE 9.14.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Aluminum	CNS	7.5E-03	--	6.7E-05	7.6E-03
								Arsenic	Skin/vascular	8.4E-01	--	2.1E-03	8.4E-01
								Benzene	Blood/Immune System	1.5E+01	--	2.4E+00	1.7E+01
								Carbon disulfide	Fetus	2.5E-02	--	5.8E-03	3.1E-02
								Chloroform	Liver	3.6E-01	--	4.5E-02	4.0E-01
								Ethylbenzene	Liver/Kidney	3.1E-02	--	3.5E-02	6.6E-02
								Iron	Gastrointestinal/Blood/ Liver	6.6E-01	--	8.0E-03	6.7E-01
								Manganese	CNS	3.1E-01	--	2.2E-03	3.2E-01
								Methylene chloride	Liver	4.6E-02	--	2.1E-03	4.8E-02
								Naphthalene	Whole Body	1.8E-02	--	3.0E-02	4.8E-02
								Tetrachloroethene	Liver/Whole body	6.5E-03	--	1.0E-02	1.7E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.7E+01	0.0E+00	2.5E+00	2.0E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					2.0E+01
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			Aluminum	--	N/A	--	0.0E+00	Aluminum	N/A	--	NA	--	0.0E+00
			Arsenic	--	N/A	--	0.0E+00	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	4.2E-04	--	4.2E-04	Benzene	Blood	--	6.6E+01	--	6.6E+01
			Carbon disulfide	--	N/A	--	0.0E+00	Carbon disulfide	CNS	--	4.0E-02	--	4.0E-02
			Chloroform	--	7.0E-05	--	7.0E-05	Chloroform	Liver	--	7.8E+01	--	7.8E+01
			Ethylbenzene	--	N/A	--	0.0E+00	Ethylbenzene	Development	--	2.7E-02	--	2.7E-02
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Manganese	--	N/A	--	0.0E+00	Manganese	N/A	--	N/A	--	0.0E+00
			Methylene chloride	--	1.0E-06	--	1.0E-06	Methylene chloride	Liver	--	5.7E-03	--	5.7E-03
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	1.2E+00	--	1.2E 0
			Tetrachloroethene	--	3.9E-08	--	3.9E-08	Tetrachloroethene	Liver/Whole Body	--	1.1E-03	--	1.1E-03
			(Total)	0.0E+00	4.9E-04	0.0E+00	4.9E-04	(Total)		0.0E+00	1.5E+02	0.0E+00	1.5E+02
			Total Risk Across Vapors at Showerhead				4.9E-04	Total Hazard Index Across Vapors at Showerhead					1.5E+02
	All Media		Total Risk Across Groundwater				4.9E-04	Total Hazard Index Across Groundwater					1.6E+02
			Total Risk Across All Media and All Exposure Routes				4.9E-04	Total Hazard Index Across All Media and All Exposure Routes					1.6E+02

* surface and subsurface combined

Total Vascular HI =	8.4E-01
Total Kidney HI =	6.6E-02
Total Neural HI =	3.6E-01
Total Skin HI =	8.4E-01
Total Fetus HI =	3.1E-02
Total Body HI =	6.4E-02
Total Development HI =	2.7E-02
Total Blood HI =	8.4E+01
Total Respiratory HI =	1.2E+00
Total Liver HI =	8.0E+01
Total Gastrointestinal HI =	6.7E-01

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Aluminum	CNS	2.5E-02	--	2.1E-04	2.5E-02
								Arsenic	Skin/vascular	2.8E+00	--	6.7E-03	2.8E+00
								Benzene	Blood	4.9E+01	--	5.8E+00	5.5E+01
								Carbon disulfide	Fetus	8.3E-02	--	1.4E-02	9.7E-02
								Chloroform	Liver	1.2E+00	--	9.5E-02	1.3E+00
								Ethylbenzene	Liver/Kidney	1.0E-01	--	7.4E-02	1.8E-01
								Iron	Gastrointestinal/ Blood/Liver	2.2E+00	--	2.5E-02	2.2E+00
								Manganese	CNS	1.0E+00	--	6.9E-03	1.1E+00
								Methylene chloride	Liver	1.5E-01	--	5.2E-03	1.6E-01
								Naphthalene	Whole Body	6.0E-02	--	6.1E-02	1.2E-01
								Tetrachloroethene	Liver/Whole Body	2.2E-02	--	2.0E-02	4.2E-02
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		5.7E+01	0.0E+00	6.1E+00	6.3E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					6.3E+01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					6.3E+01
Soil*	Soil*	Direct Contact						Acenaphthene	NOAEL	4.3E-03	--	1.4E-03	5.8E-03
								Aluminum	CNS	6.2E-02	--	5.3E-03	6.7E-02
								Aroclor-1254	Immune System	9.6E-02	--	1.5E-02	1.1E-01
								Aroclor-1260	N/A	N/A	--	N/A	0.0E+00
								Arsenic	Skin/vascular	2.8E-02	--	2.2E-03	3.1E-02
								Benzo(a)anthracene	N/A	N/A	--	N/A	0.0E+00
								Benzo(a)pyrene	N/A	N/A	--	N/A	0.0E+00
								Benzo(b)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Benzo(k)fluoranthene	N/A	N/A	--	N/A	0.0E+00
								Carbazole	N/A	N/A	--	N/A	0.0E+00
								Chromium	Liver	2.8E-02	--	6.4E-02	9.2E-02
								Dibenz(a,h)anthracene	N/A	N/A	--	N/A	0.0E+00
								Dibenzofuran	Kidney	8.9E-04	--	2.9E-05	9.2E-04
								Dieldrin	Liver	1.3E-03	--	5.9E-04	1.9E-03
								Fluorene	Blood	1.7E-01	--	5.5E-02	2.2E-01
								Indeno(1,2,3-cd)pyrene	N/A	N/A	--	N/A	0.0E+00
								Iron	Gastrointestinal/ Blood/Liver	1.1E-01	--	1.2E-02	1.2E-01
								Napthalene	Whole Body	5.8E-04	--	1.7E-04	7.4E-04
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		4.9E-01	0.0E+00	1.6E-01	6.5E-01
			Total Risk Across Soil*				0.0E+00	Total Risk Across Soil*					6.5E-01

TABLE 9.15.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Total Risk Across All Media and All Exposure Routes							0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					6.4E+01

* surface and subsurface combined

Total Vascular HI =	2.8E+00
Total Kidney HI =	1.8E-01
Total Body HI =	1.6E-01
Total Neural HI =	1.1E+00
Total Blood HI =	5.7E+01
Total Skin HI =	2.8E+00
Total Fetus HI =	9.7E-02
Total NOAEL HI =	7.6E-03
Total Immune System HI =	1.1E-01
Total Gastrointestinal HI =	2.3E+00
Total Liver HI =	4.1E+00

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	Aluminum	N/A	--	N/A	0.0E+00						
			Arsenic	1.6E-04	--	3.9E-07	1.6E-04						
			Benzene	1.0E-03	--	1.3E-04	1.1E-03						
			Carbon disulfide	N/A	--	N/A	0.0E+00						
			Chloroform	9.0E 06	--	8.4E-07	9.9E-06						
			Ethylbenzene	N/A	--	N/A	0.0E+00						
			Iron	N/A	--	N/A	0.0E+00						
			Manganese	N/A	--	N/A	0.0E+00						
			Methylene chloride	8.6E-06	--	3.2E-07	8.9E-06						
			Naphthalene	N/A	--	N/A	0.0E+00						
			Tetrachloroethene	1.4E-06	--	1.6E-06	3.0E-06						
			(Total)	1.2E-03	0.0E+00	1.4E-04	1.3E-03	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Tap water				1.3E-03	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				1.3E-03	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	3.8E-07	--	1.2E-07	5.1E-07						
			Aroclor-1260	3.6E-07	--	1.1E-07	4.7E-07						
			Arsenic	1.3E-06	--	2.0E-07	1.5E-06						
			Benzo(a)anthracene	7.1E-06	--	N/A	7.1E-06						
			Benzo(a)pyrene	9.0E-05	--	N/A	9.0E-05						
			Benzo(b)fluoranthene	1.5E-05	--	N/A	1.5E-05						
			Benzo(k)fluoranthene	3.1E-06	--	N/A	3.1E-06						
			Carbazole	1.7E-08	--	N/A	1.7E-08						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	1.0E-04	--	N/A	1.0E-04						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	1.0E-07	--	9.7E-08	2.0E-07						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	5.0E-06	--	N/A	5.0E-06						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	2.3E-04	0.0E+00	5.4E-07	2.3E-04	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil*				2.3E-04	Total Risk Across Soil*					0.0E+00

TABLE 9.16.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	*Inhalation*	*Dermal* Absorption	*Exposure* Routes Total		*Primary* Target Organ	*Ingestion*	*Inhalation*	*Dermal* Absorption	*Exposure* Routes Total
			Total Risk Across All Media and All Exposure Routes				1.5E-03	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit											
			Aluminum	--	--	N/A	0.0E+00						
			Arsenic	--	--	1.5E-07	1.5E-07						
			Benzene	--	--	1.1E-05	1.1E-05						
			Carbon disulfide	--	--	N/A	0.0E+00						
			Chloroform	--	--	8.4E-08	8.4E-08						
			Ethylbenzene	--	--	N/A	0.0E+00						
			Iron	--	--	N/A	0.0E+00						
			Manganese	--	--	N/A	0.0E+00						
			Methylene chloride	--	--	4.9E-08	4.9E-08						
			Naphthalene	--	--	N/A	0.0E+00						
			Tetrachloroethene	--	--	7.0E-08	7.0E-08						
			(Total)	0.0E+00	0.0E+00	1.1E-05	1.1E-05						
			Total Risk Across Water in Pit				1.1E-05						
Groundwater	Air	Columbia Aquifer-Volatilization from Water in Excavation Pit											
								Aluminum	N/A	--	N/A	--	0.0E+00
								Arsenic	N/A	--	NA	--	0.0E+00
								Benzene	Blood	--	9.3E-03	--	9.3E-03
								Carbon disulfide	CNS	--	4.5E-06	--	4.5E-06
								Chloroform	Liver	--	1.3E-02	--	1.3E-02
								Ethylbenzene	Development	--	3.6E-06	--	3.6E-06
								Iron	N/A	--	N/A	--	0.0E+00
								Manganese	N/A	--	N/A	--	0.0E+00
								Methylene chloride	Liver	--	1.1E-06	--	1.1E-06
								Naphthalene	Respiratory	--	1.3E-04	--	1.3E-04
								Tetrachloroethene	Liver/Whole Body	--	1.4E-07	--	1.4E-07
								(Total)		--	2.3E-02	--	2.3E-02
								Total Risk Across Volitilizaton from Pit					2.3E-02
	All Media		Total Risk Across Groundwater				1.1E-05	Total Hazard Index Across Groundwater					2.3E-02

TABLE 9.17.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil	Direct Contact											
			Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	5.3E-08	--	9.1E-09	6.2E-08						
			Aroclor-1260	4.9E-08	--	8.5E-09	5.8E-08						
			Arsenic	1.8E-07	--	1.5E-08	1.9E-07						
			Benzo(a)anthracene	9.8E-07	--	N/A	9.8E-07						
			Benzo(a)pyrene	1.2E-05	--	N/A	1.2E-05						
			Benzo(b)fluoranthene	2.1E-06	--	N/A	2.1E-06						
			Benzo(k)fluoranthene	4.2E-07	--	N/A	4.2E-07						
			Carbazole	2.4E-09	--	N/A	2.4E-09						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	1.4E-05	--	N/A	1.4E-05						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	1.4E-08	--	7.2E-09	2.1E-08						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	6.9E-07	--	N/A	6.9E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	3.1E-05	0.0E+00	4.0E-08	3.1E-05						
			Total Risk Across Soil*				3.1E-05						
			Total Risk Across All Media and All Exposure Routes				4.3E-05	Total Hazard Index Across All Media and All Exposure Routes					

* surface and subsurface combined

Total Liver HI =	1.3E-02
Total Blood HI =	9.3E-03
Total Neural HI =	4.5E-06
Total Development HI =	3.6E-06
Total Respiratory HI =	1.3E-04
Total Body HI =	1.4E-07

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact	Acenapthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	2.8E-08	--	5.9E-08	8.7E-08						
			Aroclor-1260	2.6E-08	--	5.5E-08	8.1E-08						
			Arsenic	9.2E-08	--	9.9E-08	1.9E-07						
			Benzo(a)anthracene	5.1E-07	--	N/A	5.1E-07						
			Benzo(a)pyrene	6.5E-06	--	N/A	6.5E-06						
			Benzo(b)fluoranthene	1.1E-06	--	N/A	1.1E-06						
			Benzo(k)fluoranthene	2.2E-07	--	N/A	2.2E-07						
			Carbazole	1.2E-09	--	N/A	1.2E-09						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	7.5E-06	--	N/A	7.5E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	7.3E-09	--	4.7E-08	5.4E-08						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	3.6E-07	--	N/A	3.6E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	1.6E-05	0.0E+00	2.6E-07	1.7E-05						
						Total Risk Across Soil*	1.7E-05						
						Total Risk Across All Media and All Exposure Routes	1.7E-05						

* surface and subsurface combined

TABLE 9.19.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	5.9E-09	--	7.9E-09	1.4E-08						
			Aroclor-1260	5.5E-09	--	7.4E-09	1.3E-08						
			Arsenic	2.0E-08	--	1.3E-08	3.3E-08						
			Benzo(a)anthracene	1.1E-07	--	N/A	1.1E-07						
			Benzo(a)pyrene	1.4E-06	--	N/A	1.4E-06						
			Benzo(b)fluoranthene	2.3E-07	--	N/A	2.3E-07						
			Benzo(k)fluoranthene	4.7E-08	--	N/A	4.7E-08						
			Carbazole	2.6E-10	--	N/A	2.6E-10						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	1.6E-06	--	N/A	1.6E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	1.6E-09	--	6.3E-09	7.9E-09						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	7.6E-08	--	N/A	7.6E-08						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	3.5E-06	0.0E+00	3.5E-08	3.5E-06						
			Total Risk Across Soil*				3.5E-06						
			Total Risk Across All Media and All Exposure Routes				3.5E-06						

* surface and subsurface combined

TA\ 20.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil	Direct Contact	Acenaphthene	N/A	--	N/A	0.0E+00						
			Aluminum	N/A	--	N/A	0.0E+00						
			Aroclor-1254	8.1E-09	--	6.0E-09	1.4E-08						
			Aroclor-1260	7.5E-09	--	5.6E-09	1.3E-08						
			Arsenic	2.7E-08	--	1.0E-08	3.7E-08						
			Benzo(a)anthracene	1.5E-07	--	N/A	1.5E-07						
			Benzo(a)pyrene	1.9E-06	--	N/A	1.9E-06						
			Benzo(b)fluoranthene	3.2E-07	--	N/A	3.2E-07						
			Benzo(k)fluoranthene	6.5E-08	--	N/A	6.5E-08						
			Carbazole	3.6E-10	--	N/A	3.6E-10						
			Chromium	N/A	--	N/A	0.0E+00						
			Dibenz(a,h)anthracene	2.2E-06	--	N/A	2.2E-06						
			Dibenzofuran	N/A	--	N/A	0.0E+00						
			Dieldrin	2.2E-09	--	4.7E-09	6.9E-09						
			Fluorene	N/A	--	N/A	0.0E+00						
			Indeno(1,2,3-cd)pyrene	1.0E-07	--	N/A	1.0E-07						
			Iron	N/A	--	N/A	0.0E+00						
			Napthalene	N/A	--	N/A	0.0E+00						
			(Total)	4.8E-06	0.0E+00	2.6E-08	4.8E-06						
						Total Risk Across Soil*	4.8E-06						
						Total Risk Across All Media and All Exposure Routes	4.8E-06						

* surface and subsurface combined

TABLE 10.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact											
			Arsenic	1.0E-06	--	6.6E-07	1.7E-06						
			Benzo(a)anthracene	5.9E-06	--	N/A	5.9E-06						
			Benzo(a)pyrene	7.4E-05	--	N/A	7.4E-05						
			Benzo(b)fluoranthene	1.2E-05	--	N/A	1.2E-05						
			Dibenz(a,h)anthracene	8.6E-05	--	N/A	8.6E-05						
			Indeno(1,2,3-cd)pyrene	4.1E-06	--	N/A	4.1E-06						
			(Total)	1.8E-04	0.0E+00	6.6E-07	1.8E-04						
			Total Risk Across Surface Soil				1.8E-04		Total Risk Across Surface Soil				0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.8E-04		Total Risk Across All Media and All Exposure Routes				0.0E+00

TAB 2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact											
			Benzo(a)anthracene	1.2E-06	--	N/A	1.2E-06						
			Benzo(a)pyrene	1.5E-05	--	N/A	1.5E-05						
			Benzo(b)fluoranthene	2.5E-06	--	N/A	2.5E-06						
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05						
			(Total)	3.6E-05	0.0E+00	0.0E+00	3.6E-05						
			Total Risk Across Surface Soil				3.6E-05	Total Risk Across Surface Soil					0.0E+00
			Total Risk Across All Media and All Exposure Routes				3.6E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

TABLE 10.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact	Benzo(a)pyrene	7.6E-06	--	N/A	7.6E-06						
			Benzo(b)fluoranthene	1.3E-06	--	N/A	1.3E-06						
			Dibenz(a,h)anthracene	8.8E-06	--	N/A	8.8E-06						
			(Total)	1.8E-05	0.0E+00	0.0E+00	1.8E-05	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Surface Soil				1.8E-05	Total Risk Across Surface Soil					0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.8E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

TABLE 1E

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic	Skin	1.8E+00	--	3.8E-03	1.8E+00
								Chloroform	Liver	7.6E-01	--	7.8E-02	8.4E-01
								Iron	Gastrointestinal	1.4E+00	--	1.4E-02	1.4E+00
								Manganese	CNS	6.7E-01	--	3.8E-03	6.7E-01
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		4.6E+00	0	1.0E-01	4.7E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					4.7E+00
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			Benzene	--	1.6E-03	--	1.6E-03	Chloroform	Liver	--	1.2E+02	--	1.2E+02
			Chloroform	--	2.8E-04	--	2.8E-04	Naphthalene	Respiratory	--	1.7E+00	--	1.7E+00
			Methylene chloride	--	4.2E-06	--	4.2E-06						
			(Total)	0	1.9E-03	0	1.9E-03	(Total)		0	1.2E+02	0	1.2E+02
			Total Risk Across Vapors at Showerhead				1.9E-03	Total Hazard Index Across Vapors at Showerhead					1.2E+02
	All Media		Total Risk Across Groundwater				1.9E-03	Total Hazard Index Across Groundwater					1.2E+02
			Total Risk Across All Media and All Exposure Routes				1.9E-03	Total Hazard Index Across All Media and All Exposure Routes					1.2E+02

* surface and subsurface combined

Total Neural HI =	6.7E-01
Total Skin HI =	1.8E+00
Total Gastrointestinal HI =	1.4E+00
Total Respiratory HI =	1.7E+00
Total Liver HI =	1.2E+02

TABLE 10.5.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic	Skin	4.2E+00	--	1.2E-02	4.2E+00
								Chloroform	Liver	1.8E+00	--	1.6E-01	1.9E+00
								Iron	Gastrointestinal	3.3E+00	--	4.3E-02	3.3E+00
								Manganese	CNS	1.6E+00	--	1.2E-02	1.6E+00
								(Total)		1.1E+01	0	2.3E-01	1.1E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					1.1E+01
			Total Risk Across Groundwater				0.0E+00		Total Hazard Index Across Groundwater				1.1E+01
Soil*	Soil*	Direct Contact						Aluminum	CNS	1.8E-01	--	8.9E-03	1.9E-01
								Aroclor-1254	Immune System	2.9E-01	--	2.5E-02	3.1E-01
								Arsenic	Skin	8.5E-02	--	3.8E-03	8.9E-02
								Fluorene	Blood	5.0E-01	--	9.3E-02	5.9E-01
								Iron	Gastrointestinal	3.2E-01	--	2.1E-02	3.4E-01
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.4E+00	0.0E+00	1.5E-01	1.5E+00
			Total Risk Across Soil*				0.0E+00	Total Risk Across Soil*					1.5E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					1.3E+01

* surface and subsurface combined

Total Neural HI =	1.8E+00
Total Blood HI =	5.9E-01
Total Skin HI =	4.3E+00
Total Immune System HI =	3.1E-01
Total Gastrointestinal HI =	3.7E+00
Total Liver HI =	1.9E+00

TABL ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
			Arsenic	4.4E-04	--	1.0E-06	4.4E-04						
			Benzene	1.5E-03	--	2.0E-04	1.7E-03						
			Chloroform	2.5E-05	--	2.5E-06	2.8E-05						
			Methylene chloride	2.4E-05	--	9.1E-07	2.5E-05						
			(Total)	2.0E-03	0	2.0E-04	2.2E-03	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				2.2E-03	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				2.2E-03	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact											
			Benzo(a)anthracene	2.6E-05	--	N/A	2.6E-05						
			Benzo(a)pyrene	3.3E-04	--	N/A	3.3E-04						
			Benzo(b)fluoranthene	5.5E-05	--	N/A	5.5E-05						
			Benzo(k)fluoranthene	1.1E-05	--	N/A	1.1E-05						
			Dibenz(a,h)anthracene	3.9E-04	--	N/A	3.9E-04						
			Indeno(1,2,3-cd)pyrene	1.8E-05	--	N/A	1.8E-05						
			(Total)	8.0E-04	0.0E+00	0.0E+00	8.3E-04	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil*				8.3E-04	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				3.0E-03	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABLE 10.7.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit	Benzene	--	--	1.5E-05	1.5E-05						
			(Total)	0.0E+00	--	1.5E-05	1.5E-05						
			Total Risk Across Water in Pit				1.5E-05	Total Hazard Index Across Water in Pit					0.0E+00
Groundwater	Air	Columbia Aquifer-Water Vapors in Excavation Pit						Chloroform	Liver	--	1.1E+01	--	1.1E+01
			(Total)	--	0.0E+00	--	0.0E+00	(Total)		--	1.1E+01	--	1.1E+01
			Total Risk Across Volitilization from Pit				0.0E+00	Total Risk Across Volitilization from Pit					1.1E+01
	All Media		Total Risk Across Groundwater				1.5E-05		Total Hazard Index Across Groundwater				1.1E+01
Soil*	Soil*	Direct Contact	Benzo(a)anthracene	1.1E-06	--	N/A	1.1E-06						
			Benzo(a)pyrene	1.4E-05	--	N/A	1.4E-05						
			Benzo(b)fluoranthene	2.4E-06	--	N/A	2.4E-06						
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05						
			(Total)	3.4E-05	0.0E+00	0.0E+00	3.4E-05						
			Total Risk Across Soil*				3.4E-05	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				4.9E-05	Total Hazard Index Across All Media and All Exposure Routes					1.1E+01

* surface and subsurface combined

TABL[illegible]RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact											
			Arsenic	1.0E-06	--	6.6E-07	1.7E-06						
			Benzo(a)anthracene	5.9E-06	--	N/A	5.9E-06						
			Benzo(a)pyrene	7.4E-05	--	N/A	7.4E-05						
			Benzo(b)fluoranthene	1.2E-05	--	N/A	1.2E-05						
			Benzo(k)fluoranthene	2.5E-06	--	N/A	2.5E-06						
			Dibenz(a,h)anthracene	8.6E-05	--	N/A	8.6E-05						
			Indeno(1,2,3-cd)pyrene	4.1E-06	--	N/A	4.1E-06						
			(Total)	1.9E-04	0.0E+00	6.6E-07	1.9E-04						
						Total Risk Across Soil*	1.9E-04					Total Risk Across Soil*	0.0E+00
						Total Risk Across All Media and All Exposure Routes	1.9E-04					Total Hazard Index Across All Media and All Exposure Routes	0.0E+00

* surface and subsurface combined

TABLE 10.9 RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Sediment	Sediment	Pond											
			Arsenic	3.5E-07	--	2.3E-07	5.8E-07						
			(Total)	3.5E-07	0.0E+00	2.3E-07	5.8E-07						
			Total Risk Across Sediment				5.8E-07	Total Risk Across Sediment					0.0E+00
Soil*	Soil*	Direct Contact											
			Benzo(a)anthracene	1.2E-06	--	N/A	1.2E-06						
			Benzo(a)pyrene	1.5E-05	--	N/A	1.5E-05						
			Benzo(b)fluoranthene	2.5E-06	--	N/A	2.5E-06						
			Dibenz(a,h)anthracene	1.7E-05	--	N/A	1.7E-05						
			(Total)	3.6E-05	0.0E+00	0.0E+00	3.6E-05						
			Total Risk Across Soil*				3.6E-05	Total Risk Across Soil*					0.0E+00
Total Risk Across All Media and All Exposure Routes							3.6E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABL[illegible] RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact											
			Benzo(a)pyrene	7.60E-06	--	N/A	7.60E-06						
			Benzo(b)fluoranthene	1.27E-06	--	N/A	1.27E-06						
			Dibenz(a,h)anthracene	8.85E-06	--	N/A	8.85E-06						
			(Total)	1.8E-05	0.0E+00	0.0E+00	1.8E-05						
			Total Risk Across Soil*				1.8E-05	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.8E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABLE 10.11.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Current
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Surface Soil	Surface Soil	Direct Contact											
			Benzo(a)pyrene	6.5E-06	--	N/A	6.5E-06						
			Benzo(b)fluoranthene	1.1E-06	--	N/A	1.1E-06						
			Dibenz(a,h)anthracene	7.5E-06	--	N/A	7.5E-06						
			(Total)	1.5E-05	0.0E+00	0.0E+00	1.5E-05						
			Total Risk Across Surface Soil				1.5E-05	Total Risk Across Surface Soil					0.0E+00
Total Risk Across All Media and All Exposure Routes							1.5E-05	Total Risk Across All Media and All Exposure Routes					0.0E+00

TAB 2.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic	Skin	8.4E-01	--	2.1E-03	8.4E-01
								Chloroform	Liver	3.6E-01	--	4.5E-02	4.0E-01
								Iron	Gastrointestinal	6.6E-01	--	8.0E-03	6.7E-01
								Manganese	CNS	3.1E-01	--	2.2E-03	3.2E-01
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		2.2E+00	0	5.7E-02	2.2E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					2.2E+00
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			Benzene	--	3.9E-04	--	3.9E-04	Chloroform	Liver	--	7.8E+01	--	7.8E+01
			Chloroform	--	7.0E-05	--	7.0E-05	Naphthalene	Respiratory	--	1.2E+00	--	1.2E+00
			(Total)	0	4.6E-04	0	4.6E-04	(Total)		0	7.9E+01	0	7.9E+01
			Total Risk Across Vapors at Showerhead				4.6E-04	Total Hazard Index Across Vapors at Showerhead					7.9E+01
	All Media		Total Risk Across Groundwater				4.6E-04		Total Hazard Index Across Groundwater				8.2E+01
			Total Risk Across All Media and All Exposure Routes				4.6E-04	Total Hazard Index Across All Media and All Exposure Routes					8.2E+01

* surface and subsurface combined

Total Neural HI =	3.2E-01
Total Skin HI =	8.4E-01
Total Gastrointestinal HI =	6.7E-01
Total Respiratory HI =	1.2E+00
Total Liver HI =	7.8E+01

