FINAL

RECORD OF DECISION TO ADDRESS SURFACE WATER AND SEDIMENT AT OPERABLE UNIT 51 ENVIRONMENTAL RESTORATION PROGRAM SITE SS-63 LANGLEY AIR FORCE BASE, VIRGINIA



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LIST OF ACRONYMS AND ABBREVIATIONS

AFB Air Force Base

ARAR applicable or relevant and appropriate requirement

BLRA baseline risk assessment

CDI chronic daily intake

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

("Superfund")

CFR Code of Federal Regulations
COC contaminant of concern
COPC chemical of potential concern

COPEC chemical of potential ecological concern

CSF carcinogenic slope factor CSM conceptual site model

EPA U.S. Environmental Protection Agency

EPC exposure point concentration ERA Ecological Risk Assessment

ERP Environmental Restoration Program

FDA Food and Drug Administration

FS Feasibility Study

HGL HydroGeoLogic, Inc.

HHRA human health risk assessment

HI hazard index HQ hazard quotient

IRP Installation Restoration Program

LOAEL lowest observed adverse effect level

LTA Lighter-than-Air
LTM long-term monitoring
LUC land use control

MCPP 2-(2-methyl-4-chlorophenoxy)propionic acid

mg/kg milligrams per kilogram

mg/kg-day milligrams of chemical per kilogram of body weight per day

NASA National Aeronautics and Space Administration NCEA National Center for Environmental Assessment

NCP National Oil and Hazardous Substances Pollution Contingency Plan

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NOAEL no observed adverse effect level

O&M operation and maintenance

OU Operable Unit

PA Preliminary Assessment

PAH polynuclear aromatic hydrocarbon

PCB polychlorinated biphenyl PCT polychlorinated terphenyl

RAB Restoration Advisory Board RAO remedial action objective RBSL risk-based screening level

RfD reference dose

RI remedial investigation

RME reasonable maximum exposure

ROD Record of Decision

SARA Superfund Amendments and Reauthorization Act

SI site inspection

SVOC semivolatile organic compound

TRV toxicity reference value

UTL upper tolerance limit

VDEQ Virginia Department of Environmental Quality

VOC volatile organic compound

FINAL

RECORD OF DECISION TO ADDRESS SURFACE WATER AND SEDIMENT AT OPERABLE UNIT 51 ENVIRONMENTAL RESTORATION PROGRAM SITE SS-63 LANGLEY AIR FORCE BASE, VIRGINIA AUGUST 2008

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Operable Unit 51 (OU51), Environmental Restoration Program (ERP) Site SS-63 Langley Air Force Base (AFB), Virginia EPA ID No. VA2800005033

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for addressing surface water and sediment at OU51 (ERP Site SS-63) at Langley AFB in Hampton, Virginia. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the information contained in the Administrative Record file for the Site, and this ROD will become part of the Administrative Record.

The U.S. Air Force is the lead agency and provides funding for site clean-up activities at Langley AFB. The U.S. Air Force and U.S. Environmental Protection Agency (EPA) Region III have co-selected the remedy presented in this ROD. The Virginia Department of Environmental Quality (VDEQ) concurs with the Selected Remedy.

1.3 ASSESSMENT OF THE SITE

OU51 is one of the 24 ERP OUs identified under CERCLA at Langley AFB. ERP Site SS-63 encompasses surface water and sediment in the Back River system along the shoreline of Langley AFB. The Back River is a tidal estuary that discharges into the Chesapeake Bay. Previous investigations identified two areas of ERP Site SS-63 that showed elevated concentrations of chemicals in sediment. These investigations did not identify chemical constituents in surface water at concentrations that pose a threat to human health or the environment. The first area (approximately 2-acres) identified was the Lighter-than-Air (LTA) Cove, located along the Northwest Branch Back River. The Site is adjacent to the former trap and skeet ranges at OU34 (ERP Site LF-17), which has resulted in lead pellet deposition and contaminant impacts similar to those observed at ERP Site LF-17. Langley AFB determined that lead-contaminated sediment within the LTA Cove area would likely

require the same or similar treatment methods as the soils characterized with lead contamination at ERP Site LF-17. Accordingly, Langley AFB, in consultation with EPA and VDEQ, decided that remedial action in the ERP Site SS-63 LTA Cove would be conducted concurrent with remediation at ERP Site LF-17. Based on this administrative decision, the LTA Cove portion of ERP Site SS-63 is addressed in the ROD for OU34 (ERP Site LF-17) (HydroGeoLogic, Inc. [HGL], 2007a).

The second area requiring remediation is located along the Langley AFB shoreline of the Southwest Branch of the Back River. This area contains elevated concentrations of polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) that pose a potential threat to human health and the environment. The response action presented in this ROD for the Back River along the Langley AFB shoreline is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment

1.4 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for ERP Site SS-63, excluding the LTA Cove portion, addresses the medium of concern (sediment in the Southwest Branch) and comprises the final remedial action for this Site. The major components of the Selected Remedy include the following:

- Construction of temporary dams to isolate and dewater the contaminated areas.
- Dry excavation of sediment using conventional earthmoving equipment (e.g., backhoe) and transfer to an on-shore staging area.
- Containment and treatment of decant water from the sediment on shore.
- Off-site disposal of contaminated sediment.

The active remedy (dry excavation with off-site disposal) was selected to address human health risks associated with the indirect exposure of potential receptors to the site-related contaminants of concern (COCs) in sediment at the Southwest Branch portion of ERP Site SS-63. Once the remedial action is complete, all site-related COCs in sediment would be removed to a concentration that would allow for unlimited use and unrestricted exposure at the Site under this CERCLA action. The use of the term unlimited use and unrestricted exposure in this ROD does not supersede the existing Virginia Department of Health condemnations or advisories pertaining to shellfishing, fishing, or recreation in the Back River and several of its tributaries including the Northwest Branch and Southwest Branch.

1.5 STATUTORY DETERMINATIONS

The Selected Remedy for ERP Site SS-63 is protective of human health and the environment and complies with federal and state regulations that are applicable or relevant and appropriate to the remedial action, are cost-effective, and utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. In addition, the Selected Remedy attains the mandates of CERCLA Section 121, and to the extent

practicable, the regulatory requirements of the NCP. The remedy for this OU does not satisfy the CERCLA statutory preference for treatment as a principal element for the remedy (40 Code of Federal Regulations [CFR] 300.430(a)(1)(iii)(A)). However, this element is not required because there are no principal threat wastes located at the site. Because the Selected Remedy will not result in site-related pollutants or contaminants remaining on-site above levels that would pose unacceptable risk to human health or the environment, a 5-year review will not be required for this remedial action.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the ROD. Additional information can be found in the Administrative Record file for Langley AFB.

- Chemicals of potential concern (COPCs) and chemicals of potential ecological concern (COPECs) and their respective concentrations (Section 2.7 and associated tables).
- Baseline risk represented by the COPCs and COPECs (Section 2.7).
- Current and reasonably anticipated future land and resource use (Section 2.6).
- Potential land use that will be available at the Site as a result of the Selected Remedy (Section 2.12.1.4).
- Estimated capital costs, annual maintenance and performance costs, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section 2.12.1.3; Table 2.19).
- Key factors that led to selecting the remedy and how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria (Section 2.12.1.1).
- Sediment cleanup goals established for COCs and the basis for those goals (Section 2.8).

1.7 AUTHORIZING SIGNATURES

TIMOTHY A. BYERS

18 AUG 01

Date

Brigadier General, USAF

Director of Installations and Mission Support (A7)

JAMES J. BURKE, Director

Hazardous Site Cleanup Division

EPA Region III

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Langley AFB is located near Hampton, Virginia, between the Northwest Branch and the Southwest Branch of the Back River, a tidal estuary of the Chesapeake Bay. The location of Langley AFB is shown on Figure 2.1. The site layout of ERP Site SS-63, which includes portions of the Back River and its tributaries, is shown on Figure 2.2. Langley AFB was listed jointly on the Superfund National Priorities List with the National Aeronautics and Space Administration (NASA) Langley Research Center in 1994 (EPA ID: VA2800005033). However, the CERCLA investigations for these two facilities are conducted separately. Langley AFB investigations and site cleanups are funded by the U.S. Air Force while the NASA Langley Research Center investigations and site cleanups are funded by NASA. The U.S. Air Force is the lead agency and provides funding for site clean-up activities at Langley AFB. The U.S. Air Force and U.S. EPA Region III have co-selected the remedy presented in this ROD. The VDEQ concurs with the Selected Remedy.

ERP Site SS-63 is composed of areas in the Back River system along the shoreline of Langley AFB. The Back River is a tidal estuary that discharges into the Chesapeake Bay, as shown in Figure 2.2. The peninsula containing Langley AFB divides the main channel of the river into the Northwest Branch and the Southwest Branch. Brick Kiln Creek and Tabbs Creek are the primary tributaries to the Northwest Branch. Newmarket Creek and Tides Mill Creek are the main tributaries to the Southwest Branch. Large areas along the shoreline of the Back River and its tributaries consist of wetlands, including the Plum Tree Island National Wildlife Refuge, which is located along the north bank of the main channel near the mouth of the river. Beds of submerged aquatic vegetation are present near the shores of the main channel. These areas of wetland and submerged aquatic vegetation provide important nursery and feeding habitat for a variety of species of fish and shellfish.

2.2 SUMMARY OF STUDIES AND INVESTIGATIONS

The following subsections provide summaries of the investigations that have been conducted to address surface water and sediment at ERP Site SS-63. There have been no CERCLA enforcement activities at Langley AFB.

2.2.1 Non-CERCLA Investigations

This section summarizes the non-CERCLA investigations that have been conducted for ERP Site SS-63.

2.2.1.1 <u>Fish and Wildlife Report Summary for Langley AFB (U.S. Fish and Wildlife Service, 1993)</u>

In 1993, a study was conducted by the U.S. Fish and Wildlife Service in response to a 1987 study that identified the presence of polynuclear aromatic hydrocarbons (PAHs) and PCTs in sediments near outfalls to the Back River. The goal of the 1993 study was to identify the area

within the Back River affected by contaminants, to assess the extent of contamination in the food chain, and to determine toxicity of sediments in areas with PCT concentrations. Sediment and biota samples were collected and analyzed for PCTs, PAHs, and metals. In addition, sediment samples were used in bioassays to assess toxicity. Areas of PCT, PAH, and metals (silver, chromium, zinc, copper, mercury, nickel, and lead) contamination were identified. The highest PCT concentrations in sediment were observed in samples collected from Tabbs Creek and from the vicinity of Outfall 4 (current Outfall 7) (Figure 2.3) in the Southwest Branch of the Back River. PCTs were detected in some of the biota samples. Based on the bioassay results, the study concluded that none of the sample locations could be considered critically contaminated (i.e., survival of organisms was depressed, but reproduction was still possible).

2.2.1.2 Water Quality Assessment of the Back River (CH2M Hill, 1997)

In 1997, a Draft Water Quality Assessment of the Back River was prepared in support of natural resources compliance programs at Langley AFB. This study included collection of 23 co-located surface water and sediment samples and biota samples (6 locations) throughout the estuary. Sediment, surface water, and biota samples were analyzed for semivolatile organic compounds (SVOCs), PCBs, PCTs, pesticides, and selected metals. The study concluded that PCTs and some metals were present at higher concentrations in the Northwest Branch and the Southwest Branch of the Back River as compared to the main channel.

2.2.2 Preliminary Assessment/Site Inspection Report (Radian, 1999)

In 1998, a Preliminary Assessment/Site Inspection (PA/SI) was conducted for the Back River to characterize better the concentrations of chemicals in river sediment and to assess the potential impact of these chemicals on ecological receptors. This study included collection and analysis of sediment samples, as well as modeling contributions from surface water discharge and groundwater discharge to contaminant loading in the Back River. The sediment data showed higher chemical concentrations in sediments of the Northwest Branch and the Southwest Branch of the Back River as compared to the main channel. The report included a screening-level ecological risk assessment (SLERA) and a qualitative human health risk assessment (HHRA). The results of these assessments indicated an additional assessment of ecological effects was warranted, and that a baseline ecological risk assessment (ERA) should be performed. The PA/SI recommended preparation of a remedial investigation/feasibility study (RI/FS) for the Back River.

2.2.3 Remedial Investigation Report (URS Corporation, 2003)

An RI was conducted in 2000 to further characterize potential contamination identified during previous investigations, conduct a baseline ERA and HHRA, and to evaluate potential impacts to the Back River from Langley AFB ERP sites situated along the shoreline (Figure 2.3). The RI included the following sampling: collection of 30 sediment samples for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, SVOCs, and volatile organic compounds [VOCs]); collection of 20 sediment samples for benthic invertebrate identification and enumeration; collection of 10 sediment samples for toxicity testing;

collection of 10 surface water samples for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, SVOCs, and VOCs); collection of biota (sport fish, killifish, bivalves, and crabs) samples for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, and SVOCs); and pathologic examination of fish from select locations.

Based on the RI data, two areas with elevated concentrations of chemicals were identified: LTA Cove and the shoreline of the Southwest Branch of the Back River. As previously mentioned, this ROD does not address sediment within the LTA Cove portion of ERP Site SS-63. The LTA Cove portion of ERP Site SS-63 is addressed in the ROD for ERP Site LF-17.

Along the Langley AFB shoreline of the Southwest Branch of the Back River, sediment samples collected from the vicinity of Outfall 4 (current Outfall 7 [Figure 2.3]) were characterized by elevated PCB/PCT concentrations. The PCBs/PCTs observed in sediment samples from the Southwest Branch of the Back River originated from a release in the 1980s at an electrical substation that was transported through the Langley AFB storm sewer system and discharged at Outfall 4 (current Outfall 7). The cause of the release was corrected by Langley AFB, and the impacted section of the storm sewer system was decontaminated in 1996.

As described in Section 2.7, the RI included a quantitative HHRA and ERA to evaluate potential threats from chemicals in the Back River sediment and surface water. For human health, there are no unacceptable risks associated with direct exposure to surface water or sediment. The only exposure pathway that posed an unacceptable risk was indirect exposure to chemicals in the sediment through consumption of fish, bivalves, and crabs (fish being the primary exposure route) that had accumulated sediment contaminants in their tissues. The contaminants that were associated with unacceptable health risks were PCBs and PCTs. The ERA concluded that chemicals in ERP Site SS-63 sediment and surface water were not adversely affecting ecological receptors. The RI recommended preparation of a FS to evaluate possible remedial alternatives to address the contaminated sediment.

2.2.4 2004 Back River Sediment Sampling (URS Corporation, 2004)

In July and August 2004, sediment samples were collected along the Southwest Branch to determine whether the PCB/PCT contamination detected in 2000 during the RI had migrated as a result of Hurricane Isabel (which struck Langley AFB in September 2003) and to refine the estimated cost for the potential remedial action. For this investigation, samples were collected from 118 locations in the Southwest Branch of the Back River and analyzed for PCBs and PCTs.

Generally, the 2004 samples were characterized by lower concentrations of PCBs/PCTs than observed during previous sampling efforts. Relatively high concentrations (i.e., greater than 1 milligram per kilogram [mg/kg]) of PCBs/PCTs were detected in the general vicinity of Outfall 4 (current Outfall 7) and Outfall 6. The highest concentration of total PCBs/PCTs (15.2 mg/kg) was detected adjacent to a jet fuel unloading facility north of Outfall 4 (Figure 2.3).

2.2.5 Feasibility Study (HydroGeoLogic, 2006)

Following completion of the RI, an FS was conducted to evaluate, screen, and develop remedial alternatives for ERP Site SS-63. During the FS, remedial objectives were identified and alternatives were developed to address risks to human health and the environment posed by the PCB/PCT contaminated sediment. The following alternatives were evaluated to address the contaminated sediment at the Southwest Branch:

- Alternative No. 1 No action (Natural Recovery)
- <u>Alternative No. 2</u> Manage waste in place Monitoring
- Alternative No. 3 Mechanical dredging with off-site disposal
- Alternative No. 4 Dry excavation with off-site disposal of impacted sediment
- <u>Alternative No. 5</u> Capping impacted sediment

A detailed and comparative analysis was performed on the remedial alternatives developed for ERP Site SS-63. Both analyses evaluated the alternatives with respect to the nine criteria outlined in Section 300.430 (e) of the NCP and CERCLA Section 121. In the detailed analysis, the acceptability and performance of each alternative against the criteria were evaluated individually (without consideration of other alternatives) so that relative strengths and weaknesses could be identified. The comparative analysis evaluated the performance of each remedial alternative relative to one another to identify its advantages and disadvantages. Alternative Nos. 1 and 2 were determined not to be protective of human health. Alternative Nos. 3, 4, and 5 were determined to be protective of human health and feasible.

2.2.6 Proposed Plan (HydroGeoLogic, 2007b)

Pursuant to CERCLA Section 117 (42 U.S.C. Section 9617) and the NCP at 40 CFR 300.430(f)(2), Langley AFB issued a Proposed Plan for ERP Site SS-63 in December 2007. The Proposed Plan identified the Preferred Alternative, Dry Excavation with Off-site Disposal, for addressing the PCB/PCT contaminated sediment at the Southwest Branch portion of ERP Site SS-63. The U.S. Air Force issued a public notice of availability, provided a public comment period, and held a public meeting as required by the NCP (see Section 2.3). No significant changes were made to the preferred remedial action alternative identified in the Proposed Plan as a result of the public meeting and comment period.

2.3 COMMUNITY PARTICIPATION

The U.S. Air Force and EPA provide information regarding the cleanup of Langley AFB to the public through the community relations program, which includes a Restoration Advisory Board (RAB), public meetings, the Administrative Record file for the Site, the information repository, and announcements published in local newspapers. The public participation activities were consistent with the requirements of CERCLA Sections 113(k)(2)(B)(i-v) and 117, 42 U.S.C. Sections 9613(k)(2)(B)(i-v) and 9617.

Langley AFB provided a public comment period from December 16, 2007 through January 15, 2008, for the Proposed Plan for ERP Site SS-63. To fulfill the public participation requirement under Section 117(a) of CERCLA, as amended by SARA, a Notice of Availability of the Proposed Plan and supporting documentation, the public comment period, and the public meeting was published in the *Daily Press* (Newport News) newspaper. The public meeting to present the Proposed Plan was held on January 8, 2008, at the Machen Elementary School, located in Hampton, Virginia.

The Proposed Plan and previous investigation reports for ERP Site SS-63 are available to the public in the Administrative Record maintained at:

Langley AFB 37 Sweeney Boulevard Langley AFB, Virginia 23665 By Appointment Mr. John Tice (757) 764-1082

2.4 SCOPE AND ROLE OF THE RESPONSE ACTION

The U.S. Air Force has organized work to date at Langley AFB into 24 OUs. The current CERCLA status and schedule of remedial actions for each OU is detailed in the Management Action Plan, which can be found in the information repository maintained at Langley AFB.

This ROD documents the rationale for the Selected Remedy to address the contaminated sediment at Southwest Branch portion of ERP Site SS-63. The LTA Cove portion of ERP Site SS-63 is addressed in the ROD for ERP Site LF-17. Surface water at ERP Site SS-63 does not present a risk to human health and the environment; therefore, no action is required for this medium. The Selected Remedy for ERP Site SS-63 will be the final CERCLA action for sediment at the Site. The general remedial objective at ERP Site SS-63 is to prevent current and future indirect exposure to the COCs in sediment through excavation and disposal of the contaminated material. Once the remedial action is complete, all site-related COCs in sediment would be removed to levels that would no longer present an unacceptable risk to human health or the environment.

2.5 SITE CHARACTERISTICS

Because historical accounts indicate that potentially hazardous materials were released from the Langley AFB storm sewer system, investigations were conducted at ERP Site SS-63 to determine the nature and extent of any potential contamination. The results of these investigations are summarized in Section 2.2. For further information, all of the documents summarized in Section 2.2, and in the site characterization discussion below, can be found in the associated Information Repository and Administrative Record files at the location provided in Section 2.3.

2.5.1 Conceptual Site Model

The source of contamination at ERP Site SS-63 is the PCB and PCT contaminated sediment at the Southwest Branch. The conceptual site models (CSMs) for human health (Figure 2.4) and ecological receptors (Figure 2.5) show potential exposure pathways for ERP Site SS-63. The baseline risk assessment (BLRA) and ERA and the subsequent remedial action objectives (RAOs) for ERP Site SS-63 (see Section 2.8) were based on these CSMs.

2.5.2 Site Overview

ERP Site SS-63 is composed of areas in the Back River system along the shoreline of Langley AFB. Langley AFB is located on a peninsula between the Northwest Branch and Southwest Branch of the Back River, which is a tidal estuary of the Chesapeake Bay. Along the shoreline within Langley AFB, which borders the Southwest Branch, development generally extends to, or near to, the riverbank although a narrow buffer of grassland is present in some locations. Langley AFB operations along the Southwest Branch include airfield and support facilities, research and development facilities, testing facilities, fuel docking and storage facilities, office and storage buildings, military housing, and the Langley AFB Marina.

Surface water and sediment contamination along the Langley AFB shoreline has resulted primarily from activities that occurred on land. Contaminants may have been transported to the river by point source discharges (collection of runoff and discharge through creeks, ditches or pipelines) and non-point source discharges (runoff directly into the river from the land surface) to surface water. Numerous storm water outfalls drain the land area occupied by Langley AFB and are potential conduits for contamination to the river. Other potential sources of contamination not related to Langley AFB include the NASA Langley Research Center, several marinas located along the shores of the Back River, and other developed areas along the tributaries that drain into the watershed. An additional potential source of contamination is discharge of contaminated groundwater from Langley AFB to the river. However, surface water and groundwater modeling studies performed as part of the PA/SI have indicated that groundwater discharge is not likely to contribute significantly to contamination in the Back River, given that groundwater discharge appears to be between 41 and 7,450 times less contaminated than the surface water discharge.

2.5.3 Sampling Strategy

A variety of sediment and biota samples were collected and analyzed to characterize the nature and extent of contamination and potential risks to human health and the environment at ERP Site SS-63 as part of the RI conducted in 2000 (URS, 2003). The RI sample locations are shown in Figure 2.6. The sampling strategy included conducting the following tasks:

- Collection of sediment samples from 30 locations for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, SVOCs, and VOCs).
- Collection of sediment samples from 20 locations for identification and enumeration of benthic macroinvertebrates.

- Collection of sediment samples from 10 locations for a solid-phase sediment toxicity test using *Leptocheirus plumulosus* (benthic invertebrate) and an elutriate toxicity test using *Mysodopsis bahia* (mysid shrimp).
- Collection of surface water samples (total and dissolved) at 10 locations for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, SVOCs, and VOCs).
- Collection of biota samples (sport fish from 10 locations; killifish and bivalves from 12 locations; and crabs [crabmeat and soft tissue] from 6 locations) for chemical analysis (metals, cyanide, pesticides, PCBs, PCTs, chlorinated herbicides, SVOCs, and VOCs).
- Pathologic examination of fish from selected locations.

In July and August 2004, sediment samples were collected along the Southwest Branch to determine whether the PCB/PCT contamination detected in 2000 during the ERP Site SS-63 RI (URS, 2003) had migrated as a result of Hurricane Isabel (which struck Langley AFB in September 2003) and to refine the estimated cost for the potential remedial action. For this investigation, samples were collected from 118 locations in the Southwest Branch of the Back River and analyzed for PCBs and PCTs (URS, 2004). These sample locations are provided in Figures 2.7 and 2.8.

2.5.4 Nature of Contamination and Potential Routes of Migration

This section discusses the nature of contamination and the potential routes of migration based on the data collected during the ERP Site SS-63 RI and July/August 2004 sampling event. To focus discussion on significant analytical results, this section discusses the results for compounds present at concentrations greater than the matrix-specific background upper tolerance limits (UTLs) (Radian, 1997) and/or human health Risk-Based Screening Levels (RBSLs). This section does not discuss the nature of contamination associated with the LTA Cove portion of ERP Site SS-63 because it is addressed in the ROD for ERP Site LF-17.

2.5.4.1 Sediment

Samples collected adjacent to Outfall 4 (current Outfall 7) in the Southwest Branch contained maximum concentrations for many of the organics detected during the ERP Site SS-63 RI (i.e., PAHs, PCBs/PCTs, and pesticides), which also frequently exceeded evaluation criteria. Sediment sample locations around Outfall 4 (current Outfall 7) include SD-10, SD-11, SD-12, TOX-05, TOX-06, and TOX-07. Sediment sampling results are provided in Table 2.1. The next most contaminated location for organics was along the Southwest Branch between the marina and Tide Mill Creek (samples SD-14, SD-15, SD-16, SD-17, and SD-18). Samples collected from the Northwest Branch generally had lower frequency of detection and lower concentrations of organics than samples collected from the Southwest Branch.

Sediment samples collected in July/August 2004 generally had lower concentrations of PCBs/PCTs than those detected during the RI sampling effort. Relatively high concentrations

of PCBs/PCTs were again detected in the general vicinity of Outfall 4 (current Outfall 7). The highest concentration of total PCBs/PCTs (15.2 mg/kg) was detected adjacent to a jet fuel unloading facility north of Outfall 4. Samples from four locations along the Southwest Branch were also analyzed for an expanded list of 52 PCB/PCT congeners. It was noted that 9 out of 13 dioxin-like PCB congeners were detected in sediment from these locations. The sample results for total PCBs/PCTs are provided in Figures 2.7 and 2.8 and in Tables 2.2 and 2.3.

Aluminum, arsenic, chromium, and iron were the most prevalent inorganics exceeding human health criteria from sample locations along the Northwest Branch and Southwest Branch. The higher concentrations of aluminum and chromium were generally detected near Outfall 4 (current Outfall 7) at sample locations SD-10, SD-11, SD-12, TOX-05, TOX-06, and TOX-07. Arsenic concentrations were generally higher at sample locations SD-17 and TOX-09 located near Tide Mill Creek. Iron concentrations were generally higher at sample locations in the Southwest Branch than in the Northwest Branch.

2.5.4.2 Benthic Macroinvertebrate Community Structure

The results of benthic invertebrate identification and enumeration are provided in Table 2.4. Information from this effort did not provide indications of stress due to chemicals in the sediment. Samples from some locations had somewhat lower richness and diversity than others, but these differences were moderate and appeared to be more closely associated with the physical characteristics of the sediment at the sample locations than with the sediment chemistry. Community structure in sediment from some of the more contaminated locations appeared to be healthy based on the community structure analysis, and there was no apparent correlation between sediment chemistry and benthic community structure. These findings were consistent with the results of similar analyses performed as part of the PA/SI for the Back River and indicate that the concentrations of chemicals in the sediment are not high enough to cause disruption of the structure of the benthic macroinvertebrate community.

2.5.4.3 Sediment Toxicity Testing

Toxicity tests using sediment from the Back River and the benthic invertebrate *Leptocheirus plumulosus* did not provide any indication of sediment toxicity. Elutriate toxicity tests using *Mysodopsis bahia* (mysid shrimp) were performed using sediment from the same 10 locations. Results of the elutriate toxicity testing is provided in Table 2.5. One of the 10 samples had a survival rate that was statistically different (lower) than the rate observed in the laboratory control. This sample was not collected from a location where a release of chemicals is known to have occurred. For the endpoint of fecundity (reproductive potential), statistical analysis indicated that there were no differences between any of the Back River samples and the laboratory control. For the endpoint measuring growth, as determined by the weight of the mysid shrimp at the end of the test, statistical analysis indicated that growth of the shrimp was slightly repressed in several samples from the Southwest Branch of the Back River. The repressed growth indicated by these results did not correlate with sediment chemistry at these locations; therefore, a correlation analysis was not performed.

2.5.4.4 Surface Water

Surface water sampling results are provided on Table 2.6. All surface water samples generally had low concentrations of pesticides and inorganics. The results for one or more pesticides exceeded ambient water quality criteria in several samples, including sample SW-04, which was collected near Plum Tree Island National Wildlife Refuge and used as a qualitative reference location. The widespread detection of low levels of pesticides may be due to the normal application of pesticides by base and off-base sources to control mosquitoes and other pests. Several inorganics also exceeded the screening criteria, and SW-04 had the most frequent detection of inorganics that exceeded these criteria.

2.5.4.5 Sport Fish

Ten sport fish samples (i.e., croaker and spot) were collected from various locations in the Northwest Branch and Southwest Branch of the Back River. Results of analysis of these samples are provided in Table 2.7. All the samples contained pesticides and PCBs; PCTs were detected in one sample from the Northwest Branch and in five samples from the Southwest Branch. Sample BIO-05, located between ERP Site WP-02 and Outfall 4 (current Outfall 7), had the highest concentrations of PCBs and PCTs for all sport fish samples. Sample BIO-06, located near Outfall 4 (current Outfall 7), had the second highest PCB/PCT concentration. Arsenic was detected in all samples except for BIO-03, which was the reference location. While chemicals detected in some samples exceeded EPA Region 3 RBSLs (appropriate screening levels for this investigation), Food and Drug Administration (FDA) action levels were not exceeded in any sample.

Bioaccumulation of pesticides, PCBs, and PCTs is occurring in the sport fish. Because sport fish have a large territorial range extending well beyond the Back River, it is difficult to determine how much of the contamination is being contributed from sources other than the Back River and Langley AFB.

2.5.4.6 Crab Sampling

Results of analysis of crab meat and tissue are provided in Table 2.8. The most prevalent elevated chemical concentrations in crabs were from pesticides, PCBs, and arsenic. PCBs were detected in only three samples, which were meat only, while pesticides and arsenic were detected in all meat and total tissue samples. PCTs were not detected in any of the samples. As with the fish samples, the crab samples indicate bioaccumulation of pesticides and PCBs based on higher levels detected in tissue compared to the levels in sediment and surface water samples. However, it is difficult to determine the level of contamination in crabs contributed by sources in the Back River because crabs can have a territorial range extending beyond the Back River estuary.

2.5.4.7 Small Fish

Fundulus (i.e., killifish) were sampled due to their limited territory, and the results would reflect possible contamination from nearby sources. Analytical results for the killifish samples

are provided in Table 2.9. Based on analytical results, PCBs, pesticides, and several inorganics are bioaccumulating within the fish tissue. Analytical results show PCB levels in the fish exceeding EPA Region 3 Fish RBSLs in all samples. The highest concentration of PCBs was detected in sample BIO-9, located near Site LF-05. The second highest PCB concentration was detected in sample BIO-6, which is located near Outfall 4 (current Outfall 7). The pesticides 4,4'-DDD and 4,4'-DDE were detected in all samples at levels exceeding fish RBSLs except for sample location BIO-03, which is the reference location. Several other organics exceeded fish RBSLs in the samples as well. For inorganics, arsenic was detected in all samples with maximum concentration at BIO-03, the reference location. None of the detected concentrations exceeded the FDA action levels for any chemical.

When chemical concentrations in the fish tissue are compared with sediment and surface water samples from their respective locations, the concentrations of pesticides and PCBs are higher in the fish tissue in most cases. Arsenic levels in fish are near that of sediment and higher than surface water levels.

2.5.4.8 Bivalve

Samples from sessile (immobile) organisms, such as oysters and mussels, can reflect contamination levels that may be attributable to nearby sources. Results of analysis of bivalve samples are provided in Table 2.10. The bivalve samples collected from the Back River generally showed elevated levels of bioaccumulative chemicals, which include pesticides, PCBs, and arsenic. PCTs were detected at six locations in both branches of the river at approximately similar concentrations; the highest concentration was at BIO-06 near Outfall 4 (current Outfall 7). PAHs were detected at elevated levels from sample location BIO-04, which is located near a fuel dock that may be contributing to the elevated levels of PAHs.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land use in the Back River watershed (which includes ERP Site SS-63) is primarily a mixture of open space, woodlands, and residential and commercial development. The northern portion of the watershed, which drains into the Northwest Branch, is primarily woodlands, open space and residential. The southern portion of the watershed, which drains to the Southwest Branch, is developed with mostly residential and commercial land use. Portions of Langley AFB are highly developed and support industrial operations. Other portions of the drainage area are intensively developed for residential use. The Back River itself is routinely used for recreational fishing and recreational boating. A less frequent use is training by the Langley AFB Sea Rescue Team. The U.S. Air Force has no plan to change its use of the existing resource in the foreseeable future.

2.7 SITE RISKS

A HHRA and ERA were completed to identify and characterize the current and potential future risks associated with ERP Site SS-63 if no remediation is implemented. The risk assessments provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action.

A detailed discussion of potential risks is provided in the ERP Site SS-63 RI Report (URS, 2003). The RI included both an HHRA and an ERA. The HHRA identified the other worker (Sea Rescue Team trainer), other recreation person (jet ski user), child fisher, and adult fisher as individuals who may be exposed to chemicals in Back River surface water or sediment. A child or adult fisher may be exposed to chemicals in the surface water while catching sport fish, crabs, or bivalves from the Back River. The sport fish, crabs, or bivalves may accumulate in their tissues chemicals present in the surface water or sediment. By eating these tissues, the adult fisher and child fisher may be exposed to the chemicals. The other worker and other recreation person may be exposed to chemicals in the surface water through incidental ingestion of and dermal contact with the water. For all potential human receptors, no complete pathway for direct exposure to sediment was identified.

Exposure scenarios evaluated in the ERA focused on aquatic pathways. Site SS-63 consists of portions of the Northwest Branch and Southwest Branch of the Back River. The shoreline of these water bodies along Langley AFB is generally developed with heaviest shoreline development occurring along the Southwest Branch. Substrate characteristics vary by location, but the substrate tends to be predominantly composed of fine-grained material. Sediment migration patterns are complex and are driven by tidal fluctuations and large storm events which cause significant erosion along the shoreline. Large pieces of concrete rubble have been placed along many portions of the shoreline to prevent erosion during these storm The presence of this debris decreases the quality of the aquatic habitat along the shoreline in these areas. Aquatic receptors considered in the ERA include benthic invertebrates, fish (Atlantic croakers), fish-eating birds (belted kingfisher), and carnivorous mammals (mink). These receptors could be exposed to chemicals in the near-shore sediment through direct contact with, or incidental ingestion of, sediment or ingestion of organisms that have accumulated chemicals in their tissue.

If no further action is taken, there are potential unacceptable human health risks associated with the indirect exposure to chemicals in the sediment through consumption of fish, bivalves, and crabs (fish being the primary exposure route) that have accumulated sediment contaminants in their tissues. There are no unacceptable human health risks associated with direct exposure to surface water or sediment. In addition, the ERA concluded that chemicals in ERP Site SS-63 sediment and surface water were not adversely affecting ecological receptors.

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.7.1 Human Health Risk Summary

2.7.1.1 Chemicals of Potential Concern

The initial screening of the data resulted in identification of a number COPCs for surface water, fish tissue, crab tissue, and bivalve tissue. The COPCs and their associated exposure point concentrations (EPCs) used to estimate the risk are provided in Appendix A.2 and A.3,

respectively. Surface water and tissue COPCs included metals, PAHs, pesticides, PCBs and PCTs. Detailed information for the selection of COPCs at ERP Site SS-63 is provided in Section 6.0 of the RI and Section 4.1 of the Bivalve HHRA Addendum in Appendix L of the RI (URS, 2003).

2.7.1.2 Exposure Assessment

The human health exposure assessment identifies and evaluates the contaminant sources, release mechanisms, exposure pathways, exposure routes, and receptors. The elements of the exposure assessment for ERP Site SS-63 are identified in the CSM (Figure 2.4). A detailed discussion of the exposure assessment for all the scenarios considered in the HHRA is provided in Section 6.2 of the RI Report and Section 4.2 of the Bivalve HHRA Addendum in Appendix L of the RI (URS, 2003). Estimates of risk were developed for ERP Site SS-63, evaluating exposure to surface water and animal tissue for the adult fisher, child fisher, other worker, and other recreational person:

- **Fisher** Child and adult fishers could be exposed to chemicals in surface water while landing fish and crabs. These receptors would also be consumers of fish, crabs, and bivalves from the Back River who may be affected by chemicals present in the animal tissue originating from surface water or sediment.
- Other Worker Sea team rescue trainer (chronic exposure to adult only). This individual is an adult who trains members of the sea rescue team, which practices maneuvers in the Back River. This receptor would be exposed directly to chemicals in the surface water.
- Other Recreational Person Jet ski user (chronic exposure to adolescents [teens] only). This person would ride a jet ski in the Back River and be exposed to surface water. The other recreational person would most likely use the river only during the summer months.

2.7.1.3 Toxicity Assessment

The toxicity assessment provides a numerical estimate of the relationship between the extent of exposure and possible severity of adverse effects, and consists of two steps: hazard identification and dose-response assessment. Most toxicity data used in the HHRA are the EPA toxicity values (noncarcinogenic reference doses [RfDs] and carcinogenic slope factors [CSFs]) published in the Integrated Risk Information System and the Health Effects Assessment Summary Tables databases, or from the EPA's Superfund Technical Support Center of the National Center for Environmental Assessment (NCEA). Toxicity data used in risk evaluations are provided in Appendix A.5 (non-cancer) and Appendix A.6 (cancer). A detailed discussion of the toxicity assessment is provided in Section 6.3 and in Appendix G of the RI Report and in Section 4.3 of the Bivalve HHRA Addendum in Appendix L of the RI (URS, 2003).

2.7.1.4 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated using the following equation:

$$Risk = CDI \times CSF$$

where:

Risk = a unitless probability (e.g., 2 x 10⁻⁶) of an individual's developing cancer

CDI = chronic daily intake averaged over 70 years (milligrams per kilogram of body weight per day [mg/kg-day])

CSF = carcinogenic slope factor, expressed as (mg/kg-day)⁻¹

These risks are probabilities that usually are expressed in scientific notation (e.g., $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure (RME) estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. EPA's generally acceptable risk range for site-related exposures is $1x10^{-6}$ to $1x10^{-4}$.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (i.e., lifetime) with an RfD derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ<1 indicates that a receptor's dose of a single contaminant does not exceed the threshold dose, and that toxic non-carcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all COPCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI>1 indicates that site-related exposures may present a risk to human health. The HQ is calculated as follows:

Non-cancer
$$HQ = CDI/RfD$$

Detailed risk characterization results are provided in Section 6.4 and in Appendix G of the RI Report and in Section 4.4 of the Bivalve HHRA Addendum in Appendix L of the RI (URS, 2003). Risk characterization summaries for total and site-related human health risks are presented in Tables 2.11 through 2.16 and discussed below:

• Other Worker – The RME cancer risk estimate for exposure (ingestion) to surface water was 2×10^{-7} (for both total and site-related risk), which is less than the lower end of the target risk range (1×10^{-6}) to 1×10^{-4} . The total non-

- cancer HI was 0.002 (for both total and site-related risk), which is less than the acceptable level of 1.
- Other Recreational Person The RME cancer risk estimate for exposure (ingestion) to surface water as 2×10^{-7} (for both total and site-related risk), which is less than the lower end of the target risk range $(1 \times 10^{-6} \text{ to } 1 \times 10^{-4})$. The total non-cancer HI was 0.008 (for both total and site-related risk), which is less than the acceptable level of 1.
- Adult Fisher RME risk estimates for exposure (dermal contact and ingestion) to surface water and animal tissue (fish and crabs) resulted in cancer risk estimates of 1 x 10⁻⁸ and 8 x 10⁻⁴, respectively. The RME risk estimate for exposure (ingestion) to bivalve tissue resulted in a cancer risk estimate of 3 x 10⁻⁴. The risks associated with the ingestion pathway exceeded the acceptable risk levels. The total HIs for consumption of fish/crab tissue and exposure to surface water were 5 and 0.0001, respectively. The total HI for the consumption of bivalves was 2. The HIs for consumption exceed the acceptable level of 1. Based on site-related chemicals (i.e., not including background contributions), the adult fisher cancer risk (2 x 10⁻⁴) and non-cancer HI (2) exceeded target levels for consumption of fish and crabs. For consumption of bivalves, the adult fisher cancer risk (6 x 10⁻⁵) and non-cancer HI (1) did not exceed target levels. On a target organ basis, the HIs for the immune system, eyes, and nails exceeded 1. The risks and hazards were due almost entirely to PCBs and PCTs. The primary exposure route was consumption of fish tissue.
- **Child Fisher** RME risk estimates for exposure (dermal contact and ingestion) to surface water and animal tissue (fish and crabs) resulted in cancer risk estimates of 4 x 10⁻⁹ and 2 x 10⁻⁴, respectively. The RME risk estimate for exposure (ingestion) to bivalve tissue resulted in a cancer risk estimate of 7×10^{-5} . The risks associated with the ingestion pathway (fish and crabs) exceeded the acceptable risk levels. The total HI for consumption of fish/crab tissue and exposure to surface water was 6 and 0.0002, respectively. The total HI for the consumption of bivalves was 3. The HIs for consumption exceed the acceptable level of 1. Based on site-related chemicals (i.e., not including background contributions), the child fisher cancer risk (5 x 10⁻⁵) was within the target risk range (10⁻⁶ to 10⁻⁴), but the non-cancer HI (3) exceeded target levels for consumption of fish and crabs. For consumption of bivalves, the child fisher cancer risk (2 x 10⁻⁵) and non-cancer HI (1) did not exceed target levels. On a target organ basis, the HIs for the immune system, eyes, and nails exceeded 1. The hazards were due almost entirely to PCBs. The primary exposure route was consumption of fish tissue.

The risk estimates summarized above are also presented in tabular form in Appendices A.7 through A.10.

In summary, direct exposure to chemicals in the surface water resulted in acceptable risks. The only exposure pathway that resulted in unacceptable risk was indirect exposure to

chemicals in sediment via accumulation in fish, bivalve, and crab tissue (fish being the primary exposure route) and subsequent consumption by humans.

2.7.1.5 Uncertainty

The risk measures used in risk assessments are not fully probabilistic estimates of risk, but are conditional estimates given that a set of assumptions about exposure and toxicity are realized. Thus, it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective. A detailed discussion of the uncertainties associated with the risk assessment is included in Section 6.5 of the RI Report and Section 4.6 of the Bivalve HHRA Addendum in Appendix L of the RI (URS, 2003).

2.7.2 Ecological Risk Summary

2.7.2.1 Chemicals of Potential Ecological Concern

To determine the COPEC for ERP Site SS-63, an ERA was performed using sediment data from both the PA/SI (Radian, 1999) and the RI (URS, 2003) as well as surface water and biota data obtained during the RI. Conservative input values were used during the ERA to calculate HQ values for detected chemicals for each of the receptors considered. The HQs were developed for ecological receptors by dividing maximum and average exposure levels by the No Observed Adverse Effects Levels (NOAELs) and the Lowest Observed Adverse Effects Levels (LOAELs). If the average concentration of a given chemical resulted in a LOAEL HQ greater than 1, then the chemical was identified as a COPEC and evaluated in greater detail. Otherwise, it was determined that the chemical did not pose a threat. The resulting COPECs that were retained for further evaluation are presented in Appendix A.11.

2.7.2.2 Exposure and Ecological Effects Assessment

ERP Site SS-63 consists of areas of sediment along the shoreline of Langley AFB. The Back River supports a wide variety of aquatic organisms and provides important breeding and nursing habitat for many species. The assessment endpoints for SS-63 were chosen based on available habitat and include aquatic benthic invertebrates, estuarine fish, piscivorous birds, and carnivorous mammals. These ecological receptors would have a high level of exposure to sediment. Benthic invertebrates receive continual exposure to sediment, while other ecological receptors are exposed directly to sediment through incidental ingestion or are indirectly exposed through ingestion of prey that may have accumulated chemicals in their tissue through exposure to sediment. Table 2.17 presents the ecological exposure pathways of concern for ERP Site SS-63, including receptors, exposure routes, and assessment and measurement endpoints.

The ecological exposure assessment evaluated the potential exposure pathways associated with the Site and developed the following list of potential receptors: benthic invertebrates (bivalves), Atlantic croaker (fish), belted kingfisher (bird), and mink.

2.7.2.3 Ecological Risk Characterization

To characterize potential ecological risks, HQs were determined for the COPECs and receptors. HQs were calculated by comparing maximum and mean site concentrations to the associated NOAEL and LOAEL:

NOAEL/LOAEL HQ = (Mean or Maximum Total Daily Dose)/(NOAEL or LOAEL)

For each receptor, the ERA calculated a maximum NOAEL HQ, a mean NOAEL HQ, a maximum LOAEL HQ, and a mean LOAEL HQ for each COPEC. If one of these four HQ values was less than 1, then the risk assessment concluded that the chemical had minimal potential to pose a risk to that particular receptor. Because LOAEL HQs are less than NOAEL HQs, the LOAEL HQs dictated whether a chemical was identified as having the potential to pose a risk to a given receptor. If a chemical was identified as posing a potential risk, then the risk assessment considered additional lines of evidence in order to characterize the potential risk.

For benthic invertebrates exposed to sediment, the mean concentrations of two SVOCs (anthracene and dibenzo[a,h]anthracene), one PCT, one PCB, and six pesticides resulted in LOAEL HQs greater than 1. These analytical results, which indicated the potential for adverse effects to benthic invertebrates, were not supported by indicators of actual stress (community structure analysis) or direct measurement of stress (toxicity testing). At 20 locations, the structure of the benthic macroinvertebrate community was assessed through identification and enumeration of benthic organisms. This analysis indicated that differences in richness and diversity among the sample locations were related to the physical characteristics of the sediment, not the sediment chemistry. Sediment toxicity testing was performed with two different organisms: an amphipod (Leptocheirus plumulosus) and a mysid shrimp (Mysidopsis bahia). There was no evidence of decreased survival due to exposure of Leptocheirus plumulosis to the site sediment. The mysid shrimp were tested for fecundity and growth in addition to survival. No adverse effects on fecundity were observed. While one sample did showed reduced survival, it was collected from an area of no known release. Five samples exhibited decreased mysid shrimp growth. The repressed growth indicated by these results did not correlate with sediment chemistry at these locations; therefore, a correlation analysis was not performed. Based on these additional lines of evidence, it was determined that chemicals in the sediment near Langley AFB are not adversely affecting the benthic invertebrate community in the Back River.

For Atlantic Croakers exposed to surface water and sediment, concentrations of 13 metals, 16 SVOCs, 7 pesticides, and 7 PCBs/PCTs resulted in mean LOAEL HQs greater than 1.0. As with the benthic invertebrates, the Atlantic Croaker HQs were evaluated in light of other indicators of stress to the fish community. Tissue analysis of sport fish and small fish indicated that SVOCs were not accumulating in fish tissue. Samples of large fish from two locations characterized by high chemical concentrations in sediment and from one reference location (i.e., not contaminated), were examined for signs of stress. During examination, specific attention was given to the tissues and organs typically affected by the chemicals detected in the tissue of the fish samples. Results of these examinations indicated that the fish

appeared to be healthy and did not exhibit any signs of stress or abnormalities. These additional lines of evidence indicate that fish are not adversely affected by chemicals in the site sediment or surface water.

For fish-eating birds (belted kingfisher), the mean concentrations of phenol and 2-(2-methyl-4-chlorophenoxy) propionic acid (MCPP) detected in fish tissue resulted in LOAEL HQs greater than 1. MCPP, which had the highest HQ value at 131, was detected in only one of the three dietary components (killifish) for the kingfisher. In addition, MCPP was detected in only one of the 12 samples of killifish tissue analyzed.

For semi-aquatic carnivorous mammals (mink), only dibenzofuran had a mean LOAEL HQ greater than 1. Dibenzofuran was detected in only one of 41 sediment samples.

These low frequencies of detection indicate that the HQs for MCPP and dibenzofuran may be overstating the actual risk to ecological receptors. In addition, calculation of the HQ values assumes that the kingfisher and the mink forage exclusively along the shoreline of Langley AFB. In reality, the actual foraging area may include areas that are not associated with Langley AFB or ERP Site SS-63. Based on these factors, it was determined that there was minimal potential for adverse effects to fish-eating birds and semi-aquatic carnivorous mammals exposed to surface water and sediment.

Additional ecological risk analysis was performed as part of the FS. To assess the potential for adverse effects to small fish (e.g., killifish, mummichogs), fish tissue concentrations of PCBs and PCTs were compared to a toxicity reference value (TRV) developed from data provided by EPA Region 3 Biological Technical Advisory Group. PCTs were not detected in the small fish tissue samples collected during the RI, and the maximum PCB concentration was less than the TRV. Based on this analysis, it was concluded that current concentrations of PCBs and PCTs in the Back River sediments do not pose an unacceptable threat to small fish.

2.7.2.4 Uncertainty

The results of the ERA are influenced to some degree by variability and uncertainty, which need to be considered when interpreting results. Major sources of uncertainty include natural variability, and incomplete knowledge of site-specific biological processes and fate and transport mechanisms. A detailed discussion of the uncertainties associated with the ERA is included in Section 7.5 of the RI Report (URS, 2003).

2.8 REMEDIAL ACTION OBJECTIVES

It is the current judgment of the U.S. Air Force and EPA Region III, in consultation with VDEQ, that the Selected Remedy is warranted to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances in sediment at ERP Site SS-63. Based on the anticipated future use for the area and the findings as documented in the RI and FS Reports, including the results of the HHRA and ERA, site-specific RAOs were developed to address the sediment contamination at ERP Site SS-63.

Based on the HHRA and ERA, there are no unacceptable risks associated with direct exposure to surface water or sediment. The only exposure pathway that posed an unacceptable risk was indirect exposure to chemicals in the sediment through consumption of fish, bivalves, and crabs (fish being the primary exposure route) that had accumulated sediment contaminants in their tissues. The way to decrease PCB and PCT concentrations in tissue is to decrease their concentrations in the sediment. Accordingly, RAOs were developed to reduce the levels of PCBs and PCTs observed in site sediment to levels that minimize bioaccumulation of those contaminants by fish, bivalves, and crabs, the consumption of which pose unacceptable risks to human health.

The ERP Site SS-63 RAOs include the following:

- Eliminate indirect exposure to sediment containing PCBs/PCTs at concentrations that pose an incremental cancer risk greater than 1x10⁻⁴.
- Eliminate indirect exposure to sediment containing PCBs/PCTs at concentrations that pose a target organ HI greater than 1.

To achieve the above RAOs, specific remedial goals were developed for PCBs and PCTs in sediment that would be protective of individuals consuming fish, bivalves, and crabs (fish being the primary exposure route) caught at the Site. Section 3.0 of the FS details how remedial goals were calculated. The sediment concentrations determined to be protective of the range of adult/child fisher exposure scenarios are summarized below.

- Recreational Freshwater Angler (fish consumption is 1/2 of total seafood ingested) = 1.7 mg/kg total PCBs/PCTs
- Recreational Freshwater Angler (fish consumption is 1/3 of total seafood ingested) = 2.8 mg/kg total PCBs/PCTs
- Recreational Marine Angler (fish consumption is 1/2 of total seafood ingested) = 2.6 mg/kg total PCBs/PCTs
- Recreational Marine Angler (fish consumption is 1/3 of total seafood ingested) = 4.0 mg/kg total PCBs/PCTs

The remedial goal selected was 1.7 mg/kg total PCBs/PCTs in sediment, the concentration protective of the most conservative exposure scenario.

2.9 DESCRIPTION OF ALTERNATIVES

2.9.1 Remedial Alternatives

Remedial alternatives to address sediment at ERP Site SS-63 are detailed in the FS. The alternatives evaluated are:

- Alternative No. 1 No Action (Natural Recovery)
- Alternative No. 2 Manage Waste in Place Monitoring
- Alternative No. 3 Mechanical Dredging with Off-Site Disposal
- Alternative No. 4 Dry Excavation with Off-Site Disposal
- Alternative No. 5 Capping

2.9.1.1 Alternative No. 1 – No Action (Natural Recovery)

The No Action alternative is included in accordance with the NCP to serve as a baseline for comparison with other alternatives. Under the No Action alternative, ERP Site SS-63 would be left as is. There is no cost for this alternative, and the timeframe is unlimited.

2.9.1.2 Alternative No. 2 - Manage Waste in Place - Monitoring

This is a risk management alternative that involves leaving the contaminated sediment in place and collecting additional information over time to evaluate whether natural processes may contain, destroy, or otherwise reduce bioavailability of the contaminants. For example, natural deposition of sediment may result in development of a "cap" over areas of elevated PCB/PCT concentrations, decreasing the levels to which aquatic organisms are exposed, and thus decreasing potential bioaccumulation.

A long-term monitoring (LTM) program would be included as part of this alternative, which addresses PCB/PCT concentrations in sediment and biota in portions of the Southwest Branch. Monitoring would include annual sampling of sediment, shellfish, and killifish for PCBs/PCTs. After 5 years of monitoring, an evaluation would be made regarding whether additional monitoring needs to be performed or if the monitoring program can be terminated (i.e., PCB/PCT concentrations in sediment below the remediation goal).

For this alternative, the estimated present worth cost is \$353,000. It would take an estimated 3 months to implement this alternative.

2.9.1.3 Alternative No. 3 - Mechanical Dredging with Off-Site Disposal

This alternative involves mechanical dredging and off-site disposal of sediment from portions of the Southwest Branch characterized by total PCB/PCT sediment concentrations above the remedial goal. With the remedial goal of 1.7 mg/kg total PCBs/PCTs and an assumed dredging depth of 1 foot, it is estimated that this alternative will remove 1,693 cubic yards of sediment from the Southwest Branch of the Back River. The proposed remediation areas are shown in Figure 2.9.

The mechanical dredging would be accomplished using an environmental clamshell dry dredge. This dredging technology is desirable because it does not require large volumes of water to transport sediment from the river bottom to the land. In addition, it has been shown to have high contaminant removal efficiencies, low sediment resuspension, and low overall

cost when compared to other dredging techniques. The dry dredge uses a boom-mounted, sealed clamshell bucket to remove sediment from the river bottom. This procedure occurs at low speed, which minimizes sediment resuspension and water quality degradation. Although mechanical dredging will disrupt the benthic habitat, this technique's impact will be less severe than the habitat disruption caused by hydraulic dredging. Sediment resuspension will be contained by use of one or more silt curtains, which will be installed to isolate the work areas from the rest of the Back River during dredging activities. Although these silt curtains may not completely eliminate the release of suspended material to other parts of the river, they will significantly reduce the magnitude of such releases.

A resuspension monitoring program would be developed for dredging activities at the Site. A performance standard would be developed for local disturbance and downstream transport of PCBs/PCTs and other critical water quality parameters. Based on the characterization results, the water would be managed in accordance with the substantive requirements of the Clean Water Act and the Virginia Pollution Discharge Elimination System Permit regulation. This approach would ensure compliance with water quality standards and provide a means of notifying the public in the event of a release.

The sediment removed by the sealed clamshell would be deposited into an on-board hopper or barge for transfer to an on-shore staging area. The only water removed during the dredging process is water naturally present in the sediment's pore spaces. Water that separates from the sediment would be containerized on shore and managed in accordance with the substantive requirements of the Clean Water Act and the Virginia Pollutant Discharge Elimination System Permit regulation.

Dredged and dewatered sediment would be characterized and disposed of in accordance with the Virginia Solid Waste Management regulations. The Southwest Branch dredged areas would not be backfilled. Natural processes would in time fill in the excavation areas.

If this alternative is implemented, the primary source of PCBs/PCTs in the sediment would be removed. The dredging alternative includes construction and operational monitoring during implementation operations. Monitoring requirements would include water quality monitoring at the dredge site, monitoring of dredging residuals, monitoring of decant treatment effluent, and potential evaluation of air quality during dredging, transport and disposal. The effectiveness of containment structures used during dredge operations would be evaluated by assessing suspended solids both inside and outside of the structure.

During implementation of this alternative, there would be potential for fine particles to be suspended and released from the dredging areas; therefore, LTM of post-dredging conditions would be conducted to ensure that the areas are not re-contaminated by disturbance of any residuals that may remain above cleanup levels. Monitoring would include annual sampling of sediment, shellfish, and killifish for PCBs/PCTs. Sample locations would be strategically located to provide data that are representative of conditions within the remediation areas. After 5 years of monitoring, an evaluation would be made regarding whether additional monitoring is required or if the monitoring program can be terminated.

For this alternative, the estimated present worth cost is \$952,000. Operation and maintenance (O&M) costs associated with this alternative are \$206,000 and remedial action costs are \$746,000. It would take an estimated 6 months to implement this alternative.

2.9.1.4 Alternative No. 4 – Dry Excavation with Off-Site Disposal

This alternative involves dry excavation and disposal of sediment from portions of the Southwest Branch characterized as containing total PCB/PCT sediment concentrations above the remedial goal. With the remedial goal of 1.7 mg/kg total PCBs/PCTs, and an assumed dredging depth of 1 foot, it is estimated that this alternative would remove 1,693 cubic yards of sediment from the Southwest Branch of the Back River. The remediation areas are shown in Figure 2.9.

