Residual Human Health Risk Assessment
Willamette Cove Upland Facility

February 2013

Prepared for:

Ash Creek Associates
Division of Apex Companies LLC
3015 SW First Avenue
Portland Oregon

and

Port of Portland
7200 N.E. Airport Way
Portland, OR 97218

Prepared by:

Formation Environmental, LLC
2500 55th Street, Suite 200
Boulder, Colorado 80301

TABLE OF CONTENTS

Page

LIST OF TABLES ..... **iii**

LIST OF FIGURES ..... **vi**

LIST OF APPENDICES ..... **vii**

LIST OF ACRONYMS ..... **ix**

1.0 INTRODUCTION **1-1**
- 1.1 Facility Description 1-2
- 1.2 Facility History 1-2
- 1.3 Regulatory Status 1-6
- 1.4 Summary of Investigations 1-7
- 1.5 Facility Land and/or Water Uses 1-9
  - 1.5.1 Current Uses 1-9
  - 1.5.2 Future Uses 1-10
- 1.6 Facility Cleanup Actions 1-10

2.0 HUMAN HEALTH RISK ASSESSMENT SCREENING **2-1**
- 2.1 Land and Water Use Determinations 2-1
- 2.2 Nature and Extent of Contamination Determination 2-2
- 2.3 Data Quality Objectives 2-2
- 2.4 Chemicals of Interest (COIs) 2-3
- 2.5 Conceptual Site Model (CSM) – Human Health Exposure Pathways 2-3
  - 2.5.1 Identification of Exposure Scenarios and Populations 2-4
  - 2.5.2 Identification of Exposure Routes 2-5
- 2.6 Contaminant Screening Procedures 2-6
  - 2.6.1 Soil Screening Procedures 2-6
  - 2.6.2 Screening-Level Values (SLVs) 2-8
  - 2.6.3 Soil Screening Tables 2-9
  - 2.6.4 Soil Screening Results 2-9

3.0 EXPOSURE ASSESSMENT **3-1**
- 3.1 Exposure Calculation Methodology 3-1
  - 3.1.1 General Exposure Assessment 3-1
  - 3.1.2 Calculation of Lead Exposure 3-2
- 3.2 Exposure Results 3-3

4.0 TOXICITY ANALYSIS **4-1**

5.0 RISK CHARACTERIZATION AND UNCERTAINTY **5-1**
- 5.1 West Parcel 5-2
  - 5.1.1 Transient Trespasser 5-2
  - 5.1.2 Recreational Trespasser/ Future Park User 5-2
  - 5.1.3 Construction Worker 5-2
- 5.2 Central Parcel 5-2
  - 5.2.1 Transient Trespasser 5-3
  - 5.2.2 Recreational Trespasser/ Future Park User 5-3
  - 5.2.3 Construction Worker 5-3
- 5.3 East Parcel 5-4

5.3.1 Transient Trespasser 5-4
5.3.2 Recreational Trespasser/ Future Park User 5-4
5.3.3 Construction Worker 5-4
5.4 Inner Cove 5-5
5.4.1 Transient Trespasser 5-5
5.4.2 Recreational Trespasser/ Future Park User 5-6
5.4.3 Construction Worker 5-6
5.4.4 Portland Harbor RI HHRA 5-7
5.4.5 Oregon Health Authority Health Consultation 5-7
5.5 Central Beach 5-8
5.5.1 Transient Trespasser 5-8
5.5.2 Recreational Trespasser/ Future Park User 5-8
5.5.3 Construction Worker 5-8
5.5.4 Portland Harbor RI HHRA 5-9
5.6 Wharf Road 5-9
5.6.1 Transient Trespasser 5-9
5.6.2 Recreational Trespasser/ Future Park User 5-10
5.6.3 Construction Worker 5-10
5.7 Hot Spots 5-10
5.8 Uncertainty and Discussion 5-10
5.9 Residual Human Health Risk Assessment Conclusions 5-11

6.0 REFERENCES 6-1

LIST OF TABLES

Table	Title
2-1	Human Health Screening Level Summary Table
2-2	Human Health Summary of Soil COPCs – West Parcel Upland Exposure Unit
2-3	Human Health Summary of Soil COPCs – Central Parcel Upland Exposure Unit
2-4	Human Health Summary of Soil COPCs – East Parcel Upland Exposure Unit
2-5	Human Health Summary of Soil COPCs – Inner Cove Beach Exposure Unit
2-6	Human Health Summary of Soil COPCs – Central Beach Exposure Unit
2-7	Human Health Summary of Soil COPCs-Wharf Road Exposure Unit
3-1	Exposure Parameters for Current Transient Trespasser
3-2	Exposure Parameters for Current Recreational Trespasser/ Future Park User
3-3	Exposure Parameters for Future Construction Worker
3-4	Exposure Point Concentration Summary for COPCs – West Parcel Upland Exposure Unit
3-5	Exposure Point Concentration Summary for COPCs – Central Parcel Upland Exposure Unit
3-6	Exposure Point Concentration Summary for COPCs – East Parcel Upland Exposure Unit
3-7	Exposure Point Concentration Summary for COPCs – Inner Cove Beach Exposure Unit
3-8	Exposure Point Concentration Summary for COPCs – Central Beach Exposure Unit
3-9	Exposure Point Concentration Summary for COPCs – Wharf Road Exposure Unit (Dioxins Only)
4-1	Non-Cancer Toxicity Data
4-2	Cancer Toxicity Data
5-1	Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit
5-1-1	Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit- Current Transient Trespasser
5-1-2	Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

LIST OF TABLES (Continued)

5-1-3 Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit- Future Construction Worker

5-2 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit

5-2-1 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Current Transient Trespasser

5-2-2 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

5-2-3 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Future Construction Worker

5-3 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit

5-3-1 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Current Transient Trespasser

5-3-2 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

5-3-3 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Future Construction Worker

5-4 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit

5-4-1 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Current Transient Trespasser

5-4-2 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Current Recreational Trespasser/ Future Park User

5-4-3 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Future Construction Worker

5-5 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit

5-5-1 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Current Transient Trespasser

5-5-2 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Current Recreational Trespasser/ Future Park User

5-5-3 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Future Construction Worker

LIST OF TABLES (Continued)

5-6 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit

5-6-1 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Current Transient Trespasser

5-6-2 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Current Recreational Trespasser/ Future Park User

5-6-3 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Future Construction Worker

5-7 Human Health Summary Table for Risks and Hazards for all Receptors in all Exposure Units

5-8 Hot Spot Concentrations for Human Health Exposure Scenarios (units = mg/kg)

LIST OF FIGURES

Figure	Title
1-1	Facility Location
1-2	Facility Features
2-1	West Parcel Upland Exposure Unit
2-2	Central Parcel Area Exposure Units
2-3	East Parcel Upland Exposure Unit
2-4	Inner Cove Beach Exposure Unit
2-5	Central Beach Exposure Unit (Detailed view)
2-6	Conceptual Site Model of Human Health Exposure Pathways
5-8	Surface Soil Locations with Exceedances of Human Health Hot Spot Concentrations

LIST OF APPENDICES

Appendix	Title
A	Summary of Correspondence with DEQ
B	Upland Facility Surface Soil Data - Residual Risk Assessment
C	ProUCL Output for 90UCL calculations for all Exposure Units (EUs)
C-1	ProUCL Output for West Parcel Upland Exposure Unit
C-2	ProUCL Output for Central Parcel Upland Exposure Unit
C-3	ProUCL Output for East Parcel Upland Exposure Unit
C-4	ProUCL Output for Inner Cove Beach Exposure Unit
C-5	ProUCL Output for Central Beach Exposure Unit
C-6	ProUCL Output for Wharf Road Exposure Unit
D	Human Health Soil Summary and Risk Screening for all EUs
D-1-1	Human Health Soil Summary and Concentration Risk Screening- West Parcel Upland Exposure Unit
D-1-2	Human Health Soil Summary with 90UCLs and Concentration Risk Screening- West Parcel Upland Exposure Unit
D-2-1	Human Health Soil Summary and Concentration Risk Screening- Central Parcel Upland Exposure Unit
D-2-2	Human Health Soil Summary with 90UCLs and Concentration Risk Screening- Central Parcel Upland Exposure Unit
D-3-1	Human Health Soil Summary and Concentration Risk Screening- East Parcel Upland Exposure Unit
D-3-2	Human Health Soil Summary with 90UCLs and Concentration Risk Screening- East Parcel Upland Exposure Unit
D-4-1	Human Health Soil Summary and Concentration Risk Screening- Inner Cove Beach Exposure Unit
D-4-2	Human Health Soil Summary with 90UCLs and Concentration Risk Screening- Inner Cove Beach Exposure Unit
D-5-1	Human Health Soil Summary and Concentration Risk Screening- Central Beach Exposure Unit
D-5-2	Human Health Soil Summary with 90UCLs and Concentration Risk Screening- Central Beach Exposure Unit
D-6-1	Human Health Soil Summary and Concentration Risk Screening- Wharf Road Exposure Unit

LIST OF APPENDICES (Continued)

E Human Health Risk Supporting Information

- E-1 Ingestion, Dermal and Inhalation Intake Equations for West Parcel Upland Exposure Unit – All receptors
- E-2 Ingestion, Dermal and Inhalation Intake Equations for Central Parcel Upland Exposure Unit – All receptors
- E-3 Ingestion, Dermal and Inhalation Intake Equations for East Parcel Upland Exposure Unit – All receptors
- E-4 Ingestion, Dermal and Inhalation Intake Equations for Inner Cove Beach Exposure Unit – All receptors
- E-5 Ingestion, Dermal and Inhalation Intake Equations for Central Beach Exposure Unit – All receptors
- E-6 Ingestion, Dermal and Inhalation Intake Equations for Wharf Road Exposure Unit – All receptors

F Calculation of Risk-Based Lead Concentrations

- F-1 Calculation of Risk-Based Lead Concentration in Willamette Cove Soil for Child Recreational Trespasser Scenario
- F-2 Calculation of Risk-Based Lead Concentrations for Adult Receptors

LIST OF ACRONYMS

~	Approximately
5x-	Five times
%	Percent
90UCL	90th percentile Upper Confidence Limit
µm	Micrometer
µg/dL	Microgram per deciliter
ac	Acre
ACA	Ash Creek Associates
ALM	Adult Lead Model
amsl	Above mean sea level
AOCs	Areas of Concern
ARL	Acceptable Risk Level
AST	Aboveground Storage Tank
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BNSF	Burlington Northern Santa Fe
BW	Body weight
CA	Contaminated Area
COIs	Chemicals of Interest
COPCs	Chemicals of Potential Concern
CRA	Comprehensive Risk Assessment
CSM	Conceptual Site Model
DEQ	Department of Environmental Quality
DU	Decision Unit
ECSI	Environmental Cleanup Site Information
EPA	United States Environmental Protection Agency
EPCs	Exposure Point Concentrations
EU	Exposure unit
FS	Feasibility Study
g/day	Grams per day
GIS	Geographic Information Systems
ha	Hectare
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IEUBK	Integrated Exposure Uptake Biokinetic
IH	Heavy Industrial
IRIS	Integrated Risk Information System
LC_{50}	Median lethal concentration
LD_{50}	Median lethal dose
LOAEL	Lowest-observed-adverse-effect-level
LWG	Lower Willamette Group
MDCs	Maximum Detected Concentrations
mg/kg	Milligram per kilogram
mg/dL	Milligram per deciliter
mg/L	Milligram per liter
MRL	Maximum Reporting Limit

LIST OF ACRONYMS (Continued)

NAVD88	North American Vertical Datum of 1988
NF	NewFields
NOAEL	No-observed-adverse-effects-level
OAR	Oregon Administrative Rule
OLLW	Ordinary Line of Low Water
OS	Open Space
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PDC	Portland Development Commission
PMC	Portland Manufacturing Company
PRGs	Preliminary Remediation Goals
RBCs	Risk Based Concentrations
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SCE	Source Control Evaluation
SLVs	Screening Level Values
SOW	Scope of Work
SVOCs	Semivolatile Organic Compounds
TCDD	tetrachlorodibenzo-p-dioxin
TEQ	Toxicity Equivalent
TMDP	Technical-Management Decision Point
TPHs	Total Petroleum Hydrocarbons
TWC	Time-Weighted Concentration
UPRR	Union Pacific Railroad
USTs	Underground Storage Tanks
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This document presents the residual human health risk assessment (RHHRA) for the Willamette Cove Upland Facility (Facility). This document is a supplemental evaluation to the Baseline Human Health Risk Assessment (BHHRA) that was conducted in 2007 (Ash Creek Associates/NewFields [ACA/NF] 2007a). The requirement and scope for the RHHRA is based on comments from the Oregon Department of Environmental Quality's (DEQ) reassessment of the BHHRA (DEQ 2010a, 2011, 2012a, 2012b; Formation 2012a, 2012b); correspondence between the Port and DEQ is presented in Appendix A and will hereafter be cited as "Port/DEQ correspondence, Appendix A". The additional scope includes incorporation of new data collected to support the Source Control Evaluation (SCE). The document was prepared on behalf of the Port of Portland (the Port) and Metro to satisfy (in part) requirements of the Voluntary Cleanup Program (VCP) Agreement (ECNWR-00-26) between the Port, Metro and DEQ (2000). The Facility is owned by Metro.

According to Oregon rules, a RHHRA is performed to supplement a Feasibility Study for a contaminated site to help identify the appropriate remedial action (OAR 340-122-0084(4)). The RHHRA estimates the residual risk associated with remedial alternatives and can be quantitative or qualitative (DEQ 2006 [FS guidance]). In the case of the Willamette Cove Upland Facility, the BHHRA was revised based on DEQ comments. DEQ requested additional risk analyses for the RHHRA that represent fundamental changes to the risk assessment approach presented in the BHHRA, including (See Port/DEQ correspondence, Appendix A):

- Addition of an exposure scenario for "Recreational Trespasser";
- Division of the site into six exposure units (EUs) (instead of one);
- Future use as park land open to the public; and
- Incorporating results of sampling conducted after the 2008 removal action (Central Parcel); results of beach samples from the Portland Harbor Superfund Site Remedial Investigation to be evaluated as part of the surface soil dataset; and the results of additional sampling and risk analysis for dioxins.

Based on these requests, the scope of the RHHRA is essentially equivalent to a full quantitative baseline risk assessment, including re-screening of chemicals of interest (COIs) for each of the six EUs. As a result, the structure of this RHHRA is based upon the process prescribed by DEQ in the *Human Health Risk Assessment Guidance* (DEQ 2010b).

Section 1 summarizes background information from the Remedial Investigation (RI) (Hart Crowser 2003) relevant to the risk assessment. Concentration-risk screens to identify Chemicals of Potential Concern (COPCs) are presented in Section 2. The exposure methodology and results are presented in Section 3, and the toxicity analysis is presented in Section 4. The risk characterization and uncertainty for the RHHRA are discussed in Section 5.

1.1 Facility Description

The Facility is located along the northeast bank of the Willamette River in the St. Johns section of Portland, Oregon between River Miles 6 and 7 (mostly in Section 12 of Township 1 North, Range 1 West, Willamette Meridian) (Figure 1-1). The DEQ Environmental Cleanup Site Information (ECSI) identification number for the Facility is 2066.

The Facility is bordered on the northeast by the Union Pacific Railroad (UPRR) right-of-way (Figure 1-2). Farther to the northeast is a vegetation-covered bluff that rises about 30 to 80 feet in elevation above the Facility. A residential area is present on top of the bluff and farther inland. On the southeast is an embankment for the Burlington Northern Santa Fe (BNSF) railroad bridge over the Willamette River. South of the BNSF embankment is the former McCormick & Baxter Creosoting Company, a federal Superfund Site. Adjacent to the northwest side of the Facility is a vacated portion of North Richmond Avenue. The Facility is bordered on the southwest by the Willamette River. The ‘cove’ adjacent to the eastern portion of the Facility (i.e., Willamette Cove) is a part of the river that is set back from the main river channel up to 800 feet. Figure 1-2 shows aerial photography from 2011 and identifies current features at the Facility, including the six EUs.

1.2 Facility History

The Willamette Cove Upland Facility is currently owned by Metro. Metro acquired the property in 1996 for the purpose of creating a green space area to be used as a public park. Historically, Willamette Cove consisted of three separate “parcels” (West, Central, and East), each of which had

different ownership and activities. Figure 1-2 shows the locations of the three parcels at the Facility. Details on the Facility history were previously provided in the Existing Data/Site History Report (Hart Crowser 2000) and in the Final Draft Remedial Investigation Addendum: Supplemental Preliminary Assessment of the Willamette Cove Upland Facility (Port 2003). Since the time of those reports, additional historical information about the Facility has been obtained. An updated summary of each parcel's history is provided below.

West Parcel. The West Parcel consists of approximately 5 acres and is the westernmost property of the Willamette Cove Upland Facility. The Port never owned or operated the West Parcel. Prior to 1901, the West Parcel was either undeveloped shoreline or used for residential purposes. An 1855 map shows the William Caples homestead was situated near the present-day intersection of North Richmond Avenue and the UPRR tracks. From about 1901 through 1963, the West Parcel was occupied by a plywood manufacturing plant. Historical maps indicate the early plant was relatively small, consisting only of a few buildings (a 1906 drawing shows three buildings and a dock) (Portland & Seattle Railway 1906). In February 1910, the plant burned to the ground, destroying the equipment and building. The plant was rebuilt and resumed plywood production in the fall of 1910. Available public records reflect that at full build-out, the plywood plant contained a glue mixing room, wood presses, an oil house, blacksmith shop, grinding room, and two debarkers. Many of these structures were built on piers or were directly adjacent to the waterfront. In addition, the central portion of the West Parcel and the adjacent river area were used as a log pond to store the logs used in the plywood mill.

The plywood manufacturing plant was operated by Portland Manufacturing Company (PMC) under various ownerships. PMC produced wood products including baskets, crates, wood drums, and excelsior (wood shavings for packing). In 1963, the plant was shut down and woodworking operations were discontinued. PMC and its affiliates or successors (culminating as Simpson Timber) owned the West Parcel until 1964, when it was sold to Portland Lumber Mills. Brand-S Corporation became owner via a merger with Portland Lumber Mills in 1966. After the plant shut down in 1963, a few buildings were used for sawmill operations. About 1972, all buildings on the West Parcel were demolished. By 1976, the former log pond on the parcel was filled. Since then, no development has occurred. The City of Portland, through the Portland Development Commission (City PDC), purchased the West Parcel from Brand-S in 1979. As previously mentioned, Metro acquired the West Parcel in 1996.

Central Parcel. The Central Parcel consists of approximately 11 acres and is situated in the center of the Facility between the West and East Parcels. Prior to 1900, most of the Central Parcel was submerged land. Maps of the area from the late 1800s show the bluff that is currently northeast of the Central Parcel extended directly to the river. As such, the Central Parcel upland did not exist historically (or if it did, it was riverbank along the present day UPRR tracks). In the 1920s, fill was placed between the dry docks (discussed below) and the UPRR tracks, creating the Central Parcel upland.

The Port acquired the Central Parcel in 1903. From 1903 through 1953, the St. Johns Dry Docks were located adjacent to the Central Parcel. The St. Johns Dry Docks was a "common user" plant, reputedly the only one of its kind in the United States, and was provided as a public service to support the commerce of the state. Oregon law forbade the Port to conduct repair activities and specified that "dry docks shall be kept open to all ship repairers and mechanics on equal terms".

Initially, the dry dock complex consisted of a single dry dock with a 10,000-ton lifting capacity (Dry Dock 1). Dry Dock 1 was installed in 1904 and was situated approximately 200 feet from the riverbank. Two piers along the dry dock extended westward about 280 and 740 feet from the dry dock. Shore access to Dry Dock 1 was on a 22-foot-wide pier located in the eastern portion of the Central Parcel. A second dry dock was constructed by the City Commission of Public Docks (City CPD) in 1921 and was positioned along the south side of Dry Dock 1. The new dry dock (Dry Dock 2) was larger than Dry Dock 1 and had a 15,000-ton lifting capacity. The City CPD was the initial owner of Dry Dock 2 and retained the maintenance responsibilities until ownership was transferred to the Port in 1923.

Between 1903 and 1918, other than the access pier, there were no buildings on the Central Parcel. Between 1907 and 1908, a small building with space allocated for an air compressor was constructed on the dry dock to be used as a blacksmith shop. Between 1915 and 1916, a new roadway to the dry dock was completed. A Power House with a 15,000-gallon steel aboveground storage tank (AST) for oil was built in 1904 and located directly north of the Central Parcel (i.e., offsite) (Oregonian 1904). The Power House was dismantled and use of the oil tank discontinued by September 1939.

In 1918, an overwater coaling dock with a rail spur was constructed about 100 feet from the riverbank. The coal dock was provided as a public service by the Port for use by private companies and the United States. The Port charged a tariff to allow private companies and the United States to handle and store coal at the wharf (Oregonian 1919). By 1924, use of the wharf for coal was discontinued and it was being used primarily for storage of machinery. Removal of the coaling wharf was initiated in 1934, and completed by December 1935.

Between 1918 and 1924, the Central Parcel was further developed with storage buildings; blacksmith, pipe, woodworking, and machine shops; a restaurant; an automobile garage; and a pattern loft. In 1921-22, an Auxiliary Plant was constructed at the dry docks for the ship repair contractors. Between 1924 and 1932, the 740-ft pier structure closest to the river bank was reconstructed with a new shorter dock (~400 feet long) and was straightened to be parallel to the other docks. The 1932 Sanborn map shows a warehouse and an additional blacksmith shop were constructed at the east end of the Central Parcel. Around 1939, the northwestern portion of the Central Parcel was used for storage. Between 1939 and 1948, the lawn at the southeast end of the Central Parcel was converted to an unpaved parking area. By 1953, operation of the St. Johns Dry Docks ceased and the dry docks were relocated to Swan Island.

In 1950, two of the three Central Parcel tax lots (99 and 124) were acquired by PMC, the owner of the adjacent West Parcel (prior to 1950, PMC had used the northeast portion of these tax lots). In May 1953, Harold Scritsmier acquired tax lot 39 and purchased the in-river dock structures from the Port. Scritsmier constructed a sawmill at the north access pier. The Scritsmier plant consisted of a sawmill, filing room, shaving hopper, shaving bin, wharf with a rail spur, and green chain. Many of the structures formerly constructed in support of the dry docks were used in sawmill activities. By 1957, a few of the buildings were demolished, including the warehouse in the northwestern portion of the Central Parcel. In 1962, the large shop building was partially demolished, and then was damaged by fire. By 1965, the sawmill operations were significantly reduced and Scritsmier began leasing portions of the Central Parcel to private tenants. By 1970, the sawmill was no longer in use. The City PDC acquired the Central Parcel in 1981 and demolished the existing structures in the early 1980s. The Central Parcel has been vacant since that time. As previously mentioned, Metro acquired the Central Parcel in 1996.

East Parcel. The East Parcel consists of approximately 16 acres and occupies the southeastern most portion of the Willamette Cove Upland Facility. The Port never owned or operated the East Parcel. The East Parcel was originally lowland and wetland areas when it was acquired in 1900 by Western Timber Company. Western Cooperage, Inc. purchased the East Parcel in 1907 for the development of a general cooperage plant for manufacturing staves, barrels, kegs, lumber, shingles, and other timber products. In developing the East Parcel, Western Cooperage had the low-lying land filled up to 30 feet with dredged material. Construction was complete and the cooperage plant was in operation by 1915. The plant features included a grinding room, oil house, transformer house, battery charging room, glue mixing/gluing/press room, machine shop, overwater log lift debarker, and saw filing room; logs used in the cooperage were stored in Willamette Cove.

Western Cooperage manufactured barrels until the 1950s, when declining demand led to a focus on plywood production. By the end of the 1950s, log and timber supplies were no longer economical to transport to the area for processing. Aerial photographs indicate that the sawdust loading dock and connecting railway were demolished by 1957. In addition, aerial photographs and the 1963 city directory indicate that the mill was no longer operating. The East Parcel was sold to Western Associates in 1957. During the 1960s and 1970s, the large warehouse on the parcel continued to be used by other small businesses, including Flakewood, Inc., who continued to manufacture plywood at the property until 1967. In October 1967, a large fire destroyed much of the plant (Oregonian 1967). Most of the cooperage buildings were demolished between 1968 and 1971. Large log rafts were observed moored in the Cove after cooperage operations ceased through the 1970s, possibly storing logs for the McCormick & Baxter Creosoting Company.

The East Parcel was sold to West Coast Orient Company in 1975. The City PDC acquired the East Parcel in 1980. The City PDC removed the large warehouse by June 1981. As previously mentioned, Metro acquired the East Parcel in 1996. In 2004, DEQ removed wooden and concrete dock pilings and a derelict barge from the near shore area in response to mitigation requirements for the McCormick & Baxter Superfund Site cleanup.

1.3 Regulatory Status

Investigation activities are being conducted at the Facility under a VCP Agreement (ECNWR-00-26) for Remedial Investigation and Source Control Measures, effective November 4, 2000. This agreement is between the Port, Metro, and DEQ.

The scope of the risk assessments is limited to the upland portion of the Facility. The Facility is defined by the property boundaries and Mean High Water Mark (MHWM); 13.3 feet above mean sea level [ft amsl] North American Vertical Datum of 1988 [NAVD88]), as described in the VCP Agreement.

1.4 Summary of Investigations

Several environmental investigations have been performed at and near the Facility, including the adjacent shoreline and river sediments. A detailed discussion of these investigations and their findings are presented in the Existing Data/Site History report (Hart Crowser 2000) and the RI report (Hart Crowser 2003). A brief summary of these investigations is provided below.

Prior to 2001, two environmental investigations (Sweet Edwards/EMCON, Inc. 1989, 1996) and an underground storage tank (UST) removal (Hahn and Associates 1999) were performed at the Facility. Samples were also collected from the Willamette Cove Upland Facility as part of studies of the adjacent McCormick & Baxter Superfund Facility (PTI Environmental Services 1992; Ecology and Environment 2000). The results of these investigations were analyzed as part of Phase I activities and are discussed in the RI report (Hart Crowser 2003).

From April 2001 through September 2002, Hart Crowser performed Phase II RI activities at the Facility to characterize the nature and extent of chemical contamination in soil and groundwater. The RI activities included completing 26 test pits, 30 push probes, and seven hand-augered soil borings; collecting 35 surface soil samples; installing seven groundwater monitoring wells; and performing two groundwater monitoring events. In addition, the extent of debris on cove beaches was mapped and the upland area and riverbank were inspected for erosion. In a letter dated December 20, 2003, DEQ provided comments on the RI report to the Port. Several of DEQ's comments expressed concern about potentially erodible soil on the riverbank at the Facility. DEQ also requested additional groundwater sampling.

In response to DEQ's comments, two additional groundwater sampling events were performed at the Facility in September and December 2005. The results are documented in the Groundwater Monitoring Report – Third Quarter 2005, (Blasland, Bouck, and Lee, Inc./Ash Creek Associates/NewFields [BBL/ACA/NF] 2005a) and Groundwater Monitoring Report – December 2005 (BBL/ACA/NF 2006a).

In addition, riverbank sampling was performed in December 2005 to address DEQ's comments regarding the potentially erodible soil on the riverbank of the Facility. Sampling was performed as outlined in the Riverbank Soil Sampling Work Plan (BBL/ACA/NF 2005b). The samples were analyzed for polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals and the results were presented in the Riverbank Soil Sampling Report (BBL/ACA/NF 2006b). PCBs were detected in one area of potentially erodible soil on the western portion of the East Parcel; however, the extent was not defined. A follow-up field investigation was performed in 2007 to define the extent of PCBs in areas of potentially erodible soil at this location. The results are provided in the Riverbank Soil Sampling Addendum (ACA 2008a).

Additionally, in a letter dated October 18, 2006, DEQ requested that the southern property boundary be surveyed to more accurately define the boundary between a Burlington Northern Santa Fe (BNSF) railroad right-of-way and the Facility. The results of the survey are provided in the Riverbank Soil Sampling Addendum (ACA 2008a).

In 2007, soil sampling was performed to support removal action activities that were recommended in the Baseline Risk Assessment (ACA/NF 2007a). The removal action was conducted to excavate surface soil that contained elevated metals and mitigate potential ecological risk. The work was completed in 2008 and the results are presented in the Removal Action report (ACA 2008a).

Additional sampling of the riverbank and beach soil was conducted in 2010, specifically in a small portion of the BNSF railroad embankment that lies on the East Parcel. In addition, four exploratory trenches on the beach portion of the East Parcel were excavated and grab samples of soil and groundwater were obtained and analyzed for petroleum hydrocarbons and PCBs. The results are presented in the Source Control Sampling Results letter report (ACA 2011).

Lastly, dioxins were recently identified in one area of non-erodible soil near the former road leading onto the wharf (ACA 2011). Additional surface soil sampling at the Former Wharf Road Area was conducted in August 2012 in accordance with DEQ's approved work plan, *Revision to Proposed Surface Soil Sampling- Former Wharf Road Area* (dated June 25, 2012), as cited in ACA 2012. Surface samples were collected from three decision unit areas using an incremental soil sampling technique. Soil samples were analyzed for extent of dioxins/furans (ACA 2012).

The sampling events outlined above provide a comprehensive dataset that adequately characterizes the soil and groundwater conditions at the Facility. COIs and potential areas of concern (AOCs) were identified from the historical use review (Hart Crowser 2000) and previous investigations as summarized above. Results of the RI indicated the presence of some COIs in soil and groundwater. The BHHRA performed in September 2007 (ACA/NF 2007a) evaluated the potential risks posed by the presence of these COIs in Facility soil and groundwater to potential human receptors. As indicated in the introduction, the RHHRA presented in this document further evaluates the potential risks posed by the presence of these COIs in Facility surface soil to potential human receptors.

This RHHRA uses these data for risk evaluations because this dataset is relevant, current, and of known data quality suitable for risk assessment purposes.

1.5 Facility Land and/or Water Uses

1.5.1 Current Uses

The Facility is currently vacant, covered with invasive and native vegetation, and provides habitat for opportunistic use by wildlife. The Facility is not managed for any human use and is posted to prohibit trespassing. However, trespassers do come on site (e.g., homeless persons and joggers).

The Facility is currently zoned as an Open Space (OS) zone with “g” (River General) and “q” (River Water Quality) greenway overlay zones (City of Portland 2004). The OS zone is intended to preserve and enhance public and private open, natural, and improved park and recreational areas. Greenway regulations are also intended to protect, conserve, enhance, and maintain the natural, scenic, historical, economic, and recreational qualities of lands along Portland’s rivers. Specifically, the “g” overlay is intended to allow public use and enjoyment of the waterfront and for enhancement of the river’s scenic and natural qualities. The “q” overlay is designed to protect the functional values of water quality resources by limiting or mitigating the impact of development in the 25-foot setback from the top of bank. Other nearby zoning includes commercial (EG2), residential (R2 and R5), open space (OS), and industrial (IH and IG2) (City of Portland 2004).