TABLE 10.13.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic	Skin	2.8E+00	--	6.8E-03	2.8E+00
								Chloroform	Liver	1.2E+00	--	9.5E-02	1.3E+00
								Iron	Gastrointestinal	2.2E+00	--	2.5E-02	2.2E+00
								Manganese	CNS	1.0E+00	--	6.9E-03	1.1E+00
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		7.2E+00	0	1.3E-01	7.4E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					7.4E+00
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					7.4E+00
Soil*	Soil*	Direct Contact						Aroclor-1254	Immune System	9.6E-02	--	1.5E-02	1.1E-01
								Fluorene	Blood	1.7E-01	--	5.5E-02	2.2E-01
								Iron	Gastrointestinal	1.1E-01	--	1.2E-02	1.2E-01
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		3.7E-01	0.0E+00	8.2E-02	4.5E-01
			Total Risk Across Soil*				0.0E+00	Total Risk Across Soil*					4.5E-01
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					7.8E+00

* surface and subsurface combined

Total Neural HI =	1.1E+00
Total Blood HI =	2.2E-01
Total Skin HI =	2.8E+00
Total Immune System HI =	1.1E-01
Total Gastrointestinal HI =	2.3E+00
Total Liver HI =	1.3E+00

TABLE .CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
			Arsenic	1.6E-04	--	3.8E-07	1.6E-04						
			Benzene	5.3E-04	--	6.9E-05	6.0E-04						
			(Total)	6.9E-04	0	7.0E-05	7.6E-04	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				7.6E-04	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				7.6E-04	Total Hazard Index Across Groundwater					0.0E+00
Soil*	Soil*	Direct Contact											
			Benzo(a)pyrene	9.0E-05	--	N/A	9.0E-05						
			Benzo(b)fluoranthene	1.5E-05	--	N/A	1.5E-05						
			Dibenz(a,h)anthracene	1.0E-04	--	N/A	1.0E-04						
			(Total)	1.2E-04	0.0E+00	0.0E+00	2.1E-04	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil*				2.1E-04	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				9.7E-04	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

TABLE 10.15.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit	Benzene	--	--	1.1E-05	1.1E-05						
			(Total)	0.0E+00	--	1.1E-05	1.1E-05						
			Total Risk Across Water in Pit				1.1E-05	Total Hazard Index Across Water in Pit					0.0E+00
Groundwater	Groundwater	Columbia Aquifer-Water Vapors in Excavation Pit						Chloroform	Liver	--	2.9E+00	--	2.9E+00
								(Total)		--	2.9E+00	--	2.9E+00
			Total Risk from volatilization of Water in Pit				0.0E+00	Total Risk from volatilization of Water in Pit					2.9E+00
	All Media		Total Risk Across Groundwater				1.1E-05		Total Hazard Index Across Groundwater				2.9E+00
Soil*	Soil*	Direct Contact	Benzo(a)pyrene	1.2E-05	--	N/A	1.2E-05						
			Benzo(b)fluoranthene	2.1E-06	--	N/A	2.1E-06						
			Dibenz(a,h)anthracene	1.4E-05	--	N/A	1.4E-05						
			(Total)	2.9E-05	0.0E+00	0.0E+00	2.9E-05						
			Total Risk Across Soil*				2.9E-05	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				4.0E-05	Total Hazard Index Across All Media and All Exposure Routes					2.9E+00

* surface and subsurface combined

Total Liver HI = 2.9E+00

TABL 6.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 15

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Soil*	Soil*	Direct Contact											
			Benzo(a)pyrene	6.5E-06	--	N/A	6.5E-06						
			Benzo(b)fluoranthene	1.1E-06	--	N/A	1.1E-06						
			Dibenz(a,h)anthracene	7.5E-06	--	N/A	7.5E-06						
			(Total)	1.5E-05	0.0E+00	0.0E+00	1.5E-05						
			Total Risk Across Soil*				1.5E-05	Total Risk Across Soil*					0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.5E-05	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

* surface and subsurface combined

Table C-1-1
Analytical Results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW01-R01	OW24-MW02-R01	OW24-MW02P-R01	OW24-MW03-R01	OW24-MW04-R01	OW24-MW05-R01	OW24-MW06-R01	OW24-MW07-R01
Chemical Name								
V[illegible]rganic Compounds (UG/L)								
1,1,[illegible]chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	2.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	NS	5 U	5 U	5 U	5 U	NS	NS	NS
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	2	1 U	1 U	0.7 J	1 U	1 U	1 U	1 U
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	1 UJ	1 U	1 U	0.2 J	1.6 B	1 U	1 U	1 U
Carbon tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	7.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	2 U	0.5 B	0.3 B	1.1 B	0.5 B	2 U	2 U	0.2 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	5.6	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	0.3 J	1 U	1 U	1 U	1 U
Xylene, total	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	59.8 J	0.2 J	0.2 J	72.6	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
tra[illegible]ichloroethene	8.8	1 U	1 U	3.8	1 U	1 U	1 U	1 U
tra[illegible]ichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semi-volatile Organic Compounds (UG/L)								
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-chloropropane)	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2,4,5-Trichlorophenol	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
2,4,6-Trichlorophenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2,4-Dichlorophenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2,4-Dimethylphenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2,4-Dinitrophenol	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
2,4-Dinitrotoluene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2,6-Dinitrotoluene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2-Chloronaphthalene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2-Chlorophenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2-Methylnaphthalene	11 J	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2-Methylphenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
2-Nitroaniline	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
2-Nitrophenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
3,3'-Dichlorobenzidine	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
3-Nitroaniline	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
4,6-Dinitro-2-methylphenol	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
4-Bromophenyl-phenylether	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
4-Chloro-3-methylphenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
4-Chloroaniline	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
4-Chlorophenyl-phenylether	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
4-Methylphenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
4-Nitroaniline	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
4-Nitrophenol	27 U	50 U	[illegible] U	28 U	28 U	27 U	27 U	27 U
Acenaphthene	0.21 U	22 U	0.22 U	0.22 U	0.22 U	0.21 U	0.22 U	0.22 U
Acenaphthylene	1 U	570	5.2	1.1 U	1.1 U	1 U	1.1 U	1.1 U
Ap[illegible]ne	1.1 J	49	0.11 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U
E[illegible]nthracene	0.01 U	1.1 U	0.016	0.011 U	0.011 U	0.003 B	0.002 B	0.011 U
Be[illegible]pyrene	0.1 U	11 U	0.11 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U
Benzo(b)fluoranthene	0.42 U	44 U	0.43 U	0.44 U	0.45 U	0.42 U	0.43 U	0.43 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low

U - Analyte not detected
UJ
UL

Table C-1-1
Analytical Results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW01-R01	OW24-MW02-R01	OW24-MW02P-R01	OW24-MW03-R01	OW24-MW04-R01	OW24-MW05-R01	OW24-MW06-R01	OW24-MW07-R01
Chemical Name								
Benzo(g,h,i)perylene	0.21 U	22 U	0.22 U	0.22 U	0.22 U	0.21 U	0.22 U	[illegible] U
Benzo(k)fluoranthene	0.84 U	88 U	0.86 U	0.87 U	0.9 U	0.84 U	0.86 U	0.86 U
Butylbenzylphthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Carbazole	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Chrysene	0.01 UJ	1.1 U	0.017	0.011 U	0.011 U	0.002 B	0.001 B	0.011 U
Di-n-butylphthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	9 J
Di-n-octyl phthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Dibenz(a,h)anthracene	0.21 U	22 U	0.22 U	0.22 U	0.22 U	0.21 U	0.22 U	0.22 U
Dibenzofuran	3 J	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Diethylphthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Dimethyl phthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Fluoranthene	14 J	110 U	1.1 U	1.1 U	1.1 U	1 U	1.1 U	1.1 U
Fluorene	0.42 U	44 U	0.39 J	0.44 U	0.45 U	0.42 U	0.43 U	0.43 U
Hexachlorobenzene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Hexachlorobutadiene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Hexachlorocyclopentadiene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Hexachloroethane	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Indeno(1,2,3-cd)pyrene	0.42 U	44 U	0.43 U	0.44 U	0.45 U	0.42 U	0.43 U	0.43 U
Isophorone	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Naphthalene	15	220 U	0.32 J	2.2 U	2.2 U	2.1 U	2.2 U	0.36 B
Nitrobenzene	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Pentachlorophenol	27 U	50 U	50 U	28 U	28 U	27 U	27 U	27 U
Phenanthrene	0.93 J	5.5 U	0.04 B	0.054 U	0.056 U	0.052 U	0.054 U	0.057 B
Phenol	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Pyrene	0.005 B	0.55 U	0.006 B	0.005 U	0.006 U	0.002 B	0.003 B	0.005 U
bis(2-Chloroethoxy)methane	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
bis(2-Chloroethyl)ether	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
bis(2-Ethylhexyl)phthalate	11 U	20 U	20 U	1 J	11 U	11 U	11 U	11 U
n-Nitroso-di-n-propylamine	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
n-Nitrosodiphenylamine	11 U	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.11 U	0.042 B	0.2 UL	0.048 B	0.11 U	0.11 U	0.11 U	0.032 J
4,4'-DDE	0.11 U	0.009 B	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.0[illegible] J
4,4'-DDT	0.11 U	0.028 B	0.2 UL	0.046 B	0.031 B	0.034 B	0.013 B	[illegible]
Aldrin	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	[illegible]
Aroclor-1016	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1221	2.1 U	4 U	4 UL	2.1 U	2.2 U	2.2 U	2.2 U	2.2 U
Aroclor-1232	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1242	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1248	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1254	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Aroclor-1260	1.1 U	2 U	2 UL	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Dieldrin	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endosulfan I	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
Endosulfan II	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endosulfan sulfate	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin aldehyde	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Endrin ketone	0.11 U	0.2 U	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Heptachlor	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
Heptachlor epoxide	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
Methoxychlor	0.53 U	1 UJ	1 UL	0.53 U	0.55 U	0.54 U	0.54 U	0.54 U
Toxaphene	5.3 U	10 U	10 UL	5.3 U	5.5 U	5.4 U	5.4 U	5.4 U
alpha-BHC	0.053 U	0.046 J	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
alpha-Chlordane	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
beta-BHC	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
delta-BHC	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
gamma-BHC (Lindane)	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
gamma-Chlordane	0.053 U	0.1 U	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
Total Metals (UG/L)								
Aluminum	291 B	5,130	2,110	1,320	2,680	1,450	392	623
Antimony	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	49.1	4.8 J	5.8 J	5.7 J	40.9	14.8 B	12.9 B	16.8
Barium	35.5 J	96 J	81.2 J	154 J	40.9 J	28.7 J	27.3 J	18.1 B
Beryllium	0.2 U	0.71 B	0.45 B	1.8 J	0.27 J	0.2 U	0.2 U	0.2 U
Cadmium	0.4 U	0.58 B	0.54 B	0.44 B	0.4 U	0.4 U	0.4 U	0.4 U
Calcium	32,900	38,200	38,700	14,300	5,310	7,750	6,580	7[illegible]
Chromium	2.3 J	15.1 B	12.4 B	4 B	10	4 J	1.8 J	[illegible]
Cobalt	0.6 U	3.3 J	3.2 J	6.4 J	2.4 B	1.9 B	19.5 J	2.6 B
Copper	2 B	14.1 B	10.5 B	7.1 B	6.5 B	1.8 B	1.9 B	3.8 B

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
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U - Analyte not detected
UJ
UL

Table C-1-1
Analytical Results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW01-R01	OW24-MW02-R01	OW24-MW02P-R01	OW24-MW03-R01	OW24-MW04-R01	OW24-MW05-R01	OW24-MW06-R01	OW24-MW07-R01
Chemical Name								
Cr	5 U	5 U	5 U	22.6 B	5 U	5 U	5.7 J	17.8 B
Iron	17,700	4,590	3,060	3,980	29,000	12,800	32,900	9,840
Lead	1.7 U	15.5	11.1	3.1	1.7 J	1.7 U	1.7 U	1.7 U
Magnesium	12,400	4,650 J	4,380 J	5,430	4,730 J	7,650	4,610 J	3,530 J
Manganese	514	66.6	57.3	50.1	95.8	319	538	80.1
Mercury	0.1 U	0.1 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	1.3 UL	24.6 B	31.8 B	8 J	9.6 J	2.2 L	2.4 L	7.8 B
Potassium	4,410 J	7,260	7,160	1,560 J	1,220 J	1,230 J	610 J	700 J
Selenium	1.9 U	1.9 U	1.9 U	1.9 U	3.6 B	3.4 B	1.9 U	1.9 J
Silver	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Sodium	12,100	9,980	10,700	10,200 B	11,000	10,700	12,400	7,800
Thallium	4.1 UL	5.6 B	4.1 U	4.1 U	4.1 UL	4.1 UL	4.1 UL	4.1 U
Vanadium	3.2 B	14.7 J	8.8 J	4.3 L	5.8 J	3.4 B	1.2 B	1.5 B
Zinc	22.4 B	135 B	104 B	38.3 B	20.5 B	25.9 B	30.5 B	20.9 B
Dissolved Metals (UG/L)								
Aluminum	40.8 U	51.6 B	53.8 B	323	40.8 U	40.8 U	41.7 B	99.5 B
Antimony	4.2 U	5 J	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	48.6	3 U	3 J	3 U	24.3	8.4 B	9.3 B	14.8
Barium	32.3 J	46.5 J	54.1 J	125 J	27.1 J	21.8 J	25.6 J	15.5 B
Beryllium	0.2 U	0.2 U	0.2 U	1.3 J	0.2 U	0.2 U	0.2 U	0.2 U
Cadmium	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Calcium	30,800	33,800	39,000	13,300	5,270	7,320	6,580	8,560
Chromium	1.8 J	0.71 B	1.3 B	0.7 U	4.9 J	0.7 U	0.98 J	2.2 B
Cobalt	0.6 U	1.3 J	1.6 J	5.3 J	1.5 B	1.9 B	17.4 J	2.4 B
Copper	4.5 B	22.4 B	32.3 B	15.7 B	4.5 B	15.9 B	4.7 B	3.6 B
Iron	16,400	1,030	1,290	2,520	23,100	10,300	30,300	9,090
Lead	1.7 U	1.7 U	1.8 J	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	11,700	3,730 J	4,280 J	4,980 J	4,680 J	7,040	4,670 J	3,720 J
Manganese	479	42.5	48.9	47.4	91.2	270	499	90.9
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	2.4 L	10.1 B	14.8 B	8.1 J	7.9 L	1.3 UL	2.3 L	6.1 B
Potassium	4,130 J	6,500	7,380	1,430 J	762 J	1,010 J	574 J	650 J
Selenium	1.9 U	1.9 U	1.9 U	4.1 B	2.8 B	1.9 U	2.7 B	1.9 U
Silver	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Sodium	11,700	9,950	11,600	10,200 B	11,700	11,100	12,200	8,300
Thallium	4.1 UL	4.1 U	4.1 U	4.1 U	4.1 UL	4.1 UL	4.1 UL	4.1 U
Vanadium	2.5 B	1.6 J	1.5 J	0.8 UL	0.96 B	1.4 B	0.8 U	0.8 U
Zinc	15.6 B	62.2 B	72.4 B	43.5 B	17.6 B	33.3 B	19.4 B	21.8 B

NS - Not sampled
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J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low

U - Analyte not detected
UJ
UL

Table C-1-1
Analytical results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW08-R01	OW24-MW09-R01	OW24-MW10-R01	OW24-MW11-R01	OW24-MW11P-R01	OW24-MW1D-R01	OW24-PZ03D-R01	OW24-PZ03S-R01
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Hexanone	NS	NS	NS	5 U	5 U	NS	5 U	5 U
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	0.1 J	1.1
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon disulfide	1 U	0.6 J	0.4 J	1 U	1 U	1 U	1 U	1 U
Carbon tetrachloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene chloride	0.3 B	0.3 B	0.2 B	1 B	0.8 B	0.9 B	0.5 B	0.6 B
Styrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	8.8	1 U	1 U	1 U	1 U	1.9	0.6 J
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5
Xylene, total	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	2.2	1 U	1 U	1 U	0.4 J	39.1	500
cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	4.5	
trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Semi-volatile Organic Compounds (UG/L)								
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-chloropropane)	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2,4,5-Trichlorophenol	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2,4-Dichlorophenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2,4-Dimethylphenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2,4-Dinitrophenol	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
2,4-Dinitrotoluene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2,6-Dinitrotoluene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2-Chloronaphthalene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2-Chlorophenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2-Methylnaphthalene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2-Methylphenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
2-Nitroaniline	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
2-Nitrophenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
3,3'-Dichlorobenzidine	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
3-Nitroaniline	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
4,6-Dinitro-2-methylphenol	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
4-Chloroaniline	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
4-Methylphenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
4-Nitroaniline	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
4-Nitrophenol	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
Acenaphthene	0.21 U	0.21 U	0.067 K	0.2 U	0.21 U	0.22 U	0.22 U	0.77 K
Acenaphthylene	1 U	1 U	1.1 U	1 U	1 U	1.1 U	1.1 U	1.1 U
Anthracene	0.1 U	0.1 U	0.079 B	0.1 U	0.1 U	0.49	0.11 U	0.
Benzo(a)anthracene	0.01 U	0.01 U	0.011 U	0.01 U	0.01 U	0.026 B	0.011 U	0.0
Benzo(a)pyrene	0.1 U	0.1 U	0.11 U	0.1 U	0.1 U	0.11 U	0.11 U	0.11 U
Benzo(b)fluoranthene	0.42 U	0.41 U	0.45 U	0.4 U	0.42 U	0.43 U	0.44 U	0.43 U

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UJ
UL

Table C-1-1
Analytical Results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW08-R01	OW24-MW09-R01	OW24-MW10-R01	OW24-MW11-R01	OW24-MW11P-R01	OW24-MW1D-R01	OW24-PZ03D-R01	OW24-PZ03S-R01
Chemical Name								
Be[illegible]i)perylene	0.21 U	0.21 U	0.22 U	0.2 U	0.21 U	0.22 U	0.22 U	0.22 U
Benzo(k)fluoranthene	0.84 U	0.82 U	0.9 U	0.8 U	0.83 U	0.86 U	0.88 U	0.86 U
Butylbenzylphthalate	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Carbazole	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Chrysene	0.01 U	0.01 U	0.011 U	0.01 U	0.01 U	0.011 U	0.011 U	0.011 U
Di-n-butylphthalate	10 U	10 U	10 U	11 U	1 J	11 U	10 U	11 U
Di-n-octyl phthalate	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Dibenz(a,h)anthracene	0.21 U	0.21 U	0.22 U	0.2 U	0.21 U	0.22 U	0.22 U	0.22 U
Dibenzofuran	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Diethylphthalate	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Dimethyl phthalate	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Fluoranthene	1 U	1 U	0.37 K	1 U	1 U	1.1 U	1.1 U	1.1 U
Fluorene	0.42 U	0.41 U	0.16 K	0.4 U	0.42 U	0.43 U	0.44 U	1.2 K
Hexachlorobenzene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Hexachlorobutadiene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Hexachloroethane	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Indeno(1,2,3-cd)pyrene	0.42 U	0.41 U	0.45 U	0.4 U	0.42 U	0.43 U	0.44 U	0.43 U
Isophorone	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Naphthalene	2.1 U	2.1 U	0.29 B	2 U	2.1 U	2.2 U	2.2 U	1.4 K
Nitrobenzene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Pentachlorophenol	25 U	26 U	26 U	27 U	27 U	28 U	26 U	26 U
Phenanthrene	0.052 U	0.052 U	0.022 B	0.05 U	0.052 U	0.067	0.055 U	0.054 U
Phenol	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Pyrene	0.005 U	0.005 U	0.003 B	0.005 U	0.005 U	0.005 U	0.006 U	0.005 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	11 U	1 J	1 J	10 U	11 U
n-Nitroso-di-n-propylamine	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
n-Nitrosodiphenylamine	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.11 U	0.1 U	0.044 J	0.059 B	0.11 UL	0.05 B	0.023 B	0.022 L
4,4[illegible]	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
4[illegible]	0.11 U	0.1 U	0.011 B	0.013 B	0.11 UL	0.014 B	0.039 B	0.015 B
Ald[illegible]	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Aroclor-1016	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Aroclor-1221	2.1 U	2.1 U	2 U	2.1 U	2.1 UL	2.2 U	2.1 U	2 UL
Aroclor-1232	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Aroclor-1242	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Aroclor-1248	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Aroclor-1254	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Aroclor-1260	1.1 U	1 U	1 U	1.1 U	1.1 UL	1.1 U	1 U	1 UL
Dieldrin	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
Endosulfan I	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Endosulfan II	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
Endosulfan sulfate	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
Endrin	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
Endrin aldehyde	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
Endrin ketone	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.003 B	0.1 UL
Heptachlor	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Heptachlor epoxide	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Methoxychlor	0.53 U	0.52 U	0.51 U	0.53 U	0.53 UL	0.54 U	0.52 U	0.51 UL
Toxaphene	5.3 U	5.2 U	5.1 U	5.3 U	5.3 UL	5.4 U	5.2 U	5.1 UL
alpha-BHC	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
alpha-Chlordane	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
beta-BHC	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
delta-BHC	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
gamma-BHC (Lindane)	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
gamma-Chlordane	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Total Metals (UG/L)								
Aluminum	768	2,070	354	1,020	461	930	906	3,920
Antimony	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	12.4	3 U	20.3	8.1 J	8.6 J	3 U	48.4	222
Barium	35.8 J	49.4 J	28.3 B	11.8 J	9.8 J	24.1 J	38.4 J	60.7 J
Beryllium	0.5 J	0.32 J	0.2 U	0.41 J	0.4 J	0.2 U	0.25 J	0.26 J
Cadmium	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
C[illegible]	5,660	6,010	5,410	3,130 J	3,080 J	80,100	6,550	15,800
C[illegible]	1.4 B	5.6 B	1.3 B	2.6 B	1.3 B	4 B	3 B	6.2 B
Cobalt	16.8 J	2.7 B	10.5 J	0.89 J	0.79 J	0.82 J	1 J	2.1 J
Copper	3.8 B	7.3 B	3.9 B	2.8 B	2.9 B	3.6 B	6.6 B	6.8 B

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UJ
UL

Table C-1-1
Analytical Results for Constituents Sampled in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW08-R01	OW24-MW09-R01	OW24-MW10-R01	OW24-MW11-R01	OW24-MW11P-R01	OW24-MW1D-R01	OW24-PZ03D-R01	OW24-PZ03S-R01
Chemical Name								
Cyanide	46.2 B	33.6 B	43 B	56.7 B	17.8 B	27.7 B	23.9 B	[illegible] B
Iron	7,610	8,760	15,600	4,470	4,170	3,910	20,800	77,700
Lead	2.1 J	3.8	1.7 U	1.7 U	1.7 U	1.7 U	2.5 J	5.3
Magnesium	3,150 J	5,180	4,270 J	2,860 J	2,790 J	10,300	4,590 J	6,100
Manganese	71.2	143	763	59.2	57.4	219	91.1	80
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	18.9 B	6.6 B	3 B	4.7 J	2.4 J	2.9 J	3.5 J	5.4 B
Potassium	930 J	1,310 J	1,090 J	849 J	710 B	3,540 J	2,080 J	1,400 J
Selenium	1.9 U	1.9 U	1.9 U	1.9 U	2 B	2.7 B	4.8 B	5.3 B
Silver	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
Sodium	3,920 J	9,700	6,890	5,150 B	5,110 B	25,300	10,200 B	9,240 B
Thallium	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Vanadium	2.8 B	10.7 J	2.2 B	1.6 L	0.84 L	3.6 L	6.2 L	8.2 L
Zinc	38.4 B	32 B	23 B	23.1 B	26.4 B	18.5 B	43 B	20.2 B
Dissolved Metals (UG/L)								
Aluminum	119 B	61.8 B	100 B	229 B	252 B	40.8 U	50.7 B	40.8 U
Antimony	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	3 U	3 U	20.2	4.8 J	8.4 J	3 U	22.4	224
Barium	27.6 J	16.2 B	24.4 J	10.3 J	10 J	19.8 J	25.3 J	37.2 J
Beryllium	0.3 J	0.2 U	0.2 U	0.34 J	0.39 J	0.2 U	0.2 U	0.2 U
Cadmium	0.4 U	0.4 U	0.4 U	0.4 U	0.51 B	0.4 U	0.4 U	0.4 U
Calcium	5,230	5,830	5,330	3,450 J	3,430 J	79,000	6,230	15,200
Chromium	0.7 U	0.99 B	1.3 B	5.2 B	4.6 B	0.7 U	0.7 U	1.4 B
Cobalt	15.1 J	0.6 U	10.1 J	0.78 J	1.2 J	0.6 U	0.6 U	1.1 J
Copper	3.1 B	3.5 B	2.6 B	4.7 B	3.2 B	2.5 B	3.4 B	2.8 B
Iron	2,560	6,180	15,100	3,900	3,960	2,450	13,800	69,300
Lead	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	2,920 J	4,470 J	4,170 J	2,880 J	2,860 J	9,890	4,260 J	5,580
Manganese	66.1	121	743	62	63.3	199	79.6	70.9
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	17.5 B	1.5 B	2.8 B	20.9 J	23.8 J	1.3 U	1.4 J	5.7 J
Potassium	927 J	949 J	1,050 J	724 B	690 B	3,310 J	2,090 J	1,120 J
Selenium	1.9 U	1.9 U	1.9 U	3.4 B	1.9 U	3 B	2.8 B	[illegible] B
Silver	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	[illegible]
Sodium	3,850 J	10,600	6,900	5,260 B	5,170 B	25,000	10,500 B	8,[illegible] B
Thallium	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U
Vanadium	0.8 U	0.8 U	0.8 U	0.8 UL	0.8 UL	0.8 UL	0.94 L	1.5 L
Zinc	28.3 B	14.5 B	15.9 B	27.8 B	29.2 B	14 B	19.4 B	19.6 B

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UJ
UL

Table C-1-2
Analytical Resu[illegible]ubsurface Soil
S[illegible]
NAS [illegible]ana

Sample Date	OW24-SB09	OW24-SB10	OW24-SB11	OW24-SB12	OW24-SB13	OW24-SB14	OW24-SB15	OW24-SB16P	OW24-SB16	OW24-SB17	OW24-SB18
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,1,1-Trichloroethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,1,2,2-Tetrachloroethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,1,2-Trichloroethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,1-Dichloroethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,1-Dichloroethene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,2-Dichloroethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,2-Dichloroethene (total)	2.7 J	18	700	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
1,2-Dichloropropane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
2-Butanone	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
2-Hexanone	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
4-Methyl-2-pentanone	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
Acetone	16	76	290	11 U	11 U	11,000 U	1,600 U	690	270	8,800 U	14 U
Benzene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Bromodichloromethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Bromoform	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Bromomethane	13 U	13 U	69 U	11 U	11 U	NS	NS	69 U	34 U	NS	14 U
Carbon disulfide	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Carbon tetrachloride	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Chlorobenzene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Chloroethane	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
Chloroform	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Chloromethane	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
Dibromochloromethane	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Ethylbenzene	1.9 J	6.7 U	34 U	5.4 U	5.4 U	5,700 U	75 J	35 U	17 U	4,400 U	6.9 U
Methylene chloride	6.6 U	7.8	57	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Styrene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Tetrachloroethene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Toluene	6.6 U	6.7 U	27 J	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Trichloroethene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Vinyl chloride	13 U	13 U	69 U	11 U	11 U	11,000 U	1,600 U	69 U	34 U	8,800 U	14 U
Xylene, total	3.1 J	2 J	31 J	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
cis-1,3-Dichloropropene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
trans-1,3-Dichloropropene	6.6 U	6.7 U	34 U	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Semi-volatile Organic Compounds (UG/KG)											
Acenaphthene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	280 U	NS
Acenaphthylene	260 UJ	270 U	270 U	220 U	210 J	280 U	260 U	280 U	270 U	280 U	NS
Anthracene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	280 U	NS
Benzo(a)anthracene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Benzo(a)pyrene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Benzo(b)fluoranthene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Benzo(g,h,i)perylene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Benzo(k)fluoranthene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	12 U	6.6 U	6.9 U	6.7 U	12 U	NS
Chrysene	26 UJ	27 U	27 U	22 U	21 U	28 U	26 U	28 U	27 U	28 U	NS
Dibenz(a,h)anthracene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Fluoranthene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Fluorene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	280 U	NS
Indeno(1,2,3-cd)pyrene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	23 U	NS
Naphthalene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	1,500	NS
Phenanthrene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	280 U	NS
Pyrene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	44	NS