Dry excavation of the sediment would begin after the contaminated areas are isolated and dewatered (prior to dewatering, authorization from the VDEQ Tidewater Regional Office would be required). To accomplish this, temporary coffer dams would be constructed around the areas identified for remedial action. It is estimated that approximately 1,900 feet of dam would be required. The dams would be constructed with a minimum of 2 feet of freeboard to account for tidal fluctuations and storm events. Prior to installation of the coffer dams, preconfirmation sediment samples would be collected and analyzed for PCBs/PCTs. These data would be used to confirm the lateral and vertical extent of the contamination above the remedial goal (1.7 mg/kg total PCBs/PCTs) and to assist in the placement of the dams.

After removal of standing water within the isolated areas, the sediment would be excavated using conventional earthmoving equipment (e.g., backhoe). The sediment would be deposited into a mobile hopper and transferred via conveyor belt to an on-shore staging area. The only water removed during the excavation process is water naturally present in the sediment's pore spaces. Water that separates from the sediment would be containerized on shore and managed in accordance with the substantive requirements of the Clean Water Act and the Virginia Pollutant Discharge Elimination System Permit regulation.

Excavated and dewatered sediment would be characterized and disposed of off-site in accordance with the Virginia Solid Waste Management regulations. The Southwest Branch dredged areas would not be backfilled. Natural processes would in time fill in the excavation areas.

If this alternative is implemented, PCBs/PCTs in Southwest Branch sediment above the remedial goal would be removed. Therefore, LTM of the post-excavation conditions would not be required because dry excavation of contaminated sediment is more complete and there are no contaminant losses through resuspension.

For this alternative, the estimated present worth capital cost is \$821,000. There are no O&M costs. It would take an estimated 6 months to implement this alternative.

2.9.1.5 Alternative No. 5- Capping

This alternative involves installing a submerged cover system that creates a barrier to contaminant migration from the underlying sediments to the water column and to bioturbation. Capping would be performed across areas characterized by total PCB/PCT sediment concentrations greater than 1.7 mg/kg (Figure 2.9.). It is estimated that 45,700 square feet of sediment in the Southwest Branch would require capping.

Typical cap materials include soil, sand, gravel, cobbles, clay, geotextile fabrics, and combinations of these materials. Typical cap construction consists of a geotextile fabric overlying the contaminated sediment. A layer of sand, gravel, or similar material overlies the fabric. A second tier of geotextile fabric separates the sand or gravel from an overlying armor material, such as stone or cobble. The constructed thickness of a typical submerged cap is approximately two to three feet. If chosen as a final remedy, methods for cap construction and isolation of resuspended/displaced sediments would be designed and implemented consistent with current technology and standards such that secondary releases are minimized during and following construction.

Bathymetric survey maps and field observations indicate that the depth of the river bottom in near-shore portions of the Southwest Branch ranges from 0.5 feet (at the shore) to 4-5 feet (approximately 100 feet offshore). The shallow nature of the river in this area will restrict the vertical extent (i.e., thickness) of the submerged cap and would require that cap construction occur from the land. It is assumed that an installed cap must maintain some portion of the water column above it to encourage aquatic and benthic communities to reestablish themselves in the capped portion of the river. In order to facilitate this goal, the submerged cap in the Southwest Branch would consist of a geotextile fabric overlying the PCB/PCT-contaminated sediments. The geotextile fabric would be covered with 6 to 12 inches of cobble or quarried riprap stone to weigh down the fabric and armor the cap against storm events. Once in place, the geotextile portion of the cap would prevent sediment contaminated with PCBs/PCTs from reentering the water column and would prevent direct exposure of benthic organisms to the contaminated sediment. These measures would minimize the potential for accumulation of PCBs/PCTs in the tissues of bivalves, crabs, and receptors farther up the food chain (sport fish).

Land use controls (LUCs) would be implemented in the form of access restrictions to protect the cap integrity. A monitoring program would be implemented to annually inspect the submerged cap and verify its integrity. Monitoring would consist of physical inspection of the cap materials, in-place thickness, and sediment resuspension to verify that the stone armor material is remaining intact. Any detected damage would be promptly corrected to ensure continued protection. Additional LTM of cap integrity would include evaluation of recolonization, chemical and physical isolation, and possibly periodic integrity inspections following severe weather events. Cap maintenance needs would be evaluated based on periodic inspections.

In addition to the cap inspections, sediment and biota samples would be collected as part of the LTM program. Monitoring would include annual sampling of sediment, shellfish, and killifish

for PCBs/PCTs. After 5 years of monitoring, an evaluation would be made regarding whether to continue or to terminate the monitoring program.

For this alternative, the estimated present worth cost is \$1,183,000. O&M costs associated with this alternative are \$264,000 and remedial action costs are \$919,000. It would take an estimated 6 months to implement this alternative.

2.9.2 Common Elements and Distinguishing Features

Neither Alternative No. 1 nor Alternative No. 2 includes an engineered action to prevent exposure. However, unlike Alternative No. 1, Alternative No. 2 provides monitoring to evaluate whether conditions are changing or remaining constant. Over time, natural processes may contain, destroy, or otherwise reduce bioavailability of the contaminants.

Alternative Nos. 3 and 4 involve the physical removal and off-site disposal of the contaminated sediment. Alternative No. 4 relies on dry excavation of the sediment, while Alternative No. 3 uses dredging. During dredging, there is potential for fine particles to be suspended and released from the dredging area to the rest of the Back River. For this reason, LTM of dredged sites is required. With the dry excavation, there is no potential for the fine particles to be suspended and migrate away from the Site during remedial activities. Therefore, LTM is not required for dry excavated areas. In summary, Alternative No. 3 would require LTM, while Alternative No. 4 would not.

Alternative No. 5 is the only remedial alternative to use a cap to minimize exposure of ecological receptors to the PCB and PCT contamination. Because the integrity of the cover could degrade with time, LTM is required for this alternative.

Alternative Nos. 3, 4, and 5 have similar implementation times, estimated to be approximately 6 months.

2.9.3 Expected Outcomes of Each Alternative

The U.S. Air Force currently has no planned alternate use for ERP Site SS-63 regardless of whether the contaminants are contained or removed. If Alternative No. 2 was implemented, no reduction in exposure to humans would result. If Alternative Nos. 3 and 4 were implemented, exposure would be controlled through off-site disposal of impacted sediment. If Alternative No. 5 were implemented, exposure would be controlled through containment; however, LUCs (e.g., monitoring of cap) would be required in the absence of additional action.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. A comparative analysis of the alternatives against the nine evaluation criteria is discussed below and presented in Table 2.18.

2.10.1 Threshold Criteria

2.10.1.1 Overall Protection of Human Health and the Environment

Alternative No. 3 (Mechanical Dredging and Off-Site Disposal) and Alternative No. 4 (Dry Excavation with Off-Site Disposal) are the most protective of human health. Both alternatives effectively eliminate the primary source of PCBs/PCTs in the sediment in the Southwest Branch. Alternative No. 5 (Capping) protects human health by establishing a physical barrier to PCB/PCT contaminant bioaccumulation. Under Alternative No. 5, the sources of PCBs/PCTs are not removed, but are covered to minimize bioaccumulation by aquatic organisms.

Alternative No. 2 (Manage Waste in Place – Monitoring) is less protective than Alternative Nos. 3, 4, and 5 because it neither removes the source of PCBs/PCTs nor eliminates the exposure pathway. However, Alternative No. 2 manages the potential risk to human receptors from fish consumption by assessing reduction of PCB/PCT bioavailability through natural processes. Although this alternative provides no reduction of volume, mobility, or toxicity of the contaminants, it would allow an evaluation to be made of whether PCBs/PCTs are moving up the food chain to higher trophic levels.

Alternative No. 1 (No Action) is not protective of human health or the environment and does not manage the potential risk for bioaccumulation. Alternative No. 1 is not considered further.

2.10.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative Nos. 2, 3, 4, and 5 would comply with Applicable or Relevant and Appropriate Requirements (ARARs). During implementation of Alternative Nos. 3, 4, and 5, control measures would be implemented to minimize the potential for short-term water quality degradation attributable to resuspension of affected sediments. Wetland and floodplain issues would be considered and mitigated, as needed, in accordance with the conditions of the Clean Water Act 404 permit and Clean Water Act 401 certification programs. The Virginia Board of Game and Inland Fisheries and the National Fish and Wildlife Service would be consulted, as needed, to ensure that impacts to listed and protected species are minimized.

2.10.2 Primary Balancing Criteria

2.10.2.1 Long-Term Effectiveness and Performance

Alternative Nos. 3 and 4 would effectively and permanently eliminate the potential for bioaccumulation by eliminating sediment with PCBs/PCTs above cleanup goals. Alternative No. 4 would ensure the most complete removal of contaminated sediments and no contaminant losses through re-suspension; therefore, no LTM of post-excavation conditions would be required, while Alternative No. 3 would require LTM of sediment to ensure that the area is not re-contaminated by re-suspension of any residuals that may remain above cleanup levels.

Alternative No. 5 would prevent contaminant bioaccumulation by providing a physical barrier between the contamination and the aquatic organisms. However, Alternative 5 provides less long-term effectiveness than Alternative Nos. 3 and 4 because sediment containing PCB/PCT remains in place. A physical monitoring program would need to be implemented to inspect the submerged cap and verify its integrity. Any detected damage would need to be corrected promptly to ensure continued protection.

Alternative No. 2 would not address bioaccumulation in a direct or permanent manner but would allow the extent of bioaccumulation to be monitored. Alternative No. 2 would not be as effective as Alternative Nos. 3, 4, and 5.

2.10.2.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative Nos. 3 and 4 provide the greatest reduction in mobility, toxicity, and volume of PCBs/PCTs in sediment at the site through removal. Alternative No. 5 would reduce the mobility of contaminated sediments in the Southwest Branch. However, this alternative would not reduce contaminant toxicity or volume and would therefore rank lower than Alternative Nos. 3 and 4 with respect to these criteria.

Alternative No. 2 would not provide any reduction in contaminant toxicity, mobility, or volume.

2.10.2.3 Short-Term Effectiveness

Alternative No. 2 could be implemented immediately and would not result in any risk to the local community or the environment. A very low potential exists for exposure of workers involved in annual sediment and biota sampling events. This exposure potential is very limited and could be controlled by using approved methods for sample collection and analysis including implementation of a health and safety plan and use of appropriate personal protective equipment.

Alternative Nos. 3, 4, and 5 could be completed within a reasonable period of time. For these alternatives, any potential short-term risk to workers involved in implementation can be minimized if workers utilize appropriate personal protective equipment and adhere to health and safety protocols. There would be some degree of disruption to the local community, as transportation of materials would require additional heavy vehicle traffic, and portions of Back River would be temporarily closed to boating and fishing. The aquatic habitat in the areas being remediated would be affected during implementation; however, the effects are expected to be temporary.

2.10.2.4 Implementability

Alternative No. 2 could be readily implemented because the only action required would be annual monitoring at a limited number of locations.

Alternative Nos. 3 and 4 could be implemented using readily available equipment and contractors; however, shallow water may increase the difficulty of execution of clamshell dredging in Alternative No. 3.

Alternative No. 5 could be implemented using readily available equipment and contractors; however, shallow water would restrict the vertical extent (i.e., thickness) of the submerged cap in Alternative No. 5, requiring that cap construction occur from the land. Implementation of the access restrictions associated with Alternative No. 5 may be difficult because the restricted area is not under the control of Langley AFB.

All of the active remedial alternatives would require staging of personnel and equipment in portions of Langley AFB along the Back River shoreline. The technologies to be used to perform the action are well proven and could be successfully implemented with relative ease.

2.10.2.5 Cost

The estimated cost of Alternative No. 2 is \$353,000. Of the remaining alternatives, which entail active remedial actions, Alternative No. 4 is the least expensive option on an estimated present-worth basis (\$821,000). Alternative No. 3 is the next estimated least costly option (\$952,000), and Alternative No. 5 is estimated as the most expensive option (\$1,183,000) on a present-worth basis.

2.10.3 Modifying Criteria

2.10.3.1 State Acceptance

State involvement has been solicited throughout the CERCLA process and remedy selection. The VDEQ as the designated state support agency in Virginia has reviewed this ROD and concurs with the Selected Remedy.

2.10.3.2 Community Acceptance

A public meeting was held on January 8, 2008, to present the Proposed Plan for ERP Site SS-63 and answer any questions on the Proposed Plan and on the documents in the information repository. There were no questions or concerns raised at the meeting. No written comments, concerns, or questions were received by the U.S. Air Force, the EPA, or the Commonwealth of Virginia during the public comment period for the Proposed Plan from December 16, 2007 through January 15, 2008.

2.11 PRINCIPAL THREAT WASTES

The NCP establishes an expectation that USEPA will use treatment to address the principal threats posed by a site whenever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Historic data for Site ERP Site SS-63 indicated that the site received point and non-point source discharges from LAFB, but no principle threat wastes were identified during

previous investigations. Once the remedial action is complete, all site-related COCs in sediment would be removed to a concentration that would allow for unlimited use and unrestricted exposure at the Site under this CERCLA action. The use of the term unlimited use and unrestricted exposure in this ROD does not supersede the existing Virginia Department of Health condemnations or advisories pertaining to shellfishing, fishing, or recreation in the Back River and several of its tributaries including the Northwest Branch and Southwest Branch.

2.12 SELECTED REMEDY

This section presents the basis for the selection of the remedy, a description of the remedy, and the expected outcome of the remedy.

2.12.1 Selected Remedy

The Selected Remedy for the ERP Site SS-63 LTA Cove is dry excavation with off-site disposal. This remedy was identified as Alternative No. 4 in the FS (HGL, 2006).

2.12.1.1 Summary of the Rationale for the Selected Remedy

Based on the evaluation of the balancing criteria, the Selected Remedy for closure of ERP Site SS-63 is Alternative No. 4 - Dry Excavation with Off-Site Disposal. This remedy was selected over the other alternatives because it provides the best balance in order to achieve protection of human health and the environment and compliance with ARARs. The Selected Remedy provides a long-term effective and permanent solution for protection of human health and the environment at a reasonable cost. Implementation of the Selected Remedy will meet the RAOs listed in Section 2.8 of this ROD.

Based on current information, the U.S. Air Force, EPA, and VDEQ believe the Selected Remedy for ERP Site SS-63 is protective of human health and the environment, complies with ARARs, is a permanent, cost-effective remedy, and provides the best balance with respect to the nine evaluation criteria.

2.12.1.2 Description of the Selected Remedy

The Selected Remedy addresses the medium of concern (sediment in the Southwest Branch) and comprises the final CERCLA remedial action for the Site. ERP Site SS-63 surface water poses no risk to human health or the environment; therefore, no action is required. The U.S. Air Force is responsible for and shall implement, operate, maintain, monitor, review, and enforce the Selected Remedy in accordance with CERCLA and the NCP to ensure protection of human health and the environment for the duration of the remedy. Once the remedial action is complete, all site-related COCs in sediment would be removed to levels that would no longer present an unacceptable risk to human health or the environment.

2.12.1.2.1 Remedy Objectives

The objectives of the remedy are as follows:

- Eliminate indirect exposure to sediment containing PCBs/PCTs at concentrations that pose an incremental cancer risk greater than 1x10⁻⁴.
- Eliminate indirect exposure to sediment containing PCBs/PCTs at concentrations that pose a target organ HI greater than 1.

2.12.1.2.2 Remedy Implementation

Dry excavation of the sediment would begin after the contaminated areas shown on Figure 2.9 are isolated and dewatered (prior to dewatering, authorization from the VDEQ Tidewater Regional Office would be required). To accomplish this, temporary dams would be constructed around the areas identified for remedial action. It is estimated that approximately 1,900 feet of dam would be required. The dams would be constructed with a minimum of 2 feet of freeboard to account for tidal fluctuations and storm events. Based on a remedial goal of 1.7 mg/kg total PCBs/PCTs, the amount of sediment that would require removal is estimated to be 1,693 cubic yards.

After removal of standing water within the isolated areas, the sediment would be excavated using conventional earthmoving equipment (e.g., backhoe). The sediment would be deposited into a mobile hopper and transferred via conveyor belt to an on-shore staging area. The only water removed during the excavation process is water naturally present in the sediment's pore spaces. Water that separates from the sediment would be managed in accordance with the substantive requirements of the Clean Water Act and the Virginia Pollutant Discharge Elimination System Permit regulation. The decant water would be containerized on shore and, at a minimum, sampled for PCBs/PCTs, dissolved oxygen, pH, temperature, and total suspended solids. Based on the characterization results, the water would be treated as necessary and discharged back into the river.

Excavated and dewatered sediment would be characterized and disposed of off-site in accordance with the Virginia Solid Waste Management regulations. The Southwest Branch dredged areas would not be backfilled. Natural processes would in time fill in the excavation areas.

No LTM would be required subsequent to the removal action. The use of dry excavation would ensure that the remediated areas would not become re-contaminated due to suspension and deposition of contaminated particles. Once removal is complete, sediments remaining at the Site would no longer be contaminated at levels that pose an unacceptable risk to human health. Because the source of risk will have been eliminated by the removal action, LUCs under this ROD would not be required, although any existing Virginia Department of Health condemnations or advisories pertaining to shellfishing, fishing, or recreation in the Back River and several of its tributaries including the Northwest Branch and Southwest Branch would remain in effect.

2.12.1.3 Summary of the Estimated Selected Remedy Costs

The information in the attached cost estimates are based on the best available information regarding the anticipated scope of the Selected Remedy. Changes in the cost estimate may occur as a result of new information and data collected during development of the remedial design of the Selected Remedy. Major changes will be documented in the form of a memorandum in the Administrative Record file. This is an order of magnitude engineering cost estimate that is expected to be within +50 percent to -30 percent of the actual project costs.

The total present-worth costs are \$821,000 for the Selected Remedy. The estimated costs for the Selected Remedy are detailed in Table 2.19. It would take an estimated 6 months to implement the Selected Remedy.

2.12.1.4Expected Outcomes of the Selected Remedy

The Selected Remedy will meet the RAOs and site related contamination would be reduced to levels that would no longer present an unacceptable risk to human health or the environment. Because the source of risk will have been eliminated by the removal action, LTM and LUCs would not be required, although any existing Virginia Department of Health condemnations or advisories pertaining to shellfishing, fishing, or recreation in the Back River and several of its tributaries including the Northwest Branch and Southwest Branch would remain in effect. Attainment of RAOs at ERP Site SS-63 is expected to require 6 months.

2.13 STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the Selected Remedy must be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The following discussion summarizes the statutory requirements that are met by the Selected Remedy for sediment in the ERP Site SS-63 Southwest Branch.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy is protective of human health and the environment by preventing exposure through removal and off-site disposal of PCB/PCT contaminated sediment. The Selected Remedy does not pose unacceptable short-term risk.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements and To-Be-Considered Criteria

The Selected Remedy will meet the Federal and State ARARs presented herein. There are no ARARs that the remedy will not meet. Federal and state ARARs are summarized by classification (chemical-specific, location-specific, and action-specific) in Appendix B.

2.13.3 Cost-Effectiveness

The Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness (40 CFR Section 300.430(f)(1)(ii)(D))." This determination was accomplished by evaluating the overall effectiveness of the alternatives that satisfied the threshold criteria. Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to represent a reasonable value for the money to be spent. The estimated present-worth cost of the Selected Remedy is \$821,000. The Selected Remedy is cost-effective because it provides protection of human health and the environment in the shortest timeframe and at the lowest cost of those remedies that satisfy ARARs and RAOs.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The U.S. Air Force and EPA determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at ERP Site SS-63. VDEQ concurred with this determination. No principal threat wastes have been identified at the Site, and treatment of the contaminated sediment is not practicable in a cost-effective manner because of the large volume of waste. Since long-term effectiveness and permanence are achieved in the shortest timeframe with the Selected Remedy, the U.S. Air Force, EPA, and VDEQ determined that the Selected Remedy provides the best balance of tradeoffs in terms of the balancing criteria, while also considering the statutory preference.

2.13.5 Preference for Treatment as a Principle Element

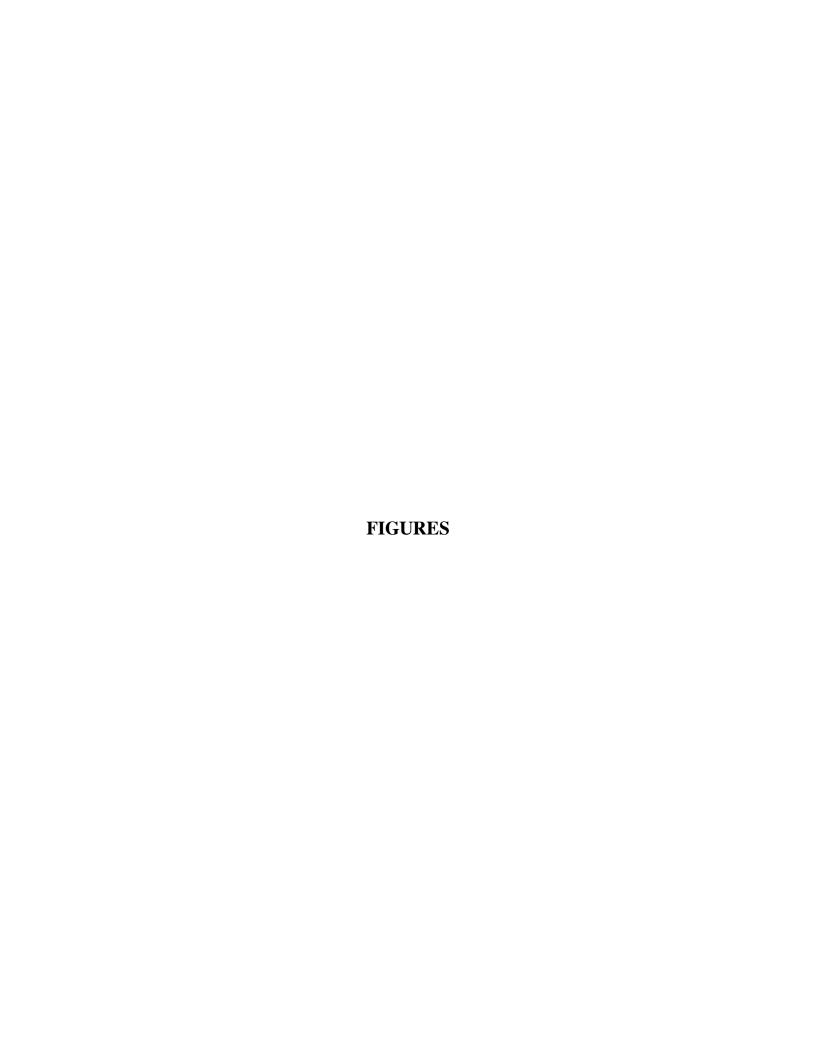
The statutory preference for remedies that employ treatment as a principal element will not be satisfied at ERP Site SS-63. However, no principal threat wastes have been identified at ERP Site SS-63; therefore, the requirement for treatment as a principal element of the remedy is not applicable.

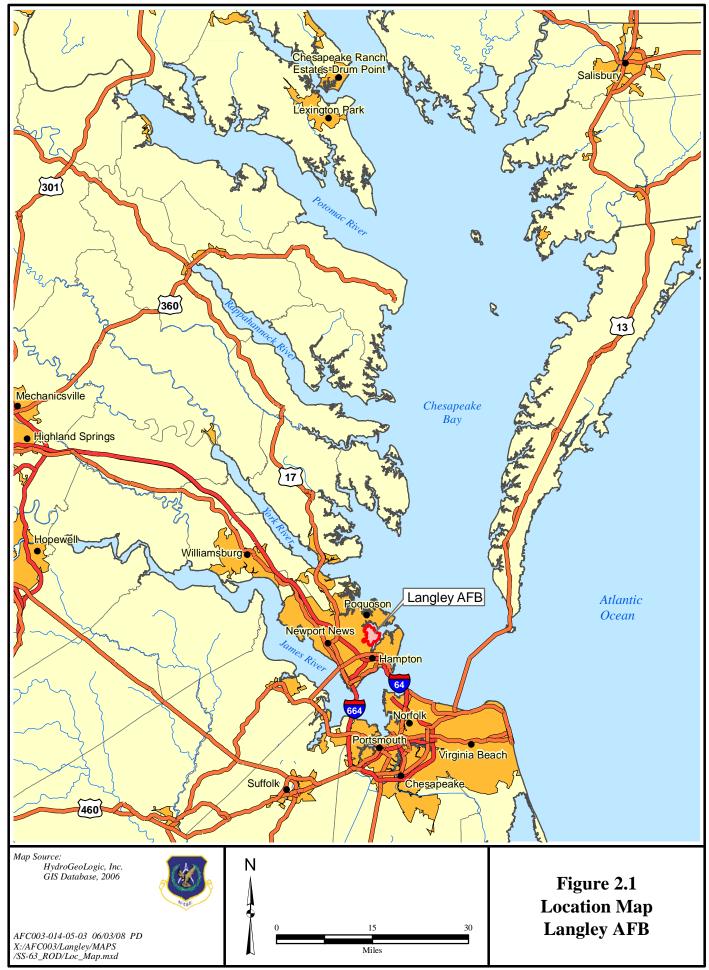
2.13.6 Five Year Review Requirements

Because the Selected Remedy will not result in site-related pollutants or contaminants remaining on-site above levels that would present an unacceptable risk to human health or the environment, a 5-year review will not be required for this remedial action.

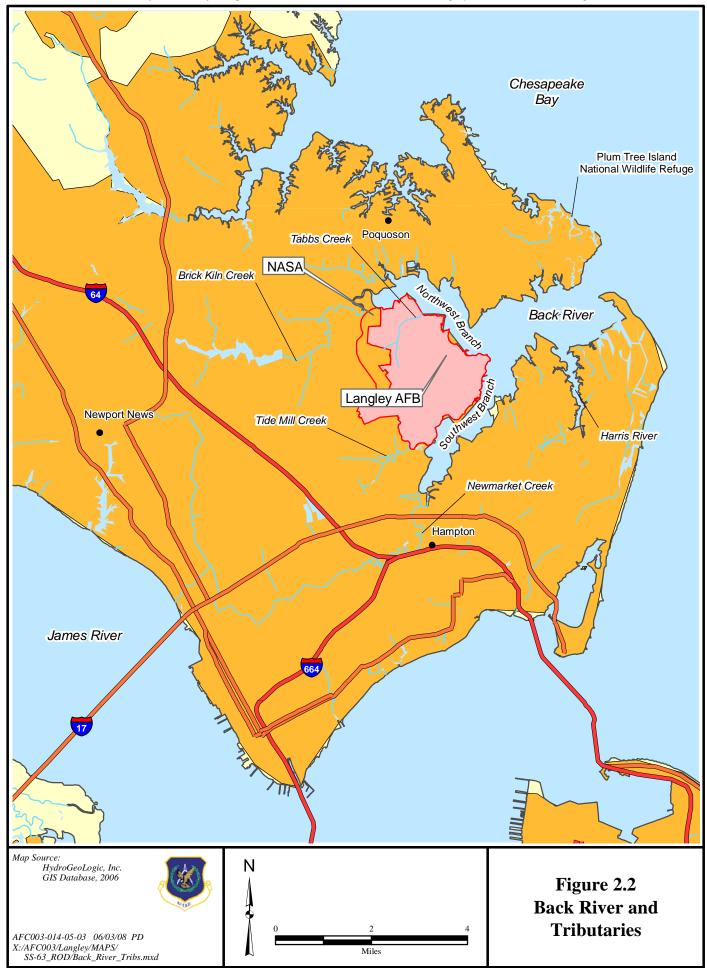
2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for Operable Unit 51, ERP Site SS-63, at Langley AFB, Virginia, was released for public comment in December 2007. The Proposed Plan identified dry excavation with off-site disposal of sediment as the Preferred Alternative for remediation. No comments were received during the public comment period.

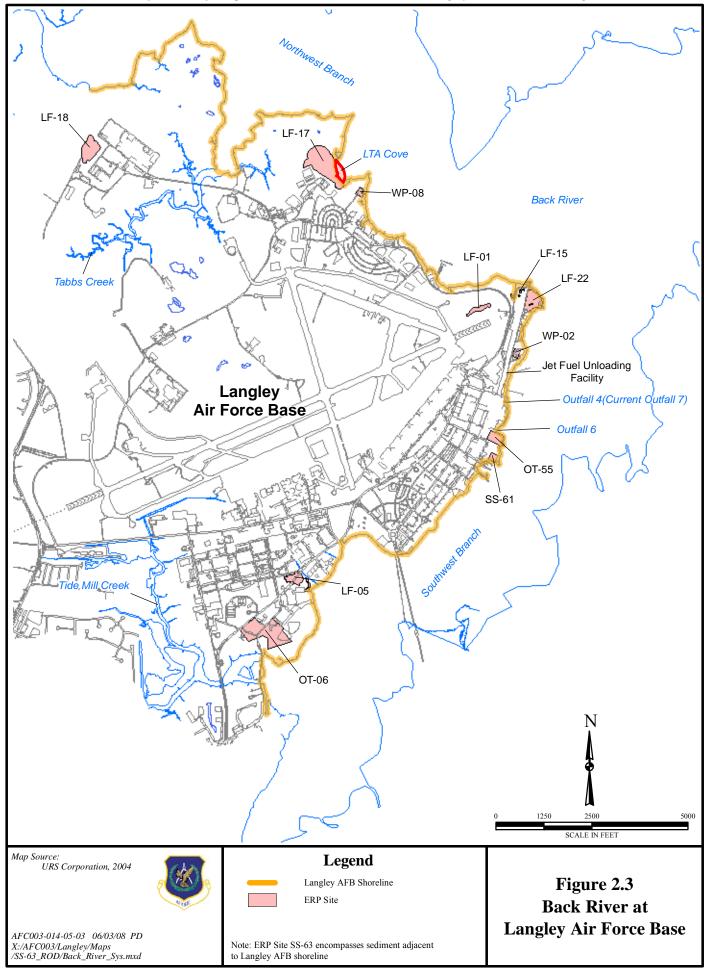


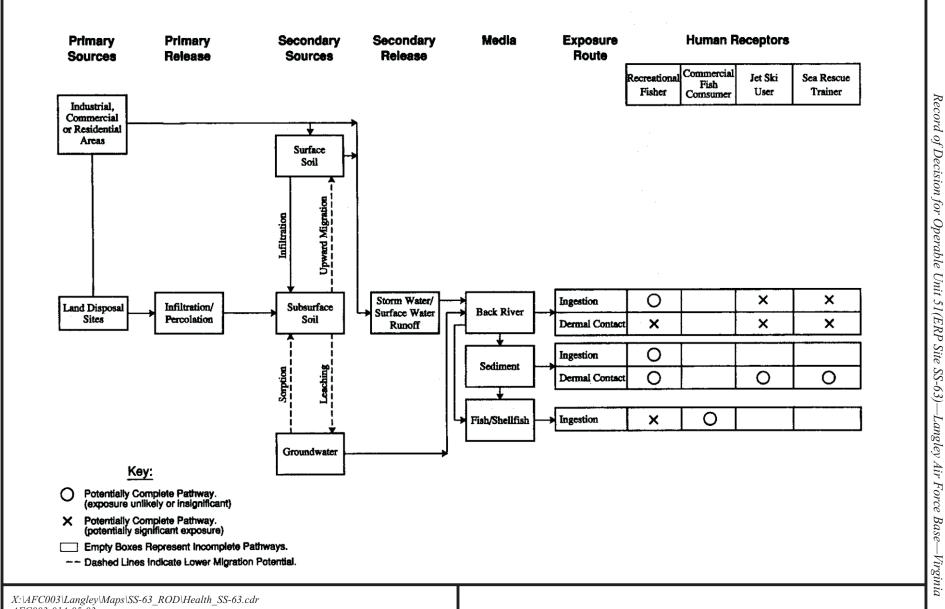


Air Force Center for Engineering and the Environment



Air Force Center for Engineering and the Environment

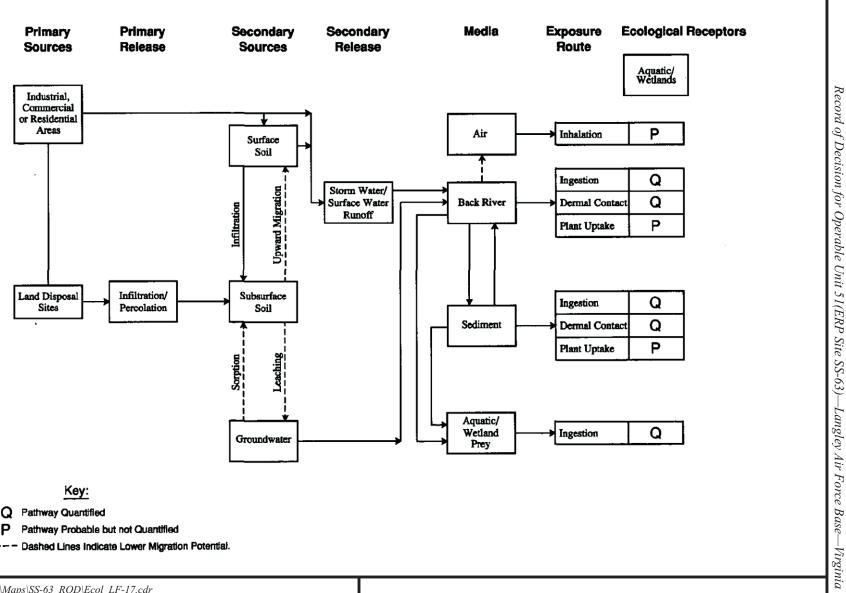




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Figure 2.4
ERP Site SS-63 Human Health
Conceptual Site Model



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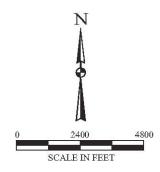


Figure 2.5
ERP Site SS-63 Ecological
Conceptual Site Model

Record of Decision for Operable Unit 51(ERP Site SS-63) Langley Air Force Base—Virginia

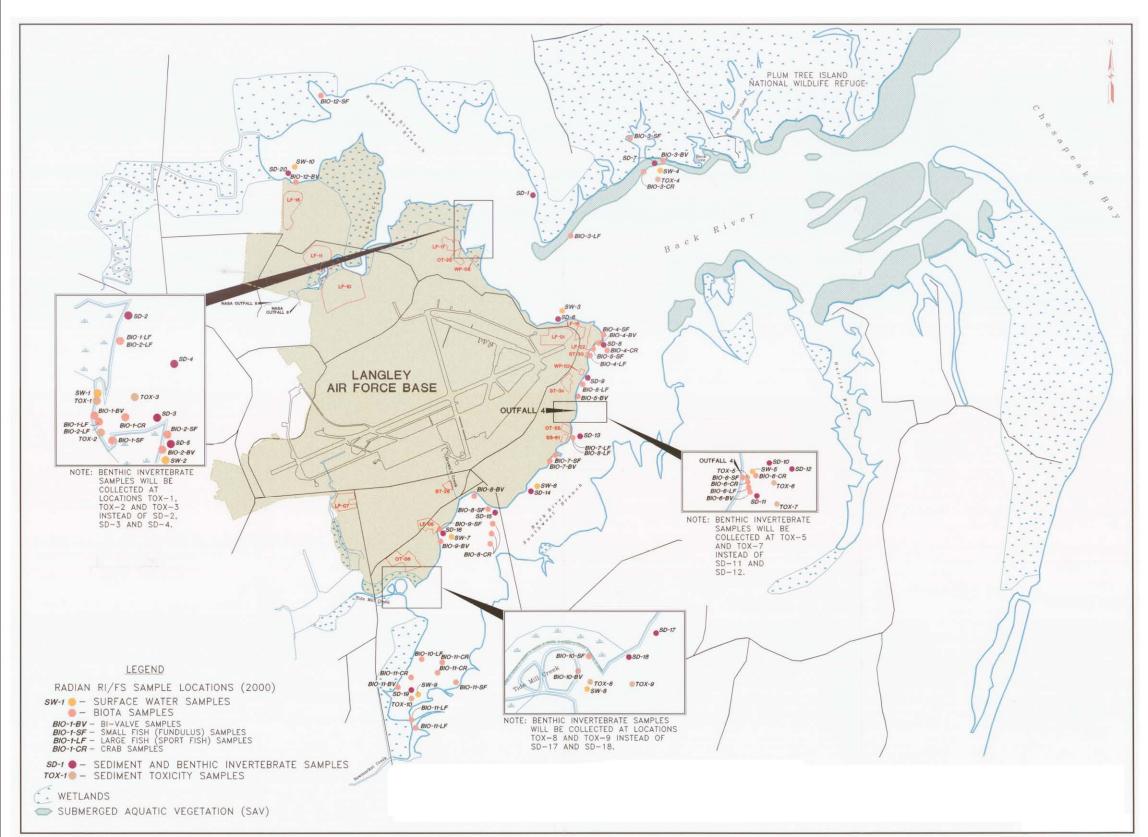
Figure 2.6 **SS-63 RI Sample Locations**

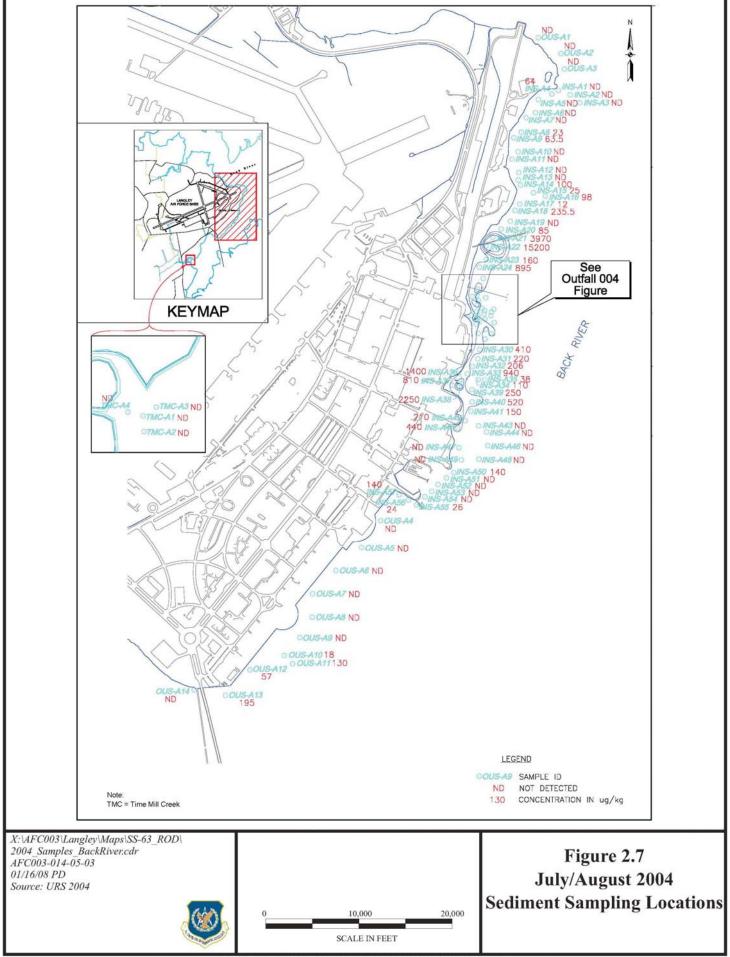
Air Force Center for Engineering and the Environment



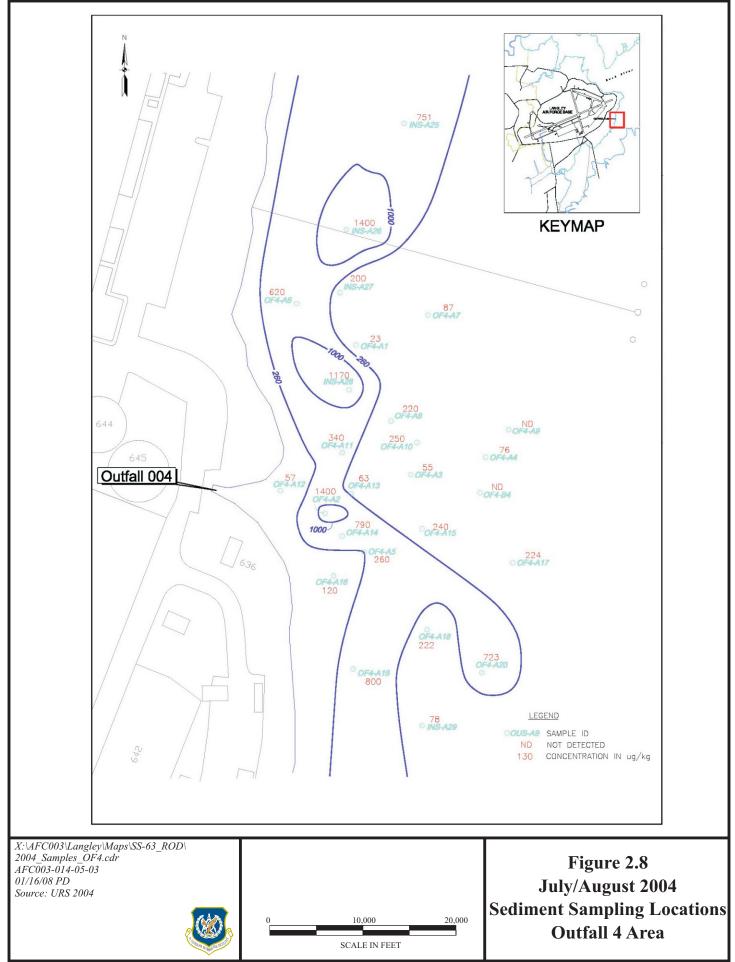
AFC003-014-05-03 01/16/08 PD







Air Force Center for Engineering and the Environment



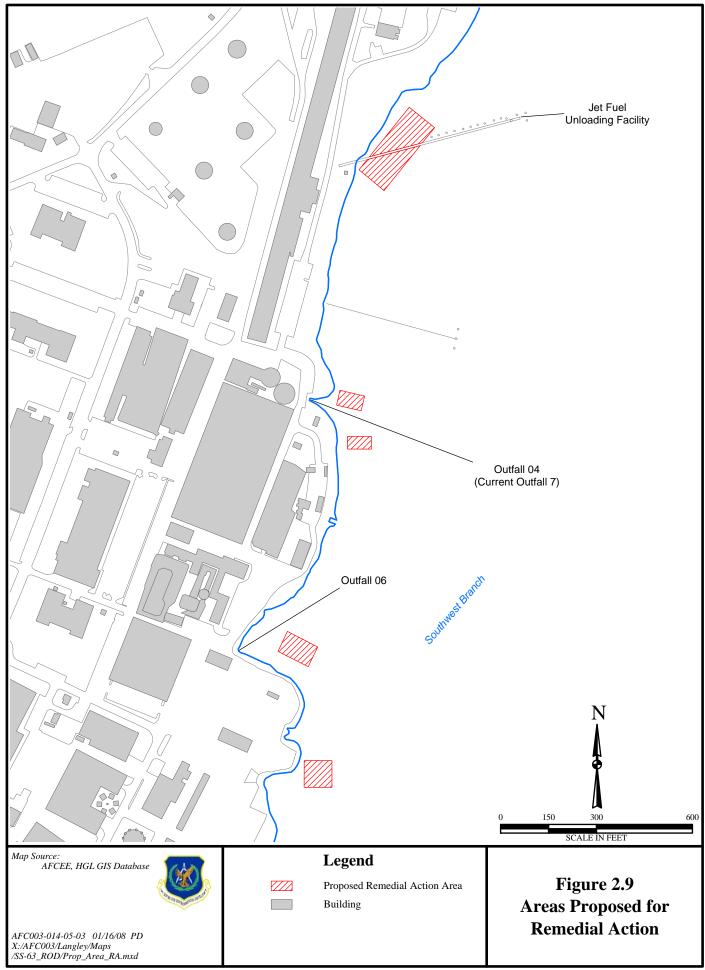




Table 2.1. Results of Analyses for Sediment Sampling at Site SS-63, Langley AFB, Virginia

Control Cont		EPA Region III	Ecological		SD-01	SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	SD-08	SD-09	SD-10	SD-10	SD-11	SD-12	SD-13	SD-14	SD-15	SD-16	SD-17	SD-18	SD-19	SD-20
STATES - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	Parameter	Res. Soil RBSLs	Criteria	Ecological Criteria Reference		Duplicate			07.0			05.0								20.0		07.0				
STORMAN STORMA	` '	=	-								21.8															
Service Servic		160	 	<u>-</u>	4550		21400	11200	7200	37300	0.528	3420	3900	5700	14700	13200	16000	17900	0000	9730	10000	13700	10400	10700	17100	23200
Secretary (1968) 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	VOCs (ug/kg)																									
Section 1.	Acetone		-	-			18.0			13.7 J			8.85	8.48					49.5	l l						
The content of the co			-	-			47.5.1			7 40 1			0.00 1	0.40 1	16.3 J	6.35 J			00.0.1	3.42					22.7	1
Control Cont			_	- -	4.35 3	10.2 3	17.53	13.0 J	33.03	7.12 J			0.20 J	0.12 J			31.0	23.2	00.2 J		15.1	32.0	30.3	19.1	22.1	43.3
Secretary (1) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Toluene		-	=																						
Secretary 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	SVOCs (mg/kg)																									
Control Cont	Acenaphthene													0.200		0.120 J				0.0251						
Control Cont														0.396		0.397 I				0.0599	0.0454					
Control Cont	Benz(a)anthracene								0.0370						0.351 J		0.382						0.0956	0.0816		
Continue	Benz(a)pyrene								0.0355					0.643								0.651				
The content of the co	Benzo(b)fluoranthene								0.0353						0.336	0.746	0.364			l l						
Control Cont									0.0270						0.204	0.677	0.545									
Secretary 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									0.0372					0.567	0.391	0.677	0.545				0.360		0.135	0.115		
The content of the co	Carbazole													0.181		0.183 J					0.0374					
Secretary 150 100 100 100 100 100 100 100 100 100	4-Chloro-3-methylphenol		-	=																						
Separate 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Chrysene							0.0154	0.0423					0.726	0.401 J	0.858 J	0.446			0.261	0.367	0.631	0.141	0.117		
The content of the co	Dibenzo(a,h)anthracene																					0.0044				
97 May 1 May															1							U.UZ14				
Secretary 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	bis(2-Ethylhexyl)phthalate																					0.221	1.25			
Secretary 1. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Fluoranthene	310						0.0278	0.0810						0.703 J	1.88 J	0.718			0.472	0.524			0.190		
**************************************	Fluorene																									
Second column Second colum	Indeno(1,2,3-cd)pyrene													0.327		0.464 J					0.240		0.0868	0.0859		
The content of the														0 191	1					0.015/						
March Marc	Phenanthrene								0.0463						0.292 J	1.40 J	0.310			0.251	0.197		0.0607	0.0536		
Second S	Pyrene							0.0247																		
Marie 100 10	Chlorinated Pesticides & PCBs (ug/kg)																									
Secretary 30 100 March M	Aldrin														6.21		9.10	12.9								
STATES ST	II ·															9.01						17.7				
980 CHANGEN STATE 1980 1980	gamma-BHC																									
ACASID 1700 270 MAX-FIRE MATERIAL MATER	alpha-Chlordane		6																			3.08				
# COCK 1900 27	gamma-Chlordane		-											46.1						4.99					1.96	
ACTION 1 100	III *																				9.67	9.92				
Section 1 40 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5			27						3.52				2.30	24.8		10.0		17.3	9.83	5.01	4.64	4.07	7.52		7.43	8.08
International 1970 1 - 1			8					3.09							62.9 J		37.0	6.91			4.04	4.07		5.91	1.81	1.99
Marked Ma	Endosulfan I		-	-																						
Process Control Cont	Endosulfan II		-	-																						
Properties Control C			-	- Delether Diele FD I Meeter			0.618						2.41	37.7	12.4	7.56	13.2	7.38	10.0	6.35					2.01	1.60
Part														31.6	12.5	7.52	27.8		4 76	3 74						
Montage Mont	Endrin ketone ¹				0.214 J									01.0					4.10	0.14						
Interruptive inter	Heptachlor		0.3	NOAA AET Marine																						
CB 1256 239 180 NOAM RE Markers NOAM RE	Heptachlor epoxide		0.6	NOAA TEL Fresh																						
CRISTON 9.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00			-	NOAA ED M Marina						15.1			27.2	4040					146	146						
Description Column Colum	PCB-1254 PCB-1260									15.1			21.2	1210					140	140						
CFC 78000 -	Chlorinated Herbicides (ug/kg)																									
ABO 786000 - 1	Dichloroprop		-	-																						
4.5-T 78000	MCPA		-	=																						
Interior (principle) 1	2,4-D 2.4.5-T		_	_																						
Second Content Seco	Metals (mg/kg)	7,0000																								
Institution 0.43 70 NOAA RETA Markine 1.72 1.54 2.16 2.39 4.69 1.83 1.43 1.939 2.16 2.12 3.42 3.42 5.99 7.99 8.78 9.66 5.79 6.13 4.24 1.65 1.67 8.51 8.56 8.56 8.79 8.70	Aluminum		-	-	2560	2610	3840	4130	9620	2760 J	1800	1320	2380	3660	6000 J		11900	16400	19400	5870	9210	3620	13600	13900	14000	17200
arisim	Antimony				4 70	4.54	0.40	0.00	4.00	4.00	4.45	0.000	0.40	0.40	0.40		7 50	0.70	0.00	. T.		4.0.	40.5	40.5	0.04	0.05
Seymon 16	Arsenic Barium																									
Second Control Seco	Beryllium		-									5.74								l l						
aidetum	Cadmium		9.6	NOAA ER-M Marine				- -										•		l l						
Debut 10 10 NOAA ET Marine 112 0784 125 1.43 3.08 128 1.07 0.322 1.03 1.47 2.41 3.85 4.81 5.97 6.73 3.59 4.50 2.25 6.96 6.96 7.02 5.01 5.00 5.00 5.00 5.00 5.00 5.00 5.00	Calcium	-	-																							
Support Supp	Chromium																									
On the curry 0.78 0.71 NOAA ER-M Marine 4.76 0.0154 0.0218 0.0399 0.0429 0.0199 0.0116 0.0100 0.0100 0.0100 0.0230 0.018 0.0016 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0100 0.0230 0.018 0.0000 0.0230 0.018 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.00000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000	Copper																									
Hercury 0.78 0.71 NOAA ER-M Marine end 4 50 9.51 17.0 0.154 0.0599 0.0599 0.0179 0.0170 0.0160 0.0304 0.2170 0.190 0.233 0.148 0.0982 0.0489 0.0742 0.0381 0.743 0.0898 0.0179 0.0179 0.0183 0.0179 0.0179 0.0183 0.0179 0.	Iron		-	-																						
ead dagnesium	Mercury		0.71	NOAA ER-M Marine																						
Hanganese Hangan	Lead				4.76	4.50	9.51	17.0	18.3	5.83	3.93	3.37	8.21	10.0	26.9 J	39.2 J	51.7	38.5	39.0	17.6	24.2	13.4	35.5	34.9	29.8	28.9
lickel 160 51.6 NOAA ER-M Marine 2.00 1.91 3.14 3.53 8.23 2.71 1.85 0.969 2.24 3.17 6.15 10.3 13.2 15.3 17.0 6.13 9.03 4.07 13.9 14.0 12.8 13.7 totalsium 9.	Magnesium	-	-																							
Volume Color Col	Manganese																			-						1
Referrium 39		160	51.6																							
Silver 39 3.7 NOAA ER-M Marine odium 1710 1980 2350 2300 4420 2000 1740 1520 1730 1990 3280 J 5020 J 5790 8650 8810 3600 5450 2150 6730 6850 5450 9420 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Selenium	39] -		302	555			1370		701	212	572		11003					1110		550	2300		2330	5-00
hallium 0.55	Silver		3.7	NOAA ER-M Marine												0.478 J	1.30	0.619			0.276			0.519		
Anadium 55 57 NOAA AET Marine 6.78 6.63 9.48 10.3 22.8 7.37 J 5.51 3.21 8.78 9.33 17.2 J 27.9 J 34.0 41.0 46.8 16.6 24.1 14.2 36.2 35.6 32.6 40.3 16.0 15.2 14.1 22.8 27.6 56.9 22.5 14.6 8.74 18.9 25.0 53.9 J 81.9 J 94.4 112 125 56.8 79.3 40.2 120 116 102 88.8 10.3 120 120 120 120 120 120 120 120 120 120	Sodium	-	-	-	1710	1980	2350	2300	4420	2000	1740	1520	1730	1990	3280 J	5020 J	5790		8810	3600	5450	2150	6730	6850	5450	9420
inc 2300 410.0 NOAA ER-M Marine 15.2 14.1 22.8 27.6 56.9 22.5 14.6 8.74 18.9 25.0 53.9 J 81.9 J 94.4 112 125 56.8 79.3 40.2 120 116 102 88.8 CTs (ug/kg) vacclor 5432 140 180 NOAA ER-M Marine vacclor 5642 vacclor 6040 140 180 NOAA ER-M Marine vacclor 6062 vacclor 6070 140 180 NOAA ER-M Marine vaccl	Thallium				6.70	6.00	0.40	40.0	20.0	7.07 !	5.54	2.04	0.70	0.00	47.0	27.0 1	24.0		40.0	10.0	24.4	14.0	20.0	25.0	20.0	40.0
CTS (ug/kg) roclor 5432	Vanadium Zinc																									
raccior 5432	PCTs (ug/kg)	2500	710.0	1407 V LICIVI IVIALILIE	10.2	1-7.1	££.U	21.0	55.5	££.U	17.0	0.14	10.0	20.0	55.55	01.00	U-7. 1	114	123	50.0	10.0	70.2	120	110	102	55.0
roclor 6062 140 180 NOAA ER-M Marine 110 J 180 N	Aroclor 5432		180	NOAA ER-M Marine											1400	2200	3500	500								64.0
roclor 6070 140 180 NOAA ER-M Marine	Aroclor 6040														120	320	270	150	90.0							
cid Volatile Sulfides (um/g) NV 3.40 2.40 2.10 4.00 10.2 1.60 0.890 3.10 1.00 2.50 5.70 7.40 8.80 17.9 32.1 2.90 12.6 7.40 20.1 18.7 15.3 21.9	Aroclor 6062				110 J								760	120	1					86.0	62.0					
	Acid Volatile Sulfides (um/g)		_		3.40	2.40	2.10	4.00	10.2	1.60	0.890	3.10	1.00	2.50	5.70	7.40	8.80	17.9	32.1	2.90	12.6	7.40	20.1	18.7	15.3	21.9
					*	*	<u> </u>			*	•											*				

⁻ Screening criteria unavailable
Blank cell - Analyte was not detected in any of the samples from the indicated investigation.
B - Concentration similar to low-level concentrations found in associated blanks.
J - Estimated value.

1 Endrin used as surrogate

Indicates result exceeds Human Health Crite.