The Facility was included in a citywide inventory which identified three scenic resources at or near the Facility (City of Portland 2000). First, the entire Willamette River through Portland was designated as a scenic corridor, offering outstanding views of the West Hills, bridges, and riverfront

natural areas. Second, a scenic viewpoint was identified on the Facility, looking northward to the St. Johns Bridge. Viewpoints provide locations where the public can enjoy the natural and built environment. Third, Willamette Boulevard, on the bluff northeast of Willamette Cove, was also designated as a scenic corridor, with views of the river, the city, and the West Hills.

1.5.2 Future Uses

Portland Parks and Recreation has prepared a draft management plan for the Willamette Cove Upland Facility (City of Portland 1999). This report indicates that one potential plan for the Facility would be an urban natural area with passive recreation opportunities (i.e., a park). The plan includes a "Cottonwood Forest" zone in the East Parcel which would have clusters of large trees, a natural-resources education area for children, a rustic picnic area, bird watching opportunities, and a parking lot for up to 40 vehicles. The Portland Bureau of Parks and Recreation has also identified the need for a park in this area, listing both Willamette Cove and the McCormick & Baxter Superfund Facility as potential locations (after cleanup) for natural areas, river access, and recreation (City of Portland 2001).

Therefore, the reasonably likely future use of the Facility is for recreation. The actual site plan and type of recreational use or development is not known at this time. Until redevelopment for recreational purposes is initiated, current land use of the Facility is not anticipated to change.

1.6 Facility Cleanup Actions

Three cleanup actions have been performed at the Facility, including one in 1999 on the West Parcel, a second in 2004 on the East Parcel, and a third in 2008 on the Central Parcel. Details on the July 1999 cleanup action can be found in a report prepared by Hahn and Associates (1999); details on the 2004 removal action are contained in a memorandum prepared by ACA/Hart Crowser (2005); and details on the 2008 removal action are contained in a removal action report prepared by ACA (2008c). The following summarizes the results of the actions:

- Several gallons of black tarry oil were observed on the ground surface of the West Parcel during brush clearing activities in July 1999. The oil and associated petroleum-contaminated soil (about 127 tons) were removed and transported off the property for treatment. During the removal, a 12,000-

gallon UST was discovered at a depth of 7 feet. The UST was subsequently removed from the West Parcel (Hahn and Associates 1999). The excavation was backfilled by grading soil from the surrounding area into the excavation.

- On July 6, 2004, a product sheen was observed at Willamette Cove during implementation of the remedial action at the McCormick & Baxter Creosoting Company Superfund Facility (McCormick & Baxter Facility). Test pits in soil directly above the ordinary line of low water indicated the presence of petroleum product. A removal action was performed in accordance with the October 5, 2004, Scope of Work (SOW) prepared by the Port and Metro and approved by DEQ. The removal action defined the extent of the petroleum product and removed the mobile petroleum product from Metro's property to the extent practicable through soil excavation (ACA/Hart Crowser 2005).
- A removal action consisting of excavation and off-site disposal of metals-impacted soil was completed in June 2008. The purpose of this removal action was to remove soils with lead and other metals to decrease residual risks to ecological receptors. A limited area on the eastern portion of the Central Parcel contained elevated concentrations of lead and other metals in surface soils. Although the baseline risk assessment (ACA/NF, 2007a) did not identify unacceptable risk associated with the metals from an overall site perspective, a removal action to excavate and dispose of these soils off-site was performed to reduce the likelihood of localized adverse effects to plants, birds, or mammals in the eastern Central Parcel. A total of approximately 987 tons of soils containing lead and other metals were removed from the Facility and disposed at Waste Management's Hillsboro landfill. This included 356 tons of soil that was stabilized prior to disposal to remove the hazardous characteristic and 631 tons of soil that did not require stabilization before disposal. Relative concentration reductions for arsenic, chromium, copper, and lead were calculated to provide a semi-quantitative measure of the removal effectiveness. Concentrations of these metals were reduced between 56% and 99.5% as a result of the action (ACA 2008b).

2.0 HUMAN HEALTH RISK ASSESSMENT SCREENING

This RHHRA was performed consistent with the procedures presented in Oregon's DEQ *Human Health Risk Assessment Guidance* (DEQ 2010b), and information is presented in the sequence described in the guidance. This section consists of the following:

- Problem Formulation step, which includes the land use determination and the protocol for screening COIs;
- Conceptual Site Model (CSM) that describes potentially exposed persons and pathways of exposure; and
- Concentration-toxicity screening process according to Section 2.6 of the DEQ guidance (2010b).

The purpose of the concentration-toxicity screen is to identify which chemicals are present at levels above screening level values (SLVs). Concentrations of COIs are compared to screening-level concentrations to determine which COIs warrant additional risk analysis to support site risk management decisions. COIs for which concentrations exceed screening levels are identified as chemicals of potential concern (COPCs) and are the focus of more detailed risk analyses, which are presented in Sections 3 through 5.

2.1 Land and Water Use Determinations

Information about land and water use by human receptors was evaluated to develop the human health CSM that was presented in the BHHRA (ACA/NF 2007a). The basic land and water uses at the Facility have not changed since the BHHRA was completed and are presented below. The CSM is discussed in depth in Section 2.5.

The approximately 27 acre facility is currently unoccupied and is predominately covered with grass, shrubs and trees. Buildings from historical industrial operations have been largely demolished and removed, although concrete foundations and floor slabs remain in some areas. Surrounding land use is a mixture of residential, commercial, industrial and open space. The McCormick and Baxter Superfund Site is adjacent to the Facility on the northeast side of the site. Although the Facility is

publicly owned, signs are posted to prevent trespassing. However, trespass use of the site by joggers, homeless individuals (i.e., transients), and other trespassers has been routinely observed.

As described in Section 1.5.2, the future use of the Facility is likely to be passive recreational use consistent with natural areas and open space.

The areas adjacent to the Facility are supplied by the municipal water supply of the City of Portland. No beneficial-use groundwater wells are present on the Facility.

2.2 Nature and Extent of Contamination Determination

The sampling and analysis programs that have determined the nature and extent of contamination are described in Section 1.4 of this document.

2.3 Data Quality Objectives

Data quality objectives define the appropriate type of data and the quality parameters that support the data for a specific application. For this Facility, the data quality objectives were established in the RI process and have been used throughout subsequent sampling endeavors in order to obtain data to sufficiently characterize nature and extent of contamination and for use in risk assessments. Analytical results from the sampling activities summarized in Section 1.4 provide a comprehensive dataset that adequately characterizes the current soil and groundwater conditions at the Facility. The available surface soil results are sufficient to perform the RHHRA evaluations for all portions of the Facility.

The scope of the dataset to be used in this RHHRA was developed through discussion with DEQ (Port/DEQ correspondence; Appendix A). The RHHRA dataset consists of surface and subsurface soil data from the RI and subsequent sampling events. The dataset (including sampling locations, sampling date, and analytical results) is presented in detail in Appendix B. Sampling locations included in the dataset are shown in Figures 2-1 through 2-5. The dataset used in the RHHRA is consistent with the dataset used in the BHHRA, but some alterations and additions were made based on data availability or DEQ comments. The primary differences are:

- DEQ requested inclusion of soil data within the depth zone of 0 to 3 feet. Data were included for samples where any portion of the sample interval was within the 0- to 3-foot depth range.
- Five trench soil samples between 8 and 8.5 feet with PCB results are included in the surface soil dataset based on DEQ's request.
- Analytical results from locations that are under the McCormick and Baxter remedial action cap (i.e., HA-8, HA-9, HA-10 and HA-11) were excluded.
- Analytical results for three Lower Willamette Group (LWG) beach sediment sampling locations in the Willamette Cove area (06B022, 06B026, LW2-B015) were added at DEQ's request.

2.4 Chemicals of Interest (COIs)

The COIs are the constituents present at the Facility either as naturally occurring or as a result of historical industrial operations both on- and off-site; these are the analytes that have been screened according to the process described below. COIs at this Facility include metals, dioxins/furans, pesticides and herbicides, PCBs, petroleum hydrocarbons, phthalates, phenols, PAHs, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) that have been identified in soil and groundwater.

2.5 Conceptual Site Model (CSM) – Human Health Exposure Pathways

A CSM identifies the means by which humans may be exposed to site contaminants. It consists of an identification of the:

- Primary, secondary and tertiary sources;
- Mechanisms of chemical releases from these source areas;
- Routes of exposure; and
- Exposure scenario and the related potentially exposed individual.

The CSM presented in the BHHRA (ACA/NF 2007a) was reviewed and updated as needed to reflect the scope of the RHHRA as discussed with DEQ (Port/DEQ correspondence, Appendix A). An updated CSM is presented as Figure 2-6. The CSM specifically identifies which exposure pathways

are being evaluated in this RHHRA, those that were evaluated in the BHHRA, and which ones are being evaluated as part of the Portland Harbor RI/FS or SCE. The primary exposure media addressed in the RHHRA are soils. There is no surface water on the Facility and no groundwater use. Volatilization of organics from groundwater and subsurface soils was evaluated for individual locations in the BHHRA and found to have no unacceptable risk.

Updates to the RHHRA CSM are focused on modifications of receptor groups requested for analysis by DEQ (Port/DEQ correspondence, Appendix A) and determining the correct designation of complete/incomplete pathways for those receptor groups. The exposure scenarios, including descriptions of exposed receptor populations and exposure pathways, are discussed in detail in the subsequent sections. The CSM also identifies which pathways are being evaluated as part of the Portland Harbor RI/FS or SCE.

2.5.1 Identification of Exposure Scenarios and Populations

The identification of exposure scenarios is based upon the land use determination that has been identified for the Facility (Section 3.1), the CSM that identifies exposure pathways (Figure 2-6), and specific comments from DEQ (Port/DEQ correspondence, Appendix A). Exposure scenarios consist of descriptions of activities as they relate to users of the Facility and the means by which exposure is assumed to occur.

The most likely current and future land use is as park or open space, which will include passive recreation or trespass use, except for potential light construction in the future. The most likely exposure scenarios for human health will be direct exposure to COPCs in surface and subsurface soil by ingestion, inhalation and dermal contact. This RHHRA provides supplemental additional evaluation of risk to current Transient and Recreational Trespassers, future Park Users, and future Construction Workers with potential exposure to surface soils, consistent with DEQ input (Port/DEQ correspondence, Appendix A). The four receptors evaluated in this RHHRA are outlined on the CSM (Figure 2-6). For current land use, the most likely exposed person is a trespasser – either a Transient Trespasser or a Recreational Trespasser – who differ based on their site use patterns. The Transient Trespasser is a receptor who may infrequently camp or inhabit the exposure area, but would not remain long-term. The Recreational Trespasser is a visitor that may access the site more frequently for recreational activities such as walking, jogging, or picnicking but would not stay overnight. Because these recreational users have to disregard posted signs to enter the site, they

are considered trespassers. For future land use, the most likely exposed persons are Construction Workers that may conduct light construction such as park shelters, restroom facilities, or landscaping at the Facility and future Recreational Park Users that may visit the Facility after it is developed as a recreational area. The future Park User is predicted to have the same site use patterns as the current Recreational Trespasser. As a result, the quantitative evaluations for these two exposure scenarios are the same and are presented in this RHHRA together, hereafter referred to as "current Recreational Trespasser/future Park User". Although Recreational Trespassers may include persons occasionally fishing in the river and consuming biota, this exposure pathway will be evaluated as part of the Portland Harbor RI/FS process, so fishing will not be discussed further in this document.

2.5.2 Identification of Exposure Routes

As outlined in Figure 2-6, soil contamination resulting from onsite or offsite historical operations may result in exposure by dermal contact, ingestion or inhalation of soil by Transient Trespassers, Construction Workers and Recreational Trespassers/Park Users. Surface soil exposure pathways are considered complete for all receptors and are evaluated in this RHHRA. Subsurface soil exposure was evaluated in the BHHRA and is not evaluated again in this RHHRA. This RHHRA does not address pathways potentially resulting from transport of erodible riverbank soils to the river, since these pathways are being evaluated as part of the Portland Harbor RI/FS or SCE.

Neither groundwater nor adjacent surface water is used for domestic or industrial water supplies, and direct ingestion pathways are incomplete. This RHHRA does not address pathways potentially resulting from transport of Facility groundwater to surface water in the Willamette River, since these pathways are being evaluated as part of the Portland Harbor RI/FS or Facility SCE.

Due to the low or trace detections of VOCs in soil and groundwater at the Facility and based on DEQ request, potential indirect inhalation exposure to volatiles in outdoor air was evaluated in the BHHRA (ACA/NF 2007a). Outdoor air concerns were addressed using indoor air screening criteria as a conservative means of screening. No contaminants exceeded the indoor air screening, and thus there is no indication of unacceptable risk from inhalation of volatiles from soil or groundwater in either indoor or outdoor settings. Inhalation of particulates from soils is evaluated in this RHHRA; refer to the BHHRA for all analyses for inhalation of volatiles.

In summary, surface soil is the primary exposure pathway for all receptors evaluated in this RHHRA. Other potential pathways have been eliminated from evaluations in this RHHRA either because: 1) they were already adequately evaluated in the BHHRA for the Facility (e.g., inhalation of volatiles from groundwater and soil), 2) they are not relevant to current or future use of the Facility (e.g., direct contact with or consumption of groundwater), or 3) because they will be evaluated in the Portland Harbor RI/FS (e.g., ingestion of inundated beach sediment, direct contact with surface water, consumption of biota). It should be noted that "beach sediment" sampling locations from the Portland Harbor RI/FS dataset were added to the RHHRA (Appendix B) at DEQ's request because these samples were collected on beaches adjacent to the Willamette River and could be considered representative of soil exposures in the beach EUs. In-river sediment exposure pathways are considered incomplete for the Facility.

The screening criteria used in the contaminant screening process incorporate the soil exposure routes.

2.6 Contaminant Screening Procedures

2.6.1 Soil Screening Procedures

Concentrations of COIs were screened to identify COPCs for each EU in accordance with OAR 340-122-0080(5), and consistent with the latest DEQ guidance for the *Concentration-Risk Screen* (Section 2.6 in DEQ 2010b). COPCs identified in this process are then further evaluated in a detailed exposure and risk analysis. Those chemicals eliminated during screening are considered to be insignificant in terms of potential human risk. The following items are considered during the screening evaluation (DEQ 2010b):

- Frequency of detection;
- Natural background concentrations;
- Essential nutrients, and
- Concentration-risk steps.

Frequency of Detection: DEQ guidance (2010b) advises eliminating any constituent reported as detected in less than 5% of samples from further risk evaluation. However, based on DEQ

comments (Port/DEQ correspondence, Appendix A), this RHHRA does not incorporate frequency of detection into the screening evaluation.

Background: The maximum detected concentrations (MDCs) of naturally-occurring COIs are compared to default background values in DEQ guidance (Table 1 of DEQ 2010b), and shown in Table 2-1. Those chemicals whose MDC was less than the default background concentration were automatically eliminated and not considered further in this RHHRA. This screening step applies to metals only and not to chemicals of anthropogenic origin (e.g., PAHs).

Essential Nutrients: DEQ (2010b) guidance indicates that chemicals that are essential human nutrients, and are present at low concentrations relative to toxic levels may be screened out. Iron was screened out from further consideration based on its status as an essential nutrient.

Concentration-Risk Screen: For those constituents not eliminated by one of the preceding two steps, a multi-tier concentration-risk evaluation was conducted in accordance with DEQ guidance (DEQ 2010b) to identify COPCs. First, MDCs of soil COIs were compared to screening-level values (SLVs) to identify candidate COPCs. SLVs are described in detail in Section 2.6.2. This screening step evaluated risk from: a) an individual constituent; and b) multiple COIs simultaneously in a single medium (DEQ 2010b). The following risk-based screening protocol was followed, per DEQ guidance (DEQ 2010b):

Individually within the medium: a risk ratio (Rij) was calculated by comparing the MDC (Cij) to the risk based concentration for that chemical (RBCij). The equation for this step is Rij = Cij / RBCij. If the ratio was greater than one (i.e., the concentration was greater than the RBC), the constituent was retained as a candidate COPC.

Additivity within the medium: a cumulative risk ratio (Rj) was calculated by summation of all individual risk ratios within one medium. The individual risk ratio was then divided by the cumulative risk ratio. This result was then compared to 1 divided by the number (Nij) of constituents in the medium. If Rij / Rj > 1 / Nij, then the constituent was retained as a candidate COPC.

Next, the 90 percent upper confidence limit on the arithmetic mean (90UCL) was calculated for each of the candidate COPCs in each EU and these concentrations were compared to SLVs, consistent

with DEQ guidance (DEQ 2010b). This step was completed only for those COPCs for which the MDC exceeded corresponding SLVs. The 90UCLs were calculated separately for results from composite and discrete samples, and the results evaluated separately. The EPA ProUCL computer program (EPA 2010, 2011) was used to calculate the 90UCLs for candidate COPCs. In accordance with ProUCL guidance, each dataset was first tested using the ProUCL software to determine the data distribution, and the appropriate 90UCL estimation method was chosen based on the best distribution fit and recommendations provided by ProUCL. In ProUCL, recommendations are provided for 95 percent upper confidence limit on the arithmetic mean (95UCL) calculations only. 95UCL calculations were performed and these recommendations were applied to 90UCL evaluations. Appendix C presents output information from ProUCL 90UCL calculations, with recommended values from 95UCL calculations highlighted. The latest ProUCL package (version 4.1.01) includes computation methods (e.g., Kaplan-Meier) that can be used for datasets with non-detect values and so this methodology was used in 90UCL calculations.

Due to an inadequate sample size, 90UCLs could not be calculated for several chemicals. Following a conservative approach, these chemicals were therefore automatically considered COPCs because their MDC exceeded the screening level value. In addition, 90UCLs could not be calculated for the dioxin results from the Wharf Road EU, since there were only three samples collected using incremental sampling techniques. For the Wharf Road EU, the maximum dioxin concentration among the three incremental samples was used in the RHHRA screening evaluation.

Candidate COPCs with 90UCLs that exceeded the SLVs were identified as COPCs and retained for further evaluation. The fact that a chemical has been retained by the screening process does not indicate that it represents unacceptable risk or that remedial action will be required. Rather, it indicates that additional evaluation is needed to better characterize the level of risk and, if necessary, the need for risk management. Additionally, chemicals that do not have SLVs or alternative toxicity values are eliminated and not evaluated further in this residual risk assessment. This chemical elimination based on deficient screening criteria is a source of uncertainty in the risk screening process.

2.6.2 Screening-Level Values (SLVs)

Consistent with DEQ risk guidance (i.e., DEQ 2003, 2010b) and comments from DEQ (Port/DEQ correspondence, Appendix A), the primary benchmarks for screening soil constituents were obtained

from the latest DEQ table *Risk-Based Concentrations for Individual Chemicals* (DEQ 2012c), and the May 2012 EPA Regional Screening Levels (RSLs) tables (EPA 2012). With the recent release of the November 2012 RSLs, updates were reviewed but none were found to impact the residual risk assessment screening tables. The benchmarks are based on risk-based soil concentrations for residential direct exposure pathways; the urban resident DEQ value was used where available, then the EPA RSL was applied if no DEQ value was available. Although future land use will not be residential, residential screening values were used since they were readily available and would be protective of general recreational and construction occupational use of the Facility. This approach results in a conservative screen for the receptors evaluated in this RHHRA. All benchmarks are shown on Table 2-1 and the final column presents the selected SLV for use in the screen.

2.6.3 Soil Screening Tables

The RHHRA surface soil dataset is described in Section 2.3 and presented in Appendix B. For the screening evaluations, the available data were tabulated and summarized separately for each of the six EUs. As indicated above, concentration values for COIs in soil were screened in two phases: a) comparison of SLVs to MDCs; and b) comparison of SLVs to the 90UCL (or maximum when 90UCL could not be calculated) of each COI. Complete screening tables for all EUs are presented in Appendix C.

2.6.4 Soil Screening Results

This section presents the results of soil screening and the identification of COPCs. Screening summary tables are presented for all EUs in Tables 2-2 through 2-7. Details of the screening analysis are presented in Appendix D.

The initial step in the concentration-toxicity screen is the comparison of the MDC to screening criteria to identify candidate COPCs. MDCs exceeded screening criteria for 20 chemicals in the West Parcel Upland EU; 25 chemicals in the Central Parcel Upland EU; 25 chemicals In the East Parcel Upland EU; 23 chemicals in the Inner Cove Beach EU; and 10 chemicals in the Central Beach EU. Dioxin/furan tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent (TEQ) (i.e., dioxin TEQ) exceeded the screening level in the Wharf Road EU.

Diesel-range hydrocarbons are COPCs in the Central and East Upland Parcel EUs, as well as the Inner Cove Beach EU, because MDCs exceeded risk-based screening levels. However, no specific toxicity factors are available for diesel because it is a mixture of many chemicals. Risk is not generally quantified for complex mixtures like diesel. Many of the organic and inorganic chemicals in diesel are included in the COI list and were included in the risk screen.

For the second step of the screening, the 90UCL was calculated for each of the initial candidate COPCs (with adequate sampling sizes) and was also compared to relevant screening criteria. Details of the 90UCL screen are presented in Appendix D. As a result of this screen, COPCs were identified for further analysis for each EU: 5 chemicals were identified in the West Parcel EU (Table 2-2); 12 chemicals in the Central Parcel Upland EU (Table 2-3); 9 chemicals in the East Parcel Upland EU (Table 2-4); 15 chemicals in the Inner Cove Beach EU (Table 2-5); 5 chemicals in the Central Beach EU (Table 2-6); and 1 chemical in the Wharf Road EU (Table 2-7). In all EUs, a total of 20 different chemicals were found to be COPCs including: arsenic, antimony, cadmium, cobalt, copper, lead, mercury, thallium, vanadium, six PAHs, two PCBs, diesel range hydrocarbons, diesel range hydrocarbons (silica treated), and dioxin TEQ. PAHs were evaluated as benzo[a]pyrene equivalent (BaPeq) for cancer-risk and individually for non-cancer risk. PCBs were evaluated as total Aroclors in the risk characterization steps and further analyses.

3.0 EXPOSURE ASSESSMENT

The screening process described in Section 2 identified twenty COPCs in soil based on evaluation of direct contact exposure pathways. For the RHHRA, the twenty constituents identified as COPCs were evaluated by calculating exposures in the six EUs for current and future receptors:

- Transient Trespasser (current);
- On-site Construction Worker (future); and
- Recreational Trespasser (current) / Park User (future).

Given the current and expected land use, these scenarios represent the most likely current site use (trespassers), and most likely future (Construction and Park User) use for the Facility. Other default scenarios, such as agricultural and residential, are not applicable to the Facility.

3.1 Exposure Calculation Methodology

3.1.1 General Exposure Assessment

Exposure was estimated using standard equations consistent with risk assessment guidance from both EPA and DEQ. Except for lead, exposure and risk were estimated using methods and exposure variables provided in DEQ risk guidance (DEQ 2010b). Lead exposure and risk were estimated using methods described in Section 3.1.2. Exposure to potentially contaminated soil was calculated for oral (ingestion), dermal contact, and inhalation of particulates. Values for the exposure parameters for each scenario (i.e., Transient Trespasser, Construction Worker, and Recreational Trespasser/Park User) were taken from DEQ 2010b HHRA Guidance and/or based on agreements with DEQ on specific scenarios for Willamette Cove Upland Facility (see Port/DEQ correspondence, Appendix A). Parameter values and sources for the scenarios are listed in Table 3-1, 3-2, and 3-3.

Exposure point concentrations (EPCs) for surface soils in each of the EUs are shown in Tables 3-4 through 3-9. The EPC is either the 90UCL or the maximum value (where 90UCL cannot be calculated) for COPCs that are relevant for each EU.

3.1.2 Calculation of Lead Exposure

The exposure and risk characterization for lead was developed in accordance with EPA guidance document "Assessing Intermittent or Variable Exposures at Lead Sites" (EPA 2003). This document provides a process for use in assessing lead exposure risk in children and adults when exposure is not continuous at the site. For each of the Willamette Cove exposure scenarios, receptors would spend a portion of their time at the site, with the remaining waking hours spent in off-site areas.

For the child phases of the Recreational Trespasser/Park User scenario, the Integrated Exposure Uptake Biokinetic (IEUBK) Model (IEUBKWin32, Lead Model Version 1.1, Build 11) (EPA 2007) was used to estimate RBCs. The Adult Lead Model (ALM) was used to estimate RBCs for the Construction Worker and Transient Trespasser, and the adult phase of the Recreational Trespasser/Park User (EPA 2009). Both of these models estimate blood-lead levels (in micrograms per deciliter [µg/dL]) under assumed conditions of exposure to both background lead and Facility-related lead. Appendix E provides the exposure variables and results for the lead exposure estimate for each land use.

For the child receptor, the 'find PRG' function of the IEUBK model was used to identify the overall lead concentration in soil that results in acceptable risk levels (i.e., the soil lead concentration that results in <5% chance that blood lead levels will exceed 10 ug/dL). The IEUBK default exposure parameters were used because model output using these parameters results in a soil concentration of 418 mg/kg lead, which best approximates the residential soil-screening level (400 mg/kg lead) adopted by DEQ (DEQ 2010b).

Using this value, the site soil concentration that would result in acceptable risk levels was estimated based on spending three days per week at the site, and 4 days in off-site areas (see Equation 8 in EPA 2003). This scenario assumes that the child spends all waking hours at the Facility, and that there is no opportunity for lead ingestion at off-site areas on days when the site is visited. Two assumptions were used for soil lead concentrations in off-site soils: (1) 17 mg/kg, which is equal to Oregon DEQ default background lead concentration; and (2) 200 mg/kg, which is based on recommendation in EPA (2007) guidance for situations in which specific data are not available for off-site areas. Two values representing off-site areas were used in an attempt to account for uncertainty of lead concentration in an urban environment. The resulting RBCs were 950 mg/kg and 707 mg/kg, corresponding to default background and 200 mg/kg lead concentrations in off-site areas,

respectively (Appendix F-1). These values were then compared to lead EPCs for each of the EUs in which lead was identified as a COPC.

The child receptor analysis was also conducted assuming that the length of each visit to the site is less than one day, and the rest of waking hours are spent in off-site exposure areas (EPA 2003). The analysis was conducted assuming a child recreational user visits the site 3 days per week, and that each visit is 4 hours in duration. The remaining waking hours were assumed to be spent in off-site areas. The time-weighted RBCs are then based on the proportion of waking hours during the week that is spent at the site. The resulting RBCs are (Appendix F-1):

- Off-site Exposure at 17 mg/kg (background): 2,881 mg/kg; and
- Off-site Exposure at 200 mg/kg (default urban background): 1,757 mg/kg.

The ALM (EPA 2009) was used in a similar way to generate RBCs for adult receptors in the Construction Worker and Transient Trespasser, and adult life phases for the Recreational Trespasser/Park User. The calculations for the Recreational Trespasser/Park User were based on waking hours spent at the site, assuming 4 hours per visit. The Construction Worker and Transient Trespasser were based on days at the site because of the longer duration of each event (e.g., entire work-day). The resulting RBCs are (Appendix F-2):

- Construction Worker: 614 mg/kg and 370 mg/kg, assuming 17 mg/kg and 200 mg/kg for off-site exposures, respectively.
- Transient Trespasser: 1,170 mg/kg and 1,032 mg/kg, assuming 17 mg/kg and 200 mg/kg for off-site exposures, respectively.
- Adult Recreational Trespasser/Park User: 18,816 mg/kg and 17,718 mg/kg, assuming 17 mg/kg and 200 mg/kg for off-site exposures, respectively.

3.2 Exposure Results

Details of the exposure estimate calculations and overall results are shown in Appendices E-1 through E-6 for each EU-receptor combination.

4.0 TOXICITY ANALYSIS

Toxicity factors (cancer slope factors, inhalation unit risks, reference doses, and reference concentrations) used in the Risk Characterization are shown in Table 4-1 and Table 4-2. Per DEQ Guidance, toxicity factors are based on the following preferred sources in order (DEQ 2010b):

1. EPA Integrated Risk Information System (IRIS) database (www.epa.gov/iris);
2. EPA Provisional Peer-Reviewed Toxicity Value (PPRTV) database;
3. EPA Health Effects Assessment Summary Tables (HEAST);
4. EPA National Center for Environmental Assessment, Superfund Health Risk Technical Support Center;
5. Other U.S. EPA documents or databases;
6. Agency for Toxic Substances and Disease Registry (ATSDR); and
7. Other referenced technical publications.

Additionally, a summary of standard toxicity values can be obtained from EPA's regional screening table (EPA 2012). If toxicity values are not available for a chemical, a surrogate is an acceptable alternative. Selecting structurally similar compounds for surrogates allows risk calculation for those chemicals without toxicity information that are expected to contribute to unacceptable risks.

5.0 RISK CHARACTERIZATION AND UNCERTAINTY

The risk characterization phase of the risk assessment combines results of the exposure estimates (Section 3) with the toxicity factors (Section 4) to assess the relative risk and severity of adverse effects from COPCs. COPC for which risk exceeds Oregon Acceptable Risk Levels (ARLs) are identified as Chemicals of Concern (COCs) and become the focus of risk management considerations.

For potentially carcinogenic chemicals, the risk assessment calculates the excess individual lifetime risk of developing cancer as a result of potential exposure to COPCs. The cumulative risk is calculated by summing risks across exposure routes and COPCs. For the Transient Trespasser and Construction Worker receptors, risk was calculated for adults only. For the Recreational Trespasser (and future Park User), risks were calculated separately for children and adults. The child and adult cancer risks were then summed to represent lifetime cancer risk for the segment of the population that would spend their lifetimes visiting the Willamette Cove site.

Excess lifetime cancer risk (ELCR) of $1E10^{-6}$ means that a person experiencing this exposure has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This risk is in addition to the cumulative risks of cancer for individuals from other causes such as smoking or solar radiation. The cumulative individual cancer risk from all other causes has been estimated to be as high as one in three. For individual chemicals, Oregon DEQ generally considers excess cancer risks below $1x10^{-6}$ to be acceptable; for cumulative risks from multiple chemicals, DEQ considers risks less than $1x10^{-5}$ as acceptable (OAR 340-122-115(2)(a), (3)(a)).

Risk was also estimated for non-carcinogenic effects of COPCs based on oral, dermal, and particulate inhalation exposure. For non-carcinogenic effects, exposure estimates are compared to reference doses using the hazard quotient (HQ) approach (EPA 1989). Oregon ARLs for non-cancer effects are HQs < 1.0 for individual chemicals. Cumulative risk from multiple chemicals was calculated using the Hazard Index (HI) approach, where HQs of individual chemicals are summed. The Oregon ARL for cumulative, non-cancer effects is HI < 1.0.