NS - Not sampled
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Table C-2-1
Summary of Constituents Detected in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW01-R01	OW24-MW02-R01	OW24-MW02P-R01	OW24-MW03-R01	OW24-MW04-R01	OW24-MW05-R01	OW24-MW06-R01	OW24-MW07-R01
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,2-Trichloroethane	2.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzene	2	1 U	1 U	0.7 J	1 U	1 U	1 U	1 U
Carbon disulfide	1 UJ	1 U	1 U	0.2 J	1.6 B	1 U	1 U	1 U
Ethylbenzene	7.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	5.6	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	0.3 J	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	59.8 J	0.2 J	0.2 J	72.6	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	8.8	1 U	1 U	3.8	1 U	1 U	1 U	1 U
Semi-volatile Organic Compounds (UG/L)								
2-Methylnaphthalene	11 J	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Acenaphthene	0.21 U	22 U	0.22 U	0.22 U	0.22 U	0.21 U	0.22 U	0.22 U
Acenaphthylene	1 U	570	5.2	1.1 U	1.1 U	1 U	1.1 U	1.1 U
Anthracene	1.1 J	49	0.11 U	0.11 U	0.11 U	0.1 U	0.11 U	0.11 U
Benzo(a)anthracene	0.01 U	1.1 U	0.016	0.011 U	0.011 U	0.003 B	0.002 B	0.011 U
Chrysene	0.01 UJ	1.1 U	0.017	0.011 U	0.011 U	0.002 B	0.001 B	0.011 U
Di-n-butylphthalate	11 U	20 U	20 U	11 U	11 U	11 U	11 U	9 J
Dibenzofuran	3 J	20 U	20 U	11 U	11 U	11 U	11 U	11 U
Fluoranthene	14 J	110 U	1.1 U	1.1 U	1.1 U	1 U	1.1 U	1.1 U
Fluorene	0.42 U	44 U	0.39 J	0.44 U	0.45 U	0.42 U	0.43 U	0.43 U
Naphthalene	15	220 U	0.32 J	2.2 U	2.2 U	2.1 U	2.2 U	0.36 B
Phenanthrene	0.93 J	5.5 U	0.04 B	0.054 U	0.056 U	0.052 U	0.054 U	0.057 B
bis(2-Ethylhexyl)phthalate	11 U	20 U	20 U	1 J	11 U	11 U	11 U	11 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.11 U	0.042 B	0.2 UL	0.048 B	0.11 U	0.11 U	0.11 U	0.032 J
4,4'-DDE	0.11 U	0.009 B	0.2 UL	0.11 U	0.11 U	0.11 U	0.11 U	0.0057 J
alpha-BHC	0.053 U	0.046 J	0.1 UL	0.053 U	0.055 U	0.054 U	0.054 U	0.054 U
Total Metals (UG/L)								
Aluminum	291 B	5,130	2,110	1,320	2,680	1,450	392	623
Arsenic	49.1	4.8 J	5.8 J	5.7 J	40.9	14.8 B	12.9 B	16.8
Barium	35.5 J	96 J	81.2 J	154 J	40.9 J	28.7 J	27.3 J	18.1 B
Beryllium	0.2 U	0.71 B	0.45 B	1.8 J	0.27 J	0.2 U	0.2 U	0.2 U
Calcium	32,900	38,200	38,700	14,300	5,310	7,750	6,580	7,630
Chromium	2.3 J	15.1 B	12.4 B	4 B	10	4 J	1.8 J	5.3 B
Cobalt	0.6 U	3.3 J	3.2 J	6.4 J	2.4 B	1.9 B	19.5 J	2.6 B
Cyanide	5 U	5 U	5 U	22.6 B	5 U	5 U	5.7 J	17.8 B
Iron	17,700	4,590	3,060	3,980	29,000	12,800	32,900	9,840
Lead	1.7 U	15.5	11.1	3.1	1.7 J	1.7 U	1.7 U	1.7 U
Magnesium	12,400	4,650 J	4,380 J	5,430	4,730 J	7,650	4,610 J	3,530 J
Manganese	514	66.6	57.3	50.1	95.8	319	538	80.1
Mercury	0.1 U	0.1 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	1.3 UL	24.6 B	31.8 B	8 J	9.6 J	2.2 L	2.4 L	7.8 B
Potassium	4,410 J	7,260	7,160	1,560 J	1,220 J	1,230 J	610 J	700 J
Selenium	1.9 U	1.9 U	1.9 U	1.9 U	3.6 B	3.4 B	1.9 U	1.9 J
Sodium	12,100	9,980	10,700	10,200 B	11,000	10,700	12,400	7,800
Vanadium	3.2 B	14.7 J	8.8 J	4.3 L	5.8 J	3.4 B	1.2 B	1.5 B
Dissolved Metals (UG/L)								
Aluminum	40.8 U	51.6 B	53.8 B	323	40.8 U	40.8 U	41.7 B	99.5 B
Antimony	4.2 U	5 J	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	48.6	3 U	3 J	3 U	24.3	8.4 B	9.3 B	14.8
Barium	32.3 J	46.5 J	54.1 J	125 J	27.1 J	21.8 J	25.6 J	15.5 B
Beryllium	0.2 U	0.2 U	0.2 U	1.3 J	0.2 U	0.2 U	0.2 U	0.2 U
Calcium	30,800	33,800	39,000	13,300	5,270	7,320	6,580	8,560
Chromium	1.8 J	0.71 B	1.3 B	0.7 U	4.9 J	0.7 U	0.98 J	2.2 B
Cobalt	0.6 U	1.3 J	1.6 J	5.3 J	1.5 B	1.9 B	17.4 J	2.4 B
Iron	16,400	1,030	1,290	2,520	23,100	10,300	30,300	9,090
Lead	1.7 U	1.7 U	1.8 J	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	11,700	3,730 J	4,280 J	4,980 J	4,680 J	7,040	4,670 J	3,720 J
Manganese	479	42.5	48.9	47.4	91.2	270	499	90.9
Nickel	2.4 L	10.1 B	14.8 B	8.1 J	7.9 L	1.3 UL	2.3 L	6.1 B
Potassium	4,130 J	6,500	7,380	1,430 J	762 J	1,010 J	574 J	650 J
Sodium	11,700	9,950	11,600	10,200 B	11,700	11,100	12,200	8,300
Vanadium	2.5 B	1.6 J	1.5 J	0.8 UL	0.96 B	1.4 B	0.8 U	0.8 U

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low

U - Analyte not detected
UJ
UL

Table C-2-1
Summary of Constituents Detected in Groundwater
SWMU 24
NAS Oceana

Sample Date	OW24-MW08-R01	OW24-MW09-R01	OW24-MW10-R01	OW24-MW11-R01	OW24-MW11P-R01	OW24-MW1D-R01	OW24-PZ03D-R01	OW24-PZ03S-R01
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.2 J
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	0.1 J	1.1
Carbon disulfide	1 U	0.6 J	0.4 J	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	8.8	1 U	1 U	1 U	1 U	1.9	0.6 J
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.5
cis-1,2-Dichloroethene	1 U	2.2	1 U	1 U	1 U	0.4 J	39.1	500
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	4.5	65 J
Semi-volatile Organic Compounds (UG/L)								
2-Methylnaphthalene	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Acenaphthene	0.21 U	0.21 U	0.067 K	0.2 U	0.21 U	0.22 U	0.22 U	0.77 K
Acenaphthylene	1 U	1 U	1.1 U	1 U	1 U	1.1 U	1.1 U	1.1 U
Anthracene	0.1 U	0.1 U	0.079 B	0.1 U	0.1 U	0.49	0.11 U	0.34 K
Benzo(a)anthracene	0.01 U	0.01 U	0.011 U	0.01 U	0.01 U	0.026 B	0.011 U	0.011 U
Chrysene	0.01 U	0.01 U	0.011 U	0.01 U	0.01 U	0.011 U	0.011 U	0.011 U
Di-n-butylphthalate	10 U	10 U	10 U	11 U	1 J	11 U	10 U	11 U
Dibenzofuran	10 U	10 U	10 U	11 U	11 U	11 U	10 U	11 U
Fluoranthene	1 U	1 U	0.37 K	1 U	1 U	1.1 U	1.1 U	1.1 U
Fluorene	0.42 U	0.41 U	0.16 K	0.4 U	0.42 U	0.43 U	0.44 U	1.2 K
Naphthalene	2.1 U	2.1 U	0.29 B	2 U	2.1 U	2.2 U	2.2 U	1.4 K
Phenanthrene	0.052 U	0.052 U	0.022 B	0.05 U	0.052 U	0.067	0.055 U	0.054 U
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	11 U	1 J	1 J	10 U	11 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.11 U	0.1 U	0.044 J	0.059 B	0.11 UL	0.05 B	0.023 B	0.022 L
4,4'-DDE	0.11 U	0.1 U	0.1 U	0.11 U	0.11 UL	0.11 U	0.1 U	0.1 UL
alpha-BHC	0.053 U	0.052 U	0.051 U	0.053 U	0.053 UL	0.054 U	0.052 U	0.051 UL
Total Metals (UG/L)								
Aluminum	768	2,070	354	1,020	461	930	906	3,9[illegible]
Arsenic	12.4	3 U	20.3	8.1 J	8.6 J	3 U	48.4	[illegible]
Barium	35.8 J	49.4 J	28.3 B	11.8 J	9.8 J	24.1 J	38.4 J	[illegible]
Beryllium	0.5 J	0.32 J	0.2 U	0.41 J	0.4 J	0.2 U	0.25 J	0.26 J
Calcium	5,660	6,010	5,410	3,130 J	3,080 J	80,100	6,550	15,800
Chromium	1.4 B	5.6 B	1.3 B	2.6 B	1.3 B	4 B	3 B	6.2 B
Cobalt	16.8 J	2.7 B	10.6 J	0.89 J	0.79 J	0.82 J	1 J	2.1 J
Cyanide	46.2 B	33.6 B	43 B	56.7 B	17.8 B	27.7 B	23.9 B	7.3 B
Iron	7,610	8,760	15,600	4,470	4,170	3,910	20,800	77,700
Lead	2.1 J	3.8	1.7 U	1.7 U	1.7 U	1.7 U	2.5 J	5.3
Magnesium	3,150 J	5,180	4,270 J	2,860 J	2,790 J	10,300	4,590 J	6,100
Manganese	71.2	143	763	59.2	57.4	219	91.1	80
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	18.9 B	6.6 B	3 B	4.7 J	2.4 J	2.9 J	3.5 J	5.4 B
Potassium	930 J	1,310 J	1,090 J	849 J	710 B	3,540 J	2,080 J	1,400 J
Selenium	1.9 U	1.9 U	1.9 U	1.9 U	2 B	2.7 B	4.8 B	5.3 B
Sodium	3,920 J	9,700	6,890	5,150 B	5,110 B	25,300	10,200 B	9,240 B
Vanadium	2.8 B	10.7 J	2.2 B	1.6 L	0.84 L	3.6 L	6.2 L	8.2 L
Dissolved Metals (UG/L)								
Aluminum	119 B	61.8 B	100 B	229 B	252 B	40.8 U	50.7 B	40.8 U
Antimony	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Arsenic	3 U	3 U	20.2	4.8 J	8.4 J	3 U	22.4	224
Barium	27.6 J	16.2 B	24.4 J	10.3 J	10 J	19.8 J	25.3 J	37.2 J
Beryllium	0.3 J	0.2 U	0.2 U	0.34 J	0.39 J	0.2 U	0.2 U	0.2 U
Calcium	5,230	5,830	5,330	3,450 J	3,430 J	79,000	6,230	15,200
Chromium	0.7 U	0.99 B	1.3 B	5.2 B	4.6 B	0.7 U	0.7 U	1.4 B
Cobalt	15.1 J	0.6 U	10.1 J	0.78 J	1.2 J	0.6 U	0.6 U	1.1 J
Iron	2,560	6,180	15,100	3,900	3,960	2,450	13,800	69,300
Lead	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Magnesium	2,920 J	4,470 J	4,170 J	2,880 J	2,860 J	9,890	4,260 J	5,580
Manganese	66.1	121	743	62	63.3	199	79.6	70.9
Nickel	17.5 B	1.5 B	2.8 B	20.9 J	23.8 J	1.3 U	1.4 J	5.7 J
Potassium	927 J	949 J	1,050 J	724 B	690 B	3,310 J	2,090 J	1,120 J
Sodium	3,850 J	10,600	6,900	5,260 B	5,170 B	25,000	10,500 B	8,820 B
Vanadium	0.8 U	0.8 U	0.8 U	0.8 UL	0.8 UL	0.8 UL	0.94 L	

NS - Not sampled
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low

U - Analyte not detected
UJ
UL

Table 3-2-2
Summary of Constituents Detected in Subsurface Soil
SWMU 24
NAS Oceana

Sample Date	OW24-SB09	OW24-SB10	OW24-SB11	OW24-SB12	OW24-SB13	OW24-SB14	OW24-SB15	OW24-SB16P	OW24-SB16	OW24-SB17	OW24-SB18
Chemical Name											
Volatile Organic Compounds (UG/KG)											
1,2-Dichloroethene (total)	2.7 J	18	700	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Acetone	16	76	290	11 U	11 U	11,000 U	1,600 U	690	270	8,800 U	14 U
Ethylbenzene	1.9 J	6.7 U	34 U	5.4 U	5.4 U	5,700 U	75 J	35 U	17 U	4,400 U	6.9 U
Methylene chloride	6.6 U	7.8	57	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Toluene	6.6 U	6.7 U	27 J	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Xylene, total	3.1 J	2 J	31 J	5.4 U	5.4 U	5,700 U	820 U	35 U	17 U	4,400 U	6.9 U
Semi-volatile Organic Compounds (UG/KG)											
Naphthalene	260 UJ	270 U	270 U	220 U	210 U	280 U	260 U	280 U	270 U	1,500	NS
Pyrene	6.6 UJ	6.7 U	6.9 U	5.4 U	5.4 U	23 U	6.6 U	6.9 U	6.7 U	44	NS

NS - Not sampled
J - Reported value is estimated
U - Analyte not detected
UJ - Not detected, quantitation limit may be inaccurate

Ta[illegible]
Statistical Summary for Cons[illegible]s Detected in Groundwater
at SWMU 24
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/L)																				
1,1,2-Trichloroethane	1 - 16	2.4	2.4	OW24-MW01-R01	0.61875	-0.595108686	0.475	0.392153979	1	1	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	1.95	0.82691875	0.725588992
1,1-Dichloroethene	1 - 16	0.2	0.2	OW24-PZ03S-R01	0.48125	-0.750415351	7.50E-02	0.229072683	1	1	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	1.824	0.51411875	0.53994104
Benzene	4 - 16	0.1	2	OW24-MW01-R01	0.61875	-0.636785553	0.415080314	0.588566331	1	1	0.887	0.565078771	FALSE	0.887	0.664990762	FALSE	1.753	2.154	0.800658947	0.872630478
Carbon disulfide	3 - 16	0.2	0.8	OW24-MW09-R01	0.5	-0.723591499	0.115470054	0.274310846	1	1	0.887	0.881395471	FALSE	0.887	0.616702953	FALSE	1.753	1.853	0.550604751	0.574229408
Ethylbenzene	1 - 16	7.6	7.6	OW24-MW01-R01	0.94375	-0.523066216	1.775	0.680323857	1	1	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	2.263	1.72164375	1.111677428
Trichloroethene	4 - 16	0.8	8.8	OW24-MW09-R01	1.43125	-0.268076224	2.352224125	0.93044747	1	1	0.887	0.470169007	FALSE	0.887	0.527290405	FALSE	1.753	2.608	2.462112223	2.206344924
Vinyl chloride	2 - 16	0.3	2.5	OW24-PZ03S-R01	0.6125	-0.624483913	0.505799697	0.430178173	1	1	0.887	0.322411899	FALSE	0.887	0.414005183	FALSE	1.753	1.987	0.834166717	0.732524743
cis-1,2-Dichloroethene	8 - 16	0.2	500	OW24-PZ03S-R01	42.40625	0.585300907	124.2604923	2.478753499	1	100	0.887	0.38657582	FALSE	0.887	0.732618227	FALSE	1.753	5.427	96.86341077	1249.816809
trans-1,2-Dichloroethene	4 - 16	3.8	85	OW24-PZ03S-R01	5.50625	5.44E-02	18.03128062	1.458712026	1	100	0.887	0.354931811	FALSE	0.887	0.593329509	FALSE	1.753	3.492	12.53195873	11.39919705
Semi-volatile Organic Compounds (UG/L)																				
2-Methylnaphthalene	1 - 16	11	11	OW24-MW01-R01	6.28125	1.798971871	2.032803893	0.269512816	10	20	0.887	0.587791634	FALSE	0.887	0.616999621	FALSE	1.753	1.853	7.172126306	7.129489658
Acenaphthene	2 - 16	0.067	0.77	OW24-PZ03S-R01	0.827	-1.849313518	2.717895632	1.243910154	0.2	22	0.887	0.298584257	FALSE	0.887	0.465091787	FALSE	1.753	3.107	2.018117761	0.92518392
Acenaphthylene	2 - 16	5.2	570	OW24-MW02-R01	36.4125	-5.92E-02	142.2947733	1.801315864	1	110	0.887	0.275988681	FALSE	0.887	0.396894128	FALSE	1.753	4.116	98.77318439	32.37868613
Anthracene	4 - 16	0.34	49	OW24-MW02-R01	3.22184375	-2.088604851	12.21066786	1.876535321	0.1	11	0.887	0.285482247	FALSE	0.887	0.591360993	FALSE	1.753	4.267	8.573177711	5.694875747
Benzo(a)anthracene	1 - 16	0.016	0.016	OW24-MW02P-R01	0.03996875	-5.012217805	0.136057521	1.34524187	0.01	1.1	0.887	0.2917203	FALSE	0.887	0.667744322	FALSE	1.753	3.299	9.96E-02	5.17E-02
Chrysene	1 - 16	0.017	0.017	OW24-MW02P-R01	0.0395	-5.130854613	0.136177091	1.439889309	0.01	1.1	0.887	0.288670988	FALSE	0.887	0.664056458	FALSE	1.753	3.457	0.09917961	6.03E-02
Di-n-butylphthalate	2 - 16	1	9	OW24-MW07-R01	5.875	1.679863197	2.187083294	0.509245273	10	20	0.887	0.757666894	FALSE	0.887	0.63582625	FALSE	1.753	2.066	6.833489253	8.014078522
Dibenzofuran	1 - 16	3	3	OW24-MW01-R01	5.78125	1.717766885	1.760365848	0.272744466	10	20	0.887	0.645925994	FALSE	0.887	0.714778547	FALSE	1.753	1.853	6.552739098	6.589345426
Fluoranthene	2 - 16	0.37	14	OW24-MW01-R01	4.766875	-0.162268354	13.61119677	1.386893936	1	110	0.887	0.360059801	FALSE	0.887	0.472176627	FALSE	1.753	3.369	10.81963198	7.43270093
Fluorene	3 - 16	0.16	1.2	OW24-PZ03S-R01	1.6440625	-1.129303893	5.433937559	1.215733286	0.4	44	0.887	0.294635688	FALSE	0.887	0.461482222	FALSE	1.753	3.074	4.025485635	1.776475611
Naphthalene	3 - 16	0.32	15	OW24-MW01-R01	8.6090625	0.226966257	27.26748598	1.565027723	2	220	0.887	0.330653578	FALSE	0.887	0.739854719	FALSE	1.753	3.691	20.55902946	18.97481355
Phenanthrene	2 - 16	0.067	0.93	OW24-MW01-R01	0.2545	-3.127259772	0.702564564	1.457948165	0.05	5.5	0.887	0.388405968	FALSE	0.887	0.590683609	FALSE	1.753	3.492	0.56239892	0.472403049
bis(2-Ethylhexyl)phthalate	3 - 16	1	1	OW24-MW03-R01	5.09375	1.436009905	2.578941016	0.744496655	10	20	0.887	0.794321914	FALSE	0.887	0.692223405	FALSE	1.753	2.34	6.2230944	8.696855593
Pesticide/Polychlorinated Biphenyls (UG/L)																				
4,4'-DDD	3 - 16	0.022	0.044	OW24-MW10-R01	0.0430625	-3.272108424	2.17E-02	0.542365446	0.1	0.2	0.887	0.875067245	FALSE	0.887	0.91872356	TRUE	1.753	2.099	5.26E-02	5.89E-02
4,4'-DDE	1 - 16	0.0057	0.0057	OW24-MW07-R01	0.050325	-3.185017501	2.12E-02	0.836771895	0.1	0.2	0.887	0.683628632	FALSE	0.887	0.539136666	FALSE	1.753	2.477	5.98E-02	0.100282989
alpha-BHC	1 - 16	0.046	0.046	OW24-MW02-R01	0.0291875	-3.556663309	7.40E-03	0.204317156	0.051	0.1	0.887	0.479964342	FALSE	0.887	0.503840775	FALSE	1.753	1.803	3.24E-02	3.20E-02
Total Metals (UG/L)																				
Aluminum	15 - 16	354	5130	OW24-MW02-R01	1517.46875	6.94181149	1386.1452	0.944269645	40.8	40.8	0.887	0.831088839	FALSE	0.887	0.987213076	TRUE	1.753	2.623	2124.946884	3062.987532
Arsenic	12 - 16	4.8	222	OW24-PZ03S-R01	26.734375	2.451494948	53.96124757	1.310651595	3	3	0.887	0.504256558	FALSE	0.887	0.949950184	TRUE	1.753	3.228	52.38289175	81.71283851
Barium	14 - 16	9.8	154	OW24-MW03-R01	44.8	3.497483453	38.20480336	0.817146577	0.4	0.4	0.887	0.817403256	FALSE	0.887	0.968321241	TRUE	1.753	2.449	61.54325507	77.32777732
Beryllium	8 - 16	0.25	1.8	OW24-MW03-R01	0.336875	-1.464886744	0.411857075	0.815853049	0.2	0.2	0.887	0.555915408	FALSE	0.887	0.658198516	FALSE	1.753	2.449	0.517371363	0.539997342
Calcium	16 - 16	3080	80100	OW24-MW1D-R01	17319.375	9.257106889	20751.68989	0.975258543	28	28	0.887	0.687867158	FALSE	0.887	0.893727707	TRUE	1.753	2.884	26413.80309	33141.16196
Chromium	4 - 16	1.8	10	OW24-MW04-R01	3.075	0.807946014	2.663706891	0.825292217	0.7	0.7	0.887	0.809850345	FALSE	0.887	0.956162807	TRUE	1.753	2.463	4.242369457	5.329935679
Cobalt	11 - 16	0.79	19.5	OW24-MW06-R01	4.40625	0.752923325	5.998571913	1.205941079	0.6	0.6	0.887	0.677611835	FALSE	0.887	0.9180383	TRUE	1.753	3.058	7.035124141	11.38444388
Cyanide	1 - 16	5.7	5.7	OW24-MW06-R01	10.40625	1.993528766	8.35455714	0.903120495	5	5	0.887	0.872177598	FALSE	0.887	0.87864258	FALSE	1.753	2.563	14.06763467	20.0853507
Iron	16 - 16	3060	77700	OW24-PZ03S-R01	18055.625	9.233842205	18832.07511	0.934975205	23.5	23.5	0.887	0.680289178	FALSE	0.887	0.93611029	TRUE	1.753	2.608	24308.78192	29748.31181
Lead	8 - 16	1.7	15.5	OW24-MW02-R01	3.24375	0.635662501	4.215690056	0.985460625	1.7	1.7	0.887	0.639364918	FALSE	0.887	0.808867359	FALSE	1.753	2.899	5.091271784	6.098088823
Magnesium	16 - 16	2790	12400	OW24-MW01-R01	5413.75	8.506924365	2648.264978	0.418392349	24.2	24.2	0.887	0.605202042	FALSE	0.887	0.925707088	TRUE	1.753	1.977	6573.475627	6687.682429
Manganese	16 - 16	50.1	763	OW24-MW10-R01	200.3	4.855090948	218.5481061	0.912521268	1.1	1.1	0.887	0.712550835	FALSE	0.887	0.844842032	FALSE	1.753	2.578	296.0787075	357.3966309
Mercury	1 - 16	0.1	0.1	OW24-MW02-R01	0.053125	-2.952410575	0.0125	0.173286795	0.1	0.1	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	1.786	0.058603125	5.74E-02
Nickel	8 - 16	2.2	9.6	OW24-MW04-R01	5.3375	1.361900112	4.388716593	0.841635458	1.3	1.3	0.887	0.839167249	FALSE	0.887	0.960449129	TRUE	1.753	2.477	7.260855047	9.529101862
Potassium	15 - 16	610	7260	OW24-MW02-R01	2231.5	7.335980998	2213.274347	0.862436042	20.2	20.2	0.887	0.731032448	FALSE	0.887	0.940282368	TRUE	1.753	2.506	3201.467482	3889.030287
Selenium	1 - 16	1.9	1.9	OW24-MW07-R01	1.334375	0.215547633	0.576113053	0.376440982	1.9	1.9	0.887	0.719444326	FALSE	0.887	0.728974143	FALSE	1.753	1.941	1.586856546	1.608111039
Sodium	11 - 16	3920	25300	OW24-MW1D-R01	8777.5	8.906248658	5546.28915	0.620057432	210	210	0.887	0.834698911	FALSE	0.887	0.946739254	TRUE	1.753	2.189	11208.16122	12694.68468
Vanadium	10 - 16	0.84	14.7	OW24-MW02-R01	4.493125	1.036780827	4.231527256	1.039488579	0.8	0.8	0.887	0.848814735	FALSE	0.887	0.934342254	TRUE	1.753	2.779	6.34759182	10.20541061
Dissolved Metals (UG/L)																				
Aluminum	1 - 16	323	323	OW24-MW03-R01	59.659375	3.661286436	77.62512956	0.830431648	40.8	40.8	0.887	0.567995002	FALSE	0.887	0.794987957	FALSE	1.753	2.463	93.67858803	93.14921989
Antimony	1 - 16	5	5	OW24-MW02-R01	2.28125	0.79615613	0.725	0.216875142	4.2	4.2	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	1.817	2.59898125	2.51285599
Arsenic	9 - 16	3	224	OW24-PZ03S-R01	24.178125	1.943115867	54.80899155	1.495283977	3	3	0.887	0.447118246	FALSE	0.887	0.895458379	TRUE	1.753	3.562	46.19728905	84.4595133
Barium	14 - 16	10	125	OW24-MW03-R01	31.428125	3.179823963	28.19406538	0.736158839	0.4	0.4	0.887	0.700484071	FALSE	0.887	0.942579381	TRUE	1.753	2.34	43.78417415	49.1638486
Beryllium	4 - 16	0.3	1.3	OW24-MW03-R01	0.220625	-1.912065491	0.304290842	0.761389462	0.2	0.2	0.887	0.462428712	FALSE	0.887	0.590583106	FALSE	1.753	2.367	0.353980482	0.314465726
Calcium	16 - 16	3430	79000	OW24-MW1D-R01	18770.625	9.24306218	20184.32477	0.946150159	28	28	0.887	0.678417307	FALSE	0.887	0.887476508	TRUE	1.753	2.639	25616.40533	30802.86597
Chromium	3 - 16	0.98	4.9	OW24-MW04-R01	1.1425	-0.260352281	1.235692788	0.855526728	0.7	0.7	0.887	0.697509836	FALSE	0.887	0.860992747	FALSE	1.753	2.506	1.684042364	1.933199155
Cobalt	9 - 16	0.78	17.4	OW24-MW06-R01	3.62375	0.333775027	5.547001442	1.370795274	0.6	0.6	0.887	0.63704851	FALSE	0.887	0.873551625	FALSE	1.753	3.334	6.054723382	11.82715826
Iron	16 - 16	1030	69300	OW24-PZ03S-R01	13205	8.849535452	17187.36202	1.188683983	23.5	23.5	0.887	0.687683554	FALSE	0.887	0.973942435	TRUE	1.753	3.026	20737.36141	35754.94509
Lead	1 - 16	1.8	1.8	OW24-MW02P-R01	0.909375	-0.11562483	0.2375	0.187576399	1.7	1.7	0.887	0.272673424	FALSE	0.887	0.272673424	FALSE	1.753	1.797	1.013459375	0.989060241
Magnesium	16 - 16	2860	11700	OW24-MW01-R01	5114.375	8.45467097	2476.422066	0.403148833	24.2	24.2	0.887	0.773494181	FALSE	0.887	0.896478598	TRUE	1.753	1.958	6199.666971	6246.325995
Manganese	16 - 16	42.5	743	OW24-MW10-R01	185.8625	4.769231978	208.4102745	0.921013082	1.1	1.1	0.887	0.70573467	FALSE	0.887	0.869233626	FALSE	1.753	2.593	277.1983028	333.6163645
Nickel	8 - 16	1.4	23.8	OW24-MW11P-R01	6.2625	1.265360356	6.922246745	1.156518512	1.3	1.3	0.887	0.759909887	FALSE	0.887	0.843552629	TRUE	1.753	2.976	9.296174636	16.823[illegible]
Potassium	14 - 16	574	7380	OW24-MW02P-R01	2036.8125	7.17566287	2183.000022	0.938676616	20.2	20.2	0.887	0.793735456	FALSE	0.887	0.932841486	TRUE	1.753	2.623	2993.51226	3636.312989
Sodium	11 - 16	3850	25000	OW24-MW1D-R01	8929.6875	8.922740839	5530.916883	0.625981368	210	210	0.887	0.84183988	FALSE	0.887	0.935312444	TRUE	1.753	2.202	11353.61182	13024.28984
Vanadium	4 - 16	0.94	1.6	OW24-MW02-R01	0.723125	-0.49344117	0.469037578	0.573283411	0.8	0.8	0.887	0.703616913	FALSE	0.887	0.717407003	FALSE	1.753	2.132	0.928680719	0.986557993