Table 2.1. Results of Analyses for Sediment Sampling at Site SS-63, Langley AFB, Virginia

Parameter	EPA Region III Res. Soil RBSLs	Ecological Criteria	Ecological Criteria Reference	TOX-01	TOX-02	TOX-03	TOX-04	TOX-05	TOX-05 Duplicate	TOX-06	TOX-07	TOX-08	TOX-09	TOX-10	R-1	R-2	R-3	R-4	R-5	R-5 Duplicate	R-6	R-7	R-8	R-9	R-10	R-11
Moisture (%)	Res. Soli RBSLS	- Criteria	- Ecological Criteria Reference	28.1	48.0	28.3	24.3	26.4	25.7	51.9	55.6	60.9	61.6	57.6						Duplicate						
TOC (mg/kg)	-	-	-	7670	8220	8460	2910	11100	13300	16700	17600	8370	8170	7780												
Total Cyanide (mg/kg)	160	-	-									0.349														
VOCs (ug/kg) Acetone	780000	_	_	8.03	67.2	15.0	223	21.2 B	96.2 J	143	407	109	86.2	80.3												i
2-Butanone (MEK)	4700000	-	-	0.00	5.45		8.35	7.05 J	21.1 J	18.2	91.5	14.2	7.59	7.29							3.13					i
Carbon disulfide	780000	-	-	4.87	12.9	14.2	7.39	16.2	31.6	24.7	50.6	10.8	19.7	37.6					2.35J	3.55 J	2.89	3.40			3.29	4.15
Methylene chloride Toluene	85000 1600000	-	-	1.14		1.64	1.52	1.54	1.77 1.18 J		3.67	2.23	2.33	1.95	4.35	4.76		2.09	3.49	4.21	5.23				9.52	10.2
SVOCs (mg/kg)	1000000								1.100																	
Acenaphthene	470	0.5	NOAA ER-M Marine						1.45 J										0.371J							
Acenaphthylene Anthracene	470 2300	0.64 1.1	NOAA ER-M Marine NOAA ER-M Marine						7.99 J										1.02J		0.585	0.427				i
Benz(a)anthracene	0.87	1.6	NOAA ER-M Marine						25.7 J	0.374	0.404								3.78J	2.06 J	3.39	1.80	0.218	0.294	0.747	
Benz(a)pyrene	0.087	1.6	NOAA ER-M Marine						27.4 J	0.448	0.464								3.85	2.55	4.42	2.11		0.333	1.12	
Benzo(b)fluoranthene	0.87	1.8	NOAA JET Frank						19.9 J	0.382	0.474							0.246 J	3.43J	2.26 J	3.95	2.20	0.491	0.623	1.28	i
Benzo(g,h,i)perylene Benzo(k)fluoranthene	230 8.7	0.3 0.0272	NOAA UET Fresh NOAA Lowest TEL Fresh						15.9 J 23.8 J	0.400	0.425							0.246 J	2.35J 3.44	1.73 J 2.57	2.78 3.65	1.33 1.58	0.491	0.623	0.848 1.01	
Butylbenzylphthalate	1600	0.063	NOAA AET Marine						20.00	000	0.1.20							0.2.00	0	2.0.	0.00		0.101	0.020		i
Carbazole	32	0.4	Relative Risk ER-L Marine																							i
4-Chloro-3-methylphenol	160 87	2.8	- NOAA ER-M Marine						27.4 J	0.471	0.581								0.681 4.96 J	2.70 J	4.32	2.44	0.324	0.335	1.26	i
Chrysene Dibenzo(a,h)anthracene	0.087	1.6	NOAA ER-M Marine						21.4 J	0.471	0.561								1.03	2.70 J	4.32	2.44	0.324	0.335	1.20	i
Dibenzofuran	31	0.11	NOAA AET Marine																0.208							1
Di-n-butylphthalate	780	0.058	NOAA AET Marine																0.07		0.51				0.40-	1
bis(2-Ethylhexyl)phthalate Fluoranthene	46 310	0.18216 5.1	NOAA TEL Marine NOAA ER-M Marine						63.0 J	0.800	0.894								3.35 8.69 J	4.90 J	2.84 5.99	3.78	0.620	0.518	0.485 1.93	1
Fluorene	310	0.54	NOAA ER-M Marine						00.00	0.000	0.004								0.481	7.50 0	0.55	5.76	0.020	0.010	1.55	1
Indeno(1,2,3-cd)pyrene	0.87	0.01732	NOAA Lowest TEL Fresh						14.5 J										2.37	1.73	2.73	1.30			0.829	
2-Methylnaphthalene	160 160	0.67	NOAA ER-M Marine																							ļ
Naphthalene Phenanthrene	160 230	2.1 1.5	NOAA ER-M Marine NOAA ER-M Marine						24.2 J		0.357								4.73 J	1.73 J	1.73	1.73	0.281		0.601	
Pyrene	230	2.6	NOAA ER-M Marine		<u> </u>				48.8 J	0.686	0.767				<u> </u>		0.0916	0.123	7.13 J	3.99 J	5.24	3.42	0.468	0.450	1.67	0.214
Chlorinated Pesticides & PCBs (ug/kg)		-								0.55														0.45		
Aldrin alpha-BHC	38 100	9.5 100	NOAA AET Marine NOAA UET Fresh							6.79 9.21														3.49 J		
beta-BHC	350	100	NOAA UET Fresh							9.21																
gamma-BHC	490	100	NOAA UET Fresh																							
alpha-Chlordane	1800	6	NOAA ER-M Marine					6.00	4.33					1.59											4.50	5.43
gamma-Chlordane 4,4'-DDD	1800 2700	6 20	NOAA ER-M Marine NOAA ER-M Marine		9.07	7.00		37.0	28.4	15.7 63.7	29.8	11.9	12.1	10.0	2.43				66.9 J 117	27.3 J 122	284 141	33.6 56.0		15 5.56	1.58 9.63	1.48 4.6
4,4'-DDE	1900	27	NOAA ER-M Marine	3.99	9.55	4.70		26.5	18.1	23.1	13.4	8.12	8.07	6.41	1.25				52.8 J	33.8 J	141	00.0		0.00	9.86	5.44
4,4'-DDT	1900	7	NOAA ER-M Marine		6.11	12.9					155				2.25					11.0 J	159 J	56.3	54.2	10.2 J	6.56	
Dieldrin	40 47000	8	NOAA ER-M Marine	1.16	3.48				6.64 J		7.70															
Endosulfan I Endosulfan II	47000	-	-		3.40				6.24 J	31.9	7.33															
Endosulfan sulfate	47000	-	-		3.53			15.0	11.4	23.0	8.24	3.75	3.86													
Endrin	2300	0.02	Relative Risk ER-L Marine																		564 J			6.11 J	5.83	
Endrin aldehyde ¹ Endrin ketone ¹	2300 2300	0.02 0.02	Relative Risk ER-L Marine Relative Risk ER-L Marine					11.9 20.3	7.50 11.1	73.4 118	10.4 18.4								8.02 J 18.4J		204 J			11.1 J	6.40	
Heptachlor	140	0.02	NOAA AET Marine					20.3	11.1	110	10.4								10.43	1.68 J					0.40	
Heptachlor epoxide	70	0.6	NOAA TEL Fresh						2.64 J	3.50	3.20					0.722										
Methoxychlor	39000	-	- NOAA ED MAN-i																		418 J			24.9 J		
PCB-1254 PCB-1260	320 320	180 180	NOAA ER-M Marine NOAA ER-M Marine		108																4180			736		
Chlorinated Herbicides (ug/kg)																										
Dichloroprop	63000	-	-																							
MCPA 2,4-D	3900 78000	-	-	13000		10100				16300		14500	13700								12.9					17.9
2,4,5-T	78000	-	-					2.52 J							3.51				3.58 J		4.27			5.72	6.88	6.94
Metals (mg/kg)																										
Aluminum	7800	-	Polotivo Piok CD I Marin	3150	10700 K	6580	1790	3910	3990	10900	11300	13900	14700	13700	3000	1540	1670	4890	2440	2930	3310	15,100 0.241	14800 H	14,700	17,300	22,000
Antimony Arsenic	3.1 0.43	2 70	Relative Risk ER-L Marine NOAA ER-M Marine	0.314 1.87	0.416 J 6.47	3.47	0.247 0.830	2.14 J 3.30	3.39	6.52	0.620 6.41	0.438 10.0	10.4	9.49	0.170 1.85	0.744	1.49	4.74	0.268 J 3.87	1.20 J 2.54	0.295 3.50	0.341 8.11	7.77	8.94	0.335 10.2	12.1
Barium	550	48	NOAA AET Marine	9.25	31.3	14.3	6.58	18.6	19.2	34.8	30.1	26.2	27.7	25.6	6.82	4.75	5.12	9.64	33.2	30.5	39.7	51.0	30.9	30.2	37.7	41.5
Beryllium	16	-	-	0.128	0.466	0.287	0.0664	0.205	0.200	0.508	0.522	0.825	0.826	0.867	0.195	0.316	0.105	0.321	0.00-	0.251	0.218	0.727	0.736	0.810	0.842	1.42
Cadmium Calcium	3.9	9.6	NOAA ER-M Marine	447	0.226 1230	787	212	0.107 1220	0.156 1460	1930	2320	1590	1680	1500	0.179 411	0.105 219	1000	833	0.898 14,300	0.880 10,300	0.967 1390	0.238 2850	0.142 1470	0.210 1900	1.38 1730	1.46 2080
Chromium	23	370	NOAA ER-M Marine	9.28	33.1	19.4	3.84	71.9	61.0	63.3	36.4	34.4	35.5	31.5	12.0	4.43	5.28	14.8	28.3 J	50.8 J	54.6	42.2	32.9	44.0	39.7	48.2
Cobalt	160	10	NOAA AET Marine	0.978	3.36	2.20	0.389	2.05	2.10	4.46	4.28	6.85	6.96	7.94	0.953	0.716	0.833	2.00	1.73	1.68	1.98	5.76	5.47	6.07	6.54	9.84
Copper Iron	310	270	NOAA ER-M Marine	4.73	23.4 13900	7.72	2.78	19.2 6840	14.8	26.7	22.8	17.3 22900	18.1 23600	14.8 21900	3.80 3740	1.55 1830	1.52 2600	4.68 9800	38.6 J 5120	81.1 J 5950	59.9 5870	27.0 18,400	21.6 18,000	19.4 19,900	21.4 23,600	25.0
Mercury	2300 0.78	0.71	NOAA ER-M Marine	3920 0.0199	0.0957	8180 0.0672	1740 0.0122	0.207	6490 0.236	16100 0.269	16500 0.149	0.101	0.136	0.0683	0.0169	0.0126	2000	0.0459	0.128 J	0.217 J	0.120 J	0.161	0.121	0.106	0.0830	29,200 0.123
Lead	1	218	NOAA ER-M Marine	45.3	164 L	15.7	4.87	32.2	25.0	46.1	32.2	33.8	34.3	35.3	6.51	3.66	3.74	7.61	54.9 J	186 J	147	75.7	31.8	84.0	42.7	47.3
Magnesium	-	-	-	937	3120	1840	561	2340	2370	3930	4250	4420	4570	4070	805	467	654	1530	1940	2260	1960	5230	4060	4180	4430	5790
Manganese Nickel	160 160	260 51.6	NOAA AET Marine NOAA ER-M Marine	24.0 2.71	81.0 9.46	54.7 5.49	9.72 1.37	63.0 5.44	60.8 5.21	109 11.9	108 10.9	121 13.7	131 14.3	109 14.5	22.1 2.37	13.2 1.23	16.4 1.40	39.2 4.03	60.1 3.69	58.1 3.80	50.1 4.45	125 13.5	111 12.2	116 12.8	122 15.7	158 19.5
Potassium	-	-	-	541	1860	1200	298	727	737	2120	2240	2480	2490	2230	541	305	354	1150	492	570	568	2260	2200	2200	2860	3790
Selenium	39	-	-	0.355		0.335																				
Silver	39	3.7	NOAA ER-M Marine	0.275	1.34	0.302	2120	2500	2210	0.482	0.421	0.454	0.440	5210	0.267	1/160	1560	0.0430	0.718 J	0.293 J	0.349	0.419	0.558	0.479	0.460	0.621
Sodium Thallium	0.55	-	-	2620	5800 0.572	3750 0.352	2120	2580	2210	6390	7720	7180	7520	5210	1750	1460	1560	1910	2360	2110	2370	6040	5660	5360	6390	8460
Vanadium	55	57	NOAA AET Marine	8.03	26.6	16.0	4.17	14.5	13.8	31.9	29.5	35.1	37.0	34.0	7.83	4.25	5.52	19.3	10.2	11.50	12.6	39.7	36.1	36.0	43.9	53.1
Zinc	2300	410.0	NOAA ER-M Marine	21.0	84.4	37.8	11.9	65.9	68.1	115	101	120	123	121	18.4	9.95	10.8	30.0	73.4	68.3	96.8	134	96.5	108	124	157
PCTs (ug/kg) Aroclor 5432	140	180	NOAA ER-M Marine					490	840	1800	1300								6100 J	2200 J	1	7200 J			L	2800 J
Aroclor 5432 Aroclor 6040	140	180	NOAA ER-M Marine NOAA ER-M Marine		100			450	100 J	1800 380	1300								01003	2200 J	1	1200 3	1		ľ	2000 J
Aroclor 6062	140	180	NOAA ER-M Marine																							
Aroclor 6070	140 NV	180	NOAA ER-M Marine	2.00	44.4	4 00	1 17	89 J 6.60	7.40	10.0	150	0 00	0.20	0.00	1			ļļ				1			-	
Acid Volatile Sulfides (um/g)	NV	-	-	2.00	11.1	4.80	1.17	0.00	7.40	19.0	13.4	8.80	9.30	9.80	<u> </u>	<u> </u>				<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	
Screening criteria unavailable																										

⁻ Screening criteria unavailable
Blank cell - Analyte was not detected in any of the samples from the indicated investigation.
B - Concentration similar to low-level concentrations found in associated blanks.
J - Estimated value.

1 Endrin used as surrogate

Indicates result exceeds Human Health Crite.

Table 2.2. Summary of PCB/PCT Arochlors, Back River, Langley Air Force Base, Virginia (Page 1 of 5)

											PCI	3/PC1	Arochi	ors (µ	ıg/kg)										
Sample ID Number	PCB 1016	Q	PCB 1221	Q	PCB 1232	Q	PCB 1242	Q	PCB 1248	Q	PCB 1254	Q	PCB 1260	Q	PCT 5432	Q	PCT 5460	Q	PCT 6040	Q	PCT 6062	Q	PCT 6070	Q	Total
INS-A1-01	44	U	44	U	88	U	88	U	88	U	88	U	88	U	0										
INS-A2-01	44	U	44	U	87	U	87	U	87	U	87	U	87	U	0										
INS-A3-01	58	U	58	U	120	U	120	U	120	U	120	U	120	U	0										
INS-A4-01	46	U	64		46	U	92	U	92	U	92	U	92	U	92	U	64								
INS-A5-01	59	U	59	U	120	U	120	U	120	U	120	U	120	U	0										
INS-A6-01	53	U	53	U	110	U	110	U	110	U	110	U	110	U	0										
INS-A7-01	260	U	260	U	510	U	510	U	510	U	510	U	510	U	0										
INS-A8-01	47	U	23	J	47	U	94	U	94	U	94	U	94	U	94	U	23								
INS-A9-01	44	U	25	J	44	U	88	U	88	U	88	U	88	U	88	U	25								
INS-A9-31	45	U	79		45	U	90	U	23	JP	90	U	90	U	90	U	102								
INS-A10-01	49	U	49	U	98	U	98	U	98	U	98	U	98	U	0										
INS-A11-01	46	U	46	U	91	U	91	U	91	U	91	U	91	U	0										
INS-A12-01	54	U	54	U	110	U	110	U	110	U	110	U	110	U	0										
INS-A13-01	45	U	45	U	89	U	89	U	89	U	89	U	89	U	0										
INS-A14-01	55	U	100		55	U	110	U	110	U	110	U	110	U	110	U	100								
INS-A15-01	49	U	25	J	98	U	98	U	98	U	98	U	98	U	25										
INS-A16-01	63	U	98		63	U	130	U	130	U	130	U	130	U	130	U	98								
INS-A17-01	44	U	12	J	44	U	88	U	88	U	88	U	88	U	88	U	12								
INS-A18-01	47	U	340		47	U	93	U	45	J	93	U	93	U	93	U	385								
INS-A18-31	47	U	86		47	U	93	U	93	U	93	U	93	U	93	U	86								
INS-A19-01	96	U	96	U	190	U	190	U	190	U	190	U	190	U	0										
INS-A20-01	72	U	85	*	150	U	150	U	150	U	150	U	150	U	85										
INS-A21-01	2200	U	3600		2200	U	4400	U	370	J	4400	U	4400	U	4400	U	3970								
INS-A21-51	1.1	U	1.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	0										
INS-A22-01	2300	U	14000		2300	U	4700	U	1200	J	4700	U	4700	U	4700	U	15200								
INS-A23-01	61	U	160		61	U	120	U	120	U	120	U	120	U	120	U	160								
INS-A24-01	110	U	790		110	U	210	U	79	J	210	U	210	U	210	U	869								
INS-A24-31	260	U	850		260	U	520	U	71	J	520	U	520	U	520	U	921								
INS-A25-01	95	U	700		95	U	190	U	51	J	190	U	190	U	190	U	751								

Table 2.2. Summary of PCB/PCT Arochlors, Back River, Langley Air Force Base, Virginia (Page 2 of 5)

											PCI	3/PC1	Arochi	ors (µ	ıg/kg)										
Sample ID Number	PCB 1016	Q	PCB 1221	Q	PCB 1232	Q	PCB 1242	Q	PCB 1248	Q	PCB 1254	Q	PCB 1260	Q	PCT 5432	Q	PCT 5460	Q	PCT 6040	Q	PCT 6062	Q	PCT 6070	Q	Total
INS-A26-01	450	U	1300		450	U	890	U	100	J	890	U	890	U	890	U	1400								
INS-A27-01	45	U	200		45	U	89	U	89	U	89	U	89	U	89	U	200								
INS-A28-01	100	U	710	Р	100	U	200	U	460		200	U	200	U	200	U	1170								
INS-A29-01	44	U	78		44	U	88	U	88	U	88	U	88	U	88	U	78								
INS-A30-01	43	U	43	U	410		87	U	87	U	87	U	87	U	410										
INS-A31-01	43	U	43	U	220		87	U	87	U	87	U	87	U	220										
INS-A32-01	45	U	96		45	U	90	U	110		90	U	90	U	90	U	206								
INS-A33-01	50	U	50	U	940		99	U	99	U	99	U	99	U	940										
INS-A34-01	71	U	110	*P	71	U	140	U	140	U	140	U	140	U	140	U	110								
INS-A35-01	82	U	38	JP	160	U	38																		
INS-A36-01	61	U	61	U	1400		120	U	120	U	120	U	120	U	1400										
INS-A37-01	42	U	100		42	U	710		84	U	84	U	84	U	84	U	810								
INS-A37-31	41	U	110		41	U	490		83	U	83	U	83	U	83	U	600								
INS-A38-01	60	U	250	Р	60	U	2000		120	U	120	U	120	U	120	U	2250								
INS-A39-01	66	U	50	J	66	U	200	Р	130	U	130	U	130	U	130	U	250								
INS-A40-01	78	U	90		78	U	430	Р	160	U	160	U	160	U	160	U	520								
INS-A41-01	76	U	150	Р	76	U	150	U	150	U	150	U	150	U	150	U	150								
INS-A42-01	43	U	210	Р	85	U	210																		
INS-A43-01	88	U	88	U	180	U	180	U	180	U	180	U	180	U	0										
INS-A44-01	86	U	86	U	170	U	170	U	170	U	170	U	170	U	0										
INS-A45-01	69	U	140	Р	69	U	300	Р	140	U	140	U	140	U	140	U	440								
INS-A46-01	88	U	95		88	U	180	U	180	U	180	U	180	U	180	U	95								
INS-A46-51	1.1	U	1.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	0										
INS-A47-01	46	U	69	Р	46	U	91	U	91	U	91	U	91	U	91	U	69								
INS-A48-01	80	U	80	U	160	U	160	U	160	U	160	U	160	U	0										
INS-A48-31	82	U	82	U	160	U	160	U	160	U	160	U	160	U	0										
INS-A49-01	85	U	85	U	170	U	170	U	170	U	170	U	170	U	0										
INS-A50-01	79	U	140		79	U	160	U	160	U	160	U	160	U	160	U	140								
INS-A51-01	86	U	86	U	170	U	170	U	170	U	170	U	170	U	0										

Table 2.2. Summary of PCB/PCT Arochlors, Back River, Langley Air Force Base, Virginia (Page 3 of 5)

											PCI	3/PC1	Arochle	ors (µ	ıg/kg)										
Sample ID Number	PCB 1016	Q	PCB 1221	Q	PCB 1232	Q	PCB 1242	Q	PCB 1248	Q	PCB 1254	Q	PCB 1260	Q	PCT 5432	Q	PCT 5460	Q	PCT 6040	Q	PCT 6062	Q	PCT 6070	Q	Total
INS-A52-01	78	U	78	U	160	U	160	U	160	U	160	U	160	U	0										
INS-A52-31	76	U	76	U	150	U	150	U	150	U	150	U	150	U	0										
INS-A53-01	81	U	81	U	160	U	160	U	160	U	160	U	160	U	0										
INS-A54-01	69	U	69	U	140	U	140	U	140	U	140	U	140	U	0										
INS-A55-01	46	U	26	J	46	U	92	U	92	U	92	U	92	U	92	U	26								
INS-A56-01	56	U	24	J*	110	U	24																		
INS-A57-01	59	U	59	U	120	U	140	Р	120	U	120	U	120	U	140										
INS-B1-01	46	U	46	U	92	U	92	U	92	U	92	U	92	U	0										
INS-B14-01	44	U	44	U	89	U	89	U	89	U	89	U	89	U	0										
INS-B33-01	58	U	58	U	120	U	120	U	120	U	120	U	120	U	0										
INS-B42-01	78	U	78	U	160	U	160	U	160	U	160	U	160	U	0										
INS-C1-01	48	U	48	U	97	U	97	U	97	U	97	U	97	U	0										
INS-C14-01	46	U	46	U	91	U	91	U	91	U	91	U	91	U	0										
INS-C33-01	61	U	61	U	120	U	120	U	120	U	120	U	120	U	0										
INS-C42-01	74	U	74	U	150	U	150	U	150	U	150	U	150	U	0										
OF4-A1-01	45	U	23	J	45	U	90	U	90	U	90	U	90	U	90	U	23								
OF4-A2-01	200	U	200	U	200	U	200	U	1400	Р	200	U	200	U	410	U	410	U	410	U	410	U	410	U	1400
OF4-A3-01	55	U	250	U	55		110	U	55																
OF4-A4-01	76	U	76	U	76	U	610	U	76	U	76		76	U	150	U	150	U	150	U	150	U	150	U	76
OF4-A5-01	46	U	260		46	U	92	U	92	U	92	U	92	U	92	U	260								
OF4-A6-01	59	U	520		59	U	120	U	100	J	120	U	120	U	120	U	620								
OF4-A7-01	51	U	70	Р	51	U	100	U	17	J	100	U	100	U	100	U	87								
OF4-A8-01	52	U	220	Р	52	U	100	U	100	U	100	U	100	U	100	U	220								
OF4-A9-01	62	U	62	U	130	U	130	U	130	U	130	U	130	U	0										
OF4-A10-01	58	U	110	Р	58	U	120	U	140		120	U	120	U	120	U	250								
OF4-A10-51	1.1	U	1.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	0										
OF4-A11-01	48	U	110	*	96	U	230		96	U	96	U	96	U	340										
OF4-A12-01	57	U	57		150	U	110	U	110	U	110	U	110	U	110	U	57								
OF4-A13-01	63	U	63	U	63	U	63		63	U	320	U	63	U	130	U	130	U	130	U	130	U	130	U	63

Table 2.2. Summary of PCB/PCT Arochlors, Back River, Langley Air Force Base, Virginia (Page 4 of 5)

											PCI	3/PC1	Arochi	ors (µ	ıg/kg)										
Sample ID Number	PCB 1016	ď	PCB 1221	Q	PCB 1232	Q	PCB 1242	ø	PCB 1248	Q	PCB 1254	Q	PCB 1260	Q	PCT 5432	Q	PCT 5460	Q	PCT 6040	Q	PCT 6062	Q	PCT 6070	Q	Total
OF4-A14-01	420	*P	92	U	92	U	92	U	92	U	470		92	U	180	U	180	U	180	U	180	U	180	U	890
OF4-A14-31	44	U	44	U	44	U	44	U	44	U	330		44	U	88	U	360		88	U	88	U	88	U	690
OF4-A15-01	39	U	39	U	39	U	39	U	39	U	120		39	U	78	U	120		78	U	78	U	78	U	240
OF4-A16-01	42	U	42	U	42	U	42	U	42	U	120		42	U	84	U	84	U	84	U	84	U	84	U	120
OF4-A17-01	65	U	65	U	65	U	65	U	65	U	34	JP	65	U	130	U	190	Р	130	U	130	U	130	U	224
OF4-A18-01	57	U	57	U	57	U	57	U	57	U	160	Р	57	U	110	U	62	J	110	U	110	U	110	U	222
OF4-A19-01	60	U	60	U	60	U	60	U	60	U	210	Р	60	U	590	Р	120	U	120	U	120	U	120	U	800
OF4-A20-01	330	U	330	U	330	U	330	U	330	U	1100	Р	330	U	660	U	270	J	660	U	660	U	660	U	1370
OF4-A20-31	66	U	66	U	66	U	66	U	66	U	76	*	66	U	130	U	130	U	130	U	130	U	130	U	76
OF4-B1-01	45	U	45	U	45	U	45	U	45	U	45	U	45	U	90	U	90	U	90	U	90	U	90	U	0
OF4-B2-01	240	U	240	U	240	U	240	U	240	U	240	U	400		480	U	130	J*	480	U	480	U	480	U	530
OF4-B3-01	49	U	49	U	49	U	49	U	49	U	32	JP	49	U	98	U	98	U	98	U	98	U	98	U	32
OF4-B4-01	66	U	66	U	66	U	66	U	66	U	66	U	66	U	130	U	130	U	130	U	130	U	130	U	0
OF4-B5-01	45	U	45	U	45	U	45	U	45	U	45	U	45	U	91	U	91	U	91	U	91	U	91	U	0
OF4-C1-01	45	U	45	U	45	U	45	U	45	U	45	U	45	U	91	U	91	U	91	U	91	U	91	U	0
OF4-C2-01	46	U	46	U	46	U	46	U	46	U	46	U	18	J	91	U	11	J*	91	U	91	U	91	U	29
OF4-C3-01	48	U	48	U	48	U	48	U	48	U	48	U	48	U	96	U	96	U	96	U	96	U	96	U	0
OF4-C4-01	62	U	62	U	62	U	62	U	62	U	62	U	62	U	130	U	130	U	130	U	130	U	130	U	0
OF4-C5-01	44	U	44	U	44	U	44	U	44	U	44	U	44	U	89	U	89	U	89	U	89	U	89	U	0
OF4-D5-01	44	U	44	U	44	U	44	U	44	U	44	U	44	U	87	U	87	U	87	U	87	U	87	U	0
OUS-A1-01	43	U	43	U	43	U	43	U	43	U	43	U	43	U	86	U	86	U	86	U	86	U	86	U	0
OUS-A1-01-2	33	U	33	U	33	U	33	U	33	U	33	U	33	U	67	U	67	U	67	U	67	U	67	U	0
OUS-A2-01	42	U	42	U	42	U	42	U	42	U	42	U	42	U	85	U	85	U	85	U	85	U	85	U	0
OUS-A2-51	1	U	1	U	1	U	1	U	1	U	1	U	1	U	2	U	2	U	2	U	2	U	2	U	0
OUS-A3-01	210	U	210	U	210	U	210	U	210	U	210	U	210	U	420	U	420	U	420	U	420	U	420	U	0
OUS-A3-31	210	U	210	U	210	U	210	U	210	U	210	U	210	U	420	U	420	U	420	U	420	U	420	U	0
OUS-A4-01	47	U	47	U	47	U	47	U	47	U	47	U	47	U	94	U	94	U	94	U	94	U	94	U	0
OUS-A5-01	63	U	63	U	63	J	63	כ	63	U	63	U	63	U	130	U	130	U	130	U	130	U	130	U	0
OUS-A5-31	63	U	63	U	63	U	63	J	63	U	63	U	63	U	130	U	130	U	130	U	130	U	130	U	0

Table 2.2. Summary of PCB/PCT Arochlors, Back River, Langley Air Force Base, Virginia (Page 5 of 5)

											PCE	3/PCT	Arochi	ors (µ	ıg/kg)										
Sample ID Number	PCB 1016	Q	PCB 1221	Q	PCB 1232	Q	PCB 1242	Q	PCB 1248	Q	PCB 1254	Q	PCB 1260	Q	PCT 5432	Q	PCT 5460	Q	PCT 6040	Q	PCT 6062	Q	PCT 6070	Q	Total
OUS-A6-01	60	U	60	U	60	U	60	U	60	U	60	U	60	U	120	U	120	U	120	U	120	U	120	U	0
OUS-A7-01	60	U	60	U	60	U	60	U	60	U	60	U	60	U	120	U	120	U	120	U	120	U	120	U	0
OUS-A8-01	57	U	57	U	57	U	57	U	57	U	57	U	57	U	110	U	110	U	110	U	110	U	110	U	0
OUS-A9-01	46	U	46	U	46	U	46	U	46	U	46	U	46	U	91	U	91	U	91	U	91	U	91	U	0
OUS-A10-01	55	U	55	U	55	U	55	U	55	U	55	U	18	J	110	U	18								
OUS-A11-01	72	U	72	U	72	U	72	U	72	U	130	Р	72	U	140	U	140	U	140	U	140	U	140	U	130
OUS-A12-01	52	U	52	U	52	U	52	U	52	U	57		52	U	100	U	100	U	100	U	100	U	100	U	57
OUS-A12-51	1	U	1	U	1	U	1	U	1	U	1	U	1	U	2	U	2	U	2	U	2	U	2	U	0
OUS-A13-01	46	U	46	U	46	U	46	U	46	U	160		46	J	92	U	110		92	U	92	U	92	U	270
OUS-A13-31	46	U	46	U	46	U	46	U	46	U	120		46	U	92	U	92	U	92	U	92	U	92	U	120
OUS-A14-01	47	כ	47	U	47	U	47	\supset	47	\supset	47	כ	47	כ	94	U	94	כ	94	U	94	U	94	J	0
OUS-B9-01	42	U	42	U	42	U	42	U	42	U	42	J	42	J	84	U	84	J	84	U	84	U	84	U	0
OUS-C9-01	43	כ	43	U	43	U	43	\supset	43	\supset	43	כ	43	כ	86	U	86	כ	86	U	86	U	86	J	0
TMC-A1-01	62	U	62	U	62	U	62	U	62	U	62	U	62	U	130	U	130	U	130	U	130	U	130	U	0
TMC-A2-01	66	U	66	U	66	U	66	C	66	C	66	U	66	U	130	U	130	U	130	U	130	C	130	U	0
TMC-A3-01	68	U	68	U	68	U	68	U	68	U	68	U	68	U	140	U	140	U	140	U	140	U	140	U	0
TMC-A3-31	70	U	70	U	70	U	70	U	70	U	70	U	70	U	140	U	140	U	140	U	140	U	140	U	0
TMC-A4-01	69	U	69	U	69	U	69	U	69	U	69	U	69	U	140	U	140	U	140	U	140	U	140	U	0
TMC-A4-51	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	0
TMC-B1-01	53	U	53	U	53	U	53	U	53	U	53	U	53	U	110	U	110	U	110	U	110	U	110	U	0
TMC-C1-01	64	U	64	U	64	U	64	U	64	U	64	U	64	U	130	U	130	U	130	U	130	U	130	U	0

Qualifier Definitions:

U – Indicates that the compound was analyzed for but not detected.
J – Indicates that the value is less than the reporting limit but greater than the Method Detection Limit (MDL).
P – Indicates that there is greater than 25% difference for detected Arochlor results between the two GC columns.
* – Indicates that the duplicate analysis was not within control limits.

Table 2.3. PCB Congener Analysis for Two Sample Locations, Back River, Langley Air Force Base, Virginia
(Page 1 of 3)

		Inner Shoreline ID Numbe	r and Concentration (μg/kg)	Outfall 004 ID N	lumber and Conce	ntration (µg/kg)
Congener Number	PCB Species Name	INS-A10-01	INS-A47-01	OF4-A2-01	OF4-A3-01	OF4-A3-31
1	2-Chlorobiphenyl	ND	ND	ND	ND	ND
3	4-Chlorobiphenyl	ND	ND	ND	ND	ND
5	2,3-Dichlorobiphenyl	ND	ND	В	ND	ND
7	2,4'-Dichlorobiphenyl	ND	ND	1.2 J,COL	2.4	1.6 J
15	4,4'-Dichlorobiphenyl	ND	ND	ND	ND	ND
18	2,2',5-Trichlorobiphenyl	ND	ND	4.3	5.2	3.1
28	2,4,4'-Trichlorobiphenyl	ND	2.8 J	5.4 J	5.0 J	3.3 J
29	2,4',5-Trichlorobiphenyl	ND	2.1 J	4.5 J	4.2 J	2.6 J
37	3,4',4'-Trichlorobiphenyl	ND	ND	ND	1.5 J,COL	ND
43	2,2',3,5'-Tetrachlorobiphenyl	ND	4.5	8.3	12	7.1
48	2,2',4,5'-Tetrachlorobiphenyl	0.27 J	3.5	6.5	7.3	4.5
52	2,2',5,5'-Tetrachlorobiphenyl	0.47 J	9.1	13	27	15
60	2,3',4,4'-Tetrachlorobiphenyl	0.17 J,COL	3.3 COL	7.6 COL	6.7 COL	4.0 COL
61	2,3',4',5'-Tetrachlorobiphenyl	ND	7.2	12	20	11
74	2,4,4',5'-Tetrachlorobiphenyl	ND	1.9	4.5	4.5	2.6
77	3,3',4,4'-Tetrachlorobiphenyl	ND	ND	ND	ND	ND
81	3,4,4',5-Tetrachlorobiphenyl	ND	ND	ND	ND	ND
87	2,2',3,4,5'-Pentachlorobiphenyl	0.31 J,COL	8.2 COL	7.3 COL	22 COL	13 COL
86	2,2',3,4,5-Pentachlorobiphenyl	ND	ND	ND	ND	ND
99	2,2',4,4',5-Pentachlorobiphenyl	0.50 J	8.0	8.1	19.0	10
101	2,2',4,5,5'-Pentachlorobiphenyl	1.0	14 COL	37	43	25
105	2,3,3',4,4'-Pentachlorobiphenyl	0.27 J	6.4	6.2	17	9.6
108	2,3,3',4',5-Pentachlorobiphenyl	0.86 J	20	18 COL	50	29
114	2,3,4,4',5-Pentachlorobiphenyl	ND	0.53 J,COL	1.8 J,COL	1.2 J,COL	0.71 J,COL
115	2,3,4,4',6-Pentachlorobiphenyl	ND	0.19 J,COL	ND	1.0 J,COL	0.52 J,COL
118	2,3',4,4',5-Pentachlorobiphenyl	0.70 J,COL	16	14	41	22
119	2,3',4,4',6-Pentachlorobiphenyl	ND	ND	ND	0.82 J	0.52 J,COL

Table 2.3. PCB Congener Analysis for Two Sample Locations, Back River, Langley Air Force Base, Virginia
(Page 2 of 3)

		Inner Shoreline ID Number	er and Concentration (µg/kg)	Outfall 004 ID N	lumber and Conc	entration (µg/kg)
Congener Number	PCB Species Name	INS-A10-01	INS-A47-01	OF4-A2-01	OF4-A3-01	OF4-A3-31
118	2,3',4,4',5'-Pentachlorobiphenyl	ND	ND I	1.3 J	ND	ND
126	3,3',4,4',5'-Pentachlorobiphenyl	ND	ND	ND	ND	ND
128	2,2',3,3',4,4'-Hexachlorobiphenyl	0.22 J	4.1	3.2	11	5.9
137	2,2',3,4,4',5'-Hexachlorobiphenyl	0.81 J	17	14	41	24
138	2,2',3,4,5,5'-Hexachlorobiphenyl	ND	3.1	2.8	8.2	4.7
149	2,2',3,4',5',6-Hexachlorobiphenyl	0.75 J	12 COL	9.5	29	17
151	2,2',3,5,5',6-Hexachlorobiphenyl	ND	2.6	2.3	6.5	3.7
153	2,2',4,4',5,5'-Hexachlorobiphenyl	0.89 J	14	11	33	19
156	2,3,3',4,4',5-Hexachlorobiphenyl	ND	1.9	1.6 J	5.1	2.9
157	2,3,3',4,4',5'-Hexachlorobiphenyl	ND	ND	ND	1.4 J, COL	0.84 J,COL
158	2,3,3',4,4',6-Hexachlorobiphenyl	ND	3.2	2.6	8.1	4.6
167	2,3',4,4',5,5'-Hexachlorobiphenyl	ND	1.1	0.81 J,COL	2.3	1.3 J
168	2,3',4,4',5',6-Hexachlorobiphenyl	ND	ND	ND	ND	ND
169	3,3',4,4',5,5'-Hexachlorobiphenyl	ND	ND	ND	ND	ND
170	2,2',3,3',4,4',5-Heptachlorobiphenyl	ND	4.1	3.4	8.7	5.2
174	2,2',3,3',4,5',6'-Heptachlorobiphenyl	ND	1.6 COL	1.5 J	3.3	2.2
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	ND	5.1	6.3	14	8.2
183	2,2',3,4,4',5',6-Heptachlorobiphenyl	ND	1.6	1.9	4.0	2.5
184	2,2',3,4,4',6,6'-Heptachlorobiphenyl	ND	ND	ND	ND	ND
185	2,2',3,4',5,5',6-Heptachlorobiphenyl	0.20 J	3.0	3.4	6.8	4.5
189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	ND	ND	ND	0.44 J,COL	ND
194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	ND	ND G	2.0	3.9	2.7
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	ND	0.38 J,COL	0.71 J	1.1 J,COL	0.71 J,COL
201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	ND	ND	ND	ND	ND
203	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	ND	ND G	3.0	7.3	ND G
202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	ND	3.3	ND	8.6	4.2

Table 2.3. PCB Congener Analysis for Two Sample Locations, Back River, Langley Air Force Base, Virginia

		Inner Shoreline ID Number	and Concentration (µg/kg)	Outfall 004 ID N	umber and Conce	entration (µg/kg)
Congener Number	Congeners of Polychlorinated Biphenyls	INS-A10-01	INS-A47-01	OF4-A2-01	OF4-A3-01	OF4-A3-31
205	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	ND	0.82 J,B	2.1	2.3	1.6 J
207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	ND	ND	ND	ND	ND
208	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	ND	1.2	1.1 J,COL	0.68 J	ND

J - Estimated result. Result is less than reporting limit.

COL - More than 40% reported between primary and confirmation column results. Lower of the two results is reported.

I - Matrix interference.

G - Elevated reporting limit. The reporting limit is elevated due to matrix interference.

B - Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Table 2.4. Results of Back River Benthic Macroinvertebrate Sampling at Site SS-63, Langley AFB, Virginia (Page 1 of 2)

	SD-01	SD-02	SD-03	SD-04	SD-05	SD-06	SD-07	SD-08	SD-09	SD-10
Depth	4.00	4.50	5.00	6.00	6.00	5.00	3.00	3.50	4.00	4.50
Temperature (°C)	NA	27.40	26.30	26.20	27.00	24.60	23.90	NA	NA	24.30
Salinity (%)	NA	1.58	1.62	1.61	1.62	1.58	1.96	NA	NA	1.86
Conductivity (ms/cm)	NA	25.70	26.30	26.10	26.20	26.80	31.20	NA	NA	29.60
pH	NA	8.10	8.17	8.15	8.23	8.10	8.11	NA	NA	8.14
Total Taxa	19.00	6.00	15.00	15.00	17.00	24.00	28.00	25.00	21.00	21.00
Mean Number of individuals	132.70	13.70	38.70	23.30	50.30	92.00	164.00	85.30	50.70	50.00
Shannon-Weiner Diversity	1.60	1.19	2.05	2.23	2.10	1.79	2.01	1.68	2.44	2.45
Simpson's Dominance Index	0.30	0.42	0.18	0.16	0.18	0.31	0.22	0.40	0.13	0.12
Species Richness	3.01	1.35	2.95	3.30	3.19	4.09	4.36	4.33	3.98	3.99
Species Evenness	0.54	0.66	0.76	0.82	0.74	0.56	0.60	0.52	0.80	0.81
Ash Free Dry Weight (AFDW) (grams)	0.018	0.001	0.013	0.025	0.013	0.013	0.021	0.013	0.026	0.067
Number of Intolerant (Sensitive) Species	2	1	2	1	2	2	2	2	2	2

Table 2.4. Results of Back River Benthic Macroinvertebrate Sampling at Site SS-63, Langley AFB, Virginia (Page 2 of 2)

	SD-11	SD-12	SD-13	SD-14	SD-15	SD-16	SD-17	SD-18	SD-19	SD-20
Depth	5.00	7.00	5.00	4.00	4.00	3.00	3.50	3.00	2.00	2.50
Temperature (°C)	23.70	23.90	NA	25.40	24.80	25.30	25.50	25.10	27.10	24.40
Dissolved Oxygen (DO) (mg/L)	7.76	7.72	NA	6.55	5.47	6.09	6.27	5.79	7.39	8.26
Salinity (%)	1.83	1.82	NA	1.60	1.43	1.49	1.39	1.37	1.01	1.01
Conductivity (ms/cm)	29.50	29.30	NA	26.10	23.20	25.00	22.90	22.50	17.10	17.10
рН	8.07	8.07	NA	7.87	7.74	7.86	7.78	7.74	7.86	6.52
Total Taxa	20.00	13.00	15.00	17.00	17.00	21.00	18.00	14.00	10.00	14.00
Mean Number of individuals	31.30	10.30	13.00	74.50	25.00	81.70	151.70	133.70	105.00	76.70
Shannon-Weiner Diversity	2.40	2.15	2.43	2.23	2.64	2.28	1.28	0.95	1.31	0.98
Simpson's Dominance Index	0.14	0.17	0.12	0.15	0.08	0.15	0.46	0.62	0.42	0.63
Species Richness	4.18	3.49	3.82	3.20	3.71	3.64	2.78	2.17	1.56	2.39
Species Evenness	0.80	0.84	0.90	0.79	0.93	0.75	0.44	0.36	0.57	0.37
Ash Free Dry Weight (AFDW) (grams)	0.018	0.010	0.014	0.019	0.022	0.064	0.076	0.041	0.049	0.029
Number of Intolerant (Sensitive) Species	1	1	1	3	3	3	3	3	3	3

NA – Not Available °C – degrees Celsius

mg/L - milligrams per liter

% - percent

ms/cm - millisiemens per centimeter

Table 2.5. Results of Mysid Shrimp Toxicity Data with Statistical Comparison at SS-63, Langley AFB, Virginia

Sample Location	Mean % Survival (SD)	Mean % Female with Eggs (SD)	Mean Mysid Dry Weight (mg) per Mysid (SD)
Lab Control	98(7)	83(36)	0.211(0.026)
TOX-01	95(9)	84(35)	0.233(0.037)
TOX-02	95(9)	81(35)	0.192(0.035)
TOX-03	98(7)	93(14)	0.174(0.022)
TOX-04	88(10) ^c	83(22)	0.187(0.022)
TOX-05	93(15)	92(15)	0.188(0.034)
TOX-06	94(10)	93(19)	0.152(0.039) ^a
TOX-07	100(0)	87(14)	0.150(0.032) ^a
TOX-08	85(14) ^{a,c}	89(16)	0.137(0.029) ^{a,b}
TOX-09	98(7)	80(19)	0.144(0.051) ^{a,b}
TOX-10	100(0)	94(18)	0.144(0.028) ^{a,b}

% - percent mg - milligrams

Notes:

^a Statistically different compared to the lab control data.

^b Statistically different compared to the TOX-04 (background control) data.

^c Statistically different compared to the TOX-10 (upstream control) data.

Table 2.6. Results of Analyses for Surface Water Sampling at Site SS-63, Langley AFB, Virginia

	EPA Region III	Ambient													
Parameter	Surface Water RBSLs ⁵	Water Quality Criteria	AMOC Befores	SW-01 Total	SW-01 Dissolved	SW-02 Total	SW-02 Dissolved	SW-03 Total	SW-03 Dissolved	SW-04 Total	SW-04 Dissolved	SW-05 Total	SW-05 Dissolved	SW-06 Total	SW-06
Temperature (°C)			AWQC Reference	25.60	25.60	24.90	24.90		24.30	24.00	24.00		24.60	25.60	Dissolved 25.60
	NA NA	NA	NA NA					24.30				24.60			
Salinity (%)	NA	NA	NA	1.58	1.58	1.62	1.62	1.61	1.61	1.63	1.63	1.58	1.58	1.51	1.51
Conductivity (ms/cm)	NA	NA	NA NA	25.70	25.70	26.30	26.30	27.00	27.00	26.40	26.40	25.90	25.90	24.60	24.60
рН	NA	NA	NA	8.22	8.22	8.22	8.22	8.06	8.06	8.01	8.01	7.99	7.99	7.95	7.95
Total Cyanide (mg/L)	0.73	0.001	NOAA Marine												
VOCs (ug/L)															
Acetone	610	-	-								1.72			1.86	1.82
Carbon disulfide	1000	-	-										0.0533		
Chloromethane	21	-	-												
Toluene	750	5000	NOAA Marine		0.514		0.815		0.650		0.203		0.108		0.129
m&p-Xylenes	12000	_	_												
SVOCs (ug/L)															
4-Chloro-3-methylphenol	120	_	_										6.26		
Di-n-butylphthalate	3700	3.4	NOAA Marine										1.20		
bis(2-Ethylhexyl)phthalate	48		Virginia Water Quality Standard				2.67				121		1.20		
	40	39	Virginia Water Quality Standard				2.07				121				
Chlorinated Pesticides & PCBs (ug/L)	0.000	0.0044	Virginia Water Coality Otacida												1
Aldrin	0.039	0.0014	Virginia Water Quality Standard		0.00447		0.00500			0.00504					0.0444
beta-BHC ¹	0.37	0.341	NOAA Marine		0.00447		0.00536			0.00521					0.0141
delta-BHC ¹	0.37 ¹	0.341	NOAA Marine		0.0165	0.0170		0.0147		0.00890				0.0161	0.00794
gamma-BHC ¹	0.52	0.34 ¹	NOAA Marine	0.0179	0.00829					0.00627	0.0187	0.00450			
alpha-Chlordane	1.9	0.002	NOAA Marine												
4,4'-DDD	2.8		Virginia Water Quality Standard				0.0107		0.0108	0.0147	0.0132				0.0119
4,4'-DDE	2	0.0059	Virginia Water Quality Standard											0.00786	
Endosulfan I ²	220	0.00435	NOAA Marine												
Endosulfan II ²	220	0.00435	NOAA Marine		0.00387										0.00413
Endrin	11	0.00115	NOAA Marine		0.0103		0.0109		0.0105		0.00974				0.0112
Endrin ketone ³	11	0.00115	NOAA Marine	0.00205	0.00223		0.00188								
Heptachlor	0.15	0.0018	NOAA Marine	0.00200	0.00220		0.00.00								
Heptachlor epoxide	0.074	0.0018	NOAA Marine		0.00472	0.00463	0.00538		0.00458		0.00407				0.00511
Chlorinated Herbicides (ug/L)	0.074	0.0010	NOAA Walifie		0.00472	0.00403	0.00550		0.00430		0.00407				0.00311
Dicamba	1100	_													
		_	-		0.407				0.0556		0.146				
Dichloroprop	290	-	-		0.127				0.0556	0.0007					
2,4,5-T	370	-	-							0.0337	0.0180				
MCPA	18	-	-							63.7					
Metals (mg/L)															
Aluminum	37	0.087	NOAA Fresh	0.701		0.743		0.777		1.19		0.246		1.48	
Antimony	0.015	0.5	NOAA Marine	0.00452		0.00681				0.0108		0.00501			
Arsenic⁴	0.00045	0.036 ⁴	NOAA Marine											0.00374	
Barium	2.6	-	-	0.0272	0.0256	0.0269	0.0253	0.0279	0.0248	0.0542	0.0241	0.0261		0.0306	0.0552
Beryllium	0.073	0.0053	NOAA Fresh												1
Cadmium	0.018	0.0093	NOAA Marine												1
Calcium	_	_	_	207	209	205	207	193	195	409	192	210	0.0633	189	369
Chromium	0.11	0.05	NOAA Marine	0.00139		0.00139		0.000980	0.00109	0.00660		0.00106		0.00365	
Cobalt	0.73	-	-	3.33100		3.33100		0.00000	0.00100	1.55555		5.55100		3.53000	1
Copper	1.5	0.0031	NOAA Marine												1
Iron	1.5	0.0031	NOAA Marine NOAA Fresh	0.620	0.0863	0.624		0.713		1.09		0.402		1.33	0.200
	0.011	0.00094	NOAA Fresii NOAA Marine	0.020	0.0003	0.024		0.713		1.09		0.40∠		1.33	0.200
Mercury	0.011														1
Lead		0.0081	NOAA Marine	000	007	00.4	7.0	707 :	005 :	740 :	075 :	000 1	0.0040	044.1	046
Magnesium		-	-	698	687	691	712	707 J	695 J	718 J	675 J	668 J	0.0818	641 J	649 J
Manganese	0.73	-	-	0.0238		0.0197		0.0214		0.0554	0.0145	0.0256		0.0547	0.0439
Nickel	0.73	0.0082	NOAA Marine												1
Potassium	-	-	-	219 J	215	217	220	205 J	203 J	215 J	208 J	203 J		187 J	188 J
Selenium	0.18	0.071	NOAA Marine	0.0130	0.0144	0.0136	0.0161	0.0135	0.0183	0.0333	0.0159	0.0156		0.0126	0.0277
	0.18	0.00095	NOAA Marine												1
Silver					1	i			=000	l				=000	5340 J
	-	-	-	5590	5500	5550	5630	5720 J	5630 J	5920 J	5710 J	5630 J	0.556	5300 J	3340 J
Sodium	-			5590	5500	5550	5630	5720 J	5630 J 0.00323	5920 J 0.00686	5710 J	5630 J	0.556	5300 J	5540 5
Sodium Thallium	0.0026	2.13	- NOAA Marine -	5590	5500	5550	5630	5/20 J	0.00323	5920 J 0.00686	5710 J	5630 J	0.556		5540 3
Sodium	-	2.13		5590	5500	5550	5630	5720 J			5710 J	5630 J	0.556	0.00216	5540 3

NA - Not applicable
- Screening criteria unavailable
Blank cell - Analyte was not detected in any of the samples from the indicated investigation.
B - Concentration similar to low-level concentrations found in associated blanks.

J - Estimated value.

BHC used as surrogate

Endosulfan used as surrogate

³ Endrin used as surrogate

⁴ Total Arsenic used as surrogate ⁵ Surface water RBSLs were determined by multiplying tap water RBSLs by 10

Indicates result exceeds Human Health Criteria

Indicates result exceeds Ecological Health Criteria
Indicates result exceeds Ecological and Human Health Criteria

Table 2.6. Results of Analyses for Surface Water Sampling at Site SS-63, Langley AFB, Virginia

	EDA Desien III	Ambiant	1		1	ı	T	1		ı			ı
	EPA Region III Surface Water	Ambient Water Quality		SW-07	SW-07	SW-07	SW-07	SW-08	SW-08	SW-09	SW-09	SW-10	SW-10
Parameter	RBSLs ⁵	Criteria	AWQC Reference	Total	Total-Dup	Dissolved	Dissolved-Dup	Total	Dissolved	Total	Dissolved	Total	Dissolved
Temperature (°C)	NA NA	NA	NA	24.70	24.70	24.70	24.70	26.60	26.60	27.10	27.10	24.40	24.40
Salinity (%)	NA NA	NA NA	NA NA	1.48	1.48	1.48	1.48	1.27	1.27	1.01	1.01	1.01	1.01
Conductivity (ms/cm)	NA NA	NA NA	NA NA	24.40	24.40	24.40	24.40	21.10	21.10	17.10	17.10	17.10	17.10
pH	NA NA	NA NA	NA NA	7.86	7.86	7.86	7.86	7.86	7.86	7.86	7.86	6.52	6.52
Total Cyanide (mg/L)	0.73	0.001	NOAA Marine	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	0.32	0.32
VOCs (ug/L)	0.10	0.001	1407 V (Warnie										
Acetone	610	_	_	1.13	1.58				2.47	2.17	2.28		
Carbon disulfide	1000	_	_	1.10	1.00				2	,	2.20		
Chloromethane	21	_	_			0.291	0.320						
Toluene	750	5000	NOAA Marine			0.201	0.0942		0.132	0.0916	0.168		2.06
m&p-Xylenes	12000	-	-				0.00.2		002	0.00.0	0.142		2.00
SVOCs (ug/L)	.2000										02		
4-Chloro-3-methylphenol	120	_	_										
Di-n-butylphthalate	3700	3.4	NOAA Marine										
bis(2-Ethylhexyl)phthalate	48	59	Virginia Water Quality Standard										
Chlorinated Pesticides & PCBs (ug/L)	-		<u> </u>										
Aldrin	0.039	0.0014	Virginia Water Quality Standard	0.00965		0.0127	0.0120						
beta-BHC ¹	0.37	0.341	NOAA Marine		0.00776 J								
delta-BHC ¹	0.37^{1}	0.34 ¹	NOAA Marine		0.00387 J	0.0102	0.0109	0.00447			0.0178	0.0134	
gamma-BHC ¹	0.52	0.34 ¹	NOAA Marine		0.00463 J	0.00450	0.00382	0.00510		0.0121	0.0151	0.0111	
alpha-Chlordane	1.9	0.002	NOAA Marine									0.00135	
4,4'-DDD	2.8	0.0084	Virginia Water Quality Standard									0.0144	0.0129
4,4'-DDE	2	0.0059	Virginia Water Quality Standard						0.00482				
Endosulfan I ²	220	0.00435	NOAA Marine										
Endosulfan II ²	220	0.00435	NOAA Marine									0.00455	
Endrin	11	0.00115	NOAA Marine									0.0119	0.0106
Endrin ketone ³	11	0.00115	NOAA Marine										0.00190
Heptachlor	0.15	0.0018	NOAA Marine			0.0195 J			0.0208		0.0227		
Heptachlor epoxide	0.074	0.0018	NOAA Marine										0.00405
Chlorinated Herbicides (ug/L)													
Dicamba	1100	-	-								0.0361		
Dichloroprop	290	-	-										
2,4,5-T	370	-	-										
MCPA	18	-	-										
Metals (mg/L)													
Aluminum	37	0.087	NOAA Fresh	0.464	0.719			1.12		0.454		0.672	
Antimony	0.015	0.5	NOAA Marine		0.00953 J	0.00845	0.00884		0.00719				
Arsenic ⁴	0.00045	0.036 ⁴	NOAA Marine		0.00276 J	0.00269 J			0.00490				
Barium	2.6	-		0.0299	0.0302	0.0291	0.0298	0.0340	0.0322	0.0334	0.0326	0.0296	0.0289
Beryllium	0.073	0.0053	NOAA Fresh										
Cadmium	0.018	0.0093	NOAA Marine	400	400	400	404	470	470	404	400	455	404
Calcium	-	-	-	183	193	196	184	172	176	131	138	155	181
Chromium	0.11	0.05	NOAA Marine		0.00384	0.00178	0.00144		0.00242	0.00252		0.00160	
Cobalt	0.73 1.5	0.0021	NOAA Marine										
Copper	1.5	0.0031	NOAA Marine NOAA Fresh	0.672	0.953			1.10	0.0821	0.746		0.633	
Iron Mercury	0.011	0.00094	NOAA Flesii NOAA Marine	0.672	0.955			0.000106	0.0621	0.0000750		0.033	
II	0.011	0.00094	NOAA Marine					0.000100		0.0000730			
Lead Magnesium	_	0.0061		588 J	613 J	602 J	592 J	542 J	543 J	421	437 J	467	572
Manganese	0.73	-	-	0.0676	0.0671	0.0308	0.0326	0.0964	0.0600	0.102	0.0528	0.0736	0.0385
Nickel	0.73	0.0082	NOAA Marine	0.0070	0.0071 0.00231 J	0.0300	0.0320	0.0304	0.0000	0.102	0.0320	0.0730	0.0303
Potassium	0.73	0.0062	NOAA Maille	168 J	180 J	176 J	172 J	156 J	154 J	111 J	120 J	243	171
Selenium	0.18	0.071	NOAA Marine	0.0155	0.0137	0.00965	0.0174	0.0109	0.0105	0.00994	0.00933	0.0113	0.0126
Silver	0.18	0.00095	NOAA Marine	0.0100	0.0137	0.00900	0.0174	0.0109	0.0103	0.00994	0.00300	0.0113	0.0120
Sodium	0.10	0.00093	-	4830 J	5110 J	5010 J	4900 J	4520 J	4500 J	3330	3600 J	3770	4560
Thallium	0.0026	2.13	NOAA Marine	+000 0	0.100	55103	70000	7020 0	0.00325	0000	5550 5	5770	+500
Vanadium	0.0026	2.13	NOAA Maille						0.00020				
Zinc	11	0.081	NOAA Marine		0.0110								
<u> </u>					1	I	L	I.	1	·	1	1	·

NA - Not applicable
- Screening criteria unavailable
Blank cell - Analyte was not detected in any of the samples from the indicated investigation.
B - Concentration similar to low-level concentrations found in associated blanks.

Indicates result exceeds Human Health Criteria

Indicates result exceeds Ecological Health Criteria
Indicates result exceeds Ecological and Human Health Criteria

J - Estimated value.