In accordance with Oregon DEQ guidance, results for cancer risks were reported to one significant digit while hazard index and quotient results were reported to two significant digits (DEQ 2010b).

Details of the risk characterization results are discussed in the following sections and summarized in Table 5-7. Details of the analysis are presented in Appendix E.

5.1 West Parcel

COPCs that resulted from the screening step for the West parcel included lead and four individual PAHs (Table 2-2). The risk estimates for each of the exposure scenarios are presented below.

5.1.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-1-1. Estimates of ELCR for the Transient Trespasser did not exceed the Oregon ARL for individual or multiple chemicals. Non-cancer risk also did not exceed the ARL, as no HQs for individuals or the HI exceeded a value of 1.

5.1.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-1-2. Total ELCR for the Recreational Trespasser was 4E-5, which exceeds the Oregon ARL for multiple chemicals (i.e., 1E-5). Carcinogenic risk was entirely from the PAHs that were identified as COPCs. Each of the PAHs exceeded the ARL for individual chemicals for either oral or dermal pathways or both (Table 5-1-2). Non-cancer risk did not exceed the ARL, as the HQs for lead did not exceed 1.

5.1.3 Construction Worker

Results for the Construction Worker are shown in Table 5-1-3. Estimates of ELCR for the Construction Worker did not exceed the Oregon ARL for individual or multiple chemicals. Non-cancer risk also did not exceed the ARL, as HQs for lead did not exceed 1.

5.2 Central Parcel

The COPCs identified for the Central Parcel were antimony, arsenic, copper, lead, thallium, six PAHs and diesel range hydrocarbons (Table 2-3).

5.2.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-2-1. Total ELCR for the Transient Trespasser was 3E-6, which did not exceed the Oregon ARL for multiple chemicals (i.e., 1E-5), and no cancer risks exceeded the ARL for individual chemicals (Table 5-2-1).

Non-cancer risk did not exceed the ARL, as no individual HQs exceeded 1 and the HI did not exceed 1.

5.2.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-2-2. Total ELCR for the Recreational Trespasser was 6E-4, which exceeds the Oregon ARL for multiple chemicals (i.e., 1E-5). Carcinogenic risk was primarily from the PAHs. Total risk from PAHs expressed as BaPEq was 6E-4, with multiple PAHs exceeding the ARL for individual chemicals. Risk from arsenic ingestion also exceeded the ARL for individual chemicals, but arsenic concentration in soil (12 mg/kg) was similar to the default background concentration (7 mg/kg).

Non-cancer risk did not exceed the ARL for any individual chemicals for either the child or adult scenarios. The HI which represents combined risk across chemicals and pathways did not exceed 1 when rounded for the child receptor. The most significant contributors to the child HI were lead, antimony, arsenic, and copper.

5.2.3 Construction Worker

Results for the Construction Worker are shown in Table 5-2-3. Estimates of ELCR for this scenario did not exceed the Oregon ARL for multiple chemicals, but the risk estimates for benzo(a)pyrene exceeded the ARL for individual chemicals.

Non-cancer risks exceeded the ARL for multiple chemicals (HI = 1.6). Lead was the only chemical with a HQ of 1 or higher. Other primary contributors were ingestion of arsenic and copper and dermal contact of antimony. The soil concentrations for arsenic and antimony were similar to default background concentrations.

5.3 East Parcel

COPCs that resulted from the screening for the East parcel included antimony, arsenic, copper, lead, Aroclors, three individual PAHs and diesel range hydrocarbons (silica gel treated) (Table 2-4). The risk estimates for each of the exposure scenarios are presented below.

5.3.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-3-1. Total ELCR for the Transient Trespasser did not exceed the Oregon ARL for multiple chemicals, and no cancer risks exceeded the ARL for individual chemicals.

Non-cancer risks exceeded the ARL for multiple chemicals (HI = 1.6), but no individual chemicals had HQs higher than 1. The HQs contributing most to the HI were for lead and copper.

5.3.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-3-2. Total ELCR for the Recreational Trespasser was 5E-5, which exceeds the Oregon ARL for multiple chemicals (i.e., 1E-5). Carcinogenic risk was primarily from benzo(a)pyrene and arsenic, but risk from multiple PAHs, arsenic, and Aroclors exceed the ARL for individual chemicals.

Non-cancer risk for copper (ingestion) and antimony (dermal) were equal to or greater than the ARL for the child receptor, and the HI for all COPCs and pathways was 6, with lead and Aroclors contributing to the overall risk level for the child receptor. All HQs for the adult were less than 1, and the HI was also less than 1.0.

5.3.3 Construction Worker

Results for the Construction Worker are shown in Table 5-3-3. Estimates of ELCR for this scenario did not exceed the Oregon ARL for multiple chemicals or individual chemicals.

Non-cancer risks exceeded the ARL for multiple chemicals (HI = 5.8), with lead and antimony as the only COPCs with individual HQs of 1 or higher. Other primary contributors to the elevated HI were arsenic, copper, and Aroclors.

5.4 Inner Cove

The COPCs identified for the Inner Cove Beach Parcel included antimony, arsenic, cobalt, copper, lead, mercury, thallium, vanadium, Aroclors, four individual PAHs and "diesel range hydrocarbons" (Table 2-5). The risk estimates for each of the exposure scenarios are presented below.

5.4.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-4-1. Total ELCR for the Transient Trespasser was 1E-5, which did not exceed the Oregon ARL for multiple chemicals (i.e., 1E-5). Only Aroclors exceeded the ARL for individual chemicals and were the primary source of total ELCR reflected in the total risk estimate.

Non-cancer risks exceeded the ARL for multiple chemicals (HI = 13). The only chemicals with individual HQs greater than 1 were lead (HQ = 3.5) and Aroclors (HQ = 8.8).

The risk estimate for Aroclors is based on a 90UCL that includes subsurface samples from trenches dug in the beach to evaluate the deep subsurface materials. Trench 3 and 4 had a sampling depth of eight feet below ground surface. Aroclor concentrations of 207 mg/kg (Trench 4B discrete), 7.94 mg/kg (Trench 3 and 4 composite), and 0.363 (Trench 4A) were observed at this depth. However, because the samples were collected from a depth of eight feet below ground surface, they would not result in exposure to receptors under baseline conditions. The subsurface samples were included in the EPC calculation at the request of DEQ because there were no surface samples available from the Trench 3 and 4 areas. As agreed with DEQ, the EPC for the Inner Cove was also calculated without these subsurface samples. Many of the surface samples from the Inner Cove area did not contain detectable concentrations of PCBs, and removing the subsurface samples results in too few samples to calculate a 90UCL. The resulting EPC for soils is 0.0025 mg/kg, the maximum detected concentration remaining among the samples in the Inner Cove EU. The resulting Aroclor risk estimate for the Transient Trespasser is 1E-6 cancer risk, which is below the ARL. Non-cancer risk remains at a HQ of 4.1.

5.4.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-4-2. Total ELCR for the Recreational Trespasser was 3E-4, which exceeds the Oregon ARL for multiple chemicals (i.e., 1E-5). Cancer risk for the child phase was 2E-4 and 9E-5 for the adult. Carcinogenic risk was primarily from Aroclors and PAHs, but the risk estimate for arsenic also exceeded the ARL for individual chemicals.

Total non-cancer risk exceeded the ARL with a HI of 52 for the child receptor and 5.9 for the adult receptor. COPCs with HQs greater than 1 and contributing most to the risk levels were Aroclors, lead, and antimony.

As for the Transient Trespasser, the risk from Aroclors was also recalculated using the value of 0.0025 mg/kg for this exposure scenario excluding the deep subsurface subsamples. The resulting ELCR estimate for Aroclors is 3E-9, which is well below the ARL for individual chemicals. The resulting total ELCR for all chemicals risk is 7E-5 and 2E-5 cancer risks for child and adult Recreational Trespasser/ future Park User receptors, respectively. The remaining cancer risks are due primarily to arsenic and PAHs. Non-cancer risks were represented by HQs of 7.3 and 0.6 child and adult receptors, respectively.

5.4.3 Construction Worker

Results for the Construction Worker are shown in Table 5-4-3. The resulting estimate of ELCR for this scenario was 2E-5, which exceeds the Oregon ARL for multiple chemicals. Arsenic and Aroclors were the only COPCs for which the ELCR exceeded the ARL for individual chemicals.

Non-cancer risks (HI = 48) exceeded the ARL for multiple chemicals, with Aroclors, lead, and antimony as the primary contributors to the risk estimate.

The risk from Aroclors was also recalculated for this exposure scenario without the deep subsurface subsamples as described in Section 5.4.1. The resulting Aroclor ELCR estimates is 3E-10, and total ELCR from all chemicals is 2E-6 cancer risk. Both of these risk estimates are below the Oregon ARLs for cancer risk. The corresponding non-cancer risk is reduced to a HQ of 9.4.

5.4.4 Portland Harbor RI HHRA

The HHRA associated with Portland Harbor RI (LWG 2011) included assessment of beach use at the Inner Cove area. Sampling was based on a multi-point composite sample collected above the low water mark along the length of the beach (i.e., sample location 06B022). The assessment included Transient User, Adult Beach User, Child Beach User, and combined Adult/Child Recreational Beach User receptor scenarios (see Tables 5-4, 5-6, 5-8, and 5-10 in Appendix F of the Portland Harbor RI). Neither total cancer risks, total non-cancer risks, nor non-cancer risks for individual chemicals exceeded Oregon ARLs for any of the receptor scenarios evaluated. Arsenic exposure exceeded the cancer risk ARL for individual chemicals for the Child and Adult/Child Beach User scenarios. However, the arsenic concentration was 2.6 mg/kg, which is below the default background for arsenic in soil (7 mg/kg).

5.4.5 Oregon Health Authority Health Consultation

The Oregon Health Authority (OHA) Environmental Health Assessment Program (EHAP) recently conducted a Health Consultation for the Willamette Cove area including upland parts of the Facility and beach/waterfront areas (OHA 2012). The Health Consultation had three primary conclusions regarding public health, only two of the conclusions related to hazardous substances:

1. Lead in soils and beach sand in the “East Parcel Beach” were of potential health risk concern to EHAP. This area roughly corresponds to the Inner Cove Beach EU. The EHAP expressed concerns that lead could adversely affect users who accidentally swallow soils or beach sands from this area. This concern was primarily based on analysis using the highest lead concentrations observed in beach materials on the downstream end of the Inner Cove Beach area.

2. The EHAP did not identify enough evidence that people would experience adverse health effects from dioxins at the East Parcel Beach. The focus of this analysis was on beach and soil samples that contained elevated levels of dioxins. OHA did not have evidence that people using the area would contact affected soils with enough frequency to result in adverse health effects.

3. EHAP identified physical hazards associated with metal debris on beaches and upland areas of the East Parcel Beach. The debris is from former operations at the site, illegal dumping, and result of materials washing onto the beach from the Willamette River.

5.5 Central Beach

COPCs that resulted from the screening for the Central Beach Parcel included cadmium, lead, and three individual PAHs (Table 2-6). The risk estimates for each of the exposure scenarios are presented below.

5.5.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-5-1. Total ELCR for the Transient Trespasser was 9E-8, which does not exceed the Oregon ARL for multiple chemicals (i.e., 1E-5), and no chemicals exceeded the ARL for individual chemicals.

Non-cancer risks did not exceed the ARL for multiple chemicals (HI = 0.08), and no chemicals exceeded the non-cancer ARL for individual chemicals.

5.5.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-5-2. Total ELCR for the Recreational Trespasser was 3E-5, which exceeds the Oregon ARL for multiple chemicals (i.e., 1E-5). Cancer risk for the child phase was 2E-5 and 4E-6 for the adult. Risks for benzo(a)pyrene, benzo(a)anthracene, and dibenzo(a,h)anthracene exceed the cancer risk ARL for individual chemicals.

Non-cancer risks did not exceed the ARL for multiple chemicals for either the child (HI = 0.3), or the adult (HI = 0.03), and no chemicals exceeded the non-cancer ARL for individual chemicals.

5.5.3 Construction Worker

Results for the Construction Worker are shown in Table 5-5-3. Total ELCR for the Construction Worker was 2E-7, which does not exceed the Oregon ARL for multiple chemicals (i.e., 1E-5), and no chemicals exceeded the ARL for individual chemicals.

Non-cancer risks did not exceed the ARL for multiple chemicals (HI = 0.3), and no chemicals exceeded the non-cancer ARL for individual chemicals.

5.5.4 Portland Harbor RI HHRA

The Portland Harbor RI HHRA (LWG 2011) also included risk for a beach area in the vicinity of the Central Beach EU. Sampling was based on a multi-point composite sample collected above the low water mark along the length of the beach (i.e., sample location 06B026). The assessment included the same groups as discussed above for the Inner Cove beach area (Transients, Adult Beach Users, Child Beach Users, and Combined Adult/Child Recreational Beach Users). Neither total cancer risks, total non-cancer risks, nor non-cancer risks for individual chemicals exceeded Oregon ARLs for any of the receptor scenarios evaluated. Arsenic risk was the only chemical that exceeded the ARL for individual chemicals (approximately 2E-6 for both Child and Adult/Child scenarios) (See Tables 5-4, 5-6, 5-8, and 5-10 in Appendix F of the Portland Harbor RI). However, the arsenic concentration was 1.7 mg/kg, which is below the default background for arsenic in soil (7 mg/kg). Non-cancer risks did not exceed ARLs for any receptor scenario.

5.6 Wharf Road

The COPC for the Wharf Road EU included dioxin TEQ. Risk estimates for each of the exposure scenarios are presented below.

5.6.1 Transient Trespasser

Results for the Transient Trespasser are shown in Table 5-6-1. Total ELCR for the Transient Trespasser was 2E-6, which exceeds the Oregon ARL individual chemicals, but does not exceed the ARL for multiple chemicals. Non-cancer risks did not exceed the ARL (HQ = 0.6).

The average dioxin TEQ concentration (4.3E-4 mg/kg) was used to represent the EPC for each of the receptor groups because the incremental samples were wide area composites meant to be most representative of concentrations in each of the decision units (DUs). The maximum concentration among the DUs was 7.4E-4 mg/kg. If this value were used as the EPC to represent a more conservative estimate of risk, the results would be 3E-6 for the cancer risk and 1.2 for the non-cancer HQ. However, the small proportion of the site represented by the Wharf Road EU may add a degree

of conservatism to the overall risk estimates. Therefore, using maximum concentrations among the incremental sampling DUs, combined with the reasonable maximum exposure (RME)-based scenarios may be unnecessarily conservative for making risk management decisions.

5.6.2 Recreational Trespasser/ Future Park User

Results for the Recreational Trespasser are shown in Table 5-6-2. Total ELCR for the Recreational Trespasser was 4E-5, which exceeds the Oregon ARL for individual and multiple chemicals. Non-cancer risk also exceeded the ARL with a HQ of 3.7. When maximum dioxin TEQ is used as the EPC instead of the average, cancer risk is 7E-5 and the HQ is 6.7.

5.6.3 Construction Worker

Results for the Construction Worker are shown in Table 5-6-3. Total ELCR for this receptor was 4E-6, which exceeds the Oregon ARL for individual chemicals. Non-cancer risk also exceeded the ARL with a HQ of 2.9. When maximum dioxin TEQ is used as the EPC instead of the average, cancer risk is 7E-6 and the HQ is 5.2.

5.7 Hot Spots

High concentration hot spots were calculated in accordance with OAR 340-122-090 and DEQ guidance (DEQ 1998) for each of the chemicals for which exposures exceeded ARLs at the site. Table 5-8 shows the hot spot concentrations calculated for the relevant chemical/exposure scenario combinations. Cancer hot spots were calculated as concentrations that correspond to 1E-4 ELCR, based on the exposure parameters for the scenarios and toxicity factors for each of the COCs. Non-cancer hot spots were calculated as the concentrations that correspond to 10-times the concentration corresponding to a HQ = 1.0 for the COCs. Figure 5-1 shows the sampling locations at which concentrations of one or more COCs exceed the hot spot concentrations.

5.8 Uncertainty and Discussion

All environmental investigations have uncertainty associated with results and conclusions. Elimination of uncertainty is generally impossible. Therefore, the goal of the investigations should be to reduce and characterize uncertainty to the extent needed to adequately support site management decisions (EPA 1989). In this risk assessment, conservative assumptions have been adopted to

consistently bias the uncertainty toward protectiveness without becoming so conservative as to make results impractical for site decisions. The RHHRA was conducted according to DEQ guidelines and, therefore, results can be compared directly to levels of unacceptable risk, reducing uncertainty associated with interpretation of risk levels.

Key sources of uncertainty in the residual human health RA are discussed below.

Transient Trespasser: Use of the site by transient individuals has been observed, and so represents current use. Use of the site by transients is likely to be highly variable in daily use and duration of use (i.e., exposure duration). The risk analysis in this document does not consider ingestion of food (plants or animals) from the Facility or from the adjacent river. It is unlikely that food from the site would be ingested for significant periods of time. The Portland Harbor Superfund Site RIFS will include an evaluation of the risks from eating fish and shellfish from the Willamette River.

Recreational Trespasser (and Future Park User): The frequency and duration of exposure assumed for recreational use are more consistent with active recreational areas such as playgrounds or parks. This level of use may not be consistent with uses of the Willamette Cove Facility if it is developed into a natural area or wildlife habitat, where nature trails are defined and use beyond the trails is limited. Typical human contact in such areas is generally minimal, and likely to be restricted to relatively small portions of the site.

Future Construction Worker: The future use at the site has not yet been determined and the type of construction, if any, at the Facility is unknown at this time. In any case, construction projects at the site are likely to be relatively small in size and duration, and likely to be restricted to walking trails, restroom facilities, or similar projects. Thus, the default 1-year duration for the Construction Worker exposure estimate may be an overestimate of actual project duration. In addition, it is unclear whether construction projects would have to be located in specific areas of the site where benzo(a)pyrene is at high concentrations. If not, then the risk for the Construction Worker may be overestimated.

5.9 Residual Human Health Risk Assessment Conclusions

The screening process identified antimony, arsenic, lead, Aroclors (i.e., PCBs), PAHs, and dioxin TEQ as COPCs in soil for relatively localized areas of the Facility. The Risk Characterization

indicates that each of these chemicals could be considered a COC in parts of the site, and may be important to consider in risk management decisions.

For the four exposure scenarios evaluated, potentially unacceptable risk among the EUs is summarized as follows:

Transient Trespasser:

Cancer Risk based on multiple chemicals: None

Cancer Risk based on Individual chemicals:

- Inner Cove: Aroclors
- Wharf Road: Dioxin TEQ

Non-Cancer Risk based on multiple chemicals (HI): East Parcel and Inner Cove

Non-Cancer Risk based on HQ for individual chemicals:

- Inner Cove: Lead, Aroclors

Recreational Trespasser (and Future Park User):

Cancer Risk based on multiple chemicals: All EUs

Cancer Risk based on Individual chemicals:

- West Parcel: PAHs
- Central Parcel: PAHs, Arsenic
- East Parcel: PAHs, Arsenic, Aroclors
- Inner Cove: Aroclors, PAHs, Arsenic
- Central Beach: PAHs
- Wharf Road: Dioxin TEQ

Non-Cancer Risk based on multiple chemicals (HI): Central Parcel, East Parcel, Wharf Road Area

Non-Cancer Risk based on HQ for individual chemicals:

- East Parcel: Antimony, Copper
- Inner Cove: Aroclors, Antimony, Lead

Construction Worker:

Cancer Risk based on multiple chemicals: Inner Cove

Cancer Risk based on individual chemicals:

- Central Parcel: PAHs (benzo(a)pyrene only)
- Inner Cove: Aroclors, Arsenic
- Wharf Road: Dioxin TEQ

Non-Cancer Risk based on multiple chemicals (HI): Central Parcel, East Parcel, Inner Cove, Wharf Road Area

Non-Cancer Risk based on HQ for individual chemicals:

- Central Parcel: Lead
- East Parcel: Antimony, Lead
- Inner Cove: Aroclors, Antimony, Lead
- Wharf Road: Dioxin TEQ

For three of the COCs/EUs (Inner Cove, Central Beach, and Wharf Road), exposure estimates were based on the MDC because of inadequate sample size for calculating 90UCLs. This is due primarily to the fact that sampling at the Facility was conducted in multiple sampling events with different sampling goals. The sampling was not designed to address the spatial areas represented by the EUs that DEQ ultimately requested in 2010 and 2012. As a result, the exposure estimates may not

be representative of conditions throughout the EU. The chemicals for which MDCs were used as EPCs for these three EUs are listed in Tables 3-7 through 3-9 in Section 3.

For most COPCs, the analysis suggests that very localized areas within the EUs are responsible for exceedance of the Oregon ARLs. The location and relative size of the areas with elevated concentrations of COCs in each EU can be used to assess whether risk management actions are necessary and, if so, where action may be needed.

For arsenic, some distinctly elevated concentrations are observed, but overall concentrations are similar to default background concentrations, so extensive remediation at the Facility may not result in overall lower exposure or risk from arsenic for human receptors.

More information on how the site may be used is necessary to determine where the exposure scenarios may be applicable for evaluating human health risk management needs. For example, natural area/habitat land-use is likely to result in areas of dense vegetation that will be inaccessible to use by children, or even passive adult recreational users. Soil remediation in such areas would not reduce human health risk substantially. Possible locations for construction of site facilities would also help to determine what parts of the site should be considered for remedial action to protect future Construction Workers.

Based on the results presented in this RHHRA, human use of the Facility could result in hazardous substance exposures that exceed Oregon ARLs, if the exposure frequency, intensity, and duration are similar to those assumed in this analysis. Consistent with Oregon statute, a Feasibility Study (OAR 340-122-0085) is recommended to help determine whether remediation or other risk management actions would be effective in reducing risk at the site.

6.0 REFERENCES

Ash Creek Associates (ACA). 2011. 2010 Source Control Sampling Results, Willamette Cove Upland Facility, May 6.

Ash Creek Associates (ACA). 2012. 2012 Surface Soil Sampling Results-Former Wharf Road Area, Willamette Cove Upland Facility, October 17.

Ash Creek Associates/Hart Crowser (ACA/Hart Crowser). 2005. Memorandum: Removal Action Activities: October 28, 2004. From Amanda Spencer (Ash Creek Associates) and Rick Ernst (Hart Crowser) to Port of Portland and METRO. March 8.

Ash Creek Associates/NewFields (ACA/NF). 2007a. Willamette Cove Baseline Risk Assessment, Willamette Cove Upland Facility (Final), September.

Ash Creek Associates/NewFields (ACA/NF). 2007b. Addendum to Riverbank Soil Sampling, Work Plan, Willamette Cove Upland Facility, August.

Ash Creek Associates/NewFields (ACA/NF). 2008a. Riverbank Soil Sampling Addendum, Willamette Cove Upland Facility, October 29.

Ash Creek Associates/NewFields (ACA/NF). 2008b. Removal Action Report, Willamette Cove Upland Facility, December.

Blasland, Bouck, and Lee, Inc./Ash Creek Associates/NewFields (BBL/ACA/NF). 2005a. Groundwater Monitoring Report – Third Quarter 2005, Willamette Cove Upland Facility. November.

Blasland, Bouck, and Lee, Inc./Ash Creek Associates/NewFields (BBL/ACA/NF). 2005b. Riverbank Soil Sampling Work Plan, Willamette Cove Upland Facility. December.

Blasland, Bouck, and Lee, Inc./Ash Creek Associates/NewFields (BBL/ACA/NF). 2006a. Groundwater Monitoring Report – December 2005, Willamette Cove Upland Facility. April 21.

Blasland, Bouck, and Lee, Inc./Ash Creek Associates/NewFields (BBL/ACA/NF). 2006b. Riverbank Soil Sampling Report, Willamette Cove Upland Facility. May 5.

City of Portland. 1999. Willamette Cove Management Plan Draft. Bureau of Parks and Recreation. May 25.

City of Portland. 2000. Draft Willamette River Inventory: Natural Resources. Bureau of Planning, Public review draft, August.

City of Portland. 2001. Parks 2020 Vision. Bureau of Parks and Recreation. July.

City of Portland. 2004. Zoning Maps. Available at http://www.portlandonline.com/planning/. Map 2222 revised 07/10/2004; downloaded 04/11/2006

Ecology and Environment. 2000. Draft Biological Evaluation, McCormick & Baxter Creosoting Company, Portland, Oregon. January.

Formation Environmental (Formation). 2012a. Letter to Ken Thiessen from Formation Environmental. Re: Response to DEQ December 20, 2011 Letter, Willamette Cove Upland Facility Residual Risk Assessment. Prepared by Formation Environmental for Ash Creek Associates on behalf of Port of Portland (Portland, OR). February 3.

Formation Environmental (Formation). 2012b. Letter to Ken Thiessen from Formation Environmental. Re: Response to DEQ March 2, 2012 Letter, Willamette Cove Upland Facility Residual Risk Assessment. Prepared by Formation Environmental for Ash Creek Associates on behalf of Port of Portland (Portland, OR). June 20.

Hahn and Associates. 1999. Underground Storage Tank Decommissioning Report, Willamette Cove Property, North Richmond Street, Portland Oregon. August 13.

Hart Crowser. 2000. Existing Data/Site History Report, Willamette Cove, Portland, Oregon. November 8.

Hart Crowser. 2001. Remedial Investigation Work Plan. February 26.

Hart Crowser. 2003. Remedial Investigation (Volume I), Willamette Cove, Portland, Oregon, ECSI No. 2066. Prepared for Port of Portland/Metro, Project No. 23998, Task No. 730. March 11.

Lower Willamette Group (LWG). 2011. Portland Harbor RI/FS. Draft Final Remedial Investigation Report. July 1.

Oregon Department of Environmental Quality (DEQ). 1998. Guidance for Identification of Hot Spots. Oregon Department of Environmental Quality, Land Quality Division. April 23.

Oregon Department of Environmental Quality (DEQ). 2003. Risk-based decision making for the remediation of petroleum-contaminated Sites. Oregon Department of Environmental Quality, Land Quality Division, Environmental Cleanup and Tanks Program. September 22.

Oregon Department of Environmental Quality (DEQ). 2006. Guidance for Conducting Feasibility Studies. Final.

Oregon Department of Environmental Quality (DEQ). 2010a. Letter to Kelly Madalinski, Port of Portland from Kenneth Thiessen, Oregon DEQ. “Re: DEQ Request for Residual Risk Assessment and Data Requirements for Completion of Uplands and Source Control Site Characterization. Willamette Cove, ECSI 2066.” Oregon Department of Environmental Quality, January 15.

Oregon Department of Environmental Quality (DEQ). 2010b. Human Health Risk Assessment Guidance. Oregon Department of Environmental Quality, Environmental Cleanup Program, October 2010.

Oregon Department of Environmental Quality (DEQ). 2011. Letter to Dwight Leisle from Kenneth Thiessen. "Re: Response to Proposed Approach for Willamette Cove Upland Facility Residual Risk Assessment, dated November 28, 2011. ECSI #2066." Oregon Department of Environmental Quality, December 20.

Oregon Department of Environmental Quality (DEQ). 2012a. Letter to Dwight Leisle from Kenneth Thiessen. Re: Resubmission and corrected response letter: Comments on February 3, 2012 letter entitled: *Response to DEQ December 20, 2011 Letter Willamette Cove Upland Facility Residual Risk Assessment, ECSI #2066*. Oregon Department of Environmental Quality, March 16

Oregon Department of Environmental Quality (DEQ). 2012b. Letter to Dwight Leisle from Kenneth Thiessen. Re: DEQ Approval of Willamette Cove Upland Facility Residual Risk Assessment, final planning letter date June 20, 2012. ECSI #2066. Oregon Department of Environmental Quality, July 5.

Oregon Department of Environmental Quality (DEQ). 2012c. Risk-Based Concentrations for Individual Chemicals. Revision: June 7. Available at: http://www.deq.state.or.us/lq/cu/health.htm.

Oregon Health Authority Environmental Health Assessment Program (EHAP). 2012. Health Consultation: Willamette Cove East Parcel Beach.

Oregonian. 1904. Has Japanese Exhibit Portland And Asiatic Liner, Indravelli, Arrives, p. 14, March 3.

Oregonian. 1919. Coal Dock is in Service. Business of Supplying Ships in Harbor Begun. Considerable Quantities of Fuel Already, p. 22, May 25.

Oregonian. 1967. Flakewood Fire. October 14.

Port of Portland. 2003. Final Draft Remedial Investigation Addendum: Supplemental Preliminary Assessment of the Willamette Cove Upland Facility. September 19.

Port of Portland, Metro, and Oregon Department of Environmental Quality (DEQ). 2000. Voluntary Cleanup Program Agreement (ECNWR-00-26) for Remedial Investigation and Source Control Measures, effective November 4.

Portland and Seattle Railway. 1906. Willamette River Bridge at Portland, Exhibit No. 17, submitted by Port of Portland Bridge Committee, February 19.

PTI Environmental Services. 1992. Remedial Action Report, McCormick & Baxter Creosoting Company. September.

Sweet Edwards/EMCON, Inc. 1989. Level II Environmental Site Assessment, St. Johns Riverfront Property, Portland, Oregon. March 15.

Sweet Edwards/EMCON, Inc. 1996. Supplemental Environmental Site Assessment, St. Johns Riverfront.

Property, Portland, Oregon. 1996 Includes a Qualitative Risk Assessment (Appendix E). January 9.

United States Environmental Protection Agency (EPA). 1989. Risk Assessment Guidance for Superfund. Volume I, Human Health Evaluation Manual (Part A). Interim Final. EPA/540/1-89/002.

United States Environmental Protection Agency (EPA). 2003. Assessing Intermittent or Variable Exposures at Lead Sites. EPA-540-R-03-008, OSWER #9285.7-76. November. Available online: http://www.epa.gov/superfund/lead/products/twa-final-nov2003.pdf

United States Environmental Protection Agency (EPA). 2007. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK). Office of Research and Development, Washington, D.C. EPA/540/R-93/081. May.

United States Environmental Protection Agency (EPA). 2009. Update of the adult lead methodology default baseline blood lead concentrations and geometric standard deviation parameters. OSWER 9200.2-82. June.

United States Environmental Protection Agency (USEPA). 2010. Draft ProUCL Version 4.1 User Guide. USEPA Office of Research and Development. USEPA/600/R-07/041. May.

United States Environmental Protection Agency (USEPA). 2011. ProUCL software, version 4.1.01. Downloaded at http://www.epa.gov/osp/hstl/tsc/software.htm. July.

United States Environmental Protection Agency (EPA) 2012. Mid-Atlantic Risk Assessment User's Guide (May 2012). http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm (website last updated November 8, 2012). Includes associated regional screening levels and supporting chemical-specific parameter tables.