Table C-3-2
Statistical Summary for Constituents Detected in Subsurface Soil
at SWMU 24
NAS Oceana

AnalyteName	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	SampleID of Maximum Detected Value	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Minimum Reporting Limit	Maximum Reporting Limit	Shapiro-Wilkes/ DAgastino - Quantile (Norm)	Shapiro-Wilkes/ DAgastino - Value (Norm)	Shapiro-Wilkes/ DAgastino - Test (Norm)	Shapiro-Wilkes/ DAgastino - Quantile (Ln)	Shapiro-Wilkes/ DAgastino - Value (Ln)	Shapiro-Wilkes/ DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Volatile Organic Compounds (UG/KG)																				
1,2-Dichloroethene (total)	3 - 10	2.7	700	OW24-SB11	619.83	3.7496079	1042.387326	2.954889731	5.4	5700	0.842	0.668392361	FALSE	0.842	0.815419266	FALSE	1.833	7.74	1224.045118	6844184.578
Acetone	4 - 10	16	690	OW24-SB16	1179	4.8351776	2025.282737	2.715561502	11	11000	0.842	0.639911101	FALSE	0.842	0.891717902	TRUE	1.833	7.168	2352.946015	3304172.215
Ethylbenzene	2 - 10	1.9	75	OW24-SB15	516.485	3.0046734	1069.83718	2.768615752	5.4	5700	0.842	0.547590374	FALSE	0.842	0.783222537	FALSE	1.833	7.292	1136.611302	779861.6822
Methylene chloride	2 - 10	7.8	57	OW24-SB11	554.57	3.4352473	1057.173639	2.808785508	5.4	5700	0.842	0.597177158	FALSE	0.842	0.810712452	FALSE	1.833	7.392	1167.355937	1607497.89
Toluene	1 - 10	27	27	OW24-SB11	551.125	3.2760095	1059.038689	2.854775691	5.4	5700	0.842	0.593383949	FALSE	0.842	0.772291895	FALSE	1.833	7.491	1164.992005	1942053.956
Xylene, total	3 - 10	2	31	OW24-SB11	551.37	3.2319912	1058.908709	2.90623135	5.4	5700	0.842	0.594039216	FALSE	0.842	0.793795679	FALSE	1.833	7.64	1165.161663	2831405.835
Semi-volatile Organic Compounds (UG/KG)																				
Naphthalene	1 - 9	1500	1500	OW24-SB17	272.777778	5.0448241	460.7338651	0.877750404	210	280	0.829	0.434254952	FALSE	0.829	0.611801832	FALSE	1.86	3.032	558.4327741	584.6261294
Pyrene	1 - 9	44	44	OW24-SB17	8.44722222	1.510383	13.64052123	0.991858603	5.4	23	0.829	0.522914666	FALSE	0.829	0.748457628	FALSE	1.86	3.278	16.90434539	23.37781089

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 24 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Industrial Worker	Adult	Dermal Absorption	On-site	None	Groundwater not currently used on site as a water supply.
						Ingestion	On-site	None	Groundwater not currently used on site as a water supply.
	Surface Soil	Surface Soil	Direct Contact	Industrial Worker	Adult	Dermal Absorption	On-site	None	All stained surface soil was excavated and therefore no current exposure to surface soil.
						Ingestion	On-site	None	All stained surface soil was excavated and therefore no current exposure to surface soil.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
						Ingestion	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
					Adolescents	Dermal Absorption	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
						Ingestion	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
		Air	Emissions from exposed soil	Industrial Worker	Adult	Inhalation	On-site	None	All stained surface soil was excavated and therefore no current exposure to surface soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
					Adolescents	Inhalation	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
Future	Groundwater	Groundwater	Columbia Aquifer - Tap Water	Resident	Adult	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Child	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Adult/Child	Dermal Absorption	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
						Ingestion	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
			Columbia Aquifer - Water in Excavation Pit	Construction Worker	Adult	Dermal Absorption	On-site	Quant	Construction worker may contact shallow groundwater during construction activities.
						Ingestion	On-site	None	Construction worker not expected to incidentally ingest significant amount of groundwater during construction activities.
		Air	Columbia Aquifer -Water Vapors at Showerhead	Resident	Adult	Inhalation	On-site	Quant	Although unlikely, groundwater could be used as a potable water supply in the future.
					Child	Inhalation	On-site	None	Children are assumed not to shower.
			Columbia Aquifer - Volatilization from Water in Excavation Pit	Construction Worker	Adult	Inhalation	On-site	Quant	Construction worker may inhale vapors from groundwater during construction activities.
	Subsurface Soil	Soil	Direct Contact	Industrial Worker	Adult	Dermal Absorption	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
						Ingestion	On-site	Quant	Site workers could contact soil while conducting maintenance activities.
				Trespasser/Visitor	Adult	Dermal Absorption	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
						Ingestion	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.

TABLE 1

SELECTION OF EXPOSURE PATHWAYS

SWMU 24 at NAS Oceana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Subsurface Soil	Soil	Direct Contact	Trespasser/Visitor	Adolescents	Dermal Absorption	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
						Ingestion	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
				Resident	Adult	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
					Adult/Child	Dermal Absorption	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
						Ingestion	On-site	Quant	Residents may contact soil, if the site is used for future residential development.
				Construction Worker	Adult	Dermal Absorption	On-site	Quant	Exposure to soil during construction activities.
						Ingestion	On-site	Quant	Exposure to soil during construction activities.
		Air	Emissions from exposed soil	Industrial Worker	Adult	Inhalation	On-site	Quant	Site workers may inhale vapors and dust from soil.
				Trespasser/Visitor	Adult	Inhalation	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
					Adolescents	Inhalation	On-site	None	Most of the site is entirely fenced and the site is in the middle of the Base. General public cannot access the site.
				Resident	Adult	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
					Adult/Child	Inhalation	Off-site	Quant	Residents may inhale vapors and dust from soil, if the site is used for future residential development.
				Construction Worker	Adult	Inhalation	On-site	Quant	Exposure to emissions from soil during construction activities.

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer-Tap Water

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
79-00-5	1,1,2-Trichloroethane	2.40E+00		2.40E+00		UG/L	OW24-MW01-R01	1/16	1 - 1	2.40E+00	N/A	1.9E-01 C	NA	NA	YES	ASL
75-35-4	1,1-Dichloroethene	2.00E-01	J	2.00E-01	J	UG/L	OW24-PZ03S-R01	1/16	1 - 1	2.00E-01	N/A	4.0E-02 C	NA	NA	YES	ASL
91-57-6	2-Methylnaphthalene	1.10E+01	J	1.10E+01	J	UG/L	OW24-MW01-R01	1/16	10 - 20	1.10E+01	N/A	1.2E+01 N	NA	NA	NO	BSL
72-54-8	4,4'-DDD	2.20E-02	L	4.40E-02	J	UG/L	OW24-MW10-R01	3/16	0.1 - 0.2	4.40E-02	N/A	2.8E-01 C	NA	NA	NO	BSL
72-55-9	4,4'-DDE	5.70E-03	J	5.70E-03	J	UG/L	OW24-MW07-R01	1/16	0.1 - 0.2	5.70E-03	N/A	2.0E-01 C	NA	NA	NO	BSL
83-32-9	Acenaphthene	6.70E-02	K	7.70E-01	K	UG/L	OW24-PZ03S-R01	2/16	0.2 - 22	7.70E-01	N/A	3.7E+01 N	NA	NA	NO	BSL
208-96-8	Acenaphthylene	5.20E+00		5.70E+02		UG/L	OW24-MW02-R01	2/16	1 - 110	5.70E+02	N/A	1.8E+02 N	NA	NA	YES	ASL
319-84-6	alpha-BHC	4.60E-02	J	4.60E-02	J	UG/L	OW24-MW02-R01	1/16	0.051 - 0.1	4.60E-02	N/A	1.1E-02 C	NA	NA	YES	ASL
7429-90-5	Aluminum	3.54E+02		5.13E+03		UG/L	OW24-MW02-R01	15/16	40.8 - 40.8	5.13E+03	N/A	3.7E+03 N	5.0E+01	SMCL	YES	ASL
7429-90-5	Aluminum (d)	3.23E+02		3.23E+02		UG/L	OW24-MW03-R01	1/16	40.8 - 40.8	3.23E+02	N/A	3.7E+03 N	5.0E+01	SMCL	YES	ASL
120-12-7	Anthracene	3.40E-01	K	4.90E+01		UG/L	OW24-MW02-R01	4/16	0.1 - 11	4.90E+01	N/A	1.8E+02 N	NA	NA	NO	BSL
7440-36-0	Antimony (d)	5.00E+00	J	5.00E+00	J	UG/L	OW24-MW02-R01	1/16	4.2 - 4.2	5.00E+00	N/A	1.5E+00 N	6.0E+00	MCL	YES	ASL
7440-38-2	Arsenic	4.80E+00	J	2.22E+02		UG/L	OW24-PZ03S-R01	12/16	3 - 3	2.22E+02	N/A	4.5E-02 C	5.0E+00	MCL	YES	ASL
7440-38-2	Arsenic (d)	3.00E+00	J	2.24E+02		UG/L	OW24-PZ03S-R01	9/16	3 - 3	2.24E+02	N/A	4.5E-02 C	5.0E+00	MCL	YES	ASL
7440-39-3	Barium	9.80E+00	J	1.54E+02	J	UG/L	OW24-MW03-R01	14/16	0.4 - 0.4	1.54E+02	N/A	2.6E+02 N	2.0E+03	MCL	NO	BSL
7440-39-3	Barium (d)	1.00E+01	J	1.25E+02	J	UG/L	OW24-MW03-R01	14/16	0.4 - 0.4	1.25E+02	N/A	2.6E+02 N	2.0E+03	MCL	NO	BSL
71-43-2	Benzene	1.00E-01	J	2.00E+00		UG/L	OW24-MW01-R01	4/16	1 - 1	2.00E+00	N/A	3.2E-01 C	5.0E+00	MCL	YES	ASL
56-55-3	Benzo(a)anthracene	1.60E-02		1.60E-02		UG/L	OW24-MW02P-R01	1/16	0.01 - 1.1	1.60E-02	N/A	9.2E-02 C	NA	NA	NO	BSL
7440-41-7	Beryllium	2.50E-01	J	1.80E+00	J	UG/L	OW24-MW03-R01	8/16	0.2 - 0.2	1.80E+00	N/A	7.3E+00 N	4.0E+00	MCL	NO	BSL
7440-41-7	Beryllium (d)	3.00E-01	J	1.30E+00	J	UG/L	OW24-MW03-R01	4/16	0.2 - 0.2	1.30E+00	N/A	7.3E+00 N	4.0E+00	MCL	NO	BSL
117-81-7	bis(2-Ethylhexyl)phthalate	1.00E+00	J	1.00E+00	J	UG/L	OW24-MW11P-R01	3/16	10 - 20	1.00E+00	N/A	4.8E+00 C	NA	NA	NO	BSL
7440-70-2	Calcium	3.08E+03	J	8.01E+04		UG/L	OW24-MW1D-R01	16/16	28 - 28	8.01E+04	N/A	N/A	NA	NA	NO	NUT
7440-70-2	Calcium (d)	3.43E+03	J	7.90E+04		UG/L	OW24-MW1D-R01	16/16	28 - 28	7.90E+04	N/A	N/A	NA	NA	NO	NUT
75-15-0	Carbon disulfide	2.00E-01	J	6.00E-01	J	UG/L	OW24-MW09-R01	3/16	1 - 1	6.00E-01	N/A	1.0E+02 N	NA	NA	NO	BSL
7440-47-3	Chromium	1.80E+00	J	1.00E+01		UG/L	OW24-MW04-R01	4/16	0.7 - 0.7	1.00E+01	N/A	1.1E+01 N	1.0E+02	MCL	NO	BSL
7440-47-3	Chromium (d)	9.80E-01	J	4.90E+00	J	UG/L	OW24-MW04-R01	3/16	0.7 - 0.7	4.90E+00	N/A	1.1E+01 N	1.0E+02	MCL	NO	BSL
218-01-9	Chrysene	1.70E-02		1.70E-02		UG/L	OW24-MW02P-R01	1/16	0.01 - 1.1	1.70E-02	N/A	9.2E+00 C	NA	NA	NO	BSL
156-59-2	cis-1,2-Dichloroethene	2.00E-01	J	5.00E+02		UG/L	OW24-PZ03S-R01	8/16	1 - 100	5.00E+02	N/A	6.1E+00 N	7.0E+01	MCL	YES	ASL
7440-48-4	Cobalt	7.90E-01	J	1.95E+01	J	UG/L	OW24-MW06-R01	11/16	0.6 - 0.6	1.95E+01	N/A	2.2E+02 N	NA	NA	NO	BSL
7440-48-4	Cobalt (d)	7.80E-01	J	1.74E+01	J	UG/L	OW24-MW06-R01	9/16	0.6 - 0.6	1.74E+01	N/A	2.2E+02 N	NA	NA	NO	BSL
57-12-5	Cyanide	5.70E+00	J	5.70E+00	J	UG/L	OW24-MW06-R01	1/16	5 - 5	5.70E+00	N/A	7.3E+01 N	2.0E+02	MCL	NO	BSL

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer-Tap Water

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
132-64-9	Dibenzofuran	3.00E+00	J	3.00E+00	J	UG/L	OW24-MW01-R01	1/16	10 - 20	3.00E+00	N/A	2.4E+00 N	NA	NA	YES	ASL
84-74-2	Di-n-butylphthalate	1.00E+00	J	9.00E+00	J	UG/L	OW24-MW07-R01	2/16	10 - 20	9.00E+00	N/A	3.7E+02 N	NA	NA	NO	BSL
100-41-4	Ethylbenzene	7.60E+00		7.60E+00		UG/L	OW24-MW01-R01	1/16	1 - 1	7.60E+00	N/A	1.3E+02 N	7.0E+03	MCL	NO	BSL
206-44-0	Fluoranthene	3.70E-01	K	1.40E+01	J	UG/L	OW24-MW01-R01	2/16	1 - 110	1.40E+01	N/A	1.5E+02 N	NA	NA	NO	BSL
86-73-7	Fluorene	1.60E-01	K	1.20E+00	K	UG/L	OW24-PZ03S-R01	3/16	0.4 - 44	1.20E+00	N/A	2.4E+01 N	NA	NA	NO	BSL
7439-89-6	Iron	3.06E+03		7.77E+04		UG/L	OW24-PZ03S-R01	16/16	23.5 - 23.5	7.77E+04	N/A	1.1E+03 N	NA	NA	YES	ASL
7439-89-6	Iron (d)	1.03E+03		6.93E+04		UG/L	OW24-PZ03S-R01	16/16	23.5 - 23.5	6.93E+04	N/A	1.1E+03 N	NA	NA	YES	ASL
7439-92-1	Lead	1.70E+00	J	1.55E+01		UG/L	OW24-MW02-R01	8/16	1.7 - 1.7	1.55E+01	N/A	N/A	1.5E+01	AL	NO	NTX
7439-92-1	Lead (d)	1.80E+00	J	1.80E+00	J	UG/L	OW24-MW02P-R01	1/16	1.7 - 1.7	1.80E+00	N/A	N/A	1.5E+01	AL	NO	BSL
7439-95-4	Magnesium	2.79E+03	J	1.24E+04		UG/L	OW24-MW01-R01	16/16	24.2 - 24.2	1.24E+04	N/A	N/A	NA	NA	NO	NUT
7439-95-4	Magnesium (d)	2.86E+03	J	1.17E+04		UG/L	OW24-MW01-R01	16/16	24.2 - 24.2	1.17E+04	N/A	N/A	NA	NA	NO	NTX
7439-96-5	Manganese	5.01E+01		7.63E+02		UG/L	OW24-MW10-R01	16/16	1.1 - 1.1	7.63E+02	N/A	7.3E+01 N	5.0E+01	SMCL	YES	ASL
7439-96-5	Manganese (d)	4.25E+01		7.43E+02		UG/L	OW24-MW10-R01	16/16	1.1 - 1.1	7.43E+02	N/A	7.3E+01 N	5.0E+01	SMCL	YES	ASL
7439-97-6	Mercury	1.00E-01	J	1.00E-01	J	UG/L	OW24-MW02-R01	1/16	0.1 - 0.1	1.00E-01	N/A	1.1E+00 N	2.0E+00	MCL	NO	BSL
91-20-3	Naphthalene	3.20E-01	J	1.50E+01		UG/L	OW24-MW01-R01	3/16	2 - 220	1.50E+01	N/A	6.5E-01 N	NA	NA	YES	ASL
7440-02-0	Nickel	2.20E+00	L	9.60E+00	J	UG/L	OW24-MW04-R01	8/16	1.3 - 1.3	9.60E+00	N/A	7.3E+01 N	NA	NA	NO	BSL
7440-02-0	Nickel (d)	1.40E+00	J	2.38E+01	J	UG/L	OW24-MW11P-R01	8/16	1.3 - 1.3	2.38E+01	N/A	7.3E+01 N	NA	NA	NO	BSL
85-01-8	Phenanthrene	6.70E-02		9.30E-01	J	UG/L	OW24-MW01-R01	2/16	0.05 - 5.5	9.30E-01	N/A	1.8E+01 N	NA	NA	NO	BSL
7440-09-7	Potassium	6.10E+02	J	7.26E+03		UG/L	OW24-MW02-R01	15/16	20.2 - 20.2	7.26E+03	N/A	N/A	NA	NA	NO	NUT
7440-09-7	Potassium (d)	5.74E+02	J	7.38E+03		UG/L	OW24-MW02P-R01	14/16	20.2 - 20.2	7.38E+03	N/A	N/A	NA	NA	NO	NUT
7782-49-2	Selenium	1.90E+00	J	1.90E+00	J	UG/L	OW24-MW07-R01	1/16	1.9 - 1.9	1.90E+00	N/A	1.8E+01 N	5.0E+01	MCL	NO	BSL
7440-23-5	Sodium	3.92E+03	J	2.53E+04		UG/L	OW24-MW1D-R01	11/16	210 - 210	2.53E+04	N/A	N/A	NA	NA	NO	NUT
7440-23-5	Sodium (d)	3.85E+03	J	2.50E+04		UG/L	OW24-MW1D-R01	11/16	210 - 210	2.50E+04	N/A	N/A	NA	NA	NO	NUT
156-60-5	trans-1,2-Dichloroethene	3.80E+00		6.50E+01	J	UG/L	OW24-PZ03S-R01	4/16	1 - 100	6.50E+01	N/A	1.2E+01 N	1.0E+02	MCL	YES	ASL
79-01-6	Trichloroethene	6.00E-01	J	8.80E+00		UG/L	OW24-MW09-R01	4/16	1 - 1	8.80E+00	N/A	1.6E+00 C	5.0E+00	MCL	YES	ASL
7440-62-2	Vanadium	8.40E-01	L	1.47E+01	J	UG/L	OW24-MW02-R01	10/16	0.8 - 0.8	1.47E+01	N/A	2.6E+01 N	NA	NA	NO	BSL
7440-62-2	Vanadium (d)	9.40E-01	L	1.60E+00	J	UG/L	OW24-MW02-R01	4/16	0.8 - 0.8	1.60E+00	N/A	2.6E+01 N	NA	NA	NO	BSL
75-01-4	Vinyl chloride	3.00E-01	J	2.50E+00		UG/L	OW24-PZ03S-R01	2/16	1 - 1	2.50E+00	N/A	4.0E-02 C	2.0E+00	MCL	YES	ASL

Table 2.1

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columb ı Aquifer-Tap Water

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection

AL-Action level for lead from USEPA, October 1996, Drinking Water Regulations and Health Advisories. EPA 822-B-96-002

(d) Dissolved groundwater samples.

[1] Minimum/Maximum detected concentrations

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] The tap water RBC; Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III.
RBC value for Chromium VI used for total chromium.
RBC value for anthracene used as surrogate for acenaphthylene.
RBC value for pyrene used as surrogate for phenanthrene.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

SQL = Sample Quantification Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered
J = Estimated Value
K = Biased High
L = Biased Low
C = Carcinogenic
N = Noncarcinogenic
MCL = Maximum Contaminant Level (Summer 2000)
MCLG = Maximum Contaminant Level Goal
SMCL = Secondary Maximum Contaminant Level
AL = Action Level

Table 2.2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
540-59-0	1,2-Dichloroethene (total)	2.70E-03	J	7.00E-01		MG/KG	OW24-SB11	3/10	0.00 54 - 5.700	7.00E-01	N/A	3.70E-02	N	NA	NA	YES	ASL
67-64-1	Acetone	1.60E-02		6.90E-01		MG/KG	OW24-SB16	4/10	0.011 - 11.000	6.90E-01	N/A	2.50E-01	N	NA	NA	YES	ASL
100-41-4	Ethylbenzene	1.90E-03	J	7.50E 02	J	MG/KG	OW24-SB15	2/10	0.00 54 - 5.700	7.50E-02	N/A	1.50E+00	N	NA	NA	NO	BSL
75-09-2	Methylene chloride	7.80E-03		5.70E-02		MG/KG	OW24-SB11	2/10	0.00 54 - 5.700	5.70E-02	N/A	1.90E-02	C	NA	NA	YES	ASL
91-20-3	Naphthalene	1.50E+00		1.50E+00		MG/KG	OW24-SB17	1/9	0.210 - 0.280	1.50E+00	N/A	1.50E-01	N	NA	NA	YES	ASL
129-00-0	Pyrene	4.40E-02		4.40E-02		MG/KG	OW24-SB17	1/9	0.00 54 - 0.023	4.40E-02	N/A	6.80E+01	N	NA	NA	NO	BSL
108-88-3	Toluene	2.70E-02	J	2.70E-02	J	MG/KG	OW24-SB11	1/10	0.00 54 - 5.700	2.70E-02	N/A	8.80E-01	N	NA	NA	NO	BSL
1330-20-7	Xylene, total	2.00E-03	J	3.10E-02	J	MG/KG	OW24-SB11	3/10	0.00 54 - 5.700	3.10E-02	N/A	1.70E+01	N	NA	NA	NO	BSL

[1] Minimum/Maximum detected concentrations.
[2] Maximum concentration is used for screening.
[3] Background values not available.
[4] The most conservative value of residential RBC versus soil screening level, DAF 20; Risk-Based Concentration Table, October 5, 2000, U.S. EPA Region III.
[5] Rationale Codes

Selection Reason:	Above Screening Levels (ASL)	J = Estimated Value
Deletion Reason:	No Toxicity Information (NTX)	L = Biased Low
	Essential Nutrient (NUT)	C = Carcinogenic
	Below Screening Level (BSL)	N = Noncarcinogenic

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

Screening value for cis-1,2-Dichlorethene used as surrogate for 1,2-dichlorethene (total).