BHC used as surrogate
Endosulfan used as surrogate

³ Endrin used as surrogate

⁴ Total Arsenic used as surrogate ⁵ Surface water RBSLs were determined by multiplying tap water RBSLs by 10

Table 2.7. Results of Analyses for Sport Fish (Large Fish) Sampling at Site SS-63, Langley AFB, Virginia

	FDA Action	FDA	EPA RBSLs	BIO-01	BIO-02	BIO-03	BIO-04	BIO-05	BIO-06	BIO-07	BIO-08	BIO-10	BIO-11
Parameter	Levels	Reference	for Fish										
Lipids (%)	-		-	3.31	3.12	6.01	3.24	3.91	5.42	3.39	4.73	5.75	7.06
Total Cyanide (mg/kg)	-	-	2.7										
SVOCs (mg/kg)													
Chlorinated Pesticides & PCBs (ug/kg)													
alpha-BHC	-	-	0.5	0.137	0.188	0.0744	0.212	0.223	0.104	0.134	0.132		
delta-BHC	-	-	1.8	0.178	0.212								
gamma-BHC	-	-	2.4	0.196		0.126				0.0813			
4.4'-DDD	_	-	13	2.03	2.23			28.4	6.41		6.58	5.04	6.42
4.4'-DDE	5000	Fish	9.3	13.5	11.0	4.00	6.42	37.9	22.7	4.54	15.3	29.2	30.7
Heptachlor	300	Fish	0.7					0.10					
PCB-1248	2000	Fish	1.6					104	19.2		23.7	16.7	26.2
PCB-1254	2000	Fish	1.6	47.9	48.8	37.2	42.0	308	142	31.1	97.3	68.9	72.5
PCB-1260	2000	Fish	1.6	22.8	11.5	34.3	17.3	97.2	58.7	11.2	42.1	39.8	55.8
Chlorinated Herbicides (ug/kg)	2000					00		<u> </u>				55.5	55.5
Metals (mg/kg)													
Aluminum	_	_	140										
Arsenic	76	Crustacea	0.0021	1.50	1.81		0.840	1.28	1.04	2.56	2.10	0.742	1.03
Barium	-	-	9.5				2.0.0					4.1. 1	
Beryllium	_	_	0.27										
Cadmium	3	Crustacea	0.14										
Calcium	_	-	_	1320		276				168			848
Chromium	12	Crustacea	200										
Cobalt	-	-	2.7										
Copper	_	_	5.4	0.228	0.439	0.315	0.395	0.332	0.427	0.335	0.316	0.451	0.419
Iron	_	_	41	0.220	0.100	0.0.0	0.000	0.002	0	0.000	0.0.0	0	00
Mercury	1	Fish	0.014	0.0593	0.0512	0.0486	0.0692	0.0521	0.0238	0.0598 J	0.0395	0.0504	0.0530
Lead	1.5	Crustacea	0.000014	0.000	0.00.1	0.0.00	0.0002	0.002	0.0200	0.0000	0.0000	0.000	0.0000
Magnesium	-	Oraciacca	-	317	288	300	304	348	358	349	360	315	282
Manganese	_		19	011	200	000	001	0.10	000	0.10	000	0.10	202
Nickel	70	Crustacea	2.7										
Potassium	-	-	2.7	3511	3440	3489	3952	3863	3711	3650	3840	3525	3292
Selenium	_	_	0.68	0.638	1.05	1.14	0.914	0.758	0.854	0.789	0.868	0.636	0.670
Silver	_	_	0.68	0.000	1.00	1.14	0.014	0.700	0.004	0.700	0.000	0.000	0.070
Sodium	_	-	0.00	296	317	335	403	633	622	717	707	472	263
Thallium	_	-	0.0095	230	317	333	700	000	022	/ ' '	, , ,	712	200
Vanadium	_	-	0.0093										
Zinc	_	-	41.0	5.77	4.78	5.78	5.36	5.31	5.13	5.45	5.65	5.72	5.13
PCTs (mg/kg)	-		71.0	5.11	7.70	5.70	3.30	5.51	0.10	0.70	5.05	5.12	0.10
Aroclor 5432	2000 ³	Fish	0.0007	0.0226				0.379	0.155		0.158	0.0318	0.0586
Moisture (%)	2000	-	0.0007	77.2	75.6	71.4	75.3	76.3	73.3	76.1	73.7	73.5	72.1
woisture (/o)	-	-	-	11.2	75.0	/ 1.4	15.3	10.3	13.3	/0.1	13.1	13.5	12.1

Blank cell - Analyte was not detected in any of the samples from the indicated investigation.

Yellow indicates result exceeds RBSL

B - Concentration similar to low-level concentrations found in associated blanks.

J - Estimated value.

Table 2.8. Results of Analyses for Blue Crab Sampling at Site SS-63, Langley AFB, Virginia

Parameter	FDA Action Levels	FDA Reference	EPA RBSLs for Fish	BIO-01 Meat	BIO-01 Total Tissue	BIO-03 Meat	BIO-03 Total Tissue	BIO-04 Meat	BIO-04 Total Tissue	BIO-04 Total Tissue-Dup	BIO-06 Meat	BIO-06 Total Tissue	BIO-08 Meat	BIO-08 Total Tissue	BIO-11 Meat	BIO-11 Total Tissue
Lipids (%)	-	-	-	0.647	1.47	0.998	1.25	0.93	2.34	2.11	0.599	1.45	0.655	2.84	0.624	3.18
Total Cyanide (mg/kg)				0.047	1.77	0.000	1.20	0.00	2.04	2.11	0.000	1.40	0.000	2.04	0.024	0.10
SVOCs (mg/kg)																+
Acenaphthene																
Anthracene																
Benz(a)anthracene																
Benz(a)pyrene																
Benzo(b)fluoranthene																
Benzo(g,h,i)perylene																
Benzo(k)fluoranthene																
4-Methylphenol			0.60		0.0754				0.130	0.144		0.166		0.0902		
	-	-	0.68	0.400	0.0754					0.144		0.100		0.0902		0.400
bis(2-Ethylhexyl)phthalate	-	-	0.23	0.120	0.440	0.400		0.400	0.0792 J	0.450	0.400	0.000		0.040		0.198
Phenol	-	-	81		0.113	0.126		0.120	0.164	0.152	0.133	0.0680		0.216		0.108
Chlorinated Pesticides & PCBs (ug/kg)																
alpha-BHC	-	-	0.5													
delta-BHC	-	-	1.8											1.08		1
gamma-BHC Lindane	-	-	2.4													1
gamma-Chlordane	300	Fish	9											0.200		0.222
Dieldrin	300	Fish	0.2		1.08				2.16	2.05				3.53		4.62
4,4'-DDD	-	-	13	3.39	2.73		2.25		2.88	2.67	0.513	1.81				
4,4'-DDE	5000	Fish	9.3	11.1	10.4		6.30	4.05	15.8	16.6		13.3	1.27	25.5	2.24	34.3
Endosulfan I	-	-	810													
Endosulfan sulfate	-	-	810				0.165		0.180 J			0.196		0.431		
Endrin	-	-	41						1.67	1.89				2.94		2.38
Heptachlor	300	Fish	0.7		0.156		0.195	0.0757	0.0864 J	0.164 J		0.166		0.549		0.29
Heptachlor epoxide	300	Fish	0.35		1.43		1.23	0.792	1.80	1.74		1.07		1.92		2.90
PCB-1254	2000	Fish	1.6	23.1		78.8									8.48	
Chlorinated Herbicides (ug/kg)						7 0.0									00	1
MCPP	_	_	140			24500										
2,4,5-T	_	_	1400		20.8	28.0	19.5			25.0 J						39.6
2,4,5-TP	_	_	1100		20.0	20.0	4.95		3.60 J	8.82 J						33.0
Metals (mg/kg)			1100				4.00		3.00 0	0.02 0						+
Aluminum			140	15.3	42.8	6.51	29.7	7.25	13.2	13.4	6.19	39.6	8.12	17.5	6.53	25.2
Antimony	-	_	0.054	15.5	42.0	0.51	29.1	7.25	13.2	13.4	0.19	39.0	0.12	17.5	0.55	25.2
	- 76			2.05	4.00	4.40	2.00	2 20	2.74	2.05	2.00	0.00	1.75	2.06	1.07	0.024
Arsenic	76	Crustacea	0.0021	3.05	1.86	4.18	2.88	3.38	2.74	2.95	3.08	2.33	_	2.06		0.924
Barium	-	-	9.5	0.477	0.780	0.333	1.47	0.405	0.594	0.636	0.308	0.740	0.336	1.45	0.288	0.634
Beryllium	-		0.27													
Cadmium	3	Crustacea	0.14													
Calcium	-	-	-	2233	3237	1414	6060	1989	2502	2255	985	4621	1506	4704	806	1346
Chromium	12	Crustacea	200		1.16										0.304 B	
Cobalt	-	-	2.7													
Copper	-	-	5.4	6.62	14.7	7.75	10.1	8.62	9.34	9.94	8.05	7.85	6.09	9.49	8.54	7.85
Iron	-	-	41	14.20	61.8	12.1	49.7	13.1	34.4	57.4	11.1	59.9	11.4	30.2	10.2	47.4
Mercury	1	Fish	0.014													
Lead	1.5	Crustacea	0.000014													
Magnesium	-	-	-	547	449	352	642	454	391	420	352	797	444	633	365	305
Manganese	-	-	19	1.45	3.13	1.47	7.55	1.58	2.81	3.18	1.09	4.15	1.10	3.57	0.848	2.14
Nickel	70	Crustacea	2.7	0.431	0.351	0.263		0.370	0.342	0.431	0.496	0.347	0.425	0.274	5.25	0.792
Potassium	-	-	-	2002	2028	2730	1461	2464	2088	2276	2839	1555	2443	2215	2544	1175
Selenium	-	_	0.68	0.524	0.559	0.508		0.616	0.594	0.574	0.684		0.620		0.464	1
Silver	_	_	0.68	0.785	0.637	0.333	0.825	0.458	0.522	0.595	0.445	0.468	0.425	0.451	0.288	0.330
Sodium	_	_	-	3419	6279	2363	2970	3643	2952	3198	3061	4017	3133	3606	2656	2310
Thallium	_	_	0.0095	0-710	0210	2000	2010	0040	2002	0.00	0001	7017	0100	3300	2000	2010
Vanadium			0.0095		0.208		0.210					0.196				
	-	-		27.4		22.0		44.0	0E 7	06.4	24 5		20.0	27.6	44.4	22.4
Zinc	-	-	41.0	37.1	25.2	33.8	29.6	41.9	25.7	26.4	31.5	26.9	38.2	37.6	41.4	33.1
PCTs (mg/kg)		1		04.0	07.0	00.5	05.0	00.4	00.0	70.5	00.0	0.1.0	00.0	00.4	04.0	
Moisture (%)	-	-	ed investigation.	84.6	87.0	82.5	85.0	82.4	82.0	79.5	82.9	84.9	82.3	80.4	84.0	86.8

Blank cell - Analyte was not detected in any of the samples from the indicated investigation.

B - Concentration similar to low-level concentrations found in associated blanks.

J - Estimated value.

Table 2.9. Results of Analyses for *Fundulus* (Small Fish) Sampling at Site SS-63, Langley AFB, Virginia

							1	1									
	FDA Action	FDA	EPA RBSLs	BIO-01	BIO-01	BIO-02	BIO-03	BIO-04	BIO-05	BIO-06	BIO-06	BIO-07	BIO-08	BIO-09	BIO-10	BIO-11	BIO-12
Parameter	Levels	Reference	for Fish		Duplicate			M/M			Duplicate						
Lipids (%)	-	-	-	1.52	1.52	1.17	1.76	2.08	1.25	2.27	2.65	1.54	2.44	1.62	1.57	2.41	1.98
Total Cyanide (mg/kg)			2.7														
SVOCs (mg/kg)																	1
bis(2-Ethylhexyl)phthalate	-	-	0.23														1
Phenol	-	-	81	0.901 J	0.750 J				0.114					0.128	0.0907	0.377	1
Chlorinated Pesticides & PCBs (ug/kg)																	
alpha-BHC	-	-	0.5	0.664	0.605		0.116		0.155	0.0747 J	0.320 J	0.234	0.277	0.339	0.145	0.256	0.667
beta-BHC	-	-	1.8	1.49	1.26	0.0941				1.12 J	0.290 J	0.675	0.958	0.726	0.179	0.286	0.0815
delta-BHC	-	-	1.8	2.37 J	1.57 J							0.229					1
gamma-BHC	-	-	2.4	0.0758 J								0.166	0.227				0.245
4,4'-DDD	-	-	13	23.5	23.5	8.05	4.18	21.9	1.97	9.46	8.32	1.98	3.28	7.94	2.74	2.21	3.95
4,4'-DDE	5000	Fish	9.3	41.7	41.9	16.7	7.66	38.8	10.0	33.6	31.8	12.5	30.2	42.8	17.2	19.1	32.1
Heptachlor	300	Fish	0.7														1
PCB-1248	2000	Fish	1.6			3.34					9.07 J						1
PCB-1254	2000	Fish	1.6	27.3	24.2	18.4	22.0	36.0	16.4	55.3	50.4	48.2	83.2	106	20.1	26.1	76.6
PCB-1260	2000	Fish	1.6	62.3	63.4	11.9	5.57	27.5	8.96	82.7	76.1	17.4	40.3	174	12.3	16.1	27.2
Chlorinated Herbicides (ug/kg)**																	
Dicamba	-	-	4100										7.81				1
MCPP	-	-	140	37920 J													1
2,4,5-T	-	-	1400				4.41					6.27	7.06				1
Metals (mg/kg)																	
Aluminum	-	-	140	57.4	51.8		31.6			54.5 J	85.2 J	44.8	31.5	120	164	90.9	1
Antimony	-	-	0.054														1
Arsenic	76	Crustacea	0.0021	1.28	1.38	0.690	2.18	1.59	0.941	1.42	1.51	0.747	0.605	0.944	0.931	0.879	0.766
Barium	-	-	9.5	1.68	1.72	1.11	2.95	2.66	1.52	1.79	2.44	0.868	1.97	1.43	1.54	1.18	1.31
Beryllium	-	-	0.27														1
Cadmium	3	Crustacea	0.14														1
Calcium	-	=	-	20074	19820	9823	27608	11850	15568	16907	20513	8435	20614	22603	16415	15186	13486
Chromium	12	Crustacea	200														1
Cobalt	-	-	2.7														1
Copper	-	_	5.4	3.65	2.78	0.627	1.95	2.17	1.32	2.12	2.55	0.988	1.41	1.77	3.63	1.08	1.06
Iron	-	-	41	65.4	59.8	21.5		19.8	19.1	59.3 J	98.5 J			127.00	156.00	93.60	1
Mercury	1	Fish	0.014	0.00972 J	0.0242 J	0.0142	0.00998	0.0277	0.0130	0.0324	0.0353	0.0169	0.00983	0.0215	0.0294	0.0143	0.00963
Lead	1.5	Crustacea	0.000014	1.19	1.06										0.10_0		
Magnesium	-	-	-	692	687	443	793	471	598	588	663	465	673	714	635	582	605
Manganese	_	_	19	10.5	9.70	1.99	12.9	4.55	2.89	4.81	6.40	4.82	5.67	14.1	15.1	11.8	2.49
Nickel	70	Crustacea	2.7														: · •
Potassium	-	-		2678	2759	2884	2668	3095	2688	2938	2873	2772	2671	2807	2842	2811	2841
Selenium	_	_	0.68	1.02	0.0944	0.961	0.789	0.901	0.851	0.996	1.08	0.651	0.706	1.11	0.858	0.954	0.667
Silver	_	_	0.68	0.147	0.140	-0.001	011.00	0.116	-0.001	-0.000	0.0832 J	0.001	-01100	0.0702	0.0735	-0.001	0.00.
Sodium	_	_		1716	1815	1739	1993	1580	1933	1863	1882	1622	1704	1895	1573	1581	1502
Thallium	_	_	0.0095	17.10	1010	1700	1000	1000	1000	1300	1002	1022	1704	1000	1070	1001	1002
Vanadium	_	_	0.95	0.284	0.290		0.255			0.209	0.328		0.219	0.532	0.564	0.452	1
Zinc	_	_	41.0	43.6	44.0	19.0	48.0	31.9	30.9	32.4	38.3	25.1	42.8	44.8	40.4	34.4	46.4
PCTs (mg/kg)		_	71.0	70.0	77.0	10.0	40.0	01.0	50.5	52.7	55.5	۷. ۱	72.0	77.0	7 ∪. 7	U-1.T	70.7
Moisture (%)	-	-	-	76.3	75.8	79.1	76.8	76.9	77.6	75.1	74.8	75.9	74.8	75.8	75.5	74.9	75.3
morotare (70)		_		70.0	7 0.0	7 3. 1	70.0	10.0	11.0	7 0.1	1-7.0	10.0	17.0	70.0	70.0	17.0	, 0.0

Blank cell - Analyte was not detected in any of the samples from the indicated investigation. B - Concentration similar to low-level concentrations found in associated blanks.

Yellow indicates results exceed RBSL

J - Estimated value.

Table 2.10. Results of Analyses for Bivalves at Site SS-63, Langley AFB, Virginia

	1	1							1								
B	FDA Action		EPA RBSLs	BIO-01	BIO-02	BIO-03	BIO-04	BIO-05	BIO-06	BIO-07	BIO-08	BIO-08	BIO-09	BIO-09	BIO-10	BIO-11	BIO-12
Parameter	Levels	FDA Reference	1	Oyster	Mussel	Mussel	Mussel	Mussel	Mussel	Mussel	Mussel	Mussel-Dup	Mussel	Mussel-Dup	Mussel	Mussel	Mussel
Lipids (%)	-	-	-	0.712	0.608	0.600	0.602	0.320	0.106	0.490	1.06	0.882	0.264	0.220	0.300	0.924	0.450
Total Cyanide (mg/kg)	-	-	2.7	ND	1.34	1.20	1.50	1.91	1.53	1.33	0.931	1.07	ND	0.880	2.08	0.816	1.09
SVOCs (mg/kg)			0.0040		ND					N.D.							
Benz(a)anthracene	-	-	0.0043		ND		0.0366			ND							ND
Benz(a)pyrene	-	-	0.00043				0.0437										
Benzo(b)fluoranthene	-	-	0.0043				0.0484										
Benzo(g,h,i)perylene	-	-	4.1	0.0596					0.0525								
Chrysene	-	-	0.43				0.0389										
2,6-Dinitrotoluene	-	-	0.14					0.0496	0.0742						0.0516		
bis(2-Ethylhexyl)phthalate	-	-	0.23														
2-Methylphenol	-	-	6.8			0.0518	0.0472				0.0893	0.0725				0.0650	
Phenanthrene	-	-	4.1					0.0336									
Pyrene	-	-	4.1				0.0590										
Chlorinated Pesticides & PCBs (ug/kg)																	
Aldrin	300	Fish	0.19	0.303							0.134 J	0.0706 J				0.131	
alpha-BHC	-	-	0.5	0.160		0.353	0.555		0.212	0.154	0.470 J	0.304 J	0.264 J	0.380 J		0.747	
beta-BHC	-	-	1.8			2.18										2.08	
delta-BHC	-	-	1.8	0.703					1								
4,4'-DDD	-	-	13				9.20		1							6.47	
4,4'-DDE	5000	Fish	9.3	7.74		0.713	1.77	0.536	0.954	0.525	3.65	3.23	1.67	2.26		5.01	
4,4'-DDT	5000	Fish	9.3				3.07	2.72	1.59								
Endosulfan I	-	-	810			0.735							0.255 J				
Endosulfan sulfate	_	_	810										0.207 J				
Endrin aldehyde	_	_	41		0.555	0.420			0.901	1.05					0.660 J		0.503
Endrin ketone	_	_	41		5.555	****				0.315					0.282		
Heptachlor	300	Fish	0.7							0.0.0					0.202		
Heptachlor epoxide	300	Fish	0.35	0.427			0.472							0.0935 J			
PCB-1254	2000	Fish	1.6	35.6	9.88		11.8	23.2	7.42	7.70	24.0	32.3		0.0000	9.00	16.2	24.0
PCB-1260	2000	Fish	1.6	00.0	3.00		11.0	4.72	7.42	7.70	24.0	5.78 J			3.00	10.2	24.0
Chlorinated Herbicides (ug/kg)	2000	1 1011	1.0					7.12				3.700					
Dicamba	_	_	4100	2.82							9.41	10.0		ND		12.6	
2,4-DB	1000	Fish	1100	24.9		180	168				144 J	78.4 J	8.14 J	ND		98.6	
2,4,5-T	-	-	1400	24.0	21.3	100	100	22.4	21.2	23.1	1440	70.40	0.140		22.2 J	30.0	23.3
2,4,5-TP	_	_	1100	1.50	21.0	13.7		22.4	21.2	20.1		8.13 J	3.52 J		22.2 0	6.47	20.0
Metals (mg/kg)	-	-	1100	1.50		13.7						0.133	3.32 3			0.47	
Aluminum		_	140	48.1	12.3	15.2	142	35.7	18.5	32.6	160 J	63.9 J			15.7		18.1
Antimony	_	_	0.054	40.1	12.5	13.2	142	33.7	10.5	32.0	100 3	03.93			15.7		10.1
Arsenic	86	Bivalves	0.0021	1.43	0.844	0.915	1.13	0.744	0.694	0.665	1.03	0.715					0.818
Barium	00	bivaives	9.5	0.312	0.044	0.915		0.744	0.694	0.665	0.768	0.715	0.216	0.369		0.262	0.010
	-	-		0.312		0.225	1.46				0.766	0.343	0.216	0.369		0.202	
Beryllium		_	0.27	0.407		0.400	0.450	0.400	0.444	0.0000	0.444	0.407	0.400	0.404		0.400	
Calaires	4		0.14	0.427	4045 !	0.128	0.153	0.120	0.111	0.0980	0.144	0.127	0.136	0.121	047 !	0.100	040 1
Calcium	-	- D5	-	3587	1345 J	551	926	920 J	294 J	334 J	1776 J	528 J	308	339	247 J	257	243 J
Chromium	13	Bivalves	200	6.84		0.180	1.50	1.52	1	1.13	0.682	0.529	0.383	0.385		0.216	
Cobalt	-	-	2.7	40.5	4.70 !	4.40	0.00		1		4 75	404	0.007	0.004		4.07	
Copper	-	-	5.4	18.5	1.73 L	1.16	2.08	74.0	00.1.1	44.0	1.75	1.31	0.937	0.864	00.0	1.27	04.5
lron	<u> </u>		41	109	24.5	42.8	297	71.6	38.1 J	44.0	265 J	100 J	44.0	41.6	29.3	35.7	31.5
Mercury ¹	1	Fish	0.014			0.00645	0.0142		0.0201		0.00922	0.0127				0.00624	
Lead ²	1.7	Bivalves	0.000014	2.23													
Magnesium	-	-	-	521	401	554	627	410	346	370	757	507	360	364	287	291	324
Manganese	-	-	19	3.99	3.53	0.968	6.21	3.61	2.45	33.2	13.5 J	5.24 J	1.75	1.99	2.56	2.07	4.80
Nickel	80	Bivalves	2.7	0.498	0.274		0.283	0.288	1	0.959	0.346	0.196				0.216	0.225
Potassium	-	-	-	908	590	679	768	662	368	516	676	635	369	358	382	665	628
Selenium	-	-	0.68	0.472	0.593		0.779	0.480	0.620	0.630		0.529 J		1		0.693	
Silver	-	-	0.68	1.14	0.122	0.165	1.24	0.280	0.101	0.175	0.547	0.490	0.616 J	0.281 J	0.102	0.193	0.203
Sodium	-	-	-	3186	2956	4088	3788	2968	2655	2737	3197	3048	2477	2431	2058	1825	2513
Thallium	-	-	0.0095						1								
Vanadium	-	-	0.95	0.240			1.09		1		0.365	0.284					
Zinc		-	41.0	457	6.00 L	7.03	9.45	6.50 L	<u> </u>	5.61 L	8.48	7.90		4.52		6.78	5.00 L
DCT- (m-m/len)																	
PCTs (mg/kg)														1			
PCTs (mg/kg) Aroclor 5432	2000 ³	Fish	0.0007	0.0294	ND	ND	0.0224	ND	0.0403	ND	0.0278	0.0225	ND	ND	ND	0.0223	0.0248

Blank cell - Analyte was not detected in any of the samples from the indicated investigation.

B - Concentration similar to low-level concentrations found in associated blanks.

J - Estimated value.

L - Potentially biased low.

¹ Methylmercury used as RBSL surrogate

² Tetraethyllead used as RBSL surrogate

Table 2.11. Human Health Total Risk Summary for Site SS-63, Langley AFB, Virginia

Medium of Concern	Child Fisher	Adult Fisher	Other Recreational Person ¹	Other Worker ²
Receptor Hazard Index				
Surface Water	0.00022	0.0001	0.008	0.002
Animal Tissue (crabs & fish)	6 (0.98)	5 (0.80)	NA	NA
Total	6 (0.98)	5 (0.80)	0.008	0.002
Receptor Cancer Risk				
Surface Water	4E-09	1E-08	2E-07	2E-07
Animal Tissue (crabs & fish)	2E-04 (1E-05)	8E-04 (3E-05)	NA	NA
Total	2E-04 (1E-05)	8E-04 (3E-05)	2E-07	2E-07
Receptor Hazard Index				
Animal Tissue (bivalve)	3	2	NA	NA
Receptor Cancer Risk				
Animal Tissue (bivalve)	7E-05	3E-04	NA	NA

 \overline{NA} = Not applicable; pathway not evaluated.

Values in parentheses indicate central tendency value.

¹ JetSkier ² Sea Rescue Trainer

Table 2.12. Total Risk Characterization Summary for Site SS-63: Cancer Risks, Langley AFB, Virginia

		Estimated To	tal Cancer Risk		
Scenario	Receptor Age	Reasonable Maximum	Central Tendency	COPC and Pathway Risk ≥ 1E-06	Primary Site Specific Uncertainties
Current/Future Scenarios					
Fisher (chronic) (Fish & Crabs)	Child	2E-04	1E-05	 Ingestion of arsenic, Aroclor 5432, PCB-1254, PCB-1248, and PCB- 1260 in fish tissue. Ingestion of arsenic in crab tissue 	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs in seafood.
Fisher (chronic) (Fish & Crabs)	Adult	8E-04	3E-05	 Ingestion of arsenic, arclor 5432, PCB-1254, PCB-1248, PCB-1260 in fish tissue. Ingestion of arsenic and PCB-1254 in crab tissue 	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs in seafood.
Other Recreational Person	Adolescent	2E-07	NA	NA	NA
Other Worker	Adult	2E-07	NA	NA	NA
Fisher (chronic) (Bivalves)	Child	7E-05	4E-06	1. Ingestion of arsenic, Aroclor 5432, PCB-1254, and benzo(a)pyrene in bivalve tissue.	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs and PAHs in seafood.
Fisher (chronic) (Bivalves)	Adult	3E-04	1E-05	1. Ingestion of arsenic, Aroclor 5432, PCB-1254, and benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene in bivalve tissue.	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs and PAHs in seafood.

Table 2.13. Total Risk Characterization Summary for Site SS-63: Non-Cancer Hazards, Langley AFB, Virginia

		Estimated Tota	l Hazard Index				
Scenario	Receptor Age	Reasonable Maximum	Central Tendency	CO	OPC and Pathway HI ≥1	Target Organ HIs≥1	Primary Site-Specific Uncertainties
Current/Future Sce	enarios			_			_
Fisher (chronic) (Fish & Crabs)	Child	6	0.98	1.	Ingestion of arsenic and PCB-1254 in fish tissue Ingestion of arsenic in crab tissue	Skin/Vascular (arsenic) (HI =3) Eye/Immune System (PCB-1254) (HI = 2)	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs in seafood.
Fisher (chronic) (Fish & Crabs)	Adult	5	0.80	3.	Ingestion of arsenic and PCB-1254 in fish tissue Ingestion of arsenic in crab tissue	Skin/vascular (arsenic) (HI =3) Immune system/ Eye (PCB-1254) (HI = 2)	High uncertainty associated with source, speciation and toxicity of arsenic and with source of PCBs/PCTs in seafood.
Other Recreational Person ³	Adolescent	0.008	NA		NA	NA	NA
Other Worker ⁴	Adult	0.002	NA		NA	NA	NA
Fisher (chronic) (Bivalves)	Child	3	0.4	1.	Ingestion of arsenic in bivalve tissue	Skin/Vascular (arsenic) (HI =1.24)	High uncertainty associated with source, speciation and toxicity of arsenic
Fisher (chronic) (Bivalves)	Adult	2	0.3	1.	Ingestion of arsenic in bivalve tissue	Skin/Vascular (arsenic) (HI =1.12)	High uncertainty associated with source, speciation and toxicity of arsenic

NA = Not Applicable RfD = Reference Dose

Table 2.14. Human Health Site Risk Summary for Site SS-63, Langley AFB, Virginia

Medium of Concern	Child Fisher	Adult Fisher	Other Recreational Person ⁵	Other Worker ⁶
Receptor Hazard Index				
Surface Water	0.0002	0.0001	0.008	0.002
Animal Tissue(crabs & fish)	2.6 (0.3)	2.3 (0.2)	NA	NA
Total	2.6 (0.3)	2.3 (0.2)	0.008	0.002
Receptor Cancer Risk				
Surface Water	4E-09	1E-08	2E-07	2E-07
Animal Tissue(crabs & fish)	5E-05	2E-04 (4E-06)	NA	NA
Total	5E-05	2E-04 (4E-06)	2E-07	2E-07
		•	•	
Receptor Hazard Index				
Animal Tissue (bivalve)	1	1	NA	NA
Receptor Cancer Risk			-	
Animal Tissue (bivalve)	2E-05	6E-05	NA	NA

NA = Not applicable; pathway not evaluated.
Values in parentheses indicate central tendency value.

⁵ Jet Skier ⁶ Sea Rescue Trainer

Table 2-15. Site Risk Summary for Site SS-63, Langley AFB, Virginia

		Estimated To	tal Cancer Risk		
Scenario	Receptor Age	Reasonable Maximum	Central Tendency	COPC and Pathway Risk ≥ 1E-06	Primary Site Specific Uncertainties
Current/Future Scenarios					
Fisher (chronic) (Fish & Crabs)	Child	5E-05	NA	1. Ingestion of Aroclor 5432, PCB-1254, PCB-1248, PCB-1260 in fish tissue.	High uncertainty associated with the source of PCBs/PCTs
Fisher (chronic) (Fish & Crabs)	Adult	2E-04	4E-06	 Ingestion of Aroclor 5432, PCB- 1254, PCB-1248, PCB-1260 in fish tissue. Ingestion of PCB-1254 in crab tissue. 	High uncertainty associated with the source of PCBs/PCTs.
Other Recreational Person	Adolescent	2E-07	NA	NA	NA
Other Worker	Adult	2E-07	NA	NA	NA
Fisher (chronic) (Bivalves)	Child	2E-05	NA	NA	NA
Fisher (chronic) (Bivalves)	Adult	6E-05	NA	NA	NA

Table 2-16. Site Risk Characterization Summary for Site SS-63: Non-Cancer Hazards, Langley AFB, Virginia

		Estimated To Inde				
Scenario	Receptor Age	Reasonable Maximum	Central Tendency	COPC and Pathway HI ≥ 1	Target Organ HIs≥1	Primary Site-Specific Uncertainties
Current/Future Scen	narios					
Fisher (chronic) (Fish & Crabs)	Child	2.6	0.3	1. Ingestion of PCB-1254 in fish tissue.	Immune System/Eye/Nails (PCB-1254) (HI = 2)	High uncertainty associated with source of PCBs/PCTs.
Fisher (chronic) (Fish & Crabs)	Adult	2.3	0.2	2. Ingestion of PCB-1254 in fish tissue.	Immune system/Eye/Nails (PCB-1254) (HI = 2)	High uncertainty associated with source of PCBs/PCTs.
Other Recreational Person ⁷	Adolescent	0.008	NA	NA	NA	NA
Other Worker ⁸	Adult	0.002	NA	NA	NA	NA
Fisher (chronic) (Bivalves)	Child	1	NA	NA	NA	NA
Fisher (chronic) (Bivalves)	Adult	1	NA	NA	NA	NA

NA = Not Applicable RfD = Reference Dose

⁷ Jet Skier ⁸ Sea Rescue Trainer

Table 2.17 Ecological Exposure Pathways of Concern ERP Site SS-63

Exposure				
Medium	Receptor	Exposure Route	Assessment Endpoints	Measurement Endpoints
Sediment	Benthic and Epibenthic Invertebrates	Direct contact	Protect benthic and epibenthic invertebrate communities to maintain species diversity, biomass, and nutrient cycling Provide a food source for higher-level consumers Minimize bioaccumulation to protect higher trophic level receptors	Toxicity testing Enumeration of benthic macroinvertebrates in sediment samples Comparison of maximum and mean chemical concentrations to NOAELs and LOAELs obtained from the Langley AFB Toxicity Study Comparison of maximum and mean chemical concentrations to NOAELs and LOAELs from the literature Collection of bivalves and crabs for chemical analysis of their tissues
Sediment and Surface Water	Fish (Atlantic croaker)	Direct contact Ingestion	Protect fish communities to maintain species diversity Ensure that contaminant ingestion does not negatively affect growth or survival Minimize bioaccumulation to protect higher-level consumers	 Collection of killifish and sport fish samples for tissue analysis Comparison of killifish tissue concentrations to toxicity values obtained from the literature Calculation of chemical intake by sport fish through use of a food chain model. Chemical concentration in food (benthic invertebrates, bivalves, and killifish) determined from sediment and tissue data. Maximum and mean chemical intakes were compared to NOAELs and LOAELs obtained from the literature Examination of killifish and sport fish samples for evidence of stress or disease
Sediment and Surface Water	Piscivorous Birds (belted kingfisher)	Ingestion	Ensure that ingestion of contaminants in water or prey (fish, shellfish) does not negatively impact growth, survival, or reproduction	Calculation of chemical intake through use of a food chain model. Chemical concentration in food obtained from tissue data. Maximum and mean chemical intakes were compared to NOAELs and LOAELs obtained from the literature.
Sediment and Surface Water	Semi-aquatic Carnivorous Mammals (mink)	• Ingestion	Ensure that ingestion of contaminants in water or prey (fish, invertebrates) does not negatively impact growth, survival, or reproduction	Calculation of chemical intake through use of a food chain model. Chemical concentration in food obtained from tissue and sediment data. Maximum and mean chemical intakes were compared to NOAELs and LOAELs obtained from the literature.

Table 2.18 Comparison of Sediment Remedial Action Alternatives ERP Site SS-63 LTA Cove Langley AFB, Virginia

				E	valuatior	ı Criteria	1		
	Thre	shold			Balancii	ng		Mod	ifying
Remedial Alternative	1. Overall Protection of Human Health and the Environment	2. Compliance with ARARs	3. Long-Term Effectiveness and Permanence	4. Reduction in Toxicity, Mobility or Volume Through Treatment	5. Short Term Effectiveness	6. Implementability	7. Total Alternative Cost	8. State Acceptance	9. Community Acceptance
1: No Action	0	•	0	0	•	•	\$ -	NA	NA
2: Manage waste in place – Monitoring	•	•	0	0	•	•	\$ 353,000) NA	NA
3: Mechanical dredging with off-site disposal	•	•	•	0	•	•	\$ 952,000	NA	NA
4: Dry excavation with off-site disposal	•	•	•	0	•	•	\$ 821,000	Accepted	Accepted
5: Capping	•	•	•	0	•	•	\$ 1,183,000	NA	NA

Ranking Key: Fully Satisfies Criteria Partially Satisfies Criteria Does Not Satisfies Criteria

NA: Not applicable

Table 2.19. Cost Estimate Summary for ERP Site SS-63 Dry Excavation with Offsite Disposal Langley AFB, Virginia

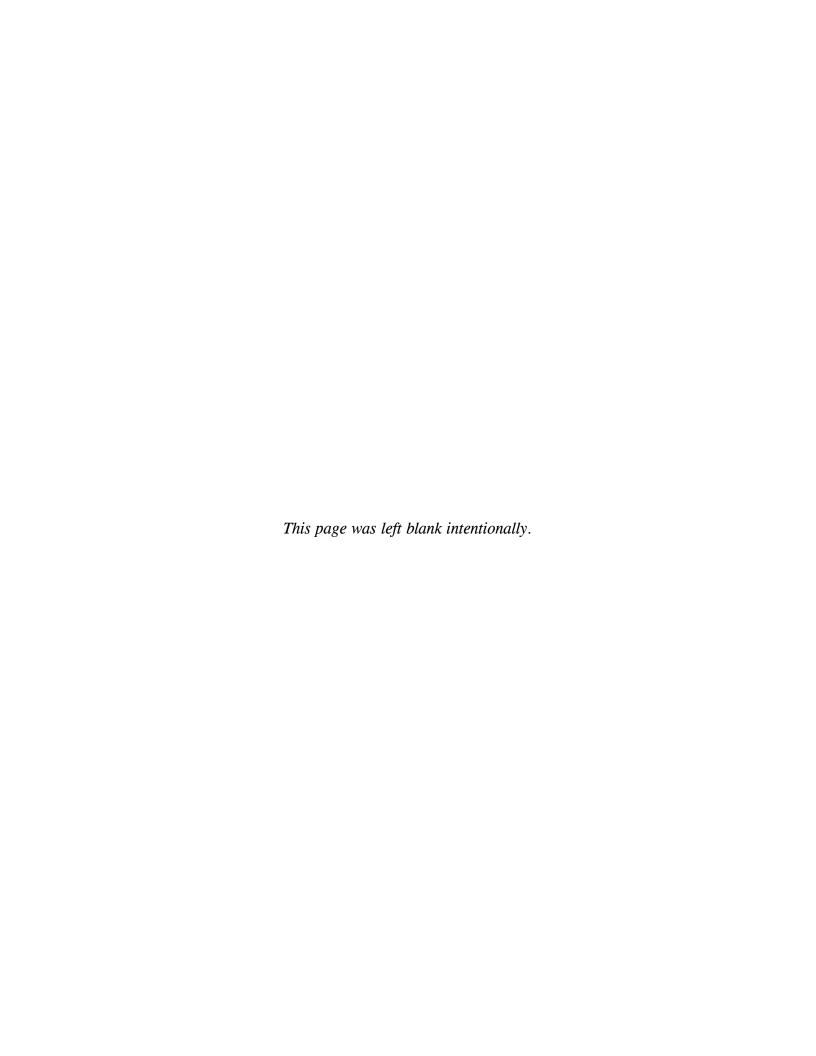
Description	Unit	Quantity	Unit Cost	Cost
REMEDIAL ACTIVITIES				
Site Preparation				
Mobilization	Lump Sum	1	\$15,000.00	\$15,000
Develop Work Plans	Lump Sum	1	\$50,000.00	\$50,000
Setup Temporary Facilities	Lump Sum	1	\$10,000.00	\$10,000
Surveying	Lump Sum	1	\$3,000.00	\$3,000
Dredging Activities				
Pre-Confirmation Sampling	Each	104	\$110.00	\$11,440
Installation of Coffer Dams	Linear Feet	1,940	\$71.00	\$137,740
Excavation of Sediment	Cubic Yard	1,693	\$20.60	\$34,876
Dewatering Sediment	Cubic Yard	1,693	\$15.00	\$25,395
Sediment Characterization (TCLP)	Each	8	\$1,000.00	\$8,465
Transportation and Disposal				
PCB/PCT Contaminated Sediment (non-hazardous)	Ton	3,047	\$60.00	\$182,844
Site Restoration				
Cleanup and Demobilization	Lump Sum	1	\$10,000.00	\$10,000
Site Closeout				
Final Report	Lump Sum	1	\$50,000.00	\$50,000
Subtotal				\$538,760
Additional Costs				
Engineering/Design		% of Subtota		\$64,651
Project Management	10	% of Subtota	al	\$53,876
Construction Management		% of Subtota		\$43,101
Residual Wastes Management		% of Subtota	-	\$10,775
Contingencies	20	% of Subtota	al	\$110,214
Total Costs For Dry Excavation with Offsite Dispos	al			\$821,377

Notes:

- 1. Sources for cost information include vendor-specific data and Means Environmental Remediation Cost Data (2005).
- 2. A conversion factor of 1.8 was used to convert cubic yard to tons.
- 3. Unit costs include all labor, equipment, and materials unless otherwise noted in the table.
- 4. Analysis of decant water included in residual waste management costs.
- 5. Assumed one characterization sample would be collected per every 200 cubic yards excavated.
- 6. Assumed PCB/PCT contaminated sediment would be classified as non-hazardous.

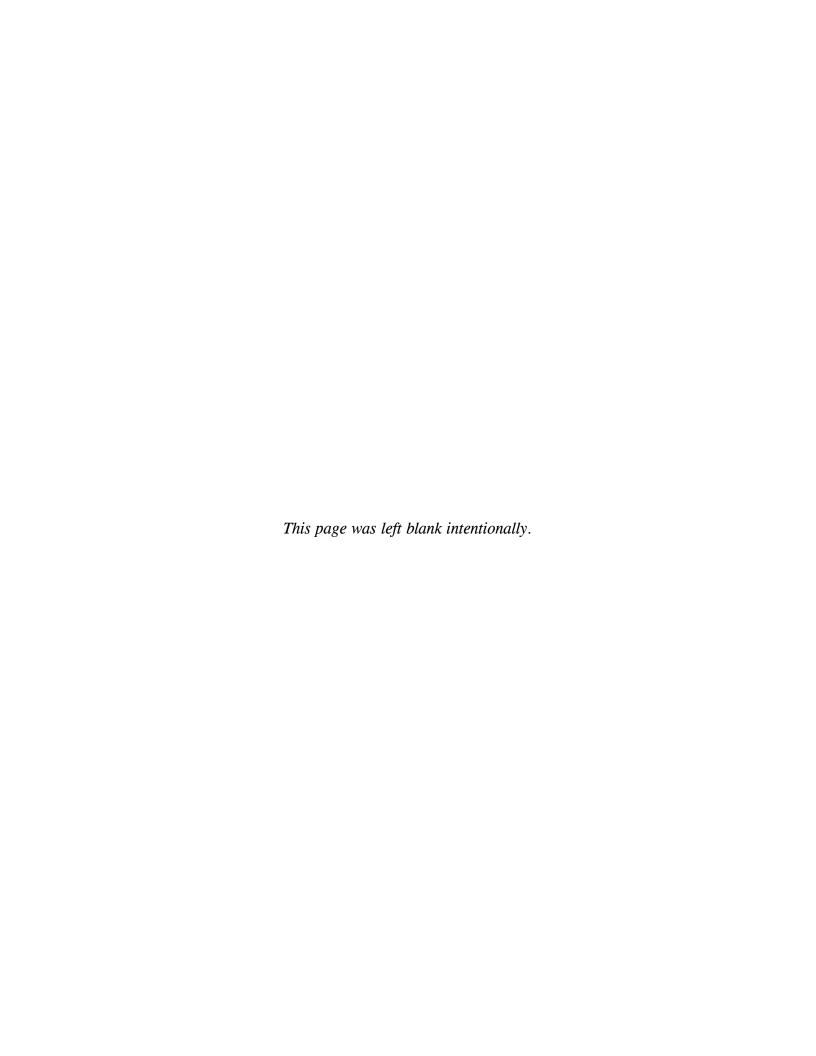
3.0 RESPONSIVENESS SUMMARY

The public participation requirements set out in the NCP at 40 CFR 300.435(c)(2)(ii) have been met for ERP Site SS-63. No questions or comments were received in the public meeting for the Proposed Plan held on January 8, 2008. No oral or written comments were received during the public comment period that extended from December 16, 2007 through January 15, 2008.



4.0 REFERENCES

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- HydroGeoLogic, Inc. 2006. Final Feasibility Study, ERP Site SS-63, Langley AFB, Virginia, July.
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- URS, 2004. Back River Sediment Sampling Results, Site SS-63, Langley Air Force Base, Virginia. September.



APPENDIX A

RISK TABLES

(Source: URS, 2003)

Appendix A.1

RAGS Part D Table 1's Selection of Exposure Pathways TABLE 1 SELECTION OF EXPOSURE PATHWAYS SS-63, LANGLEY AFB

	Rationa	or exposure Fauway The physical configuration of the slope embankment of the Back River prevents the fisher from coming into contact with surface water such that ingestion would be untikely or Insignificant.	Receptor may come into contact with surface water by handling fist/crabs or by ninsing off hands.	The physical configuration of the slope embankment of the Back River prevents the fisher from coming into contact with surface water such that ingestion would be unitkely or insignificant.	Receptor may come into contact with surface water by handling fistricrabs or by rinsing off hands.	Receptor is not likely to ingest surface water from the Back River at an off- site location.	Receptor is not likely to come into contact with surface water from the Back. River at an off-site location.	Receptor incidentally ingests surface water while jet skiing.	Receptor comes into contact with surface water while jet skiing.	Receptor incidentally ingests surface water during training exercises in the Back River.	Receptor comes into contact with surface water during training exercises in the Back River.	The physical configuration of the slope embankment of the Back River prevents the fisher from corning into contact with the sediment of the Back River.	The physical configuration of the slope embankment of the Back River prevents the fisher from coming into contact with the sediment of the Back River.	The physical configuration of the slope embankment of the Back River prevents the fisher from coming into contact with the sediment of the Back River.	The physical configuration of the slope embankment of the Back River prevents the fisher from coming into contact with the sediment of the Back River.	Receptor is not likely to ingest sediment from the Back River at an off-site location.	Receptor is not likely to come into contact with sediment from the Back River at an off-site location.
11		None	Quant	NON POON	Quant	None	None	Quant	Quant	Quant	Quant	None	None	None	None	None	None
	On-Site	On-site	On-site	On-site	On-site	Off-Site	Off-Site	On-site	On-site	On-site	On-site	On-site	On-site	On site	On-site	Off-Site	Off-Site
	Exposure	Ingestion	Dennal Absorption	Ingestion	Dermal Absorption	ingestion	Dermal Absorption	Ingestion	Dermal Absorption	vojseđuj	Dermal Absorption	Ingestion	Dermal Absorption	Ingestion	Dermal Absorption	Ingestion	Dermal Absorption
	Receptor	Child		Adult		Adult		Adolescents (teens)		Adult		Child		Aduit		Adult	
	Receptor	Fisher				Other (1)		Other Recreational Person (2)		Other Worker (3)		Fisher			į	Other (1)	
	Exposure	Surface Water from Back River										Sediment from Back River			•		
	Madium	Surface Water										Sediment					
The state of the s	шары	Surface Water		_								Sediment					
cionaco	Timeframe	Current/Future		<u></u>													

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SS-63, LANGLEY AFB

	Rations	is of Exposure Pathway	The physical configuration of the slope embankment of the Back River prevents the jet skler from coming into contact with sediment such that ingestion would be unlikely or insignificant. Jet skler is most likely to enter water via jet ski.	The physical configuration of the slope embankment of the Back River prevents the jet skier from coming into contact with sediment such that contact would be unlikely or Insignificant. Jet skier is most likely to enter water via jet ski.	P. septor would enter Back River via watercraft or helicopter and would not likely ingest sediment from the Back River.	Receptor would enter Back River via watercraft or helicopter and would not likely come into contact with sediment from the Back River.	Receptor is likely to consume fish from the Back River.	Receptor is likely to consume fish from the Back River.	Receptor may consume fish from the Back River, but would most likely be mixed with other fish from other locations and consumption would be insignificant.	Receptor is not likely to fish from the Back River.	Receptor is not likely to fish from the Back River.	Receptor is likely to consume crabs from the Back River.	Receptor is likely to consume crabs from the Back River.	Receptor may consume crabs from the Back River, but would most likely be mixed with other crabs from other locations and consumption would be insignificant.	Receptor is not likely to crab from the Back River.	Receptor is not likely to crab from the Back River.
	_	Analysis	None	None	None	None	Quant	Quant	None	None	None	Quant	Quant	None	None	None
	On-Site	Off-Site	On-site	On-site	On-site	On-site	On-site	On-sile	Off-Site	On-site	On-sile	On site	On-site	Off-Site	On-site	On site
,,	Exposure	Route	Ingestion	Dermal Absorption	Ingestion	Dermal Absorption	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion	Ingestion
	Receptor	Age	Adolescents (feens)		Adult		Child	Adult	Adult	Adolescents (teens)	Adult	Child	Adult	Adult	Adolescents (teens)	Adult
	Receptor	Population	Other Recreational Person (2)		Other Worker (3)		Fisher		Other (1)	Other Recreational Person (2)	Other Worker (3)	Fisher		Other (1)	Other Recreational Person (2)	Other Worker (3)
	Exposure	Point	Sediment from Back River (continued)				Fish from Back River					Crabs from Back River	•			
	Exposure	Medium	Sediment (continued)				Animal Tissue					Animal Tissue				
:	Medium		Sediment (continued)				Animal Tissue					Animal Tissue				
	Scenano	Гімепапе	Current/Future (continued)													

⁽¹⁾ Commercial Fish Consumer

Jet Skier
 Sea Rescue Trainer

Appendix A.2

RAGS Part D Table 2's Occurrence, Distribution, and Selection of COPCs Selection of Exposure Pathways

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN ERP Site SS-63 (Back River), Langley Air Force Base TABLE 2.1

Scenano Timeframe, Current/Futue Medum: Surface Water-total (9) Exposure Medum: Surface Water Exposure Point: Surface Water

			I		I											
	i i	(1)	8	€					:		(9)	ω				
Z Z	Chemical	Minmin	Minimum (2)	Maximum	Maximum (2)	<u>ş</u>	Location	Detection (3)	Range of (4)	Concentration (5)	Background	Screening	Potential	Potential	00 r	
					}		Concentration	for market	Limits	Screening	Aran	TOACHY VAICE	Value	Source	2	Deletion Or Selection
	INORGANCS					T										
7429-90-5	Auminum	0.246		1.48		, Su	3S63-SW06	8/8	0.0142	1.48	N'A	37.0 N	0.087	NO AA Fresh	2	4
7440-36-0	Antimony	0 00452		0.00953	,	ē	SS63-SW07	8,4	0.00443	0.00953	¥.	0.0150 N	6.3	SW VA WQC	ž	۵
7440-38-2	Arsenic	0 00276	7	0.00374		-Gu	8563-SW06	8/8	0.00238	0.00374	4×2	0.00045 C	0.036	NO AA Marine	*	•
	Barlum	0.0261		0.0340		ģ	\$563-SW08	8/8	0.0000800	0.0340	NA A	2.60 N	¥,¥	¥ž	£	۵
7440-70-2	Calcium	165		210	•	Š	SS63-SW05	8/9	0.0510	210	¥.	400	Ą	ž	£	۰
7440-47-3	Chromium	0.000960		0.00384		Š	\$563-5W07	9//	0.000910	0.00384	ΚĀ	0.110 N	90.0	NOAA Marine	ž	٩
7439-89-6	Iron	0.402		1.33		56	\$563-5W06	8/8	0.0145	1.33	ΝA	=	-	NOAA Fresh	ž	۵
7439-95-4	Magnesium	467		707	7	٦	SS63-SW03	8	0.0804	707	Ϋ́Α	158	Ą	Ϋ́Α	.	•
7439-96-5	Manganese	0.0197		0 0964		Į,	SS63-SW08	8	0.000200	0.0964	¥.Ž	0.73 N	ΝA	¥ž	2	۵
7439-97-6	Mercury	0.000106		0.000106		<u> </u>	\$\$63-\$W08	1/8	0.0000600	0.000106	۸×	N 110'0	0.000053	SW VA WQC	£	۵
7440-02-0	Nckel	0.00231	٦	0.00231	7	ē	\$563-5W07	1/8	0.00202	0.00231	₩A	N 06.7.0	4.6	SW VA WGC	£	۵
7440-09-7	Potassium	156	٦	243		8	SS63-SW10	8	0.137 - 2.74	243	××2	1000	Α¥	ΑŅ	£	ű
7762-49-2	Selenium	0.0109		0.0156		Se .	\$363-SW05	8/8	0.00260	0.0156	Ϋ́Α	0.180 N	=	SW VA WGC	£	۵
7440-23-5	Sodium	3770		5720	7	- Jo	SS63-SW03	8	2.80	5720	WA	250	¥	ν×.	\$ *	-
7440-62-2	Vanadum	0 00216		0.00216		ıδω	SSE3-SW06	1/8	0.000410	0.00216	Ϋ́Α	0.260 N	₹2	٧×	ž	۵
7440-66-6	Zinc	0.0110		0.0110		S.	\$563-5W07	1/8	0.00365	0.0110	٧×	11.0 N	0.081	NO AA Marine	£	۵
	ORGANICS							•								
72-54-8	4.4.000	0.0000144		0.0000144		Š	SS63-SW10	1/8	0.000000864 + 0.00000191	0.0000144	ΝA	0.0028 C	0.00000084	SW VA WGC	£	۵
	4,4'-DDE	0.00000786		0.00000786		80	SS63-SW06	1/8	0,00000108 - 0.00000233	0.00000786	K.A	0.002 C	650000010	SW VA WGC	£	۵
	Acetone	0.00136		0.00188		ğ	8563-SW06	2,8	0.000286 - 0.000499	0.00186	WA	0.610 N	Ϋ́Α	ď Ž	ž	م
	Aldrin	0.00000985		0.0000213	•	Ď	\$\$63-\$W01	8/8	0.000000749 - 0.00000144	0 0000213	WA	0.000039 C	0.0000014	SW VA WGC	£	۵
	Endosulian I	0.00000248		0.00000514		δ	SS63-SW06	88	0.000000572 - 0.00000126	0.00000514	NA	0.220 N	0.24	SW VA WGC	£	۵
9	Endosulfan II	0 00000455		0.00000455		5	SS63-SW10	1/8	0.000000743 - 0.00000157	0.00000455	ΝA	0.220 N	0.24	SW VA WQC	£	Φ
	Endrin	0.0000119		0.0000119		Š	SS63-SW10	1/8	0.00000175 - 0.00000636	0.0000119	WA	0.011 N	0.00081	SW VA WQC	£	ф
53494-70-5	Endrin Ketone	0.00000205		0.00000205		γÔΕ.	SS63-SW01	1/8	0.00000157 - 0.00000302	0.00000205	WA	0.011 N	¥	٧×	£	م
•	Heptachlor	0.00000175		0.00000784		J.Gu	SS63-SW10	3/8	0.000000661 • 0.00000304	0.00000784	WA	0.00015 C	120000000	SW VA WGC	£	
	Heptachlor epoxide	0.00000463		0.00000453		Lôu.	SS63-SW02	1/8	0.000000639 - 0.00000633	0.00000483	¥χ	0.000074 C	0.0000018	NO AA Marine	2	۵
6	alpha-Chlordane	0.00000135		0.00000135	•	jo B	\$\$63.SW10	1/8	0.000000623 + 0.00000120	0.00000135	¥Α	0.0019 C	0.0000059	SW VA WOC	£	۵
319-85-7	beta-BHC	0.00000776	7)	0 00000776	7	<u>ئ</u>	SS63-SW07	1/8	0.000000585 - 0.00000500	0.00000776	Κ¥	0.00037 C	۸×	¥	£	۵
	delta-BHC	0.00000387	7	0 0000170		٥	SS63-SW02	88	0.000000371 • 0.00000133	0 00000170	¥ž	0.00037 C	Ϋ́	¥	2	۵
58-89-9	gamma-BHC(Lindane)	0.00000450		0.0000179		ľg.	SSE3-SW01	823	0.000000410 - 0.000000881	0.0000179	WA	0.00052 C	0.025	SW VA WOC	ž	۵

(1) Minimum/maximum detected concentration.

(2) if minimun/maximun detected concentration comes from average of normal and field duplicate sangles, then both qualifiers are presented. In a such case, the formal is known a qualifiers/kfield duplicate qualifiers.

(3) Detection Frequency is defined as the number of sangles that are detected and are not 8-flagged over the total number of sangles.

(4) Flange of Detection Limits includes limits associated with any division factor. See the analytical results section for more details of detection limits and division factors, per sangles.

(5) Maximum concentration is used for screening.

(6) WA - Refer to supporting information for background discussion. Background values, derived from statistical analysis, are upper tolerance limits (UTLs).

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN ERP Site SS-63 (Back River), Langley Air Force Base TABLE 2.1

Scenario Tineframe: Current/Future Medium: Surface Water-total (9) Exposure Medium: Surface Water Exposure Point: Surface Water

•				
	COPC Rationals for	Contaminant	Deletion	or Selection
	COPC	Flag		
	otential	ARAR/TBC Flag Contaminant	Source	
 •	Potential	ARAP/TBC	Value	
 6		2		
	Screening	Toxicity Value		
(9)	Background	Value		
	Concentration (5) Background	Used for	Screening	
	Range of (4)	Detection	Limits	
	Detection (3)	Frequency		
	Location	of Maximum	Concentration	
	Units			
	Maximum (2)	Qualifier		_
Ê	Maximum	Qualifier Concentration		
	Minlmum (2)	Qualifier		
(1)	Minimum	Concentration		
	Chemical			
	CAS	Number		

(7) Fisk-Based Concentration Table, U.S. EPA Region III. October 2000. (Cancer benchmark value = 1E-05, HO = 0.1). Surface water RBSLs were determined by multiplying the tap water HBSL x 10.

- (8) Rationale for Contaminant Deletion or Selection:
- No measurable results on site.
- Maximum detected result is less than the RBSL.
- Maximum detected concentration is less than Essential Nutrient intake rate.
- d. Mean site concentration is not significantly greater than mean background concentration (alpha = 0.20) and maximum detected result is less than background UTL.
- e. Maximum detected result exceeds acreering toxicity value.
- f. Maximum detected concentration exceeds Essential Nathent intake rate.
- (9) The surface water sample results are for unfittered samples only.