TABLES

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]		Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
TOC	total organic carbon	Conventionals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TSO	total solids	Conventionals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)*	Dioxins_Furans	C	NA	1.20E-05	1.20E-05	NA	4.40E-06	4.50E-06	4.50E-06	NA	1.20E-05
93-76-5	2,4,5-T*	Herbicides	N	NA	NA	NA	NA	NA	610	NA	61	61
94-75-7	2,4-D*	Herbicides	N	NA	1200	NA	120	610	690	NA	69	120
94-82-6	2,4-DB*	Herbicides	N	NA	NA	NA	NA	NA	490	NA	49	49
75-99-0	Dalapon	Herbicides	N	NA	NA	NA	NA	NA	1800	NA	180	180
1918-00-9	Dicamba	Herbicides	N	NA	NA	NA	NA	NA	1800	NA	180	180
120-36-5	Dichloroprop	Herbicides	N	NA	1200	NA	120	610	690	NA	69	120
88-85-7	Dinoseb	Herbicides	N	NA	NA	NA	NA	NA	61	NA	6.1	6.1
94-74-6	MCPA	Herbicides	N	NA	61	NA	6.1	31	31	NA	3.1	6.1
93-65-2	MCPP	Herbicides	N	NA	NA	NA	NA	NA	61	NA	6.1	6.1
93-72-1	Silvex*	Herbicides	N	NA	NA	NA	NA	NA	490	NA	49	49
191-26-4	Anthanthrene	HPAHs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
56-55-3	Benzo(a)anthracene	HPAHs	C	NA	0.34	0.34	NA	0.15	0.15	0.15	NA	0.34
50-32-8	Benzo(a)pyrene	HPAHs	C	NA	0.034	0.034	NA	0.015	0.015	0.015	NA	0.034
192-97-2	Benzo(e)pyrene*	HPAHs	N	NA	3,400	NA	340	1,700	1,700	NA	170	340
205-99-2	Benzo(b)fluoranthene	HPAHs	C	NA	0.34	0.34	NA	0.15	0.15	0.15	NA	0.34
191-24-2	Benzo(g,h,i)perylene	HPAHs	N	NA	3,400	NA	340	1,700	1,700	NA	170	340
207-08-9	Benzo(k)fluoranthene	HPAHs	C	NA	3.4	3.4	NA	1.5	1.5	1.5	NA	3.4
BKBFLANTH	Benzo(b+k)fluoranthene	HPAHs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
218-01-9	Chrysene	HPAHs	C	NA	32	32	NA	14	15	15	NA	32
53-70-3	Dibenz(a,h)anthracene	HPAHs	C	NA	0.034	0.034	NA	0.015	0.015	0.015	NA	0.034
206-44-0	Fluoranthene	HPAHs	N	NA	4,600	NA	460	2,300	2,300	NA	230	460
193-39-5	Indeno(1,2,3-cd)pyrene	HPAHs	C	NA	0.34	0.34	NA	0.15	0.15	0.15	NA	0.34
129-00-0	Pyrene	HPAHs	N	NA	3,400	NA	340	1,700	1,700	NA	170	340
HPAH	High-Molecular Weight PAHs (sum) [b]	HPAHs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
91-57-6	2-Methylnaphthalene	LPAHs	N	NA	NA	NA	NA	NA	230	NA	23	23
83-32-9	Acenaphthene	LPAHs	N	NA	9,400	NA	940	4,700	3,400	NA	340	940
208-96-8	Acenaphthylene*	LPAHs	N	NA	9,400	NA	940	4,700	3,400	NA	340	940
120-12-7	Anthracene	LPAHs	N	NA	47,000	NA	4,700	23,000	17,000	NA	1,700	4700
132-64-9	Dibenzofuran	LPAHs	N	NA	NA	NA	NA	NA	78	NA	7.8	7.8
86-73-7	Fluorene	LPAHs	N	NA	6,300	NA	630	3,100	2,300	NA	230	630
90-12-0	1-Methylnaphthalene	LPAHs	C	NA	NA	NA	NA	NA	16	16	NA	16
91-20-3	Naphthalene	LPAHs	C	NA	25	25	NA	4.6	3.6	3.6	NA	25
85-01-8	Phenanthrene*	LPAHs	N	NA	4,600	NA	460	2,300	2,300	NA	230	460
LPAH	Low-Molecular Weight PAHs (sum) [a]	LPAHs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
BAPEQ	Total BaPEq	PAHs	C	NA	0.034	0.034	NA	0.015	0.015	0.015	NA	0.034
130498-29-2	Total PAHs	PAHs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
7429-90-5	Aluminum[d]	Metals	N	94412	NA	NA	NA	NA	77000	NA	7700	7700
7440-36-0	Antimony	Metals	N	4	NA	NA	NA	NA	31	NA	3.1	3.1
7440-38-2	Arsenic	Metals	C	7	1	1	NA	0.39	0.39	0.39	NA	1
7440-39-3	Barium	Metals	N	NA	31,000	NA	3,100	15,000	15,000	NA	1,500	3100
7440-41-7	Beryllium	Metals	N	NA	310	NA	31	160	160	NA	16	31
7440-43-9	Cadmium	Metals	N	1	78	NA	7.8	39	70	NA	7	7.8
7440-70-2	Calcium	Metals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-47-3	Chromium*	Metals	N	42	230,000	NA	23,000	120,000	120,000	NA	12,000	23000
7440-48-4	Cobalt	Metals	N	NA	NA	NA	NA	NA	23	NA	2.3	2.3
7440-50-8	Copper	Metals	N	36	6,200	NA	620	3,100	3,100	NA	310	620
7439-89-6	Iron	Metals	N	NA	NA	NA	NA	NA	55000	NA	5500	5500
7439-92-1	Lead	Metals	N	17	400	NA	40	400	400	NA	40	40

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]	Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
7439-95-4	Magnesium	Metals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
7439-96-5	Manganese	Metals	N	NA	3,600	NA	360	1,800	1,800	NA	180	360
7439-97-6	Mercury	Metals	N	0.07	47	NA	4.7	23	10	NA	1	4.7
7440-02-0	Nickel	Metals	N	38	3,100	NA	310	1,500	1,500	NA	150	310
744-09-7	Potassium	Metals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
7782-49-2	Selenium	Metals	N	2	NA	NA	NA	NA	390	NA	39	39
7440-22-4	Silver	Metals	N	1	780	NA	78	390	390	NA	39	78
7440-23-5	Sodium	Metals	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
7440-28-0	Thallium	Metals	N	NA	NA	NA	NA	NA	0.78	NA	0.078	0.078
7440-62-2	Vanadium	Metals	N	NA	NA	NA	NA	NA	390	NA	39	39
7440-66-6	Zinc	Metals	N	86	NA	NA	NA	NA	23000	NA	2300	2300
TEQ_PCB.0	Dioxin-like PCB congener TCDD toxicity equivalent (ND = 0)	PCB_Congeners	C	NA	1.20E-05	1.20E-05	NA	4.40E-06	4.50E-06	0.0000045	NA	1.20E-05
32598-13-3	PCB077	PCB_Congeners	C	NA	NA	NA	NA	NA	0.034	0.034	NA	0.034
70362-50-4	PCB081	PCB_Congeners	C	NA	NA	NA	NA	NA	0.011	0.011	NA	0.011
32598-14-4	PCB105	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
PCB106_118	PCB106 & 118	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
74472-37-0	PCB114	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
65510-44-3	PCB123	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
57465-28-8	PCB126	PCB_Congeners	C	NA	NA	NA	NA	NA	3.40E-05	3.40E-05	NA	3.40E-05
38380-08-4	PCB156	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
69782-90-7	PCB157	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
52663-72-6	PCB167	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
32774-16-6	PCB169	PCB_Congeners	C	NA	NA	NA	NA	NA	1.10E-04	1.10E-04	NA	1.10E-04
39635-31-9	PCB189	PCB_Congeners	C	NA	NA	NA	NA	NA	0.11	0.11	NA	0.11
12674-11-2	Aroclor 1016	PCBs	C	NA	NA	NA	NA	NA	3.9	3.9	NA	3.9
11104-28-2	Aroclor 1221	PCBs	C	NA	NA	NA	NA	NA	0.14	0.14	NA	0.14
11141-16-5	Aroclor 1232	PCBs	C	NA	NA	NA	NA	NA	0.14	0.14	NA	0.14
53469-21-9	Aroclor 1242	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
12672-29-6	Aroclor 1248	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
11097-69-1	Aroclor 1254*	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
11096-82-5	Aroclor 1260	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
37324-23-5	Aroclor 1262*	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
11100-14-4	Aroclor 1268*	PCBs	C	NA	NA	NA	NA	NA	0.22	0.22	NA	0.22
12767-79-2	Total Aroclors [c]	PCBs	C	NA	0.31	0.31	NA	0.2	0.22	0.22	NA	0.31
53-19-0	2,4'-DDD*	Pesticides	C	NA	6.4	6.4	NA	2.4	2	2	NA	6.4
3424-82-6	2,4'-DDE*	Pesticides	C	NA	4.5	4.5	NA	1.7	1.4	1.4	NA	4.5
789-02-6	2,4'-DDT*	Pesticides	C	NA	4.5	4.5	NA	1.7	1.7	1.7	NA	4.5
72-54-8	4,4'-DDD*	Pesticides	C	NA	6.4	6.4	NA	2.4	2	2	NA	6.4
72-55-9	4,4'-DDE	Pesticides	C	NA	4.5	4.5	NA	1.7	1.4	1.4	NA	4.5
50-29-3	4,4'-DDT*	Pesticides	C	NA	4.5	4.5	NA	1.7	1.7	1.7	NA	4.5
309-00-2	Aldrin	Pesticides	C	NA	0.072	0.072	NA	0.025	0.029	0.029	NA	0.072
959-98-8	alpha-Endosulfan*	Pesticides	N	NA	730	NA	73	370	370	NA	37	73
319-84-6	alpha-Hexachlorocyclohexane	Pesticides	C	NA	0.2	0.2	NA	0.07	0.077	0.077	NA	0.2
33213-65-9	beta-Endosulfan*	Pesticides	N	NA	730	NA	73	370	370	NA	37	73
319-85-7	beta-Hexachlorocyclohexane	Pesticides	C	NA	NA	NA	NA	NA	0.27	0.27	NA	0.27
12789-03-6	Chlordane (technical)	Pesticides	C	NA	4.2	4.2	NA	1.6	1.6	1.6	NA	4.2
5103-71-9	cis-Chlordane*	Pesticides	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
5103-73-1	cis-Nonachlor*	Pesticides	C	NA	4.2	4.2	NA	1.6	1.6	1.6	NA	4.2
319-86-8	delta-Hexachlorocyclohexane	Pesticides	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
60-57-1	Dieldrin	Pesticides	C	NA	0.08	0.08	NA	0.029	0.03	0.03	NA	0.08
1031-07-8	Endosulfan sulfate*	Pesticides	N	NA	730	NA	73	370	370	NA	37	73

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]	Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
72-20-8	Endrin	Pesticides	N	NA	37	NA	3.7	18	18	NA	1.8	3.7
7421-93-4	Endrin aldehyde*	Pesticides	N	NA	NA	NA	NA	NA	18	NA	1.8	1.8
53494-70-5	Endrin ketone*	Pesticides	N	NA	NA	NA	NA	NA	18	NA	1.8	1.8
50-00-0	Formaldehyde	Pesticides	C	NA	31,000	31,000	NA	16,000	12,000	12,000	NA	31000
5566-34-7	gamma-Chlordane*	Pesticides	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
58-89-9	gamma-Hexachlorocyclohexane*	Pesticides	C	NA	1.1	1.1	NA	0.38	0.52	0.52	NA	1.1
76-44-8	Heptachlor	Pesticides	C	NA	0.28	0.28	NA	0.1	0.11	0.11	NA	0.28
1024-57-3	Heptachlor epoxide	Pesticides	C	NA	0.14	0.14	NA	0.053	0.053	0.053	NA	0.14
72-43-5	Methoxychlor	Pesticides	N	NA	NA	NA	NA	NA	310	NA	31	31
2385-85-5	Mirex	Pesticides	C	NA	NA	NA	NA	NA	0.027	0.027	NA	0.027
27304-13-8	Oxychlordane*	Pesticides	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
TOTCHLDANE	Total Chlordanes*	Pesticides	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
TOTENDOSLFN	Total Endosulfan	Pesticides	N	NA	NA	NA	NA	NA	370	NA	37	37
PP_DDT3ISO	Total of 4,4'-DDD, -DDE, -DDT	Pesticides	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
8001-35-2	Toxaphene	Pesticides	C	NA	1.2	1.2	NA	0.44	0.44	0.44	NA	1.2
5103-74-2	trans-Chlordane*	Pesticides	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
39765-80-5	trans-Nonachlor*	Pesticides	C	NA	4.2	4.2	NA	1.6	1.6	1.6	NA	4.2
DRH	Diesel Range Hydrocarbons	Petroleum	N	NA	2200	NA	220	1,100	NA	NA	NA	220
DRH (SGT)	Diesel Range Hydrocarbons (silica gel treated)	Petroleum	N	NA	2200	NA	220	1,100	NA	NA	NA	220
GRH	Gasoline Range Hydrocarbons	Petroleum	N	NA	2500	NA	250	1,200	NA	NA	NA	250
M09800000	Motor oil	Petroleum	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
M09800000 (SG	Motor oil (silica gel treated)	Petroleum	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
ORH	Oil Range Hydrocarbons	Petroleum	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH	Total Petroleum Hydrocarbons	Petroleum	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
4901-51-3	2,3,4,5-Tetrachlorophenol*	Phenols	N	NA	NA	NA	NA	NA	1800	NA	180	180
25167-83-3_3	2,3,4,6;2,3,5,6-Tetrachlorophenol coelution*	Phenols	N	NA	NA	NA	NA	NA	1800	NA	180	180
58-90-2	2,3,4,6-Tetrachlorophenol	Phenols	N	NA	NA	NA	NA	NA	1800	NA	180	180
935-95-5	2,3,5,6-Tetrachlorophenol*	Phenols	N	NA	NA	NA	NA	NA	1800	NA	180	180
95-95-4	2,4,5-Trichlorophenol	Phenols	N	NA	NA	NA	NA	NA	6100	NA	610	610
88-06-2	2,4,6-Trichlorophenol	Phenols	N	NA	120	NA	12	44	44	NA	4.4	12
120-83-2	2,4-Dichlorophenol	Phenols	N	NA	NA	NA	NA	NA	180	NA	18	18
105-67-9	2,4-Dimethylphenol	Phenols	N	NA	NA	NA	NA	NA	1200	NA	120	120
51-28-5	2,4-Dinitrophenol	Phenols	N	NA	NA	NA	NA	NA	120	NA	12	12
87-65-0	2,6-Dichlorophenol*	Phenols	N	NA	NA	NA	NA	NA	180	NA	18	18
95-57-8	2-Chlorophenol	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-48-7	2-Methylphenol*	Phenols	N	NA	NA	NA	NA	NA	3100	NA	310	310
88-75-5	2-Nitrophenol	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
C_3+4MPHN	3- and 4-Methylphenol Coelution	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
534-52-1	4,6-Dinitro-2-methylphenol	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
59-50-7	4-Chloro-3-methylphenol	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-44-5	4-Methylphenol*	Phenols	N	NA	NA	NA	NA	NA	6100	NA	610	610
100-02-7	4-Nitrophenol	Phenols	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
1319-77-3	Cresol	Phenols	N	NA	NA	NA	NA	NA	6100	NA	610	610
87-86-5	Pentachlorophenol	Phenols	C	NA	2.4	2.4	NA	0.89	0.89	0.89	NA	2.4
108-95-2	Phenol	Phenols	N	NA	NA	NA	NA	NA	18000	NA	1800	1800
25167-83-3	Tetrachlorophenol*	Phenols	N	NA	NA	NA	NA	NA	1800	NA	180	180
117-81-7	Bis(2-ethylhexyl) Phthalate	Phthalates	C	NA	93	93	NA	35	35	35	NA	93
85-68-7	Butyl Benzyl Phthalate	Phthalates	C	NA	NA	NA	NA	NA	260	260	NA	260
84-66-2	Diethyl Phthalate	Phthalates	N	NA	NA	NA	NA	NA	49000	NA	4900	4900
131-11-3	Dimethyl Phthalate*	Phthalates	N	NA	NA	NA	NA	NA	49000	NA	4900	4900
84-74-2	Di-n-butyl Phthalate*	Phthalates	N	NA	NA	NA	NA	NA	6100	NA	610	610

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]	Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
117-84-0	Di-n-octyl Phthalate*	Phthalates	N	NA	NA	NA	NA	NA	49000	NA	4900	4900
120-82-1	1,2,4-Trichlorobenzene	SVOCs	N	NA	NA	NA	NA	NA	22	NA	2.2	2.2
95-50-1	1,2-Dichlorobenzene	SVOCs	N	NA	4,400	NA	440	2,200	1,900	NA	190	440
541-73-1	1,3-Dichlorobenzene*	SVOCs	C	NA	4,400	4,400	NA	2,200	1,900	1900	NA	4400
106-46-7	1,4-Dichlorobenzene	SVOCs	C	NA	62	62	NA	13	2.4	2.4	NA	62
121-14-2	2,4-Dinitrotoluene	SVOCs	C	NA	NA	NA	NA	NA	1.6	1.6	NA	1.6
606-20-2	2,6-Dinitrotoluene	SVOCs	N	NA	120	NA	12	61	61	NA	6.1	12
91-58-7	2-Chloronaphthalene*	SVOCs	N	NA	NA	NA	NA	NA	6300	NA	630	630
88-74-4	2-Nitroaniline	SVOCs	N	NA	NA	NA	NA	NA	610	NA	61	61
91-94-1	3,3'-Dichlorobenzidine	SVOCs	C	NA	NA	NA	NA	NA	1.1	1.1	NA	1.1
99-09-2	3-Nitroaniline*	SVOCs	N	NA	NA	NA	NA	NA	610	NA	61	61
101-55-3	4-Bromophenyl phenyl ether	SVOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
106-47-8	4-Chloroaniline*	SVOCs	C	NA	NA	NA	NA	NA	2.4	2.4	NA	2.4
7005-72-3	4-Chlorophenyl phenyl ether	SVOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
100-01-6	4-Nitroaniline	SVOCs	C	NA	NA	NA	NA	NA	24	24	NA	24
62-53-3	Aniline	SVOCs	N	NA	NA	NA	NA	NA	85	NA	8.5	8.5
103-33-3	Azobenzene	SVOCs	C	NA	NA	NA	NA	NA	5.1	5.1	NA	5.1
65-85-0	Benzoic acid	SVOCs	N	NA	NA	NA	NA	NA	240000	NA	24000	24000
100-51-6	Benzyl alcohol	SVOCs	N	NA	NA	NA	NA	NA	6100	NA	610	610
108-60-1	Bis(2-chloro-1-methylethyl) ether	SVOCs	C	NA	NA	NA	NA	NA	4.6	4.6	NA	4.6
111-91-1	Bis(2-chloroethoxy) methane	SVOCs	N	NA	NA	NA	NA	NA	180	NA	18	18
111-44-4	Bis(2-chloroethyl) ether	SVOCs	C	NA	NA	NA	NA	NA	0.21	0.21	NA	0.21
39638-32-9	Bis(2-chloroisopropyl) ether*	SVOCs	C	NA	NA	NA	NA	NA	4.6	4.6	NA	4.6
86-74-8	Carbazole	SVOCs	N	NA	6,300	NA	630	3,100	2,300	NA	230	630
118-74-1	Hexachlorobenzene	SVOCs	C	NA	0.84	0.84	NA	0.26	0.3	0.3	NA	0.84
87-68-3	Hexachlorobutadiene	SVOCs	N	NA	NA	NA	NA	NA	6.2	NA	0.62	0.62
77-47-4	Hexachlorocyclopentadiene	SVOCs	N	NA	NA	NA	NA	NA	370	NA	37	37
67-72-1	Hexachloroethane	SVOCs	N	NA	66	NA	6.6	19	12	NA	1.2	6.6
78-59-1	Isophorone	SVOCs	C	NA	NA	NA	NA	NA	510	510	NA	510
98-95-3	Nitrobenzene	SVOCs	C	NA	NA	NA	NA	NA	4.8	4.8	NA	4.8
62-75-9	N-Nitrosodimethylamine	SVOCs	C	NA	NA	NA	NA	NA	0.0023	0.0023	NA	0.0023
86-30-6	N-Nitrosodiphenylamine	SVOCs	C	NA	NA	NA	NA	NA	99	99	NA	99
621-64-7	N-Nitrosodipropylamine	SVOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
630-20-6	1,1,1,2-Tetrachloroethane	VOCs	C	NA	NA	NA	NA	NA	1.9	1.9	NA	1.9
71-55-6	1,1,1-Trichloroethane	VOCs	N	NA	110,000	NA	11,000	53,000	8,700	NA	870	11000
79-34-5	1,1,2,2-Tetrachloroethane	VOCs	C	NA	NA	NA	NA	NA	0.56	0.56	NA	0.56
79-00-5	1,1,2-Trichloroethane	VOCs	N	NA	6.3	NA	0.63	3.2	1.1	NA	0.11	0.63
75-34-3	1,1-Dichloroethane	VOCs	C	NA	190	190	NA	52	3.3	3.3	NA	190
75-35-4	1,1-Dichloroethene	VOCs	N	NA	3,500	NA	350	1,800	240.0	NA	24.0	350
563-58-6	1,1-Dichloropropene*	VOCs	C	NA	NA	NA	NA	NA	1.7	1.7	NA	1.7
87-61-6	1,2,3-Trichlorobenzene	VOCs	N	NA	NA	NA	NA	NA	49	NA	4.9	4.9
96-18-4	1,2,3-Trichloropropane	VOCs	C	NA	NA	NA	NA	NA	0.005	0.005	NA	0.005
95-63-6	1,2,4-Trimethylbenzene	VOCs	N	NA	220	NA	22	110	62	NA	6.2	22

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]	Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
96-12-8	1,2-Dibromo-3-chloropropane	VOCs	C	NA	NA	NA	NA	NA	0.0054	0.0054	NA	0.0054
107-06-2	1,2-Dichloroethane	VOCs	C	NA	12	12	NA	3.2	0.43	0.43	NA	12
78-87-5	1,2-Dichloropropane	VOCs	C	NA	NA	NA	NA	NA	0.94	0.94	NA	0.94
108-67-8	1,3,5-Trimethylbenzene	VOCs	N	NA	1600	NA	160	780	780	NA	78	160
142-28-9	1,3-Dichloropropane	VOCs	N	NA	NA	NA	NA	NA	1600	NA	160	160
99-87-6	1-Methyl-4-isopropylbenzene	VOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
594-20-7	2,2-Dichloropropane	VOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
95-49-8	2-Chlorotoluene	VOCs	N	NA	NA	NA	NA	NA	1600	NA	160	160
106-43-4	4-Chlorotoluene*	VOCs	N	NA	NA	NA	NA	NA	1600	NA	160	160
67-64-1	Acetone	VOCs	N	NA	NA	NA	NA	NA	61000	NA	6100	6100
71-43-2	Benzene	VOCs	C	NA	24	24	NA	7.3	1.1	1.1	NA	24
108-86-1	Bromobenzene	VOCs	N	NA	NA	NA	NA	NA	300	NA	30	30
74-97-5	Bromochloromethane	VOCs	N	NA	12	NA	1.2	3	160	NA	16	1.2
75-27-4	Bromodichloromethane	VOCs	C	NA	NA	NA	NA	NA	0.27	0.27	NA	0.27
75-25-2	Bromoform	VOCs	C	NA	170	170	NA	51	62	62	NA	170
74-83-9	Bromomethane	VOCs	N	NA	92	NA	9.2	46	7.3	NA	0.73	9.2
75-15-0	Carbon disulfide	VOCs	N	NA	NA	NA	NA	NA	820	NA	82	82
56-23-5	Carbon tetrachloride	VOCs	C	NA	20	20	NA	6.7	0.61	0.61	NA	20
108-90-7	Chlorobenzene	VOCs	N	NA	1100	NA	110	530	290	NA	29	110
124-48-1	Chlorodibromomethane	VOCs	C	NA	12	12	NA	3.3	0.68	0.68	NA	12
75-00-3	Chloroethane*	VOCs	N	NA	320,000	NA	32,000	160,000	15,000	NA	1,500	32000
67-66-3	Chloroform	VOCs	C	NA	22	22	NA	5.1	0.29	0.29	NA	22
74-87-3	Chloromethane	VOCs	N	NA	2,900	NA	290	1,400	120	NA	12	290
156-59-2	cis-1,2-Dichloroethene	VOCs	N	NA	310	NA	31	160	160	NA	16	31
10061-01-5	cis-1,3-Dichloropropene*	VOCs	C	NA	NA	NA	NA	NA	1.7	1.7	NA	1.7
75-71-8	Dichlorodifluoromethane	VOCs	N	NA	NA	NA	NA	NA	94	NA	9.4	9.4
100-41-4	Ethylbenzene	VOCs	C	NA	110	110	NA	30	5.4	5.4	NA	110
106-93-4	Ethylene dibromide*	VOCs	C	NA	NA	NA	NA	NA	0.034	0.034	NA	0.034
98-82-8	Isopropylbenzene*	VOCs	N	NA	7,000	NA	700	3,500	2,100	NA	210	700
179601-23-1	m,p-Xylene	VOCs	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
108-10-1	Methyl isobutyl ketone	VOCs	N	NA	NA	NA	NA	NA	5300	NA	530	530
591-78-6	Methyl n-butyl ketone*	VOCs	N	NA	NA	NA	NA	NA	210	NA	21	21
1634-04-4	Methyl tert-butyl ether	VOCs	C	NA	720	720	NA	220	43	43	NA	720
74-95-3	Methylene bromide*	VOCs	N	NA	NA	NA	NA	NA	25	NA	2.5	2.5
75-09-2	Methylene chloride	VOCs	N	NA	NA	NA	NA	NA	56	NA	5.6	5.6
78-93-3	Methylethyl ketone	VOCs	N	NA	NA	NA	NA	NA	28000	NA	2800	2800
104-51-8	n-Butylbenzene	VOCs	N	NA	NA	NA	NA	NA	3900	NA	390	390
103-65-1	n-Propylbenzene	VOCs	N	NA	NA	NA	NA	NA	3400	NA	340	340
95-47-6	o-Xylene	VOCs	N	NA	NA	NA	NA	NA	690	NA	69	69
135-98-8	Sec-butylbenzene*	VOCs	N	NA	NA	NA	NA	NA	3900	NA	390	390
100-42-5	Styrene	VOCs	N	NA	16,000	NA	1,600	7,900	6,300	NA	630	1600
98-06-6	tert-Butylbenzene*	VOCs	N	NA	NA	NA	NA	NA	3900	NA	390	390
127-18-4	Tetrachloroethene	VOCs	N	NA	540	NA	54	200	22	NA	2.2	54
108-88-3	Toluene	VOCs	N	NA	12,000	NA	1,200	5,800	5,000	NA	500	1200
156-60-5	trans-1,2-Dichloroethene	VOCs	N	NA	1200	NA	120	590	150	NA	15	120
10061-02-6	trans-1,3-Dichloropropene	VOCs	C	NA	NA	NA	NA	NA	1.7	1.7	NA	1.7

TABLE 2-1 Human Health Screening Level Summary Table

Constituents of Interest (COIs)												
CASNo	Analyte[1]	Analyte Group/Methods	Carcinogen or Non-Carcinogen	Background Levels[3]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4]	Oregon DEQ-Approved Soil RBC: Urban Resident[4,5]	Oregon DEQ-Approved Soil RBC: Resident[4]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[6]	EPA RSL 2012 Resident Soil[5]	Selected Value[7]
				Default Background Soil Concs (mg/kg)		Carcinogenic Effect (TR = 106)	Noncarcinogenic Effect (HQ = 0.1)			Carcinogenic Effect (TR = 10^6)	Noncarcinogenic Effect (HQ = 0.1)	
79-01-6	Trichloroethene	VOCs	C	NA	17	17	NA	6.4	0.91	0.91	NA	17
75-69-4	Trichlorofluoromethane	VOCs	N	NA	15,000	NA	1,500	7,600	790	NA	79	1500
75-01-4	Vinyl chloride	VOCs	C	NA	0.76	0.76	NA	0.34	0.06	0.06	NA	0.76
1330-20-7	Xylene	VOCs	N	NA	2,900	NA	290	1,400	630	NA	63	290

Notes :

1 - Notes about summed analytes:

a - Sum of Low Molecular Weight PAHs (LPAHs): Sum of the detected LPAHs or the highest detection limit when not detected. LPAHs have three or fewer aromatic rings and include: 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, Phenanthrene. 1-Methylnaphthalene was not included in the sum.

b - Sum of High Molecular Weight PAHs (HPAHs): Sum of the detected HPAHs or the highest detection limit when not detected. HPAHs have four or more aromatic rings and include: Anthanthrene, Benz(a)anthracene, Benzo(a)pyrene, Benzo(e)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Pyrene. Dibenzofuran was not included in the sum.

c- Total Aroclors: Sum of the detected Aroclors or the highest detection limit when not detected.