T. .1

Medium-Specific Exposure Point Concentration Summary

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer-Tap Water

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,1,2-Trichloroethane	UG/L	6.19E-01	8.27E-01	2.40E+00		UG/L	8.27E-01	95%UCL-N	W-Stat (3)	8.27E-01	95%UCL-N	W-Stat (3)
1,1-Dichloroethene	UG/L	4.81E-01	5.40E-01	2.00E-01	J	UG/L	2.00E-01	Max	W-Stat (4,2)	2.00E-01	Max	W-Stat (4,2)
Acenaphthylene	UG/L	3.64E+01	9.88E+01	5.70E+02		UG/L	9.88E+01	95%UCL-N	W-Stat (4)	9.88E+01	95%UCL-N	W-Stat (4)
alpha-BHC	UG/L	2.92E-02	3.24E-02	4.60E-02	J	UG/L	3.24E-02	95%UCL-N	W-Stat (3)	3.24E-02	95%UCL-N	W-Stat (3)
Aluminum	UG/L	1.52E+03	2.12E+03	5.13E+03		UG/L	3.06E+03	95%UCL-T	W-Stat (1)	3.06E+03	95%UCL-T	W-Stat (1)
Aluminum (d)	UG/L	5.97E+01	9.37E+01	3.23E+02		UG/L	9.37E+01	95%UCL-N	W-Stat (4)	9.37E+01	95%UCL-N	W-Stat (4)
Antimony (d)	UG/L	2.28E+00	2.60E+00	5.00E+00	J	UG/L	2.60E+00	95%UCL-N	W-Stat (4)	2.60E+00	95%UCL-N	W-Stat (4)
Arsenic	UG/L	2.87E+01	5.24E+01	2.22E+02		UG/L	8.17E+01	95%UCL-T	W-Stat (1)	8.17E+01	95%UCL-T	W-Stat (1)
Arsenic (d)	UG/L	2.42E+01	4.82E+01	2.24E+02		UG/L	8.45E+01	95%UCL-T	W-Stat (1)	8.45E+01	95%UCL-T	W-Stat (1)
Benzene	UG/L	6.19E-01	8.01E-01	2.00E+00		UG/L	8.73E-01	95%UCL-T	W-Stat (1)	8.73E-01	95%UCL-T	W-Stat (1)
cis-1,2-Dichloroethene	UG/L	4.24E+01	9.69E+01	5.00E+02		UG/L	5.00E+02	Max	W-Stat (4, 2)	5.00E+02	Max	W-Stat (4, 2)
Dibenzofuran	UG/L	5.78E+00	6.59E+00	3.00E+00	J	UG/L	3.00E+00	Max	W-Stat (4, 2)	3.00E+00	Max	W-Stat (4, 2)
Iron	UG/L	1.61E+04	2.43E+04	7.77E+04		UG/L	2.97E+04	95%UCL-T	W-Stat (1)	2.97E+04	95%UCL-T	W-Stat (1)
Iron (d)	UG/L	1.32E+04	2.07E+04	6.93E+04		UG/L	3.58E+04	95%UCL-T	W-Stat (1)	3.58E+04	95%UCL-T	W-Stat (1)
Manganese	UG/L	2.00E+02	2.96E+02	7.63E+02		UG/L	3.57E+02	95%UCL-T	W-Stat (1)	3.57E+02	95%UCL-T	W-Stat (1)
Manganese (d)	UG/L	1.86E+02	2.77E+02	7.43E+02		UG/L	3.34E+02	95%UCL-T	W-Stat (4)	3.34E+02	95%UCL-T	W-Stat (4)
Naphthalene	UG/L	8.61E+00	2.06E+01	1.50E+01		UG/L	1.50E+01	Max	W-Stat (4, 2)	1.50E+01	Max	W-Stat (4, 2)
trans-1,2-Dichloroethene	UG/L	5.51E+00	1.25E+01	6.50E+01	J	UG/L	1.25E+01	95%UCL-N	W-Stat (3)	1.25E+01	95%UCL-N	W-Stat (3)
Trichloroethene	UG/L	1.43E+00	2.46E+00	8.80E+00		UG/L	2.46E+00	95%UCL-N	W-Stat (3)	2.46E+00	95%UCL-N	W-Stat (3)
Vinyl chloride	UG/L	6.13E-01	8.34E-01	2.50E+00		UG/L	8.34E-01	95%UCL-N	W-Stat (3)	8.34E-01	95%UCL-N	W-Stat (3)

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

(d) Dissolved groundwater samples.

Table 3.2

Medium-Specific Exposure Point Concentration Summary

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
1,2-Dichloroethene (total)	UG/KG	6.20E+02	1.22E+03	7.00E+02		UG/KG	7.00E+02	Max	W-Test (2)	7.00E+02	Max	W-Test (2)
Acetone	UG/KG	1.18E+03	2.35E+03	6.90E+02		UG/KG	6.90E+02	Max	W-Test (2)	6.90E+02	Max	W-Test (2)
Methylene chloride	UG/KG	5.55E+02	1.17E+03	5.70E+01		UG/KG	5.70E+01	Max	W-Test (2)	5.70E+01	Max	W-Test (2)
Naphthalene	UG/KG	2.73E+02	5.58E+02	1.50E+03		UG/KG	5.85E+02	95%UCL-T	W-Test (4)	5.85E+02	95%UCL-T	W-Test (4)

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) Shapiro-Wilk W Test indicates data are log-normally distributed.

(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(3) Shapiro-Wilks W Test indicates data are normally distributed.

(4) Shapiro-Wilks W Test inconclusive. Higher of normal or log-transformed value used for EPC.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	2	EPA, 1997	1.4	EPA, 1993	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.2	EPA, 1995	0.2	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm^2	20,000	EPA, 1992	17,000	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	350	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with groundwater are based on ranges. For total adult male surface area ranges from 17,000 to 23,000 cm ^{2}, with a mean of 20,000 cm^2; the mean value of 20,000 cm^2 is used for the RME value and 17,000 cm^2 is used for the CT value.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-W	Ingestion Rate of Water	liters/day	1	EPA, 1997	1	(1)	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF1	Conversion Factor 1	mg/µg	0.001	--	0.001	--	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ---		see Table ---	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	--	0.001	--	Inorganics: DAevent (mg/cm2-event) =
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	0.33	EPA, 1992	0.33	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^2	0.001	--	0.001	--	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm^2	7,930	EPA, 1992	6,880	EPA, 1992	x CF1 x CF2
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area for th RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1997). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal Absorption	CW	Chemical Concentration in Water	µg/l	see Table ----		see Table ----	chem specific	CDI (mg/kg-day) =
	DAevent	Dermally Absorbed Dose per Event	mg/cm^2-event	calculated	EPA, 1992	calculated	EPA, 1992	DAevent x SA x EF x ED x 1/BW x 1/AT
	CF1	Conversion Factor 1	mg/µg	0.001	- -	0.001	- -	
	PC	Permeability Constant	cm/hr	chem specific	EPA, 1992	chem specific	EPA, 1992	Inorganics: DAevent (mg/cm2-event) =
	t	Lag Time	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	PC x CW x ET x CF1 x CF2
	t*	Time to Reach Steady-state	hours	chem specific	EPA, 1992	chem specific	EPA, 1992	
	B	Ratio of Permeability of Stratum Corneum to Epidermis	dimensionless	chem specific	EPA, 1992	chem specific	EPA, 1992	Organics :
	ET	Exposure Time	hr/day	8	(1)	4	(1)	ET<t*: DAevent (mg/cm2-event) =
	CF2	Conversion Factor 2	l/cm^3	0.001	- -	0.001	- -	2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	x CF1 x CF2
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	EPA, 1991	ET>t*: DAevent (mg/cm2-event) =
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	x CF1 x CF2
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on construction activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

SA: Skin surface area in contact with groundwater based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2, with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or 5,100 cm^2.

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	InhExp	Inhalation Exposure per Shower	mg/kg-shower	see Table ----		see Table ----	- -	Foster & Chrostowski Shower Inhalation Model for InhExp
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	Chronic Daily Intake (CDI) (mg/kg-day) =
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	InhExp x EF x ED x 1/AT
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future

Medium: Groundwater

Exposure Medium: Air

Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit

Receptor Population: Construction Worker

Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CA	Air concentration	mg/m^3	see Table --		see Table --		Two-Film Volatilization Model for CA
	IN	Inhalation Rate	$m^3/hour$	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	Chronic Daily Intake (CDI) (mg/kg-day) =
	EF	Exposure Frequency	days/yr	250	EPA, 1989	250	EPA, 1989	
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	CA x IN x ET x EF x ED x 1/BW x 1/AT
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	--	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1992	5,000	EPA, 1992	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.32	EPA, 1997	0.32	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for utility workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	100	EPA, 1991	50	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	5,800	EPA, 1997	5,000	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.2	EPA, 1997	0.2	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for gardeners.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and inorganics value of 1%.

SA: Based on 25% of total body surface area for adult or 25% of 23,000 cm^2 for RME and 25% of 20,000 cm^2 for CT.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	200	EPA, 1991	100	EPA, 1993	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----		CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	2,379	EPA, 1997	2,094	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.11	EPA, 1997	0.11	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	--	0.000001	--	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for child playing soccer.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Skin surface area for th RME is based on the 50th percentile total surface area for the child ages 5-6 years (Table 6-6 of EPA, 1999). The CT value is based on the average between the 50th percentile surface areas for the child ages 2-3 years and 5-6 years.

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	IR-S	Ingestion Rate of Soil	mg/day	480	EPA, 1991	480	(1)	CS x IR-S x EF x ED x CF3 x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	
Dermal Absorption	CS	Chemical Concentration in Soil	mg/kg	see Table ----		see Table ----	- -	CDI (mg/kg-day) =
	SA	Skin Surface Area Available for Contact	cm^2	6,000	EPA, 1997	5,100	EPA, 1997	CS x SA x SSAF x DABS x CF3 x EF x
	SSAF	Soil to Skin Adherence Factor	mg/cm^2-day	0.24	EPA, 1997	0.24	EPA, 1992	ED x 1/BW x 1/AT
	DABS	Dermal Absorption Factor Solids	--	chem specific	EPA, 1995	chem specific	EPA, 1995	
	CF3	Conversion Factor 3	kg/mg	0.000001	- -	0.000001	- -	
	EF	Exposure Frequency	days/year	250	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(1)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1992: Dermal Exposure Assessment: Principals and Applications. ORD. EPA/600/8-91/011B.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1995: Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa; SSAF based on maximum adherence factor for construction workers.

DABS: Based on Region III Technical Guidance "Assessing Dermal Exposure from Soil, December 1995", for constituents not listed used volatile organics value of 20%, semi-volatile organics value of 10%, and Inorganics value of 1%.

SA: Skin surface area in contact with soil based on contact during construction activities. The total adult male surface area ranges from 17,000 to 23,000 cm^2 with a mean of 20,000 cm^2. The RME is based on 30% of the mean total adult male surface area (20,000 cm^2) or 6,000 cm^2 and the CT value is based on 30% of the 17,000 cm^2 or 5,100 cm^2.

TABLE 4.10

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	m^3/kg	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/PEF + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	25	EPA, 1991	5	EPA., 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	1,825	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.11

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.83	EPA, 1999	0.83	EPA, 1999	
	ET	Exposure Time	hr/day	24	(1)	24	(1)	CA (mg/m^3) = CS (1/PEF + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA,1993	
	ED	Exposure Duration	years	24	EPA, 1991	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	3,285	EPA, 1989	

(1) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

Workbook: Tab4_SWMU24.XLS
Worksheet: t411

01/04/2001

TABLE 4.12

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	1.32E+09	EPA, 1996	1.32E+09	EPA, 1996	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	0.5	EPA, 1999	0.5	EPA, 1999	
	ET	Exposure Time	hr/day	24	(2)	24	(2)	CA (mg/m^3) = CS (1/PEF + 1/VF)
	EF	Exposure Frequency	days/year	350	EPA, 1991	219	EPA, 1993	
	ED	Exposure Duration	years	6	EPA, 1991	6	(1)	
	BW	Body Weight	kg	15	EPA, 1991	15	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	2,190	EPA, 1989	

(1) Not available, used RME value.

(2) Professional Judgement conservatively assumed all day.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1999: Region III Risk-Based Concentration Table. October 27, 1999.

TABLE 4.13

VALUES USED FOR DAILY INTAKE CALCULATIONS

SWMU 24 at NAS Oceana

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation	CS	Chemical Concentration in Soil	mg/kg	see Table ----	- -	see Table ---	- -	Chronic Daily Intake (CDI) (mg/kg-day) =
	CA	Chemical Concentration in Air	mg/m^3	see Table ----	- -	see Table ---	- -	CA x IN x ET x EF x ED x 1/BW x 1/AT
	PEF	Particulate Emissions Factor	kg/m^3	calc	(1)	calc	(1)	
	VF	Volatilization Factor for volatile constituents	m^3/kg	calc	EPA, 1996	calc	EPA, 1996	
	IN	Inhalation Rate	$m^3/hour$	2.5	EPA, 1997	1.5	EPA, 1997	
	ET	Exposure Time	hr/day	8	(1)	4	(1)	CA (mg/m^3) = CS (1/PEF + 1/VF)
	EF	Exposure Frequency	days/year	250	EPA,1991	219	EPA, 1993	
	ED	Exposure Duration	years	1	EPA, 1991	1	(2)	
	BW	Body Weight	kg	70	EPA, 1991	70	EPA, 1991	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

(1) Professional Judgement based on maintenance activities that would occur 8 hrs per day for the RME and 1/2 of a day for the CT.

(2) Not available, used RME value.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1996: Soil Screening Guidance: User's Guide. OSWER. EPA/540/R-96/018.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

Calc. (1): Calculated in Appendix--- Section Generation of Fugitive Dust During Construction Activites.

IN: Inhalation rates are based on values for the outdoor worker assuming heavy activity for the RME and moderate activity for the CT (page 5-24 of EPA, 1997).

Workbook: Tab4_SWMU24.XLS
Worksheet: t413

01/04/2001

TABLE 5.1

NON-CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 24

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
1,1-Dichloroethene	Chronic	9.0E-03	mg/kg-day	0.8	7.2E-03	mg/kg-day	Liver	1000	IRIS	07/02/1998
	Subchronic	9.0E-03	mg/kg-day	0.8	7.2E-03	mg/kg-day	Liver	1000	HEAST	07/08/1998
1,2-Dichloroethene (total)	Chronic	9.0E-03	mg/kg-day	1	9.0E-03	mg/kg-day	Liver	1000	HEAST:HEAST	07/00/97
	Subchronic	9.0E-03	mg/kg-day	1	9.0E-03	mg/kg-day	Liver	1000	HEAST:HEAST	07/00/97
1,1,2-Trichloroethane	Chronic	4.0E-03	mg/kg-day	0.8	3.2E-03	mg/kg-day	Blood	1000/1	IRIS:IRIS	01/00/00
	Subchronic	4.0E-02	mg/kg-day	0.8	3.2E-02	mg/kg-day	Blood	100/NA	HEAST:HEAST	07/00/97
Acetone	Chronic	1.0E-01	mg/kg-day	0.83	8.3E-02	mg/kg-day	Liver, Kidney	1000	IRIS	02/28/2000
	Subchronic	1.0E+00	mg/kg-day	0.83	8.3E-01	mg/kg-day	Liver, Kidney	100	HEAST	02/28/2000
alpha-BHC	Chronic	N/A	mg/kg-day	N/A	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aluminum	Chronic	1.0E+00	mg/kg-day	0.27	2.7E-01	mg/kg-day	CNS	100/1	Reg III RBC	01/05/95
Antimony	Chronic	4.0E-04	mg/kg-day	0.1	4.0E-05	mg/kg-day	Blood/Whole body	1000	IRIS	06/17/1998
	Subchronic	4.0E-04	mg/kg-day	0.1	4.0E-05	mg/kg-day	Blood	1000	HEAST	07/08/1998
Arsenic	Chronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin/vascular	3/1	IRIS	01/00/00
	Subchronic	3.0E-04	mg/kg-day	0.95	2.9E-04	mg/kg-day	Skin	3	HEAST	07/00/97
Benzene	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	N/A	N/A	Reg III RBC	10/00/99
cis-1,2-Dichloroethene	Chronic	1.0E-02	mg/kg-day	1	1.0E-02	mg/kg-day	Blood	3000/1	HEAST:HEAST	07/00/97
	Subchronic	1.0E-01	mg/kg-day	1	1.0E-01	mg/kg-day	Blood	300/NA	HEAST:HEAST	07/00/97
Dibenzofuran	Chronic	4.0E-03	mg/kg-day	0.7	2.8E-03	mg/kg-day	Kidney	3000	Reg III RBC	08/29/1994
Di-n-butylphthalate	Chronic	1.0E-01	mg/kg-day	0.5	5.0E-02	mg/kg-day	Whole body	1000/1	IRIS:IRIS	01/00/00
	Subchronic	1.0E+00	mg/kg-day	0.5	5.0E-01	mg/kg-day	Whole body	100/NA	HEAST:HEAST	07/00/97
Iron		3.0E-01	mg/kg-day	0.2	6.0E-02		Blood/Liver/GI	N/A	Reg III RBC	10/00/99
Manganese (nondietary)	Chronic	2.0E-02	mg/kg-day	0.35	7.0E-03	mg/kg-day	CNS	1/1	IRIS	01/00/00
Methylene chloride	Chronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100	IRIS	07/02/1998
	Subchronic	6.0E-02	mg/kg-day	0.8	4.8E-02	mg/kg-day	Liver	100	HEAST	07/08/1998
Naphthalene	Chronic	2.0E-02	mg/kg-day	0.8	1.6E-02	mg/kg-day	Decreased body weight gain	3000/1	IRIS	01/00/00
trans-1,2-Dichloroethene	Chronic	2.0E-02	mg/kg-day	1	2.0E-02	mg/kg-day	Blood	1000/1	IRIS:IRIS	01/00/00
	Subchronic	2.0E-01	mg/kg-day	1	2.0E-01	mg/kg-day	N/A	100/NA	HEAST:HEAST	07/00/97
Trichloroethene	Chronic	6.0E-03	mg/kg-day	0.8	4.8E-03	mg/kg-day	Liver	1000/3	Reg III RBC	4/00/92
Vinyl chloride	Chronic	3.0E-03	mg/kg-day	1	3.0E-03	mg/kg-day	Liver	30/1	IRIS	08/07/2000

N/A = Not Applicable or Not Available. IRIS indicates that calculations of dermal risks may not be appropriate for this chemical.

(1) Refer to RAGS, Part A. Source is EPA Region III fax from Linda Watson dated 06/23/99.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Region III RBC Table, 10/5/2000

(2) Provide equation for derivation in text.

(3) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

RESP = Respiratory System

CNS = Central Nervous System

NOAEL = No adverse effect level

GI = Gastrointestinal system

TA[illegible]2

NON-CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 24

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
1,1,2-Trichloroethane	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
alpha-BHC	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aluminum	Chronic	3.5E-03	mg/m^3	1.0E-03	mg/kg-day	N/A	N/A	NA:Reg. III RBC:N/A	10/00/99
Arsenic	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzene	Chronic	5.9E-03	mg/m^3	1.7E-03	mg/kg-day	N/A	N/A	NA:Reg. III RBC:N/A	N/A
cis-1,2-Dichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Di-n-butlyphthalate	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Iron	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Manganese (nondietary)	Chronic	4.9E-05	mg/m^3	1.4E-05	mg/kg-day	RSP and psychomotor disturbances	1000/1	IRIS:IRIS:IRIS	01/00/00
Methylene chloride	Chronic	3.0E+00	mg/m^3	8.6E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
	Subchronic	3.0E+00	mg/m^3	8.6E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
Naphthalene	Chronic	3.1E-03	mg/m^3	9E-04	mg/kg-day	Nasal effects	3000/1	IRIS:IRIS:IRIS	01/00/00
trans-1,2-Dichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Trichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Vinyl Chloride	Chronic	9.8E-02	mg/m^3	2.8E-02	mg/kg-day	Liver	3.0E+01	IRIS	08/07/00

N/A = Not Applicable

(1) For chemicals that have Inhalation RfCs, Inhalation RfC x 0.286 = Adjusted Inhalation RfD

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

HEAST(3) = Health Effects Assessment Summary Tables, Alternate Methods

HEAST(4)= Health Effects Assessment Summary Tables, Withdrawn

Region III RBC Table, 10/5/2000

TABLE 5.2

NON-CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 24

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC:RfD: Target Organ	Dates (2) (MM/DD/YY)
1,1,2-Trichloroethane	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
alpha-BHC	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Aluminum	Chronic	3.5E-03	mg/m^3	1.0E-03	mg/kg-day	CNS	N/A	NA:Reg. III RBC:N/A	10/00/99
Arsenic	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Benzene	Chronic	5.9E-03	mg/m^3	1.7E-03	mg/kg-day	Blood	N/A	NA:Reg. III RBC:N/A	N/A
cis-1,2-Dichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Di-n-butlyphthalate	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Iron	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Manganese (nondietary)	Chronic	4.9E-05	mg/m^3	1.4E-05	mg/kg-day	RSP and psychomotor disturbances	1000/1	IRIS:IRIS:IRIS	01/00/00
Methylene chloride	Chronic	3.0E+00	mg/m^3	8.6E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
	Subchronic	3.0E+00	mg/m^3	8.6E-01	mg/kg-day	Liver	100	HEAST	07/08/1998
Naphthalene	Chronic	3.1E-03	mg/m^3	9E-04	mg/kg-day	Nasal effects	3000/1	IRIS:IRIS:IRIS	01/00/00
trans-1,2-Dichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Trichloroethene	Chronic	N/A	mg/m^3	N/A	mg/kg-day	N/A	N/A	N/A	N/A
Vinyl Chloride	Chronic	9.8E-02	mg/m^3	2.8E-02	mg/kg-day	Liver	3.0E+01	IRIS	08/07/00

N/A = Not Applicable

(1) For chemicals that have Inhalation RfCs, Inhalation RfC x 0.286 = Adjusted Inhalation RfD

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

ATSDR = Agency for Toxic Substances and Disease Registry

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

HEAST(3) = Health Effects Assessment Summary Tables, Alternate Methods

HEAST(4)= Health Effects Assessment Summary Tables, Withdrawn

Region III RBC Table, 10/5/2000

TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

NAS Oceana-SWMU 24

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	EPA Carcinogen Group	Source (Oral Slope Factor)	Date (2) (MM/DD/YY)
1,1,2-Trichloroethane	5.7E-02	0.8	7.1E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	01/00/00
1,1-Dichloroethene	6.0E-01	0.8	7.5E-01	$(mg/kg\text{-}day)^{-1}$	C	IRIS	07/08/98
alpha-BHC	6.3E+00	0.5	1.3E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Arsenic	1.5E+00	0.95	1.6E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzene	5.5E-02	1.0	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Methylene chloride	7.5E-03	0.8	9.4E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/08/98
Trichloroethene	1.1E-02	0.8	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	Reg. III RBC	07/00/97
Vinyl chloride	1.5E+00	1.0	1.5E+00	(mg/kg-day)-1	A	IRIS	08/07/00

N/A-Not available

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Region III RBC Table, 10/5/2000

EPA Carcinogen Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

(1) Provide equation for derivation in text. Source is EPA Region III fax from Linda Watson dated 06/23/97.

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

TABLE 6.2

CANCER TOXICITY DATA -- INHALATION

NAS Oceana-SWMU 24

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guidance Description	Source (Unit Risk or Inhal Slope Factor)	Date (2) (MM/DD/YY)
1,1,2-Trichloroethane	1.6E-05	$(ug/m3)^{-1}$	3500	5.6E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	01/00/00
1,1-Dichloroethene	5.0E-05	$(ug/m3)^{-1}$	3500	1.75E-01	$(mg/kg\text{-}day)^{-1}$	C	IRIS	06/13/98
alpha-BHC	1.8E-03	$(ug/m3)^{-1}$	3500	6.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	01/00/00
Arsenic	4.3E-03	$(ug/m3)^{-1}$	3500	1.5E+01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Benzene	7.8E-06	$(ug/m3)^{-1}$	3500	2.9E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	01/00/00
Methylene chloride	4.7E-07	$(ug/m3)^{-1}$	3500	1.65E-03	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	06/13/98
Trichloroethene	1.7E-06	$(ug/m3)^{-1}$	3500	6.0E-03	$(mg/kg\text{-}day)^{-1}$	B2	Reg. III RBC	07/00/97
Vinyl chloride	8.6E-06	$(ug/m3)^{-1}$	3500	3.0E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/29/00

IRIS = Integrated Risk Information System

Region III RBC Table, 10/5/2000

N/A = Not Available

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor = 70kg x 1/20m3/day x 1000ug/mg

(2) For IRIS values, provide the date IRIS was searched.
For RBC values, provide the date of last change in the Tables.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABL[illegible]ME
CALCULATION OF N[illegible]ANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	2.3E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	5.7E-03
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	5.5E-06	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	6.1E-04
	Acenaphthylene*	9.88E+01	µg/l	9.88E+01	µg/l	M	2.7E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	9.0E-03
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	8.9E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	2.6E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	2.6E-03
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	7.1E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	1.8E-01
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	2.3E-03	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	7.7E+00
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	2.4E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	8.0E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	1.4E-02	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.4E+00
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	8.2E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.1E-02
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	9.8E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	3.3E+00
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	9.1E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.6E-01
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	4.1E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.1E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	3.4E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.7E-02
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	6.7E-05	mg/kg-day	6.0E-03	mg/kg-day	N/A	N/A	1.1E-02
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	2.3E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	7.6E-03
	(Total)												1.3E+01
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	1.8E-06	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	5.5E-04
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	6.3E-07	mg/kg-day	7.2E-03	mg/kg-day	N/A	N/A	8.8E-05
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	3.8E-03	mg/kg-day	2.1E-01	mg/kg-day	N/A	N/A	1.8E-02
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	3.5E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	5.1E-06	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.9E-05
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	1.4E-07	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	3.6E-03
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	4.6E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	1.6E-02
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	3.2E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.1E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	9.9E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	9.9E-02
	Dibenzofuran	3.00E+00	µg/l	3.00E+00	µg/l	M	1.5E-04	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	5.3E-02
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	2.0E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	3.3E-02
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	1.8E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	2.6E-03
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	2.6E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	1.6E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	2.5E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.2E-03
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	9.9E-06	mg/kg-day	4.8E-03	mg/kg-day	N/A	N/A	2.1E-03
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	9.5E-07	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.2E-04
	(Total)												2.5E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III "*Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk*", August 10, 1992.

RfD value for anthracene used as surrogate for acenapthylene.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

TABLE 7.1b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation													
	1,1,2-Trichloroethane	8.27E-01	µg/l	1.46E-05	mg/kg/shower	R	1.4E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1,1-Dichloroethene	2.00E-01	µg/l	1.16E-05	mg/kg/shower	R	1.1E-05	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acenaphthylene*	9.88E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	alpha-BHC	3.24E-02	µg/l	6.53E-09	mg/kg/shower	R	6.3E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	3.50E-03	mg/m^3	N/A
	Antimony (d)	2.60E+00	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Arsenic (d)	8.45E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	8.73E-01	µg/l	4.43E-05	mg/kg/shower	R	4.2E-05	mg/kg-day	1.7E-03	mg/kg-day	5.90E-03	mg/m^3	2.5E-02
	cis-1,2-Dichloroethene	5.00E+02	µg/l	2.13E-02	mg/kg/shower	R	2.0E-02	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran*	3.00E+00	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron (d)	3.58E+04	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese (d)	3.34E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	4.90E-05	mg/m^3	N/A
	Naphthalene	1.50E+01	µg/l	1.67E-04	mg/kg/shower	R	1.6E-04	mg/kg-day	8.6E-04	mg/kg-day	3.10E-03	mg/m^3	1.9E-01
	trans-1,2-Dichloroethene	1.25E+01	µg/l	6.49E-04	mg/kg/shower	R	6.2E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Trichloroethene	2.46E+00	µg/l	1.15E-04	mg/kg/shower	R	1.1E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Vinyl chloride	8.34E-01	µg/l	5.67E-05	mg/kg/shower	R	5.4E-05	mg/kg-day	2.8E-02	mg/kg-day	9.80E-02	mg/m^3	1.9E-03
	(Total)												2.1E-01

Total Hazard Index Across All Exposure Routes/Pathways 2.1E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic Inhalation.
N/A - Not applicable; metals are not volatile.

Table 7.1c RME
Calculation of DAevent

NAS Oceana-SWMU 24

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[1]	Duration of Event (ET)	DAevent
1,1,2-Trichloroethane	8.27E-01	µg/l	8.40E-03	5.70E-01	0.2	6.48E-09
1,1-Dichloroethene	2.00E-01	µg/l	1.60E-02	3.40E-01	0.2	2.31E-09
Acenaphthylene	9.88E+01	µg/l	N/A	N/A	0.2	1.39E-05
alpha-BHC	3.24E-02	µg/l	1.40E-02	5.20E+00	0.2	1.28E-09
Aluminum (d)	9.37E+01	µg/l	1.00E-03	N/A	0.2	1.87E-08
Antimony (d)	2.60E+00	µg/l	1.00E-03	N/A	0.2	5.20E-10
Arsenic (d)	8.45E+01	µg/l	1.00E-03	N/A	0.2	1.69E-08
Benzene	8.73E-01	µg/l	2.10E-02	2.60E-01	0.2	1.16E-08
cis-1,2-Dichloroethene	5.00E+02	µg/l	1.00E-02	3.40E-01	0.2	3.60E-06
Dibenzofuran*	3.00E+00	µg/l	N/A	N/A	0.2	5.40E-07
Iron (d)	3.58E+04	µg/l	1.00E-03	N/A	0.2	7.15E-06
Manganese (d)	3.34E+02	µg/l	1.00E-03	N/A	0.2	6.67E-08
Naphthalene	1.50E+01	µg/l	6.90E-02	5.30E-01	0.2	9.31E-07
trans-1,2-Dichloroethene	1.25E+01	µg/l	1.00E-02	3.40E-01	0.2	9.03E-08
Trichloroethene	2.46E+00	µg/l	1.60E-02	5.50E-01	0.2	3.61E-08
Vinyl chloride	8.34E-01	µg/l	7.30E-03	2.10E-01	0.2	3.45E-09

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

N/A - not applicable.