N/A = Not applicable Definitions SQL = Sample Quantitation Limit

COPC = Chemical of Potential Concern

ARAP/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL = Federal Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

J - Estimated Value

N = Non-Carcinogenic C = Carcinogenic

TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
ERP Site SS-63 (Back River), Landey Air Force 88se

Scenario Timetrane, Currentfuture Adedium: Anima Tissue Exposure Medium: Animal Tissue Exposure Point: Fish from Back River

						ŀ			•							
_		<u> </u>		3							e e	6				€
CAS	Chanical	Minimum	Minimum (2)	_	Maximum (Z)	Sales Sales	Location	Detection (3)	Range of (4)	Range of (4) Concentration (5)	Background	Screening	Potential	Potential	2000	Rationale for
Number		Concentration	Outfiler	Concentration	Qualifier	_	of Maximum	Frequency	Detection	Cased for	Value	Toddity Value	ARAR/TBC	ARARTEC	Š	Conteminant
							Concentration		₽) HJ	Screening			Value	Source		Deletton
						┨										or Selection
Ĭ	NORGANICS					_										
7440-38-2 Are	Arsenic	0.742		2.58	. F	morka	SS63-BIO07	878	0.398 - 0.427	2.58	N/A	0.00210 C	ž		ķ	•
7440752 Ca	Calcium	108		1320	<u>E</u> _	поже	SS83-BIQ01	22	1.96 - 1.98	1320	Y/N	ź	Y/N		<u>*</u>	•
7440-50-6 Co	Copper	0.226		0.451	E	D YOU	SS63-BIO 10	50	0.108 - 0.111	0.451	N/A	2 40 N	Y/N		Š	۵
7439-95-4 Ma	Magnesium	288		360	<u>E</u>	Вруде	\$563-BIO06	8/8	3.18 - 3.31	360	V/N	₹	¥¥		ž	•
7438-97-6 Me	Mercury	0.0238		0.0692	E	ПОЖО	\$583-BIO04	8/8	00810 - 0.0085	0.0892	¥N	0.014 N	¥	-	ř	•
7440-09-7 Po	Potassium	3440		3850	<u> </u>	mgAco	SS83-BIO04	8/8	24.0 - 24.9	3950	N.A	ž	Ϋ́		į	•
7782-49-2 Se	Selenium	9090		8	<u>.</u>	P.Va	SS63-BIOUZ	878	0.390 - 0.420	8.1	NVA	N 089:0	¥		ž	•
7440-23-5 So	Sodium	508	-	717	<u>E</u>	B ON E	\$\$63-BIO07	9,9	8.72 - 0.72	21.2	V/N	₹	¥¥		į	•
7440-68-8 Zin	Zinc	4.78		5.77	E	m Q/ka	SS83-BIO01	8/8	0.265 - 0.289	#.#	N/A	6.	∀ /¥		ž	۵
ō	ORGANICS										_					
72548 4,4	4,4-00b	0.00203		0.0284	<u>E</u>	a gyba	\$583-81005	648	000129 - 0.0013	0.0284	√×	0.0130 C	¥		* *	•
72-55-9 4,4	4,4-0DE	0.00454		0.0379	E	B Q KG	SS63 BIODS	8/8	000129 - 0.0013	0.0379	Y/V	0.00830 C	¥		¥ \$	•
γ.,	Arador 5432	92.20 0		D.379	E	010	SS83-BIO05	55	D.0199 - 0.0403	0.370	NVA	0 0000	¥,N		,	•
12672-28-6 PC	PCB-1248	0.0167		\$ 01.0	E	DAGE	\$563-BIO05	£48	00318 - 0.0066	0.104	NIA	0.001d0 C	W/A		•	•
11097-69-1 PC	PCB-1254	1150:0		0 308	E	D Syde	\$563-BIO06	9/9	00318 - 0 0066	900.0	N/A	D.00160 C	ž		<u>*</u>	•
11096-82-5 PC	PCB-1280	0.0112		22,00.0	E	DWG E	\$583-81005	8/8	00318 - 0.0066	0.0972	N/A	0.00160 C	¥		, ,	•
319-84-6	apha-BMC	#01000 0		0.000223	<u>E</u>	D XOE	\$583-81005	7/6	000658 - 0 0000	0.000223	NVA	0.000500 C	¥ Z		ş	
319-86-8 ded	della BMC	0.000178	•	D. 00002 12	E	200	SS83-BIO02	972	00000 - 0.0000	D.000212	N/A	0.0018 C	¥,N		ş	4
58-89-9 gar	gamma-BHC(Lindane)	0.0000613	-	0.000196	E	mp/kg	\$563-81001	2/8	D00659 - 0.000:	0.000196	N/A	0.00240 C	N/A	_	No	۵

(1) Minimum/maximum detected concentration.

(2) Il minimum/maximum detered concentration comes from average of normal and field duplicate samples, then both qualitiers are presented. In a such case, the format is knormal qualitier /-clied duplicate qualitier.

(3) Detector Frequency is defined as the number of samples that are detected and are not B-happed over the total number of samples.

(4) Range of Detection Umits includes finite associated with any disiden factor. See the analytical results section for more details of detection familia and disiden factors, per sample (5) Maximum concentration is used for screening.

(6) NUA - Refer to supporting information for background discussion. Background values, derived from statistical analysis, are upper Polerance limits (UTLs).

(7) Risk-Based Concentration Table, U.S. EPA Region III. October 2000. (Cancer benchmark value ± 1E-08, HO = 0.1).

(8) Retorate for Contaminant Deletion or Selection:

a. No measurable results on see.

b. Maximum detected result refess than the RBSL

Maximum detected result is less than the Estential Nutrient intake value

d. Mean site concentration is not significantly greater than mean background concentration (stote = 0.20) and maximum detected result is less than background UTL.

Maximum detected result exceeds screening toxicity value.

Definitions. N/A = Not applicable

SQL = Sample Quantitation Limit

COPC = Chamical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL * Federal Maximum Contaminant Level

SMCL * Secondary Maximum Continuingol Level

TABLE 2.2 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN ERP Site SS-63 (Back Rhwr), Langley Air Force Base

e: CurrentFuture	141	Animal Tissue	late from Back Bires
Scenario Timetrame: CurrentFuture	Medium: Animal Titata	Exposure Medium: Animal Tissue	Evange Point Fish from Back River

	ationale for	ontaminant	Deletion	x Selection
	30PC R	2		-
	Potential COPC Rationale for	ARARITEC	Source	
	Potential		Value	
6		_		
	Screening	Toxicity Value		
(9)	•	Value		
	Detection (3) Range of (4) Concentration (5) Background	Used for	Screening	
	Range of (4)	Detection	Limits	
	Detection (3)	Frequency		
	Location	of Maximum	_	
	Units	<u></u>	_	
_	Maximum (2)	Qualifier		
3	3			
	Minimum (2) Maximum	Qualifier		
£	•			
	Minimum	Concentration		
	Chemical			
	SYS	a tu		

J = Estimated Value C = Carcinogenic N = Non-Carcinogenic

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN ERP Site SS-83 (Back River), Langley Air Force Base

Exposure Point: Crabs from Back River Scenario Timeframe: Current/Future xposure Medium; Animal Tissue edium: Animal Tissue

CAS	Chenka	(1) Winterland	Minimum (2)	(1) Maximum	Maximum (2) Units	Units	coagou	Detection (3)	Renge of (4)	Concentration (5)	(8) Background	(7) Screening	Potental	Potential	70PC	(8) Rationale for
Numb ar		Conomitation		Concentration	Qualifier		of Maximum Concentration	Frequency	Detection Limite	Used for Screening	Value	Toxicity Value	ARARUTBC Value	ARARTBC	<u> </u>	Contaminant Deletion or Selection
	INORGANICS					T									Ī	
7429-90-5	Aluminum	6.19		15.3		D Age	\$\$63-BIO01	ş	3.75 - 3.85	15.3	∀ /¥	¥	N/A		* *	•
7440-38-2	Arrenic	1.75		3.38		m QA	SS63-BIOO4	*	0.400 - 0.422	3.38	N.A	¥	ΥN		•	•
740363	Bartum	0.308		0.477		m Q/Kg	SS63-BIO01	\$	D.0478 - 0.0496	0.477	N/A	ź	¥?¥		.	•
7440-70-2	Calchum	586		2230		D A G	5563-61001	\$1,5	1.03 - 1.09	2230	M/A	≨	Ž.			•
7440-50-8	Copper	60.09		8.02		mg/kg	SSGNBIOOM	7,	0.106 - 0.109	8.62	N/A	ž	¥/N		* *	•
7439-89-6	tron	=		14.2		marka	\$\$63-BIO01	***	1.93 - 1.99	14.2	¥¥	¥	¥.		.	•
7439-95-4	Magnesium	352		547		9 50 10 10 10 10 10 10 10 10 10 10 10 10 10	SS83-BIO01	\$	3.17 - 3.27	247	Y/N	ź	N/A		<u>.</u>	
7439-96-5	Manganese	1.09		5 7		morka	SS63-BIOOM	*/*	0.0283 - 0.0299	1.58	V/N	¥	₹X		* *	•
7440-02-0	Nicke	0.370		0.496	-	Dya.	\$583-81008	9/9	0.188 - 0.200	0.408	N/A	¥	₹/₹		۶	•
7440-09-7	Potassum	2000		2840		D PAGE	SSB3-BIO66	7.7	24.1 - 24.8	2840	N/A	¥	K/N		>	•
7782-49-2	Selevium	9250	_	D 864		g w	SSB3-B1006	4/4	0.389 - 0 410	0.884	N.A	ž	ž		¥ .	•
7440-22-4	Sive	0 425		0.785		g/g F	\$583-81001	3	0.0581 - 0.0598	0.785	N/A	₹	¥		٤	•
7440-23-5	Sodium	3080		3640		m Dyka	SS63-BIOD4	\$	26.9 - 27.8	3840	¥X	¥	N/A		,	•
7440-68-6	Zinc	315		410	<u> </u>	moko	5563-BIO04	414	0.288 - 0.282	41.9	V/N	ź	√/N		¥.	•
	ORGANICS															
72-54-8	000-⊁°•	0.000513		0.00339		O X O E	5583-81001	1/2	100129 - 0.0003	0.00339	K.Y	ž	¥3		ž	•
72-55-9	4,4'.DOE	0.00127		0 0111		m DXo	5583-81001	3/4	00129 - 0.0003	0.0111	N/A	\$	YN.			•
78-44-8	Heptachlor	0.0000757		0 0000757	-	S S E	SS83-B1004	និ	00000 - 0.0000	0.0000757	K/A	ž	ž		, <u>.</u>	•
1024-57-3	Heptachior spoolds	0.000792		0 000792		9 8	5563-81004	23	000000 - 0.0000	0.000792	N/A	ž	¥3		۶	•
11007-66-1	PCB-1254	0.0231		0.0231		m QAQ	5583-81001	*	00325 - 0.0098	0.0231	¥/N	ž	¥/¥		5	•
108-95-2	Pheno	0.120		0.133		mg/ka	\$583-BIO06	\$2	D.0667 - 0.0678	0.133	NVA	ž	4		:	•
117-81-7	bis(2-Ethylhexyl)phthalate	0.120		0.120		mg/kg	\$\$83-BIO01	1/4	D.0667 - 0.0678	0.120	N/A	٧×	MA		Yes	•

(1) Minimum/maximum detected concentration.

(2) if minimunth examp detected concernitation comes from average of normal and field duplicate samples, then both qualifiers are presented. In a such case, the formal is knownal qualifiers/staid duplicate qualifiers.

(3) Detection Frequency is defined as the number of samples that are detected and are not B-flagged over the total number of samples.

(4) Range of Detection Limits includes finities associated with any disuloun backor. See the analytical readsta section for more detaits of detection limits and disulson features, per sample.

(5) Maximum concentration is used for screening.

(8) MA-Refer to supporting information for background discussion. Background values, derived from statistical analysis, are upper tolerance limits (UTLs).
(7) Risk Based Concentration Table, U.S. EPA Region III. October 2000. (Cancer benchmark value = 15-06, MD = 0.1).

 Maximum detected result is less than the RBSL. a. No measurable results on site.

(8) Rationale for Contaminant Defetion or Selection;

c. Maximum detected result is less than the Essential Nutrient intake value.

d. Mean site concentration is not significantly greater than mean background concentration (slipts = 0.20) and maximum detected result is less than background UTL.

Maximum detected result accessés screening bodoky value.

Definitions: N/A = Not applicable

SQL * Sample Quantitation Limit

COPC - Chemical of Polential Concern

TABLE 2.3 OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN ERP Site SS-83 (Back River), Langley Af Force Base

Scenario Timetrane. Currentfuture Medium: Animal Traxe Exposure Medium: Animal Traxe Exposure Pohl: Crabs from Back River

Denograph of the second	Toxicity Value	
percent	_	
	-	
	Value	
CONCERNATION (5)	Used for	Screening
(*) io some u	Detection	Limite
Celebration (3)	Frequency	
Location	of Maximum	Concentration
5		
(7)	Qualifier	
	Concentration	
(x)	Qualifier	
	Concentration	
2	Number	
	COLOR OF THE PROPERTY (4)	Concentration Qualifier Concentration Qualifier of Maximum

Rationale for Contaminant Deletion

Fig.

Potential ARAR/TBC Source

Potential ARAR/TBC Value

6

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL = Federal Maximum Conteminant Level

SMCL = Secondary Maximum Contembrant Level J = Estimated Value

C = Carchogenic

N = Non-Carcinogenic

Scenary Timelrana Curentifutus Nedum Fizh-shellan Isans Espoaus Medium Fish-shellich Isans

		_	_	-	_	-	_	_	_	_	-			_	_		-		_	_		_		_	-	_	-	_	-	_		-	-	-				-	_	_		_	-	_	_		_	_	_
Pationale for	Selection or (7) Detector			æ ₹	ਲ ;	KS.	₹	Ĭ,	188	%	98.	ď.	¥Si ¥	£ :	5 :	¥ :	z 3	5 4	16 W	Z	¥8	ASI	į	BSI	981	RS	BSI	BSL	1S4	Pet	15 8	¥8	4	i 64	# #	<u>र्</u>	981	PSI	KB	BSF	154	821	ASL	ASL	ASL	BSf	188	YST.	E :
	<u>2</u>			>	> :	z ;	>	z	ź	>	z	> :	> :	ε,	-)	- :	2 2	: >	>	z	>	-		z	z	z	2	z	z	7	z	> :	- >	- >	· >-	z	z	2	z	z	z	z	۰	>	>	z	z	<u>-</u>	z ,
	Potential APARTBC Source			*	£ :	£ :	£ :	ž	£ :	€ .	£	ž	≨ :	£ :	£ :	- د :	٤ ۽	· ·	: ;	* *	<u> </u>	ž		₹	ž	ž	ź	ž	ž	3	ž	2 :	ŧ :	. 1	: ≇	ž	≨	ž	ŧ	ź	ź	ž	ź	ž	ž	ž	ź	*	ž 1
	Poental APAP/IBC Vate			ž	ž:	≨ ;	2	ž	ž	ŧ	ž	ž:	≨ ;	ŧ :	≨ 3	£ :	źź	: 1	. 1	2	ź	ž		ž	¥	ž	ź	ž	∌	ž	ž	ž :	ž į	€ ∌	≨	ž	£	ž	ž	ž	ž	ž	£	ž	ž	≨	≨ :	≨ :	£ :
	Screening Toxicity Value (6) (MC)	,		₹			2 0					Z 0.5	≨ ;			2 ;	2 1		2 2 2 2 2 2		2 098 0			Z 9	L.10 M	Z Q	2 04:0	7 083					2 0000000		0 7000		0.430 C	Z 0 .	N OILO	N 0180	0 0410 N		D 000000 C	0 00100 C	0 00160 C	5 5			0.00160 C
	Background (5) Velue			≨ :	£	Œ :	ž :	≨ :	≨ :	≨ :	≨ :	ž	5 3	£ 3	£ ±	5 3	£ 3	2	2	. ≨	ž	ž		ž	ž	ž	£	ž	ž	2	ž	≨ :	5 2	: 2	ž	ž	ž	3	ž	£	¥	ž	2	ž	ž	ž	5 ;	≨ :	£ £
	Concentrator (4) Used for Screening	'		<u> </u>	\$	*	0.427	380	# :	5 82	508	201	523	3 5	1000	10000		977.0	132	3790	8.	194		0.00	0.000	821.0	0.0742	00800	0.00020	0 00774	0.0000	00000	35000	0.0437	0 0484	9690:0	6800 0	0.00670	0.000266	0.000207	\$01000	\$1,000,0	0 000472	99000	0.00076	90000	0.0000	\$500000	0.00000
	Range of (3) Detection Umits			377-390	0.368 - 0.418	0.0444 - 0.0486	0.0840 - 0.0812	1.80 .2.00	0.453 - 0.160	0.00.00.00	0.177 - 0.184	190-2:00	0.800 - 0.080	0.000 - 0.000	0.0000.00000	0.000 v.000	200.050	0.397 - 0.410	0.0675 - 0.0673	26.7 - 28.0	0 180 - 0 192	0.270 - 0.281		D 000309 - 0 00802	0 0000294 - 0 00661	0.00329 - 0.0661	0 00027 - 0.00000	0 0007 - 0 0000	0 0000128 - 0 000003	0.000128 - 0.000134	D-000128 - 0.00134	BONDO - DEGONO	0.0007 - 0.0000	0.0227 - 0.0333	0 free - 0 mm	0.0027 - 0.0038	D.00027 - D.00039	£ 000757 - £ 0153	0 0000060 - 0.00000	0.000128 - 0.000673	40100 0 - 821000 B	0.000128 - 0.000134	0.000000 - 0.000000 0	0.00007 · 0.00000	0 00027 - 0 00030	0.0027 0.0030	0.000050-0.0000	O OCCUPATION OF THE PROPERTY O	0.000000 - 0.000000
	Detector (2) Fraquency		-	0 1	2 :	\$ }	P	010	8	\$	P :	0.01	0.00	921	2 5	, ,	ULU.	01/1	01/01	10/10	01%	s		\$	O.Y.	610	3410	2/10	01/4	01/4	6.50	2 2	01/1	1/10	OLM	2/10	01/1	27.0	01/1	1/10	5.50	01/2	9,00	0.00	2/10	1/10	010		
	Location of Marimum Concernation			SOSS-EHON	5885 BION	5063 BILUM	Saca-encor	2562-81001	55K3-BIO01	5563-86301	5365-BIU10	8883-BIO04	SSECTION S	SS63 BIDO?	SSS3-Biffers	Con Bring	SSG-BIDO	SSS3 BIODA	SS63-Bicon	SS63-BIODA	SSKD BIDON	SSEC-BIODS		5563 BIO17	5552-Bridge	SSSS PIF.OF	SSG3 BILDS	5553 HC08	SSect Birliot	SSS BILDO	5053 BIDDS	DOMESTIC SECOND	\$563-P1004	SS63 Block	SS63 BICO4	SS63-BIO01	5563-81004	SS63 BICOS	\$563 BICOB	\$\$62-B1000	5563 BIO07	SS63-B1:007	2567 BICO4	SS63-PIO01	SSEC-BITTOR	SSG-81006	SSS BION	and	8569 BICO
	9			Ş .	2 1		2	2	Š.	Oudsu	P .	D 1	1			7	No.	9	DAUGH	g /xu	9,44	D) W		aV ₀ r	i by/cu	тоуко	940	0×3/40	É É H	o E	0 o		2	E C	6yeu	φ γ (m	D/Ou	Š	D/du	Ž	Ş	±0¥¢	0 0	67 QF	υδγά	2	2 5		6
	Concerniation (Quehar) (1)			7 9	2 3		/200	Rieg.	***	6.80	8 2	, S.	3, 8	100	10000	0.069	806	922.0	1 24	3790	40.	159		0.0233	0.00813 #	8910	0.0742	0 0400	0.00020	6,00574	0.00000	00000	0 00068	0.0437	0 0484	96900	0 0000	0.00010	0 000255 J	0.000207	30100	\$160000.0	0 000472	99000	0.00578 J	90000	00000	000044	p 600700
	Concentration (Auditor) (1)		;	6.3	200	77.77	- 550		800	886	7 0897	24.5	28.2	181	21.00	0.725	*	6 472	0 101	2050	0540	4.52		£1.20 G	0.00150	0.00014 J	56.5KG G	22,000	0.600.0	0.00053	12 83 000 G	0.0024	99000	0.0437	0.0484	0.0525	68600 0	0 00082	r 5520000	r 102000 a	0 000003	0 000282	F 95600000	0 00742	5,000	0000	00 00 00 00 00 00 00 00 00 00 00 00 00	Hacoord	0 000103
	8		thor gardes		Harding			Control		Comple			Mannageriti	Mencamasa	Marcun		Potession	Selection	She.	Sodium	Version	Z _Z	Organica.	2.0.5.7	2.4.5 TP (SNext)	2.4-DR	2. A Printing Agent	2 Methylphena	000.7	100	4.4 DD 1	Aroclo SAS	Senz(a) entiracene	Benz(a)try ene	Renzo(b) fluorambans	Benzo(g.n.:)tranylana	Chrystene	Nomba	Endoarden I	Endoaulten Sultan	Endrin Alberton	Endin Ketare	Physician accords	FCB 154	PCR-1260	Phenantivane	Pylan Rock	TAK-BIC	delte-BrC
	35		P 100 BL72	746.24.3	1440.00.3	746043.0	7440 TD 2	2460473	746660	27.13.6	7430 90 4	7470.07.1	7478-95-4	7439-06-5	7438 87 6	7440-02-0	7440-06-7	1782 48 2	7440-22-4	7440-23-5	244045	7440-86-6		_	43.72.1	24-82-6	, 65 30 y	45.45.7		9	2000	1788.33	C-88-98	8 25 05	705-99-2	181-24-2	216-01-9	3-00 8141	99.56	#:/0-LD01	7471-83-4	53494-70 5	024.57.3				119-84-6		
	Рам		Sack Roer Shalltish								_																			_	•																		

⁽¹⁾ Manushmanum deech socialises. Il minimuchiaenum deechd concentration come stop of nomel and sad Actical samples feet that outside an presental in a achicase the finance come audistrational parties, qualities.

(1) Neuron frequency outside and extracted entries that in descend and entries (8 kg)pot one fee bad nuffer of samples.

(3) Neuron concentration council outside and and the factor face the emption for more desire of descriptions and deficit factor, per sample.

(4) Neuron concentration council outside activation.

⁽d) the back plants where been connected for this Studies). Travers
(S) All compounds were intreeved apparent the Plat Beand Concentration (ESC). Table, U.S. EPA Region HI. Destree 2002 for table (cancer benchmark a. E. Db. HD.a.D.s)
(f) Restorate Conse.
(f) Restorate Conse.

MABLE 2.1 CCCLINGENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN Back Print, Languay Air Page Regs

Scenario finatrana Currantificace Medium: Fratrishalita secue Exposure Medium: Fratrishallish secue

L	
	Concentration (4) Used for Screening
	Pange of (3) Desection Limite
	Detection (2) Frequency
	Location of Maximum Concessination
	ş i ğ
	Meanum Concinitation (Quelifier) (1)
	Minnum Concentetion (Qualities) (1)
	Chamical
	CAS
	Exposure Point

Selection or (7) Deletion

00 E

Polential APARYTBC Source

Potential ARAP/TBC Value

Screening Toricity Value (6) (NC)

Background (5) Value

Selector Reacon - Above Screening Level (ASL)
Deletor Feacon: Relow Screening Level (BSL)
Essenial Numern (EN

Duinton. Na. Not expected.

CORCs. Chemical of Pountal Concern

Ada/PTRCs. Application or Resource and Appropriate Preparement of the Considered.

J. Estimate Value.

C. Electroperic.

N. Mon. Concernoperic.

Appendix A.3

RAGS Part D Table 3's Medium-Specific Exposure Point Concentration Summary

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
ERP Site SS-63 (Back River), Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Surface Water Exposure Medium: Surface Water Exposure Point: Surface Water

Chemical	Units		Arithmetic 95% UCL of	Maximum	Maximum	EPC	Reasonal	Reasonable Maximum Exposure	posure	1 3	Central Tendency	
of		Mean	Normal	Detected	Qualifier	Units						
Potential			Data (b)	Concentration			Medium	Medium	Medium	Medium	Medium	Medium
Concern (a)							EPC	EPC	EPC	EPC	EPC	EPC
							Value (c)	Statistic	Rationale	Value (c)	Statistic	Rationale
INORGANICS												
Arsenic	mg/L	0.00171	0.00237	0.00374		mg/L	0.00237	95% UCL-N	W-Test (4)	0.00171	Mean-N	W-Test (4)
Magnesium	mg/L	627	684	707	7	mg/L	684	85% UCL-N	W-Test (3)	627	Mean-N	W-Test (3)
Mercury	mg/L	0.0000427	0.0000682	0.000106		J/6ш	0.0000682	95% UCL-N	W-Test (4)	0.0000427	Mean-N	W-Test (4)
Sodium	mg/L	5130	5590	5720	<u>,</u>	mg/L	5590	95% UCL-N	W-Test (3)	5130	Mean-N	W-Test (3)
ORGANICS												•
4,4'-DDD	mg/L	2.42E-06	0.00000567	0.0000144		mg/L	0.000000567	95% UCL-N	W-Test (4)	0.00000242	Mean-N	W-Test (4)
4,4'-DDE	mg/L	1.66E-06	0.00000335	0.00000786		J/Bu	0.00000335	95% UCL-N	W-Test (4)	0.00000166	Mean-N	W-Test (4)
Aldrin	mg/L	0.0000129	0.0000186	0.0000213		mg/L	0.0000186	95% UCL-N	W-Test (3)	0.0000129	Mean-N	W-Test (3)
Heptachlor	mg/L	2.82E-06	0.00000489	0.00000784		mg/L	0.00000489	95% UCL-N	W-Test (4)	0.00000282	Mean-N	W-Test (4)
Heptachlor epoxide	mg/L	1.94E-06	0.00000309	0.00000463		mg/L	0.0000000	85% UCL-N	W-Test (4)	0.00000194	Mean.N	W-Test (4)

^{*} Surface soil EPCs will be used for the following exposure points: 1) surface soil at WP-02, and 2) ambient air above WP-02 (vapors and particulates). Surface soil EPCs will be used to model ambient air route

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

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

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

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

- (1) Shapiro-Wilk W Test indicates data are log-normally distributed.
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
 - (3) Shapiro-Wilk W Test indicates data are normally distributed.
- (4) Shapiro-Wilk W Test indicates data are neither log-normally distributed or normally distributed. Therefore, normal distribution equations used as default.
 - (a) All chemicals are in the site and total data sets unless otherwise footnoted with the letter "T".
 - (b) 95% UCL of Normal Data defined as the 95% UCL associated with the data's distribution.
- (c) See Statistics Section of the report for more information on the calculation of the 95% UCL and the mean.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
ERP Site S-63 (Back River), Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point: Fish from Back River

Chemical	Units	Arithmetic	95% UCL of	Maximum	Maximum	EPC	Reasona	Reasonable Maximum Exposure	posure	O	Central Tendency	
ō		Mean	Normal	Detected	Qualifier	Units						···
Potential			Data (b)	Concentration			Medium	Medium	Medium	Medium	Medium	Medium
Concern (a)							EPC	EPC	EPC	EPC	EPC	EPC
							Value (c)	Statistic	Rationale	Value (c)	Statistic	Rationale
INORGANICS												
Arsenic	mg/kg	1.48	1.9	2.56		mg/kg	6.1	95% UCL-N	W-Test (3)	1,48	Mean-N	W-Test (3)
Calcium	mg/kg	744	4380	1320		mg/kg	1320	Max	W-Test (2)	744	Mean-N	W-Test (3)
Magnesium	mg/kg	330	348	360		mg/kg	348	95% UCL-N	W-Test (3)	330	Mean-N	W-Test (3)
Mercury	mg/kg	0.0506	0.0599	0.0692		mg/kg	0.0599	95% UCL-N	W-Test (3)	0.0506	Mean-N	W-Test (3)
Potassium	mg/kg	3690	3820	3850		mg/kg	3820	95% UCL-N	W-Test (3)	3690	Mean-N	W-Test (3)
Selenium	mg/kg	0.813	0.906	1.05		mg/kg	906.0	95% UCL-N	W-Test (3)	0.813	Mean-N	W-Test (3)
Sodium	mg/kg	521	636	717		mg/kg	636	95% UCL-N	W-Test (3)	521	Mean-N	W.Test (3)
ORGANICS						1						()
4,4'-DDD	⊞g/kg	0.00635	5.32	0.0284		mg/kg	0.0284	Max	W-Test (2)	0.0109	Mean-T	W-Test (1)
4,4'-DDE	mg/kg	0 0176	0.0254	0.0379		mg/kg	0.0254	95% UCL-N	W-Test (3)	0.0176	Mean-N	W-Test (3)
Aroclor 5432	⊞g/kg	260.0	1.45	0.379		mg/kg	0.379	Max	W-Test (2)	0.0941	Mean-T	W-Test (1)
PCB-1248	mg/kg	0.0213	0.0446	0.104		mg/kg	0.0446	95% UCL-N	W-Test (4)	0.0213	Mean-N	W-Test (4)
PCB-1254	mg/kg	0.0982	0.219	0.308		mg/kg	0.219	95% UCL-T	W-Test (1)	0.0941	Mean-T	W-Test (1)
PCB-1260	mg/kg	0.0376	0.0572	0.0972		mg/kg	0.0572	95% UCL-N	W-Test (3)	0.0376	Mean-N	W-Test (3)

^{*} Surface soit EPCs will be used for the following exposure points: 1) surface soil at WP-02, and 2) ambient air above WP-02 (vapors and particulates). Surface soil EPCs will be used to model ambient air route

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

For non-detects, 1/2 sample-specific method detection limit was used as a prcxy concentration; for duplicate sample results, the average value was used in the calculation.

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

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

- (1) Shapiro-Wilk W Test indicates data are log-normally distributed.
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
 - (3) Shapiro-Wilk W Test indicates data are normally distributed.
- (4) Shapiro-Wilk W Test indicates data are neither log-normally distributed or normally distributed. Therefore, normal distribution equations used as default.
 - (a) All chemicals are in the site and total data sets unless otherwise footnoted with the letter T'.
 - (b) 95% UCL of Normal Data defined as the 95% UCL associated with the data's distribution.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
ERP Site S-63 (Back River), Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point. Fish from Back River

Chemical	Units	Units Arithmetic 95%	95% UCL of	Maximum	Maximum	EPC	Reasonat	Reasonable Maximum Exposure	posure	Ō	Central Tendency	
of		Mean	Normal	Detected	Qualifier	Crits						
Potential			Data (b)	Concentration			Medium	Medium	Medium	Medium	Medium	Medium
Concern (a)							EPC	EPC	EPC	EPC	EPC	EPC
							Value (c)	Statistic	Rationale	Value (c)	Statistic	Rationale

(c) See Statistics Section of the report for more information on the calculation of the 95% UCL and the mean.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
ERP Sile SS-63 (Back River), Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point: Crabs from Back River

Chemical	Units	Arithmetic	95% UCL of	Maximum	Maximum	EPC	Reasona	Reasonable Maximum Exposure	bosoue	<u>ن</u>	Central Tendency	-
Ď		Mean	Normal	Detected	Qualifier	Cnits						
Potential			Data (b)	Concentration			Medium	Medium	Medium	Medium	Medium	Medium
Concern (a)			•				EPC	EPC	EPC	EPC	EPC	EPC
INORGANICS							Value (c)	Statistic	Rationale	Value (c)	Statistic	Rationale
Aluminum	mg/kg	9.21	14.1	15.3		mg/kg	14.1	95% UCL-N	W-Test (3)	9.21	Mean-N	 W-Test (3)
Arsenic	mg/kg	2.81	3.66	3.38	-	mg/kg	3.38	Max	W-Test (2)	2.81	Mean-N	W-Test (3)
Barium	mg/kg	0.382	0.471	0.477		mg/kg	0.471	95% UCL-N	W-Test (3)	0.382	Mean-N	W-Test (3)
Calcium	mg/kg	1680	2330	2230		mg/kg	2230	Max	W-Test (2)	1680	Mean-N	W-Test (3)
Copper	mg/kg	7.35	8.75	8.62		mg/kg	8.62	Max	W-Test (2)	7.35	Mean-N	W-Test (3)
Iron	mg/kg	12.4	14.1	14.2		mg/kg	14.1	95% UCL-N	W-Test (3)	12.4	Mean-N	W-Test (3)
Magnesium	mg/kg	449	543	547		mg/kg	543	85% UCL-N	W-Test (3)	449	Mean-N	W-Test (3)
Manganese	mg/kg	1.31	1.6	1.58		mg/kg	1.58	Max	W-Test (2)	1.31	Mean-N	W-Test (3)
Nickel	mg/kg	0.43	0.491	0.496		mg/kg	0.491	85% UCL-N	W-Test (3)	0.43	Mean-N	W-Test (3)
Potassium	mg/kg	2440	2840	2840		mg/kg	2840	Max	W-Test (2)	2440	Mean-N	W-Test (3)
Selenium	mg/kg	0.611	0.689	0.684		mg/kg	0.684	Max	W-Test (2)	0.611	Mean-N	W-Test (3)
Silver	mg/kg	0.528	0.73	0.785		mg/kg	0.73	95% UCL-N	W-Test (4)	0.528	Mean-N	W-Test (4)
Sodium	mg/kg	3310	3630	3640		mg/kg	3630	85% UCL-N	W-Test (3)	3310	Mean-N	W-Test (3)
Zinc	mg/kg	37.2	42.3	41.9	-	mg/kg	41.9	Max	W-Test (2)	37.2	Mean-N	W-Test (3)
ORGANICS							_					
4,4'-DDD	mg/kg	0.00101	0.00289	0.00339		mg/kg	0.00289	95% UCL-N	W-Test (4)	0.00101	Mean-N	W-Test (4)
4,4'-DDE	mg/kg	0.00412	0.00993	0.0111	-	mg/kg	0.00993	85% UCL-N	W-Test (3)	0.00412	Mean-N	W-Test (3)
Heptachlor	mg/kg	0.0000476	0.0000887	0.0000757		mg/kg	0.0000757	Max	W-Test (2)	0.0000476	Mean-N	W-Test (4)
Heptachlor epoxide	mg/kg	0.000642	0.00159	0.000792		mg/kg	0.000792	Мах	W-Test (2)	0.000642	Mean-N	W-Test (3)
PCB-1254	mg/kg	0.00702	0.0196	0.0231		mg/kg	0.0196	85% UCL-N	W-Test (4)	0.00702	Mean-N	W-Test (4)
Phenol	mg/kg	0.0801	0.144	0.133		mg/kg	0.133	Max	W-Test (2)	0.0801	Mean-N	W-Test (3)
bis(2-Ethylhexyl)phthalate	mg/kg	0.0551	0.106	0.12		mg/kg	0.106	85% UCL-N	W-Test (4)	0.0551	Mean-N	W-Test (4)

^{*} Surface soil EPCs will be used for the following exposure points: 1) surface soil at WP-02, and 2) ambient air above WP-02 (vapors and particulates). Surface soil EPCs will be used to model ambient air route

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

For non-detects, 1/2 sample-specific method detection limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation. W - Test Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285,7-081, May 1992.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY ERP Site SS-63 (Back River), Langley Air Force Base

Exposure Point: Crabs from Back River Scenario Timeframe: Current/Future Exposure Medium: Animal Tissue Medium: Animal Tissue

						í				č	Jondon	
Chemical	Units	Units Arithmetic 95%	95% UCL of	Maximum	Maximum	بر ت	Keasona	Keasonabie Maximum Exposure	bosod	Š		***
jo		Mean	Normal	Detected	Qualifier	Units						
Potentia			Data (b)	Concentration			Medium	Medium	Medium	Medium	Medium	Medium
Concern (a)							EPC	EPC	EPC	EPC	EPC	EPC
(a) macros							Value (c)	Statistic	Rationale	Value (c)	Statistic	Rationale

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

- T Total data set only.
- (1) Shapiro-Wilk W Test indicates data are log-normally distributed.
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
 - (3) Shapiro-Wilk W Test indicates data are normally distributed.
- (4) Shapiro-Wilk W Test indicates data are neither log-normally distributed or normally distributed. Therefore, normal distribution equations used as default.
 - (a) All chemicals are in the site and total data sets unless otherwise footnoted with the letter "T".
- (b) 95% UCL of Normal Data defined as the 95% UCL associated with the data's distribution. (c) See Statistics Section of the report for more information on the calculation of the 95% UCL and the mean.

EXPOSURE POINT CONCENTRATION SUMMARY REASONABLE MAXIMUM EXPOSURE Back River, Langley Air Force Base TABLE 3.1 RME

Scenario Timeframe: Current/Future	
Medium: Fish-shellfish tissue	
Exposure Medium: Fish-shellfish tissue	

					Maximum				
Exposure Point	Chemical of	Units	Arithmetic	95% UCL	Concentration		Exposure F	Exposure Point Concentration	noi
	Potential Concern (a)		Меап	(Distribution) (b)	(Qualifier)	Value (b)	Unids	Statistic	Rationale
Back River Shellfish	Inorganics								
	Aluminum	mg/kg	43.6	228 (T)	142	142	mg/kg	Мак	W-Test (2)
	Arsenic	mg/kg	0.761	(N) 2260	1.43	0.977	mg/kg	95% UCL-N	W-Test (3)
	Cadmium	ш9/кд	0.131	0.240 (T)	0.427	0.240	mg/kg	95% UCL-T	W-Test (1)
	Chromium (Total)	mg/kg	2.00	10.7 (T)	6.84	6.84	mg/kg	Max	W-Test (2)
	Copper	то/ка	4.95	133 (T)	18.5	18.5	mg/kg	Max	W-Test (2)
	Iron	mg/kg	87.1	188 (T)	297	38	gX/gm	95% UCL-T	W-Test (1)
	Lead	mg/kg	0.654	0.974 (N)	2.23	0.974	mg/kg	95% UCL-N	W-Test (4)
	Manganese	mg/kg	7.16	14.3 (T)	33.2	14.3	mg/kg	95% UCL-T	W-Test (1)
	Mercury	mg/kg	0.00669	0.0103 (N)	0.0201	0.0103	mg/kg	95% UCL-N	W-Test (4)
-	Selenium	mg/kg −	0.470	(N) 685:0	0.779	0.589	mg/kg	95% UCL-N	W-Tes! (3)
	Silver	mg/kg	0.433	1.13 (T)	1.24	1.13	mg/kg	95% UCL-T	W-Test (1)
	Vanadium	mg/kg	0.230	0.411 (N)	60:1	0.411	mg/kg	95% UCL-N	W-Test (4)
	Zinc	mg/kg	62.7	(N) 691	457	169	mg/kg	95% UCL-N	W-Test (4)
	Organics								
	Aldrin	mg/kg	0.000154	0.000203 (N)	0.000303	0.000203	mg/kg	95% UCL-N	W-Test (3)
	Aroclor 5432	mg/kg	0.0192	0.0255 (N)	0.0403	0.0255	mg/kg	95% UCL-N	W-Test (4)
	Benzo(a)anthracene	шу/ка	0.0165	0.0222 (N)	0.0366	0.0222	mg/kg	95% UCL-N	W-Test (4)
	Benzo(a)pyrene	mg/kg	0.0192	0.0242 (N)	0.0437	0.0242	mg/kg	95% UCL-N	W-Test (4)
	Benzo(b)fluoranthene	mg/kg	0.0197	0.0256 (N)	0.0484	0.3256	mg/kg	95% UCL-N	W-Test (4)
	Heptachlor epoxide	mg/kg	0.000224	0.000317 (N)	0 000472	0.000317	mg/kg	95% UCL-N	W-Test (3)
	PCB 1254	mg/kg	0.0158	0.0222 (N)	0.0356	0.0222	mg/kg	95% UCL-N	W-Test (3)
	PCB 1260	₩g/kg	0.00237	0.00326 (N)	0.00578 J	0.00326	mg/kg	95% UCL-N	W-Test (4)
	alpha-BHC	mg/kg	0.000192	0.000296 (N)	0.000555	0.000296	mg/kg	95% UCL-N	W-Test (3)
	della-BHC	mg/kg	0 000101	0.000224 (N)	0.000703	0.005224	mayka	95% UCL-N	W-Tes! (4)

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

For non-delects, 1/2 sample-specific method detection limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

- (1) Shapiro-Wilk W Test indicates data are log-normally distributed.
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC. (3) Shapiro-Wilk W Test indicates data are normally distributed.
- (4) Shapiro-Wirk W Test indicates data are neither log-normally distributed or normally distributed. Therefore, normal distribution equations used as default.

(a) All chemicals are in the site and total data sets unless otherwise footnoted with the letter "T".

(b) See Statistics Section of the report for more information on the calculation of the 95% UCL.

T=Lognormal UCL Definitions: J= Estimated Value N=Normal UCL

Appendix A.4

RAGS Part D Table 4's Values Used for Daily Intake Calculations

TABLE 4.1

Daily Intake Equations for the Fisher (Child): Dermal Absorption of Surface Water
ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure Roule Parameter	Parameter	Parameter Definition	Units	RME	RME	5	13	Inlake Equation/
	Code		·	Value	Rationale/ Reference	Value	Rationale/ Reference	Model Name (2)
Demail	W-IQD	Chronic Daily Intake, Surface Water	mg/kg-day	calculated	t			CDI-W (Inorganics) = CW-Mx CF3 x SA x PC x ET-D x EF x ED x CF2
Absorption	CW-M	Chemical Concentration in Surface Water	₽6m	CSV	ţ	ı	ţ	BWxAT
	ΥS	Skin Surface Area Avaitable for Contact	cm,	410	EPA, 1997	1	1	
	Ħ	Exposure Frequency	days/year	. 9	£	7.2	EPA, 1993	CDI-W (Organics 1) = $\frac{CW-M \times CF3 \times SA \times (2 \times PC \times sqrt(8 \times tau \times ET-D/pi))}{2}$
	ED	Exposure Duration	years	^	6	2.1	ε	X EF x ED x CF2
	BW	Body Weight	9	20.2	EPA, 1997	Ī	1	BW×AT
	ET:0	Exposure Time - Dermal	hr/event	0.25	ε	1	ı	
	5	Permeability Coefficient	cm/hour	CSV	1	ı	ı	CDI-W (Organics 2) = CW-M x CF3 x SA x PC x [(ET-D/1 + B) + 2 x tau
	tau	tau	hour	AS:	ı	į	1	X(1 + (3 x B)/1+B)] x EF x ED x CF2
	85	Cleek and Bunge (1992) parameter	unitless	A\$3	EPA, 1992	1	ı	BWxAT
	:-	sleady state time factor	hour	CSV	EPA, 1992	ţ	1	
	CF3	Conversion Factor 3	event/day	-	ţ	I	ı	
	CF2	Conversion Factor 2	l/cm³	0.001	ı	1	:	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	:	1	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	2,555	ED x 365 days/yr	787	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

csv = chemical-specific value

⁽²⁾ For organics, if ET-D < t*, then equation (Organics 1) is used. If ET-D > t*, then equation (Organics 2) is used.

TABLE 4.2

Daily Intake Equations for the Fisher (Adult): Dermal Absorption of Surface Water ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water from Back River
Receptor Population: Fisher
Receptor Age: Adult

Exposure Route Parameter	Parameter	Parameter Definition	Coits	RME	RME	CT	10	Intake Equation/
	Code			Value	Rationale/ Reference	Value	Rationale/ Reference	Model Name (2)
Dermal	W-IOO	CDI-W Chronic Daily Intake, Surface Water	mg/kg-day	calculated		t	ı	CDI-W (Inorganics) = CW-M x CF3 x SA x PC x ET-D x EF x ED x CF2
Absorption	CW-M	Chemical Concentration in Surface Water	Mg/A	^85	1	ı	ı	BW x AT
	S,	Skin Surface Area Available for Contact	cm ₂	783	EPA, 1997	ı	ı	
	Ħ	Exposure Frequency	days/year	4	EPA, 1991	22	EPA, 1993	CDI-W (Organics 1) = CW-M x CF3 x SA x (2 x PC x sqrt(6 x tau x ET-D/pi))
	ED	Exposure Duration	years	30	EPA, 1991	G 5	EPA, 1993	X EF X ED X CF2
	BW	Body Weight	kg	70	EPA, 1991	1	ţ	BW×AT
	ET-0	Exposure Time - Dermai	hrlevent	0.25	£	;	I	
	ၓၙ	Permeability Coefficient	cm/hour	۸sɔ	ı	1	ı	CDI-W (Organics 2) = CW-M x CF3 x SA x P.C.x [(ET-D/1 + B) + 2 x lay_
	tau	nen	hour	CSV	ı	1	1	x (1 + (3 x B)/1+B)] x EF x ED x CF2
	•	Cleek and Bunge (1992) parameter	unitess	۸۶۵	EPA, 1982	ı	ı	BW×AT
	L	steady state time factor	hour	782	EPA, 1992	ı	ı	
	CF3	Conversion Factor 3	event/day	-	;	l	t	
	CF2	Conversion Factor 2	Ист ^з	0.001	1	1	;	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ı	1	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	10,950	ED x 365 days/yr	3,285	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

csv = chemical-specific value

⁽²⁾ For organics, if ET-D < I', then equation (Organics 1) is used. If ET-D > I', then equation (Organics 2) is used.

TABLE 4.3

Daily Intake Equations for the Other Recreational Person (Adolescents (teens)): Ingestion/Dermal Absorption of Surface Water

ERP Site \$5-63, Langley Air Force Base

Receptor Population: Other Recreational Person³ xposure Point: Surface Water from Back River Scenario Timeframe. Current/Future Receptor Age: Adolescents (teens) xposure Medium: Surface Water Medium: Surface Water

Exposure Route Parameter	Parameter	Perameter Definition	sign	RME	HWS	L	Ŀ	intake Fortation
	Code			Value	Rationale/ Reference	Value	Rationale/ Reference	Model Name (2)
Ingestion	W-IGO	Chronic Daily Intake, Surface Water	тр/кр-дәу	calculated	1	:	-	CDI-W = CW-M x IR-W X EF X ED X FI-W
	CW-M	Chemical Concentration in Surface Water	1/0 E	À.	1	ı	1	BW×AT
	IR-W	Ingestion Rate of Water	liters/day	0.2	EPA, 1989	ı	1	
	FI-W	Fraction of Exposure, Surface Water	unitless	-	ε	t	ı	
	EF	Exposure Frequency	days/year	20	Ê	\$	Ê	
	ED	Exposure Ouration	years	Ð	€	9.1	3	
	BW	Body Weight	97	22	EPA, 1997	ı	t	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	:	I	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	ED x 365 days/yr	657	ED x 365 days/yr	
Dermal	CDI-W	Chronic Daily Intake, Surface Water	тд/кд-day	calculated	4		1	CDI-W (Inorganics) = CW-M x CF3 x SA x PC x ET-D x EF x ED x CF2
Absorption	CW-M	Chemical Concentration in Surface Water	₽⁄6m	VS.	1	ı	ı	BWxAT
	SA	Skin Surface Area Available for Contact	~5	15,800	EPA, 1997	1	ı	
	FF	Exposure Frequency	days/year	20	€	4	ε	CDI-W (Organics 1) = $\frac{CW-M}{N} \times CF3 \times SA \times (2 \times PC \times sqrt(0 \times teu \times ET-D/bit))$
	ED	Exposure Duration	years	9	EPA, 1991	1.8	ε	XEF XED X GF2
	BW	Body Weight	Kg.	57	EPA, 1997	1	1	BW×AT
	ET-0	Exposure Time - Dermal	hr/event	4	ε	i	I	
	5	Permeability Coefficient	cm/hour	Š	1	ı	1	CDI-W (Organics 2) = QW-M x CF3 x SA x PC x [(ET-D/1 + B) + 2 x lau_
	tau	tau	hour	À	1	ŧ	1	x(1+(3xBV1+B))xEFxEDxCF2
	æ	Cleek and Bunge (1992) parameter	unitless	È	EPA, 1992	1	;	BW×AT
	1	steady state time factor	hour	A\$5	EPA, 1992	ı	1	
	CF3	Conversion Factor 3	event/day	-	t	ł	ı	
	CF2	Conversion Factor 2	vcm³	1000	1	1	ı	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	1	ı	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	ED x 365 days/yr	657	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)
(2) For organics, if ET-D < t*, then equation (Organics 1) is used. If ET-D > t*, then equation (Organics 2) is used.

(3) Jet Skier

TABLE 44

· Daily Intake Equations for the Other Worker (Adult): Ingestion/Dermal Absorption of Surface Water ERP Site SS-63, Langley Air Force Base

> Exposure Point: Surface Water from Back River Receptor Population: Other Worker* Scenario Timeframe: Current/Future Exposure Medium: Surface Water dedium: Surface Water Receptor Age: Aduit

EPA, 1991 70 x 365 days/yr EPA, 1991 70 x 365 days/yr EPA, 1997 71 5 EPA, 1997 72,738 EPA, 1997 73,5 EPA, 1997 74 EPA, 1997 75,5 EPA, 1997 77,5 EPA, 1997 78 79 79 70 70 70 70 70 70 70 70			: 1	!	į	
Code Nationalist Rationalist Value Rationalist Value CD1-W Chronic Daily Intake, Surface Water mg/kg-day calculated — — CW4M Chemical Concentration in Surface Water litera/day 0.2 EPA, 1989 — — FLW Fraction of Exposure, Surface Water unitiess 1 (1) 4 — FLW Fraction of Exposure Surface Water unitiess 25 EPA, 1991 7.5 — ED Exposure Frequency days 25.550 70 x 365 days/r — — AT-A Averaging Time (Non-Cancer) days 25.550 70 x 365 days/r — — AT-A Averaging Time (Non-Cancer) days 25.550 70 x 365 days/r — — AT-A Averaging Time (Non-Cancer) days 25.550 70 x 365 days/r — — CDI-W Chronic Davily Intake, Surface Water mg/r calculated — — — CWAM Chemical Concentratio			KME	5	5	Intere Equation
CDI-W Chronic Daily Intake, Surface Water mg/kg-day calculated - - CWAM Chemical Concentration in Surface Water mg/l csv - - - FI-W Fraction of Exposure, Surface Water unitiess 1 (1) 4 FI-W Fraction of Exposure, Surface Water unitiess 1 (1) 4 EF Exposure Frequency days/year 5 (1) 4 EF Exposure Frequency years 25 EPA,1991 7.5 BW Body Weight kg 70 EPA,1991 7.5 AT-N Averaging Time (Cancer) days 25,550 70 x 365 days/r 2.738 CDI-W Averaging Time (Mon-Cancer) days 21,25 ED x 365 days/r 2.738 CDI-W Arenaging Time (Cancer) mg/kg-day calculated - - CDI-W Chronic Dauly Intake, Surface Water mg/kg-day calculated - - EF Exposure Frequency daysye		Value	Rationate/ Reference	Value	Retionale/ Reference	Model Name (3)
CWM Chemical Concentration in Surface Water might csv — — IR-W Higestion Rate of Water unitless 1 (1) – FI-W Fraction of Exposure, Surface Water unitless 1 (1) 4 EF Exposure Fraction of Exposure, Surface Water unitless 25 EPA, 1991 – BW Body Weight kQ 70 EPA, 1991 7.5 AT-C Averaging Time (Cancer) days 25,550 70 x 365 days/yr – AT-M Averaging Time (Mon-Cancer) days 9,125 ED x 365 days/yr – CDI-W Chronic Daily Intake, Surface Water mg/l calculated – – CWAM Chemical Concentration in Surface Water mg/l cav – – CWAM Chemical Concentration in Surface Water mg/l calculated – – EF Exposure Frequency days/vear 5 EPA, 1991 – EF Exposure Time - Dermal hour	ļ	┢		ī	_	CDI-W = CW-M x IR-W x EF x ED x FI-W
IR-W Ingestion Rate of Water liters/day 0.2 EPA 1989 — FI-W Fraction of Exposure, Surface Water unitiess 1 (1) 4 EF Exposure Frequency days/year 5 (1) 4 BW Body Weight kg 70 EPA 1991 7.5 AT-C Averaging Time (Non-Cancer) days 25,550 70 x 365 days/yr - AT-M Averaging Time (Non-Cancer) days 9,125 ED x 365 days/yr - CDI-W Chronic Daily Intake, Surface Water mg/l calculated - - CWAM Chronical Concentration in Surface Water mg/l calculated - - CWAM Chronical Concentration in Surface Water mg/l calculated - - CWAM Chronical Concentration in Surface Water mg/l calculated - - EF Exposure Frequency construct construct calculated - - EW Skin Surface Area Availa			ı	t	ı	BW⊼AT
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BW Body Weight kg 70 EPA, 1991			EPA, 1991	7.5	EPA, 1993	
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Skin Surface Area Available for Cortlact cm² 20,000 EPA, 1997 Exposure Frequency days/year 5 (1) 4 Exposure Fund years 25 EPA, 1991 7.5 Body Weight kg 70 EPA, 1991 7.5 Exposure Time - Dermal hi/levent 4 (1) - Permeability Coefficient cm/hour csv - - Cleek and Burge (1992) parameter unitless cav EPA, 1992 - steedy state time factor hour csv EPA, 1992 - conversion Factor 3 event/day 1 - - Conversion Factor 2 Vcm³ 1.0E-03 - -			ı	ı	١	BW×AT
Exposure Frequency days/ear 5 (1) 4 Exposure Duration years 25 EPA, 1991 7.5 Body Weight kg 70 EPA, 1991 7.5 Exposure Time - Dermal hi/levent 4 (1) - Permeability Coefficient cnt/hour csv - - Cleek and Bunge (1992) parameter untitless cav EPA, 1992 - steady state time factor hour csv EPA, 1992 - Conversion Factor 3 event/day 1 - - Conversion Factor 2 Vom³ 1.0.E-03 - -		20,000	EPA 1997	:	1	
Exposure Duration yéars 25 EPA, 1991 7.5 Body Weight kg 70 EPA, 1991 7.5 Body Weight h/vent 4 (1) - Exposure Time - Dermal h/vent Csv - - Permeability Coefficient cm/hour csv EPA, 1992 - Cleek and Burge (1992) parameter untless cav EPA, 1992 - steady state time factor hour csv EPA, 1992 - Conversion Factor 3 event/day 1 - - Conversion Factor 2 Vom3 1.0.E-03 - -			3	4	£	CDI-W (Organics 1) = CW-M × CF3 x SA x (2 x PC x sort(6 x tau x ET-D/b))
Body Weight kg 70 EPA, 1991 Exposure Time - Dermal hr/levent 4 (1) Permeability Coefficient cm/hour csv Iau hour csv EPA, 1992 Sleady state time factor hour csv EPA, 1992 Conversion Factor 3 event/day 1 Conversion Factor 2 Vcm³ 1.0E-03	<u> </u>		EPA, 1991	7.5	EPA, 1993	XEE X ED X GF2
Exposure Time - Dermal In/levent 4 (1) - Permeability Coefficient cm/hour csv - - Iau bour csv - - Cleek and Burge (1992) parameter undless cav EPA, 1992 - steady state time factor hour csv EPA, 1992 - Conversion Factor 3 event/day 1 - - Conversion Factor 2 Vcm³ 1.0.E-03 - -	Dy .	70	EPA, 1991	ı	1	BW×AT
Permeability Coefficient cm/hour csv			3	ι	ł	
lau hour cav — — Cleek and Bunge (1992) parameter unitiess cav EPA, 1992 — steady state time factor hour csv EPA, 1992 — Conversion Factor 3 event/day 1 — — Conversion Factor 2 Vcm³ 1.0.E-03 — —			ı	ı	ì	CDI-W (Organics 2) = CW-M.x CF3 x SA x PC x ((ET-D/1 + B) + 2 x lau
Cleek and Bunge (1992) parameter unitiess cav EPA, 1992 - steady state time factor hour csv EPA, 1992 - Conversion Factor 3 event/day 1 - - Conversion Factor 2 Vcm³ 1.0,E-03 - -	Jriou Hori		ı	1	1	x(1+(3xBV)+B))xEFxEDxCF2
steady state time factor hour csv EPA, 1992 Conversion Factor 3 event/day 1 Conversion Factor 2 Vcm³ 1.0.E-03			EPA, 1992	1	l —	BW×AT
Conversion Factor 3 event/day 1 Conversion Factor 2 Vom³ 1.0.E-03			EPA, 1992	ı	:	
Conversion Factor 2 Vcm³ 1.0.E-03	<u> </u>	ay 1	1	;	ı	
			t	ı	:	
AT-C Averaging Time (Cancer) days 25,550 70 x 365 days/r			70 x 365 days/yr	·	ı	
AT-N Averaging Time (Non-Cancer) days 9,125 ED x 365 daystyr 2,738 ED x 365 daystyr 2,738 ED x 365 dayst			ED x 365 days/yr	2,738	ED x 365 days/yr	

⁽¹⁾ Professional Judgement (see Appendix F1)

⁽²⁾ Combined child/adult cancer risk for these routes will be addressed by adding cancer risk of the child and adult together.