3 - Background levels: Oregon Department of Environmental Quality (DEQ). 2010. Human Health Risk Assessment Guidance, Table 1. Oregon Department of Environmental Quality, Environmental Cleanup Program, October 2010.

d - Background value for Aluminum taken from United States Environmental Protection Agency (U.S. EPA). 2003. Guidance for Developing Ecological Soil Screening Levels. November. Office of Solid Waste and Emergency and Remedial Response. OSWER Directive 92857-55. Revised February 2005

4 - Oregon DEQ Risk Based Concentrations from Oregon Department of Environmental Quality (DEQ). 2012. Risk-Based Concentrations for Individual Chemicals. Revision: June 7, 2012. Available at: http://www.deq.state.or.us/lq/cu/health.htm

5 - RSLs for noncarcinogenic chemicals are divded by 10 to account for cumulative effects from multiple chemicals as requered by EPA Region 10. Dividing EPA RSLs for noncarcinogenic chemicals by 10 is equivalenve to using a hazard quotient of 0.1 (LWG, 2011)

6 - Regional Screening Level (RSL) source: USEPA, 2012c. Mid-Atlantic Risk Assessment User's Guide (May 2012). http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm (website last updated May 3, 2012). Includes associated regional screening levels and supporting chemical-specific parameter

Chemicals with a star have the following surrogates/notes:

- Aroclor 1260 SLV applied to Aroclor 1262 & Aroclor 1268
- pyrene SLV applied to benzo(g,h,i)perylene, benzo (e) pyrene
- Chlordane SLV applied to cis-Chlordane, gamma-Chlordane, oxychlordane, trans-Chlordane, total chlordane, trans-Nonachlor, cis-nonachlor
- chromium III SLV applied to chromium
- 2-Chloronaphthalene also known as Beta-Chloronapthalene
- 2,4,5-T also known as 2,4,5-Trichlorophenoxyacetic acid
- 2,4,-D also known as 2,4-Dichlorophenoxyacetic acid, 2,4-D SLV applied to Dichloroprop
- 2,4-DB also known as 4-(2,4-dichlorophenoxy) butyric acid
- 4-methylphenol also known as p-cresol
- 2-methylphenol also known as o-cresol
- Methylene bromide also known as Dibromomethane
- Methyl n-butyl ketone also known as 2-Hexanone
- Fluorene SLV applied to Carbazole
- PCB 118 SLV applied to PCB106 & 118
- DDD RSL applied to 2,4-DDD and 4,4,-DDD
- DDT RSL applied to 2,4-DDT and 4,4,-DDT
- 2,3,4,6-Tetrachlorophenol SLV applied to 2,3,5,6-Tetrachlorophenol, 2,3,4,5-Tetrachlorophenol, 2,3,4,6;2,3,5,6-Tetrachlorophenol coelution
- endrin SLV applied to endrin aldehyde and endrin ketone
- ethyl dibromide also known as 1,2-dibromomethane
- 2,3,4,6-Tetrachlorophenol SLV applied to Tetrachlorophenol
- diethyl phthalate SLV applied to dimethyl phthalate, di-n-octyl phthalate
- 4-Chloroaniline also known as p-Chloroaniline
- Isopropylbenzene also known as cumene
- 2-chlorotoluene also known as o-chlorotoluene
- dibutyl phthalate SLV applied to di-n-butyl phthalate
- 2-Nitroaniline SLV applied to 3-Nitroaniline
- Silvex also known as Fenoprop & 2-(2,4,5-Trichlorophenoxy) propionic acid
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin applied to Dioxin/furan TCDD toxicity equivalent (ND = 0)
- total endosulfan SLV applied to alpha-endosulfan, beta-endosulfan, endosulfan sulfate
- gamma-Hexachlorocyclohexane also known as Lindane
- 1,3-dichloropropene SLV applied to cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,1-dichloropropene
- 1,2 dichlorobenzene SLV applied to 1,3 dichlorobenzene
- 2,4 dichlorophenol SLV applied to 2,6 dichlorophenol
- Chloroethane also known as ethyl chloride
- n-Butylbenzene SLV applied to sec-butylbenzene and tert-Butylbenzene
- 4-chlorotoluene also known as p-chlorotoluene
- Bis(2-chloro-1-methylethyl) ether SLV applied to Bis(2-chloroisopropyl) ether
- Fluoranthene SLV applied to Phenanthrene
- Acenapthene SLV applied to Acenaphthylene
- 4,4 DDE RSL applied to 2,4-DDE
- hexachlorodibenzo-p-dioxin, mixture SLV applied to Hexachlorodibenzo-p-dioxin homologs

7 - The final selected Screening Level Value (SLV) to be used in the risk evaluation is the urban resident Oregon DEQ value where available, then the 2012 Regional Screening Level Value

TABLE 2-2 Human Health Summary of Soil COPCs - West Parcel Upland Exposure Unit

Candidate COPCs[2]	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?[1]	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
1,2,3-Trichloropropane	NA	4	4	0	N	--	--	N	No detected concentrations
1,2-Dibromo-3-chloropropane	NA	4	4	0	N	--	--	N	No detected concentrations
2,4-Dinitrotoluene	NA	1	1	0	N	--	--	N	No detected concentrations
3,3'-Dichlorobenzidine	NA	1	1	0	N	--	--	N	No detected concentrations
4-Chloroaniline	NA	1	1	0	N	--	--	N	No detected concentrations
Antimony	Yes	3	3	0	N	--	--	N	No detected concentrations
Arsenic	No	5	0	5	N	--	--	N	Does not exceed background
Total BaPEq	NA	7	0	7	Y	--	YES	Y	
Benzo(a)pyrene	NA	7	0	7	Y	--	YES	Y	
Benzo(b)fluoranthene	NA	7	0	7	Y	--	YES	Y	
Bis(2-chloroethyl) ether	NA	1	1	0	N	--	--	N	No detected concentrations
Cadmium	Yes	4	4	0	N	--	--	N	No detected concentrations
Dibenzo(a,h)anthracene	NA	7	1	6	Y	--	YES	Y	
Diesel Range Hydrocarbons	NA	12	12	0	N	--	--	N	No detected concentrations
Ethylene dibromide	NA	4	4	0	N	--	--	N	No detected concentrations
Hexachlorobenzene	NA	1	1	0	N	--	--	N	No detected concentrations
Hexachlorobutadiene	NA	5	5	0	N	--	--	N	No detected concentrations
Indeno(1,2,3-cd)pyrene	NA	7	0	7	Y	--	YES	Y	
Lead	Yes	5	0	5	Y	--	YES	Y	
Pentachlorophenol	NA	3	3	0	N	--	--	N	No detected concentrations
Thallium	NA	3	3	0	N	--	--	N	No detected concentrations

Notes:

1 - Refer to Appendix D-1-2 (Human Health Soil Summary with 90UCLs and Concentration Risk Screening) for a description of all 90UCL calculations.

2 - Final COPCs are highlighted in gray

COPCs - Chemicals of Potential Concern

90UCL - 90% upper confidence limit

HQ - hazard quotient

TABLE 2-3 Human Health Summary of Soil COPCs - Central Parcel Upland Exposure Unit

Candidate COPCs[2]	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?[1]	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
1,2,3-Trichloropropane	NA	2	2	0	N	--	--	N	No detected concentrations
1,2-Dibromo-3-chloropropane	NA	2	2	0	N	--	--	N	No detected concentrations
2,4-Dinitrotoluene	NA	2	2	0	N	--	--	N	No detected concentrations
3,3'-Dichlorobenzidine	NA	2	2	0	N	--	--	N	No detected concentrations
4-Chloroaniline	NA	2	2	0	N	--	--	N	No detected concentrations
Antimony	Yes	29	9	20	Y	NO	YES	Y	
Aroclor 1221	NA	20	20	0	N	--	--	N	No detected concentrations
Arsenic	Yes	63	0	63	Y	YES	YES	Y	
Total BaPEq	NA	46	2	44	Y	YES	YES	Y	
Benzo(a)anthracene	NA	46	4	42	Y	YES	YES	Y	
Benzo(a)pyrene	NA	46	2	44	Y	YES	YES	Y	
Benzo(b)fluoranthene	NA	46	2	44	Y	YES	YES	Y	
Benzo(k)fluoranthene	NA	46	5	41	Y	YES	YES	Y	
Bis(2-chloroethyl) ether	NA	2	2	0	N	--	--	N	No detected concentrations
Chrysene	NA	46	2	44	Y	NO	NO	N	Does not exceed HQ=1
Copper	Yes	63	0	63	Y	YES	YES	Y	
Dibenzo(a,h)anthracene	NA	46	9	37	Y	YES	YES	Y	
Diesel Range Hydrocarbons	NA	20	12	8	Y	--	YES	Y	COPC but not considered further[3]
Ethylene dibromide	NA	2	2	0	N	--	--	N	No detected concentrations
Hexachlorobenzene	NA	2	2	0	N	--	--	N	No detected concentrations
Hexachlorobutadiene	NA	4	4	0	N	--	--	N	No detected concentrations
Indeno(1,2,3-cd)pyrene	NA	46	3	43	Y	YES	YES	Y	
Lead	Yes	76	1	75	Y	YES	YES	Y	
Mercury	Yes	63	9	54	Y	NO	NO	N	Does not exceed HQ=1
Pentachlorophenol	NA	2	2	0	N	--	--	N	No detected concentrations
Thallium	NA	29	4	25	Y	YES	YES	Y	

Notes:
1 - Refer to Appendix D-2-2 (Human Health Soil Summary with 90UCLs and Concentration Risk Screening) for a description of all 90UCL calculations
2 - Final COPCs are highlighted in gray
3. Diesel range hydrocarbons were not included in the exposure and risk calculations because no toxicity information is available for quantifying risk.
ge hydrocarbons is a mixture of many organic and inorganic chemicals, many of which are included in the COI list and were included in the risk screen.

COPCs - Chemicals of Potential Concern
Diesel ran
90UCL - 90% upper confidence limit
HQ - hazard quotient

TABLE 2-4 Human Health Summary of Soil COPCs - East Parcel Upland Exposure Unit

Candidate COPCs[2]	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?[1]	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
1,2,3-Trichloropropane	NA	5	5	0	N	--	--	N	No detected concentrations
1,2-Dibromo-3-chloropropane	NA	5	5	0	N	--	--	N	No detected concentrations
2,4-Dinitrotoluene	NA	1	1	0	N	--	--	N	No detected concentrations
3,3'-Dichlorobenzidine	NA	1	1	0	N	--	--	N	No detected concentrations
4-Chloroaniline	NA	1	1	0	N	--	--	N	No detected concentrations
Antimony	Yes	21	2	19	Y	NO	YES	Y	
Aroclor 1221	NA	23	23	0	N	--	--	N	No detected concentrations
Aroclor 1232	NA	23	23	0	N	--	--	N	No detected concentrations
Aroclor 1242	NA	23	23	0	N	--	--	N	No detected concentrations
Aroclor 1248	NA	23	23	0	N	--	--	N	No detected concentrations
Aroclor 1254	NA	23	20	3	Y	--	NO	N	Did not exceed HQ=1
Aroclor 1260	NA	23	16	7	Y	--	YES	Y	
Aroclors	NA	23	15	8	Y	YES	YES	Y	
Arsenic	Yes	25	1	24	Y	YES	YES	Y	
Total BaPEq	NA	20	0	20	Y	YES	YES	Y	
Benzo(a)anthracene	NA	20	5	15	Y	NO	NO	N	Did not exceed HQ=1
Benzo(a)pyrene	NA	20	2	18	Y	YES	YES	Y	
Benzo(b)fluoranthene	NA	18	1	17	Y	YES	YES	Y	
Bis(2-chloroethyl) ether	NA	1	1	0	N	--	--	N	No detected concentrations
Copper	Yes	25	0	25	Y	YES	YES	Y	
Dibenzo(a,h)anthracene	NA	20	8	12	Y	YES	YES	Y	
Diesel Range Hydrocarbons (silica gel treated)	NA	2	0	2	N	--	--	Y	COPC but not considered futher[3]
Ethylene dibromide	NA	5	5	0	N	--	--	N	No detected concentrations
Hexachlorobenzene	NA	3	3	0	N	--	--	N	No detected concentrations
Hexachlorobutadiene	NA	8	8	0	N	--	--	N	No detected concentrations
Lead	Yes	23	0	23	Y	YES	YES	Y	
Thallium	NA	20	2	18	Y	NO	NO	N	Did not exceed HQ=1

Notes:

1 - Refer to Appendix D-3-2 (Human Health Soil Summary with 90UCLs and Concentration Risk Screening) for a description of all 90UCL calculations.

2 - Final COPCs are highlighted in gray

3. Diesel range hydrocarbons were not included in the exposure and risk calculations because no toxicity information is available for quantifying risk.
Diesel range hydrocarbons is a mixture of many organic and inorganic chemicals, many of which are included in the COI list and were included in the risk screen.

COPCs - Chemicals of Potential Concern

90UCL - 90% upper confidence limit

HQ - hazard quotient

TABLE 2-5 Human Health Summary of Soil COPCs - Inner Cove Beach Exposure Unit

Candidate COPCs[2]	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?[1]	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
1,2,3-Trichloropropane	NA	5	5	0	N	--	--	N	No detected concentrations
1,2-Dibromo-3-chloropropane	NA	5	5	0	N	--	--	N	No detected concentrations
Aluminum	No	4	0	4	N	--	--	N	Does not exceed background
Antimony	Yes	13	0	13	Y	--	YES	Y	
Aroclor 1221	NA	9	9	0	N	--	--	N	No detected concentrations
Aroclor 1232	NA	9	9	0	N	--	--	N	No detected concentrations
Aroclor 1254	NA	9	5	4	Y	--	YES	Y	
Aroclor 1260	NA	9	9	0	N	--	--	N	No detected concentrations
Aroclors	NA	9	5	4	Y	--	YES	Y	
Arsenic	Yes	13	0	13	Y	--	YES	Y	
Total BaPEq	NA	9	3	6	Y	--	YES	Y	
Benzo(a)anthracene	NA	9	3	6	Y	--	YES	Y	
Benzo(a)pyrene	NA	9	3	6	Y	--	YES	Y	
Benzo(b)fluoranthene	NA	9	3	6	Y	--	YES	Y	
Cobalt	NA	3	0	3	N	--	--	Y (MDC)	
Copper	Yes	13	0	13	Y	--	YES	Y	
Dibenzo(a,h)anthracene	NA	9	4	5	Y	--	YES	Y	
Diesel Range Hydrocarbons	NA	11	1	10	Y	--	YES	Y	COPC but not considered further[3]
Diesel Range Hydrocarbons (silica gel treated)	NA	5	0	5	Y	--	--	Y (MDC)	COPC but not considered further[3]
Iron	NA	3	0	3	N	--	--	N	Essential Nutrient
Lead	Yes	13	0	13	Y	--	YES	Y	
Mercury	Yes	13	5	8	Y	--	YES	Y	
N-Nitrosodimethylamine	NA	1	1	0	N	--	--	N	No detected concentrations
Thallium	NA	9	1	8	Y	--	YES	Y	
Vanadium	NA	3	0	3	N	--	--	Y (MDC)	

Notes:

1 - Refer to Appendix D-4-2 (Human Health Soil Summary with 90UCLs and Concentration Risk Screening) for a description of all 90UCL calculations.

2 - Final COPCs are highlighted in gray

3. Diesel range hydrocarbons were not included in the exposure and risk calculations because no toxicity information is available for quantifying risk.

Diesel range hydrocarbons is a mixture of many organic and inorganic chemicals, many of which are included in the COI list and were included in the risk screen.

COPCs - Chemicals of Potential Concern

MDC - maximum detected concentration

90UCL - 90% upper confidence limit

HQ - hazard quotient

TABLE 2-6 Human Health Summary of Soil COPCs - Central Beach Exposure Unit

Candidate COPCs[2]	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?[1]	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
Aluminum	No	2	0	2	N	--	--	N	Does not exceed background
Arsenic	No	6	0	6	N	--	--	N	Does not exceed background
Benzo(a)anthracene	NA	9	2	7	Y	YES	--	Y	
Benzo(a)pyrene	NA	9	2	7	Y	YES	--	Y	
Benzo(b)fluoranthene	NA	9	2	7	Y	NO	--	N	Does not exceed HQ=1
Cadmium	Yes	6	3	3	Y	--	--	Y (MDC)	
Dibenzo(a,h)anthracene	NA	9	6	3	Y	YES	--	Y	
Lead	Yes	6	0	6	Y	--	--	Y (MDC)	
N-Nitrosodimethylamine	NA	2	2	0	N	--	--	N	No detected concentrations
Total BaPEq	NA	9	2	7	Y	YES	--	Y	
Thallium	NA	1	1	0	N	--	--	N	No detected concentrations

Notes:
1 - Refer to Appendix D-5-2 (Human Health Soil Summary with 90UCLs and Concentration Risk Screening) for a description of all 90UCL calculations
2 - Final COPCs are highlighted in gray

COPCs - Chemicals of Potential Concern
MDC - maximum detected concentration
90UCL - 90% upper confidence limit
HQ - hazard quotient

TABLE 2-7 Human Health Summary of Soil COPCs - Wharf Road Expsoure Unit

Candidate COPCs	Exceed Background?	# of Samples	# of ND	# of Detects	ProUCL?	Composite 90UCL >HQ=1	Discrete 90UCL >HQ=1	COPC?	Notes
Dioxin/furan TCDD toxicity equivalent (ND = 0)	NA	3	0	3	N	--	--	Y	

Notes:

1 - Final COPCs are highlighted in gray

Notes:
COPCs - Chemicals of Potential Concern
90UCL - 90% upper confidence limit
HQ - hazard quotient

TABLE 3-1 Exposure Parameters for Current Transient Trespasser

Scenario Timeframe:	Present
Location:	All Exposure Units
Receptor:	Current Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Ingestion	Current Transient Trespasser	Adult	Soil	Cs	Chemical Concentration in Soil	(1)	mg/L	(1)
				IR-S	Ingestion Rate of Soil	100	mg/day	Recommended value for construction worker EPA (2002)
				EF	Exposure Frequency	208	days/year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	2	years	
				BW	Body Weight	70	kg	Recommended value USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	Recommended value USEPA, 1989
				AT-NC	Average Time Non-Cancer	730	days	Recommended value USEPA, 1989
Dermal	Current Transient Trespasser	Adult	Soil	Cs	Chemical Concentraion in Soil	(1)	mg/L	(1)
				Abs	Fraction Absorbed Soil	Chemical specific	dimensionless	USEPA, 2004
				SA-adult	Skin Surface Area	5,700	cm^2	Recommended value for residential adults USEPA, 2004
				AF	Adherence Factor	0.07	mg/cm^2	Recommended value for residential adults (EPA 2004)
				DAF	Dermal Absorption factor	Chemical specific	unitless	EPA, 2004
				EF	Exposure Frequency Adult	104	days per year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	2	years	
				BW-adult	Body Weight	70	kg	USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	USEPA, 1989
				AT-NC (adult)	Average Time Non-Cancer	730	days	USEPA, 1989

TABLE 3-1 Exposure Parameters for Current Transient Trespasser

Scenario Timeframe:	Present
Location:	All Exposure Units
Receptor:	Current Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Inhalation	Current Transient Trespasser	Adult	Soil	CCA	Chemical Concentration in Ambient Air modeled from Soil	(1)	mg/m^3	(1)
				ET	Exposure Time	24	hrs/day	
				EF	Exposure Frequency	104	days/year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	2	years	
				BW	Body Weight	70	kg	USEPA, 1989
				AT-C	Averaging Time (cancer)	25,550	day	USEPA, 1989
				AT-NC	Averaging Time (non-cancer)	730	days	USEPA, 1989

Footnote Instructions:

(1) For Soil concentrations, See Exposure Point Concentration Summary Tables

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR, Chapter 6,. EPA/540-1-89-002.

USEPA, 1997 Exposure Factors Handbook, Chapter 3: Drinking Water Intake, August, 1997.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

Default Dermal Absorption Factors (ODEQ 2010)	
Chemical	Default DAF
Arsenic	0.03
Cadmium	0.001
Chlordan	0.04
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.05
DDT	0.03
TCDD (TOC <=10%)	0.03
TCDD (TOC>10%)	0.001
Lindane	0.04
Benzo(a)pyrene and other PAHs	0.13
Aroclor 1242, Aroclor 1254, and other PCBs	0.14
Pentachlorophenol	0.25
Semi-volatile organic compounds	0.1
All other chemicals	1

TABLE 3-2 Exposure Parameters for Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	All Exposure Units
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Ingestion	Current Recreational Trespasser/ Future Park User	Adult & Child	Aquifier 1-Tap Water	Cs	Chemical Concentration in Soil	(1)	mg/kg	(1)
				IR-S-adult	Ingestion Rate of Soil	100	mg/day	Recommended daily RME residential exposure in EPA (1991)
				IR-S-child	Ingestion Rate of Soil	200	mg/day	Recommended daily RME child residential exposure in EPA (1991)
				EF	Exposure Frequency	104	days/year	Two days per week (LWG, 2004)
				ED-adult	Exposure Duration	24	years	USEPA, 2004
				ED-child	Exposure Duration	6	years	USEPA, 2004
				BW-adult	Body Weight	70	kg	USEPA, 1989
				BW-child	Body Weight	15	kg	USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	USEPA, 1989
				AT-NC (adult)	Average Time Non-Cancer	8,760	days	USEPA, 1989
				AT-NC (child)	Average Time Non-Cancer	2,190	days	USEPA, 1989

TABLE 3-2 Exposure Parameters for Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	All Exposure Units
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Dermal	Current Recreational Trespasser/ Future Park User	Adult & Child	Soil	Cs	Chemical Concentraion in Soil	(1)	mg/kg	(1)
				DAF	Dermal Absorption Factor	Chemical specific	dimensionless	USEPA, 2004
				SA-adult	Skin Surface Area	5,700	cm^2	USEPA, 2004
				SA-child	Skin Surface Area	2,800	cm^2	USEPA, 2004
				AF-adult	Adherence Factor	0.07	mg/cm^2	Recommended value for residential adults (EPA 2007)
				AF-child	Adherence Factor	0.2	mg/cm^2	Recommended value for residential child (EPA 2007)
				EF	Exposure Frequency	104	days per year	Two days per week (LWG, 2004)
				ED-adult	Exposure Duration	24	years	USEPA, 2004
				ED-child	Exposure Duration	6	years	USEPA, 2004
				BW-adult	Body Weight	70	kg	USEPA, 1989
				BW-child	Body Weight	15	kg	USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	USEPA, 1989
				AT-NC (adult)	Average Time Non-Cancer	8,760	days	USEPA, 1989
				AT-NC (child)	Average Time Non-Cancer	2,190	days	USEPA, 1989

TABLE 3-2 Exposure Parameters for Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	All Exposure Units
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Inhalation	Current Recreational Trespasser/ Future Park User	Adult & Child	Soil	CCA	Chemical Concentration in Ambient Air modeled from Soil	(1)	mg/m^3	(1)
				ET	Exposure Time	4	hrs/day	
				EF	Exposure Frequency	104	days/year	Two days per week (LWG, 2004)
				ED-adult	Exposure Duration	24	years	USEPA, 1989
				ED-child	Exposure Duration	6	years	USEPA, 1989
				AT-C	Averaging Time (cancer)	25,550	day	USEPA, 1989
				AT-NC	Averaging Time (non-cancer)	10,950	day	USEPA, 1989

Footnote Instructions:
(1) For Soil concentrations, See Exposure Point Concentration Summary Tables

Sources:
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR, Chapter 6,. EPA/540-1-89-002.
USEPA, 1997 Exposure Factors Handbook, Chapter 3: Drinking Water Intake, August, 1997.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

Default Dermal Absorption Factors (ODEQ 2010)	
Chemical	Default DAF
Arsenic	0.03
Cadmium	0.001
Chlordan	0.04
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.05
DDT	0.03
TCDD (TOC <=10%)	0.03
TCDD (TOC>10%)	0.001
Lindane	0.04
Benzo(a)pyrene and other PAHs	0.13
Aroclor 1242, Aroclor 1254, and other PCBs	0.14
Pentachlorophenol	0.25
Semi-volatile organic compounds	0.1
All other chemicals	1

TABLE 3-3 Exposure Parameters for Future Construction Worker

Scenario Timeframe:	Future
Location:	All Exposure Units
Receptor:	Future Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Ingestion	Future Construction Worker	Adult	Soil	Cs	Chemical Concentration in Soil	(1)	mg/L	(1)
				IR-S	Ingestion Rate of Soil	330	mg/day	Recommended value for construction worker EPA (2002)
				EF	Exposure Frequency	250	days/year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	1	years	Construction expected within 6 months
				BW	Body Weight	70	kg	Recommended value USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	Recommended value USEPA, 1989
				AT-NC	Average Time Non-Cancer	365	days	Recommended value USEPA, 1989
Dermal	Future Construction Worker	Adult	Soil	Cs	Chemical Concentraion in Soil	(1)	mg/L	(1)
				Abs	Fraction Absorbed Soil	Chemical specific	dimensionless	USEPA, 2004
				SA-adult	Skin Surface Area	3,300	cm^2	Recommended value for residential adults USEPA, 2004
				AF	Adherence Factor	0.3	mg/cm^2	Recommended value for construction worker (EPA 2004)
				DAF	Dermal Absorption factor	Chemical specific	unitless	EPA, 2004
				EF	Exposure Frequency Adult	250	days per year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	1	years	Construction expected within 6 months
				BW-adult	Body Weight	70	kg	USEPA, 1989
				AT-C	Average Time Cancer	25,550	days	USEPA, 1989
				AT-NC (adult)	Average Time Non-Cancer	365	days	USEPA, 1989

TABLE 3-3 Exposure Parameters for Future Construction Worker

Scenario Timeframe:	Future
Location:	All Exposure Units
Receptor:	Future Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference
Inhalation	Future Construction Worker	Adult	Soil	CCA	Chemical Concentration in Ambient Air modeled from Soil	(1)	mg/m^3	(1)
				ET	Exposure Time	8	hrs/day	Standard work day
				EF	Exposure Frequency	250	days/year	Recommneded value (EPA, 1991)
				ED	Exposure Duration	1	years	Construction expected within 6 months
				BW	Body Weight	70	kg	USEPA, 1989
				AT-C	Averaging Time (cancer)	25,550	day	USEPA, 1989
				AT-NC	Averaging Time (non-cancer)	365	days	USEPA, 1989

Footnote Instructions:
(1) For Soil concentrations, See Exposure Point Concentration Summary Tables

Sources:
USEPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A OERR, Chapter 6,. EPA/540-1-89-002.
USEPA, 1997 Exposure Factors Handbook, Chapter 3: Drinking Water Intake, August, 1997.
USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, Part E: Supplemental Guidance for Dermal Risk Assessment, EPA/540/R/99/005, July 2004.

Default Dermal Absorption Factors (ODEQ 2010)	
Chemical	Default DAF
Arsenic	0.03
Cadmium	0.001
Chlordan	0.04
2,4-Dichlorophenoxyacetic acid (2,4-D)	0.05
DDT	0.03
TCDD (TOC <=10%)	0.03
TCDD (TOC>10%)	0.001
Lindane	0.04
Benzo(a)pyrene and other PAHs	0.13
Aroclor 1242, Aroclor 1254, and other PCBs	0.14
Pentachlorophenol	0.25
Semi-volatile organic compounds	0.1
All other chemicals	1

Table 3-4 Exposure Point Concentration Summary for COPCs- West Parcel Upland Exposure Unit

Location:	WC-West Parcel Upland Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	90% UCL (Distribution)	90UCL based on discrete or composite	Exposure Point Concentration mg/kg
7439-92-1	Lead	Metals	mg/kg	95	78.59 (90% Approximate Gamm UCL)	discrete	78.59
BAPEQ	Total BaPEq	PAHs	mg/kg	1.2671	0.66 (90% Student's-t UCL)	discrete	0.66
50-32-8	Benzo(a)pyrene	PAHs	mg/kg	0.927	0.54 (90% Approximate Gamm UCL)	discrete	0.54
205-99-2	Benzo(b)fluoranthene	PAHs	mg/kg	0.726	0.40 (90% Student's-t UCL)	discrete	0.40
53-70-3	Dibenzo(a,h)anthracene	PAHs	mg/kg	0.159	0.09 (90% KM (t) UCL)	discrete	0.09
193-39-5	Indeno(1,2,3-cd)pyrene	PAHs	mg/kg	0.724	0.39 (90% Student's-t UCL)	discrete	0.39

Table 3-5 Exposure Point Concentration Summary for COPCs- Central Parcel Upland Exposure Unit

Location:	WC-Central Parcel Upland Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	90% UCL (Distribution)	90UCL based on discrete or composite	Exposure Point Concentration mg/kg
7440-36-0	Antimony	Metals	mg/kg	29.9	7.44 (90% KM (Chebyshev) UCL)	discrete	7.44
7440-38-2	Arsenic	Metals	mg/kg	40.3	11.85 (90% Chebyshev (Mean, Sd) UCL)	discrete	11.85
7440-50-8	Copper	Metals	mg/kg	5440	1400 (90% Approximate Gamma)	composite	1400.00
7439-92-1	Lead	Metals	mg/kg	4040	632.1 (90% KM (Chebyshev) UCL)	discrete	632.1
7440-28-0	Thallium	Metals	mg/kg	0.77	0.22 (90% Approximate Gamma)	composite	0.22
BAPEQ	Total BaPEq	PAHs	mg/kg	63.611	10.90 (90% KM (Chebyshev) UCL)	discrete	10.90
56-55-3	Benzo(a)anthracene	PAHs	mg/kg	23.6	4.01 (90% KM (Chebyshev) UCL)	discrete	4.01
50-32-8	Benzo(a)pyrene	PAHs	mg/kg	46.3	7.82 (90% KM (Chebyshev) UCL)	discrete	7.82
205-99-2	Benzo(b)fluoranthene	PAHs	mg/kg	27.5	5.88 (90% KM (Chebyshev) UCL)	discrete	5.88
207-08-9	Benzo(k)fluoranthene	PAHs	mg/kg	24.2	3.91 (90% KM (Chebyshev) UCL)	discrete	3.91
53-70-3	Dibenzo(a,h)anthracene	PAHs	mg/kg	9.13	1.57 (90% KM (Chebyshev) UCL)	discrete	1.57
193-39-5	Indeno(1,2,3-cd)pyrene	PAHs	mg/kg	27.9	5.14 (90% KM (Chebyshev) UCL)	discrete	5.14
DRH	Diesel Range Hydrocarbons	Petroleum	mg/kg	2390	424 (90 % KM (t) UCL)	discrete	424

Table 3-6 Exposure Point Concentration Summary for COPCs- East Parcel Upland Exposure Unit

Location:	WC-East Parcel Upland Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	90% UCL (Distribution)	90UCL based on discrete or composite	Exposure Point Concentration mg/kg
7440-36-0	Antimony	Metals	mg/kg	192	71.39 (90% Adjusted Gamma UCL)	discrete	71.39
7440-38-2	Arsenic	Metals	mg/kg	36.2	13.33 (90% (Chebyshev) UCL)	discrete	13.33
7440-50-8	Copper	Metals	mg/kg	47500	10637 (90% Chebyshev (Mean, Sd) UCL)	discrete	10637.00
7439-92-1	Lead	Metals	mg/kg	3090	779.7 (90% KM (t) UCL)	composite	779.7
BAPEQ	Total BaPEq	PAHs	mg/kg	0.885	0.49 (90% Approximate Gamma UCL)	composite	0.49
50-32-8	Benzo(a)pyrene	PAHs	mg/kg	0.589	0.35 (90% Approximate Gamma UCL)	composite	0.35
205-99-2	Benzo(b)fluoranthene	PAHs	mg/kg	0.782	0.43 (90% (Chebyshev) UCL)	discrete	0.43
53-70-3	Dibenzo(a,h)anthracene	PAHs	mg/kg	0.127	0.06 (90% KM (t) UCL)	discrete	0.06
12767-79-2	Aroclors	PCBs	mg/kg	7.94	5.21 (90% KM (Chebyshev) UCL)	composite	5.21

Table 3-7 Exposure Point Concentration Summary for COPCs- Inner Cove Beach Exposure Unit