1 From EPA Dermal Exposure Assessment: Principles and Applications. January 1992. Epa/600/8-91/011B

* - DAevent calculated as shown in Table 7.1d.RME Supplement

Default value of 0.001 cm/hour used for inorganics without published permability constants.

Permeability constant for lindane used as surrogate for alpha-BHC

Permeability constant for trans-1,2-Dichloroethene used as a surrogate for cis-1,2-Dichloroethene.

Table 7.1d.RME Supplement
Calculation of DAevent
NAS Oceana - SWMU 24

Chemical	MW	log Kow	Kow	log Kp	Kp (cm/hr)	B	log Dsc/lsc	lsc (cm)	log Dsc	Dsc (cm^2/hr)	Tau (hr)	c	b	T* (hr)	Tevent (hr/event)	Medium EPC Value, Cv?	DAevent mg/(cm^2-event)
Acenaphthylene	152.2	3.9	7.94E+03	-8.79E-01	1.32E-01	7.94E-01	-3.65E+00	1.00E-03	-6.65E+00	2.25E-07	7.42E-01	1.13E+00	9.22E-01	1.32E+01	0.2	9.88E+01	1.39E-05
Dibenzofuran	168.19	4.12	1.32E+04	-8.21E-01	1.51E-01	1.32E+00	-3.75E+00	1.00E-03	-6.75E+00	1.79E-07	9.29E-01	1.65E+00	1.77E+00	6.32E+00	0.2	3.00E+00	5.40E-07

Equations from *Dermal Exposure Assessment: Principles and Applications.* EPA/600/8-91/011B. January 1992.

Tabl RME
Inhalation Exposure Concentrations from Foster and Chrostowski Shower Model
NAS Oceana - SWMU 24

Chemical	Exposure Point Concentration Cwo (µg/l)	Molecular weight (HH) (g/mole)	Henry's Law dimensionless	Henry's Law Constant (H) (atm-m³/mole)	Kg (VOC) (cm/hr)	Kl(VOC) (cm/hr)	KL (cm/hr)	Kal (cm/hr)	Cwd (µg/l)	S (µg/m³-min)	Calculated Inhalation Exposure (Einh) (mg/kg/shower)
1,1,2-Trichloroethane	8.27E-01	133	3.74E-02	9.1391E-05	1.10E+03	1.15E+01	3.08E+00	4.16E+00	1.07E-01	7.13E-01	1.46E-05
1,1-Dichloroethene	2.00E-01	97	1.07E+00	0.00261465	1.29E+03	1.35E+01	1.23E+01	1.66E+01	8.50E-02	5.67E-01	1.16E-05
Acenaphthylene	9.88E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
alpha-BHC	3.24E-02	291	4.35E-04	1.06E-06	7.46E+02	7.78E+00	3.29E-02	4.44E-02	4.80E-05	3.20E-04	6.53E-09
Aluminum (d)	9.37E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Antimony (d)	2.60E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (d)	8.45E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	8.73E-01	78	2.28E-01	5.57E-04	1.44E+03	1.50E+01	1.04E+01	1.40E+01	3.25E-01	2.17E+00	4.43E-05
cis-1,2-Dichloroethene	5.00E+02	97	1.67E-01	4.08E-04	1.29E+03	1.35E+01	8.35E+00	1.13E+01	1.57E+02	1.04E+03	2.13E-02
Dibenzofuran	3.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron (d)	3.58E+04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese (d)	3.34E+02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	1.50E+01	128	1.98E-02	4.84E-05	1.13E+03	1.17E+01	1.90E+00	2.57E+00	1.23E+00	8.20E+00	1.67E-04
trans-1,2-Dichloroethene	1.25E+01	97	3.85E-01	9.41E-04	1.29E+03	1.35E+01	1.06E+01	1.44E+01	4.77E+00	3.18E+01	6.49E-04
Trichloroethene	2.46E+00	131	4.22E-01	1.03E-03	1.11E+03	1.16E+01	9.33E+00	1.26E+01	8.44E-01	5.63E+00	1.15E-04
Vinyl chloride	8.34E-01	62.5	1.11E+00	2.71E-03	1.61E+03	1.68E+01	1.54E+01	2.08E+01	4.17E-01	2.78E+00	5.67E-05

Variables	Units	Exposure Assumptions	Source
Kg(VOC) = gas-film mass transfer coefficient	cm/hr	Solved by Eq 1	NA
Kl(VOC) = liquid-film mass transfer coefficient	cm/hr	Solved by Eq 2	NA
KL = overall mass transfer coefficient	cm/hr	Solved by Eq 3	NA
Kal = adjusted overall mass transfer coeff.	cm/hr	Solved by Eq 4	NA
Tl = Calibration temp. of water	K (20C +273)	293	F&C
Ts = Shower water temperature	k (45C)	318	F&C
Us = water viscosity at Ts	centipoise	0.596	F&C
Ul = water viscosity at Tl	cp	1.002	F&C
Cwd = conc. leaving droplets after time sdt	ug/l	Solved by Eq 5	NA
sdt = shower droplet drop time	sec	2	F&C
d = shower droplet diameter	mm	1	F&C
FR = shower water flow rate	l/min	20	F&C
SV = shower room air volume	m³	3	F&C
S = indoor VOC generation rate	ug/m³-min	Solved by Eq 6	NA
VR = ventilation rate	l/min	13.8	USEPA, 1991
BW = body weight	kg	70	USEPA, 1991
Ds = duration of shower	min	12	USEPA, 1989
Dt = total duration in shower room	min	15	
R = air exchange rate	min⁻¹	0.0083	F&C
Ca = indoor air concentration of VOCs	ug/m³	Solved by Eq 7	NA
Einh = inhalation exposure per shower	mg/kg/shower	Solved by Eq 8	NA

Equation 1:	Kg(VOC) =	$3000 * (18 / HH)^{0.5}$	
Equation 2:	Kl(VOC) =	$20 * (44 / HH)^{0.5}$	
Equation 3:	KL =	$((1 / Kl(VOC)) + (0.024 / (Kg (VOC) * H)))^{-1}$	
Equation 4:	Kal =	$(KL * (((Tl * Us) / (Ts * Ul))^{-0.5}))$	
Equation 5:	Cwd =	(Cwo * (1-EXP((-1 * Kal * sdt)/(60 * d))))	
Equation 6:	S =	(Cwd * FR / SV)	
Equation 7:	see time series example on Table I-GW-5		
Equation 8:	**Einh =**	**If t>Ds**	(((VR * S) / (BW * R * 1000000)) * ((Ds + (EXP(-R * Dt) / R)-(EXP(R * (Ds - Dt))) / R)))

Henry's Law Constant from USEPA's *Superfund Public Health Evaluation Manual*. USEPA/540/1-86/060, October 1986.

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual. Interim Final. OSWER Directive 9285.6-03.

USEPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

TABLE 7.2a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	5.3E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	1.3E-02
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.3E-05	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	1.4E-03
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	6.3E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	2.1E-02
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	2.1E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	6.0E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	6.0E-03
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	1.7E-04	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	4.2E-01
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	5.4E-03	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.8E+01
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	5.6E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.9E-02
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	3.2E-02	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	3.2E+00
	Dibenzofuran	3.00E+00	µg/l	3.00E+00	µg/l	M	1.9E-04	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	4.8E-02
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	2.3E+00	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	7.6E+00
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	2.1E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.1E+00
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	9.6E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.8E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	8.0E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.0E-02
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	1.6E-04	mg/kg-day	6.0E-03	mg/kg-day	N/A	N/A	2.6E-02
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	5.3E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.8E-02
	(Total)												3.1E+01
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	4.2E-06	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	1.3E-03
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.5E-06	mg/kg-day	7.2E-03	mg/kg-day	N/A	N/A	2.1E-04
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	9.0E-03	mg/kg-day	2.1E-01	mg/kg-day	N/A	N/A	4.3E-02
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	8.3E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	1.6E-05	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	5.8E-05
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	4.3E-07	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	1.1E-02
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	1.4E-05	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	4.9E-02
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	7.5E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	2.5E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	2.3E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	2.3E-01
	Dibenzofuran	3.00E+00	µg/l	3.00E+00	µg/l	M	3.5E-04	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	1.3E-01
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	6.0E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.0E-01
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	5.6E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	8.0E-03
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	6.1E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.8E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	5.9E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.9E-03
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	2.4E-05	mg/kg-day	4.8E-03	mg/kg-day	N/A	N/A	4.9E-03
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	2.2E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	7.5E-04
	(Total)												6.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	3.1E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III *"Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk"*, August 10, 1992.

RfD value for anthracene used as surrogate for acenapthylene.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

Table 7.2b RME
Calculation of Daevent(child)

NAS Oceana-SWMU 24

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[1]	Duration of Event (ET)	DAevent
1,1,2-Trichloroethane	8.27E-01	µg/l	8.40E-03	5.70E-01	0.33	8.33E-09
1,1-Dichloroethene	2.00E-01	µg/l	1.60E-02	3.40E-01	0.33	2.96E-09
Acenaphthylene*	9.88E+01	µg/l	N/A	N/A	0.33	1.78E-05
alpha-BHC	3.24E-02	µg/l	1.40E-02	5.20E+00	0.33	1.64E-09
Aluminum (d)	9.37E+01	µg/l	1.00E-03	N/A	0.33	3.09E-08
Antimony (d)	2.60E+00	µg/l	1.00E-03	N/A	0.33	8.58E-10
Arsenic (d)	8.45E+01	µg/l	1.00E-03	N/A	0.33	2.79E-08
Benzene	8.73E-01	µg/l	2.10E-02	2.60E-01	0.33	1.48E-08
cis-1,2-Dichloroethene	5.00E+02	µg/l	1.00E-02	3.40E-01	0.33	4.63E-06
Dibenzofuran*	3.00E+00	µg/l	N/A	N/A	0.33	6.94E-07
Iron (d)	3.58E+04	µg/l	1.00E-03	N/A	0.33	1.18E-05
Manganese (d)	3.34E+02	µg/l	1.00E-03	N/A	0.33	1.10E-07
Naphthalene	1.50E+01	µg/l	6.90E-02	5.30E-01	0.33	1.20E-06
trans-1,2-Dichloroethene	1.25E+01	µg/l	1.00E-02	3.40E-01	0.33	1.16E-07
Trichloroethene	2.46E+00	µg/l	1.60E-02	5.50E-01	0.33	4.64E-08
Vinyl chloride	8.34E-01	µg/l	7.30E-03	2.10E-01	0.33	4.43E-09

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

N/A - not applicable.
1 From EPA Dermal Exposure Assessment: Principles and Applications. January 1992. Epa/600/8-91/011B
* - DAevent calculated as shown in Table 7.1d.RME Supplement
Default value of 0.001 cm/hour used for inorganics without published permability constants.
Permeability constant for lindane used as surrogate for alpha-BHC
Permeability constant for trans-1,2-Dichloroethene used as a surrogate for cis-1,2-Dichloroethene.

Table 7.2c.RME Supplement
Calculation of DAevent
NAS Oceana - SWMU 24

Chemical	MW	log Kow	Kow	log Kp	Kp (cm/hr)	B	log Dsc/lsc	lsc (cm)	log Dsc	Dsc (cm^2/hr)	Tau (hr)	c	b	T* (hr)	Tevent (hr/event)	Medium EPC Value, Cv?	DAevent mg/(cm^2-event)
Acenaphthylene	152.2	3.9	7.94E+03	-8.79E-01	1.32E-01	7.94E-01	-3.65E+00	1.00E-03	-6.65E+00	2.25E-07	7.42E-01	1.13E+00	9.22E-01	1.32E+01	0.33	9.88E+01	1.78E-05
Dibenzofuran	168.19	4.12	1.32E+04	-8.21E-01	1.51E-01	1.32E+00	-3.75E+00	1.00E-03	-6.75E+00	1.79E-07	9.29E-01	1.65E+00	1.77E+00	6.32E+00	0.33	3.00E+00	6.94E-07

Equations from *Dermal Exposure Assessment: Principles and Applications*. EPA/600/8-91/011B. January 1992.

Table 7.2b RME
Calculation of Daevent(child)

NAS Oceana-SWMU 24

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[1]	Duration of Event (ET)	DAevent
1,1,2-Trichloroethane	8.27E-01	µg/l	8.40E-03	5.70E-01	0.33	8.33E-09
1,1-Dichloroethene	2.00E-01	µg/l	1.60E-02	3.40E-01	0.33	2.96E-09
Acenaphthylene	9.88E+01	µg/l	N/A	N/A	0.33	1.78E-05
alpha-BHC	3.24E-02	µg/l	1.40E-02	5.20E+00	0.33	1.64E-09
Aluminum (d)	9.37E+01	µg/l	1.00E-03	N/A	0.33	3.09E-08
Antimony (d)	2.60E+00	µg/l	1.00E-03	N/A	0.33	8.58E-10
Arsenic (d)	8.45E+01	µg/l	1.00E-03	N/A	0.33	2.79E-08
Benzene	8.73E-01	µg/l	2.10E-02	2.60E-01	0.33	1.48E-08
cis-1,2-Dichloroethene	5.00E+02	µg/l	1.00E-02	3.40E-01	0.33	4.63E-06
Dibenzofuran	3.00E+00	µg/l	N/A	N/A	0.33	6.94E-07
Iron (d)	3.58E+04	µg/l	1.00E-03	N/A	0.33	1.18E-05
Manganese (d)	3.34E+02	µg/l	1.00E-03	N/A	0.33	1.10E-07
Naphthalene	1.50E+01	µg/l	6.90E-02	5.30E-01	0.33	1.20E-06
trans-1,2-Dichloroethene	1.25E+01	µg/l	1.00E-02	3.40E-01	0.33	1.16E-07
Trichloroethene	2.46E+00	µg/l	1.60E-02	5.50E-01	0.33	4.64E-08
Vinyl chloride	8.34E-01	µg/l	7.30E-03	2.10E-01	0.33	4.43E-09

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

N/A - not applicable.
1 From EPA Dermal Exposure Assessment: Principles and Applications. January 1992. Epa/600/8-91/011B
* - DAevent calculated as shown in Table 7.1d.RME Supplement
Default value of 0.001 cm/hour used for inorganics without published permability constants.
Permeability constant for lindane used as surrogate for alpha-BHC

TABLE 7.3a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	6.31E-08	µg/l	M	3.7E-06	mg/kg-day	3.2E-02	mg/kg-day	N/A	N/A	1.2E-04
	1,1-Dichloroethene	2.00E-01	µg/l	1.46E-08	µg/l	M	8.6E-07	mg/kg-day	7.2E-03	mg/kg-day	N/A	N/A	1.2E-04
	Acenaphthylene	9.88E+01	µg/l	8.78E-05	µg/l	M	5.2E-03	mg/kg-day	2.1E+00	mg/kg-day	N/A	N/A	2.5E-03
	alpha-BHC	3.24E-02	µg/l	8.09E-09	µg/l	M	4.8E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	3.06E+03	µg/l	2.45E-05	µg/l	M	1.4E-03	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	5.3E-03
	Arsenic	8.17E+01	µg/l	6.54E-07	µg/l	M	3.8E-05	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	1.3E-01
	Benzene	8.73E-01	µg/l	1.54E-07	µg/l	M	9.1E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.0E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	4.32E-05	µg/l	M	2.5E-03	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	2.5E-02
	Dibenzofuran	3.00E+00	µg/l	3.36E-06	µg/l	M	2.0E-04	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.1E-02
	Iron	2.97E+04	µg/l	2.38E-04	µg/l	M	1.4E-02	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	2.3E-01
	Manganese	3.57E+02	µg/l	2.86E-06	µg/l	M	1.7E-04	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	2.4E-02
	Naphthalene	1.50E+01	µg/l	8.36E-06	µg/l	M	4.9E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	3.1E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.08E-06	µg/l	M	6.4E-05	mg/kg-day	2.0E-01	mg/kg-day	N/A	N/A	3.2E-04
	Trichloroethene	2.46E+00	µg/l	3.53E-07	µg/l	M	2.1E-05	mg/kg-day	4.8E-03	mg/kg-day	N/A	N/A	4.3E-03
	Vinyl chloride	8.34E-01	µg/l	5.12E-08	µg/l	M	3.0E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.0E-03
	(Total)												5.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	5.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic value used if available. Chronic value used if no subchronic value available.

RfD value for anthracene used as surrogate for acenapthylene.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

Ingestion pathway not quantitatively evaluated per dicussion in Table 1.

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

TABLE 7.3b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation													
	1,1,2-Trichloroethane	8.27E-01	µg/l	1.97E-06	mg/kg/shower	R	3.9E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	1,1-Dichloroethene	2.00E-01	µg/l	1.45E-04	mg/kg/shower	R	1.4E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acenaphthylene	9.88E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	alpha-BHC	3.24E-02	µg/l	1.38E-08	mg/kg/shower	R	2.7E-09	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum	3.06E+03	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.0E-03	mg/kg-day	3.50E-03	mg/m3	N/A
	Arsenic	8.17E+01	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Benzene	8.73E-01	µg/l	2.47E-06	mg/kg/shower	R	4.8E-07	mg/kg-day	1.7E-03	mg/kg-day	5.90E-03	mg/m3	2.8E-04
	cis-1,2-Dichloroethene	5.00E+02	µg/l	1.33E-03	mg/kg/shower	R	2.6E-04	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Dibenzofuran	3.00E+00	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Iron	2.97E+04	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Manganese	3.57E+02	µg/l	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.4E-05	mg/kg-day	4.90E-05	mg/m3	N/A
	Naphthalene	1.50E+01	µg/l	3.77E-05	mg/kg/shower	R	7.4E-06	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m3	8.2E-03
	trans-1,2-Dichloroethene	1.25E+01	µg/l	3.36E-05	mg/kg/shower	R	6.6E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Trichloroethene	2.46E+00	µg/l	6.12E-02	mg/kg/shower	R	1.2E-02	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Vinyl chloride	8.34E-01	µg/l	2.50E-06	mg/kg/shower	R	4.9E-07	mg/kg-day	2.8E-02	mg/kg-day	9.80E-02	mg/m3	1.7E-05
	(Total)												8.5E-03
												Total Hazard Index Across All Exposure Routes/Pathways	8.5E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic value used if available. Chronic value used if no subchronic value available.
N/A - Not applicable; metals are not volatile.

Table 7.3c RME
Calculation of DAevent

NAS Oceana-SWMU 24

Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Permeability Constant (PC)[1]	Lag Time (t)[1]	Duration of Event (ET)	DAevent
1,1,2-Trichloroethane	8.27E-01	µg/l	8.40E-03	5.70E-01	8	6.31E-08
1,1-Dichloroethene	2.00E-01	µg/l	1.60E-02	3.40E-01	8	1.46E-08
Acenaphthylene*	9.88E+01	µg/l	N/A	N/A	8	8.78E-05
alpha-BHC	3.24E-02	µg/l	1.40E-02	5.20E+00	8	8.09E-09
Aluminum	3.06E+03	µg/l	1.00E-03	N/A	8	2.45E-05
Arsenic	8.17E+01	µg/l	1.00E-03	N/A	8	6.54E-07
Benzene	8.73E-01	µg/l	2.10E-02	2.60E-01	8	1.54E-07
cis-1,2-Dichloroethene	5.00E+02	µg/l	1.00E-02	3.40E-01	8	4.32E-05
Dibenzofuran*	3.00E+00	µg/l	N/A	N/A	8	3.36E-06
Iron	2.97E+04	µg/l	1.00E-03	N/A	8	2.38E-04
Manganese	3.57E+02	µg/l	1.00E-03	N/A	8	2.86E-06
Naphthalene	1.50E+01	µg/l	6.90E-02	5.30E-01	8	8.36E-06
trans-1,2-Dichloroethene	1.25E+01	µg/l	1.00E-02	3.40E-01	8	1.08E-06
Trichloroethene	2.46E+00	µg/l	1.60E-02	5.50E-01	8	3.53E-07
Vinyl chloride	8.34E-01	µg/l	7.30E-03	2.10E-01	8	5.12E-08

Inorganics: DAevent (mg/cm2-event) =
PC x CW x ET x CF1 x CF2 (eq 1)

Organics: DAevent (mg/cm2-event) =

ET<t*: DAevent (mg/cm2-event) =
2 x PC x CW x (sqrt((6 x t x ET)/3.1415))
x CF1 x CF2 (eq 2)

ET>t*: DAevent (mg/cm2-event) =
PC x CW x (ET/(1+B) + 2 x t x ((1 + 3xB)/(1+B))
x CF1 x CF2 (eq 3)

N/A - not applicable.
1 From EPA Dermal Exposure Assessment: Principles and Applications. January 1992. Epa/600/8-91/011B
Default value of 0.001 cm/hour used for inorganics without published permability constants.
Permeability constant for lindane used as surrogate for alpha-BHC
Permeability constant for trans-1,2-Dichloroethene used as a surrogate for cis-1,2-Dichloroethene.
Permeability constant for lindane used as surrogate for alpha-BHC

Table 7.3d.RME Supplement
Calculation of DAevent
NAS Oceana - SWMU 24

Chemical	MW	log Kow	Kow	log Kp	Kp (cm/hr)	B	log Dsc/lsc	lsc (cm)	log Dsc	Dsc (cm^2/hr)	Tau (hr)	c	b	T* (hr)	Tevent (hr/event)	Medium EPC Value, Cv?	DAevent mg/(cm^2-event)
Acenaphthylene	152.2	3.9	7.94E+03	-8.79E-01	1.32E-01	7.94E-01	-3.65E+00	1.00E-03	-6.65E+00	2.25E-07	7.42E-01	1.13E+00	9.22E-01	1.32E+01	8	9.88E+01	8.78E-05
Dibenzofuran	168.19	4.12	1.32E+04	-8.21E-01	1.51E-01	1.32E+00	-3.75E+00	1.00E-03	-6.75E+00	1.79E-07	9.29E-01	1.65E+00	1.77E+00	6.32E+00	8	3.00E+00	3.36E-06

Equations from *Dermal Exposure Assessment: Principles and Applications.* EPA/600/8-91/011B. January 1992.

Table 7.3e RME
Inhalation of Volatiles from Groundwater During Construction
Inhalation Exposure Concentrations Calculated Using a Two-Film Volatilization Model
Future Construction Worker Senario
NAS Oceana - SWMU 24

Chemical	Cw (µg/L)	MW (mol/gram)	K_H (unitless)	k_l (cm/hr)	k_g (cm/hr)	K_v (cm/hr)	ER (mg/hr)	ERa (g/sec-m^2)	Ca (mg/m^3)
1,1,2-Trichloroethane	8.27E-01	133	3.74E-02	3.08E+00	1.87E+03	2.95E+00	2.44E+00	2.511E-10	1.97E-06
1,1-Dichloroethene	2.00E-01	97	1.07E+00	3.33E+00	2.02E+03	3.33E+00	6.66E-01	6.851E-11	1.45E-04
Acenaphthylene	9.88E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
alpha-BHC	3.24E-02	291	4.35E-04	2.53E+00	1.54E+03	5.29E-01	1.71E-02	1.764E-12	1.38E-08
Aluminum	3.06E+03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	8.17E+01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzene	8.73E-01	78	2.28E-01	3.52E+00	2.13E+03	3.50E+00	3.05E+00	3.14E-10	2.47E-06
cis-1,2-Dichloroethene	5.00E+02	97	1.76E-01	3.33E+00	2.02E+03	3.30E+00	1.65E+03	1.70E-07	1.33E-03
Dibenzofuran	3.58E+04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Iron	2.97E+04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	3.57E+02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	1.50E+01	128	1.98E+02	3.11E+00	1.89E+03	3.11E+00	4.67E+01	4.80E-09	3.77E-05
trans-1,2-Dichloroethene	1.25E+01	97	3.85E-01	3.33E+00	2.02E+03	3.32E+00	4.16E+01	4.28E-09	3.36E-05
Trichloroethene	2.46E+00	131	4.22E-01	3.09E+00	1.88E+03	3.08E+00	7.59E+00	7.80E-10	6.12E-02
Vinyl chloride	8.34E-01	62.5	1.11E+00	3.72E+00	2.26E+03	3.72E+00	3.10E+00	3.19E-10	2.50E-06

Equations

Equation 1 $Kv = 1/(1/k_l + 1/K_H{*}K_g)$

Equation 2 $k_g = 700(18/MW)^{1/4}V$

Equation 3 $k_l = (32/MW)^{1/4}Ka'$

Equation 4 $ER = Kv * Cw * L/1000\ cm^3 * mg/1000\ \mu g$

Equation 5 $ERa = ER * g/1000\ mg * hr/60\ min * min/60\ sec * 1/A$

Variables	Units	Exposure Assumptions
Cw = groundwater concentration	(µg/L)	chem-specific
MW = molecular weight	(mol/gram)	chem-specific
K_H - Henry's Law Constant	(unitless)	chem-specific
Kv = volatilization rate	(cm/hr)	Solved by Eq 1
k_g = gas phase transfer coefficient	(cm/hr)	Solved by Eq 2
k_l = liquid phase transfer coefficient	(cm/hr)	Solved by Eq 3
V = wind speed	(m/s)	4.4
Ka' = aeration rate	(cm/hr)	0.0633
ER = emission rate	(mg/hr)	Solved by Eq 4
A = area of excavation (utility ditch)	(m^2)	2,700
Era = area emission rate	(g/sec-m^2)	Solved by Eq 5
Ca = air concentration	(mg/m^3)	Solved using SCREEN3 model

Note: aeration rate based on aeration rate for small pond (0.1/day) multiplied by depth of water in excavation (1/2 ft)

TABLE 7.4a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	6.8E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	7.6E-05
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	6.8E-07	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	6.8E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	5.6E-08	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	9.3E-07
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	5.7E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.9E-05
	(Total)												1.1E-04
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	3.8E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	4.2E-05
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.8E-07	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	4.5E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	3.1E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	6.5E-07
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	1.1E-06	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	6.6E-05
	(Total)												1.1E-04
												Total Hazard Index Across All Exposure Routes/Pathways	2.3E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 10% for naphthalene, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressure.

N/A - not applicable.

TABLE 7.4b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	3.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	3.4E-11	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	2.8E-12	mg/kg-day	8.6E-01	mg/kg-day	3.00E+00	mg/m^3	3.3E-12
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	2.9E-11	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m^3	3.2E-08
	(Total)												3.2E-08
												Total Hazard Index Across All Exposure Routes/Pathways	3.2E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 7.5a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	9.6E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	1.1E-04
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	9.5E-07	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	9.5E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	7.8E-08	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.3E-06
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	8.0E-07	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	4.0E-05
	(Total)												1.6E-04
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	3.3E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	3.7E-05
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.3E-07	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	4.0E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	2.7E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.7E-07
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	9.3E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.8E-05
	(Total)												1.0E-04
												Total Hazard Index Across All Exposure Routes/Pathways	2.6E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 10% for naphthalene, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressure.