⁽³⁾ For organics, if ET-D < t*, then equation (Organics 1) is used. If ET-D > t*, then equation (Organics 2) is used. (4) Sea Rescue Trainer csv = chemical-specific value

TABLE 4.5 Daily Intake Equations for the Fisher (Child): Ingestion of Fish from Back River

ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Fish from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure Route Parameter Code	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CDI-F	CDI-F Chronic Daily Intake, Fish	mg/kg-day	calculated	ï	ı	**	CDI-F = CF x IRc-F x EF x ED x FI-F
	స	Chemical Concentration in Fish	mg/kg	csv	1	:	I	BW×AT
	IR _C -F	Ingestion Rate, Fish for Child	kg/day	0.008	EPA, 1997	0.003	EPA 1997	
	FI-F	Fraction of Exposure, Fish	unitless	0.5	€	1	ı	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	a	Exposure Duration	years	7	€	2.1	Ξ)	
	8W	Body Weight	kg	20.2	EPA, 1997	ı	•	
	AT-C	AT-C Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ŀ	ı	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	2,555	ED x 365 days/yr	767	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

TABLE 4.6

Daily Intake Equations for the Fisher (Adult): Ingestion of Fish from Back River ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Fish from Back River
Receptor Population: Fisher
Receptor Age: Adult

Exposure Route Parameter Code	Parameter Code	Parameter Definition	Units	RMË Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CDI-F	CDI-F Chronic Daily Intake, Fish	mg/kg-day	calculated	ł	1	1	CDI-F = CF x IR4-F x EF x ED x FI-F
	P	Chemical Concentration in Fish	mg/kg	CSV	ŀ	:	ı	BW×AT
	IR _A -F	Ingestion Rate, Fish for Adult	kg/day	0.025	EPA, 1997	900.0	EPA, 1997	
	FI-F	Fraction of Exposure, Fish	unitless	0.5	(3)	1	:	
	#	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	9	Exposure Duration	years	£	EPA, 1991	o	EPA, 1993	
	8W	Body Weight	ķ	20	EPA, 1991	ı	i	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ı	1	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	10,950	ED x 365 days/yr	3,285	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

TABLE 4.7
Daily Intake Equations for the Fisher (Child): Ingestion of Crabs from Back River ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Crabs from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure Route Parameter Code	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CDI-F	CDI-F Chronic Daily Intake, Crabs	mg/kg-day	calculated	1	1	I	CDI-F = CF x IRc-C x EF x ED x FI-C
	გ	Chemical Concentration in Crabs	mg/kg	csv	1	1	ì	BW×AT
	IR _c -C	IR _c -C Ingestion Rate, Crabs for Child	kg/day	0.008	EPA, 1997	0.003	EPA, 1997	
	F-C	Fraction of Exposure, Crabs	unitless	9.0	Ξ	1	1	
	Æ	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	a	Exposure Duration	years	۷	(5)	2.1	£	
	BW	Body Weight	kg	20.2	EPA, 1997	ŧ	I	
	AT-C	AT-C Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ï	ŧ	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	2,555	ED x 365 days/yr	767	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

TABLE 4.8

Daily Intake Equations for the Fisher (Adult): Ingestion of Crabs from Back River ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Crabs from Back River
Receptor Population: Fisher
Receptor Age: Adult

Exposure Route Parameter Code	Parameter Code	Parameter Definition	Units	RME	RME Rationale/	CT Value	CT Rationale/	Intake Equation/ Model Name
					Reference		Reference	
Ingestion	CDI-F	CDI-F Chronic Daily Intake, Crabs	mg/kg-day	calculated	1	ı	ï	CDI-F = CF x IRA-C x EF x ED x EI-C
	ÇF	Chemical Concentration in Crabs	mg/kg	OSV	1	:	!	BW×AT
	IR _A -C	Ingestion Rate, Crabs for Adult	kg/day	0.025	EPA 1997	0.008	EPA, 1997	
	٦ -	Fraction of Exposure, Crabs	unitiess	0.5	9	1	ı	
	EF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	30	EPA, 1991	on .	EPA, 1993	
	BW	Body Weight	ş	20	EPA, 1991	ŀ	;	
	AT-C	AT-C Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ţ	l	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	10,950	ED x 365 days/yr	3,285	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

TABLE 4.1

Daily Intake Equations for the Fisher (Child): Ingestion of Bivalves from Back River ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point: Bivalves from Back River Receptor Population: Fisher Receptor Age: Child

Exposure Route	Parameter	Parameter Definition	Units	RME	HME	ե	CT	Intake Equation/
	Code			Value	Rationale/	Value	Rationale/	Model Name
					Reference		Reference	
lngestion	CDI-BV	CDI-BV Chronic Daily Intake, Bivalves	mg/kg-day	calculated	:	:	;	CDI-BV = CF x IRc-C x EF x ED x FI-C
	P.	Chemical Concentration in Bivalves	mg/kg	CSV	l	1	;	BW x AT
	lR _c -BV	Ingestion Rate, Bivalves for Child	kg/day	0.008	EPA, 1997	0.003	EPA, 1997	
	FI-BV	Fraction of Exposure, Bivalves	unitless	-	Ξ	1	1	
	出	Exposure Frequency	days/year	320	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	7	(3)	2.1	ε	
	BW	Body Weight	ķā	20.2	EPA, 1997	1	i	
	AT-C	Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	ı	:	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	2,555	ED x 365 days/yr	767	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1)

TABLE 4.2
Daily Intake Equations for the Fisher (Adult): Ingestion of Bivalves from Back River ERP Site SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Bivalves from Back River
Receptor Population: Fisher
Receptor Age: Adult

Exposure Route Parameter	Parameter	Parameter Definition	Units	RME	RME	C.	CT	Intake Equation/
	Code			Value	Rationale/	Value	Rationale/	Model Name
					Reference		Reference	
Ingestion	CDI-BV	CDI-BV Chronic Daily Intake, Bivalves	mg/kg-day	calculated	1	1	-	CDI-BV = CF x IB4-C x EF x ED x FI-C
	2	Chemical Concentration in Bivalves	mg/kg	CSV	;	1	ı	BW x AT
	IR _A ·BV	IRA-BV Ingestion Rate, Bivalves for Adult	kg/day	0.025	EPA, 1997	0.008	EPA, 1997	
	FI-BV	Fraction of Exposure, Bivalves	unitless	, -	ε)	:	ı	
	FF	Exposure Frequency	days/year	350	EPA, 1991	234	EPA, 1993	
	ED	Exposure Duration	years	30	EPA, 1991	6	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1991	1	1	
	AT-C	AT-C Averaging Time (Cancer)	days	25,550	70 x 365 days/yr	1	ı	
	AT-N	AT-N Averaging Time (Non-Cancer)	days	10,950	ED x 365 days/yr	3,285	ED x 365 days/yr	

(1) Professional Judgement (see Appendix F1) csv = chemical-specific value

Appendix A.5

RAGS Part D Table 5's Non-Cancer Toxicity Data

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
ERP Site SS-63, Langley Air force Base

Chanteds Christist Christist Christist Christist Christist Christist Adjustment Feder (1) brands Adjustment Feder (1) brands Adjustment Feder (1) brands Adjustment Feder (1) brands Frings Trappin COD Christist NA NAA T70% NAA NAA <th></th>											
of Pointrial Subdiction Value Units Adjustment Facial (1) Dommal FRO (2) Promited Organia Concient NIA NIA NIA NIA NIA NIA NIA Chronic 10 Cot 10 Cot mylog-day 27 Cot 10 Cot Doy NS 27 Cot 10 Cot NIA NIA </th <th>Chemical</th> <th>Chronic</th> <th>Oral RID</th> <th>Oral RfD</th> <th>Oval to Dermai</th> <th>Adjusted</th> <th>Uaits</th> <th>Риятагу</th> <th>Combined</th> <th>Sources of RID:</th> <th>Dales of RfC:</th>	Chemical	Chronic	Oral RID	Oral RfD	Oval to Dermai	Adjusted	Uaits	Риятагу	Combined	Sources of RID:	Dales of RfC:
Concent NIA NAA TOTAS NAA N	of Potential	Subchronic	Value	Siles	Adjustment Factor (1)	Derman		Tarpet	Uncertainty/Modifying	Tarpet Organ	Terpet Organ (3)
Chronic N/A N/A 70% N/A	Concern					RIO (2)		Organ	Factors		(MM/DD/YY)
Official Committee NUA NUA TONA TONA NUA Dee MS 2 TE-61 magkeday 2 TE-64 magkeday Dee MS Dee M	4,4-000	Chronic	N/A	N/A	70%	Α'N	ΝΑ	٧'n	N/A	ΥN	Α'N
Official 3.0E-64 Cyberial 278.4 2.7E-61 mylog-day bis-strain	4.4-DDE	Chronic	N/A	N/A	70%	N/A	N/A	¥/N	NA	ΥN	ΑN
22 Chronic 10E+00 mb/d-day 77% 27E-01 mb/d-day Day NS NA	Aldrin	Chronic	3.0E-05	mg/kg-day	%06	2.7E-05	тд/кд-бау	liver	1000	RIS	03/21/01
22 Chronic NuA MSA MSA<	Aluminum	Chronic	1.0E+00	mg/kg-day	27%	2.7E-01	mg/kg-day	Dev. NS	100	NCEA	06/26/96
Offworis 316 G-M mobile day 985% 28 E-M mobile day Bakery bakery Offworis 216 G-Z mylky day 100% 10 E-M mylky day biskery mylky day biskery mylky day biskery mylky day mylky day </td <td>Arodor 5432</td> <td>Chronic</td> <td>¥2</td> <td>N/A</td> <td>3608</td> <td>N/A</td> <td>Ϋ́</td> <td>N/A</td> <td>NA</td> <td>NA</td> <td>NV.A</td>	Arodor 5432	Chronic	¥2	N/A	360 8	N/A	Ϋ́	N/A	NA	NA	NV.A
Intervision Tote of the control of the c	Arsenic	Сһтопіс	3.06-04	mg/kg-day	95%	2.9E-04	mg/kg-day	skinVescular	3	IRIS	03/21/01
Promise Chronic 10E-02 mg/kg-day 15E-02 mg/kg-day liver liver Chronic N.M. N/A	Barium	Сһтопіс	7.0E-02	mg/kg-day	100%	7.0E-02	mg/kg-day	kidney	£	RIS	03/21/01
Chronic NuA NIA NIA NIA NIA NIA Chronic 4 0 E 02 mg/dg day 60% 2 4 E 02 mg/dg day 60% 2 4 E 02 mg/dg day 60% 6 E 04 mg/dg day 60% 6 E 04 mg/dg day 6 E 04 MA NA	bis (2-Ethylhexyl) phthalate	Chronic	2.0E-02	то/ко-дау	55%	1.1E-02	mg/kg-day	liver	1000	IRIS	03/21/01
chronic 5 DE 504 mg/kg-day 60% 2.4E-02 mg/kg-day Ci Unaci epoxide Chronic 5 DE 504 mg/kg-day 90% 4.5E-04 mg/kg-day kevar n Chronic 1 3E-53 mg/kg-day 100% 1.2E-03 mg/kg-day kevar n Chronic 1 3E-51 mg/kg-day 100% 1.0E-01 mg/kg-day N/A	Calcium	Chronic	₹ /	V/A	N/A	N/A	N/A	VIN	NA	ΥN	Α'N
epoxide Chronic 5.0 E.04 mg/kg day 6.9% 4.5 E.04 mg/kg day bivert bivert n Chronic 1.3 E.05 mg/kg day 1.2 E.03 mg/kg day biocodivent/Gl tred 1 n Chronic N/A N/A N/A N/A N/A N/A n Chronic 1.4 E.01 mg/kg-day 1.00% 1.0 E-03 mg/kg-day chros CNS n Chronic 2.0 E.02 mg/kg-day 1.0 E-03 mg/kg-day chros CNS n Chronic 2.0 E.02 mg/kg-day 1.0 E-03 mg/kg-day chros CNS n Chronic 1.0 E.04 mg/kg-day 1.0 E-03 mg/kg-day chros CNS chronic 2.0 E-03 mg/kg-day 1.0 C-03 mg/kg-day chros chro chro chro chro	Copper	Chronic	4 0E 02	mg/kg-day	%09	2.4E-02	mg/kg-day	Gi traci	N/A	NCEA	04/29/97
eparatide Chronic 13E-05 mg/hg-day 100% 12E-05 mg/hg-day free/ref n Chronic 30E-01 mg/hg-day 100% 30E-01 mg/hg-day blood/hyen/Cl tract 1 n Chronic 1.4E-01 mg/hg-day N/A N/A N/A N/A N/A n Chronic 1.4E-01 mg/hg-day 5% 1.0E-03 mg/hg-day CASS CASS u/y Chronic 2.0E-02 mg/hg-day 1.00% N/A N/A N/A N/A u/y Chronic 1.0E-04 mg/hg-day 1.00% N/A N/A <td>Heptachior</td> <td>Chranic</td> <td>\$ 0E-04</td> <td>тр/кр-дау</td> <td>30%</td> <td>4.5E-04</td> <td>mg/kg-day</td> <td>liver</td> <td>300</td> <td>IRIS</td> <td>10/12/00</td>	Heptachior	Chranic	\$ 0E-04	тр/кр-дау	30%	4.5E-04	mg/kg-day	liver	300	IRIS	10/12/00
1 Chronic 3 DE-01 mgAg-day 100% 3 DE-01 mgAg-day bloodhverifGl tract 1 (bood) Chronic N/A N/A N/A N/A N/A N/A 1 (bood) Chronic 1 4E-01 mgAg-day 5% 1 0E-03 mgAg-day CNS CNS 2 (non-lood) Chronic 2 0E-02 mgAg-day 1 00-03 mgAg-day 1 0E-03 mgAg-day CNS CNS Lury Chronic 1 0E-04 mgAg-day 1 00-05 mgAg-day 0 0E-05 mgAg-day Dev NS NA Lury Chronic 1 0E-04 mgAg-day 0 45% 8 0E-05 mgAg-day Dev NS NA Lury Chronic N/A N/A 100% N/A N/A N/A N/A Lury Chronic N/A N	Heptachtor epoxide	Chronic	1 3E-05	тф/кд-дау	80%	1.26.05	mg/kg-day	liver	1000	IRIS	03/21/01
1 (Chronic NIA	+can	Chronic	3.0E-01	mg/kg-day	100%	3.06-01	толка-сыу	blood/liver/Gl tract	1	NCEA	01/05/99
(flood) Chronic 1 4E-01 mg/kg-day N/A N/A N/A CNS (flon-flood) Chronic 2 GE-02 mg/kg-day 5% 1 0E-03 mg/kg-day 5% 1 0E-03 mg/kg-day CNS uv/y Chronic 3 GE-04 mg/kg-day 1 0G-04 mg/kg-day 1 0G-05 mg/kg-day low Dov. NS Dov. NS lmmmune system lmmmu	Magnesium	Chronic	¥/¥	AVA.	N/A	N/A	ΝΑ	N/A	NVA	ΑN	ΝΑ
e (non-food) Chronic 2 0E-02 mg/kg-day 5% 1 0E-03 mg/kg-day CNE cury Chronic 3 0E-04 mg/kg-day 100% 3 0E-04 mg/kg-day Immune system cury Chronic 1 0E-04 mg/kg-day 0 4% 8 0E-05 mg/kg-day Day NS chronic 2 0E-02 mg/kg-day 1 00% N/A N/A N/A chronic 2 0E-03 mg/kg-day 1 00% N/A N/A N/A chronic 2 0E-03 mg/kg-day 1 00% N/A N/A N/A N/A chronic 6 0E-03 mg/kg-day 1 00% N/A N/A N/A N/A chronic 6 0E-03 mg/kg-day 4 4% 2 2E-03 mg/kg-day Liver/main/nsikin/nCNS N/A chronic 3 0E-03 mg/kg-day 4 4% 2 2E-03 mg/kg-day Liver/main/nsikin/nCNS N/A chronic 3 0E-03 mg/kg-day 4 4% 2 2E-03 mg/kg-day	Manganese (food)	Chronic	1.4E-01	mg/kg-day	N/A	N/A	N/A	CNS	1	IRIS	03/21/01
cury Chronic 3 0E-04 mg/kg-day 100% 3 0E-04 mg/kg-day Immune system cury Chronic 1 0E-04 mg/kg-day 60% 9 0E-05 mg/kg-day Dev NS 7 chronic 2 0E-02 mg/kg-day 0 4% 8 6E-03 mg/kg-day hraad/liver 1 chronic 2 0E-03 mg/kg-day 100% N/A N/A N/A N/A chronic 6 0E-01 mg/kg-day 100% N/A <	Manganese (non-food)	Chronic	2 OE-02	mg/kg-day	5%	1 0E-03	mg/kg-day	CNS	1	IRIS	03/21/01
Luy Chronic 1 0E-04 mg/kg-day 90% 9 0E-05 mg/kg-day Dov. NS Dov. NS Chronic 2 0E-02 mg/kg-day 0 4% 8 6E-03 mg/kg-day haartiner n/A Chronic 2 0E-03 mg/kg-day 100% N/A N/A N/A N/A Chronic 6 0E-01 mg/kg-day 100% N/A N/A N/A N/A Chronic 6 0E-01 mg/kg-day 44% 2 2E-03 mg/kg-day haba N/A N/A N/A Chronic 5 0E-03 mg/kg-day 44% 2 2E-03 mg/kg-day Luvarhaminalabakin/CNS 1 Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A Chronic 5 0E-03 mg/kg-day 44% 2 2E-03 mg/kg-day Luvarhaminalabakin/CNS 1 Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A	Mercury	Chronic	306.04	mg/kg-day	100%	3 0E-04	mg/kg-day	Immune system	1000	IRIS	03/21/01
Chronic 2 0E-02 mg/kg-day 0 4% 8 6E-03 mg/kg-day haar/liver Chronic 2 0E-03 mg/kg-day 100% N/A N/A N/A N/A Chronic 2 0E-03 mg/kg-day 100% N/A N/A N/A N/A Chronic 6 0E-01 mg/kg-day 100% 3 4E-01 mg/kg-day h/A N/A	Methylmercury	Съгопе	1 OF 9	тд/кд-дву	3606	9 0E.05	mg/kg-day	Dev. NS	10	IRIS	03/21/01
Chronic N/A N/A 100% N/A N/A N/A Chronic 2 0E-03 mg/kg-day 100% 2 0E-05 mg/kg-day inmrune ayster/keye/halls 100% Chronic 6 0E-01 mg/kg-day N/A N/A N/A N/A N/A Chronic 5 0E-03 mg/kg-day 44% 2 2E-03 mg/kg-day Luvermanthaite/kin/CNS 100m Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A	Nicket	Chronic	2 0E-02	mg/kg-day	0.4%	8.6E-05	тоже сау	hearthiver	300	IRIS	03/21/01
Chronic 2 0E-05 rng/kg-day 100% 100% 100% Inmuna aystamilis Chronic 6 0E-01 mg/kg-day 80% 5 4E-01 mg/kg-day febus 100% Chronic 6 0E-03 mg/kg-day 44% 2 2E-03 mg/kg-day LuverhaufhaitstrinCNS 100m Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A N/A	PCB-1246	Chronic	NVA	N/A	100%	Α'N	N.A	N/A	N/A	NIA	NIA
Chronic NIA NIA NIA NIA NIA Chronic 6 GE-01 mg/kg-day 80% 5.4E-01 mg/kg-day febus 160.6 Chronic N.A N.A N.A N.A N.A N.A N.A Chronic 5.0E-03 mg/kg-day 44% 2.2E-03 mg/kg-day Luverhaufhaifushin/CNS 1.0 Chronic 5.0E-03 mg/kg-day N.A 5.0E-03 mg/kg-day wkin 1.0 Chuonic N.A N.A N.A N.A N.A N.A N.A	PCB-1254	Chronic	2.0E-05	тале-дау	100%	2.0E-05	mg/kg-dey	immine aystendeye/mails	300	IRIS	03/21/01
Time Chronic 6 DE-01 mg/kg-day 5 4E-01 mg/kg-day febus In Chronic N/A N/A N/A N/A N/A In Chronic 5 0E-03 mg/kg-day Liverhaufhafsishin/CNS Liverhaufhafsishin/CNS Chronic 5 0E-03 mg/kg-day N/A N/A N/A N/A	PCB-1260	Chronic	N.A	N/A	100%	ΑχΑ	ΥN	N/A	NA	NA	AVA
In The Chronic NIA	Phenol	Chronic	6.0E-01	mg/kg-day	*06	5.4E-01	mg/kg-day	fetus	100	IRIS	03/21/01
n Chronic 5 0E.03 mg/kg-day 44% 2 2E.03 mg/kg-day Liverhaufnafkbakin/CNS Chronic 5 0E.03 mg/kg-day M/A N/A akin Chronic N/A N/A N/A N/A N/A	Polassium	Chronic	¥,	N/A	NA	N/A	ΥN	N/A	NA	N/A	N/A
Chronic â 0E-03 mg/kg-day N/A \$ 0E-03 mg/kg-day ukin Chronic N/A N/A N/A N/A N/A	Selenium	Chronic	5.0E-03	тр/ка-дау	44%	2.2E-03	толе-дау	Liverthanthaliatoring	3	IRIS	03/21/01
Chronic NJA NJA NJA NJA NJA NJA	Silver	Chronic	5.0E-03	то/кр-дау	NIA	5.0E-03	толо-дау	BAIN	3	IRIS	03/21/01
	Sodium	Chronic	AN A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	NA
Chronic 3.0E-01 mg/kg-day 25% 7.5E-02 mg/kg-day blood	Zinc	Chronic	3.0E-01	mg/kg-day	25%	7.5E-02	mg/kg-day	poold	3	IRIS	03/21/01

NA = Not Available
(1) Refer to RAGS, Part A
(2) Adjusted Dermal RiDammul = Oral Chronic RiDchemical x Gl Absorption Factorannes
(3) The data IRIS was searched.

The date of HEAST.
The date of the article provided by NCEA.
The date of the RBC Region III Tables

TABLE 5.1
NON-CANCER TOXICITY DATA – ORAL/DERMAL
ERP Site SS-63, Langey Air Force Base

	į	€ (2)	ξ.	
	5	Target Organ (3)	(WM/DD/WY)	
	Sources of Allin	Target Organ		
	Compined	Uncertainty/Modifying	Factors	
	Fumany	Target	Organ	
	Adjusted	Demail	RfD (2)	
	Oral to Dermal	Adjustment Factor (1)		
	Oral Rid	Units		
	Oral RID	Value		
	Chronic	Subchronic		
	Chemical	of Potential	Concern	
<u> </u>		_		_

Note: Endosuffan was used as a surrogate for endosuffan I and endosuffan suffate. Endrin was used as a surrogate for endrin aldehyde, and endrin ketone.

NON-CANCER TOXICITY DATA -- ORAL/DERMAL ERP Site SS-63, Langley Air Force Base

Chemical	Chronic	Oral RID	Oral RIO	Oral to Demail	Adjusted	Units	Primary	Combined	Sources of RID:	Deles of RID:
of Potential Concern	Subchronic	Value	S)	Adjustment Factor (1)	Oermat RtD (2)		Target Organ	Uncertainty/Modifying Factors	Target Organ	Target Organ (3) (MM/DD/YY)
Aldrin	Chonic	3.0E-05	mg/kg-day	%06	2.7E-05	mg/kg-day	Mer	1000	IRIS	03/21/01
Aluminum	Chronic	1.0E+00	т9/кр-дву	27%	2.7E-01	mg/kg-day	Dev. NS	100	NCEA	08/26/96
Arocior 5432	Chronic	Y/V	N/A	%06	ΝΑ	N/A	WA	NA	¥Λ	N/A
Arsenic	Chronic	3.0E-04	mg/kg-day	95%	2.9E-04	толко-дау	skhryvascular	3	SIM	03/21/01
Benzo(a)anthracene	Chronic	Y/Y	N/A	Ϋ́	¥/N	N/A	WA	NVA	YA V	N/A
Benzo(a)pyrene	Chronic	A/A	¥	NA	ΥN	ΑN	N/A	N/A	Y/N	NA
Benzo(b) fluoranthene	Chronic	NA	¥/N	N/A	V/V	N/A	WA	N/A	VA	N.N
alpha BHC	Chronic	ΝΑ	A/A	97.4%	N/A	N/A	N/A	NVA	ΝΑ	N/A
detta-BHC	Chronic	N/A	A/N	%06	N/A	N/A	N/A	NA	ΥN	Y.
Cadmium	Chronic	1.0E-03	mg/kg-day	2.5%	2.5E-06	mg/kg-day	kidney	10	SIHI	03/21/01
Chromum	Chronic	1.SE+00	тд/кд-дау	<u>2</u> 8	1.5E-02	mg/kg-day	Gi tracVletus/Done marrow/spleen/liver	1000	SIŁI	03/21/01
Соррег	Chronic	4.0E-02	mg/kg-day	60%	2.4E-02	mg/kg-day	Gl trạci	NA	NCEA	04/28/97
Heplachlor epoxide	Chronic	1.3E-05	mg/kg-day	%06	1.2E-05	mg/kg-day	liver	1000	SIH	03/21/01
lron	Chronic	3.0E-01	mg/kg-day	*001	3.0E-01	mg/kg-day	blood/liver/Gi tract	1	NCEA	04/50/10
Manganese (food)	Chronic	1.4E-01	mg/kg-day	NA	V.A	N/A	CNS	1	SIRI	03/21/01
Methylmercury	Chronk	1.05-04	mg/kg-day	%08	9.0E-05	толка-дау	Dev. NS	10	SILH	03/21/01
PCB-1254	Chronic	2.0E-05	mg/kg-day	*001	2.0E-05	пъджа-дау	Immune system/eye/nalls	300	SIHI	03/21/01
PCB-1260	Chronic	¥.×	ς»	100%	N/A	N/A	N/A	NVA	N/A	NA
Selenium	Chronic	5.0E-03	то/ка-дау	848%	2.2E-03	mg/kg-day	Liverfhair/nails/skin/CNS	3	IRIS	03/21/01
Silvar	Chronic	5.0E-03	тд/кд-дау	NA	5.0E-03	mg/kg-day	skin	3	IRIS	03/21/01
Vanadium	Chronic	7.0E-03	mg/kg-day	2%	1.4E-04	тф/кр-дау	Gi tract/CNS/kidney/bone marrow/liver	100	HEAST	04/29/97
Zinc	Chronic	30E-01	трлка-дау	25%	7.5E-02	тола-дау	blood	3	IFIS	03/21/01
	:									

N/A . Not Available

- (1) Refer to FIAGS, Part A
- (2) Advisted Dermal Ritbowners Oral Chionic Ritbonemical x Gl Absorption Factoromed
 - (3) The date IRIS was searched.

The date of HEAST

The date of the erticle provided by NCEA.

The date of the Region #1 RBC Tables.

Note: Endosulan was used as a surrogate for endosulan I and endosulan suffate. Endrin was used as a surrogate for endrin aldehyde, and endrin telone.

Appendix A.6

RAGS Part D Table 6's Cancer Toxicity Data

CANCER TOXICITY DATA -- ORAL/DERMAL ERP Site SS-63, Langley Air Force Base TABLE 6.1

Chemical	Oral Cancar Stope Factor	Units	Oral to Dermai	Adjusted Dermal	Units	Weight of Evidence/	Source	Dete (2)
of Potential			Adjustment	Cancer Slope Factor (1)		Cancer Guideline		(MM/DD/YY)
Cancern			Factor			Description		
4,4'-DDD	2.4E-01	(mg/kg-day) 1	70%	3.4E-01	(mg/kg-day)	B2	IRIS	03/21/01
4,4'-DDE	3.4E-01	(mg/kg-day) 1	70%	4.9E-01	(mg/kg-day) 1	B2	IRIS	03/21/01
Aldrin	1.7E+01	(mg/kg-day) 1	%06	1.9E+01	(mg/kg-day) 1	BZ	IRIS	03/21/01
Aluminum	N/A	(mg/kg-day) ⁻¹	27%	N/A	(mg/kg-day) 1	N/A	N/A	NA
Aroclor 5432	4 5E+00	(mg/kg-day) 1	90%	5.0E+00	(mg/kg-day)	82	IRIS	03/21/01
Arsenic	1.5É+00	(mg/kg-day) 1	85%	1.6€+00	(mg/kg-day) 1	< .	IRIS	03/21/01
Barium	N/A	(mg/kg-day) 1	100%	NA	(mg/kg-day) -	NIA	NIA	MA
bis (2-Ethylhexyl) phthaiate	1.4E-02	(mg/kg-day) 1	55%	2.5E-02	(mg/kg-day) -1	182	IRIS	03/21/01
Calcium	NA	(mg/kg-day) 1	5%	N/A	(mg/kg-day) 1	NA	NA	NA
Copper	N/A	(mg/kg-day) 1	60%	N/A	(mg/kg-day) '	N/A	N/A	NA
Heptachlor	4 5E+00	(mg/kg-day) "	%0.06	5 0E+00	NVA	82	IRIS	03/21/01
Heptachfor epoxide	9 1E+00	(mg/kg-day) 1	%06	1.0E+01	NA	B2	IRIS	03/21/01
Iron	N/A	(mg/kg-day) 1	100%	NA	N/A	WA	N/A	ΝΑ
Magnesium	A/A	(mg/kg-day) 1	N/A	N/A	N/A	WA	N/A	Ϋ́Z
Manganese (food)	N/A	(mg/kg-day) 1	N/A	N/A	(mg/kg-day)	NA	N/A	NA
Manganese (non-food)	N/A	(mg/kg-day) 1	5%	N/A	(mg/kg-day) 1	N/A	N/A	NIA
Mercury	NA	N/A	100%	N/A	N/A	NIA	N/A	N/A
Methylmercury	N/A	N/A	%06	N/A	N/A	N/A	N/A	N/A
Nickel	ΝΑ	N/A	%0	N/A	N/A	NA	N/A	ΝΑ
PCB-1248	2.0E+00	(mg/kg-day) ''	100%	2.0E+00	N/A	B2	IRIS	03/21/01
PCB-1254	2.0E+00	(mg/kg-day) 1	100%	2.0E+00	(mg/kg-day) 1	82	IRIS	01/01/01
PCB-1260	2.0E+00	(mg/kg-day) 1	100%	2.0€+00	N/A	82	IRIS	03/21/01
Phenol	NA	(mg/kg-dav)	%06	N/A	(mg/kg-day) '	MA	N/A	NA
Połassium	N/A	(mg/kg-day) 1	N/A	NIA	(mg/kg-day)	NA	NIA	N/A
Selenium	N/A	(mg/kg-day) '	44%	ΝΆ	(mg/kg-day)	N/A	N/A	NA
Silver	N/A	(mg/kg-day) 1	NA	ΥX	(mg/kg-day)	N/A	N/A	N/A
Sodium	NA	(mg/kg-day) 1	N/A	N/A	(mg/kg-day)	NA	NA	NA
Zinc	N/A	(mg/kg-day) "	25%	N/A	(тр/кд-дау)	N/A	N/A	NA

EPA Group: A - Human carcinogen

IRIS = Integrated Risk Information System HEAST= Health Effects Assessment Summary Tables

CANCER TOXICITY DATA -- ORAL/DERMAL ERP Site SS-63, Langley Air Force Base TABLE 6.1

-									_
	Oral Cancer Slone Factor	Pije.	Oral to Darmat	Adiisted Dermai	Chrits	Weight of Evidence/	Source	Date (2)	
		1	Adjustment	Cancer Stone Factor (1)	2	Cancer Guideline	<u> </u>	(MM/DD/YY)	
			Factor			Description		•	
					•				_

N/A= Not Available

(1) Adjusted $SF_0 = Sf_0/GI$ Absorption Factor (2) The date IRIS was searched.

The date of HEAST.

The date of article provided by NCEA.

Note: For PCTs and PCB-1248,

81 - Probable human carcinogen - indicates that limited human data are available B2 - Probable human carcinogen - indicates sufficient evidence in animals and

inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERIMAL
ERP Site SS-63, Langley Air Force Base

Chemical of Potential Concern	Oral Cancer Slope Factor	Units	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (1)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MWDD/YY)
Aldrin	1.7E+01	(mg/kg-day)	%06	1.9E+01	(mg/kg-day)	B2	IRIS	03/21/01
Aluminum	NA	ΝΆ	27%	N/A	NA	NVA	N/A	NA
Aroclor 5432	4.5E+00	(mg/kg-day) 1	%06	5.0E+00	(mg/kg-day) 1	B2	NCEA	03/21/01
Arsanic	1.5E+00	(mg/kg-day)	%56	1.6E+00	(тр/кр-дау)	٧	IRIS	03/21/01
Benzo(a)anthracene	7.3E-01	(mg/kg-day) ¹¹	N/A	NA	N/A	B2	NCEA, IRIS	07/01/83, 3/21/01
Вепго(а)ругеле	7.3E+00	(mg/kg-day) "	N/A	NA	NA	82	RIS	03/21/01
Benzo(b)lluoranthene	7.3E-01	(mg/kg-day) *	NA	NA	ΝΑ	82	NCEA, IRIS	07/01/93, 03/21/01
alpha-BHC	6.3E+00	(mg/kg-day) '	97.4%	6.5E+00	(mg/kg-day) -1	B2	SILI	03/21/01
delta-BHC	1.8E+00	(mg/kg-day) ''	%06	2.0E+00	(то/кд-дау) -1	Q	IRIS	03/21/01
Cadmium	ΝΑ	N/A	2.5%	NA	N/A	N/A	N/A	N/A
Chromium	N/A	N/A	1%	N/A	N/A	D	νN	NA
Соррег	N/A	N/A	60%	NA	N/A	N/A	NA	N/A
Heptachlor apoxide	9.1E+00	(mg/kg-day)	80%	1.0E+01	(т9/кр-дау)	B2	IRIS	03/21/01
Iron	N/A	(mg/kg-day) '	100%	NA	N/A	N/A	N/A	NA
Manganese (food)	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Methytmercury	NA	N/A	%0 6	N/A	ΝΑ	N/A	N/A	N/A
PCB-1254	2.0E+00	(mg/kg-day) 1	100%	2.0E+00	(mg/kg-day) 1	B2	SILI	03/21/01
PCB-1260	2.0E+00	(mg/kg-day)	100%	2.0E+00	N/A	B2	IRIS	03/21/01
Selenium	N/A	ΝΆ	44%	NA	N/A	NA	N/A	N/A
Silver	N/A	NA	NA	NA	N/A	N/A	N/A	NA
Vanadium	NA	NA	2%	NA	N/A	NA	NA	NA
Zinc	NA	N/A	25%	N/A	N/A	N/A	V/N	N/A

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

N/A≂ Not Available

(1) Adjusted SF₄ = St₄ / Gl Absorption Factor

(2) The date IRIS was searched.

The date of HEAST.

EPA Group:

A - Human cercinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - Indicates sufficient evidence in animals and

inadequate or no evidence in humans

C - Possible human carcinogen

CANCER TOXICITY DATA -- ORAL/DERMAL ERP Site SS-63, Langley Air Force Base TABLE 6.1

Γ	• ••			
	Date (2)	(MWDD/YY)		
	Source			
	Weight of Evidence/	Cancer Guideline	Description	
	Units			
	Adjusted Dermal	Cancer Slope Factor (1)		
	Oral to Dermai	Adjustment	Factor	
	Units			
	Oral Cancer Stope Factor			
	Chemical	of Potential	Concern	

The date of article provided by NCEA.

D - Not classifiable as a human carcinogen E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

Appendix A.7

RAGS Part D Table 7's Calculation of Non-Cancer Hazards Resonable Maximum Exposure

TABLE 7 1.RME
RME CALCULATION OF NON-GANCER HAZARDS: DERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR THE CHILD FISHER
SS-63, Langley Air Force Base

Scanario Timeframe: CurrentiFuture
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Carroer) Units	Reference	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	INORGANICS												
Absorption	Arsenic	2.4E-03	l/g/m	2.4E-03	l/Dm	Σ	1.3E-09	mg/kg-day	2.9E-04	mg/kg-day	ΝΆ	¥.X	0 000005
	Magnesium	6.8E+02	mg/l	6.8E+02	Ngm	Σ	3.8E-04	mg/kg-day	ı	:	N/A	N/A	1
	Methylmercury	6 8E-05	l/đw	6 8E-05	l _l gm	2	3.8E-11	тд/кд-дау	9.0E-05	mg/kg-day	ΝΆ	ΑΝ	0.0000004
	Sodium	5.6E+03	l⁄gm	5.6E+03	l⁄gm	×	3.1E-03	mg/kg-day	1	,	N/A	V/V	,
	ORGANICS												
	4,4-DDD	5 7E-06	l/gm	5.7E-06	mg/l	Σ	1.4E-08	mg/kg-day	ı	ı	N/A	N/A	ı
	4,4'-DDE	3.4E-06	⊮6m	3.46-06	ľ/Ĝm	Σ	6 8E-09	mp/kg-day	ı	ŧ	ΑΝ	ΚΆ	ı
	Aldrin	1.9E-05	l/g/m	1.96-05	l\gm	Σ	3.5E-10	mg/kg-day	2.7E-05	mg/kg-day	N/A	N/A	0.00001
	Heptachlor	4 9E-06	мgм	4.9E-06	l/ôm	₹	6.8E-10	mg/kg-day	4.5E-04	mg/kg-day	N/A	V/N	0.0000
	Heptachlor epoxide	3.1E-06	у6ш	3.1E-06	l∕gm	Σ	2.4E-09	тд/кд-day	1.2E-05	mg/kg-day	N/A	Ϋ́N	0.0002
	(Total)											:	0.0002

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Total Hazard Index Across All Exposure Routes/Pathways

TABLE 72.RME
RME CALCULATION OF NON-CANCER HAZARDS DERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe. Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water from Back River
Receptor Population: Fisher
Receptor Age Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Vatue	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference	Reference Concentration Units	Hazard Quotient
Dermal	INORGANICS												
Absorption	Arsenic	2.4E-03	ng.	2.4E-03	l _l ge	Σ	7.4E-10	mg/kg-day	2.9E-04	mg/kg-day	ΑN	Ϋ́	0.00003
	Magnesium	6.8E+02	l/gm	6.8E+02	ng∕l	Σ	2.1E-04	mg/kg-day	ı		ΥN	WA	1
	Methylmercury	6.8E-05	l/gm	6 BE-05	P _Q m	Σ	2.1E-11	тр/кр-dау	9.0E-05	mg/kg-day	N/A	Ϋ́	0.0000002
	Sodium	5 6E+03	l/gm	5 6E+03	f/6m	Σ	1.7E-03	mg/kg-day	ı		ΝΆ	Υ'N	ı
	ORGANICS				_								
	4.4-000	5 7E-06	e Se	5 7E-06	Гб	Σ	7.6E-09	mg/kg~day	ţ	ı	W/W	A/N	ı
	4,4'.DDE	3.4E-06	mg/l	3.4E-06	l∕gπ	≨	3.8E-09	mg/kg-day	ı	1	N/A	A/N	ı
	Aldrin	1 9E-05	mg/l	1 9E-05	mg/l	Σ	2.0E-10	mg/kg-day	2 7E-05	mg/kg-day	ΝΆ	K/N	200000
	Heptachlor	4.9E-06	.πg/l	4 9E-06	mg/l	Σ	3.8E-10	тд/кд-day	4.5E-04	mg/kg-dey	A/A	WA	0.00001
	Heptachlor epoxide	3.1E-06	F P	3 1E-06	l/6w	×	1.36-09	тр/кр-дау	1.2E-05	mg/kg-day	K/A	Ϋ́Z	0.0001
	(Total)												0.0001
									٩	Total Hazard Index Across All Exposure Routes/Pathways	ross All Exposure f	Routes/Pallways	0 0001

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation

TABLE 7.3.RME
RME CALCULATION OF NON-CANCER HAZARDS: INGESTIONDERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR THE OTHER RECREATIONAL PERSON (ADOLESCENTS (TEENS))
SS-63, Langley Air Force Base

Exposure Medium: Surface Water Exposure Point: Surface Water from Back River Receptor Population: Other Receational Person² Receptor Age Adolescents (sens) Scenario Timeframe: Current/Future Aedium, Surface Water

Exposure	Chemical	Medium	Мефип	Route	Route	EPC	Intske	Intake	Reference	Reference	Reference	Reference	Hazard
Route	of Potential Concern	EPC Value	Units	S even	C sign	Selected for Hazard Calcutation (1)	(Non-Cancer)	(Non-Cancer) Units	Dolle	Dose Units	Concentration	Concentration Units	Ovolient
Ingestion	INDRGANICS												
	Arsenic	2.4E-03	lgm	2.4E-03	Ş.	2	4 6E-07	mg/kg-day	3.06-04	mg/kg-day	ΥA	¥7	0.002
	Magnesium	6 BE+02	John Mark	8 BE+02	ě	3	1 3E-01	mg/kg-day	;	ţ	NA	Κχ	ı
	Methylmercury	8 8E-05	l Om	6 8E-05	(A)	2	135-08	mg/kg-day	1.05-04	mg/kg-day	¥N	₹/Z	1000.0
	Sodium	5 6E+03	Ngm	5 6E+03	Ē	ž	1,15+00	mg/kg-day	ı	ı	Y/N	Y/V	ŧ
	ORGANICS	_		_									
	4,41,000	5 7E-06	М	5 7E-06	ě	3	1.1E-09	mg/kg-day	ı	1	Ϋ́	4 /Z	1
	4.4'.DDE	3.4E-06	wow.	3.4E-06	Ē	2	6.4E-10	mg/kg-day	ı	1	N/A	₹/Z	1
	Adm	1 9E-05	m64	1 9E-05	ja P	3	3.66-09	mg/kg-day	3.0E-05	mg/kg-day	N/A	Ϋ́Z	0.0001
	Heptachlor	4 9E-06	Mon	4.9E-06	26	2	9.4E-10	mg/kg-day	5.0E-04	mg/kg-day	ΝΑ	Υ/V	0.000002
	Heptachlor apoxide	3.1E-08	lon.	3.1E-06	ě	2	5 96-10	mg/kg-day	1.3E-05	то/кр сау	K/N	ΥN	0.00005
	(Total)												0.002
Dermal	INORGANICS												
Absorption	Arsenic	2.4E-D3	ja m	2.4E-03	P.	₹	1.4E-07	mg/kg-day	2.9E-04	mg/kg-day	¥/N	ΝΆ	0.0005
•	Magnesium	6 8E+D2	John Mg	6 BE+02	S E	2	4.2E-02	mg/kg-day	1	1	W/A	K/A	;
	Metrylmercury	8 8E-05	Jon H	6 BE-05	Μď	Œ	4 (E-09	mg/kg-day	9.0E-05	mp/kg-day	Ϋ́	¥.	0.00005
-	Sodium	5 6 E + 03	Ş.	5.6€+03	ja B	Ξ	3.46-01	mg/kg-day	1	,	N/A	X/X	1
	ORGANICS												
	4,4'-000	5.7E.06	δu	5.75-08	15	3	3.7E-07	mg/kg-day	1	ī	N/A	¥2	:
	4.4.DDE	3.4E-05	ē	3.4E-06	70	3	1.9E-07	то/ко-дву	ı	ı	¥/N	W/A	î
	Aldrin	1 9E-05	5	1.9E-05	Ē	2	9.7E-09	mg/kg-day	2.7E-05	mg/kg-day	¥/N	N/A	0.0004
	Heptachlor	4 9E-06	топ Г	4.9E-06	γ 6	3	1.96-08	то/кр-фау	4.5E-04	mg/kg-day	Y/N	Α'N	00000
	Heptachlor epoxide	3.1E-06	Š	3.1E-06	ě	2	6.5E-08	mg/kg-day	1.2E-05	moke-day	∀ N	¥	900 0
]	(Total												0.008
									Tot	Total Mazard Index Across All Exposure Routes/Pathways	ross All Exposure	RouteLPathways	0.008

(1) Specity Medum-Specific (M) or Route-Specific (R) EPC naterted for hazard calculation (2) Jet Steer

TABLE 7.4 RME
RME CALCULATION OF NON-CANCER HAZARDS. INGESTION/DERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR OTHER WORKER (ADULT)
SS-83, Langley Air Force Base

Exposure Medium. Surface Water Exposure Point. Surface Water from Back River Receptor Population. Other Worker² Receptor Age. Adult Scenario Timetrame: CurrenVFuture Medium: Surface Water

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazerd Calculation (1)	intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference	Reference Concentration Units	Hazard Quotient
Ingestion	INDRIGANICB	2.4E-03	Joe Lo	2.4E-03	ē	2	9.36-08	та/ко-сау	3.06.04	mo/kg-day	¥/N	¥N.	0 0003
	Magnesium	6.8E+02		6.8E+02	ě	3	2.7E-02	mg/kg-day	1		N/A	N/A	,
	Methylmorcury	6.8E-05		6 8E-05	Se E	3	2.7E-09	mg/kg-day	1.0E-04	mg/kg-day	N/A	N/A	0.00003
	Sodium	5.6E+03	νoυ (1)	S.6E+03	Š	3	2.2E-01	mg/kg-day	t	ı	Ϋ́	N/A	1
	ORGANICS						-						
	4.4-DDD	5 7E-06	√ôw	5 7E-08	Į,	×	2.2E-10	mg/kg-day	ı	;	N/A	V/V	,
	4,4'-DDE	3.4E-06	Ž	3.4E-06	Ę	3	1.3E-10	mg/kg-day	1	1	Α'n	ΑŅ	ı
	Aldrin	1.96-05	Ş	1 9E-05	Ę	2	7.3E-10	mg/kg-day	3 0E-05	mp/kg-day	A/A	N/A	0.00002
_	Haptachior	4 9E.06	ě	4.9E-06	Ď	3	1 9E-10	mg/kg-day	5.0E-04	толо-дау	N/A	N/A	0.0000004
	Heptachlor epoxide	3.16.06	5	3.16.06	Į,	3	1 2E-10	mg/kg-day	1.3E-05	mg/kg-day	N/A	Y/Y	0.00009
	(Total)												0.0004
Dermal	INORGANICS												
Absorption	Arsenic	2.4E-03	lgm	2.4E-03	Š	3	3.7E-08	mg/kg-day	2.9E-04	mg/kg-day	¥,Z	N/A	10000
	Magnesium	6.9E+02		6 BE+02	ign ign	3	1.1E-02	mg/kg-day	ı	ı	N/A	K.X	,
	Methylmercury	6.8€-05	S E	6 BE-05	mg/	3	1.15-09	mg/kg-day	₽ 0E-05	mg/kg-day	N/A	N/A	0.00001
	Sodium	5 6E+03	ě	5.6E+03	ξ.	3	8.8E-02	mg/kg-day	t	1	N/A	Y/N	1
	ORGANICS												
	4,4'.000	5 7E-06	٦	5 7E-06	20	3	9 GE-08	mg/kg-day	;	ţ	Ϋ́χ	Ϋ́Z	1
_	4,4-DDE	3.46.06	Page	3.4E-06	26	3	4.66-08	mg/kg-day	;	1	X	N/A	,
	Aldrin	1.95.05	μ	1.9E-05	ja B	¥	2.5E-09	mg/kg-day	2.7E-05	mg/kg-dey	N.A	V/N	6,00009
-	Heptachlor	4.9E-06	Ş.	4.9E-06	Jon W	3	4.8E-09	mg/kg-day	4.5E-04	mg/kg-day	¥7	V/N	0.0000
	Heptachlor epoxide	3.18.06	Ē	3.1E-06	5	3	1.75.08	mg/kg-day	1.2E-05	mg/kg-day	¥/¥	ΝΆ	0.001
	(Tolely)												0 002
										Total Hazard Index	Across All Exposure	Total Hazard Index Across All Exposura Routes/Pathways	200 0

(1) Specify Medium-Specific (M) or Roule-Specific (R) EPC selected for hazard calculation.
(2) Sea Rescue Trainer

TABLE 7.5.RME
RME CALCULATION OF NON-CANCER HAZARDS. INGESTION
OF FISH FROM BACK RIVER FOR THE CHILD FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point. Fish from Back River Receptor Population: Fisher Receptor Age: Child

Hazard Quotient		-	:	:	0.1	:	0.03	1		:	1	ı		7	:	3.4
				_												
Reference Concentration Units		ΥN	N/A	N/A	N/A	N/A	Ϋ́	A/N		Ψ/X	N/A	N/A		N/A	Y.Y	
Reference Concentration		V/A	N/A	N/A	N/A	N/A	Α'N	ΑΝ		N/A	N/A	N/A		Ϋ́Ν	N/A	
Reference Dose Units		mg/kg-day	:	ı	толод-дау	;	mg/kg-day	ı		1	ı	ı	ı	mg/kg-day	ı	
Reference Dose		3.05-04	ı	,	1.0E-04	,	5.05-03	1		:	ı	ı	ı	2.0E-05	1	
Intake (Non-Cancer) Units		mg/kg-day	mg/kg-day	тд/кд-дау	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day		mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	
Intake (Non-Cancer)		3.6E-04	2.5E-01	6.6E-02	1.1E-05	7.3E-01	1.7E-04	1.2E-01		5.4E-06	4.8E-06	7.2E-05	9.5E-06	4.2E-05	1.1E-05	
EPC Selected for Hazard Calculation (1)		2	Σ	Σ	Σ	Σ	Σ	Σ.		Σ	Σ	Σ	Σ	Σ	Σ	
Route EPC Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg·	тдука	mg/kg	mg/kg	mg/kg	mg/kg	
Route EPC Value		1.9E+00	1.3E+03	3.5E+02	6.0E-02	3.8E+03	9.1E-01	6.4E+02		2 8E-02	2 5E-02	3.8E-01	4.5E-02	2.2E-01	5.7E-02	
Medium EPC Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	ag/g	mg/kg	mg/kg·	mg/kg	
Medium EPC Value		1.9E+00	1 3E+03	3.5E+02	6.0E-02	3.8E+03	9.1E-01	6.4E+02		2 8E-02	2.5E-02	3.8E-01	4.5E-02	2 2E-01	5.7E-02	
Chemical of Potential Concern	INORGANICS	Arsenic	Całcium	Magnesium	Methylmercury	Potassium	Selenium	Sodium	ORGANICS	4,4'-DDD	4,4'-DDE	Aroclor 5432	PCB-1248	PCB-1254	PCB-1260	(Lotal)
Exposure Route	Ingestion	•							<u>-</u>	*	-1	•			. -	

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Total Hazard Index Across All Exposure Routes/Pathways

TABLE 7.6.RME
RME CALCULATION OF NON-CANCER HAZARDS: INGESTION
OF FISH FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: CurrenVFuture
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Fish from Back River
Receptor Population: Fisher
Receptor Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	intake (Non-Cancer)	intake (Non-Cancer) Units	Reference	Reference Dose Units	Reference	Reference Concentration Units	Hazard Quotient
Ingestion	INORGANICS												
	Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	≥	3.3E-04	mg/kg-day	3.0E-04	тд/кд-дау	N/A	ΥX	-
	Calcium	1.3E+03	mg/kg	1.3E+03	mg/kg	Σ	2.3E-01	mg/kg-day	ı	ı	A/A	Α̈́Ν	;
•	Magnesium	3.5E+02	mg/kg	3.5E+02	та/ка	Σ	6.0E-02	тд/кд-day	:	ı	Υ/X	A/N	ı
-	Methylmercury	6.0E-02	mg/kg	6.0E-02	тдля	\$	1.0E-05	mg/kg-day	1.0E-04	mg/kg-day	ΑΝ	ΚX	0.1
	Potassium	3.8E+03	mg/kg	3.8E+03	mg/kg	×	6.5E-01	mg/kg-day	1	ı	¥,X	ΑX	ı
	Selenium	9.1E-01	mg/kg	9.1E-01	mg/kg	Σ	1.6E-04	mg/kg-day	5.0E-03	mg/kg-day	A/A	N/A	0.03
	Sodium	6.4E+02	т9/кв	6.4E+02	mg/kg	Σ	1.1E-01	тр/кр-дау	1	ł	Y/N	ΥN	1
	ORGANICS												
	4.4'-DDD	2.8E-02	mg/kg	2.8E-02	mg/kg	₽	4.9E-06	mg/kg-day	ı	!	¥,	¥/Ž	ı
	4.4*-DDE	2.5E-02	mg/kg	2.5E-02	mg/kg	₹	4.3E-06	mg/kg-day	ı	ı	V/N	¥,X	ı
	Aroclor 5432	3.8E-01	mg/kg	3.8E-01	тдЛкд	Σ	6.5E-05	тд/кд-day	1	1	Ϋ́Z	V Z	:
	PCB-1248	4.5E-02	mg/kg	4.5E-02	mg/kg	Σ	7.6E-06	mg/kg-day	t	ı	Ϋ́	A/A	ı
	PCB-1254	2.2E-01	mg/kg	2.2E-01	mg/kg	Σ	3.8E-05	тд/ка-дау	2.0E-05	mg/kg-day	A/N	¥/N	73
·	PCB-1260	5.7E-02	mg/kg	5.7E-02	mg/kg	2	9.8E-06	та/ка-дау	ı	1	K Z	A'A	1
	(Total)												3.1
									Tot	Total Hazard Index Across All Exposure Routes/Pathways	ross All Exposure F	coutes/Pathways	3.1

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.7.RME
RME CALCULATION OF NON-CANCER HAZARDS. INGESTION
OF CRABS FROM BACK RIVER FOR THE CHILD FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tiesue
Exposure Medium: Animal Tissue
Exposure Point: Crabs from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure	Chemical	Medium	Medium	Route	Route	EPC	Intake	Intake	Reference	Reference	Reference	Reference	Hazard
Route	of Potential	EP.	EPC	EPC	EPC	Selected	(Non-Cancer)	(Non-Cancer)	Dose	Dase Units	Concentration	Concentration	Quotient
	Concern	Value	Units	Value	Onics Si	for Hazard Calculation (1)		Onits		,		Sir.	
Ingestion	INORGANICS												
:	Aluminum	1.4€+01	mg/kg	1.45+01	mg/kg	2	2.7E-03	mg/kg-day	1.0E+00	mg/kg-day	N/A	A/N	0 003
	Arsenic	3.4€+00	mg/kg	3.4€+00	трука	2	6.4E-04	mg/kg-day	3.0E-04	mo/kg-day	N/A	4 22	~
	Barium	4.7E-01	mg/kg	4.7E-01	mg/kg	ž	8 9E-05	mg/kg-day	7.0E-02	mo/kg-day	N/A	Α'n	0.001
	Calcium	2 2E+03	mg/kg	2.2E+03	тржа	Σ	4 2E-01	төлкр-дау	ı	,	ΚN	Ϋ́	1
	Соррег	B 6E+00	mg/kg	9.6E+D0	mp/kg	×	1.6E-03	mg/kg-day	4.0E-02	mp/kg-day	A'N	N/A	0.04
	Iron	1 4E+01	mg/kg	1.4E+01	тожо	2	2.7E-03	mg/kg-day	3.0E-01	mg/kg-day	N/A	Ψ/X	0.00
	Magnesium	5.4E+02	mg/kg	5.4E+02	mg/kg	Σ	1.0E-01	mg/kg-day	ı	1	Α'n	ΑN	t
	Manganese (food)	1 6E+00	mg/kg	1.6E+00	mg/kg	2	3.0E-04	тр/кр-дау	1.4E-01	mg/kg-day	N/A	ΑN	0.002
<u> </u>	Nickel	4.9E-01	mg/kg	4 9E-01	шрука	Σ	9.3E-05	mg/kg-day	2.05-02	mg/kg-day	V/A	WA	0.005
	Polassium	2.8E+03	трука	2.8E+03	mg/kg	Σ	5.4E-01	mg/kg-day	t	. 1	ΨN	N/A	ı
	Salanium	6.8E-01	mg/kg	6.8E-01	mg/kg	≥	1.3E-04	mg/kg-day	5.0E-03	mg/kg-day	ΝΑ	ΑN	0.03
	Silver	7.36-01	mg/kg	7.3E-01	mg/kg	2	146-04	mp/kg-day	5.0E-03	mp/kg-day	V,V	N/A	0.03
	Sodium	3.6E+03	mg/kg	3.6E+03	mg/kg	Σ	6.9E-01	mg/kg-day	ı	1	¥ž	W/A	ı
·	Zinc	4.2E+01	тдУка	4.2E+01	толе	Σ	8.0E-03	mg/kg-day	3.0E-01	mg/kg-day	ΝΑ	ΑX	0.03
	ORGANICS			•	_					•			
	4.4'-DDD	2 96-03	шаука	2 9E-03	mg/kg	₹	5 5E-07	mg/kg-day	ı	ŀ	N/A	N/A	ı
	4,4'-DDE	9.96-03	mg/kg	9.96-03	marka	₹	1.9E-06	та/ка-фау	ı	ı	N/A	ΝΑ	ı
	Heptachlor	7.6E-05	mg/kg	7.6E-05	толе	2	1.4E.08	mg/kg-day	5.0E-04	mg/kg-day	N/A	N/A	0.00003
	Heptachior epoxide	7.96-04	mg/kg	7.96-04	mg/kg	5.	1.56-07	mg/kg-day	1.3E-05	mg/kg-day	N/A	W/A	0.01
	PCB-1254	2.0E-02	пр/кр	2.0E-02	mg/kg	Z	3.7E-06	mg/kg-day	2.0E-05	mg/kg-day	Α'n	¥×	0.2
	Phenol	1.3E-01	mg/kg	1.36-01	mg/kg	Σ	2.5E-05	mg/kg-day	6.0E.01	mg/kg-day	N/A	¥2	0.00004
	bis (2-Ethylhexyl) phthalate	116-01	mg/kg	1.16-01	тр/кр	2	2.0E-05	mg/kg-day	2.0E-02	тф/кд-дау	N/A	K/N	0.001
	(Total)				_								2.5