Location:	WC-Inner Cove Beach Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	90% UCL (Distribution)	90UCL based on discrete or composite	Exposure Point Concentration mg/kg
7440-36-0	Antimony	Metals	mg/kg	154	62.57 (90% Chebyshev (Mean, Sd) UCL)	discrete	62.57
7440-38-2	Arsenic	Metals	mg/kg	39	23.79 (90% Chebyshev (Mean, Sd) UCL)	discrete	23.79
7440-48-4	Cobalt	Metals	mg/kg	16.1	Too small sample size	--	16.10
7440-50-8	Copper	Metals	mg/kg	1400	744.30 (90% Chebyshev (Mean, Sd) UCL)	discrete	744.30
7439-92-1	Lead	Metals	mg/kg	8660	4115 (90% Chebyshev (Mean, Sd) UCL)	discrete	4115
7439-97-6	Mercury	Metals	mg/kg	113	26.01 (90% KM (BCA) UCL)	discrete	26.01
7440-28-0	Thallium	Metals	mg/kg	0.18	0.12 (90% KM (t) UCL)	discrete	0.12
7440-62-2	Vanadium	Metals	mg/kg	68.3	Too small sample size	--	68.30
BAPEQ	Total BaPEq	PAHs	mg/kg	1.5787	1.11 (90% KM (t) UCL)	discrete	1.11
56-55-3	Benzo(a)anthracene	PAHs	mg/kg	2.82	1.61 (90% KM (t) UCL)	discrete	1.61
50-32-8	Benzo(a)pyrene	PAHs	mg/kg	0.849	0.61 (90% KM (t) UCL)	discrete	0.61
205-99-2	Benzo(b)fluoranthene	PAHs	mg/kg	1.76	1.06 (90% KM (t) UCL)	discrete	1.06
53-70-3	Dibenzo(a,h)anthracene	PAHs	mg/kg	0.233	0.22 (90% KM (t) UCL)	discrete	0.22
12767-79-2	Aroclors	PCBs	mg/kg	207	168.20 (90% KM (Chebyshev) UCL)	discrete	168.20

Table 3-8 Exposure Point Concentration Summary for COPCs- Central Beach Exposure Unit

Location:	WC-Central Beach Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	90% UCL (Distribution)	90UCL based on discrete or composite	Exposure Point Concentration mg/kg
7440-43-9	Cadmium	Metals	mg/kg	72.2	Too small sample size	composite	72.20
7439-92-1	Lead	Metals	mg/kg	17	Too small sample size	composite	17
BAPEQ	Total BaPEq	PAHs	mg/kg	0.6497	0.44 (90% KM (t) UCL)	composite	0.44
56-55-3	Benzo(a)anthracene	PAHs	mg/kg	0.663	0.38 (90% KM (t) UCL)	composite	0.38
50-32-8	Benzo(a)pyrene	PAHs	mg/kg	0.494	0.33 (90% KM (t) UCL)	composite	0.33
53-70-3	Dibenzo(a,h)anthracene	PAHs	mg/kg	0.0442	0.03 (90% KM (t) UCL)	composite	0.03

Table 3-9 Exposure Point Concentration Summary for COPCs- Wharf Road Exposure Unit

Location:	WC-Wharf Road Exposure Unit
Medium:	Soil
Exposure Medium:	Soil

Soil Exposure Point Cas Number	Chemical of Potential Concern	Analyte Group	Units	Maximum Result mg/kg	Method	discrete or composite	Exposure Point Concentration mg/kg
TEQ_DIOXIN.0	Dioxin/furan TCDD toxicity equivalent (ND = 0)	Dioxins_Furans	mg/kg	7.73E-04	Average of DU-1, DU-2, DU-3	composite	4.29E-04

Table 4-1 Non-Cancer Toxicity Data

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency For Dermal	Absorbed RfD for Dermal		RfD	
		Value	Units	GIABS	Value	Units	Source(s)	Date(s)
Antimony	Chronic	4.00E-04	mg/kg-day	0.150	6.00E-05	mg/kg-day	RSL	2012
Arsenic	Chronic	3.00E-04	mg/kg-day	1.000	3.00E-04	mg/kg-day	RSL	2012
Cobalt	Chronic	3.00E-04	mg/kg-day	1.000	3.00E-04	mg/kg-day	RSL	2012
Cadmium	Chronic	1.00E-03	mg/kg-day	0.025	2.50E-05	mg/kg-day	RSL	2012
Copper	Chronic	4.00E-02	mg/kg-day	1.000	4.00E-02	mg/kg-day	RSL	2012
Lead	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Mercury	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Thallium	Chronic	1.00E-05	mg/kg-day	1.000	1.00E-05	mg/kg-day	RSL	2012
Vanadium	Chronic	5.00E-03	mg/kg-day	1.000	5.00E-03	mg/kg-day	RSL	2012
Total BaPEq	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Benzo(a)anthracene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Benzo(a)pyrene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Benzo(b)fluoranthene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Benzo(k)fluoranthene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Dibenzo(a,h)anthracene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Indeno(1,2,3-cd)pyrene	Chronic	NA	mg/kg-day	1.000	NA	mg/kg-day	RSL	2012
Aroclors	Chronic	2.00E-05	mg/kg-day	1.000	2.00E-05	mg/kg-day	RSL	2012
Dioxin/furan TCDD toxicity equivalent (ND = 0)	Chronic	7.00E-10	mg/kg-day	1.00	7.00E-10	mg/kg-day	RSL	2012

Table 4-1 Non-Cancer Toxicity Data

Chemical of Potential Concern	Chronic/ Subchronic	Oral Rfc		RfC	
		Value	Units	Source(s)	Date(s)
Antimony	Chronic	NA	mg/m^3	RSL	2012
Arsenic	Chronic	1.50E-05	mg/m^3	RSL	2012
Cadmium	Chronic	2.00E-05	mg/m^3	RSL	2012
Cobalt	Chronic	6.00E-06	mg/m^3	RSL	2012
Copper	Chronic	NA	mg/m^3	RSL	2012
Lead	Chronic	NA	mg/m^3	RSL	2012
Mercury	Chronic	3.00E-04	mg/m^3	RSL	2012
Thallium	Chronic	NA	mg/m^3	RSL	2012
Vanadium	Chronic	NA	mg/m^3	RSL	2012
Total BaPEq	Chronic	NA	mg/m^3	RSL	2012
Benzo(a)anthracene	Chronic	NA	mg/m^3	RSL	2012
Benzo(a)pyrene	Chronic	NA	mg/m^3	RSL	2012
Benzo(b)fluoranthene	Chronic	NA	mg/m^3	RSL	2012
Benzo(k)fluoranthene	Chronic	NA	mg/m^3	RSL	2012
Dibenzo(a,h)anthracene	Chronic	NA	mg/m^3	RSL	2012
Indeno(1,2,3-cd)pyrene	Chronic	NA	mg/m^3	RSL	2012
Aroclors	Chronic	NA	mg/m^3	RSL	2012
Dioxin/furan TCDD toxicity equivalent (ND = 0)	Chronic	4.00E-08	mg/m^3	RSL	2012

Notes

1.The default GIABS (fraction of contaminant absorbed in gastrointestinal tract) was taken from EPA's 2012 Mid-Atlantic RSL table.

The Technical Guidance Manual for 2012 Mid-Atlantic RSL tables was also consulted.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, (Part E: Supplemental Guidance for Dermal Risk Assessment), Final EPA/540/R/99/005,Oc

Table 4-2 Cancer Toxicity Data

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Oral CSF	
	Value	Units	GIABS	Value	Units	Source(s)	Date(s) (YYYY)
Antimony	NA	$(mg/kg/day)^{-1}$	0.150	NA	$(mg/kg/day)^{-1}$	RSL	2012
Arsenic	1.50E+00	$(mg/kg/day)^{-1}$	1.000	1.50E+00	$(mg/kg/day)^{-1}$	RSL	2012
Cadmium	NA	$(mg/kg/day)^{-1}$	0.025	NA	$(mg/kg/day)^{-1}$	RSL	2012
Cobalt	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Copper	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Lead	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Mercury	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Thallium	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Vanadium	NA	$(mg/kg/day)^{-1}$	1.000	NA	$(mg/kg/day)^{-1}$	RSL	2012
Total BaPEq	7.30E+00	$(mg/kg/day)^{-1}$	1.000	7.30E+00	$(mg/kg/day)^{-1}$	RSL	2012
Benzo(a)anthracene	7.30E-01	$(mg/kg/day)^{-1}$	1.000	7.30E-01	$(mg/kg/day)^{-1}$	RSL	2012
Benzo(a)pyrene	7.30E+00	$(mg/kg/day)^{-1}$	1.000	7.30E+00	$(mg/kg/day)^{-1}$	RSL	2012
Benzo(b)fluoranthene	7.30E-01	$(mg/kg/day)^{-1}$	1.000	7.30E-01	$(mg/kg/day)^{-1}$	RSL	2012
Benzo(k)fluoranthene	7.30E-02	$(mg/kg/day)^{-1}$	1.000	7.30E-02	$(mg/kg/day)^{-1}$	RSL	2012
Dibenzo(a,h)anthracene	7.30E+00	$(mg/kg/day)^{-1}$	1.000	7.30E+00	$(mg/kg/day)^{-1}$	RSL	2012
Indeno(1,2,3-cd)pyrene	7.30E-01	$(mg/kg/day)^{-1}$	1.000	7.30E-01	$(mg/kg/day)^{-1}$	RSL	2012
Aroclors	2.00E+00	$(mg/kg/day)^{-1}$	1.000	2.00E+00	$(mg/kg/day)^{-1}$	RSL	2012
Dioxin/furan TCDD toxicity equivalent (ND = 0)	1.30E+05	(mg/kg/day)-1	1.00	1.30E+05	(mg/kg/day)-1	RSL	2012

Table 4-2 Cancer Toxicity Data

Inhalation Unit Risk Factor				
Chemical of Potential Concern	Value	Units	Source(s)	Date(s) (YYYY)
Antimony	NA	(ug/m3)-1	RSL	2012
Arsenic	4.30E-03	(ug/m3)-1	RSL	2012
Cadmium	1.80E-03	$(ug/m3)^{-1}$	RSL	2012
Cobalt	9.00E-03	(ug/m3)-1	RSL	2012
Copper	NA	(ug/m3)-1	RSL	2012
Lead	NA	$(ug/m3)^{-1}$	RSL	2012
Mercury	NA	(ug/m3)-1	RSL	2012
Thallium	NA	(ug/m3)-1	RSL	2012
Vanadium	NA	(ug/m3)-1	RSL	2012
Total BaPEq	1.10E-03	$(ug/m3)^{-1}$	RSL	2012
Benzo(a)anthracene	1.10E-04	$(ug/m3)^{-1}$	RSL	2012
Benzo(a)pyrene	1.10E-03	$(ug/m3)^{-1}$	RSL	2012
Benzo(b)fluoranthene	1.10E-04	(ug/m3)-1	RSL	2012
Benzo(k)fluoranthene	1.10E-04	(ug/m3)-1	RSL	2012
Dibenzo(a,h)anthracene	1.20E-03	$(ug/m3)^{-1}$	RSL	2012
Indeno(1,2,3-cd)pyrene	1.00E-04	(ug/m3)-1	RSL	2012
Aroclors	5.70E-04	(ug/m3)-1	RSL	2012
Dioxin/furan TCDD toxicity equivalent (ND = 0)	3.80E+01	(ug/m3)-1	RSL	2012

Notes

1.The default GIABS (fraction of contaminant absorbed in gastrointestinal tract) was taken from EPA's 2012 Mid-Atlantic RSL table.

The Technical Guidance Manual for 2012 Mid-Atlantic RSL tables was also consulted.

USEPA, 2004: RAGs Volume 1, Human Health Evaluation Manual, (Part E: Supplemental Guidance for Dermal Risk Assessment), Final EPA/540/R/99/005,October 2004.

Table 5-1-1 Human Health Summary for Risks and Hazards for West Parcel Upland Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Present
Location:	WC-West Parcel Upland Exposure Unit
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Noncancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Noncancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Noncancer Hazard: RfD/RfC Note	Adult Noncancer Hazard: Hazard Quotient
Soil	Soil	Transient Trespasser	Ingestion	Lead	7.86E+01	NA	NA	NA	NA	1.17E+03	1	6.72E-02
				Total BaPEq	6.60E-01	1.54E-08	7.30E+00	1.12E-07	5.37E-07	NA		NA
				Benzo(a)pyrene	5.40E-01	1.26E-08	7.30E+00	9.17E-08	4.40E-07	NA		NA
				Benzo(b)fluoranthene	4.00E-01	9.30E-09	7.30E-01	6.79E-09	3.26E-07	NA		NA
				Dibenzo(a,h)anthracene	9.00E-02	2.09E-09	7.30E+00	1.53E-08	7.33E-08	NA		NA
				Indeno(1,2,3-cd)pyrene	3.90E-01	9.07E-09	7.30E-01	6.62E-09	3.17E-07	NA		NA
			Dermal	Lead	7.86E+01	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	6.60E-01	3.98E-09	7.30E+00	2.91E-08	1.39E-07	NA		NA
				Benzo(a)pyrene	5.40E-01	3.26E-09	7.30E+00	2.38E-08	1.14E-07	NA		NA
				Benzo(b)fluoranthene	4.00E-01	2.41E-09	7.30E-01	1.76E-09	8.45E-08	NA		NA
				Dibenzo(a,h)anthracene	9.00E-02	5.43E-10	7.30E+00	3.96E-09	1.90E-08	NA		NA
				Indeno(1,2,3-cd)pyrene	3.90E-01	2.35E-09	7.30E-01	1.72E-09	8.23E-08	NA		NA
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Lead	7.86E+01	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	6.60E-01	1.13E-12	1.10E-03	1.24E-18	3.94E-11	1.50E-05		2.63E-06
				Benzo(a)pyrene	5.40E-01	9.21E-13	1.10E-03	1.01E-18	3.22E-11	6.00E-06		5.37E-06
				Benzo(b)fluoranthene	4.00E-01	6.82E-13	1.10E-04	7.50E-20	2.39E-11	NA		NA
				Dibenzo(a,h)anthracene	9.00E-02	1.53E-13	1.20E-03	1.84E-19	5.37E-12	NA		NA
				Indeno(1,2,3-cd)pyrene	3.90E-01	6.65E-13	1.10E-04	7.31E-20	2.33E-11	3.00E-04		7.76E-08
								1.41E-07				**6.72E-02**
								1.41E-07				**5.45E-06**

Notes:

1. Cancer risk and hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-1-2 Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	WC-West Parcel Upland Exposure Unit
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Child Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Child Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Child Cancer Risk: Cancer Risk	Child Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Child Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Child Non-cancer Hazard: Note	Child Non-cancer Hazard: Hazard Quotient	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Non-cancer Hazard: Note	Adult Non-cancer Hazard: Hazard Quotient	Lifetime Cancer Risk	HI
		Current Recreational Trespasser/ Future Park User	Ingestion	Lead	7.9E+01	NA	NA	NA	NA	9.50E+02	1	8.27E-02	NA	NA	NA	NA	1.88E+04	1	4.18E-03	NA	--
				Total BaPEq	6.6E-01	1.15E-06	7.3E+00	8.37E-06	1.34E-05	NA		NA	1.69E-07	7.30E+00	1.23E-06	4.93E-07	NA		NA	9.60E-06	NA
				Benzo(a)pyrene	5.4E-01	9.38E-07	7.3E+00	6.85E-06	1.09E-05	NA		NA	1.38E-07	7.30E+00	1.01E-06	4.03E-07	NA		NA	7.85E-06	NA
				Benzo(b)fluoranthene	4.0E-01	6.95E-07	7.3E-01	5.07E-07	8.10E-06	NA		NA	1.02E-07	7.30E-01	7.47E-08	2.98E-07	NA		NA	5.82E-07	NA
				Dibenzo(a,h)anthracene	9.0E-02	1.56E-07	7.3E+00	1.14E-06	1.82E-06	NA		NA	2.30E-08	7.30E+00	1.68E-07	6.72E-08	NA		NA	1.31E-06	NA
				Indeno(1,2,3-cd)pyrene	3.9E-01	6.77E-07	7.3E-01	4.94E-07	7.90E-06	NA		NA	9.98E-08	7.30E-01	7.28E-08	2.91E-07	NA		NA	5.67E-07	NA
			Dermal	Lead	7.9E+01	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	6.6E-01	3.21E-06	7.3E+00	2.34E-05	3.74E-05	NA		NA	6.74E-07	7.30E+00	4.92E-06	1.97E-06	NA		NA	2.83E-05	NA
				Benzo(a)pyrene	5.4E-01	2.63E-06	7.3E+00	1.92E-05	3.06E-05	NA		NA	5.51E-07	7.30E+00	4.02E-06	1.61E-06	NA		NA	2.32E-05	NA
				Benzo(b)fluoranthene	4.0E-01	1.95E-06	7.3E-01	1.42E-06	2.27E-05	NA		NA	4.08E-07	7.30E-01	2.98E-07	1.19E-06	NA		NA	1.72E-06	NA
				Dibenzo(a,h)anthracene	9.0E-02	4.38E-07	7.3E+00	3.19E-06	5.11E-06	NA		NA	9.19E-08	7.30E+00	6.71E-07	2.68E-07	NA		NA	3.87E-06	NA
				Indeno(1,2,3-cd)pyrene	3.9E-01	1.90E-06	7.3E-01	1.38E-06	2.21E-05	NA		NA	3.98E-07	7.30E-01	2.91E-07	1.16E-06	NA		NA	1.68E-06	NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard	Lifetime Cancer Risk	HI
			Inhalation	Lead	78.59	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	0.66	NA	1.1E-03	NA	NA	NA		NA	2.81E-12	1.10E-03	3.09E-18	6.56E-12	NA		NA	3.09E-18	NA
				Benzo(a)pyrene	0.54	NA	1.1E-03	NA	NA	NA		NA	2.30E-12	1.10E-03	2.53E-18	5.37E-12	NA		NA	2.53E-18	NA
				Benzo(b)fluoranthene	0.40	NA	1.1E-04	NA	NA	NA		NA	1.70E-12	1.10E-04	1.88E-19	3.98E-12	NA		NA	1.88E-19	NA
				Dibenzo(a,h)anthracene	0.09	NA	1.2E-03	NA	NA	NA		NA	3.84E-13	1.20E-03	4.60E-19	8.95E-13	NA		NA	4.60E-19	NA
				Indeno(1,2,3-cd)pyrene	0.39	NA	1.1E-04	NA	NA	NA		NA	1.66E-12	1.10E-04	1.83E-19	3.88E-12	NA		NA	1.83E-19	NA
	Total Risks All Media (all)							3.18E-05	Total Risks All Media (all)			8.27E-02	Total Risks All Media (all)		6.15E-06	Total Risks All Media (all)			4.18E-03	3.79E-05	0.00E+00
	Total Risks All Media (PAH)							3.18E-05	Total Risks All Media (PAH)			0.00E+00	Total Risks All Media (PAH)		6.15E-06	Total Risks All Media (PAH)			4.18E-03	3.79E-05	0.00E+00

Notes:

1. Cancer risk and hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-1-3 Human Health Summary Table for Risks and Hazards for West Parcel Upland Exposure Unit- Future Construction Worker

Scenario Timeframe:	Future
Location:	WC-West Parcel Upland Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard Quotient
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Construction Worker	Ingestion	Lead	78.59	NA	NA	NA	NA	6.14E+02	1	1.28E-01
				Total BaPEq	0.66	3.04E-08	7.30E+00	2.22E-07	2.13E-06	NA		NA
				Benzo(a)pyrene	0.54	2.49E-08	7.30E+00	1.82E-07	1.74E-06	NA		NA
				Benzo(b)fluoranthene	0.40	1.85E-08	7.30E-01	1.35E-08	1.29E-06	NA		NA
				Dibenzo(a,h)anthracene	0.09	4.15E-09	7.30E+00	3.03E-08	2.91E-07	NA		NA
				Indeno(1,2,3-cd)pyrene	0.39	1.80E-08	7.30E-01	1.31E-08	1.26E-06	NA		NA
			Dermal	Lead	78.59	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.66	1.19E-08	7.30E+00	8.67E-08	8.31E-07	NA		NA
				Benzo(a)pyrene	0.54	9.71E-09	7.30E+00	7.09E-08	6.80E-07	NA		NA
				Benzo(b)fluoranthene	0.40	7.20E-09	7.30E-01	5.25E-09	5.04E-07	NA		NA
				Dibenzo(a,h)anthracene	0.09	1.62E-09	7.30E+00	1.18E-08	1.13E-07	NA		NA
				Indeno(1,2,3-cd)pyrene	0.39	5.40E-09	7.30E-01	3.94E-09	3.78E-07	NA		NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Lead	78.59	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.66	4.51E-13	1.10E-03	4.96E-19	3.16E-11	NA		NA
				Benzo(a)pyrene	0.54	3.69E-13	1.10E-03	4.06E-19	2.58E-11	NA		NA
				Benzo(b)fluoranthene	0.40	2.73E-13	1.10E-04	3.01E-20	1.91E-11	NA		NA
				Dibenzo(a,h)anthracene	0.09	6.15E-14	1.20E-03	7.38E-20	4.30E-12	NA		NA
				Indeno(1,2,3-cd)pyrene	0.39	2.66E-13	1.10E-04	2.93E-20	1.86E-11	NA		NA
						Total Risks All Media (all)		**3.09E-07**	Total Risks All Media (all)			**1.28E-01**
						Total Risks All Media (PAH)		**3.09E-07**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Cancer risk and hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-2-1 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Current
Location:	WC-Central Parcel Upland Exposure Unit
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Noncancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Noncancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Noncancer Hazard: RfD/RfC Note	Adult Noncancer Hazard: Hazard Quotient
Soil	Soil	Transient Trespasser	Ingestion	Antimony	7.44E+00	1.73E-07	NA	NA	6.06E-06	4.00E-04		1.51E-02
				Arsenic	1.19E+01	2.76E-07	1.50E+00	4.13E-07	9.65E-06	3.00E-04		3.22E-02
				Copper	1.40E+03	3.26E-05	NA	NA	1.14E-03	4.00E-02		2.85E-02
				Lead	6.32E+02	NA	NA	NA	NA	1.17E+03	1	5.40E-01
				Thallium	2.20E-01	5.12E-09	NA	NA	1.79E-07	1.00E-05		1.79E-02
				Total BaPEq	1.09E+01	2.54E-07	7.30E+00	1.85E-06	8.87E-06	NA		NA
				Benzo(a)anthracene	4.01E+00	9.33E-08	7.30E-01	6.81E-08	3.26E-06	NA		NA
				Benzo(a)pyrene	7.82E+00	1.82E-07	7.30E+00	1.33E-06	6.37E-06	NA		NA
				Benzo(b)fluoranthene	5.88E+00	1.37E-07	7.30E-01	9.98E-08	4.79E-06	NA		NA
				Benzo(k)fluoranthene	3.91E+00	9.09E-08	7.30E-02	6.64E-09	3.18E-06	NA		NA
				Dibenzo(a,h)anthracene	1.57E+00	3.65E-08	7.30E+00	2.67E-07	1.28E-06	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14E+00	1.20E-07	7.30E-01	8.73E-08	4.18E-06	NA		NA
				Diesel Range Hydrocarbons	4.24E+02	9.86E-06	NA	NA	3.45E-04	NA		NA
			Dermal	Antimony	7.44E+00	5.18E-08	NA	NA	1.81E-06	6.00E-05		3.02E-02
				Arsenic	1.19E+01	1.65E-08	1.50E+00	2.47E-08	5.77E-07	3.00E-04		1.92E-03
				Copper	1.40E+03	6.50E-07	NA	NA	2.27E-05	4.00E-02		5.68E-04
				Lead	6.32E+02	NA	NA	NA	NA	NA	1	NA
				Thallium	2.20E-01	1.02E-10	NA	NA	3.57E-09	1.00E-05		3.57E-04
				Total BaPEq	1.09E+01	6.58E-08	7.30E+00	4.80E-07	2.30E-06	NA		NA
				Benzo(a)anthracene	4.01E+00	2.42E-08	7.30E-01	1.77E-08	8.47E-07	NA		NA
				Benzo(a)pyrene	7.82E+00	4.72E-08	7.30E+00	3.44E-07	1.65E-06	NA		NA
				Benzo(b)fluoranthene	5.88E+00	3.55E-08	7.30E-01	2.59E-08	1.24E-06	NA		NA
				Benzo(k)fluoranthene	3.91E+00	2.36E-08	7.30E-02	1.72E-09	8.26E-07	NA		NA
				Dibenzo(a,h)anthracene	1.57E+00	9.47E-09	7.30E+00	6.91E-08	3.31E-07	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14E+00	3.10E-08	7.30E-01	2.26E-08	1.09E-06	NA		NA
				Diesel Range Hydrocarbons	4.24E+02	1.97E-06	NA	NA	6.89E-05	NA		NA
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Antimony	7.44E+00	1.27E-11	NA	NA	4.44E-10	NA		NA
				Arsenic	1.19E+01	2.02E-11	4.30E-03	8.69E-17	7.07E-10	1.50E-05		4.71E-05
				Copper	1.40E+03	2.39E-09	NA	NA	8.35E-08	NA		NA
				Lead	6.32E+02	NA	NA	NA	NA	NA	1	NA
				Thallium	2.20E-01	3.75E-13	NA	NA	1.31E-11	NA		NA
				Total BaPEq	1.09E+01	1.86E-11	1.10E-03	2.04E-17	6.50E-10	NA		NA
				Benzo(a)anthracene	4.01E+00	6.84E-12	1.10E-04	7.52E-19	2.39E-10	NA		NA
				Benzo(a)pyrene	7.82E+00	1.33E-11	1.10E-03	1.47E-17	4.67E-10	NA		NA
				Benzo(b)fluoranthene	5.88E+00	1.00E-11	1.10E-04	1.10E-18	3.51E-10	NA		NA
				Benzo(k)fluoranthene	3.91E+00	6.67E-12	1.10E-04	7.33E-19	2.33E-10	NA		NA
				Dibenzo(a,h)anthracene	1.57E+00	2.68E-12	1.20E-03	3.21E-18	9.37E-11	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14E+00	8.76E-12	1.10E-04	9.64E-19	3.07E-10	NA		NA
				Diesel Range Hydrocarbons	4.24E+02	7.23E-10	NA	NA	2.53E-08	NA		NA
						Total Risks All Media (all)		2.77E-06	Total Risks All Media (all)			**6.67E-01**
						Total Risks All Media (PAH)		2.33E-06	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-2-2 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	WC-Central Parcel Upland Exposure Unit
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Child Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Child Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Child Cancer Risk: Cancer Risk	Child Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Child Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Child Non-cancer Hazard: Note	Child Non-cancer Hazard: Hazard Quotient	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Non-cancer Hazard: Note	Adult Non-cancer Hazard: Hazard Quotient	Lifetime Cancer Risk	HI
Soil	Soil	Current Recreational Trespasser/ Future Park User	Ingestion	Antimony	7.4E+00	2.42E-06	NA	NA	2.83E-05	4.00E-04		7.07E-02	1.04E-06	NA	NA	3.03E-06	4.00E-04		7.57E-03	NA	7.82E-02
				Arsenic	1.2E+01	3.86E-06	1.5E+00	5.79E-06	4.50E-05	3.00E-04		1.50E-01	1.65E-06	1.50E+00	2.48E-06	4.82E-06	3.00E-04		1.61E-02	8.27E-06	1.66E-01
				Copper	1.4E+03	4.56E-04	NA	NA	5.32E-03	4.00E-02		1.33E-01	1.95E-04	NA	NA	5.70E-04	4.00E-02		1.42E-02	NA	1.47E-01
				Lead	6.3E+02	NA	NA	NA	NA	9.50E+02	1	6.65E-01	NA	NA	NA	NA	1.88E+04	1	3.36E-02	NA	--
				Thallium	2.2E-01	7.16E-08	NA	NA	8.36E-07	1.00E-05		8.36E-02	3.07E-08	NA	NA	8.95E-08	1.00E-05		8.95E-03	NA	9.25E-02
				Total BaPEq	1.1E+01	1.89E-05	7.3E+00	1.38E-04	2.21E-04	NA		NA	2.79E-06	7.30E+00	2.04E-05	8.13E-06	NA		NA	1.59E-04	NA
				Benzo(a)anthracene	4.0E+00	6.96E-06	7.3E-01	5.08E-06	8.12E-05	NA		NA	1.03E-06	7.30E-01	7.49E-07	2.99E-06	NA		NA	5.83E-06	NA
				Benzo(a)pyrene	7.8E+00	1.36E-05	7.3E+00	9.91E-05	1.58E-04	NA		NA	2.00E-06	7.30E+00	1.46E-05	5.84E-06	NA		NA	1.14E-04	NA
				Benzo(b)fluoranthene	5.9E+00	1.02E-05	7.3E-01	7.45E-06	1.19E-04	NA		NA	1.50E-06	7.30E-01	1.10E-06	4.39E-06	NA		NA	8.55E-06	NA
				Benzo(k)fluoranthene	3.9E+00	6.79E-06	7.3E-02	4.96E-07	7.92E-05	NA		NA	1.00E-06	7.30E-02	7.30E-08	2.92E-06	NA		NA	5.69E-07	NA
				Dibenzo(a,h)anthracene	1.6E+00	2.73E-06	7.3E+00	1.99E-05	3.18E-05	NA		NA	4.02E-07	7.30E+00	2.93E-06	1.17E-06	NA		NA	2.28E-05	NA
				Indeno(1,2,3-cd)pyrene	5.1E+00	8.93E-06	7.3E-01	6.52E-06	1.04E-04	NA		NA	1.32E-06	7.30E-01	9.60E-07	3.84E-06	NA		NA	7.48E-06	NA
				Diesel Range Hydrocarbons	4.2E+02	1.38E-04	NA	NA	1.61E-03	NA		NA	5.92E-05	NA	NA	1.73E-04	NA		NA	NA	NA
			Dermal	Antimony	7.4E+00	1.02E-06	NA	NA	1.19E-05	6.00E-05		1.98E-01	6.21E-07	NA	NA	1.81E-06	6.00E-05		3.02E-02	NA	2.28E-01
				Arsenic	1.2E+01	3.24E-07	1.5E+00	4.86E-07	3.78E-06	3.00E-04		1.26E-02	1.98E-07	1.50E+00	2.97E-07	5.77E-07	3.00E-04		1.92E-03	7.83E-07	1.45E-02
				Copper	1.4E+03	1.28E-05	NA	NA	1.49E-04	4.00E-02		3.72E-03	3.11E-09	NA	NA	2.27E-05	4.00E-02		5.68E-04	NA	4.29E-03
				Lead	6.3E+02	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Thallium	2.2E-01	2.01E-09	NA	NA	2.34E-08	1.00E-05		2.34E-03	3.11E-09	NA	NA	3.57E-09	1.00E-05		3.57E-04	NA	2.70E-03
				Total BaPEq	1.1E+01	5.30E-05	7.3E+00	3.87E-04	6.18E-04	NA		NA	1.11E-05	7.30E+00	8.12E-05	3.25E-05	NA		NA	4.68E-04	NA
				Benzo(a)anthracene	4.0E+00	1.95E-05	7.3E-01	1.42E-05	2.27E-04	NA		NA	4.09E-06	7.30E-01	2.99E-06	1.19E-05	NA		NA	1.72E-05	NA
				Benzo(a)pyrene	7.8E+00	3.80E-05	7.3E+00	2.78E-04	4.44E-04	NA		NA	7.98E-06	7.30E+00	5.83E-05	2.33E-05	NA		NA	3.36E-04	NA
				Benzo(b)fluoranthene	5.9E+00	2.86E-05	7.3E-01	2.09E-05	3.34E-04	NA		NA	6.00E-06	7.30E-01	4.38E-06	1.75E-05	NA		NA	2.53E-05	NA
				Benzo(k)fluoranthene	3.9E+00	1.90E-05	7.3E+00	1.39E-04	2.22E-04	NA		NA	3.99E-06	7.30E+00	2.91E-05	1.16E-05	NA		NA	1.68E-04	NA
				Dibenzo(a,h)anthracene	1.6E+00	7.63E-06	7.3E-01	5.57E-06	8.91E-05	NA		NA	1.60E-06	7.30E-01	1.17E-06	4.67E-06	NA		NA	6.74E-06	NA
				Indeno(1,2,3-cd)pyrene	5.1E+00	2.50E-05	7.3E-01	1.82E-05	2.92E-04	NA		NA	5.25E-06	7.30E-01	3.83E-06	1.53E-05	NA		NA	2.21E-05	NA
				Diesel Range Hydrocarbons	4.2E+02	3.87E-05	NA	NA	4.51E-04	NA		NA	3.11E-08	NA	NA	6.89E-05	NA		NA	NA	NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	Lifetime Cancer Risk	HI
			Inhalation	Antimony	7.4E+00	NA	NA	NA	NA	NA		NA	3.17E-11	NA	NA	7.40E-11	NA		NA	NA	NA
				Arsenic	1.2E+01	NA	4.3E-03	NA	NA	1.50E-05		NA	5.05E-11	4.30E-03	2.17E-16	1.18E-10	1.50E-05		7.86E-06	2.17E-16	7.86E-06
				Copper	1.4E+03	NA	NA	NA	NA	NA		NA	5.97E-09	NA	NA	1.39E-08	NA		NA	NA	NA
				Lead	6.3E+02	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Thallium	2.2E-01	NA	NA	NA	NA	NA		NA	9.38E-13	NA	NA	2.19E-12	NA		NA	NA	NA
				Total BaPEq	1.1E+01	NA	1.1E-03	NA	NA	NA		NA	4.65E-11	1.10E-03	5.11E-17	1.08E-10	NA		NA	5.11E-17	NA
				Benzo(a)anthracene	4.0E+00	NA	1.1E-04	NA	NA	NA		NA	1.71E-11	1.10E-04	1.88E-18	3.99E-11	NA		NA	1.88E-18	NA
				Benzo(a)pyrene	7.8E+00	NA	1.1E-03	NA	NA	NA		NA	3.33E-11	1.10E-03	3.67E-17	7.78E-11	NA		NA	3.67E-17	NA
				Benzo(b)fluoranthene	5.9E+00	NA	1.1E-04	NA	NA	NA		NA	2.51E-11	1.10E-04	2.76E-18	5.85E-11	NA		NA	2.76E-18	NA
				Benzo(k)fluoranthene	3.9E+00	NA	1.1E-04	NA	NA	NA		NA	1.67E-11	1.10E-04	1.83E-18	3.89E-11	NA		NA	1.83E-18	NA
				Dibenzo(a,h)anthracene	1.6E+00	NA	1.2E-03	NA	NA	NA		NA	6.69E-12	1.20E-03	8.03E-18	1.56E-11	NA		NA	8.03E-18	NA
				Indeno(1,2,3-cd)pyrene	5.1E+00	NA	1.1E-04	NA	NA	NA		NA	2.19E-11	1.10E-04	2.41E-18	5.11E-11	NA		NA	2.41E-18	NA
				Diesel Range Hydrocarbons	4.2E+02	NA	NA	NA	NA	NA		NA	1.81E-09	NA	NA	4.22E-09	NA		NA	NA	NA
						Total Risks All Media (all)		5.31E-04	Total Risks All Media (all)			1.32E+00	Total Risks All Media (all)		1.04E-04	Total Risks All Media (all)			1.14E-01	6.36E-04	7.34E-01
						Total Risks All Media (PAH)		5.25E-04	Total Risks All Media (PAH)			0.00E+00	Total Risks All Media (PAH)		1.02E-04	Total Risks All Media (PAH)			0.00E+00	6.27E-04	0.00E+00