N/A - not applicable.

TABLE 7.5b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	1.4E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	1.2E-11	mg/kg-day	8.6E-01	mg/kg-day	3.00E+00	mg/m^3	1.4E-11
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	1.2E-10	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m^3	1.3E-07
	(Total)												1.3E-07
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 7.6a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	8.9E-06	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	9.9E-04
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	8.8E-06	mg/kg-day	1.0E-01	mg/kg-day	N/A	N/A	8.8E-05
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	7.3E-07	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.2E-05
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	7.5E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.7E-04
	(Total)												1.5E-03
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	3.5E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	3.9E-05
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.5E-07	mg/kg-day	8.3E-02	mg/kg-day	N/A	N/A	4.2E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	2.9E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	6.0E-07
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	9.8E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	6.1E-05
	(Total)												1.0E-04
												Total Hazard Index Across All Exposure Routes/Pathways	1.6E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 10% for naphthalene, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressure.

N/A - not applicable.

TABLE 7.6b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	4.1E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	4.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	3.3E-11	mg/kg-day	8.6E-01	mg/kg-day	3.00E+00	mg/m^3	3.9E-11
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	3.4E-10	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m^3	3.8E-07
	(Total)												3.8E-07
												Total Hazard Index Across All Exposure Routes/Pathways	3.8E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 7.7a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	3.3E-06	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	3.7E-04
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	3.2E-06	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	3.2E-06
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	2.7E-07	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	4.5E-06
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	2.7E-06	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.4E-04
	(Total)												5.1E-04
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	3.0E-07	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	3.3E-05
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	2.9E-07	mg/kg-day	8.3E-01	mg/kg-day	N/A	N/A	3.5E-07
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	2.4E-08	mg/kg-day	4.8E-02	mg/kg-day	N/A	N/A	5.0E-07
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	8.2E-07	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	5.1E-05
	(Total)												8.5E-05
												Total Hazard Index Across All Exposure Routes/Pathways	6.0E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Subchronic, if available, else chronic.

Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 10% for naphthalene, 0.05% for VOCs with vapor pressure of ~95.2 mm Hg, 3% for VOCs with lower vapor pressure.

N/A - not applicable.

TABLE 7.7b RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	1.0E-10	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	8.5E-12	mg/kg-day	8.6E-01	mg/kg-day	3.00E+00	mg/m^3	9.8E-12
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	8.7E-11	mg/kg-day	9.0E-04	mg/kg-day	3.10E-03	mg/m^3	9.6E-08
	(Total)												9.6E-08
												Total Hazard Index Across All Exposure Routes/Pathways	9.6E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Subchronic, if available, else chronic.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF= 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 7.8a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	1.1E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	2.7E-03
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	2.6E-06	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	2.8E-04
	Acenaphthylene*	9.88E+01	µg/l	9.88E+01	µg/l	M	1.3E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	4.2E-03
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	4.2E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	1.2E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	1.2E-03
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	3.3E-05	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	8.3E-02
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	1.1E-03	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	3.6E+00
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	1.1E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.7E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	6.4E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	6.4E-01
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	3.8E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	9.6E-03
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	4.6E-01	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.5E+00
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	4.3E-03	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.1E-01
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	1.9E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	9.6E-03
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	1.6E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	8.0E-03
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	3.2E-05	mg/kg-day	6.0E-03	mg/kg-day	N/A	N/A	5.3E-03
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	1.1E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	3.6E-03
	(Total)												6.1E+00
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	6.48E-09	µg/l	M	1.0E-06	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	3.2E-04
	1,1-Dichloroethene	2.00E-01	µg/l	2.31E-09	µg/l	M	3.6E-07	mg/kg-day	7.2E-03	mg/kg-day	N/A	N/A	5.0E-05
	Acenaphthylene*	9.88E+01	µg/l	1.39E-05	µg/l	M	2.2E-03	mg/kg-day	2.1E-01	mg/kg-day	N/A	N/A	1.0E-02
	alpha-BHC	3.24E-02	µg/l	1.28E-09	µg/l	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	1.87E-08	µg/l	M	2.9E-06	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	1.1E-05
	Antimony (d)	2.60E+00	µg/l	5.20E-10	µg/l	M	8.1E-08	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	2.0E-03
	Arsenic (d)	8.45E+01	µg/l	1.69E-08	µg/l	M	2.6E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	9.1E-03
	Benzene	8.73E-01	µg/l	1.16E-08	µg/l	M	1.8E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	6.0E-04
	cis-1,2-Dichloroethene	5.00E+02	µg/l	3.60E-06	µg/l	M	5.6E-04	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	5.6E-02
	Dibenzofuran*	3.00E+00	µg/l	5.40E-07	µg/l	M	8.4E-05	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	3.0E-02
	Iron (d)	3.58E+04	µg/l	7.15E-06	µg/l	M	1.1E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	1.9E-02
	Manganese (d)	3.34E+02	µg/l	6.67E-08	µg/l	M	1.0E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	1.5E-03
	Naphthalene	1.50E+01	µg/l	9.31E-07	µg/l	M	1.5E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	9.1E-03
	trans-1,2-Dichloroethene	1.25E+01	µg/l	9.03E-08	µg/l	M	1.4E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	7.0E-04
	Trichloroethene	2.46E+00	µg/l	3.61E-08	µg/l	M	5.6E-06	mg/kg-day	4.8E-03	mg/kg-day	N/A	N/A	1.2E-03
	Vinyl chloride	8.34E-01	µg/l	3.45E-09	µg/l	M	5.4E-07	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.8E-04
	(Total)												1.4E-01
												Total Hazard Index Across All Exposure Routes/Pathways	6.3E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Chronic value used.
(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III *"Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk"*, August 10, 1992.
RfD value for anthracene used as surrogate for acenapthylene.
Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

TABLE 7.9a CT
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	3.5E-05	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	8.8E-03
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	8.5E-06	mg/kg-day	9.0E-03	mg/kg-day	N/A	N/A	9.5E-04
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	4.2E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	1.4E-02
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	4.0E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	N/A	4.0E-03
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	1.1E-04	mg/kg-day	4.0E-04	mg/kg-day	N/A	N/A	2.8E-01
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	3.6E-03	mg/kg-day	3.0E-04	mg/kg-day	N/A	N/A	1.2E+01
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	3.7E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.2E-02
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	2.1E-02	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	2.1E+00
	Dibenzofuran	3.00E+00	µg/l	3.00E+00	µg/l	M	1.3E-04	mg/kg-day	4.0E-03	mg/kg-day	N/A	N/A	3.2E-02
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	1.5E+00	mg/kg-day	3.0E-01	mg/kg-day	N/A	N/A	5.1E+00
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	1.4E-02	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	7.1E-01
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	6.4E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	3.2E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	5.4E-04	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	2.7E-02
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	1.1E-04	mg/kg-day	6.0E-03	mg/kg-day	N/A	N/A	1.8E-02
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	3.6E-05	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.2E-02
	(Total)												2.0E+01
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.33E-09	µg/l	M	2.4E-06	mg/kg-day	3.2E-03	mg/kg-day	N/A	N/A	7.7E-04
	1,1-Dichloroethene	2.00E-01	µg/l	2.96E-09	µg/l	M	8.7E-07	mg/kg-day	7.2E-03	mg/kg-day	N/A	N/A	1.2E-04
	Acenaphthylene	9.88E+01	µg/l	1.76E-05	µg/l	M	5.2E-03	mg/kg-day	2.1E-01	mg/kg-day	N/A	N/A	2.5E-02
	alpha-BHC	3.24E-02	µg/l	1.64E-09	µg/l	M	4.8E-07	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A
	Aluminum (d)	9.37E+01	µg/l	3.09E-08	µg/l	M	9.1E-06	mg/kg-day	2.7E-01	mg/kg-day	N/A	N/A	3.4E-05
	Antimony (d)	2.60E+00	µg/l	8.58E-10	µg/l	M	2.5E-07	mg/kg-day	4.0E-05	mg/kg-day	N/A	N/A	6.3E-03
	Arsenic (d)	8.45E+01	µg/l	2.79E-08	µg/l	M	8.2E-06	mg/kg-day	2.9E-04	mg/kg-day	N/A	N/A	2.8E-02
	Benzene	8.73E-01	µg/l	1.48E-08	µg/l	M	4.4E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	1.5E-03
	cis-1,2-Dichloroethene	5.00E+02	µg/l	4.63E-06	µg/l	M	1.4E-03	mg/kg-day	1.0E-02	mg/kg-day	N/A	N/A	1.4E-01
	Dibenzofuran	3.00E+00	µg/l	6.94E-07	µg/l	M	2.0E-04	mg/kg-day	2.8E-03	mg/kg-day	N/A	N/A	7.3E-02
	Iron (d)	3.58E+04	µg/l	1.18E-05	µg/l	M	3.5E-03	mg/kg-day	6.0E-02	mg/kg-day	N/A	N/A	5.8E-02
	Manganese (d)	3.34E+02	µg/l	1.10E-07	µg/l	M	3.2E-05	mg/kg-day	7.0E-03	mg/kg-day	N/A	N/A	4.6E-03
	Naphthalene	1.50E+01	µg/l	1.20E-06	µg/l	M	3.5E-04	mg/kg-day	1.6E-02	mg/kg-day	N/A	N/A	2.2E-02
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.16E-07	µg/l	M	3.4E-05	mg/kg-day	2.0E-02	mg/kg-day	N/A	N/A	1.7E-03
	Trichloroethene	2.46E+00	µg/l	4.64E-08	µg/l	M	1.4E-05	mg/kg-day	4.8E-03	mg/kg-day	N/A	N/A	2.8E-03
	Vinyl chloride	8.34E-01	µg/l	4.43E-09	µg/l	M	1.3E-06	mg/kg-day	3.0E-03	mg/kg-day	N/A	N/A	4.3E-04
	(Total)												3.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	2.1E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Chronic value used.

(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III *"Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk"*, August 10, 1992.

RfD value for anthracene used as surrogate for acenapthylene.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values (all of the COPCs).

TABLE 8.1 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	1.23E-05	mg/kg-day	5.70E-02	mg/kg-day	7.0E-07
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	2.99E-06	mg/kg-day	6.00E-01	mg/kg-day	1.8E-06
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	1.47E-03	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	4.84E-07	mg/kg-day	6.30E+00	mg/kg-day	3.1E-06
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	1.40E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	3.88E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	1.26E-03	mg/kg-day	1.50E+00	mg/kg-day	1.9E-03
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	1.30E-05	mg/kg-day	5.50E-02	mg/kg-day	7.2E-07
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	7.47E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	4.48E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	5.34E-01	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	4.98E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	2.24E-04	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	1.87E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	3.68E-05	mg/kg-day	1.10E-02	mg/kg-day	4.0E-07
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	1.25E-05	mg/kg-day	1.50E+00	mg/kg-day	1.9E-05
	(Total)										1.9E-03
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	9.7E-07	mg/kg-day	7.1E-02	mg/kg-day	6.9E-08
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	3.5E-07	mg/kg-day	6.00E-01	mg/kg-day	2.1E-07
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	2.1E-03	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	1.9E-07	mg/kg-day	1.3E+01	mg/kg-day	2.5E-06
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	1.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	1.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	1.6E-06	mg/kg-day	1.6E+00	mg/kg-day	2.6E-06
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	2.3E-06	mg/kg-day	5.50E-02	mg/kg-day	1.3E-07
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	3.4E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	2.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	7.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	5.2E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	9.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	6.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	8.4E-06	mg/kg-day	1.4E-02	mg/kg-day	1.2E-07
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	2.3E-06	mg/kg-day	1.5E+00	mg/kg-day	3.5E-06
	(Total)										9.1E-06
							Total Risk Across All Exposure Routes/Pathways				1.9E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III *"Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk*, August 10, 1992.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

N/A - not applicable.

TABLE 8.1 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Water Vapors at Showerhead
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	8.27E-01	mg/kg	1.46E-05	mg/kg/shower	R	4.8E-06	mg/kg-day	5.6E-02	mg/kg-day	2.7E-07
	1,1-Dichloroethene	2.00E-01	mg/kg	1.16E-05	mg/kg/shower	R	3.8E-06	mg/kg-day	1.8E-01	mg/kg-day	6.7E-07
	Acenaphthylene*	9.88E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	mg/kg	6.53E-09	mg/kg/shower	R	2.1E-09	mg/kg-day	6.3E+00	mg/kg-day	1.4E-08
	Aluminum (d)	9.37E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony (d)	2.60E+00	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic (d)	8.45E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.5E+01	mg/kg-day	N/A
	Benzene	8.73E-01	mg/kg	4.43E-05	mg/kg/shower	R	1.5E-05	mg/kg-day	2.9E-02	mg/kg-day	4.2E-07
	cis-1,2-Dichloroethene	5.00E+02	mg/kg	2.13E-02	mg/kg/shower	R	7.0E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran*	3.00E+00	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Iron (d)	3.58E+04	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese (d)	3.34E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	mg/kg	1.67E-04	mg/kg/shower	R	5.5E-05	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	mg/kg	6.49E-04	mg/kg/shower	R	2.1E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	mg/kg	1.15E-04	mg/kg/shower	R	3.8E-05	mg/kg-day	6.0E-03	mg/kg-day	2.2E-07
	Vinyl chloride	8.34E-01	mg/kg	5.67E-05	mg/kg/shower	R	1.9E-05	mg/kg-day	3.0E-02	mg/kg-day	5.6E-07
	(Total)										2.2E-06
										Total Risk Across All Exposure Routes/Pathways	2.2E-06

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

N/A Not applicable.

TABLE 8.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	5.3E-08	mg/kg-day	7.1E-02	mg/kg-day	3.8E-09
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.2E-08	mg/kg-day	7.50E-01	mg/kg-day	9.2E-09
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	7.4E-05	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	6.8E-09	mg/kg-day	1.30E+01	mg/kg-day	8.8E-08
	Aluminum	3.06E+03	µg/l	3.06E+03	µg/l	M	2.1E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	8.17E+01	µg/l	8.17E+01	µg/l	M	5.5E-07	mg/kg-day	1.60E+00	mg/kg-day	8.8E-07
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	1.3E-07	mg/kg-day	5.50E-02	mg/kg-day	7.1E-09
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	3.6E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	3.00E+00	µg/l	3.00E+00	µg/l	M	2.8E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	2.97E+04	µg/l	2.97E+04	µg/l	M	2.0E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	3.57E+02	µg/l	3.57E+02	µg/l	M	2.4E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	7.0E-06	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	9.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	3.0E-07	mg/kg-day	1.4E-02	mg/kg-day	4.1E-09
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	4.3E-08	mg/kg-day	1.5E+00	mg/kg-day	6.4E-08
	(Total)										1.1E-06
										Total Risk Across All Exposure Routes/Pathways	1.1E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

Ingestion pathway not quantitatively evaluated per dicussion in Table 1.

N/A - not applicable.

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.3c and 7.3d.

TABLE 8.2bRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Columbia Aquifer - Volatilization from Water in Excavation Pit
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,1,2-Trichloroethane	8.27E-01	mg/kg	1.97E-06	mg/kg/shower	R	5.5E-09	mg/kg-day	5.6E-02	mg/kg-day	3.1E-10
	1,1-Dichloroethene	2.00E-01	mg/kg	1.45E-04	mg/kg/shower	R	4.1E-07	mg/kg-day	1.8E-01	mg/kg-day	7.1E-08
	Acenaphthylene	9.88E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	6.3E+00	mg/kg-day	N/A
	alpha-BHC	3.24E-02	mg/kg	1.38E-08	mg/kg/shower	R	3.9E-11	mg/kg-day	6.3E+00	mg/kg-day	2.4E-10
	Aluminum	3.06E+03	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic	8.17E+01	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	1.5E+01	mg/kg-day	N/A
	Benzene	8.73E-01	mg/kg	2.47E-06	mg/kg/shower	R	6.9E-09	mg/kg-day	2.9E-02	mg/kg-day	2.0E-10
	cis-1,2-Dichloroethene	5.00E+02	mg/kg	1.33E-03	mg/kg/shower	R	3.7E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran	3.00E+00	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Iron	2.97E+04	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese	3.57E+02	mg/kg	N/A	mg/kg/shower	R	N/A	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	mg/kg	3.77E-05	mg/kg/shower	R	1.1E-07	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	mg/kg	3.36E-05	mg/kg/shower	R	9.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	mg/kg	6.12E-02	mg/kg/shower	R	1.7E-04	mg/kg-day	6.0E-03	mg/kg-day	1.0E-06
	Vinyl chloride	8.34E-01	mg/kg	2.50E-06	mg/kg/shower	R	7.0E-09	mg/kg-day	3.0E-02	mg/kg-day	2.1E-10
	(Total)										1.1E-06
										Total Risk Across All Exposure Routes/Pathways	1.1E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
N/A Not applicable.

TABLE 8.3a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 1

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	2.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	2.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	2.0E-08	mg/kg-day	7.5E-03	mg/kg-day	1.5E-10
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	2.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.5E-10
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	1.1E-08	mg/kg-day	9.4E-03	mg/kg-day	1.0E-10
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.8E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.0E-10
										Total Risk Across All Exposure Routes/Pathways	2.5E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure c
~95.2 mm Hg, 3% for VOCs with lower vapor press

N/A - not applicable.

TABLE 8.3b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Industrial Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	1.2E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	1.2E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	1.0E-12	mg/kg-day	1.7E-03	mg/kg-day	1.7E-15
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	1.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.7E-15
										Total Risk Across All Exposure Routes/Pathways	1.7E-15

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg.
N/A Not applicable.

TABLE 8.4a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.1E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	8.9E-08	mg/kg-day	7.5E-03	mg/kg-day	6.7E-10
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	9.2E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										6.7E-10
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.4E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	1.2E-08	mg/kg-day	9.4E-03	mg/kg-day	1.1E-10
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	4.0E-07	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.1E-10
										Total Risk Across All Exposure Routes/Pathways	7.8E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 3.2% for arsenic, 6% for PCBs, 0.05% for VOCs with vapor pressure (~95.2 mm Hg, 3% for VOCs with lower vapor press

N/A - not applicable.

TABLE 8.4b RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	8.5E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m3	R	8.4E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m3	R	7.0E-12	mg/kg-day	1.7E-03	mg/kg-day	1.1E-14
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m3	R	7.1E-11	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.1E-14
										Total Risk Across All Exposure Routes/Pathways	1.1E-14

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF = 1.32E+9 m^3/kg
N/A Not applicable.

TABLE 8.5a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Soil
Exposure Point: Direct Contact
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	4.7E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	4.6E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	3.8E-09	mg/kg-day	7.5E-03	mg/kg-day	2.9E-11
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.9E-08	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.9E-11
Dermal Absorption	1,2-Dichloroethene (total)	7.00E-01	mg/kg	7.00E-01	mg/kg	M	7.0E-11	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	6.90E-01	mg/kg	M	1.4E-08	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	5.70E-02	mg/kg	M	1.1E-09	mg/kg-day	9.4E-03	mg/kg-day	1.1E-11
	Naphthalene	5.85E-01	mg/kg	5.85E-01	mg/kg	M	3.5E-09	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										1.1E-11
										Total Risk Across All Exposure Routes/Pathways	3.9E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Dermal absorption factor from EPA, 1995, Assessing Dermal Exposure from Soil. EPA Region III. EPA/903-K-95-003. Skin absorption factor is 10% for naphthalene, 6% for PCBs, 0.05% for VOCs with vapor pressure of ~95.2 m VOCs with lower vapor pressure.

N/A - not applicable.

TABLE 8.5bRME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Emissions from exposed soil
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	1,2-Dichloroethene (total)	7.00E-01	mg/kg	5.30E-10	mg/m^3	R	1.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Acetone	6.90E-01	mg/kg	5.23E-10	mg/m^3	R	1.5E-12	mg/kg-day	N/A	mg/kg-day	N/A
	Methylene chloride	5.70E-02	mg/kg	4.32E-11	mg/m^3	R	1.2E-13	mg/kg-day	1.7E-03	mg/kg-day	2.0E-16
	Naphthalene	5.85E-01	mg/kg	4.43E-10	mg/m^3	R	1.2E-12	mg/kg-day	N/A	mg/kg-day	N/A
	(Total)										2.0E-16
										Total Risk Across All Exposure Routes/Pathways	2.0E-16

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
Route EPC Value is equal to Medium EPC value multiplied by 1/PEF. PEF= 1.32E+9 m^3/kg
N/A Not applicable.

TABL CT
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Columbia Aquifer - Tap Water
Receptor Population: Resident
Receptor Age: Adult/Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	4.39E-06	mg/kg-day	5.70E-02	mg/kg-day	2.5E-07
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	1.06E-06	mg/kg-day	6.00E-01	mg/kg-day	6.4E-07
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	5.25E-04	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	1.72E-07	mg/kg-day	6.30E+00	mg/kg-day	1.1E-06
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	4.98E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	1.38E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	4.49E-04	mg/kg-day	1.50E+00	mg/kg-day	6.7E-04
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	4.64E-06	mg/kg-day	5.50E-02	mg/kg-day	2.5E-07
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	2.66E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	1.59E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	1.90E-01	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	1.77E-03	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	7.97E-05	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	6.66E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	1.31E-05	mg/kg-day	1.10E-02	mg/kg-day	1.4E-07
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	4.43E-06	mg/kg-day	1.50E+00	mg/kg-day	6.6E-06
	(Total)										6.8E-04
Dermal Absorption	1,1,2-Trichloroethane	8.27E-01	µg/l	8.27E-01	µg/l	M	6.5E-07	mg/kg-day	7.1E-02	mg/kg-day	4.6E-08
	1,1-Dichloroethene	2.00E-01	µg/l	2.00E-01	µg/l	M	2.3E-07	mg/kg-day	6.00E-01	mg/kg-day	1.4E-07
	Acenaphthylene	9.88E+01	µg/l	9.88E+01	µg/l	M	1.4E-03	mg/kg-day	N/A	mg/kg-day	N/A
	alpha-BHC	3.24E-02	µg/l	3.24E-02	µg/l	M	1.3E-07	mg/kg-day	1.3E+01	mg/kg-day	1.7E-06
	Aluminum (d)	9.37E+01	µg/l	9.37E+01	µg/l	M	1.2E-06	mg/kg-day	N/A	mg/kg-day	N/A
	Antimony (d)	2.60E+00	µg/l	2.60E+00	µg/l	M	9.3E-07	mg/kg-day	N/A	mg/kg-day	N/A
	Arsenic (d)	8.45E+01	µg/l	8.45E+01	µg/l	M	1.1E-06	mg/kg-day	1.6E+00	mg/kg-day	1.7E-06
	Benzene	8.73E-01	µg/l	8.73E-01	µg/l	M	1.5E-06	mg/kg-day	5.50E-02	mg/kg-day	8.4E-08
	cis-1,2-Dichloroethene	5.00E+02	µg/l	5.00E+02	µg/l	M	2.3E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Dibenzofuran*	3.00E+00	µg/l	3.00E+00	µg/l	M	1.7E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Iron (d)	3.58E+04	µg/l	3.58E+04	µg/l	M	4.7E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Manganese (d)	3.34E+02	µg/l	3.34E+02	µg/l	M	3.5E-04	mg/kg-day	N/A	mg/kg-day	N/A
	Naphthalene	1.50E+01	µg/l	1.50E+01	µg/l	M	6.2E-05	mg/kg-day	N/A	mg/kg-day	N/A
	trans-1,2-Dichloroethene	1.25E+01	µg/l	1.25E+01	µg/l	M	4.0E-05	mg/kg-day	N/A	mg/kg-day	N/A
	Trichloroethene	2.46E+00	µg/l	2.46E+00	µg/l	M	5.6E-06	mg/kg-day	1.4E-02	mg/kg-day	7.9E-08
	Vinyl chloride	8.34E-01	µg/l	8.34E-01	µg/l	M	1.6E-06	mg/kg-day	1.5E+00	mg/kg-day	2.3E-06
	(Total)										6.1E-06
										Total Risk Across All Exposure Routes/Pathways	6.9E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(d) Dissolved groundwater concentrations used due to the discrepancy in the total versus dissolved aluminum values per USEPA Region III "*Draft Guidance on the Selection of Analtyical Metal Results from Monitoring Well Samples for Use in the Quantitative Assessment of Risk*", August 10, 1992.

Permeability constants from EPA 1992, Dermal Exposure Assessment: Principals and Applications. ORD, EPA/600/8-91/001B. Default value of 0.001 cm/hour used for inorganics without published values.

Route EPC value used for dermal absorption reflects the calculated Daevent from Tables 7.1c and 7.1d.

N/A - not applicable.