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Total Hazard Index Across All Exposure Roules/Pathways

TABLE 7.8.RME
RME CALCULATION OF NON-CANCER HAZARDS: INGESTION
OF CRABS FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Animal Tissue Exposure Medium: Animal Tissue Exposure Point: Crabs from Back River Receptor Population: Fisher Receptor Age: Adult

Exposure	Chemical	Medium	Medlum	Route	Roule	EPC	Intake	Intake	Reference	Reference	Reference	Reference	Hazard
Route	of Potential Concern	EPC Value	EPC Units	EPC	Chits	Selected for Hazard Calculation (1)	(Non-Cancer)	(Non-Cancer) Units	Oose	Dase Units	Сапсентивол	Concentration	Quotient
Ingestion	INORGANICS		_										
	Aluminum	1.4E+01	mg/kg	1.4E+01	mg/kg	≨	2.4E-03	mg/kg-day	1.0E+00	mg/kg-day	∢ Ż	Ϋ́Z	0.002
	Arsenic	3.4€+00	mg/kg	3.4E+00	mg/kg	2	5.8E-04	mg/kg-day	3.0E-04	mg/kg-day	V/N	ΥN	7
	Barium	4.7E-01	тд/кр	4.7E-01	тд/ка	Σ	8.1E-05	талка-аву	7.0E-02	mg/kg-day	Ϋ́	Ϋ́	0.001
	Calcium	2.ZE+03	mg/kg	2.2E+03	mg/kg	Σ	3.8E-01	mg/kg-day	;	1	Y/X	V/V	ı
	Copper	9.6E+00	mg/kg	B.6E+00	трле	Σ	1.5E-03	mg/kg-day	4.0E-02	mg/kg-day	ΑN	ΥN	0.04
	Iron	1.4E+01	mg/kg	1.4E+01	mg/kg	ž	2.4E-03	mg/kg-day	3.0E-01	mg/kg-day	ΥZ	V.V.	10.0
	Magnesium	5.4E+02	mg/kg	5.4E+02	mg/kg	×	9.3E-02	тр/кр-сау	1	1	Y/N	A/A	ł
	Manganese (food)	1 6E+00	тд/кр	1.6E+00	mg/kg	S	2.7E-04	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	0.002
	Nickel	4.9E-01	mg/kg	4.9E-01	mg/kg	Σ	8.4E-05	mg/kg-day	2.0E-02	mg/kg-day	ΑN N	¥/N	0.004
	Polassium	2.BE+03	mg/kg	2.8E+03	mg/kg	2	4.9E-01	тд/кд-dау	1	ı	V/V	W/A	ı
	Selenium	6 8E-01	mg/kg	6.8E-01	mg/kg	Σ	1.2E-04	mg/kg-day	5.DE-03	mg/kg-day	Α/N	ΝΆ	0.03
	Silver	7.3E-01	mg/kg	7.3E-01	mg/kg	≆	1.3E-04	mg/kg-day	5.0E-03	mg/kg-day	Ψ/N	¥/N	0.03
	Sodium	3.6E+03	mg/kg	3.6E+03	та/ка	Σ	8.2E-01	mg/kg-day	ı	1	ΥN	Υ/X	ı
	Zinc	4.2E+01	аууба	4.2E+01	тр/ка	Σ	7.2E-03	mg/kg-day	3.05-01	mg/kg-day	Y.A	¥X	0.02
	ORGANICS	_		_					_				
	4.4-DDD	2.9E-03	mg/kg	2.9E-03	mg/kg	₹	4.9E-07	mg/kg-day	ı	1	N/A	NIA	ı
	4.4-DDE	8.9E-03	тд/ка	9.9E-03	mg/kg	¥	1.7E-06	mg/kg-day	1	ı	A/N	N/A	1
	Heptachlor	7.6E-05	трле	7.6E-05	mg/kg	Σ	1.3E-08	mg/kg-day	5.0E-04	тд/кд-day	¥2	¥/N	0.00003
	Heptachlor epoxide	7.9E-04	mo/kg	7.9E-04	mg/kg	Σ	1.4E-07	mg/kg-day	1.3E-05	mg/kg-day	¥X	¥/N	0.01
	PCB-1254	2.0E-02	mg/kg	2.0E-02	mg/kg	Σ	3.4E-06	mg/kg-day	2.0E-05	mg/kg-day	A/N	Y/N	0.2
	Phenol	1.3E-01	mg/kg	1.3E-01	mg/kg	×	2.3E-05	mg/kg-day	6.0E-01	mg/kg-day	N/A	Ψ/N	0.00004
	bis (2-Ethylhexyl) phthalate	1.1E-01	mg/kg	1.1E-01	mg/kg	×	1.8E-05	то/ка-дау	2.0E-02	то/кр-day	Y/A	A/A	0.0009
	(Total)												2.2

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Total Hazard Index Across All Exposure Routes/Pathways

RME CALCULATION OF NON-CANCER HAZARDS: INGESTION OF BIVALVES FROM BACK RIVER FOR THE CHILD FISHER SS-63, Langley Air Force Base TABLE 7.1.RME

Exposure Medium: Animal Tissue Exposure Point: Bivalves from Back River Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Child Aedium: Animal Tissue

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard	intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference	Reference Concentration Units	Hazard Quotient
						Calculation (1)							
Ingestion	INORGANICS			<u> </u>									
	Aluminum	142	mg/kg	142	mg/kg	₹	5.4E-02	mg/kg-day	1.0€+00	mg/kg-day	N/A	Y.	90.0
_	Arsenic	7260	mg/kg	7.20	mg/kg	z	3.7E-04	mg/kg-day	3.0E.04	mg/kg-day	¥,X	Ϋ́Z	1.24
	Садтит	0.24	ау∕ко	0.24	mg/kg	Σ	9.1E-05	тд/кд-дау	1.0E-03	mg/kg-day	N/A	٧ž	60.0
	Chromium (Total)	6.84	mg/kg	6.84	mg/kg	Σ	2.6E-03	mg/kg-day	1.5E+00	mg/kg-day	K/N	N/A	0.0017
	Соррег	18.5	mg∕kg	18.5	mg/kg	2	7.0E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	A'N	0.18
	Iron	188	т9/кд	188	mg∕kg	2	7.1E-02	mg/kg-day	3.0E-01	mg/kg-day	ΥN	N/A	0.24
	Manganese	143	mg/kg	14.3	mg/kg	Σ	5.4E-03	mg/kg-day	1.4E-01	mg/kg-day	N/A	N/A	0.0
-	Mercury	0.0103	mg/kg	0.0103	mg/kg	₹	3.95-06	mg/kg-day	1.0E-04	mg/kg-day	A/A	K/N	20.0
- Paral	Selenium	0.589	mg/kg	0.589	mg/kg	Σ	2.2E-04	mg/kg-day	5.0E-03	тд/кд-дау	N/A	A/A	90.0
	Silver	113	mg/kg	1.13	mg/kg	Σ	4.3E-04	mg/kg-day	5.0E-03	mg/kg-day	N/A	ΥN	60.0
	Vanadium	0 411	mg/kg	0.411	mg/kg	≥	1.6E-04	mg/kg-day	7.0E-03	mg/kg-day	¥,N	V/V	0.02
	Zinc	169	mg/kg	169	mg/kg	Σ	6.4E-02	mg/kg-day	3.0E-01	mg/kg-day	V/A	N/A	0.21
_	ORGANICS												
	Aldrin	0.000203	mg/kg	0.000203	mg/kg	Σ	7.7E.08	mg/kg-day	3.0E-05	mg/kg-day	N/A	ΝΑ	0.0026
	Aroclor 5432	0.0255	mg/kg	0.0255	mg/kg	Σ	9.7E.06	mg/kg-day	;	;	N/A	ΥN	:
- نست	Benzo(a)anthracene	0.0222	mg/kg	0.0222	mg/kg	2	8.4E.06	тд/кд-дау	;	,	W.W	ΥN	;
	Benzo(a)pyrene	0.0242	mg/kg	0.0242	mg/kg	Σ	9.2E-06	mg/kg-day	;	·	N/A	K/A	:
	Benzo(b)fluoranthene	0.0256		0.0256	mg/kg	Σ	9.7E-06	тд/кд-дау	,	;	N/A	N/A	;
	Heptachlor epoxide	0.000317	_	0.000317	mg/kg	2	1.2E-07	тэ/ка-бау	1.3E-05	mg/kg-day	Ϋ́Α	ΥN	0.01
	PCB 1254	0.0222	т9/кд	0.0222	mg/kg	Σ	8.4E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	V/V	0.42
	PCB 1260	0.00326	mg/kg	0.00326	ту/кд	Σ	1.2E-06	mg/kg-day	;	:	W/N	V/Α	:
	alpha-BHC	0.000296		0.000296	mg/kg	×	1.1E-07	mg/kg-day	;	;	¥/Σ	N/A	;
	delta-BHC	0.000224	mg/kg	0.000224	mg/kg	Σ	8.5E-08	mg/kg-day	;	;	V/V	Ϋ́Α	,
	(Total)												2.7
									Ť	Total Hazard Index Across All Exposure Routes/Pathways	cross All Exposure	Routes/Pathways	2.7

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 7.2.FIME
FIME CALCULATION OF NON-CANCER HAZARDS: INGESTION
OF BIVALVES FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Animal Tissue
Exposure Medium: Animal Tissue
Exposure Point: Bivalves from Back River
Receptor Population: Fisher

Exposure	Chemical	Medium	Medium	Route	Route	EP.C	Intake	Intake	Beference	Raference	Reference	Reference	Hazard
Route	of Potential	SH2	EPC	EP.	5	Selected	(Non-Cancer)	(Non-Cancer)	Dose	Dose Units	Concentration	Concentration	Quotient
	Concern	Value	Crits	Value	Crits	for Hazard Calculation (1)		Units				Units	
Ingestion	INORGANICS												
	Aluminum	142	mg/kg	142	mg/kg	2	4.9E-02	mg/kg-day	1.0E+00	mg/kg-day	ΥN	ΥN	0.05
	Arsenic	726.0	mg/kg	0.977	mg/kg	Σ	3.3E-04	mg/kg-day	3.0E-04	mg/kg-day	K/A	V.A	1.12
	Cadmium	0.24	mg/kg	0.24	mg/kg	Σ	8.2E-05	mg/kg-day	1.0E-03	mg/kg-day	ΝA	N/A	90.0
	Chromium (Total)	6.84	mg/kg	6.84	mg/kg	2	2.3E-03	mg/kg-day	1.5E+00	mg/kg-day	Υ×	W/A	0.0018
	Copper	18.5	mg/kg	18.5	mg/kg	Σ	6.3E-03	mg/kg-day	4.0E-02	mg/kg-day	N/A	N/A	0.16
	lron	188	mg/kg	188	mg/kg	2	6.4E-02	mg/kg-day	3.0E-01	mg/kg-day	ΑN	Α/N	0.21
	Manganese	14.3	mg/kg	14.3	mg/kg	Σ	4.9E-03	mg/kg-day	1.4E-01	mg/kg-day	W/A	N/A	0.03
	Mercury	0.0103	mg/kg	0.0103	mg/kg	Σ	3.5E-06	mg/kg-day	1.0E-04	mg/kg-day	N/A	N/A	90.0
	Selenium	0.589	mg/kg	0.589	mg/kg	2	2.0E-04	төле-сау	5.0E-03	mg/kg-day	N/A	N/A	0.04
	Silver	1.13	тgЛkg	1.13	mg/kg	2	3.9E-04	mg/kg-day	5.0E-03	mg/kg-day	N/A	N/A	90:0
	Vanadium	0.411	mg/kg	0.411	т9/кд	2	1.4E-04	т9/кд-дау	7.0E-03	mg/kg-day	N/A	N/A	0.02
_	Zinc	169	™g⁄kg	169	mg/kg	2	5.8E-02	mg/kg-day	3.0E-01	mg/kg-day	Ϋ́Α	N/A	0.19
· ·	ORGANICS				•					_ 			
	Addrin	0.000203	mg/kg	0.000203	mg/kg	2	7.0E-08	mg/kg-day	7.7€-05	mg/kg-day	N/A	V/A	0.0023
	Aroctor 5432	0.0255	тg/kg	0.0255	mg/kg	2	8.7E-06	mg/kg-day	:	:	N/A	¥/Ν	;
	Benzo(a)anthracene	0.0222	mg/kg	0.0222	mg/kg	Σ	7.6E-06	mg/kg-day	:	:	N/A	N/A	;
	Benzo(a)pyrene	0.0242	mg/kg	0.0242	mg/kg	2	8.3E-06	mg/kg-day	ì	,	N/A	N/A	:
	Benzo(b)fluoranthene	0.0256	mg/kg	0.0256	mg/kg	2	8.8E-06	mg/kg-day	:	ı	ΥN	N/A	ı
	Heptachlor epoxide	0.000317	mg/kg	0.000317	mg/kg	Σ	1.1E-07	mg/kg-day	1.3E-05	mg/kg-day	ΥN	Υ/N	10.0
	PCB 1254	0.0222	mg/kg	0.0222	mg/kg	Σ	7.6E-06	mg/kg-day	2.0E-05	mg/kg-day	N/A	N/A	0.38
	PCB 1260	0.00326	mg/kg	0.00326	mg/kg	Σ	1.1E-06	mg/kg-day	:	:	N/A	NA	·
	appa-BHC	0.000296	mg/kg	0.000296	mg/kg	2	1.0E-07	mg/kg-day	:	;	V/V	N/A	:
	delta-BHC	0.000224	mg/kg	0.000224	mg/kg	Σ	7.7E-08	mg/kg-day	;	ì	N/A	N/A	:
	(Total)												2.4

⁽¹⁾ Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Total Hazard Index Across All Exposure Routes/Pathways

Appendix A.8

RAGS Part D Table 8's Calculation of Cancer Risks Resonable Maximum

TABLE 8.1.RME
RME CALCULATION OF CANCER RISKS: DERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR THE CHILD 7. ISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water from Back River
Receptor Population: Fisher
Receptor Age: Child

pe Cancer its Risk		-1 2.1E-10		1	l		-1 4.7E-10	·1 3.3E-10	-1 6.7E-10	-1 3.4E-10	·1 2.4E-09	4F.00
Cancer Slope Factor Units		mg/kg-day	ı	1	1		mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	
Cancer Stope Factor	-	1.6E+00	ŀ	!	ŀ		3.4E-01	4.9E-01	1.9E+01	5.0E+00	1.0E+01	
Intake (Cancer) Units		mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day		mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	mg/kg-day	
tntake (Cancer)		1.3E-10	3.8E-05	3.8E-12	3.1E-04		1.4E-09	6.8E-10	3.5E-11	6.8 E -11	2.4E-10	
EPC Selected for Risk Calculation (1)		Σ	\$	Σ	Σ		Σ	Σ	≊	Σ	≥	
Route EPC Units		l/gm	l/gm	∥ĝш	l∕g⁄u		l/gm	∥g⁄l	mg/l	l/gm	/bm	
Route EPC Value		2.4E-03	6.8E+02	6.8E-05	5.6E+03		5.7E-06	3.4E-06	1.9E-05	4.9E-06	3.1E-06	
Medium EPC Units		mg/l	l/gm	l/gm	l/6ш		l/gm	l/6ш	mg/l	l/6m	∥,6w	
Medium EPC Value		2.4E-03	6.8E+02	6.8E-05	5.6E+03		5.7E-06	3.4E-06	1.9E-05	4.9E-06	3.1E-06	
Chemical of Potential Concern	INORGANICS	Arsenic	Magnesium	Methylmercury	Sodium	ORGANICS	4,4'-DDD	4,4'-DDE	Aldrin	Heptachlor	Heptachlor epoxide	(Total)
Exposure Route	Dermal	Absorption										

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Total Risk Across All Exposure Routes/Pathways

TABLE 8.2.RME
RME CALCULATION OF CANCER RISKS: DERMAL ABSORPTION
OF SURFACE WATER FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Surface Water Exposure Medium: Surface Water Exposure Point: Surface Water from Back River Receptor Population: Fisher Receptor Age: Adult

Exposure	Chemical	Medium	Medium	Route	Route	EPC Selected	Intake	Intake	Cancer Stope	Cancer Slope	Cancer
Route	of Potential	EPC	EPC	EPC	EPC	for Risk	(Cancer)	(Cancer)	Factor	Factor Units	Risk
	Concern	Value	Units	Value	Units	Calculation (1)		Units			
Dermal	INORGANICS										
Absorption	Arsenic	2.4E-03	l/gm	2.4E-03	l/gm	Σ	3.2E-10	mg/kg-day	1.6E+00	mg/kg-day	5.0E-10
	Magnesium	6.8E+02	mg/l	6.8E+02	l/gm	Σ	9.1E-05	mg/kg-day	I	1	
	Methylmercury	6.8E-05	mg/l	6.8E-05	∥g/l	Σ	9.15-12	mg/kg-day	ı	1	ı
	Sodium	5.6E+03	mg/l	5.6E+03	₩ I/gw	₹	7.4E-04	mg/kg-day	ţ	ı	1
	ORGANICS										
	4,4'-DDD	5.7E-06	l/gm	5.7E-06	∥g/l	Σ	3.3E-09	mg/kg-day	3.4E-01	mg/kg-day 1	1.1E-09
	4,4'-DDE	3.4E-06	mg/l	3.4E-06	mg/l	Σ	1.6E-09	mg/kg-day	4.9E-01	mg/kg-day ·1	7.9E-10
	Aldrin	1.9E-05	mg/l	1.9E-05	mg/l	Σ	8.5E-11	mg/kg-day	1.9E+01	mg/kg-day 1	1.6E-09
	Heptachlor	4.9E-06	₩g/l	4.9E-06	₩	×	1.6E-10	mg/kg-day	5.0E+00	mg/kg-day -1	8.2E-10
	Heptachlor epoxide	3.1E-06	∥g/l	3.1E-06	mg/i	≥	5.7E-10	mg/kg-day	1.0E+01	mg/kg-day -1	5.7E-09
	(Total)	; ;									1E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

RME CALCULATION OF CANCER RISKS: INGESTION/DERMAL ABSORPTION OF SURFACE WATER FROM BACK RIVER FOR THE OTHER RECREATIONAL PERSON (ADOLESCENTS (TEENS)) SS-63, Langley Air Force Base TABLE 8.3.RME

Exposure Point: Surface Water from Back River Receptor Population: Other Recreational Person² Scenario Timeframe: Current/Future Receptor Age: Adolescents (teens) Exposure Medium: Surface Water Aedium: Surface Water

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer
Ingestion	INORGANICS										
	Arsenic	2.4E-03	₩g/I	2.4E-03	mg/i	Σ	3.9E-08	mg/kg-day	1.5E+00	mg/kg-day	5.9E-08
	Magnesium	6.8E+02	ľgm	6.8E+02	₩g/l	Σ	1.1E-02	mg/kg-day	;	1	;
==	Methylmercury	6.8E-05	ľбш	6.8E-05	₩.	≥	1.15-09	mg/kg-day		ı	;
	Sodium	5.6E+03	mg/l	5.6E+03	∥gm	Σ	9.2E-02	mg/kg-day	1	•	ı
	ORGANICS										
	4.4'-DDD	5.7E-06	l/gm	5.7E-06	mg/l	≨	9.3E-11	mg/kg-day	2.4E-01	mg/kg-day	2.2E-11
	4,4'-DDE	3.4E-06	l/gm	3.4E-06	l/gm	Σ	5.5E-11	mg/kg-day	3.4E-01	mg/kg-day -1	1.9E-11
	Aldrin	1.9E-05	mg/l	1.9E-05	J/ĝw	Σ	3.1E-10	mg/kg-day	1.7E+01	mg/kg-day ·	5.2E-09
	Heptachlor	4.9E-06	mg/l	4.9E-06	mg/l	≥	8.16-11	mg/kg-day	4.5E+00	mg/kg-day	3.6E-10
	Heptachlor epoxide	3.1E-06	l/gm	3.1E-06	∏g/l	Σ	5.1E-11	mg/kg-day	9.1€+00	mg/kg-day	4.6E-10
	(Total)										6.5E-08
Dermal	INORGANICS										
Absorption	Arsenic	2.4E-03	∥gш	2.4E-03	₩ J/gw	Σ	1.2E-08	mg/kg-day	1.6E+00	mg/kg-day 1	1.9E-08
···	Magnesium	6.8E+02	₩gm	6.8E+02	l/gm	ĭ	3.6E-03	mg/kg-day	;	ı	;
	Methylmercury	6.8E-05	1/gm	6.8E-05	J/g₩	Σ	3.65-10	mg/kg-day	:	ı	;
	Sodium	5.6E+03	пgЛ	5.6E+03	l∕gπ	Σ	2.9E-02	mg/kg-day	1	ı	;
	ORGANICS										
	4,4'-000	5.7E-06	∥gm	5.7E-06	∥g/l	Σ	3.2E-08	mg/kg-day	3.4E-01	mg/kg-day 1	1.1E-08
	4,4'-DDE	3.4E-06	1/6m	3.4E-06	mg/l	Σ	1.6E-08	mg/kg-day	4.9E-01	mg/kg-day	7.7E-09
	Aldrin	1.9E-05	₩	1.9E-05	J∕ĝw	S	8.3E-10	т9/кв-дау	1.9€+01	mg/kg-day -1	1.6E-08
	Heptachlor	4.9E.06	m∂/	4.9E-06	Ngm	Σ	1.6E-09	mg/kg-day	5.0E+00	mg/kg-day 1	8.0E-09
	Heptachlor epoxide	3.15.06	νδω	3.1E-06	пgЛ	Σ	5.6E-09	mg/kg-day	1.0E+01	mg/kg-day	5.6E-08
	(Total)										1E-07
								otal Risk Acro	ss All Exposure	Total Risk Across All Exposure Routes/Pathways	2E-07

Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.
 Jet Skier

RME CALCULATION OF CANCER RISKS: INGESTION/DERMAL ABSORPTION OF SURFACE WATER FROM BACK RIVER FOR OTHER WORKER (ADULT) SS-63, Langley Air Force Base TABLE 8.4.RME

Exposure Point: Surface Water from Back River Receptor Population: Other Worker² Scenario Timeframe. Current/Future Exposure Medium: Surface Water Aedium: Surface Water Receptor Age: Adult

Exposure	Chemical	Medium	Medium	Route	Route	EPC Selected	Intake	Intake	Cancer Shoe	Cancer Stone	Cancer
Route	of Potential	EPC	EPC	EPC	EPC	for Risk	(Cancer)	_	Factor	Factor Units	Risk
	Concern	Value	Units	Value	Units	Calculation (1)		Units			-
Ingestion	INORGANICS										
=	Arsenic	2.4E-03	- l/gm	2.4E-03	l/gm	Σ	3.3E-08	mg/kg-day	1.5E+00	mg/kg-day	5.0E-08
	Magnesium	6.8E+02	"mō	6.8E+02	₽ Jobu	Σ	9.6E-03	mg/kg-day	l	1	ı
	Methylmercury	6.8E-05	J⁄6⊞	6.8E-05	l/gm	Σ	9.5E-10	mg/kg-day	;	ŀ	:
	Sodium	5.6E+03	mg/l	5.6E+03	√gm	Σ	7.8E-02	тд/кд-дау	;	;	1
	ORGANICS										===
	4,4'-DDD	5.7E-06	- Jôu	5.7E-06	mg/l	Σ	7.9E-11	mg/kg-day	2.4E-01	mg/kg-day 1	1.9E-11
	4,4'-DDE	3.4E-06	₩g/I	3.4E-06	l/gm	Σ	4.7E-11	mg/kg-day	3.4E-01	mg/kg-day -1	1.6E-11
	Aldrin	1.9E-05	ľĝu	1.9E-05	₩	Σ	2.6E-10	mg/kg-day	1.7E+01	mg/kg-day	4.4E-09
-	Heptachlor	4.9E-06	ВĒ	4.9E.06	l/gm	¥	6.8E-11	mg/kg-day	4.5E+00	mg/kg-day 1	3.1E-10
	Heptachlor epoxide	3.1E-06	l/gm	3.1E-06	l/gm	Σ	4.3E-11	mg/kg-day	9.1E+00	mg/kg-day -1	3.9E-10
	(Total)										5.5E-08
Dermai	INORGANICS										
Absorption	Arsenic	2.4E-03) D	2.4E-03	l/gm	×	1.3E-08	mg/kg-day	1.6E+00	mg/kg-day -1	2.1E-08
	Magnesium	6.8E+02	mg/l	6.8E+02	mg/l	Σ	3.8E-03	mg/kg-day	;	f	ı
	Methylmercury	6.8E-05	₽g/l	6.8E-05	mg/	Σ	3,8E-10	mg/kg-day	ł	:	ŧ
	Sodium	5.6E+03	mg/l	5.6E+03	l/gm	ž	3.1E-02	тд/к3-дау	;	1	;
	ORGANICS										
	4,4'-DDD	5.7E-06)ôL	5.7E-06	/gm	Σ	3.4E-08	mg/kg-day	3.4E-01	mg/kg-day 1	1.2E-08
	4,4'-DDE	3.4E-06		3.4E-06	mg/l	Σ	1.7E-08	mg/kg-day	4.9E-01	mg/kg-day ·	8.3E-09
	Aldrin	1.9E-05	l/gπ	1.9E-05	l/gm	Σ	8.9E-10	mg/kg-day	1.9E+01	mg/kg-day	1.7E-08
	Heptachlor	4.9E-06	mg/	4.9E-08	₩	Σ	1.7E-09	mg/kg-day	5.0E+00	mg/kg-day ·1	8.6E-09
	Heptachlor epoxide	3.1E-06	mg.	3.1E-08	Jom Jom	Σ	6.0E-09	mg/kg-day	1.0E+01	mg/kg-day 1	6.0E-08
 	(Total)										1E-07
					! !			otal Risk Acro	ss All Exposure	Total Risk Across All Exposure Routes/Pathways	2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

(2) Sea Rescue Trainer

TABLE 8.5.RME
RME CALCULATION OF CANCER RISKS: INGESTION
OF FISH FROM BACK RIVER FOR THE CHILD FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Animal Tissue
Exposure Point: Fish from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure	Chemical	Medium	Medium	Route	Route	EPC Selected	Intake	Intoko	Cancer Slone	Cancer Clone	Caprocr
Route	of Potential	EPC	EPC	EPC	EPC	for Risk	(Cancer)	(Cancer)	Factor	Factor Units	A SE
	Concern	Value	Units	Value	Units	Calculation (1)	,	Units			
Ingestion	INORGANICS										
	Arsenic	1.9E+00	тв/ка	1.9E+00	mg/kg	Σ	3.6E-05	mg/kg-day	1.5E+00	mg/kg-day	5.4E-05
	Calcium	1.3E+03	mg/kg	1.3E+03	mg/kg	₹	2.5E-02	mg/kg-day	1	l	1
	Magnesium	3.5E+02	mg/kg	3.5E+02	mg/kg	Σ	6.6E-03	mg/kg-day	1	;	1
<u></u>	Methylmercury	6.0E-02	mg/kg	6.0E-02	mg/kg	Σ	1.1E-06	mg/kg-day	1	ı	ı
	Potassium	3.8E+03	mg/kg	3.8E+03	mg/kg	Σ	7.3E-02	mg/kg-day	1	ı	ı
	Selenium	9.1E-01	mg/kg	9.1E-01	mg/kg	Σ	1.7E-05	mg/kg-day	1	1	ı
	Sodium	6.4E+02	mg/kg	6.4E+02	mg/kg	Σ	1.2E-02	mg/kg-day	1	ı	ı
	ORGANICS										•
•	4,4'-DDD	2.8E-02	mg/kg	2.8E-02	mg/kg	Σ	5.4E-07	mg/kg-day	2.4E-01	mg/kg-day 1	1.3E-07
	4,4'-DDE	2.5E-02	mg/kg	2.5E-02	mg/kg	S	4.8E-07	mg/kg-day	3.4E-01	mg/kg-day 1	1.6E-07
	Aroclor 5432	3.8E-01	mg/kg	3.8E-01	mg/kg	Σ	7.2E-06	mg/kg-day	4.5E+00	mg/kg-day	3.2E-05
	PCB-1248	4.5E-02	mg/kg	4.5E-02	mg/kg	Σ	8.5E-07	mg/kg-day	2.0E+00	mg/kg-day 1	1.7E-06
	PCB-1254	2.2E-01	mg/kg	2.2E-01	тд/кд	₹	4.2E-06	mg/kg-day	2.0E+00	mg/kg-day	8.3E-06
*	PCB-1260	5.7E-02	mg/kg	5.7E-02	mg/kg	Σ	1.1E-06	mg/kg-day	2.0E+00	mg/kg-day 1	2.2E-06
	(Total)										4

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Total Risk Across All Exposure Routes/Pathways

TABLE 8.6.RME
RME CALCULATION OF CANCER RISKS: INGESTION
OF FISH FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Medium: Surface Water Exposure Medium: Animal Tissue Exposure Point: Fish from Back River Receptor Population: Fisher

MORGANICS Feet Fe	Exposure	Chemical	Medi	Modium	đ.	d	FPC Selected	4	cycto	0 200	0	į
NNORGANICS Value Units Cakculation (1) Lunits Lunits Cakculation (1) Lunits Cakculation (1) Lunits Cakculation (1) Lunits Cakculation (1) Lunits Lunits Cakculation (1) Lunits Lunits <th< th=""><th>Route</th><th>of Potential</th><th>EPC</th><th>EPC</th><th>EPC</th><th>EPC</th><th>for Risk</th><th>(Cancer)</th><th>(Cancer)</th><th>Factor</th><th>Factor Units</th><th>Risk</th></th<>	Route	of Potential	EPC	EPC	EPC	EPC	for Risk	(Cancer)	(Cancer)	Factor	Factor Units	Risk
INDRGANICS 1 9E+00 mg/kg 1.9E+00 mg/kg 1.9E+00 mg/kg 1.9E+00 mg/kg 1.9E+00 mg/kg M 1.4E-04 mg/kg-day 1.5E+00 mg/kg-day 1.5E+02 mg/kg-day 1.5E+02 mg/kg-day 1.5E+02 mg/kg-day 1.5E+02 mg/kg-day 1.5E+02 mg/kg-day 1.5E+02 mg/kg-day 1.5E+03		Concern	Value	Units	Value	Units	Calculation (1)		Units			
1.9E+00 1.9E+00 1.9E+00 1.9E+00 1.9E+00 1.4E-04 1.4E-04 1.5E+00 1.5E+00 1.3E+03 1.3E	gestion	INORGANICS										
Lime 1.3E+03 mg/kg 1.3E+03 mg/kg 1.3E+02 mg/kg		Arsenic	1.9E+00	mg/kg	1.9E+00	mg/kg	Σ	1.4E-04	mg/kg-day	1.5E+00	mg/kg-day 1	2.1E-04
Jum 3.5E+02 mg/kg 3.5E+02 mg/kg 3.5E+02 mg/kg M 2.6E-02 mg/kg-day		Calcium	1.3E+03	mg/kg	1.3E+03	т9/к	٤	9.7E-02	mg/kg-day	ı	:	1
ercury 6.0E-02 mg/kg 6.0E-02 mg/kg mg/kg M 4.4E-06 mg/kg-day		Magnesíum	3.5E+02	mg/kg	3.5E+02	mg/kg	Σ	2.6E-02	mg/kg-day	i	1	1
m 3.8E+03 mg/kg 3.8E+03 mg/kg mg/kg mg/kg M 2.8E-01 mg/kg-day <td></td> <td>Methylmercury</td> <td>6.0E-02</td> <td>mg/kg</td> <td>6.0E-02</td> <td>mg/kg</td> <td>Σ</td> <td>4.4E-06</td> <td>mg/kg-day</td> <td>i</td> <td>ı</td> <td>ŀ</td>		Methylmercury	6.0E-02	mg/kg	6.0E-02	mg/kg	Σ	4.4E-06	mg/kg-day	i	ı	ŀ
1		Potassium	3.8E+03	mg/kg	3.8E+03	mg/kg	ž	2.8E-01	mg/kg-day	i	I	ł
CS 2.8E-02 mg/kg 2.8E-02 mg/kg M 2.1E-06 mg/kg-day 2.4E-01 mg/kg-day 1.9E-06 mg/kg-day 3.4E-01 mg/kg M 1.9E-06 mg/kg-day 3.4E-01 mg/kg M 2.8E-05 mg/kg M 2.8E-06 mg/kg-day 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 1.6E-05 mg/kg-day 1.6		Selenium	9.1E-01	mg/kg	9.1E-01	mg/kg	Σ	6.6E-05	mg/kg-day	ŧ	ŀ	ŀ
CS 2.8E-02 mg/kg 2.8E-02 mg/kg mg/kg <t< td=""><td></td><td>Sodium</td><td>6.4E+02</td><td>mg/kg</td><td>6.4E+02</td><td>mg/kg</td><td>Σ</td><td>4.7E-02</td><td>mg/kg-day</td><td>1</td><td>1</td><td>1</td></t<>		Sodium	6.4E+02	mg/kg	6.4E+02	mg/kg	Σ	4.7E-02	mg/kg-day	1	1	1
2.8E-02 mg/kg 2.8E-02 mg/kg mg/kg M 2.1E-06 mg/kg-day 2.4E-01 mg/kg-day mg/kg-day 432 3.8E-01 mg/kg 2.5E-02 mg/kg M 1.9E-06 mg/kg-day 3.4E-01 mg/kg-day 8 4.5E-02 mg/kg 4.5E-02 mg/kg M 3.3E-06 mg/kg-day 2.0E+00 mg/kg-day 4 2.2E-01 mg/kg 2.2E-01 mg/kg M 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 5.7E-02 mg/kg 5.7E-02 mg/kg M 4.2E-06 mg/kg-day 2.0E+00 mg/kg-day		ORGANICS							,			
432 2.5E-02 mg/kg 2.5E-02 mg/kg M 1.9E-06 mg/kg-day 3.4E-01 mg/kg-day M 2.8E-05 mg/kg-day 4.5E+00 mg/kg-day M 4 5.2E-01 mg/kg 2.2E-01 mg/kg M 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 1.0E+00 0 (Total) (Total) 5.7E-02 mg/kg M 4.2E-06 mg/kg-day 1.0E+00 mg/kg-day 1.0E+00		4,4'-DDD	2.8E-02	тв/ка	2.8E-02	mg/kg	Σ	2.1E-06	mg/kg-day	2.4E-01	mg/kg-day -1	5.0E-07
3.8E-01 mg/kg 3.8E-01 mg/kg M 2.8E-05 mg/kg-day 4.5E+00 mg/kg-day 1		4,4'-DDE	2.5E-02	mg/kg	2.5E-02	mg/kg	Σ	1.9E-06	mg/kg-day	3.4E-01	mg/kg-day 1	6.3E-07
4.5E-02 mg/kg 4.5E-02 mg/kg M 3.3E-06 mg/kg-day 2.0E+00 mg/kg-day 1.5E-05 mg/kg-day 2.0E+00 mg/kg-day 1.5E-05 mg/kg-day 2.0E+00 mg/kg-day 1.5E-05 mg/kg-day 2.0E+00 mg/kg-day 1.5E-05 mg/kg-05 m		Aroclor 5432	3.8E-01	mg/kg	3.8E-01	mg/kg	2	2.8E-05	mg/kg-day	4.5E+00	mg/kg-day 1	1.3E-04
2.2E-01 mg/kg 2.2E-01 mg/kg M 1.6E-05 mg/kg-day 2.0E+00 mg/kg-day 1 5.7E-02 mg/kg M 4.2E-06 mg/kg-day 2.0E+00 mg/kg-day 1 (Total)		PCB-1248	4.5E-02	mg/kg	4.5E-02	mg/kg	Σ	3.3E-06	mg/kg-day	2.0E+00	mg/kg-day 1	6.5E-06
(Total) 5.7E-02 mg/kg 5.7E-02 mg/kg M 4.2E-06 mg/kg-day 2.0E+00 mg/kg-day 1		PCB-1254	2.2E-01	mg/kg	2.2E-01	mg/kg	Σ	1.6E-05	mg/kg-day	2.0E+00	mg/kg-day 1	3.2E-05
		PCB-1260	5.7E-02	mg/kg	5.7E-02	mg/kg	×	4.2E-06	mg/kg-day	2.0E+00	mg/kg-day -1	8.4E-06
		(Total)										4E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

OF CRABS FROM BACK RIVER FOR THE CHILD FISHER RME CALCULATION OF CANCER RISKS: INGESTION SS-63, Langley Air Force Base TABLE 8.7.RME

Exposure Point: Crabs from Back River Scenario Timeframe: Current/Future Exposure Medium: Animal Tissue Receptor Population: Fisher Medium: Surface Water Receptor Age: Child

										<u>IL.</u>	
Exposure	Chemical	Medium	Medium	Route	Route	EPC Selected	Intake	Intake	Cancer Slope		Cancer
Koute	of Potential	EPC	D C	EPC	S C	for Kisk	(Cancer)	(Cancer)	Factor	Factor Units	Risk
	Cancera	Value	Units	Value	Crits	Calculation (1)		Units			
Ingestion	INORGANICS										
	Aluminum	1.4E+01	mg/kg	1.4E+01	mg/kg	×	2.7E-04	т9/ка-дау	ı	1	ı
	Arsenic	3.4E+00	mg/kg	3.4E+00	mg/kg	=	6.4E-05	mg/kg-day	1.5E+00	mg/kg-day -1	9.6E-05
	Barium	4.7E-01	mg/kg	4.7E-01	mg/kg	2	8.9E-06	mg/kg-day	;	ı	ı
	Calcium	2.2E+03	mg/kg	2.2E+03	mg/kg	Σ	4.2E-02	mg/kg-day	1	ı	ı
	Copper	8.6E+00	mg/kg	8.6E+00	mg/kg	>	1.6E-04	mg/kg-day	ı	ı	ı
	Iron	1.4E+01	mg/kg	1.4E+01	тд/ка	2	2.7E-04	mg/kg-day	ı	ı	1
	Magnesium	5.4E+02	mg/kg	5.4E+02	mg/kg	Σ	1.0E-02	mg/kg-day	ı	ı	l
	Manganese (food)	1.6E+00	mg/kg	1.6E+00	mg/kg	×	3.0E-05	mg/kg-day	1	ı	ì
	Nickel	4.9E-01	mg/kg {	4.9E-01	mg/kg	₹	9.3E-06	mg/kg-day	1	ı	;
	Potassium	2.8E+03	mg/kg	2.8E+03	mg/kg	Σ	5.4E-02	та/ка-дау	1	ļ	r
	Selenium	6.8E-01	тд/ка	6.8E-01	mg/kg	2	1.3E-05	mg/kg-day	1	:	í
	Silver	7.3E-01	mg/kg	7.3E-01	mg/kg	×	1.4E-05	mg/kg-day	ı	ı	1
	Sodium	3.6E+03	mg/kg	3.6E+03	mg/kg	2	6.9E-02	тд/кр-дау	1	t	t
	Zinc	4.2E+01	mg/kg	4.2E+01	mg/kg	Σ	8.0E-04	mg/kg-day	ı	ı	1
	ORGANICS	•		-							
	4.4*-DDD	2.9E-03	mg/kg	2.9E-03	mg/kg	≥	5.5E-08	mg/kg-day	2.4E-01	mg/kg-day	1.3E-08
	4.4'-DDE	9.9E-03	mg/kg	9.9E-03	mg/kg	Σ	1.9E-07	mg/kg-day	3.4E-01	mg/kg-day 1	6.4E-08
	Heptachlor	7.6E-05	mg/kg	7.6E-05	mg/kg	₽	1.4E-09	mg/kg-day	4.5E+00	mg/kg-day -1	6.56-09
	Heptachlor epoxide	7.9E-04	mg/kg	7.9E-04	mg/kg	Σ	1.5E-08	mg/kg-day	9.1 E +00	mg/kg-day 1	1.4E-07
	PCB-1254	2.0E-02	mg/kg	2.0E-02	тд/кд	Σ	3.7E-07	mg/kg-day	2.0E+00	mg/kg-day 1	7.4E-07
	Phenoi	1.3E-01	mg/kg	1.3E-01	mg/kg	≥	2.5E-06	mg/kg-day	1	ı	t
	bis (2-Ethylhexyl) phthalate	1.1E-01	mg/kg	1.1E-01	mg/kg	2	2.0E-06	mg/kg-day	1.4E-02	mg/kg-day 1	2.8E-08
	(Total)										16-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Total Risk Across All Exposure Routes/Pathways

TABLE 8.8.RME
RME CALCULATION OF CANCER RISKS: INGESTION
OF CRABS FROM BACK RIVER FOR THE ADULT FISHER
SS-63, Langley Air Force Base

Exposure Point: Crabs from Back River Scenario Timeframe: Current/Future Exposure Medium: Animal Tissue Receptor Population: Fisher Receptor Age: Adult Medium: Surface Water

Exposure	Chemical	Medium	Medium	Route	Route	EPC Selected	Intake	intake	Cancer Slope	Cancer Slope	Cancer
Route	of Potential	EPC	EPC	EPC	EPC	for Risk	(Cancer)	(Cancer)	Factor	Factor Units	Risk
	Concern	Value	Units	Value	Units	Calculation (1)		Units			4
Ingestion	INORGANICS										
	Aluminum	1.4E+01	mg/kg	1.4E+01	mg/kg	Σ	1.0E-03	mg/kg-day	1	ı	ı
	Arsenic	3.4E+00	mg/kg	3.4E+00	mg/kg	Σ	2.5E-04	тд/кд-дау	1.5E+00	mg/kg-day 1	3.7E-04
	Barium	4.7E-01	mg/kg	4.7E-01	mg/kg	Σ	3.5E-05	mg/kg-day	1	1	ı
	Calcium	2.2E+03	mg/kg	2.2E+03	mg/kg	2	1.6E-01	mg/ky-day	ı	1	1
	Copper	8 6€+00	mg/kg	8.6E+00	mg/kg	×	6 3E-04	mg/kg-day	1	ı	1
	Iron	1,4E+01	mg/kg	1.4E+01	т9/кд	Σ	1.0E-03	mg/kg-day	ı	ŀ	ı
	Magnesium	5.4E+02	mg/kg	5.4E+02	mg/kg	Σ	4.0E-02	mg/kg-day	1	ı	ı
	Manganese (food)	1.6E+00	mg/kg	1.6E+00	mg/kg	Σ	1.2E-04	mg/kg-day	1	1	1
	Nickel	4 9E-01	mg/kg	4.9E-01	mg/kg	Σ	3.6E-05	mg/kg-day	1	ı	ı
	Potassium	2.8E+03	mg/kg	2.8E+03	mg/kg	×	2.1E-01	mg/kg-day	ı	ı	ı
	Selenium	6.8E-01	mg/kg	6.8E-01	mg/kg	×	5.0E-05	mg/kg-day	1	ı	ì
	Silver	7.3E-01	mg/kg	7.3E-01	mg/kg	×	5.4E-05	mg/kg-day	I	ı	ı
	Sodium	3.6E+03	mg/kg	3.6E+03	mg/kg	2	2.7E-01	тд/кд-дау	1	ı	·
	Zinc	4.2E+01	mg/kg	4.2E+01	mg/kg	Z	3.1E-03	mg/kg-day	ı	1	1
	ORGANICS								•		-
	4.4°-DDD	2.9E-03	mg/kg	2.9E-03	mg/kg	ž	2.1E-07	mg/kg-day	2.4E-01	mg/kg-day	5.1E-08
	4,4'-0DE	9.9E-03	mg/kg	9.9E-03	mg/kg	\$	7.3E-07	mg/kg-day	3.4E-01	mg/kg-day 1	2.5E-07
	Heptachlor	7.6E-05	mg/kg	7.6E-05	т9/ка	₽	5.6E-09	mg/kg-day	4.5E+00	mg/kg-day 1	2.5E-08
	Heptachlor epoxide	7.9E-04	тд/кд	7.9E-04	mg/kg	¥	5.8E-08	mg/kg-day	9.1E+00	mg/kg-day -1	5.3E-07
	PCB-1254	2.0E-02	mg/kg	2.0E-02	тр/ка	∑	1.4E-06	mg/kg-day	2.0E+00	mg/kg-day	2.9E-06
	Phenol	1.3E-01	mg/kg	1.3E-01	талв	2	9.8E-06	mg/kg-day	ı	ı	ı
	bis (2-Ethylhexyl) phthalate	1.1E-01	mg/kg	1.1E-01	mg/kg	×	7.85-06	mg/kg-day	1.4E-02	mg/kg-day	1.1E-07
	(Total)										4E-04
							To	tal Risk Across	All Exposure	Total Risk Across All Exposure Routes/Pathways	4E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.RME RME CALCULATION OF CANCER RISKS: INGESTION OF BIVALVES FROM BACK RIVER FOR THE CHILD FISHER SS-63, Langley Air Force Base

Scenario Trineframe: Current/Future
Medium: Surface Water
Exposure Medium: Animal Tissue
Exposure Point: Bivalves from Back River
Receptor Population: Fisher
Receptor Age: Child

Exposure	Chemical	Medium	Medium	Houte	Route	EPC Selected	intake	intake	Cancer Slope	Cancer Stope	Cancer
Route	of Potential	EPC	EPC	SPC	EPC	for Risk	(Cancer)	(Cancer)	Factor	Factor Units	Risk
	Concern	Value	Units	Value	Units	Calculation (1)		Units			
Ingestion	INDRGANICS										
	Atuminum	142	mg/kg	142	mg/kg	Σ	5.4E-03	mg/kg-day	;	;	,
	Arsenic	0.977	mg/kg	0.977	тъука	Σ	3.7E-05	mg/kg-day	1.5E+00	mg/kg-day 1	5.6E-05
-	Cadmium	0.24	тд/кр	0.24	ომჭმ	×	9.1E-06	то/кр-day	t	1	ı
	Chromium (Total)	6.84	mg/kg	6.84	т9/кд	Σ	2.6E-04	mg/kg-day	:	ı	;
	Copper	18.5	mg/kg	18.5	mg/kg	≨	7.0E-04	mg/kg-day	,	:	1
	Iron	188	mg/kg	188	mg/kg	Σ	7.1E-03	mg/kg-day	;	:	:
	Manganese	14.3	mg/kg	14.3	mg/kg	Z	5.4E-04	mg/kg-day	:	:	:
	Mercury	0.0103	тдука	0.0103	mg/kg	3	3.9€-07	тд/кр-дау	;	1	1
######################################	Selenium	0.589	mg/kg	0.589	mg/kg	Σ	2.2E-05	mg/kg-day	ı	1	ı
	Silver	1.13	mg/kg	1.13	mg/kg	₹	4.3E-05	mg/kg-day	ì	1	ı
	Vanadium	0.411	mg/kg	0.411	mg/kg	Σ	1.6E-05	mg/kg-day	1	1	:
	Zinc	169	mg/kg	169	mg/kg	Σ	6.4E-03	mg/kg-day	:	;	:
=	ORGANICS				_						
	Aldrin	0.000203	mg/kg	0.000203	mg/kg	Σ	7.7E-09	mg/kg-day	1.7E+01	mg/kg-day 1	1.3E-07
	Arocior 5432	0.0255	mg/kg	0.0255	mg/kg	≥	9.7E-07	mg/kg-day	4.5E+00	mg/kg-day 1	4.4E-08
	Benzo(a)anttracene	0.0222	mg/kg	0.0222	тдува	≨	8.4E-07	mg/kg-day	7.3E-01	mg/kg-day '	6.2E-07
	Benzo(a)pyrene	0.0242	mg/kg	0.0242	mg/kg	Σ	9.2E-07	тд/кд-дау	7.3E+00	mg/kg-day 1	8.7E-06
	Benzo(b)fluoranthene	0.0256	mg/kg	0.0256	mg/kg	\$	9.7E-07	тд/ка-дау	7.3E-01	mg/kg-day 1	7.1E-07
	Heptachlor epoxide	0.000317	mg/kg	0.000317	mg/kg	Σ	1.2E-08	mg/kg-day	9.1E+00	mg/kg-day 1	1.1E-07
	PCB 1254	0.0222	mg/kg	0.0222	mg/kg	Σ	8.4E-07	mg/kg-day	2.0E+00	mg/kg-day 1	1.7E-06
	PCB 1260	0.00326	mg/kg	0.00326	mg/kg	Σ	1.2E-C/	mg/kg-day	2.0E+00	mg/kg-day	2.5E-07
	alpha-BHC	0.000296	mg/kg	0.000296	mg/kg	≥ _	1.1E-08	mg/kg-day	6.3E+00	mg/kg-day	7.1E-08
=	defta-BHC	0.000224	mg/kg	0.000224	mg/kg	2	8.5E-09	mg/kg-day	1.8E+00	mg/kg-day	1.5E-08
	(Total)										7.0E-05

⁽¹⁾ Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

RME CALCULATION OF CANCER RISKS: INGESTION OF BIVALVES FROM BACK RIVER FOR THE ADULT FISHER SS-63, Langley Air Force Base TABLE 8.2.RME

Exposure Point: Bivalves from Back River Scenario Timeframe: Current/Future Exposure Medium: Animal Tissue Receptor Population: Fisher Aedium: Surface Water Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	intake (Cancer)	intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
	Į.										
Ingestion	INORGANICS			_							
	Aluminum	142	mg/kg	142	mg/kg	Σ	2.1E-02	mg/kg-day	;	;	;
	Arsenic	0.977	mg/kg	7.20	mg/kg	Σ	1.4E-04	mg/kg-day	1.5E+00	mg/kg-day 1	2.2E-04
-	Cadmium	0.24	mg/kg	0.24	mg/kg	S	3.5E-05	тд/кд-дау	;	;	;
-	Chromium (Total)	6.84	mg/kg	6.84	mg/kg	Σ	1.0E-03	mg/kg-day	;	;	:
	Copper	18.5	mg/kg	18.5	толка	∑	2.7E-03	mg/kg-day	1	1	;
	Iron	188	mg/kg	188	mg/kg	Σ	2.8E-02	mg/kg-day	1	;	;
•	Manganese	14.3	mg/kg	14.3	mg/kg	Σ	2.1E-03	mg/kg-day	ı	;	:
-	Mercury	0.0103	mg/kg	0.0103	mg/kg	¥	1.5E-06	mg/kg-day	;	;	:
	Selenium	0.589	mg/kg	0.589	mg/kg	Σ	8.6E-05	mg/kg-day	;	;	:
	Siver	1.13	твука	1.13	тдука	≊	1.7E-04	то/ка-дау	1	:	:
	Vanadium	0.411	mg/kg	0.411	mg/kg	Σ	6.0E-05	mg/kg-day	1	;	:
	Zinc	169	mg/kg	169	шд/ка	⊋	2.5E-02	mg/kg-day	:	ł	1
-	ORGANICS	•									
	Aldrin	0.000203	тдУкд	0.000203	mg/kg	Σ	3.0E-08	mg/kg-day	1.7E+01	mg/kg-day 1	5.1E-07
==	Arocior 5432	0.0255	mg/kg	0.0255	mg/kg	Σ	3.7E-06	mg/kg-day	4.5E+00	mg/kg-day 1	1.7E-05
	Benzo(a)anthracene	0.0222	mg/kg	0.0222	mg/kg	Σ	3.3E-06	mg/kg-day	7.3E-01	mg/kg-day 1	2.4E-06
	Benzo(a)pyrene	0.0242	mg/kg	0.0242	mg/kg	Σ	3.6E-06	mg/kg-day	7.3€+00	mg/kg-day 1	2.6E-05
	Benzo(b)fluoranthene	0.0256	mg/kg	0.0256	тд/ка	Σ	3.8E-06	mg/kg-day	7.3E-01	mg/kg-day 1	2.7E-06
==-	Heptachlor epoxide	0.000317	mg/kg	0.000317	тдУкд	≱	4.7E-08	mg/kg-day	9.15+00	mg/kg-day 1	4.2E-07
	PCB 1254	0.0222	mg/kg	0.0222	тд/ка	Σ	3.3E-06	mg/kg-day	2.0E+00	mg/kg-day 1	6.5E-06
	PCB 1260	0.00326	mg/kg	0.00326	mg/kg	Σ	4.8E-07	mg/kg-day	2.0E+00	mg/kg-day 1	9.6E-07
	alpha-BHC	0.000296	mg/kg	0.000296	толка	Σ	4.3E-08	mg/kg-day	6.3E+00	mg/kg-day 1	2.7E-07
	defta-8HC	0.000224	тоука	0.000224	mg/kg	×	3.3E-08	mg/kg-day	1.8E+00	mg/kg-day	5.9E-08
	(Total)										2.7E-04
							£	tal Risk Across	All Exposure	Total Risk Across All Exposure Routes/Pathways	2.7E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Appendix A.9

RAGS Part D Table 9's Summary of Receptor Risks and Hazards for COPCs Reasonable Maximum Exposure

TABLE 9.1.PIME RME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPOS: CHILD FISHER SS-63. Langley Aif Fore Base

Scenario Timetrame: Current/Future Receptor Population: Fisher Receptor Age: Child

	Exposure	Routes Total		;	0.0000004	:		1	;	0.0000131	0.0000015	0.000203	0.00022		1	1	0.11	:	0.03	1		1	;	:	1	CV	1	2.2		0.003	0.001	1	0.0	0.009	:	0.002	0.0	:	0.03	4
_	Dermal			ı	0.0000004	t		ı	ı	0.0000131	0.0000015	0.000203	0.00022		;	;	i	1	i	ł		ı	1	:	;	:	:	;		:	;	:	1	ı	ı	:	ı	ł	1	
azard Quotlen	Inhalation			1	1	ı		;	,	1	:	,	:		1	1	;	:	;	1		1	ı	1	ı	;		;		;	;	;	:	;	1	ı	1		:	
Non-Carcinogenic Hazard Quotlent	Ingestion			1	1	:	.,,	;	ı	:	1	t	*		ı	;	0.11	ı	0.03	:	_	:	,	1	1	2	:	2.2		0.003	0.001	:	0.04	600.0	,	0.005	0.00	ı	0.03	
ž	Primary	Target Organ			Dev. NS	ì		;	:	liver	liver	liver			:	ı	Dev. NS	·	Liver/hair/nails/skin/CNS	ì		:	:	:	ì	Immune system/eye/nails				Dev. NS	kidney	;	GI tract	blood/liver/Gi tract	;	CNS	hearViver	;	Liver/hair/nails/skin/CNS	12.2
Chemical	1		INORGANICS	Magnesium	Methylmercury	Sodium	ORGANICS	4,4-000	4,4.DDE	Aldrin	Heptachlor	Heptachlor epoxide	(Total)	INORGANICS	Catclum	Magnesium	Methylmercury	Potassium	Selenium	Sodium	ORGANICS	4.4:DDD	4,4'-DDE	Aroclor 5432	PCB-1248	PCB-1254	PCB-1260	(Total)	INORGANICS	Atuminum	Ватічт	Calcium	Соррег	ron	Magnesium	Manganese (food)	Nickel	Potassium	Selenium	Charle
	Exposure	Routes Total		;	;	ì		5E-10	3E.10	7E-10	3E-10	2E-09	4E-09		,	:	;	i	;			1E-07	2E-07	3E-05	2E-06	8E-06	2E-06	4E-05	. 7	****	:		1	1	ì	ı	÷		;	
Carcinogenic Risk	Dermal			;	;	ı		4.7E-10	3.3E-10	6.7E-10	3.4E-10	2.4E-09	4E-09	_	:	;	;	ı	ı	1	-	ı	ı	1	ı	1	:	;		;	;	:	1	1	ı	;	1	:	ı	
Carcir	Inhalation			;		1		1	ı	:	:	;	:		:	1	:	;	ı	1		;	,	;	,	ı	:	-		ı	1	,	1	ı	,	ı	1	ı	:	-
	Ingestion			1	:	t		ı	;	,	ı	:	,		1	1	:	ı	;	1		1.3E-07	1.6E-07	3.2E-05	1.7E-06	8.3E-96	2.2E-06	4E-05		:	;	:	:	1		1	:	1	1	 -
Chemical			INORGANICS	Мадлеѕіит	Wethylmercury	Sodium	ORGANICS	4,4:-000	4,4-D0E	Aldrin	Heptachlor	Heptachlor epoxide	(Total)	INORGANICS	Calcium	Magnesium	Methylmercury	Potassium	Selenium	Sodium	ORGANICS	4,4:000	4,4:-DDE	Aroclor 5432	PCB-1248	PCB-1254	PCB-1260	(Total)	INORGANICS	Aluminum	Barium	Calcium	Copper	Iron	Magnesium	Manganese (food)	Nickel	Potassium	Selenium	Silver
Exposure			Surface Water from Back River											Fish from Back River															Crabs from Back River											
Exposure			Surface Water											Animal Tissue	-																									
Медіит			Surface Water											Animal Tissue																										