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-2-3 Human Health Summary Table for Risks and Hazards for Central Parcel Upland Exposure Unit- Future Construction Worker

Scenario Timeframe:	Future
Location:	WC-Central Parcel Upland Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard Quotient
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Construction Worker	Ingestion	Antimony	7.44	3.43E-07	NA	NA	2.40E-05	4.00E-04		6.01E-02
				Arsenic	11.85	5.47E-07	1.50E+00	8.20E-07	3.83E-05	3.00E-04		1.28E-01
				Copper	1400.00	6.46E-05	NA	NA	4.52E-03	4.00E-02		1.13E-01
				Lead	632.10	NA	NA	NA	NA	6.14E+02	1	1.03E+00
				Thallium	0.22	1.01E-08	NA	NA	7.10E-07	1.00E-05		7.10E-02
				Total BaPEq	10.90	5.03E-07	7.30E+00	3.67E-06	3.52E-05	NA		NA
				Benzo(a)anthracene	4.01	1.85E-07	7.30E-01	1.35E-07	1.29E-05	NA		NA
				Benzo(a)pyrene	7.82	3.61E-07	7.30E+00	2.63E-06	2.53E-05	NA		NA
				Benzo(b)fluoranthene	5.88	2.71E-07	7.30E-01	1.98E-07	1.90E-05	NA		NA
				Benzo(k)fluoranthene	3.91	1.80E-07	7.30E-02	1.32E-08	1.26E-05	NA		NA
				Dibenzo(a,h)anthracene	1.57	7.24E-08	7.30E+00	5.29E-07	5.07E-06	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14	2.37E-07	7.30E-01	1.73E-07	1.66E-05	NA		NA
				Diesel Range Hydrocarbons	424.00	1.96E-05	NA	NA	1.37E-03	NA		NA
			Dermal	Antimony	7.44	1.54E-07	NA	NA	1.08E-05	6.00E-05		1.80E-01
				Arsenic	11.85	4.92E-08	1.50E+00	7.38E-08	3.44E-06	3.00E-04		1.15E-02
				Copper	1400.00	1.94E-06	NA	NA	1.36E-04	4.00E-02		3.39E-03
				Lead	632.10	NA	NA	NA	NA	NA	1	NA
				Thallium	0.22	3.04E-10	NA	NA	2.13E-08	1.00E-05		2.13E-03
				Total BaPEq	10.90	1.96E-07	7.30E+00	1.43E-06	1.37E-05	NA		NA
				Benzo(a)anthracene	4.01	7.21E-08	7.30E-01	5.27E-08	5.05E-06	NA		NA
				Benzo(a)pyrene	7.82	1.41E-07	7.30E+00	1.03E-06	9.85E-06	NA		NA
				Benzo(b)fluoranthene	5.88	1.06E-07	7.30E-01	7.72E-08	7.40E-06	NA		NA
				Benzo(k)fluoranthene	3.91	7.03E-08	7.30E-02	5.13E-09	4.92E-06	NA		NA
				Dibenzo(a,h)anthracene	1.57	2.82E-08	7.30E+00	2.06E-07	1.98E-06	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14	9.25E-08	7.30E-01	6.75E-08	6.47E-06	NA		NA
				Diesel Range Hydrocarbons	424.00	5.87E-06	NA	NA	4.11E-04	NA		NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Antimony	7.44	5.08E-12	NA	NA	3.56E-10	NA		NA
				Arsenic	11.85	8.09E-12	4.30E-03	3.48E-17	5.67E-10	1.50E-05		3.78E-05
				Copper	1400.00	9.56E-10	NA	NA	6.69E-08	NA		NA
				Lead	632.10	NA	NA	NA	NA	NA	1	NA
				Thallium	0.22	1.50E-13	NA	NA	1.05E-11	NA		NA
				Total BaPEq	10.90	7.45E-12	1.10E-03	8.19E-18	5.21E-10	NA		NA
				Benzo(a)anthracene	4.01	2.74E-12	1.10E-04	3.01E-19	1.92E-10	NA		NA
				Benzo(a)pyrene	7.82	5.34E-12	1.10E-03	5.88E-18	3.74E-10	NA		NA
				Benzo(b)fluoranthene	5.88	4.02E-12	1.10E-04	4.42E-19	2.81E-10	NA		NA
				Benzo(k)fluoranthene	3.91	2.67E-12	1.10E-04	2.94E-19	1.87E-10	NA		NA
				Dibenzo(a,h)anthracene	1.57	1.07E-12	1.20E-03	1.29E-18	7.51E-11	NA		NA
				Indeno(1,2,3-cd)pyrene	5.14	3.51E-12	1.00E-04	3.51E-19	2.46E-10	NA		NA
				Diesel Range Hydrocarbons	424.00	2.90E-10	NA	NA	2.03E-08	NA		NA
						Total Risks All Media (all)		**6.00E-06**	Total Risks All Media (all)			**1.60E+00**
						Total Risks All Media (PAH)		**5.10E-06**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-3-1 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Current
Location:	WC-Inner Cove Beach Exposure Area
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		
					(mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	Hazard Quotient
Soil	Soil	Transient Trespasser	Ingestion	Antimony	7.14E+01	1.66E-06	NA	NA	5.81E-05	4.00E-04		1.45E-01
				Arsenic	1.33E+01	3.10E-07	1.50E+00	4.65E-07	1.09E-05	3.00E-04		3.62E-02
				Copper	1.06E+04	2.47E-04	NA	NA	8.66E-03	4.00E-02		2.16E-01
				Lead	7.80E+02	NA	NA	NA	NA	1.17E+03	1	6.66E-01
				Total BaPEq	4.90E-01	1.14E-08	7.30E+00	8.32E-08	3.99E-07	NA		NA
				Benzo(a)pyrene	3.50E-01	8.14E-09	7.30E+00	5.94E-08	2.85E-07	NA		NA
				Benzo(b)fluoranthene	4.30E-01	1.00E-08	7.30E-01	7.30E-09	3.50E-07	NA		NA
				Dibenzo(a,h)anthracene	6.00E-02	1.40E-09	7.30E+00	1.02E-08	4.88E-08	NA		NA
				Aroclors	5.21E+00	1.21E-07	2.00E+00	2.42E-07	4.24E-06	2.00E-05		2.12E-01
			Dermal	Antimony	7.14E+01	4.97E-07	NA	NA	1.74E-05	6.00E-05		2.90E-01
				Arsenic	1.33E+01	1.86E-08	1.50E+00	2.78E-08	6.49E-07	3.00E-04		2.16E-03
				Copper	1.06E+04	4.94E-06	NA	NA	1.73E-04	4.00E-02		4.32E-03
				Lead	7.80E+02	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	4.90E-01	2.96E-09	7.30E+00	2.16E-08	1.03E-07	NA		NA
				Benzo(a)pyrene	3.50E-01	2.11E-09	7.30E+00	1.54E-08	7.39E-08	NA		NA
				Benzo(b)fluoranthene	4.30E-01	2.59E-09	7.30E-01	1.89E-09	9.08E-08	NA		NA
				Dibenzo(a,h)anthracene	6.00E-02	3.62E-10	7.30E+00	2.64E-09	1.27E-08	NA		NA
				Aroclors	5.21E+00	3.38E-08	2.00E+00	6.77E-08	1.18E-06	2.00E-05		5.92E-02
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Antimony	7.14E+01	1.22E-10	NA	NA	4.26E-09	NA		NA
				Arsenic	1.33E+01	2.27E-11	4.30E-03	9.77E-17	7.95E-10	1.50E-05		5.30E-05
				Copper	1.06E+04	1.81E-08	NA	NA	6.35E-07	NA		NA
				Lead	7.80E+02	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	4.90E-01	8.35E-13	1.10E-03	9.19E-19	2.92E-11	NA		NA
				Benzo(a)pyrene	3.50E-01	5.97E-13	1.10E-04	6.56E-20	2.09E-11	NA		NA
				Benzo(b)fluoranthene	4.30E-01	7.33E-13	1.10E-04	8.06E-20	2.57E-11	NA		NA
				Dibenzo(a,h)anthracene	6.00E-02	1.02E-13	1.20E-03	1.23E-19	3.58E-12	NA		NA
				Aroclors	5.21E+00	8.88E-12	5.70E-04	5.06E-18	3.11E-10	NA		NA
								Total Risks All Media (all)	**9.08E-07**	Total Risks All Media (all)		**1.63E+00**
								Total Risks All Media (PAH)	**1.05E-07**	Total Risks All Media (PAH)		**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-3-2 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	WC-East Parcel Upland Exposure Area
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Child Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Child Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Child Cancer Risk: Cancer Risk	Child Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Child Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Child Non-cancer Hazard: Note	Child Non-cancer Hazard: Hazard Quotient	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Non-cancer Hazard: Note	Adult Non-cancer Hazard: Hazard Quotient	Lifetime Cancer Risk	HI
Soil	Soil	Recreational Trespasser	Ingestion	Antimony	71.39	2.32E-05	NA	NA	2.71E-04	4.00E-04		6.78E-01	9.96E-06	NA	NA	2.91E-05	4.00E-04		7.26E-02	NA	7.51E-01
				Arsenic	1.3E+01	4.34E-06	1.5E+00	6.51E-06	5.06E-05	3.00E-04		1.69E-01	1.86E-06	1.50E+00	2.79E-06	5.43E-06	3.00E-04		1.81E-02	9.30E-06	1.87E-01
				Copper	1.1E+04	3.46E-03	NA	NA	4.04E-02	4.00E-02		1.01E+00	1.48E-03	NA	NA	4.33E-03	4.00E-02		1.08E-01	NA	1.12E+00
				Lead	7.8E+02	NA	NA	NA	NA	9.50E+02	1	8.21E-01	NA	NA	NA	NA	1.88E+04	1	4.14E-02	NA	--
				Total BaPEq	4.9E-01	8.51E-07	7.3E+00	6.21E-06	9.93E-06	NA		NA	1.25E-07	7.30E+00	9.15E-07	3.66E-07	NA		NA	7.13E-06	NA
				Benzo(a)pyrene	3.5E-01	6.08E-07	7.3E+00	4.44E-06	7.09E-06	NA		NA	8.95E-08	7.30E+00	6.54E-07	2.61E-07	NA		NA	5.09E-06	NA
				Benzo(b)fluoranthene	4.3E-01	7.47E-07	7.3E-01	5.45E-07	8.71E-06	NA		NA	1.10E-07	7.30E-01	8.03E-08	3.21E-07	NA		NA	6.25E-07	NA
				Dibenzo(a,h)anthracene	6.0E-02	1.04E-07	7.3E+00	7.61E-07	1.22E-06	NA		NA	1.54E-08	7.30E+00	1.12E-07	4.48E-08	NA		NA	8.73E-07	NA
				Aroclors	5.2E+00	1.70E-06	2.0E+00	3.39E-06	1.98E-05	2.00E-05		9.90E-01	7.27E-07	2.00E+00	1.45E-06	2.12E-06	2.00E-05		1.06E-01	4.85E-06	1.10E+00
			Dermal	Antimony	71.39	9.76E-06	NA	NA	1.14E-04	6.00E-05		1.90E+00	5.96E-06	NA	NA	1.74E-05	6.00E-05		2.90E-01	NA	2.19E+00
				Arsenic	1.3E+01	3.65E-07	1.5E+00	5.47E-07	4.25E-06	3.00E-04		1.42E-02	2.23E-07	1.50E+00	3.34E-07	6.49E-07	3.00E-04		2.16E-03	8.81E-07	1.63E-02
				Copper	1.1E+04	9.70E-05	NA	NA	1.13E-03	4.00E-02		2.83E-02	3.11E-09	NA	NA	1.73E-04	4.00E-02		4.32E-03	NA	3.26E-02
				Lead	7.8E+02	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	4.9E-01	2.38E-06	7.3E+00	1.74E-05	2.78E-05	NA		NA	5.00E-07	7.30E+00	3.65E-06	1.46E-06	NA		NA	2.10E-05	NA
				Benzo(a)pyrene	3.5E-01	1.70E-06	7.3E+00	1.24E-05	1.99E-05	NA		NA	3.57E-07	7.30E+00	2.61E-06	1.04E-06	NA		NA	1.50E-05	NA
				Benzo(b)fluoranthene	4.3E-01	2.09E-06	7.3E-01	1.53E-06	2.44E-05	NA		NA	4.39E-07	7.30E-01	3.20E-07	1.28E-06	NA		NA	1.85E-06	NA
				Dibenzo(a,h)anthracene	6.0E-02	2.92E-07	7.3E+00	2.13E-06	3.40E-06	NA		NA	6.13E-08	7.30E+00	4.47E-07	1.79E-07	NA		NA	2.58E-06	NA
				Aroclors	5.2E+00	6.65E-07	2.0E+00	1.33E-06	7.76E-06	2.00E-05		3.88E-01	4.06E-07	2.00E+00	8.12E-07	1.18E-06	2.00E-05		5.92E-02	2.14E-06	4.47E-01
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	Lifetime Cancer Risk	HI
			Inhalation	Antimony	71.39	NA	NA	NA	NA	NA		NA	3.04E-10	NA	NA	7.10E-10	NA		NA	NA	NA
				Arsenic	1.3E+01	NA	4.3E-03	NA	NA	1.50E-05		NA	5.68E-11	4.30E-03	2.44E-16	1.33E-10	1.50E-05		8.84E-06	2.44E-16	8.84E-06
				Copper	1.1E+04	NA	NA	NA	NA	NA		NA	4.53E-08	NA	NA	1.06E-07	NA		NA	NA	NA
				Lead	7.8E+02	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	4.9E-01	NA	1.1E-03	NA	NA	NA		NA	2.09E-12	1.10E-03	2.30E-18	4.87E-12	NA		NA	2.30E-18	NA
				Benzo(a)pyrene	3.5E-01	NA	1.1E-03	NA	NA	NA		NA	1.49E-12	1.10E-03	1.64E-18	3.48E-12	NA		NA	1.64E-18	NA
				Benzo(b)fluoranthene	4.3E-01	NA	1.1E-04	NA	NA	NA		NA	1.83E-12	1.10E-04	2.02E-19	4.28E-12	NA		NA	2.02E-19	NA
				Dibenzo(a,h)anthracene	6.0E-02	NA	1.2E-03	NA	NA	NA		NA	2.56E-13	1.20E-03	3.07E-19	5.97E-13	NA		NA	3.07E-19	NA
				Aroclors	5.2E+00	NA	5.7E-04	NA	NA	NA		NA	2.22E-11	5.70E-04	1.27E-17	5.18E-11	NA		NA	1.27E-17	NA
	Total Risks All Media (all)							3.54E-05	Total Risks All Media (all)			6.00E+00	Total Risks All Media (all)		9.96E-06	Total Risks All Media (all)			7.02E-01	4.53E-05	**5.84E+00**
	Total Risks All Media (PAH)							2.36E-05	Total Risks All Media (PAH)			0.00E+00	Total Risks All Media (PAH)		4.57E-06	Total Risks All Media (PAH)			0.00E+00	2.82E-05	**0.00E+00**

Notes:

1.Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-3-3 Human Health Summary Table for Risks and Hazards for East Parcel Upland Exposure Unit- Future Construction Worker

Scenario Timeframe:	Future
Location:	WC-East Parcel Upland Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard Quotient
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Construction Worker	Ingestion	Antimony	71.39	3.29E-06	NA	NA	2.31E-04	4.00E-04		5.76E-01
				Arsenic	13.33	6.15E-07	1.50E+00	9.22E-07	4.30E-05	3.00E-04		1.43E-01
				Copper	10637.00	4.91E-04	NA	NA	3.43E-02	4.00E-02		8.59E-01
				Lead	779.70	NA	NA	NA	NA	6.14E+02	1	1.27E+00
				Total BaPEq	0.49	2.26E-08	7.30E+00	1.65E-07	1.58E-06	NA		NA
				Benzo(a)pyrene	0.35	1.61E-08	7.30E+00	1.18E-07	1.13E-06	NA		NA
				Benzo(b)fluoranthene	0.43	1.98E-08	7.30E-01	1.45E-08	1.39E-06	NA		NA
				Dibenzo(a,h)anthracene	0.06	2.77E-09	7.30E+00	2.02E-08	1.94E-07	NA		NA
				Aroclors	5.21	2.40E-07	2.00E+00	4.81E-07	1.68E-05	2.00E-05		8.41E-01
			Dermal	Antimony	71.39	1.48E-06	NA	NA	1.04E-04	6.00E-05		1.73E+00
				Arsenic	13.33	5.53E-08	1.50E+00	8.30E-08	3.87E-06	3.00E-04		1.29E-02
				Copper	10637.00	1.47E-05	NA	NA	1.03E-03	4.00E-02		2.58E-02
				Lead	779.70	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.49	8.82E-09	7.30E+00	6.44E-08	6.17E-07	NA		NA
				Benzo(a)pyrene	0.35	6.30E-09	7.30E+00	4.60E-08	4.41E-07	NA		NA
				Benzo(b)fluoranthene	0.43	7.74E-09	7.30E-01	5.65E-09	5.41E-07	NA		NA
				Dibenzo(a,h)anthracene	0.06	1.08E-09	7.30E+00	7.88E-09	7.56E-08	NA		NA
				Aroclors	5.21	1.01E-07	2.00E+00	2.02E-07	7.07E-06	2.00E-05		3.53E-01
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Antimony	71.39	4.88E-11	NA	NA	3.41E-09	NA		NA
				Arsenic	13.33	9.11E-12	4.30E-03	3.92E-17	6.37E-10	1.50E-05		4.25E-05
				Copper	10637.00	7.27E-09	NA	NA	5.09E-07	NA		NA
				Lead	779.70	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.49	3.35E-13	1.10E-03	3.68E-19	2.34E-11	NA		NA
				Benzo(a)pyrene	0.35	2.39E-13	1.10E-03	2.63E-19	1.67E-11	NA		NA
				Benzo(b)fluoranthene	0.43	2.94E-13	1.10E-04	3.23E-20	2.06E-11	NA		NA
				Dibenzo(a,h)anthracene	0.06	4.10E-14	1.20E-03	4.92E-20	2.87E-12	NA		NA
				Aroclors	5.21	3.56E-12	5.70E-04	2.03E-18	2.49E-10	NA		NA
						Total Risks All Media (all)		**1.92E-06**	Total Risks All Media (all)			**5.81E+00**
						Total Risks All Media (PAH)		**2.29E-07**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-4-1 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Present
Location:	WC-Inner Cove Beach Exposure Unit
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Noncancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Noncancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Noncancer Hazard: RfD/RfC Note	Adult Noncancer Hazard: Hazard
Soil	Soil	Transient Trespasser	Ingestion	Antimony	6.26E+01	1.46E-06	NA	NA	5.09E-05	4.00E-04		1.27E-01
				Arsenic	2.38E+01	5.53E-07	1.50E+00	8.30E-07	1.94E-05	3.00E-04		6.46E-02
				Cobalt	1.61E+01	3.74E-07	NA	NA	1.31E-05	3.00E-04		4.37E-02
				Copper	7.44E+02	1.73E-05	NA	NA	6.06E-04	4.00E-02		1.51E-02
				Lead	4.12E+03	NA	NA	NA	NA	1.17E+03	1	3.52E+00
				Mercury	2.60E+01	6.05E-07	NA	NA	2.12E-05	NA		NA
				Thallium	1.20E-01	2.79E-09	NA	NA	9.77E-08	1.00E-05		9.77E-03
				Vanadium	6.83E+01	1.59E-06	NA	NA	5.56E-05	5.00E-03		1.11E-02
				Total BaPEq	1.11E+00	2.58E-08	7.30E+00	1.88E-07	9.04E-07	NA		NA
				Benzo(a)anthracene	1.61E+00	3.74E-08	7.30E-01	2.73E-08	1.31E-06	NA		NA
				Benzo(a)pyrene	6.10E-01	1.42E-08	7.30E+00	1.04E-07	4.97E-07	NA		NA
				Benzo(b)fluoranthene	1.06E+00	2.47E-08	7.30E-01	1.80E-08	8.63E-07	NA		NA
				Dibenzo(a,h)anthracene	2.20E-01	5.12E-09	7.30E+00	3.74E-08	1.79E-07	NA		NA
				Aroclors	1.68E+02	3.91E-06	2.00E+00	7.82E-06	1.37E-04	2.00E-05		6.85E+00
			Dermal	Antimony	6.26E+01	4.36E-07	NA	NA	1.52E-05	6.00E-05		2.54E-01
				Arsenic	2.38E+01	3.31E-08	1.50E+00	4.97E-08	1.16E-06	3.00E-04		3.86E-03
				Cobalt	1.61E+01	7.47E-09	NA	NA	2.61E-07	3.00E-04		8.72E-04
				Copper	7.44E+02	3.45E-07	NA	NA	1.21E-05	4.00E-02		3.02E-04
				Lead	4.12E+03	NA	NA	NA	NA	NA	1	NA
				Mercury	2.60E+01	1.21E-08	NA	NA	4.22E-07	NA		NA
				Thallium	1.20E-01	5.57E-11	NA	NA	1.95E-09	1.00E-05		1.95E-04
				Vanadium	6.83E+01	8.24E-08	NA	NA	2.88E-06	5.00E-03		5.77E-04
				Total BaPEq	1.11E+00	6.70E-09	7.30E+00	4.89E-08	2.34E-07	NA		NA
				Benzo(a)anthracene	1.61E+00	9.71E-09	7.30E-01	7.09E-09	3.40E-07	NA		NA
				Benzo(a)pyrene	6.10E-01	3.68E-09	7.30E+00	2.69E-08	1.29E-07	NA		NA
				Benzo(b)fluoranthene	1.06E+00	6.39E-09	7.30E-01	4.67E-09	2.24E-07	NA		NA
				Dibenzo(a,h)anthracene	2.20E-01	1.33E-09	7.30E+00	9.69E-09	4.64E-08	NA		NA
				Aroclors	1.68E+02	1.09E-06	2.00E+00	2.19E-06	3.82E-05	2.00E-05		1.91E+00
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard
			Inhalation	Antimony	6.26E+01	1.07E-10	NA	NA	3.73E-09	NA		NA
				Arsenic	2.38E+01	4.06E-11	4.30E-03	1.74E-16	1.42E-09	1.50E-05		9.46E-05
				Cobalt	1.61E+01	2.75E-11	9.00E-03	2.47E-16	9.61E-10	6.00E-06		1.60E-04
				Copper	7.44E+02	1.27E-09	NA	NA	4.44E-08	NA		NA
				Lead	4.12E+03	NA	NA	NA	NA	NA	1	NA
				Mercury	2.60E+01	4.43E-11	NA	NA	1.55E-09	3.00E-04		5.17E-06
				Thallium	1.20E-01	2.05E-13	NA	NA	7.16E-12	NA		NA
				Vanadium	6.83E+01	1.16E-10	NA	NA	4.08E-09	NA		NA
				Total BaPEq	1.11E+00	1.89E-12	1.10E-03	2.08E-18	6.62E-11	NA		NA
				Benzo(a)anthracene	1.61E+00	2.75E-12	1.10E-04	3.02E-19	9.61E-11	NA		NA
				Benzo(a)pyrene	6.10E-01	1.04E-12	1.10E-03	1.14E-18	3.64E-11	NA		NA
				Benzo(b)fluoranthene	1.06E+00	1.81E-12	1.10E-04	1.99E-19	6.33E-11	NA		NA
				Dibenzo(a,h)anthracene	2.20E-01	3.75E-13	1.20E-03	4.50E-19	1.31E-11	NA		NA
				Aroclors	1.68E+02	2.87E-10	5.70E-04	1.63E-16	1.00E-08	NA		NA
	Total Risks All Media (all)							**1.11E-05**	Total Risks All Media (all)			**1.28E+01**
	Total Risks All Media (PAH)							**2.37E-07**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-4-2 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	WC-Inner Cove Beach Exposure Unit
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Child Cancer Risk: Intake/Exposure Co Value (mg/kg-d)	Child Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Child Cancer Risk: Cancer Risk	Child Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Child Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Child Non-cancer Hazard: Note	Child Non-cancer Hazard: Hazard Quotient	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Non-cancer Hazard: Note	Adult Non-cancer Hazard: Hazard Quotient	Lifetime Cancer Risk	HI
Soil	Soil	Current Recreational Trespasser/ Future Park User	Ingestion	Antimony	62.57	2.04E-05	NA	NA	2.38E-04	4.00E-04		5.94E-01	8.73E-06	NA	NA	2.55E-05	4.00E-04		6.37E-02	NA	6.58E-01
				Arsenic	2.4E+01	7.75E-06	1.5E+00	1.16E-05	9.04E-05	3.00E-04		3.01E-01	3.32E-06	1.50E+00	4.98E-06	9.68E-06	3.00E-04		3.23E-02	1.66E-05	3.34E-01
				Cobalt	1.6E+01	5.24E-06	NA	NA	6.12E-05	3.00E-04		2.04E-01	2.25E-06	NA	NA	6.55E-06	3.00E-04		2.18E-02	NA	2.26E-01
				Copper	7.4E+02	2.42E-04	NA	NA	2.83E-03	4.00E-02		7.07E-02	1.04E-04	NA	NA	3.03E-04	4.00E-02		7.57E-03	NA	7.83E-02
				Lead	4.1E+03	NA	NA	NA	NA	9.50E+02	1	4.33E+00	NA	NA	NA	NA	1.89E+04	1	2.18E-01	NA	--
				Mercury	2.6E+01	8.47E-06	NA	NA	9.88E-05	NA		NA	3.63E-06	NA	NA	1.06E-05	NA		NA	NA	NA
				Thallium	1.2E-01	3.91E-08	NA	NA	4.56E-07	1.00E-05		4.56E-02	1.67E-08	NA	NA	4.88E-08	1.00E-05		4.88E-03	NA	5.05E-02
				Vanadium	6.8E+01	2.22E-05	NA	NA	2.59E-04	5.00E-03		5.19E-02	9.53E-06	NA	NA	2.78E-05	5.00E-03		5.56E-03	NA	5.75E-02
				Total BaPEq	1.1E+00	1.93E-06	7.3E+00	1.41E-05	2.25E-05	NA		NA	2.84E-07	7.30E+00	2.07E-06	8.28E-07	NA		NA	1.61E-05	NA
				Benzo(a)anthracene	1.6E+00	2.80E-06	7.3E-01	2.04E-06	3.26E-05	NA		NA	4.12E-07	7.30E-01	3.01E-07	1.20E-06	NA		NA	2.34E-06	NA
				Benzo(a)pyrene	6.1E-01	1.06E-06	7.3E+00	7.73E-06	1.24E-05	NA		NA	1.56E-07	7.30E+00	1.14E-06	4.55E-07	NA		NA	8.87E-06	NA
				Benzo(b)fluoranthene	1.1E+00	1.84E-06	7.3E-01	1.34E-06	2.15E-05	NA		NA	2.71E-07	7.30E-01	1.98E-07	7.91E-07	NA		NA	1.54E-06	NA
				Dibenzo(a,h)anthracene	2.2E-01	3.82E-07	7.3E+00	2.79E-06	4.46E-06	NA		NA	5.63E-08	7.30E+00	4.11E-07	1.64E-07	NA		NA	3.20E-06	NA
				Aroclors	1.7E+02	5.48E-05	2.0E+00	1.10E-04	6.39E-04	2.00E-05		3.20E+01	2.35E-05	2.00E+00	4.69E-05	6.85E-05	2.00E-05		3.42E+00	1.56E-04	3.54E+01
			Dermal	Antimony	62.57	8.56E-06	NA	NA	9.98E-05	6.00E-05		1.66E+00	5.23E-06	NA	NA	1.52E-05	6.00E-05		2.54E-01	NA	1.92E+00
				Arsenic	2.4E+01	6.51E-07	1.5E+00	9.76E-07	7.59E-06	3.00E-04		2.53E-02	3.97E-07	1.50E+00	5.96E-07	1.16E-06	3.00E-04		3.86E-03	1.57E-06	2.92E-02
				Cobalt	1.6E+01	1.47E-07	NA	NA	1.71E-06	3.00E-04		5.71E-03	8.97E-08	NA	NA	2.61E-07	3.00E-04		8.72E-04	NA	6.58E-03
				Copper	7.4E+02	6.79E-06	NA	NA	7.92E-05	4.00E-02		1.98E-03	3.11E-09	NA	NA	1.21E-05	4.00E-02		3.02E-04	NA	2.28E-03
				Lead	4.1E+03	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Mercury	2.6E+01	2.37E-07	NA	NA	2.77E-06	NA		NA	3.11E-09	NA	NA	4.22E-07	NA		NA	NA	NA
				Thallium	1.2E-01	1.09E-09	NA	NA	1.28E-08	1.00E-05		1.28E-03	3.11E-09	NA	NA	1.95E-09	1.00E-05		1.95E-04	NA	1.47E-03
				Vanadium	6.8E+01	6.23E-07	NA	NA	7.27E-06	5.00E-03		1.45E-03	3.80E-07	NA	NA	1.11E-06	5.00E-03		2.22E-04	NA	1.67E-03
				Total BaPEq	1.1E+00	5.40E-06	7.3E+00	3.94E-05	6.30E-05	NA		NA	1.13E-06	7.30E+00	8.27E-06	3.31E-06	NA		NA	4.77E-05	NA
				Benzo(a)anthracene	1.6E+00	7.83E-06	7.3E-01	5.72E-06	9.13E-05	NA		NA	1.64E-06	7.30E-01	1.20E-06	4.79E-06	NA		NA	6.92E-06	NA
				Benzo(a)pyrene	6.1E-01	2.97E-06	7.3E+00	2.17E-05	3.46E-05	NA		NA	6.23E-07	7.30E+00	4.55E-06	1.82E-06	NA		NA	2.62E-05	NA
				Benzo(b)fluoranthene	1.1E+00	5.15E-06	7.3E-01	3.76E-06	6.01E-05	NA		NA	1.08E-06	7.30E-01	7.90E-07	3.16E-06	NA		NA	4.55E-06	NA
				Dibenzo(a,h)anthracene	2.2E-01	1.07E-06	7.3E+00	7.81E-06	1.25E-05	NA		NA	2.25E-07	7.30E+00	1.64E-06	6.55E-07	NA		NA	9.45E-06	NA
				Aroclors	1.7E+02	2.15E-05	2.0E+00	4.29E-05	2.50E-04	2.00E-05		1.25E+01	1.31E-05	2.00E+00	2.62E-05	3.82E-05	2.00E-05		1.91E+00	6.92E-05	1.44E+01
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	Lifetime Cancer Risk	HI
			Inhalation	Antimony	62.57	NA	NA	NA	NA	NA		NA	2.67E-10	NA	NA	6.22E-10	NA		NA	NA	NA
				Arsenic	23.79	NA	4.3E-03	NA	NA	1.50E-05		NA	1.01E-10	4.30E-03	4.36E-16	2.37E-10	1.50E-05		1.58E-05	4.36E-16	1.58E-05
				Cobalt	16.10	NA	9.0E-03	NA	NA	6.00E-06		NA	6.86E-11	9.00E-03	6.18E-16	1.60E-10	6.00E-06		2.67E-05	6.18E-16	2.67E-05
				Copper	744.30	NA	NA	NA	NA	NA		NA	3.17E-09	NA	NA	7.40E-09	NA		NA	NA	NA
				Lead	4115.00	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Mercury	26.01	NA	NA	NA	NA	3.00E-04		NA	1.11E-10	NA	NA	2.59E-10	3.00E-04		8.62E-07	NA	8.62E-07
				Thallium	0.12	NA	NA	NA	NA	NA		NA	5.11E-13	NA	NA	1.19E-12	NA		NA	NA	NA
				Vanadium	68.30	NA	NA	NA	NA	NA		NA	2.91E-10	NA	NA	6.79E-10	NA		NA	NA	NA
				Total BaPEq	1.11	NA	1.1E-03	NA	NA	NA		NA	4.73E-12	1.10E-03	5.20E-18	1.10E-11	NA		NA	5.20E-18	NA
				Benzo(a)anthracene	1.61	NA	1.1E-04	NA	NA	NA		NA	6.86E-12	1.10E-04	7.55E-19	1.60E-11	NA		NA	7.55E-19	NA
				Benzo(a)pyrene	0.61	NA	1.1E-03	NA	NA	NA		NA	2.60E-12	1.10E-03	2.86E-18	6.07E-12	NA		NA	2.86E-18	NA
				Benzo(b)fluoranthene	1.06	NA	1.1E-04	NA	NA	NA		NA	4.52E-12	1.10E-04	4.97E-19	1.05E-11	NA		NA	4.97E-19	NA
				Dibenzo(a,h)anthracene	0.22	NA	1.2E-03	NA	NA	NA		NA	9.38E-13	1.20E-03	1.13E-18	2.19E-12	NA		NA	1.13E-18	NA
				Aroclors	168.20	NA	5.7E-04	NA	NA	NA		NA	7.17E-10	5.70E-04	4.09E-16	1.67E-09	NA		NA	4.09E-16	NA
						Total Risks All Media (all)		**2.19E-04**	Total Risks All Media (all)			**5.18E+01**	Total Risks All Media (all)		**8.91E-05**	Total Risks All Media (all)			**5.95E+00**	**3.08E-04**	**5.32E+01**
						Total Risks All Media (PAH)		5.35E-05	Total Risks All Media (PAH)			0.00E+00	Total Risks All Media (PAH)		1.03E-05	Total Risks All Media (PAH)			0.00E+00	6.38E-05	**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-4-3 Human Health Summary Table for Risks and Hazards for Inner Cove Beach Exposure Unit- Future Construction Worker