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water											
								1,1,2-Trichloroethane	Blood	5.7E-03	--	5.5E-04	6.2E-03
								1,1-Dichloroethene	Liver	6.1E-04	--	8.8E-05	7.0E-04
								Acenaphthylene	NOAEL	9.0E-03	--	1.8E-02	2.7E-02
								alpha-BHC	N/A	N/A	--	N/A	N/A
								Aluminum (d)	CNS	2.6E-03	--	1.9E-05	2.6E-03
								Antimony (d)	Blood/Whole Body	1.8E-01	--	3.6E-03	1.8E-01
								Arsenic (d)	Skin/Vascular	7.7E+00	--	1.6E-02	7.7E+00
								Benzene	Blood/Immune System	8.0E-03	--	1.1E-03	9.0E-03
								cis-1,2-Dichloroethene	Blood	1.4E+00	--	9.9E-02	1.5E+00
								Dibenzofuran	Kidney	2.1E-02	--	5.3E-02	7.3E-02
								Iron (d)	Gastrointestinal/Blood/ Liver	3.3E+00	--	3.3E-02	3.3E+00
								Manganese (d)	CNS	4.6E-01	--	2.6E-03	4.6E-01
								Naphthalene	Whole Body	2.1E-02	--	1.6E-02	3.6E-02
								trans-1,2-Dichloroethene	Blood	1.7E-02	--	1.2E-03	1.8E-02
								Trichloroethene	Liver	1.1E-02	--	2.1E-03	1.3E-02
								Vinyl chloride	Liver	7.6E-03	--	3.2E-04	7.9E-03
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		1.3E+01	0	2.5E-01	1.3E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					1.3E+01
Groundwater	Groundwater	Columbia Aquifer-Water Vapors at Showerhead											
			1,1,2-Trichloroethane	--	2.7E-07	--	2.7E-07	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			1,1-Dichloroethene	--	6.7E-07	--	6.7E-07	1,1-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Acenaphthylene	--	N/A	--	0.0E+00	Acenaphthylene	N/A	--	N/A	--	0.0E+00
			alpha-BHC	--	1.4E-08	--	1.4E-08	alpha-BHC	N/A	--	N/A	--	0.0E+00
			Aluminum (d)	--	N/A	--	0.0E+00	Aluminum (d)	CNS	--	N/A	--	0.0E+00
			Antimony (d)	--	N/A	--	0.0E+00	Antimony (d)	N/A	--	N/A	--	0.0E+00
			Arsenic (d)	--	N/A	--	0.0E+00	Arsenic (d)	N/A	--	N/A	--	0.0E+00
			Benzene	--	4.2E-07	--	4.2E-07	Benzene	Blood	--	2.5E-02	--	2.5E-02
			cis-1,2-Dichloroethene	--	N/A	--	0.0E+00	cis-1,2-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Iron (d)	--	N/A	--	0.0E+00	Iron (d)	N/A	--	N/A	--	0.0E+00
			Manganese (d)	--	N/A	--	0.0E+00	Manganese (d)	N/A	--	N/A	--	0.0E+00
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	1.9E-01	--	1.9E-01
			trans-1,2-Dichloroethene	--	N/A	--	0.0E+00	trans-1,2-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Trichloroethene	--	2.2E-07	--	2.2E-07	Trichloroethene	N/A	--	N/A	--	0.0E+00
			Vinyl chloride	--	5.6E-07	--	5.6E-07	Vinyl chloride	Liver	--	1.9E-03	--	1.9E-03
			(Total)	0	2.2E-06	0	2.2E-06	(Total)		0	2.1E-01	0	2.1E-01
			Total Risk Across Vapors at Showerhead				2.2E-06	Total Hazard Index Across Vapors at Showerhead					2.1E-01
	All Media		Total Risk Across Groundwater				2.2E-06	Total Hazard Index Across Groundwater					1.4E+01

1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Subsurface Soil	Soil	Direct Contact						1,2-Dichloroethene (total)	Liver	1.1E-04	--	3.7E-05	1.4E-04
								Acetone	Liver, Kidney	9.5E-06	--	4.0E-06	1.3E-05
								Methylene chloride	Liver	1.3E-06	--	5.7E-07	1.9E-06
								Naphthalene	Whole Body	4.0E-05	--	5.8E-05	9.8E-05
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.6E-04	0.0E+00	1.0E-04	2.6E-04
			Total Risk Across Soil				0.0E+00	Total Risk Across Soil					2.6E-04
Subsurface Soil	Air	Emissions from Exposed Soil						1,2-Dichloroethene (total)	N/A	--	N/A	--	0.0E+00
								Acetone	N/A	--	N/A	--	0.0E+00
								Methylene chloride	Liver	--	1.4E-11	--	1.4E-11
								Naphthalene	Respiratory	--	1.3E-07	--	1.3E-07
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	1.3E-07	0.0E+00	1.3E-07
			Total Risk Across Air				0.0E+00	Total Risk Across Air					1.3E-07
	All Media		Total Risk Across Subsurface Soil				0.0E+00	Total Hazard Index Across Subsurface Soil					2.6E-04
			Total Risk Across All Media and All Exposure Routes				2.2E-06	Total Hazard Index Across All Media and All Exposure Routes					1.4E+01

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Total Vascular	7.7E+00
Total Neural HI =	4.6E-01
Total Blood HI =	5.0E+00
Total Skin HI =	7.7E+00
Total Body HI =	2.2E-01
Total Gastrointestinal HI =	3.3E+00
Total Liver HI =	3.3E+00
Total Kidney HI =	7.3E-02
Total Respiratory HI =	1.9E-01
Immune Sysytem HI =	9.0E-03

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						1,1,2-Trichloroethane	Blood	1.3E-02	--	1.3E-03	1.5E-02
								1,1-Dichloroethene	Liver	1.4E-03	--	2.1E-04	1.6E-03
								Acenaphthlyene	NOAEL	N/A	--	4.3E-02	4.3E-02
								alpha-BHC	N/A	N/A	--	N/A	0.0E+00
								Aluminum (d)	CNS	6.0E-03	--	5.8E-05	6.1E-03
								Antimony (d)	Blood/Whole Body	4.2E-01	--	1.1E-02	4.3E-01
								Arsenic (d)	Skin/Vascular	1.8E+01	--	4.9E-02	1.8E+01
								Benzene	Blood/Immune System	1.9E-02	--	2.5E-03	2.1E-02
								cis-1,2-Dichloroethene	Blood	3.2E+00	--	2.3E-01	3.4E+00
								Dibenzofuran	Kidney	4.8E-02	--	1.3E-01	1.7E-01
								Iron (d)	Gastrointestinal/Blood/Liver	7.6E+00	--	1.0E-01	7.7E+00
								Manganese (d)	CNS	1.1E+00	--	8.0E-03	1.1E+00
								Naphthalene	Whole Body	4.8E-02	--	3.8E-02	8.6E-02
								trans-1,2-Dichloroethene	Blood	4.0E-02	--	2.9E-03	4.3E-02
								Trichloroethene	Liver	2.6E-02	--	4.9E-03	3.1E-02
								Vinyl chloride	Liver	1.8E-02	--	7.5E-04	1.9E-02
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		3.1E+01	0.0E+00	6.2E-01	3.1E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					3.1E+01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					3.1E+01
Subsurface Soil	Soil	Direct Contact						1,2-Dichloroethene (total)	Liver	9.9E-04	--	3.9E-05	1.0E-03
								Acetone	Liver, Kidney	8.8E-05	--	4.2E-06	9.2E-05
								Methylene chloride	Liver	1.2E-05	--	6.0E-07	1.3E-05
								Naphthalene	Whole Body	3.7E-04	--	6.1E-05	4.4E-04
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		1.5E-03	0.0E+00	1.0E-04	1.6E-03
			Total Risk Across Soil				0.0E+00	Total Risk Across Soil					1.6E-03
Subsurface Soil	Air	Emissions from Exposed Soil						1,2-Dichloroethene (total)	N/A	--	N/A	--	0.0E+00
								Acetone	N/A	--	N/A	--	0.0E+00
								Methylene chloride	Liver	--	3.9E-11	--	3.9E-11
								Naphthalene	Respiratory	--	3.8E-07	--	3.8E-07
			(Total)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	(Total)		0.0E+00	3.8E-07	0.0E+00	3.8E-07
			Total Risk Across Air				0.0E+00	Total Risk Across Air					3.8E-07
	All Media		Total Risk Across Subsurface Soil				0.0E+00	Total Hazard Index Across Subsurface Soil					1.6E-03
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					3.1E+01

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TABL[illegible]ME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
												Totsl Vascular HI =	1.8E+01
												Total Neural HI =	1.1E+00
												Total Blood HI =	1.2E+01
												Total Skin HI =	1.8E+01
												Total Body HI =	5.1E-01
												Total Gastrointestinal HI =	7.7E+00
												Total Kidney HI =	1.7E-01
												Total Liver HI =	7.8E+00
												Immune System HI =	2.1E-02
												Total Respiratory HI =	3.8E-07

TABLE 9.3.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	1,1,2-Trichloroethane	7.0E-07	--	6.9E-08	7.7E-07						
			1,1-Dichloroethene	1.8E-06	--	2.1E-07	2.0E-06						
			Acenaphthylene	N/A	--	N/A	0.0E+00						
			alpha-BHC	3.1E-06	--	2.5E-06	5.5E-06						
			Aluminum (d)	N/A	--	N/A	0.0E+00						
			Antimony (d)	N/A	--	N/A	0.0E+00						
			Arsenic (d)	1.9E-03	--	2.6E-06	1.9E-03						
			Benzene	7.2E-07	--	1.3E-07	8.4E-07						
			cis-1,2-Dichloroethene	N/A	--	N/A	0.0E+00						
			Dibenzofuran*	N/A	--	N/A	0.0E+00						
			Iron (d)	N/A	--	N/A	0.0E+00						
			Manganese (d)	N/A	--	N/A	0.0E+00						
			Naphthalene	N/A	--	N/A	0.0E+00						
			trans-1,2-Dichloroethene	N/A	--	N/A	0.0E+00						
			Trichloroethene	4.0E-07	--	1.2E-07	5.2E-07						
			Vinyl chloride	1.9E-05	--	3.5E-06	2.2E-05						
			(Total)	1.9E-03	0	9.1E-06	1.9E-03	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				1.9E-03	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				1.9E-03	Total Hazard Index Across Groundwater					0.0E+00
Subsurface Soil	Soil	Direct Contact	1,2-Dichloroethene (total)	N/A	--	N/A	0.0E+00						
			Acetone	N/A	--	N/A	0.0E+00						
			Methylene chloride	6.7E-10	--	1.1E-10	7.8E-10						
			Naphthalene	N/A	--	N/A	0.0E+00						
			(Total)	6.7E-10	0.0E+00	1.1E-10	7.8E-10	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Soil				7.8E-10	Total Risk Across Soil					0.0E+00
Subsurface Soil	Air	Emissions from Exposed Soil	1,2-Dichloroethene (total)	--	N/A	--	0.0E+00						
			Acetone	--	N/A	--	0.0E+00						
			Methylene chloride	--	1.1E-14	--	1.1E-14						
			Naphthalene	--	N/A	--	0.0E+00						
			(Total)	0.0E+00	1.1E-14	0.0E+00	1.1E-14	(Total)		0.0E+00	0.0E+00	0.0E+00	0.0E+00
			Total Risk Across Air				1.1E-14	Total Risk Across Air					0.0E+00
	All Media		Total Risk Across Subsurface Soil				7.8E-10	Total Hazard Index Across Subsurface Soil					0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.9E-03	Total Hazard Index Across All Media and All Exposure Routes					0.0[illegible]

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T[illegible]4.RME
SUMMARY OF RECEPT[illegible]S AND HAZARDS FOR COPCs
REASONABL[illegible]XIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Water in Excavation Pit											
			1,1,2-Trichloroethane	N/A	--	3.8E-09	3.8E-09	1,1,2-Trichloroethane	Blood	N/A	--	1.2E-04	1.2E-04
			1,1-Dichloroethene	N/A	--	9.2E-09	9.2E-09	1,1-Dichloroethene	Liver	N/A	--	1.2E-04	1.2E-04
			Acenaphthlyene	N/A	--	N/A	0.0E+00	Acenaphthlyene	N/A	N/A	--	2.5E-03	2.5E-03
			alpha-BHC	N/A	--	8.8E-08	8.8E-08	alpha-BHC	N/A	N/A	--	N/A	0.0E+00
			Aluminum	N/A	--	N/A	0.0E+00	Aluminum	CNS	N/A	--	5.3E-03	5.3E-03
			Arsenic	N/A	--	8.8E-07	8.8E-07	Arsenic	Skin/vascular	N/A	--	1.3E-01	1.3E-01
			Benzene	N/A	--	7.1E-09	7.1E-09	Benzene	Blood/Immune System	N/A	--	3.0E-03	3.0E-03
			cis-1,2-Dichloroethene	N/A	--	N/A	0.0E+00	cis-1,2-Dichloroethene	Blood	N/A	--	2.5E-02	2.5E-02
			Dibenzofuran	N/A	--	N/A	0.0E+00	Dibenzofuran	Kidney	N/A	--	7.1E-02	7.1E-02
			Iron	N/A	--	N/A	0.0E+00	Iron	Gastrointestinal/Blood/Liver	N/A	--	2.3E-01	2.3E-01
			Manganese	N/A	--	N/A	0.0E+00	Manganese	CNS	N/A	--	2.4E-02	2.4E-02
			Naphthalene	N/A	--	N/A	0.0E+00	Naphthalene	Whole Body	N/A	--	3.1E-02	3.1E-02
			trans-1,2-Dichloroethene	N/A	--	N/A	0.0E+00	trans-1,2-Dichloroethene	Blood	N/A	--	3.2E-04	3.2E-04
			Trichloroethene	N/A	--	4.1E-09	4.1E-09	Trichloroethene	Liver	N/A	--	4.3E-03	4.3E-03
			Vinyl chloride	N/A	--	6.4E-08	6.4E-08	Vinyl chloride	N/A	N/A	--	1.0E-03	1.0E-03
			(Total)	0.0E+00	--	1.1E-06	1.1E-06	(Total)		0.0E+00	--	5.3E-01	5.3E-01
			Total Risk Across Water in Pit				1.1E-06	Total Hazard Index Across Water in Pit					5.3E-01
Groundwater	Groundwater	Columbia Aquifer-Water Vapors in Excavation Pit											
			1,1,2-Trichloroethane	--	3.1E-10	--	3.1E-10	1,1,2-Trichloroethane	N/A	--	N/A	--	0.0E+00
			1,1-Dichloroethene		7.1E-08	--	7.1E-08	1,1-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Acenaphthlyene	--	N/A	--	0.0E+00	Acenaphthlyene	N/A	--	N/A	--	0.0E+00
			alpha-BHC	--	2.4E-10	--	2.4E-10	alpha-BHC	N/A	--	N/A	--	0.0E+00
			Aluminum	--	N/A	--	0.0E+00	Aluminum	CNS	--	N/A	--	0.0E+00
			Arsenic	--	N/A	--	0.0E+00	Arsenic	N/A	--	N/A	--	0.0E+00
			Benzene	--	2.0E-10	--	2.0E-10	Benzene	Blood	--	2.8E-04	--	2.8E-04
			cis-1,2-Dichloroethene	--	N/A	--	0.0E+00	cis-1,2-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Dibenzofuran	--	N/A	--	0.0E+00	Dibenzofuran	N/A	--	N/A	--	0.0E+00
			Iron	--	N/A	--	0.0E+00	Iron	N/A	--	N/A	--	0.0E+00
			Manganese	--	N/A	--	0.0E+00	Manganese	N/A	--	N/A	--	0.0E+00
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	8.2E-03	--	8.2E-03
			trans-1,2-Dichloroethene	--	N/A	--	0.0E+00	trans-1,2-Dichloroethene	N/A	--	N/A	--	0.0E+00
			Trichloroethene	--	1.0E-06	--	1.0E-06	Trichloroethene	N/A	--	N/A	--	0.0E+00
			Vinyl chloride	--	2.1E-10	--	2.1E-10	Vinyl chloride	Liver	--	1.7E-05	--	1.7E-05
			(Total)	--	1.1E-06	--	1.1E-06	(Total)		--	8.5E-03	--	8.5E-03
			Total Risk Across Vapors at Pit				1.1E-06	Total Risk Across Vapors at Pit					8.5E-03
			Total Risk Across Groundwater				2.1E-06	Total Hazard Index Across Groundwater					5.4E-01

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Subsurface Soil	Soil	Direct Contact	1,2-Dichloroethene (total)	N/A	--	N/A	0.0E+00	1,2-Dichloroethene (total)	Liver	3.7E-04	--	3.3E-05	4.0E-04
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	3.2E-06	--	3.5E-07	3.6E-06
			Methylene chloride	2.9E-11	--	1.1E-11	3.9E-11	Methylene chloride	Liver	4.5E-06	--	5.0E-07	5.0E-06
			Naphthalene	N/A	--	N/A	0.0E+00	Naphthalene	Whole Body	1.4E-04	--	5.1E-05	1.9E-04
			(Total)	2.9E-11	0.0E+00	1.1E-11	3.9E-11	(Total)		5.1E-04	0.0E+00	8.5E-05	6.0E-04
			Total Risk Across Soil				3.9E-11	Total Risk Across Soil					6.0E-04
Subsurface Soil	Air	Emissions from Exposed Soil	1,2-Dichloroethene (total)	--	N/A	--	0.0E+00	1,2-Dichloroethene (total)	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Methylene chloride	--	2.0E-16	--	2.0E-16	Methylene chloride	Liver	--	9.8E-12	--	9.8E-12
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	9.6E-08	--	9.6E-08
			(Total)	0.0E+00	2.0E-16	0.0E+00	2.0E-16	(Total)		0.0E+00	9.6E-08	0.0E+00	9.6E-08
			Total Risk Across Air				2.0E-16	Total Risk Across Air					9.6E-08
	All Media		Total Risk Across Subsurface Soil				3.9E-11	Total Hazard Index Across Subsurface Soil					6.0E-04
			Total Risk Across All Media and All Exposure Routes				2.1E-06	Total Hazard Index Across All Media and All Exposure Routes					5.4E-01

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Total Vascular HI =	1.3E-01
Total Neural HI =	2.9E-02
Total Blood HI =	2.6E-01
Total Skin HI =	1.3E-01
Total Body HI =	1.0E-01
Total Liver HI =	2.4E-01
Total Gastrointestinal HI =	2.3E-01
Total Kidney HI =	7.1E-02
Total Respiratory HI =	8.2E-03
Immune System HI =	3.0E-03

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Subsurface Soil	Soil	Direct Contact	1,2-Dichloroethene (total)	N/A	--	N/A	0.0E+00	1,2-Dichloroethene (total)	Liver	7.6E-05	--	4.2E-05	1.2E-04
			Acetone	N/A	--	N/A	0.0E+00	Acetone	Liver, Kidney	6.8E-06	--	4.5E-06	1.1E-05
			Methylene chloride	1.5E-10	--	1.0E-10	2.5E-10	Methylene chloride	Liver	9.3E-07	--	6.5E-07	1.6E-06
			Naphthalene	N/A	--	N/A	0.0E+00	Naphthalene	Whole Body	2.9E-05	--	6.6E-05	9.5E-05
			(Total)	1.5E-10	0.0E+00	1.0E-10	2.5E-10	(Total)		1.1E-04	0.0E+00	1.1E-04	2.3E-04
			Total Risk Across Soil				2.5E-10	Total Risk Across Soil					2.3E-04
Subsurface Soil	Air	Emissions from Exposed Soil	1,2-Dichloroethene (total)	--	N/A	--	0.0E+00	1,2-Dichloroethene (total)	N/A	--	N/A	--	0.0E+00
			Acetone	--	N/A	--	0.0E+00	Acetone	N/A	--	N/A	--	0.0E+00
			Methylene chloride	--	1.7E-15	--	1.7E-15	Methylene chloride	Liver	--	3.3E-12	--	3.3E-12
			Naphthalene	--	N/A	--	0.0E+00	Naphthalene	Respiratory	--	3.2E-08	--	3.2E-08
			(Total)	0.0E+00	1.7E-15	0.0E+00	1.7E-15	(Total)		0.0E+00	3.2E-08	0.0E+00	3.2E-08
			Total Risk Across Air				1.7E-15	Total Risk Across Air					3.2E-08
	All Media		Total Risk Across Subsurface Soil				2.5E-10	Total Hazard Index Across Subsurface Soil					2.3E-04
			Total Risk Across All Media and All Exposure Routes				2.5E-10	Total Hazard Index Across All Media and All Exposure Routes					2.3E-04

Total Liver HI =	1.3E-04
Total Kidney HI =	1.1E-05
Total Body HI =	9.5E-05
Total Respiratory HI =	3.2E-08

TABLE 9.6.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						1,1,2-Trichloroethane	Blood	2.7E-03	--	3.2E-04	3.0E-03
								1,1-Dichloroethene	Liver	2.8E-04	--	5.0E-05	3.3E-04
								Acenaphthylene	NOAEL	NA	--	1.0E-02	1.0E-02
								alpha-BHC	N/A	N/A	--	N/A	0.0E+00
								Aluminum (d)	CNS	1.2E-03	--	1.1E-05	1.2E-03
								Antimony (d)	Blood/Whole Body	8.3E-02	--	2.0E-03	8.5E-02
								Arsenic (d)	Skin/Vascular	3.6E+00	--	9.1E-03	3.6E+00
								Benzene	Blood/Immune System	3.7E-03	--	6.0E-04	4.3E-03
								cis-1,2-Dichloroethene	Blood	6.4E-01	--	5.6E-02	7.0E-01
								Dibenzofuran	Kidney	9.6E-03	--	3.0E-02	4.0E-02
								Iron (d)	Gastrointestinal/Blood /Liver	1.5E+00	--	1.9E-02	1.5E+00
								Manganese (d)	CNS	2.1E-01	--	1.5E-03	2.2E-01
								Naphthalene	Whole Body	9.6E-03	--	9.1E-03	1.9E-02
								trans-1,2-Dichloroethene	Blood	8.0E-03	--	7.0E-04	8.7E-03
								Trichloroethene	Liver	5.3E-03	--	1.2E-03	6.4E-03
								Vinyl chloride	Liver	3.6E-03	--	1.8E-04	3.7E-03
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		6.1E+00	0.0E+00	1.4E-01	6.3E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					6.3E+00
	All Media		Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					6.3E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					6.3E+00

d = dissolved

Total Vascular HI =	3.6E+00
Total Neural HI =	2.2E-01
Total Blood HI =	8.0E-01
Total Skin HI =	3.6E+00
Total Body HI =	1.0E-01
Total Gastrointestinal HI =	1.5E+00
Total Liver HI =	1.6E+00
Immune System HI =	4.3E-03

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						1,1,2-Trichloroethane	Blood	8.8E-03	--	7.7E-04	9.6E-03
								1,1-Dichloroethene	Liver	9.5E-04	--	9.7E-05	1.0E-03
								Acenaphthylene	NOAEL	N/A	--	N/A	0.0E+00
								alpha-BHC	N/A	N/A	--	N/A	0.0E+00
								Aluminum (d)	Blood/Whole Body	4.0E-03	--	3.4E-05	4.0E-03
								Antimony (d)	Skin/vascular	2.8E-01	--	6.3E-03	2.8E-01
								Arsenic (d)	N/A	1.2E+01	--	2.8E-02	1.2E+01
								Benzene	Blood/Immune System	1.2E-02	--	1.5E-03	1.4E-02
								cis-1,2-Dichloroethene	Whole Body	2.1E+00	--	1.4E-01	2.3E+00
								Dibenzofuran	liver	3.2E-02	--	7.3E-02	1.0E-01
								Iron (d)	CNS	5.1E+00	--	5.8E-02	5.2E+00
								Manganese (d)	Whole Body	7.1E-01	--	4.6E-03	7.2E-01
								Naphthalene	Blood	3.2E-02	--	2.2E-02	5.4E-02
								trans-1,2-Dichloroethene	Liver	2.7E-02	--	1.7E-03	2.8E-02
								Trichloroethene	N/A	1.8E-02	--	2.8E-03	2.0E-02
								Vinyl chloride	N/A	1.2E-02	--	4.3E-04	1.2E-02
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		2.0E+01	0.00E+00	3.3E-01	2.1E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					2.1E+01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					2.1E+01
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					2.1E+01

d = dissolved

Total Vascular HI =	2.8E-01
Total Neural HI =	5.2E+00
Total Blood HI =	8.2E-02
Total Skin HI =	2.8E-01
Total Body HI =	3.0E+00
Total Liver HI =	1.3E-01
Immune System HI =	1.4E-02

TABLE 9.8.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	1,1,2-Trichloroethane	2.5E-07	--	4.6E-08	3.0E-07						
			1,1-Dichloroethene	6.4E-07	--	1.4E-07	7.8E-07						
			Acenaphthylene	N/A	--	N/A	0.0E+00						
			alpha-BHC	1.1E-06	--	1.7E-06	2.8E-06						
			Aluminum (d)	N/A	--	N/A	0.0E+00						
			Antimony (d)	N/A	--	N/A	0.0E+00						
			Arsenic (d)	6.7E-04	--	1.7E-06	6.7E-04						
			Benzene	2.5E-07	--	8.4E-08	3.4E-07						
			cis-1,2-Dichloroethene	N/A	--	N/A	0.0E+00						
			Dibenzofuran*	N/A	--	N/A	0.0E+00						
			Iron (d)	N/A	--	N/A	0.0E+00						
			Manganese (d)	N/A	--	N/A	0.0E+00						
			Naphthalene	N/A	--	N/A	0.0E+00						
			trans-1,2-Dichloroethene	N/A	--	N/A	0.0E+00						
			Trichloroethene	1.4E-07	--	7.9E-08	2.2E-07						
			Vinyl chloride	6.6E-06	--	2.3E-06	9.0E-06						
			(Total)	6.8E-04	0	6.1E-06	6.9E-04	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				6.9E-04	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				6.9E-04	Total Hazard Index Across Groundwater					0.0E+00
			Total Risk Across All Media and All Exposure Routes				6.9E-04	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

d = dissolved

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic (d)	Skin	7.7E+00	--	1.6E-02	7.7E+00
								cis-1,2-Dichloroethene	Blood	1.4E+00	--	9.9E-02	1.5E+00
								Iron (d)	Gastrointestinal	3.3E+00	--	3.3E-02	3.3E+00
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		1.2E+01	0	1.5E-01	1.2E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					1.2E+01
	All Media		Total Risk Across Groundwater				0.0E+00		Total Hazard Index Across Groundwater				1.2E+01
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					1.2E+01

d = dissolved

Total Gastrointestinal HI =	3.3E+00
Total Blood HI =	1.5E+00
Total Skin HI =	7.7E+00

TABLE 10.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water					
			(Total)	0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				0.0E+00
			Total Risk Across Groundwater				0.0E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00

Chemical	Non-Carcinogenic Hazard Quotient				
	Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Arsenic (d)	Skin	1.8E+01	--	5.0E-02	1.8E+01
cis-1,2-Dichloroethene	Blood	3.2E+00	--	2.3E-01	3.4E+00
Iron (d)	Gastrointestinal	7.6E+00	--	1.0E-01	7.7E+00
Manganese (d)	CNS	1.1E+00	--	8.0E-03	1.1E+00
(Total)		3.0E+01	0	3.9E-01	3.0E+01
Total Risk Across Tap water					3.0E+01
Total Hazard Index Across Groundwater					3.0E+01
Total Hazard Index Across All Media and All Exposure Routes					3.0E+01

d = dissolved

Total Gastrointestinal HI =	7.7E+00
Total Neural HI =	1.1E+00
Total Blood HI =	3.4E+00
Total Skin HI =	1.8E+01

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	Arsenic (d)	1.9E-03	--	2.6E-06	1.9E-03						
			(Total)	1.9E-03	0	2.6E-06	1.9E-03	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				1.9E-03	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				1.9E-03		Total Hazard Index Across Groundwater				0.0E+00
			Total Risk Across All Media and All Exposure Routes				1.9E-03	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

d = dissolved

TABLE 10.4.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic (d)	Skin	3.6E+00	--	9.1E-03	3.6E+00
								cis-1,2-Dichloroethene	Blood	6.4E-01	--	5.6E-02	7.0E-01
								Iron (d)	Gastrointestinal	1.5E+00	--	1.9E-02	1.5E+00
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		5.8E+00	0	8.4E-02	5.9E+00
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					5.9E+00
	All Media		Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					5.9E+00
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					5.9E+00

d = dissolved

Total Gastrointestinal HI =	1.5E+00
Total Blood HI =	7.0E-01
Total Skin HI =	3.6E+00

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SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water						Arsenic (d)	Skin	1.2E+01	--	2.8E-02	1.2E+01
								cis-1,2-Dichloroethene	Blood	2.1E+00	--	1.4E-01	2.3E+00
								Iron (d)	Gastrointestinal	5.1E+00	--	5.8E-02	5.2E+00
								Manganese (d)	CNS	7.1E-01	--	4.6E-03	7.2E-01
			(Total)	0.0E+00	0	0.0E+00	0.0E+00	(Total)		2.0E+01	0	2.3E-01	2.0E+01
			Total Risk Across Tap water				0.0E+00	Total Risk Across Tap water					2.0E+01
			Total Risk Across Groundwater				0.0E+00	Total Hazard Index Across Groundwater					2.0E+01
			Total Risk Across All Media and All Exposure Routes				0.0E+00	Total Hazard Index Across All Media and All Exposure Routes					2.0E+01

d = dissolved

Total Gastrointestinal HI =	5.2E+00
Total Neural HI =	7.2E-01
Total Blood HI =	2.3E+00
Total Skin HI =	1.2E+01

TABLE 10.6.CT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

CENTRAL TENDENCY

NAS Oceana-SWMU 24

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal Absorption	Exposure Routes Total
Groundwater	Groundwater	Columbia Aquifer-Tap Water	Arsenic (d)	6.7E-04	--	1.7E-06	6.7E-04						
			(Total)	6.7E-04	0	1.7E-06	6.7E-04	(Total)		0.0E+00	0	0.0E+00	0.0E+00
			Total Risk Across Tap water				6.7E-04	Total Risk Across Tap water					0.0E+00
			Total Risk Across Groundwater				6.7E-04		Total Hazard Index Across Groundwater				0.0E+00
			Total Risk Across All Media and All Exposure Routes				6.7E-04	Total Hazard Index Across All Media and All Exposure Routes					0.0E+00

d = dissolved