Scenario Timeframe:	Future
Location:	WC-Inner Cove Beach Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Construction Worker	Ingestion	Antimony	62.57	2.89E-06	NA	NA	2.02E-04	4.00E-04		5.05E-01
				Arsenic	23.79	1.10E-06	1.50E+00	1.65E-06	7.68E-05	3.00E-04		2.56E-01
				Cobalt	16.10	7.43E-07	NA	NA	5.20E-05	3.00E-04		1.73E-01
				Copper	744.30	3.43E-05	NA	NA	2.40E-03	4.00E-02		6.01E-02
				Lead	4115.00	NA	NA	NA	NA	6.14E+02	1	6.70E+00
				Mercury	26.01	1.20E-06	NA	NA	8.40E-05	NA		NA
				Thallium	0.12	5.54E-09	NA	NA	3.87E-07	1.00E-05		3.87E-02
				Vanadium	68.30	3.15E-06	NA	NA	2.21E-04	5.00E-03		4.41E-02
				Total BaPEq	1.11	5.12E-08	7.30E+00	3.74E-07	3.58E-06	NA		NA
				Benzo(a)anthracene	1.61	7.43E-08	7.30E-01	5.42E-08	5.20E-06	NA		NA
				Benzo(a)pyrene	0.61	2.81E-08	7.30E+00	2.05E-07	1.97E-06	NA		NA
				Benzo(b)fluoranthene	1.06	4.89E-08	7.30E-01	3.57E-08	3.42E-06	NA		NA
				Dibenzo(a,h)anthracene	0.22	1.01E-08	7.30E+00	7.41E-08	7.10E-07	NA		NA
				Aroclors	168.20	7.76E-06	2.00E+00	1.55E-05	5.43E-04	2.00E-05		2.72E+01
			Dermal	Antimony	62.57	1.30E-06	NA	NA	9.09E-05	6.00E-05		1.52E+00
				Arsenic	23.79	9.88E-08	1.50E+00	1.48E-07	6.91E-06	3.00E-04		2.30E-02
				Cobalt	16.10	2.23E-08	NA	NA	1.56E-06	3.00E-04		5.20E-03
				Copper	744.30	1.03E-06	NA	NA	7.21E-05	4.00E-02		1.80E-03
				Lead	4115.00	NA	NA	NA	NA	NA	1	NA
				Mercury	26.01	3.60E-08	NA	NA	2.52E-06	NA		NA
				Thallium	0.12	1.66E-10	NA	NA	1.16E-08	1.00E-05		1.16E-03
				Vanadium	68.30	2.46E-07	NA	NA	1.72E-05	5.00E-03		3.44E-03
				Total BaPEq	1.11	2.00E-08	7.30E+00	1.46E-07	1.40E-06	NA		NA
				Benzo(a)anthracene	1.61	2.90E-08	7.30E-01	2.11E-08	2.03E-06	NA		NA
				Benzo(a)pyrene	0.61	1.10E-08	7.30E+00	8.01E-08	7.68E-07	NA		NA
				Benzo(b)fluoranthene	1.06	1.91E-08	7.30E-01	1.39E-08	1.33E-06	NA		NA
				Dibenzo(a,h)anthracene	0.22	3.96E-09	7.30E+00	2.89E-08	2.77E-07	NA		NA
				Aroclors	168.20	3.26E-06	2.00E+00	6.52E-06	2.28E-04	2.00E-05		1.14E+01
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard
			Inhalation	Antimony	62.57	4.27E-11	NA	NA	2.99E-09	NA		NA
				Arsenic	23.79	1.63E-11	4.30E-03	6.99E-17	1.14E-09	1.50E-05		7.58E-05
				Cobalt	16.10	1.10E-11	9.00E-03	9.90E-17	7.70E-10	6.00E-06		1.28E-04
				Copper	744.30	5.08E-10	NA	NA	3.56E-08	NA		NA
				Lead	4115.00	NA	NA	NA	NA	NA	1	NA
				Mercury	26.01	1.78E-11	NA	NA	1.24E-09	3.00E-04		4.15E-06
				Thallium	0.12	8.20E-14	NA	NA	5.74E-12	NA		NA
				Vanadium	68.30	4.67E-11	NA	NA	3.27E-09	NA		NA
				Total BaPEq	1.11	7.58E-13	1.10E-03	8.34E-19	5.31E-11	NA		NA
				Benzo(a)anthracene	1.61	1.10E-12	1.10E-04	1.21E-19	7.70E-11	NA		NA
				Benzo(a)pyrene	0.61	4.17E-13	1.10E-03	4.58E-19	2.92E-11	NA		NA
				Benzo(b)fluoranthene	1.06	7.24E-13	1.10E-04	7.96E-20	5.07E-11	NA		NA
				Dibenzo(a,h)anthracene	0.22	1.50E-13	1.20E-03	1.80E-19	1.05E-11	NA		NA
				Aroclors	168.20	1.15E-10	5.70E-04	6.55E-17	8.04E-09	NA		NA
	Total Risks All Media (all)							**2.43E-05**	Total Risks All Media (all)			**4.79E+01**
	Total Risks All Media (PAH)							**5.20E-07**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-5-1 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Present
Location:	WC-Central Beach Exposure Unit
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
					Value	Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard Quotient
					(mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Transient Trespasser	Ingestion	Cadmium	7.22E+01	1.68E-06	NA	NA	5.88E-05	1.00E-03		5.88E-02
				Lead	1.70E+01	NA	NA	NA	NA	1.17E+03	1	1.45E-02
				Total BaPEq	4.40E-01	1.02E-08	7.30E+00	7.47E-08	3.58E-07	NA		NA
				Benzo(a)anthracene	3.80E-01	8.84E-09	7.30E-01	6.45E-09	3.09E-07	NA		NA
				Benzo(a)pyrene	3.30E-01	7.68E-09	7.30E+00	5.60E-08	2.69E-07	NA		NA
				Dibenzo(a,h)anthracen	3.00E-02	6.98E-10	7.30E+00	5.09E-09	2.44E-08	NA		NA
			Dermal	Cadmium	7.22E+01	3.35E-09	NA	NA	1.17E-07	2.50E-05		4.69E-03
				Lead	1.70E+01	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	4.40E-01	2.65E-09	7.30E+00	1.94E-08	9.29E-08	NA		NA
				Benzo(a)anthracene	3.80E-01	2.29E-09	7.30E-01	1.67E-09	8.02E-08	NA		NA
				Benzo(a)pyrene	3.30E-01	1.99E-09	7.30E+00	1.45E-08	6.97E-08	NA		NA
				Dibenzo(a,h)anthracen	3.00E-02	1.81E-10	7.30E+00	1.32E-09	6.33E-09	NA		NA
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)		Hazard Quotient
			Inhalation	Cadmium	7.22E+01	1.23E-10	1.80E-03	2.22E-16	4.31E-09	2.00E-05		2.15E-04
				Lead	1.70E+01	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	4.40E-01	7.50E-13	1.10E-03	8.25E-19	2.63E-11	NA		NA
				Benzo(a)anthracene	3.80E-01	6.48E-13	1.10E-04	7.13E-20	2.27E-11	NA		NA
				Benzo(a)pyrene	3.30E-01	5.63E-13	1.10E-03	6.19E-19	1.97E-11	NA		NA
				Dibenzo(a,h)anthracen	3.00E-02	5.11E-14	1.20E-03	6.14E-20	1.79E-12	NA		NA
	Total Risks All Media (all)							**9.41E-08**	Total Risks All Media (all)			**7.82E-02**
	Total Risks All Media (PAH)							**9.41E-08**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-5-2 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	WC- Central Beach Exposure Unit
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Child Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Child Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Child Cancer Risk: Cancer Risk	Child Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Child Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Child Non-cancer Hazard: Note	Child Non-cancer Hazard: Hazard Quotient	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Non-cancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Non-cancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Non-cancer Hazard: Note	Adult Non-cancer Hazard: Hazard Quotient	Lifetime Cancer Risk	HI
Soil	Soil	Recreational Trespasser	Ingestion	Cadmium	7.2E+01	2.35E-05	NA	NA	2.74E-04	1.00E-03		2.74E-01	1.01E-05	NA	NA	2.94E-05	1.00E-03		2.94E-02	NA	3.04E-01
				Lead	1.7E+01	NA	NA	NA	NA	9.50E+02	1	1.79E-02	NA	NA	NA	NA	1.88E+04	1	9.03E-04	NA	--
				Total BaPEq	4.4E-01	7.64E-07	7.3E+00	5.58E-06	8.92E-06	NA		NA	1.13E-07	7.30E+00	8.22E-07	3.28E-07	NA		NA	6.40E-06	NA
				Benzo(a)anthracene	3.8E-01	6.60E-07	7.3E-01	4.82E-07	7.70E-06	NA		NA	9.72E-08	7.30E-01	7.10E-08	2.84E-07	NA		NA	5.53E-07	NA
				Benzo(a)pyrene	3.3E-01	5.73E-07	7.3E+00	4.18E-06	6.69E-06	NA		NA	8.44E-08	7.30E+00	6.16E-07	2.46E-07	NA		NA	4.80E-06	NA
				Dibenzo(a,h)anthracen	3.0E-02	5.21E-08	7.3E+00	3.80E-07	6.08E-07	NA		NA	7.68E-09	7.30E+00	5.60E-08	2.24E-08	NA		NA	4.36E-07	NA
			Dermal	Cadmium	7.2E+01	6.58E-08	NA	NA	7.68E-07	2.50E-05		3.07E-02	3.11E-10	NA	NA	1.17E-07	2.50E-05		4.69E-03	NA	3.54E-02
				Lead	1.7E+01	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	4.4E-01	2.14E-06	7.3E+00	1.56E-05	2.50E-05	NA		NA	4.49E-07	7.30E+00	3.28E-06	1.31E-06	NA		NA	1.89E-05	NA
				Benzo(a)anthracene	3.8E-01	1.85E-06	7.3E-01	1.35E-06	2.16E-05	NA		NA	3.88E-07	7.30E-01	2.83E-07	1.13E-06	NA		NA	1.63E-06	NA
				Benzo(a)pyrene	3.3E-01	1.60E-06	7.3E+00	1.17E-05	1.87E-05	NA		NA	3.37E-07	7.30E+00	2.46E-06	9.83E-07	NA		NA	1.42E-05	NA
				Dibenzo(a,h)anthracen	3.0E-02	1.46E-07	7.3E+00	1.06E-06	1.70E-06	NA		NA	3.06E-08	7.30E+00	2.24E-07	8.93E-08	NA		NA	1.29E-06	NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)		Hazard Quotient	Lifetime Cancer Risk	HI
			Inhalation	Cadmium	72.20	NA	1.8E-03	NA	NA	2.00E-05		NA	3.08E-10	1.80E-03	5.54E-16	7.18E-10	2.00E-05		3.59E-05	5.54E-16	3.59E-05
				Lead	17.00	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
				Total BaPEq	0.44	NA	1.1E-03	NA	NA	NA		NA	1.88E-12	1.10E-03	2.06E-18	4.38E-12	NA		NA	2.06E-18	NA
				Benzo(a)anthracene	0.38	NA	1.1E-04	NA	NA	NA		NA	1.62E-12	1.10E-04	1.78E-19	3.78E-12	NA		NA	1.78E-19	NA
				Benzo(a)pyrene	0.33	NA	1.1E-03	NA	NA	NA		NA	1.41E-12	1.10E-03	1.55E-18	3.28E-12	NA		NA	1.55E-18	NA
				Dibenzo(a,h)anthracen	0.03	NA	1.2E-03	NA	NA	NA		NA	1.28E-13	1.20E-03	1.53E-19	2.98E-13	NA		NA	1.53E-19	NA
	Total Risks All Media (all)							2.12E-05	Total Risks All Media (all)			3.23E-01	Total Risks All Media (all)		4.10E-06	Total Risks All Media (all)			3.50E-02	**2.53E-05**	**3.39E-01**
	Total Risks All Media (PAH)							2.12E-05	Total Risks All Media (PAH)			0.00E+00	Total Risks All Media (PAH)		4.10E-06	Total Risks All Media (PAH)			0.00E+00	**2.53E-05**	**NA**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-5-3 Human Health Summary Table for Risks and Hazards for Central Beach Exposure Unit- Future Construction Worker

Scenario Timeframe	Future
Location:	WC-Central Beach Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard			
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC		Hazard Quotient
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	Note	
Soil	Soil	Construction Worker	Ingestion	Cadmium	72.20	3.33E-06	NA	NA	2.33E-04	1.00E-03		2.33E-01
				Lead	17.00	NA	NA	NA	NA	6.14E+02	1	2.77E-02
				Total BaPEq	0.44	2.03E-08	7.30E+00	1.48E-07	1.42E-06	NA		NA
				Benzo(a)anthracene	0.38	1.75E-08	7.30E-01	1.28E-08	1.23E-06	NA		NA
				Benzo(a)pyrene	0.33	1.52E-08	7.30E+00	1.11E-07	1.07E-06	NA		NA
				Dibenzo(a,h)anthracene	0.03	1.38E-09	7.30E+00	1.01E-08	9.69E-08	NA		NA
			Dermal	Cadmium	72.20	9.99E-09	NA	NA	6.99E-07	2.50E-05		2.80E-02
				Lead	17.00	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.44	7.92E-09	7.30E+00	5.78E-08	5.54E-07	NA		NA
				Benzo(a)anthracene	0.38	6.84E-09	7.30E-01	4.99E-09	4.79E-07	NA		NA
				Benzo(a)pyrene	0.33	5.94E-09	7.30E+00	4.33E-08	4.16E-07	NA		NA
				Dibenzo(a,h)anthracene	0.03	5.40E-10	7.30E+00	3.94E-09	3.78E-08	NA		NA
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Note	Hazard Quotient
			Inhalation	Cadmium	72.20	4.93E-11	1.80E-03	8.88E-17	3.45E-09	2.00E-05		1.73E-04
				Lead	17.00	NA	NA	NA	NA	NA	1	NA
				Total BaPEq	0.44	3.01E-13	1.10E-03	3.31E-19	2.10E-11	NA		NA
				Benzo(a)anthracene	0.38	2.60E-13	1.10E-04	2.86E-20	1.82E-11	NA		NA
				Benzo(a)pyrene	0.33	2.25E-13	1.10E-03	2.48E-19	1.58E-11	NA		NA
				Dibenzo(a,h)anthracene	0.03	2.05E-14	1.20E-03	2.46E-20	1.43E-12	NA		NA
	Total Risks All Media (all)							**2.06E-07**	Total Risks All Media (all)			**2.89E-01**
	Total Risks All Media (PAH)							**2.06E-07**	Total Risks All Media (PAH)			**0.00E+00**

Notes:

1. Hazard values for Lead were calculated using the EPA, 2007 IEUBK model and the adult lead model (2009). The HQ was calculated based on lead RBCs, see section 3.1.2 in the text.

Table 5-6-1 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Current Transient Trespasser

Scenario Timeframe:	Current
Location:	WC-Wharf Road Exposure Unit
Receptor:	Transient Trespasser
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC Value (mg/kg)	Adult Cancer Risk: Intake/Exposure Con. Value (mg/kg-d)	Adult Cancer Risk: CSF/Unit Risk Value (mg/kg/day)-1	Adult Cancer Risk: Cancer Risk	Adult Noncancer Hazard: Intake/Exposure Con. Value (mg/kg-d)	Adult Noncancer Hazard: RfD/RfC Value (mg/kg/day)-1	Adult Noncancer Hazard: Hazard
Soil	Soil	Transient Trespasser	Ingestion	Dioxin/furan TCDD toxicity equivalen	4.29E-04	9.98E-12	1.30E+05	1.30E-06	3.49E-10	7.00E-10	4.99E-01
			Dermal	Dioxin/furan TCDD toxicity equivalen	4.29E-04	2.99E-12	1.30E+05	3.88E-07	1.05E-10	7.00E-10	1.49E-01
					Value (mg/kg)	(mg/m3)	(ug/m3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Hazard
			Inhalation	Dioxin/furan TCDD toxicity equivalen	4.29E-04	7.31E-16	3.80E+01	2.78E-17	2.56E-14	4.00E-08	6.40E-07
	Total Risks All Media (all)							**1.69E-06**	Total Risks All Media (all)		**6.48E-01**

Table 5-6-2 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Current Recreational Trespasser/ Future Park User

Scenario Timeframe:	Current/Future
Location:	Unit
Receptor:	Current Recreational Trespasser/ Future Park User
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure	Exposure Point	Exposure	Chemical of	EPC	Child Cancer Risk			Child Non-cancer Hazard			Adult Cancer Risk			Adult Non-cancer Hazard			Lifetime Cancer Risk	HI
0219-012-900-PoP-WC-Upland\RiskAssessment\Rsid		Receptor	Route	Potential Concern	Value	Intake/Exposure Co	CSF/Unit Risk		Intake/Exposure Con.	RfD/RfC		Intake/Exposure Con.	CSF/Unit Risk		Intake/Exposure Con.	RfD/RfC			
					(mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1	Cancer Risk	Value (mg/kg-d)	Value (mg/kg/day)-1	Hazard Quotient	Value (mg/kg-d)	Value (mg/kg/day)-1	Cancer Risk	Value (mg/kg-d)	Value (mg/kg/day)-1	Hazard Quotient		
Soil	Soil	Current	Ingestion	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	1.40E-10	1.3E+05	1.82E-05	1.63E-09	7.00E-10	2.33E+00	5.99E-11	1.30E+05	7.78E-06	1.75E-10	7.00E-10	2.49E-01	2.59E-05	2.58E+00
		Recreational																	
		Trespasser/	Dermal	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	5.87E-11	1.3E+05	7.63E-06	6.85E-10	7.00E-10	9.78E-01	3.58E-11	1.30E+05	4.66E-06	1.05E-10	7.00E-10	1.49E-01	1.23E-05	1.13E+00
		Future Park																	
		User			Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Hazard Quotient	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Hazard Quotient	Lifetime Cancer Risk	HI
			Inhalation	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	NA	3.8E+01	NA	NA	4.00E-08	NA	1.83E-15	3.80E+01	6.95E-17	4.27E-15	4.00E-08	1.07E-07	6.95E-17	1.07E-07
	Total Risks All Media (all)							**2.58E-05**	Total Risks All Media (all)		**3.31E+00**	Total Risks All Media (all)		**1.24E-05**	Total Risks All Media (all)		**3.99E-01**	**3.82E-05**	**3.70E+00**

Table 5-6-3 Human Health Summary Table for Risks and Hazards for Wharf Road Exposure Unit- Future Construction Worker

Scenario Timeframe:	Future
Location:	WC-Wharf Road Exposure Unit
Receptor:	Construction Worker
Medium:	Soil
Exposure Medium:	Soil

Medium	Exposure Medium	Exposure Point Receptor	Exposure Route	Chemical of Potential Concern	EPC	Adult Cancer Risk			Adult Noncancer Hazard		
						Intake/Exposure Con.	CSF/Unit Risk	Cancer Risk	Intake/Exposure Con.	RfD/RfC	Hazard
					Value (mg/kg)	Value (mg/kg-d)	Value (mg/kg/day)-1		Value (mg/kg-d)	Value (mg/kg/day)-1	
Soil	Soil	Construction Worker	Ingestion	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	1.98E-11	1.30E+05	2.57E-06	1.39E-09	7.00E-10	1.98E+00
			Dermal	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	8.91E-12	1.30E+05	1.16E-06	6.23E-10	7.00E-10	8.91E-01
					Value (mg/kg)	(mg/m^3)	(ug/m^3)-1	Cancer Risk	(mg/m^3)	(mg/m^3)	Hazard
			Inhalation	Dioxin/furan TCDD toxicity equivalent (ND = 0)	4.29E-04	2.93E-16	3.80E+01	1.11E-17	2.05E-14	4.00E-08	5.13E-07
						Total Risks All Media (all)		**3.73E-06**	Total Risks All Media (all)		**2.87E+00**

Table 5-7 Human Health Summary Table for Risks and Hazards for all Receptors in all Exposure Units

Area	Receptor	Child Cancer Risk	Adult Cancer Risk	Total Cancer Risk	Child Noncancer Hazard	Adult Noncancer Hazard	Total Noncancer Hazard
Central Beach	Current Transient Trespasser	--	9.41E-08	9.41E-08	--	7.82E-02	7.82E-02
	Current Recreational Trespasser/ Future Park User	2.12E-05	4.10E-06	**2.53E-05**	3.23E-01	3.50E-02	3.39E-01
	Future Construction Worker	--	2.06E-07	2.06E-07	--	2.89E-01	2.89E-01
Central Parcel	Current Transient Trespasser	--	2.77E-06	2.77E-06	--	6.67E-01	6.67E-01
	Current Recreational Trespasser/ Future Park User	5.31E-04	1.04E-04	**6.35E-04**	1.32E+00	1.14E-01	7.34E-01
	Future Construction Worker	--	2.77E-06	2.77E-06	--	6.67E-01	6.67E-01
East Parcel	Current Transient Trespasser	--	9.08E-07	9.08E-07	--	1.63E+00	**1.63E+00**
	Current Recreational Trespasser/ Future Park User	3.54E-05	9.96E-06	**4.54E-05**	6.00E+00	7.02E-01	**5.84E+00**
	Future Construction Worker	--	1.92E-06	1.92E-06	--	5.81E+00	**5.81E+00**
Inner Cove	Current Transient Trespasser	--	1.11E-05	**1.11E-05**	--	1.28E+01	**1.28E+01**
	Current Recreational Trespasser/ Future Park User	2.19E-04	8.91E-05	**3.08E-04**	5.18E+01	5.95E+00	**5.32E+01**
	Future Construction Worker	--	2.43E-05	**2.43E-05**	--	4.79E+01	**4.79E+01**
West Parcel	Current Transient Trespasser	--	1.41E-07	1.41E-07	--	6.72E-02	6.72E-02
	Current Recreational Trespasser/ Future Park User	3.18E-05	6.15E-06	**3.80E-05**	8.27E-02	4.18E-03	0.00E+00
	Future Construction Worker	--	3.09E-07	3.09E-07	--	1.28E-01	1.28E-01
Wharf Road Area	Current Transient Trespasser	--	1.69E-06	1.69E-06	--	6.48E-01	6.48E-01
	Current Recreational Trespasser/ Future Park User	2.58E-05	1.24E-05	**3.82E-05**	3.31E+00	3.99E-01	**3.71E+00**
	Future Construction Worker	--	3.73E-06	3.73E-06	--	2.87E+00	**2.87E+00**

Notes:

Total Non cancer Hazard (HI) excludes lead

Bold Values are those values that exceed the cancer risk of 1E-05 or the Noncancer Hazard of 1.

"--" = not calculated for the receptor because no child duration

Table 5-8 Hot Spot Concentrations for Human Health Exposure Scenarios (units = mg/Kg)

Chemical (endpoint)	Construction Worker	Transient Trespasser	Recreational Trespasser/ Future Park User
Antimony (non-cancer)	NA	NA	326
Arsenic (cancer)	NA	NA	131
Lead (non-cancer)	6,140	11,170	9,500
Total BaPEq (cancer)	214	468	1.74
Benzo(a)anthracene (cancer)	NA	NA	17.4
Benzo(a)pyrene (cancer)	214	468	1.74
Benzo(b)fluoranthene (cancer)	NA	NA	17.4
Dibenzo(a,h)anthracene (cancer)	NA	NA	1.74
Aroclors (total Polychlorinated Biphenyls) (non-cancer)	44	190	34
Dioxin/furan TCDD toxicity equivalent (ND = 0)	0.01	1.0	0.001

Notes:

NA - chemical not a COC for this exposure scenario