TABLE 9.1 RME
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCACHILD FISHER
SS-63, Langley Air Force Base

R R S S S S S S S S S S S S S S S S S S	Scenaro Timefrante: Current/Future Receptor Population: Fisher Receptor Age: Child	Current/Future Fisher											
Medium	Exposure	Exposure Point	Chemical		Caro	Carcinogenic Risk		Chemical	Σ.	Non-Carcinogenic Hazard Quotient	1azard Quotie	ت	
				Ingestion	Inhalation	Darmal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Demai	Exposura Routes Total
			Magnesium	,	-	,		Magnesium		ı	1	,	1
			Manganese (food)	ı	1	:	1	Manganese (food)	CNS	0.002	·	ı	0.00
	-		Nicket	;	1	J	ı	Nickel	headlivar	0.005	'	2	0.005
	<u></u>		Potassium	ı	1	1	ı	Potassium	1	1	1	ı	:
			Seternium	1	1	ı	ı	Selenium	Liver/heir/neils/skin/CNS	0.03	:	1	0.03
	_		Silver	1	ı	,	1	Silver	akkin	0.03	1	1	0.03
			Sodium	1	1	ı	ı	Sodium		;	;	ı	i
			Zinc	1	1	ı	ı	Zinc	poold	0.03	ı	1	0.03
			ORGANICS		·-·			ORGANICS					
			4.4-000	1E-08	,	1	16.08	4,4:000	,	1	,	ı	'
			4,4:-DDE	6E-09	;	ı	6E-08	4,4:0DE		i	ı	1	l
			Heptachlor	6E-09	1	ı	6E-09	Heptachlor	İver	0.00003	,	:	0.00003
			Haptachler epoxide	1E-07	1	,	1E-07	Heptachlor epoxide	iver	10.0	,	,	10.0
			PCB-1254	7E-07	1		7E-07	PCB-1254	Immune system/eye/neils	0.2	1	1	0.2
			Phenol	1	t	J	ı	Phenol	fetus	0.00004	1	t	0.00004
			bis (2-Ethylhexyl) phthalate	36-08	1	,	35-08	bis (2-Ethylhexyt) phthalate	- Avi	0.001	ı	ı	0.001
			(Total)	1E-04	Ţ		1E-04	(Total)		2.5	ż		2.5
				Tota	Risk Acros	Total Risk Across Surface Water	4E-09			Total Haz	and Index Ac	Total Hazard Index Across Surface Water	0.00022
				Tota	f Risk Acros	Total Risk Across Animal Tissue	2E-04			Total Haz	tard Index Ac	Total Hazard Index Across Animal Tissue	9

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2E-04

Total Risk Across All Media and All Exposure Routes

90	0.063	0.116	2	0.00004	90.0	90:0	0 005	2	0.001	90'0	2	3.4	3.3	
Total blood HI =	Total CNS HI	Total Dev. NS HI =	Total eye HI =	Total fetus HI =	Total Gi tract HI =	Total hair HI =	Total head HI =	Total Immune system HI =	Total kidney HI ≖	Total liver HI =	Total nads MI =	Total skin HI ≖	Total vescular HI =	•

TABLE 9.2.RME
RIME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCADULT FISHER
SS-63, Langley Air Force Bese

Scenario Timeframe, Current/Future Receptor Population Figher (Receptor Age: Adult

Surface White from Back River Cheerical Protect														
Suffice Water from Back River MORGANICS Command Epigote MORGANICS Command Epigote MORGANICS Command Epigote MORGANICS Command Epigote MORGANICS Command Command MORGANICS Command Comman	Medium	Exposure	Exposure	Chemical		Carci	ogenic Risk		Chemical	Ź	on-Carcinogenic	Hazard Quotie	Ē	<u> </u>
Sufficient Witter Survivate from Basis River Michicolaucts National Annual National Annual Annual Annual Annual Annual River Michicolaucts National Annual Annual River Michicolaucts National Annual River Michicolaucts National Annual River Michicolaucts National Annual River Michicolaucts National Annual River National Riv		Medium	Point											
Surface Winter Surface Winter Form Back River WORGAMICS						Inhalation	Dermal	Exposure		Primary	Ingestion	Inhalation	Dermal	Exposure
Surface Within Form Back River (DORGANICS) Assured Within Form Back River (DORGANICS) Assured River (Associated Control of Control								Routes Total		Target Organ				Routes Total
Management Management Section Section Management Section Management Section Management Section Management Section Section Management Section Section Management Section Section Management Section Section Management Management Section Section Management Managemen	Surface Water	Surface Water	Surface Water from Back River	INORGANICS					INORGANICS					
Magnesorm				Arsenic	;	•	5.0E-10	5E-10	Arsenic	skin/vascular	1	;	0.000003	0.00003
Mathymenouty South State				Magnesium	ı	,	ı	:	Magnesium	ì	ı	ı	ı	ı
Contact Cont				Methylmercury	ı	t	ı	:	Methylmercury			1	0.0000002	0.0000002
Ordinance Ordi				Sodium	:	ı	ı	ı	Sodium			t	1	t
Administrate Fig. Form Back River MORGANICS Administrate Fig. Form Back River MORGANICS Administrate Fig. Form Back River MORGANICS Administration Cooperation Administration Admini				ORGANICS					ORGANICS					
Manual Tissue Automated				4.4.000	ı	ì	1 16 09	1E-09	4,4-000	:	1	ı	ı	ı
Annual Tissue Fish from Back River Annual Tissue				4.4'.00E	ı	ı	7 9E-10	8E-10	4.4'-00E	1	ı	1	ı	,
Anomal Tatue Fig. 16 RE-10 Hepatholor Inventor				Aldrin	1		1.6E-09	2E-09	Aldrin	liver	;	ı	0:000007	0 000007
Annual Tasus Fib. Incom Back River ITEGRA EE-09 REPORT ITEGRA	•			Heptachlor	,	,	8.2E-10	8E-10	Heptachlor	liver	t	ı	0.000001	0.000001
Animal Tasue Fish from Bock River MORGANICS T.E-04 In OFFICIALITY In OFFICIALITY T.E-04 In OFFICIALITY T.E-04 In OFFICIALITY T.E-04 In OFFICIALITY T.E-04 T.E-04 </th <th></th> <th></th> <th></th> <th>Heptachlor spoxide</th> <th></th> <th>:</th> <th></th> <th>66-09</th> <th>Heptachlor epoxide</th> <th>!</th> <th>1</th> <th></th> <th>0.0001</th> <th>0.0001</th>				Heptachlor spoxide		:		66-09	Heptachlor epoxide	!	1		0.0001	0.0001
Annmail Tabue Fish from Back River MORGANICS 1 2E-04 Assent stands 1				(Total)		í	1E-08	1E-08	(Total)		ı	;	0.0001	10000
Action	Anmat Tissue	Animal Tissue	Fish from Back River	INORGANICS					INDRGANICS					
Calcum Magnessum				Arsonic	2 1E-04	,	ı	2E-04	Arsenic	skn/vescular	-	1	;	~
Magnisum Magnisum — Magnisum — — Magnisum —				Calcum	:	ı	1	;	Calcium	1	1	1	:	1
Methylmercury <				Мадлезіцт	:	1	1	í	Magnesium	ı	I	ı	ı	ı
Potatistum Potatistum Potatistum Liver/hairinais/skin/CNS 0.03 Sodum - - Selenum Liver/hairinais/skin/CNS 0.03 Sodum - - Selenum - - - A44-DDD 5.0E-07 - - - - - 444-DDD 5.0E-07 - - - - - - A64-DDD 5.0E-07 -				Methylmercury	:	,	:	1	Methylmercury	Dev NS	1.0	:	1	0.1
Selenium Selenium Liver/haitnfraitablin/CNS 0.03 Sodium Sodium				Potassium	ı	,	ı	1	Potassium	;	:	ı	ı	ı
Sodium - Sodium - Sodium -	••••			Selenium	;	ı	ı	;	Selemum	Liver/hair/naia/akir/CNS	0.03	:	,	000
ORGANICS ORGANICS ORGANICS ORGANICS ORGANICS —				Sodium	1	ı	t	ı	Sodium	ı	1	1	ı	ı
4.4-DDE 5.0E-07 - 5E-07 4.4-DDD -				ORGANICS					ORGANICS					
4.4-DDE 6.3E-07 - <				4,4'-000	5.0E-07	1	ı	5E-07	4.4.000	1	ı	:	1	:
PCB-1248 6.5E-04 - - 7E-08 PCB-1246 - <th></th> <th></th> <th></th> <th>4,4'-DDE</th> <th>6.3E-07</th> <th>ı</th> <th>1</th> <th>6E-07</th> <th>4.4-DDE</th> <th></th> <th>t</th> <th>١</th> <th>ı</th> <th>1</th>				4,4'-DDE	6.3E-07	ı	1	6E-07	4.4-DDE		t	١	ı	1
PCB-124B 6.5E-08 - 7E-08 PCB-124B - - 7E-08 PCB-124B Immune system/sys/nalis 2 PCB-1254 3.7E-05 - - 3E-05 -				Aracter 5432	1.36-04	,	,	16-04	Arodor 5432	ı	t	ı	· ·	1
PCB-1254 37E-05 3E-05 PCB-1254 Immune system/eye/halis 2 PCB-1260 8.4E-06 4E-04 PCB-1280 INORGANICS Aluminum Aluminum Nidney 0.001 Arsenc Assanc Aluminum Nidney 0.001 Banium Banium Ceptum Copper				PCB-1248	6.5E-08	,	ı	75:08	PCB-1248	1	ı	ı	1	1
PCB-1750 8-6-04 8E-08 PCB-1280 AE-04 AE-04 Aluminum Aluminum Aluminum Aluminum Aluminum Aluminum Aluminum Aluminum					3 2E-05	ı	1	3E-05	PCB-1254	Immune system/eye/nails	^	:	:	2
INORGANICS					8 4E-06	1	:	9E-08	PCB-1280	1	1	1 !	ı	1
INORGANICS					4E-04	,	-	4E-04	(Total)		3.1	_	_	3.1
4E-04			Crabs from Back River	INORGANICS					INORGANICS					
4E-04 Arsenic skirvivasoular skirviv				Aluminum	ı	,	1	ı	Aluminum	Dev. NS	0.002	٠	:	0.002
Barium kidney Caldium - Caldium - Copper Copper Copper Coppe			-	Arsenc	46-04	· ·	ı	46-04	Arsenic	skin/vascular	7	<u>'</u>	ı	7
Copper Glust	•			Barium	1	,	ı	ı	Barium	kidney	100.0	;	ı	0.001
Copper Gi tach				Calcium	ı	1	ı	ı	Calcium	1	1	1	ı	;
man				Copper	:	,	ı	ı	Copper	Gl tract	0.037		ı	3
				ro.	ı	,	1	ı	nou	blood/iver/GI tract	9000	ı	ı	900.0

TABLE 9.2 RME
RME SUMMARY OF CANCER RISKS AND NON-GANCER HAZARDS FOR COPC&DULT FISHER
SS-63, Langley Air Force Base

Scanario Timeframe, Current/Future Receptor Population, Fisher Receptor Age: Adult		
Receptor Population. Fisher Receptor Age: Adult	Scenario Timeframe	Curent/Future
Receptor Age: Adult	Receptor Population	Fisher
	Receptor Age: Adult	

ļ		Exposure	Routes Total		0.002	1000	ı	0.02	6.03		0.02			t	0.00003	10.0	0.2	0.00004	ê	2.2	0.000124	
		Exp	Route		ő	ō 		·	ة —	_	<u> </u>				ō	ä	_	ō	0.000	7		Ų
	פיון	Dermal		1	1	ı	,	ı	1	ı			1	;	t	ı	ı	ı	ı	ı	Total Hazard Index Across Surface Wate	Total Hazard Index Across Animal Tissur
	lazerd Quoti	Inhalation			ı	1	ı	ı	:	ı	ı		1	ı	t	ı	t	1	1	! !	ard Index Ac	ard Index Ac
	Non-Carcinogenic Hazard Quolient	Ingestion			0.002	0.004	ı	0.023	0.025	ı	0.024		;	;	0.00003	0100	0.168	0 00004	60000	2.2	Total Haz	Total Haz
	ο χ	Primary	Tarpet Organ	ı	CNS	heartliver	1	Liver/heis/naits/skin/CNS	skin	1	poold		ı	ı	liver	liver	Immune system/eye/nails	fetus	HV8r			
	Chemical			Magnesium	Manganese (food)	Nickel	Potassium	Selenium	Silver	Sodium	Zinc	ORGANICS	4.4'.000	4,4'-DOE	Heptachlor	Heptechlor epoxide	PCB-1254	Phenol	bis (2-Ethylhexyl) phthalate	(Total)		
		Exposure	Routes Total	ŀ	ı	;	1	ı	;	ı	ı		SE-08	2E-07	2E-08	5E-07	3E-06	!	1E-07	4E-04	1E-08	9E-04
	Carcinogenic Risk	Demal		J	ı	,	ı	ı)	į	1		,	1)	1	1	,	,	,	Total Risk Across Surface Water	Total Risk Across Animal Tissue
	Cardi	nhalation	+	1	,	1	1	1	1	 I	1			ı	1	·		:		-	Risk Across	Risk Acros
		Ingestion Inhalation		1	1	;	1	1	1	'	'		5E-08	2E-07	2E.08	SE-07	3E-08	:	1E-07	4E-04	Tota	Tota
	Chemical			Magnetium	Manganese (food)	Nickel	Polassium	Selenium	Silver	Sodium	Zinc	ORGANICS	4.4:-000	4.4'-DDE	Heptachlor	Heptachlor apoxida	PCB-1254	Phenol	bis (2-Ethylhexyl) phibalate	(Total)		
	Exposure Point																					
	Exposure								_	**	,					-						
	Medium			-		-											-					

Total Risk Across All Media and All Exposure Routes 8E-04

Total Hazard Index Across All Media and All Exposure Routes 5

	00	0.056	0.105	2	0.00004	8	0.054	000	~	임	90.0	7	3	3	
•	Total blood HI •	Total CNS HI =	Total Dev. NS HI ≖	Total eye HI =	Total fetus HI ≖	Total GI tract HI =	Total hair KI =	Total heart HI =	Total Immune system HI =	Total kidney HI =	Total liver HI =	Total naits ₩I =	Total skin HI ≖	Total vascular Hi »	•

TABLE 9.3.RME
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs: OTHER RECREATIONAL PERSON (ADOLESCENTS (TEENS))
SS-43, Langley Air Ford Base

Scenario Timetrame. Current/Future Receptor Population. Other Recreational Person' Receptor Age. Adolescents (teens)

IJ			3										
Medium	Expasure	Exposure	Chemical		Carc	Carchogenic Risk		Chemical	x	Non-Carcinogenic Hezerd Quotient	fazerd Quotie	ŧ	
				Ingestion	Inhalation	Dermal	Exposure		Primary	ngestion	Inhalation	Dermal	Exposure
							Routes Total		Target Organ				Routes Total
Surface Water	Surface Water	Surface Water Surface Water from Back River INORGANICS	INORGANICS					INORGANICS					
			Arsenic	5.9E-08	t	1.9E-08	8E-08	Arsenic	skin/vascular	0.0015	;	0.0005	200.0
			Magnesium	1	1	1	;	Magnesium	3	ı	,	ı	ı
			Methylmercury	1	1	ı	;	Methylmercury	Dev. NS	0.00013	1	0.000046	0.0002
			Sodium	:	ı	ı	ı	Sodium	1	ı	;	1	1
			ORGANICS					ORGANICS					
			4.4D00	2.2E-11	ı	1 1E-08	16.08	4,4'-000	ı	ı	ı	ı	;
			4.4.DDE	1.96.11	;	7.7E-09	8E-09	4,4'-00E	ı	ı	;	1	1
		-	Aldnn	5.2E-09	ı	1.6E-08	2E-08	Aldrin	hver	0.00012	ī	0.00036	0 0000
			Heptachlor	3.8E-10	:	8.0E-09	8E-08	Heptachlor	liver	0.0000019	ı	0.00004	0 0000
			Heptachlor epoxide	4.6E-10	1	5.BE-08	8E-08	Heptachlor epoxide	liver	0.00005	-	900.0	0.006
			(Total)	(Total) 6E-08	:	1E-07	2E-07	(Totaf)		0.002	1	900.0	0.008
				Tot	al Risk Acro	fotal Risk Across Surface Water	2E-07			Total Haz	ard Index Acr	Total Hazard Index Across Surface Water	0.008

Total Risk Across All Media and All Exposure Routes 2E-07

Total Hazard Index Across All Medis and All Exposure Routes 0.008

Total Dev. NS. HI = 0.0002

Total liver HI = 0.006

Total skin HI = 0.002

Total vescular HI = 0.002

(1) Jet Skier

RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs: OTHER WORKER (ADULT) SS-63, Langley Air Force Base TABLE 9.4.RME

	Chemical Carcinogenic Risk Chemical	Ingestion Inhalation Dermai Exposure	Routes Total	INORGANICS INORGANICS	Arsenic 5.0E-08 - 2.1E-08 Arsenic	Magnesium Magnesium	Methylmercury Wethylmercury	Sodium : 1 : The sodium	ORGANICS	4,4-000 19E-11 1.2E-08 4,4-000	4.4-DDE 8E-09 8E-09 44-DDE	Aldrin 4 4E:09 1,7E-08 2E-08 Aldrin	Heptachlor 3.1E-10 8.6E-09 9E-09 Heptachlor	3.95-10
		T.	Route		7.		_		· · ·		¥6	25	<u></u>	8
	cinogenic Risk	Dermai			2.15-08	ı	1			1.2E-08	8.3E-09	1.7E-08	8.6E-09	6.0E-08
	5	Inhalation			ı	1	ı	1		;	,	;	;	1
		Ingestion			5.0E-08	:	:	1		1 9E-11	1 6E 11	4 4E-09	3.16.10	3.9E-10
	Chemical			INORGANICS	Arsenic	Magnesium	Methylmercury	Sodium	ORGANICS	4.4-000	4.4-DDE	Aldrin	Heptachlor	Heptachior epoxide
Current/Future Other Worker	Exposure Point			Surface Water from Back River INORGANICS										•
Scenario Timeframe Receptor Population Receptor Age: Adult	Exposure			Surface Water										
	Медил		,	Surface Water										

Routes Total

0.00004

0.000012

0.000027 0.0003

0.0004

0.0000

0.000002 0.00000

0.00

0.00001

0.002 0.002

Total Hazard Index Across Surface Water

Exposure

Dermal

Inhalation

ngestion

Non-Cardinogenic Hazard Quotient

2E-07 Total Risk Across All Media and All Exposure Routes

Total Risk Across Surface Water 1E-07

0.0004 Total liver HI = Total skin HI = Total Dev. NS 111 #

Total vascular HI =

Total Hazard Index Across All Media and All Exposure Routes 0 002

(1) Sea Rescue Trainer

TABLE 9.1.CT RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: CHILD FISHER SS-63, Langley Air Force Base

...

Scenario Limestame: Current/Future Receptor Population: Fisher Receptor Age: Child

Exposure Medium	Exposure	Chemical		Carc	Carcinogenic Risk		Chemical	Ź	Non-Carcinogenic Hazard Quotient	Hazard Quotier	~	-
			Ingestion	Inhalation	Dermal	Exposure Portes Total		Primary Terror Orner	Ingestion	Inhatation	Dermal	Exposure Goutee Total
Surface Water	Surface Water from Back River	INORGANICS				montes and	INORGANICS	ia ya Cipai				ואומים ו מופו
		Arsenic	1	,	3.0E-11	3E-11	Arsenic	skin/vascular	1	:	0.000002	0.000002
		Magnesium	1	:	1	;	Magnesium	:	ı	ı	1	;
		Methymercury	ı	ı	ı	:	Methylmercury	Dev. NS	ı	1	0.00000018	0.00000018
		Sodium	:	ı	:	,	Sodium	1	1	ı	1	
		ORGANICS					ORGANICS					
		4.4-000	;	:	4.0E-11	€ -11	4.4'-DDD	ì	1	ı	í	:
		4.4'-0DE	;	,	3.3E-11	3E-11	4.4-DDE	;	;	;	;	;
		Aldrin	;	;	9.4E-11	9E-11	Adrin	iver	1	ı	0.0000061	0.0000061
		Heptachlor	;	ı	4.0E-11	4E-11	Heptachlor	liver	1	;	0.0000006	0.0000006
		Heptachtor epoxide	:	:	3.0E-10	3E-10	Heptachlor epoxide	liver	ī	ı	0.000086	0.000086
		(Total)	;	1	5E-10	5E-10	(Total)			:	0.000095	0.000095
Animal Tissue	Fish from Back River	INORGANICS					INORGANICS					
		Arsanic	3.2E-06	ı		3E-06	Arsenic	skin/vascular	0.23	,	:	0.2
		Calcium	;	:		i	Calcium	t	ı	ı	1	;
		Мадлеѕит	:	:		:	Magnesium	:	1	,	ı	1
		Methylmercury	:	:	:	:	Methylmercury	Dev. NS	0.024	;	1	0.024
		Potassium	:	;	1	1	Polassium	,	ı	t	ı	;
		Selenium	1	:	ı	:	Selenium	Liver/hair/nails/skin/CNS	0.008	ı	I	0.008
		Sodium	٠	ı	ı	1	Sodium	ı	;	:	1	ī
		ORGANICS					ORGANICS					
		4,4'-DOD	3.7E-09	;	ı	4E-09	4,4'-000	ı	;	;	:	ı
		4,4'-DDE	8.5E-09	;	ı	9E-03	4,4.DDE	:	;	,	ŧ	;
		Aroclor 5432	6.0E-07	1	:	6E-07	Aroclor 5432	:	1	,	ı	ł
		PCB-1248	6.1E-08	:	;	6E-08	PCB-1248		i	;	i	t
		PCB-1254	2.7E-07	ì	ı	3E-07	PCB-1254	Immune system/eye/naits	0.2	,	ı	0.2
		PCB-1260	1.1E-07	:	;	1E-07	PCB-1260		ť	ı	t	:
		(Total)	4E-06	:	t	4E-06	(Total)		0.5		ı	0.5
	Crabs from Back River	INORGANICS					INORGANICS					
		Aluminum	;	ı	1	ı	Aluminum	Dev. NS	0.0004	;	:	0.0004
		Arsenic	90-39	;	1	90-39	Arsenic	skin/vascular	0.45	:	;	4.0
		Barium	;	ı	ī	ı	Barium	kidney	0.0003	1	ı	0.0003
		Calcium	;	1	;	:	Calcium	:	:	:	:	ŧ
		Copper	;	ı	:		Copper	GI tract	600'0	ı	ť	0.009
		tron	1	ı	:	ı	lron	blood/liver/Gl tract	0.002	;	:	0.005
		Magnesium	1	ı	,	:	Мадлеѕіит	3	:	;	:	t
		Manganese (food)	1	ı	1	1	Manganese (food)	CNS	0.0004	;	1	0.0004
		Nickel		:	•	1	Nickel	hearVIIver	1000			0.001

TABLE 9.1.CT
RME SUMMARY OF CANCER RISKS AND NON-CANGER HAZARDS FOR COPCs: CHILD FISHER
SS-63, Langley Air Force Base

Scenerio Timelfame: CurrentFuture Receptor Population: Fisher Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical		Com	Carcinogenic Risk		Chemical	X	Non-Carcinogenic Hazard Guotient	tazard Ouotier	-	
				Ingestion	Inhalation	Dermal	Exposure		Primary	ingestion	Inhalation	Darmal	Ехровите
					1		Routes Total		Target Organ				Routes Total
			Potassium	,	ı	1	;	Potassium	:	-	-	t	3
			Selenium	•	;	ı	;	Selenium	Liver/hair/nails/skhr/CNS	90000	ı	ì	9000
			Sliver	1	1	:	:	Silver	skin	0.005	ı	:	0.005
			Sodium	,	1	:	:	Sodium	ı	ı	;	i	;
			Zinc	1	1	:	1	Zinc	blood	0.006	:	ı	0.008
			OFIGANICS					ORGANICS					
			4.4'-D00	3E-10	1	;	3€-10	4,4'-000	ī	;	;	ı	1
			4,4.00E	2E-09	1	:	2E-09	4,4'.DDE	ţ	ţ	ı	;	,
			Heptachlor	3E-10	ı	ı	3E-10	Heptachlor	liver	0.000005	:	1	0.000005
			Heptachlor epoxide	8E-09	·	ı	8E-09	Heptachlor epoxide	liver	0.002	ı	1	0.002
			PCB-1254	2E-08	ŀ	ı	2E-08	PCB-1254	mmune system/eye/nails	0.02	;	ŀ	0.02
			Phenol	;	:	;	:	Phenol	fetus	0.000006	,	:	0.000008
			bis (2-Ethylhexyl) phihaiate	1E-09	:	1	1E-09	bis (2-Ethythexyl) phthalate	liver	0.0001		1	0.0001
	_		(Total)	6E:06	:		6E-06	(Total)		0.5	-		0.5
				ρ	tal Risk Acro	Total Risk Across Surface Water	5E-10			Total Ha	zard Index Acr	Total Hazard Index Across Surface Water	0.000095
				£	tal Risk Acro	Total Risk Across Animal Tissue	1E-05			Total Ha	zard Index Ac	Total Hazard Index Across Animal Tissue	0.98

Total Risk Across All Media and All Exposure Routes 1E-05

Total Hazard Index Across All Media and All Exposure Roules 0.98

D.008	0.0140	0.0245	0.2	900000:0	0.01	0.014	0.001	0.2	0.0003	0.019	0.25	0.7	0.7
Total blood Ht =	Total CNS Ht =	Total Dev. NS HI =	Total eye HI =	Total fetus HI =	Total GI tract HI =	Total hair HI =	Total heart HI =	otal immune system HI =	Total kidney HI =	Total liver HI =	Total nails HI =	Total skin HI ≖	Total vascular HI =

TABLE 9.2 CT RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPC≰DULT FISHER SS-63, Langley Air Forze Base

Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age. Adult

Medium	Exposure	Exposure	Chemical		Carci	Carcinogenic Risk		Chemical	No	Non-Cardinogenic Hazard Quotient	Hazard Quoti	ant.	
	Medium	Point		-									
				Ingestion Inhalabon	Inhalabon	Demai	Exposure Routes Total		Primary Tarnel Ornan	Ingestion	Inhalation	Demai	Exposure Routes Total
Surface Water	Surface Water	Surface Water from Back River	INORGANICS					INORGANICS					
			Arsenic	:	,	7.36-11	7E-11	Arsenic	skirtvascular	:	:	10000010	0.000001
			Magnesium	ı	1	1	ı	Magnesium	ı	ı	1	ŧ	1
			Methylmercury	1	'	:	:	Methylmercury	Dev. NS	ı	1	0.00000010	0.00000010
			Sodium	:	:	ı	ı	Sodium	1	1	ı	ı	,
			ORGANICS					ORGANICS		. =			
			4.4'-DDD	ı	,	9.7E-11	16-10	4,4'-000	1	ı	ı	ı	ı
			4.4.DDE	1	,	7.96-11	BE-11	4,4'-DDE	1	1	:	1	ı
			Aldrin	;	J	2.2E-10	2E-10	Aldrin	liver	ı	ι	0.0000034	0.0000034
			Heptachlor	ı	;	9.5E-11	1E-10	Heptachlor	liver	ī	t	0.0000003	0.0000003
•			Heptachior epoxide		,	7.3E-10	7E-10	Heptachlor apoxide	liver	-	.	0.000048	0.000048
			(Total)	1 .	,	1E-09	1E-09	(Total)		_		0.000053	0.000053
Animal Tissue	Animal Tissue	Fish from Back River	INORGANICS			ı		INORGANICS					
			Arsenic	1.0E-05	ı	ı	1E-05	Arsenic	skin/vascular	0.2	ı	:	0.5
			Catcium	1	;	1	ı	Calcium	1	:	:	1	ı
			Magnesium	ı	1	;	ŧ	Magnesium	;	ı	ş	;	1
			Methylmercury	:	1	1	1	Methylmercury	Dev. NS	0.019	1	;	0.019
			Potassium	;	1	ı	ı	Potassium	-	i	'	ı	
			Selanium	í	1	;	ı	Selenium	Liver/hair/nails/skin/CNS	900'0	:	1	9000
			Sodium	ı	1	1	ı	Sodium	ī	1	:	ī	:
			ORGANICS					ORGANICS		_			
			4.4.000	1.2E-08	,	1	16-08	4,4-500	ı	ı	1	ţ	:
			4.4.DDE	2.8E-08	ı	;	3E-08	4,4'-DDE	ı	t	;	ì	1
	_		Arador 5432	2 0E-06	1	ı	2E.08	Arodor 5432	1	i	ı	,	ı
			PCB-1248	2.0E-07	1	ı	7E-07	PCB-1248	ı	ţ	;	ı	ı
			PCB-1254	8.9E-07	1	;		PCB-1254	immune system/eye/nails	0.2	,	;	0.2
			PCB-1260	3 5E-07	i	1 !		PCB-1260		1	1	1.	;
		Crabe from Back Buser	(Total)	50	 	1	16.05	(Total)		4.0		,	0
			Aliminim			1		Aliminim	SN C	5000		į	0000
			in a second	25.05			25.75	F. C. P. P. C. P. C. P. P. P. C. P. P. P. C. P.	Selection of the select			1 ;	2
				50-37	1				99004	200	:	1	500
	-		Barum	ſ)	,	1	Banum	kidney	0.0002	1	:	0.0002
			Celaium	1		ı	ı	Calcium	1	1	1	1	;
			Copper	r	;	ı	ı	Copper	Gitract	0.007	1	ļ	2000
			lion	1	1	1	ı	Iron	blood/liver/GI tract	0.002	:	ı	0.002
			Magnesium	1	1	1	ı	Magnesium	- 	1	'	,	, ;
			Manganese (food)	1	,	ı	ı	Manganese (food)	CNS	0 0003	1	1	0000
			NO.	1	-	1		Nicket	hearthver	90000			80000

TABLE 9.2.CT
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCSADULT FISHER
\$5-63, Langley Air Force Base

and Timeframe: Current/Future ptor Population: Fisher ptor Age: Adult

Medium Exp	Exposure	Exposure Point	Chemical		Car	Carcinogenic Risk		Chemical	X	Non-Carcinogenic Hazard Quotient	Hazard Quoties		
				Ingestion	Inhalation	Dermai	Exposme		Primary	Ingestion	Inhalation	Dermal	Exposure
							Routes Total		Target Organ				Routes Total
			Potassium	1	,	_	1	Potassium		:	-		
	-		Sevenium	;	,	;	,	Selanium	Livermentnells/skin/CNS	0.00	 ,	1	\$00.0
	<u>.</u>		Silver		1	ı	:	Silver	skin	0.004	;	1	9000
		_	Sodium	1	ı	;	ı	Sodium	:	ı	:	1	ı
			Zinc	1	1	1	ı	Zinc	poold	0.005	;	1	0.005
			ORGANICS					ORGANICS					
			4.4:-000	1E-09	ı	ı	1E-09	4.4-000	ŧ	ı	,	1	ı
	•		4,4'-DDE	7E-09	ı	;	7E-09	4,4-DDE	ı	1	;	ı	ı
			Heptachior	1E-09	;	ı	1E-09	Heptachior	fiver	0.000003	1	ſ	0.000003
			Heptachlor epoxide	3E-08	ı	1	3E-08	Heptechlor epoxide	liver	0.002	ı	ſ	0.002
			PCB-1254	7E-08	ı	1	7E-08	PCB-1254	Immune system/eye/nails	0.013	ı	t	100
			Phenol	ı	1	1	:	Phanol	fetus	0.000005	1	t	0.000005
			bis (2-Ethylhexyl) phthalate	4E-09	1	,	£:09	bis (2-Ethythexyl) phthalate	liver	0.0001	:	1	0.0001
			(Total)	2E-05	ı	_	2E-05	(Total)		0.4	,	7	60
				Tot	al Risk Acro	se Surface Water	1E-09			Total Ha.	2ard Index Acr	Total Hazard Index Across Surface Wate	٥
			Total Risk Across Animal Tissue	<u>Φ</u> .	ial Risk Acre	ss Animal Tissue	3E-05	_		Total Ha	izard Index Acr	Total Hazard Index Across Animal Tissue	9.0

3E-05
Exposure Routes
All Media and All
Total Risk Across

2	9000	0.0108	0.0189	0.2	0.000005	0 008	0.01	0.0008	0.2	0.0002	0.015	0.20	0.5	0.5
-cur hazeru index Agross An Megis and An Exposure Koure M	* IN poold letoT	Total CNS HI =	Total Dev NS His	Total eye HI =:	Total fatus HI =	Total G) tract HI F	Total hair HI =	Total beart HI a	Total Immune system HI ≈	Total kidney Ht *	Total liver HI =	Total nails HI ≈	Fotal skin Hi e	Total vascular H! #

TABLE 9.1.RME RME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZAROS FOR COPC.CMILD FISHER SS-83, Langley Air Force Base

Scenano Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Child

Medium	Exposure	Exposura	Chemical		Car	Carcinogenic Risk		Chamical	2	Non-Carcinogenic Hazard Quolent	Hazard Quolie	Ĕ	
	Medium	Point						1					
				Ingestion	Inhalation	Demal	Exposure		Primary	Ingestion	Inhalation	Oermei	Exposure
							Routes Total		Target Organ				Routes Total
Surface Water	Surface Water	Surface Water from Back River	INORGANICS					INORGANICS					
			Magnesium	,	1	1	1	Magnesium	1	:	1	1	ı
			Methylmercury	ï	1	1	1	Methylmercury	Dev. NS	1	ı	0.0000004	0.0000004
			Sodium	1	1	1	ı	Sodium	1	1	;	i	1
			ORGANICS					ORGANICS					
			4,4:000	1	ı	4.7E-10	5E-10	4.4-DDD	ı	ı	1	:	,
			4.4'-DDE	1	ı	3.3E-10	3E-10	4,4:DDE	ı	1	1	t	ı
			Aldnn	,	1	6.7E-10	7E-10	Aldrin	liver	ı	ı	0.0000131	0.0000131
_			Heptachlor	ı	ı	3.4E-10	3E-10	Heptachlor	HVAT	1	;	0.0000015	0.0000015
			Heptachlor epoxide	1		2 4E-09	2E-09	Heptachlor epoxide	liver	1	1	0 000203	0.000203
			(Total)	t	1	4E-09	4E-09	(Total)		1	-	0.00022	0.00022
Animal Tissue	Animal Tissue	Fish from Back River	INORGANICS					INORGANICS					
			Calcium	1	ı	ı	;	Calcium	1	1	,	,	1
			Magnesium	1	ı	ı	ı	Мадпезіит	ı	ı	:	;	1
			Methylmercury	ı	1	1	;	Methylmercury	Dav. NS	0.11	,	1	0.11
			Potassium	ı	ı	1	1	Potassium	ı	1	1	1	1
			Salenium	;	1	ı	:	Selenium	Liver/hair/naits/skin/CNS	0 03	١	ŀ	0.03
			Sodium	ı	1	1	1	Sodium	ı	1	1	,	i
			ORGANICS					ORGANICS					-
			4.4:-DDD	1 3E-07	1	ı	1E-07	4,4'-000	ı	1	1	;	ı
			4,4*-DDE	1.6E-07	;	ı	2E-07	4,4'-DDE	1	1	ı	1	ı
			Arocior 5432	3.2E-05	ı	1	3E-05	Aroclor 5432	ı	ı	;	1	1
			PCB-1248	1.7E-08	,	ı	2E-08	PCB-1248	:	1	:	ı	ı
			PCB-1254	8.3E-06	ı	ı	9E-06	PCB-1254	Immune system/eye/neits	۸	1	1	7
_	-		PCB-1260	2.2E-08	1	ı	2E-06	PCB-1260		ı	,	1	1:
	_		(Total)	4E-05	:	ı	4E-05	(Total)		2.2	:	;	2.2
	_	Crabs from Back River	INORGANICS					INORGANICS					
	-		Aluminum	1	,	;	ŧ	Aluminum	Dev NS	0.003	ı	ı	0.003
			Banum	ı	;	t	1	Barium	kidney	0.001	;	1	0.001
			Calcium	,	'	ı	1	Calcium		1	1	1	;
			Соррег	ı	1	ı		Copper	Gi trect	700	ı	ı	0
	_		Iron	;	1	1	ı	<u> </u>	blood/liver/GI trect	6000	,	:	0000
	_		Magnesium	t	;	ı	ı	Magnesium	1	;	1	,	;
	_		Manganese (food)	ı	1	t	1	Manganese (food)	CNS	2000	ı	;	0 002
	_		Nickel	ı	ı	1	ı	Nickel	hearthings	0.00	;	1	000
			Potassium	;	ı	1	;	Potassium	ı	ı	1	1	ŀ
	_		Selenium	ı	t	ı	1	Selenium	Liver/hair/haus/skin/CNS	0.03	:		0 03
			Silver	·	- -	-	ı	Silver	skin	0 03	-	:	0.03

TABLE 9.1.RME
RIME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPOS: CHILD FISHER
SS-83, Langley Air Force Base

Scenario Timetrame: Current/Future Receptor Population: Fisher Receptor Age: Child

				_		_	_	_		_	_		_	_		
		Exposure	HOUTES LOTEL	;	0.03		1	:	0.00003	10.0	0.2	0.00004	1000	0.3	0.00022	2.6
	_	Dermal		ŧ	1		;	ı	:	ı	1	1	:		Total Hazard Index Across Surface Water	Total Hazard Index Across Animal Tissue
	łazard Ovotien	Inhalation		:	'		:	ı	1	ì	,	ı	:	:	zard Index Acri	zard Index Acr
	Non-Carcinogenic Hazard Ouotient	Ingeston		;	0.03		:	:	0.00003	0.01	0.2	0.00004	0.001	0.3	Total Ha	Total Ha
	R	Primary	l algel Olgari	•	poold		:	1	liver	IIVBI	Immune system/eye/nalls	sn(e)	inver			
	Chemical			Sodium	Zinc	ORGANICS	4,4-500	4,4-DDE	Heptachlor	Heptachlor epoxide	PCB-1254	Phenol	bis (2-Ethythexyl) phthalale	(Totat)		
		Exposure Routes Total	noutes lotal	1	:		1E-08	6E-08	6E-09	1E-07	7E-07	;	3E-08	1E-08	4E-09	SE-05
	Carcinogenic Alsk	Dermal		ı	:	•	ı	ı	ı	ı	:	ŀ	-	1	Total Risk Across Surface Water	Total Risk Across Animal Tissue
	ĊŠ	Inhalation		ı	;		ı	ı	t	1	1	1	;		ital Risk Acro	otal Risk Acr
		Ingestion		:	:		1E-08	6E-08	6E-09	1E-07	7E-07	;	3E-08	1E-06	ř	ŗ
_	Сћетка			Sodium	Zinc	ORGANICS	4,4'-000	4,4'-DDE	Heptachlor	Heptachlor epoxide	PCB-1254	Phenol	bis (2-Ethythexyt) phthalate	(Total)		
	Exposure Pant															
	Exposure Medium															
	Medium															
													_			

Total Hazard Index Across All Media and All Exposure Routes
5E-05
Total Risk Across All Media and All Exposure Routes

0.00 6 2.3	Total hearl HI = Total firmune system HI =
90'0	Fotal hair Hi =
0.05	Total GI Iract HI =
0.00004	Total fetus HI
2.3	Total aye Hi =
0.115	Total Dev. NS Ht ≈
0.063	Total CNS HI
0.04	Total blood HI =

Total kidney Hi =
Total liver Hi =
Total nails Hi =
Total skin Hi =

Total vascular Ht =

Estmated risk from ingestion of fish and crabs does not include the contribution of arseric in tissue. Based on statistical analysis of sediment data, it was determined that angenic in fish and crab tissue is not related to site activities (see Section 4).

TABLE 9.2.FIME FIME SUMMARY OF SITE CANGER RISKS AND NON-CANCER HAZAROS FOR COPCs: ADULT FISHER SS-63, Langisy Air Force Bass

Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Aduit

1		ú											
	Medium	Exposure Point	Chemical		2 8 2	Carcinogenic Risk		Chemical	ž	Non-Carcinogenic Hazard Quotlent	lazard Quotler	=	
				Ingestion	Intralation	Dermal	Exposure Bourse Total		Primary Ternet Organ	Ingestion	inhafation	Dermat	Exposure
Surface Water	Surface Water	Surface Water from Back River	INORGANICS					INORGANICS					eno canon
			Magneslum	;	ı	1	1	Magnestum	ı	ı	ı	ŀ	,
			Methylmercury	ı	1	ı	:	Methylmercury	Dev. NS	1	1	0.00000024	0.00000024
			Sodium	ı	ı	1		Sodium	ı	ı	,	1	1
			ORGANICS					ORGANICS					
			4,4.000	1	;	1.15-09	1E-09	4,4'-DDD	;	t	1	:	ı
			4,4:-DDE	1	:	7.9E-10	8E-10	4,4:-DDE	t	1	t	1	t
			Aldrin	;	:	1.6E-09	2E-09	Aldrin	íver	1	,	0.0000073	0.0000073
			Heptachlor	ţ	;	8.2E-10	8E-10	Heptachlor	liver	1	ı	0.000008	0.0000006
			Heptachlor epoxide	ı	-	5.7E-09	6E-09	Heplachlor epoxide	liver	ı	'	0.000113	0.000113
+			(Total)	:	:	1E-08	1E-08	(Total)		1	;	0.000122	0.0001
Animal Tissue	Anımal Tissue	Fish from Back River	INORGANICS					INORGANICS					
			Calcium	;	:	ı		Calclum	;	1	1	ı	ı
			Magnesium	;	1	1	1	Magnesium	•	ı	t	ı	ı
			Methylmercury	,	:	ı	ı	Methytmercury	Dev. NS	0.10	,		0.10
			Polassum		:	;	:	Potassium	:	1	,	:	ì
			Selenium	1	:	ı	:	Sevenium	Liver/hair/nalis/skin/CNS	0.03	1	:	0.03
			Sodium	1	;	ı	:	Sodium	·	1	;	:	t
			ORGANICS	_				ORGANICS					
			4,4'-D00	5.0E-07	;	;	5E-07	4.4.000	;	ŧ	٠	;	;
			4,4.D0E	6.3E-07	;	ı	6E-07	4.4-0DE	r ·	1	;	:	;
			Arocior 5432	1.3E-04	:	ı	1E-04	Aroctor 5432	ī	:	1	1	·
			PCB-1248	6.5E-06	t	ı	76-06	PCB-1248	1		1	ŧ	·
			PCB-1254	3.2E-05	1	;	3E-05	PCB-1254	Immune system/eye/naits	7		1	2
			PCB-1260	8.4E-06	t		8E-06	PCB-1260		1		_	1
			(Total)	2E-04			2E-04	(Total)		2.0		1	2.0
****		Crabs from Back River	INORGANICS					INORGANICS					
			Aluminum	;	:	ı		Auminum	Dev. NS	0.002	ı	;	0.002
•			Baríum	;	;	i	:	Barium	kidney	0.001	ı	t	0.001
			Catclum	;	ı	1	:	Calcium	ı	;	;	;	;
			Copper	ı	;	ı	;	Соррег	GI fract	0.037	1	1	₩0:0
,			fron	;	;	į	ı	Iron	blood/liver/Gi tract	9000	1	:	9000
			Magnesium	;	1	ı	ı	Magnesium	1	ı	!	ı	ŀ
···			Manganese (food)	:	:	ı	1	Manganese (food)	CNS	0.002	1	;	0.002
			Zicke.	ı	;	;	ı	Nicket	heart/liver	0.004	ı	:	0.004
			Potassium	:	:	ı	ı	Polassium	ì	;	:	ı	1
			Selenium	:	t	1	1	Selenhim	Liver/hair/naits/skin/CNS	0.023	:	:	0.02
			Silver	1	-	1	1	Silver	skin	0.025		•	0.03

TABLE 9.2.FME RIME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: ADULT FISHER SS-63, Langley Air Force Base

Scenario Timerlame: Current/Future Receptor Population: Fisher Receptor Age: Actul

Medium	Exposure	Exposure Point	Chemical		ğ	Carcinogenic Risk		Chemical	ž	Non-Carcinogenic Hazard Quotieni	łązard Ouotier	-	
				Ingestion	Inhalation	Dermal	Exposure		Primary	Ingestion	Inhalation	Dermal	Exposure
							Routes Total		Target Organ				Routes Total
			Sodium	;	;	-		Sadium	:	;		ŧ	,
			Zinc	;	;	ı	,	Zinc	poold	0.024	t	t	0.05
			ORGANICS					ORGANICS					
			4,4.:DDD	5E-08	:	í	5E-08	4,4-000	;	ı	ı	;	;
			4,4⁺.DDE	2E-07	;	i	2E-07	4,4.DDE	:	1	1	,	;
			Heptachlor	2E-08	ı	·	2E-08	Heptachlor	liver	0.00003	:	ı	0.00003
			Heptachlor epoxide	5E-07	;	1	5E-07	Heptachlor epoxide	liver	0.010	ı	ı	0.01
			PCB-1254	3E-08	:	:	3E-06	PCB-1254	Immune system/eye/nails	0.168	ı	ı	0.2
			Phenai	;	,	ı	;	Phenal	fetus	0.00004	1	;	0.00004
			bis (2-Ethylhexyl) phthalate	1E-07	;	1	1 E -07	bis (2-Ethylhexyl) phithalate	llver	0.0009	ı	ı	0.0009
			(Total)	4E-06	;	;	4E-06	(Total)		0.3	-		0.31
				ğ	tal Hisk Acro	Total Risk Across Surface Water	1E-08			Total Ha.	zard Index Ac	Total Hazard Index Across Surface Water	0.000122
				2	tat Hisk Acro	Total Hisk Across Animal Tissue	2E-04			Total Ha	tzard Index Ac	Total Hazard Index Across Animal Tissue	2.31

Total Risk Across All Media and All Exposure Routes 2E

Total Hazard Index Across All Media and All Exposure Routes 2.31

	0.03	0.056	0.105	2.0	0.00004	0.04	0.05	0.004	2.0	0.001	90:08	2.1	0.08	0
•	Total blood HI =	Total CNS HI =	Total Dev. NS HI =	Total eye HI =	Total fetus HI =	Total Gt tract Hi =	Total hair HI	Total heart HI =	Total Immune system HI =	Total kidney HI =	Total liver HI =	Total nails Hi =	Total skin HI	Total vascutar HI =

Estimated risk from ingestion of tish and crabs does not include the contribution of arsenic in issue. Based on statistical analysis of sediment data, it was determined that arsenic in lish and crab lissue is not refated to site activities (see Section 4).

TABLE 9.1.CT RME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPC.CHILD FISHER SS-63, Langiey Aif Force Base

Scenario Timeframe: Current/Euture Receptor Population; Fisher Receptor Age: Child

Medium	Exposure	Exposure	Съетиса		Carc	Caronogenic Risk		Chemical	S.	Non-Carcinogenic Hazard Quotient	Hazard Quotie	Ĕ	
				Ingestion	Inhalation	Dermal	Exposure		Primary	Ingestion	Inhalation	Dermal	Exposure
		7					Routes Total		Target Organ				Routes Total
Surface Water	Surface Water	Surface Water from Back River	INORGANICS					INORGANICS					
			Arsenic	1	1	3.05-11	3E-11	Arsenic	skin/vascular	r	ı	0.000002	0.00002
			Мадлезит	:	;	1	ı	Magnesium	ı	ı	ı	ı	1
			Methylmercury	1	,	ı	ı	Methylmercury	Dev. NS	:	,	0.00000018	0.00000018
			Sodium	1	1	1	:	Sodium	ı	ı	1	ı	ı
	-		ORGANICS					ORGANICS	·-				
			4.4*-000	ı	ţ	4 0E-11	4E-11	4.4.000	ı	1	;	;	,
		-	4.4'-00€	1	1	3.3E-11	3E-11	4.4'.DDE	ı	ı	ı	ı	ı
			Aldrin	ı	1	9.4E-11	9E-11	Aldrin	jiver	ı	,	0.0000061	0.0000001
			Heptachiar	;	;	4.0E-11	4E-11	Heptachlor	liver	t	ı	90000000	9000000
			Heptachior epoxide	1	1	3.05-10	3E-10	Heptachlor epoxide	-5A-E		,	0.000086	0.000088
			(Total)	;	,	5E-10	5E-10	(Total)			;	0.000095	0.000095
Anımai Tişsue	Anmal Tissue	Fish from Back River	INORGANICS					INORGANICS					
			Calcium	ı	1	ı	;	Calcum	:	ī	ı	:	;
			Magnesium	;	1	1	;	Мадпеяит	ı	:	1	ı	1
			Methylmercury	1	1	1	i	Methylmercury	Dev. NS	0 024	١	ı	0.024
		-	Potassium	;	'	ı	:	Potassium	ı	1	;	ī	1
			Salenium	ı	ı	ı	1	Selenum	Liver/har/nails/skin/CNS	0.008	;	ı	0.008
			Sodium	;	,	i	;	Sodium	1	1	1	ı	ı
			ORGANICS					ORGANICS					
			4,4'-000	3.7E-09	;	ı	4E-09	4.4:000	;	ı	ī	ı	
			4.4'-DDE	8.5E-09	,	ı	9E-09	4,4'.DDE	1	ı	;	1	,
			Aroclor 5432	6.0E-07	;	1	6E-07	Aroclor 5432	1	ı	:	:	1
			PCB-1248	8.1E.08	;	1	9E-08	PCB-1248	ı	ı	ı	ı	1
			PCB-1254	2.7E-07	,	i	3E-07	PCB-1254	Immune system/eys/nails	0.2	:	1	0.2
			PCB-1260	•			15-07	PCB-1260		1	1		1 .
			(Total)	1E-06	-	1	15-06	(Total)		0.3	-	-	0.3
		Crabs from Back River	INORGANICS					INORGANICS				•	
_			Aluminum	,	1	1	1	Aluminum	SN AOO	0.0004	;	,	0.0004
			Валит	,	1	1	1	Barium	kidney	0.0003	:		0.0003
			Calcum	ı	1	:	1	Calcium	ł	:	3	:	;
			Copper	ı	1	ı	ı	Copper	GI tract	600.0	1	1	6000
			Iron	ı	1	ı	1	Iron	blood/iver/GI tract	0.002	1	ı	200'0
			Magnesium	;	,	1	1	Magnesium	ı	ì	:	1	:
			Manganese (food)	ı	,	ı	1	Manganese (food)	CNS	0.0004	,	1	0 000
			Nicke]	ı	,	ı	1	Nickei	heart/liver	1000	1	1	000
		_	Potassium	ı	,	1	:	Potassium	1	i	,	1	;
		Ţ	Selenium	1	- 	-	i	Selenium	Liver/hair/nails/skir/CNS	9000	-	:	9000
												!	

TABLE 9.1.CT RME SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPCÆHILD FISHER SS-93, Langiey Aif Force Base

Scenario Timeframa: CurrantFutura Receptor Population: Fisher Receptor Age: Child

	Τ	_	_				_	-					-	=	_	_
	Exposure	Routes Total	0000	ı	9000		ı	:	0.000006	0.002	0.02	0.000008	00001	0.0	0.000095	030
FIT	Dermad		,	1	1		1	1	ı	1	,	ı	1	ı	Total Hazard Index Across Surface Water	Total Hazard Index Across Animal Tissu
fazard Quotie	Inhalation		1	ı	1		ı	ŧ	1	ı	,	t	,	·	ard Index Acr	zard Index Ac
Non-Carcinogenic Hazard Quoteent	Ingestion		0.005	ı	900'0		1	1	0 000005	0.002	0.02	9000000	0.0001	0.0	Total Hez	Total Ha:
N	Primary	Target Organ	skin	ı	blend		ı	2	liver	liver	immune system/eye/nails	fetus	fiver			
Chemical			Silver	Sodium	Zinc	ORGANICS	4,4'-DDD	4,4'-DDE	Heptachlor	Heptachlor epoxida	PCB-1254	Pheno	bis (2-Ethylhexyl) phthafate	(Total)		
	Exposure	Routes Total	ľ	ı	1		3E-10	2E-09	3E.10	8E-09	2E-08	i	1E 09	3E-08	\$E-10	1E-06
Carcinogenic Risk	Dermal		ı	ı	:		1	;	1	ı	1	ı	1	ı	otal Risk Across Surface Water	Total Risk Across Animal Tissue
Carc	Ingestion Inhalation		:	1	1		ı	;	;	;	1	t	1 :	1	tal Risk Acro	tal Risk Acro
	Ingestion		ı	ı	1		3E-10	2E-09	3E-10	8E-09	2E-08	;	1E-09	3E-08	To	₽
Chemical			Silver	Sodium	Zinc	ORGANICS	4.4:000	4,4'-DDE	Heptachlor	Heptachlor epoxide	PCB-1254	Pheno	bis (2-Ethylhexyl) phthalate	(Total)		
									_				_		1	
Exposure Point																
Exposure Exposure Medium Point																

Total Risk Across All Media and All Exposura Routes 1E-05

Total Hazard Index Across All Media and All Exposure Routed 0.30

0.008	0.0245	0.000008	0.014		0.0003	0.25	00
Total blood HI = Total CMS HI =	Total Dev. NS HI = Total eye HI =	Total fetus HI = Total G! tract HI =	Total heart HI = Total heart HI =	Total Immune system Ht ≖	Total liver HI =	Total nails HI =	Total vascular HI =

TABLE 9.2 CT CT SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZAROS FOR COPCs, ADULT FISHER SS-69. Langley Ar Force Base

> seizurio Trinefratrie: Current/Future sciptor Population: Fraher Septor Apel: Adult

Medium	Exposure	Exposers	Chemical		3	Carchogenic Risk	•	Chamical	2	Non-Carcinogenic Hazard Outsiert	Hazard Ouolie	τ	
	Medium	Por											
				rojaetu,	Ingestion Principles	Dermal	Exposure		Printing	nosseon	inhelation	Dermal	Exposure
Acces Wilson	Section of the Control		own a contra		Ì		NOTES OC	**************************************	I Bi Det Croan				MOT SATIS
			Armenia	1	,	7.9E-11	Æ-11	Armenio	- Akina managan	,	1	0.000001	0.000001
			Megnesign	,	t	1	,	Magnesium	ı	:	_	ı	ì
			Methylmercury	1	,	ı	,	Mednymercury	Dev. NS	,	:	0.0000010	0.00000010
			Sodium	1	,	1	,	Sodium	ı	;	1	ı	;
			ORGANICS					ORGANICS					
			000:**	,	1	8.7E-11	1E-10	4,4-DDD	1	,	1	,	1
			4.4'-DOE	;	1	7.96-11	6E-13	300.77		;	-	ı	,
			Addin	1	ı	2.2E-10	2E-10	Adri	ž	ı	1	0.0000034	0.0000034
			1eptachlor	t	ı	9.5E-11	1E.10	Heptachlor	ive	ı		0.0000003	0.0000003
			deplaction aposida	,	,	7.3E-10	7E-10	Heptachior aposide	TVBC	,	,	0.000048	0.000048
			(Total)	-	-	16-09	15-00	(Total)			_	0.000063	0.000063
inal Tesus	Arena Teaus	Fish Irom Beck River	MORGANICS					MORGANICS					
_			Calcium	1	1	ı		Calchen	1	ı	1	ı	1
			Megreeium	1	,	1	,	Megnesium	t	,		1	1
			Methymercury	1	ı	ı	1	Methymercury	Dev. NS	0.019	t	1	0.019
			Potausium	:	ı	1	,	Potassium	ı	,	,	,	ı
			Salaciem	ı	,	,	:	Selenium	Liverily salah salah sakin CNS	900'0	;	1	9000
		••	Sodium	1	ı	1	;	Sodium	1	1	,	,	ı
			OFICANICS					OFIGANICS					
			000:**	1.2E-08	;	,	1E-06	000:00	ī	· _		,	,
			4.€:D0E	2.8E-06	,	1	36 on	4,4:00E	1	,		ı	;
			Aroclor 5432	2.0E-06	1	ţ	2E-06	Arodor 5432	ı	1	1	1	1
			PCB-1248	2.06-07	,	t	2E-07	PC9-1248	ı	ı	,	•	ı
			PCB-1264	8.9E-07	ı	:	Æ-07	PCB-1254	tmm.ne system/eys/nebs	0.2	,	1	0.2
		-	PCB-1260	3.5E-07	1	ı	4E-07	PCB-1260	ı	'	,	1	ı
			(Total)	36.98	-	:	36.08	(Total)		20		,	0.2
		Crabs from Beck River	MORGANICS					NORGANICS					
			Nonce	1	,	ı	:	Akminum	Dev. NS	0.0003	;	1	0.0003
_			Sarium	1	ι	1	ı	Berken	kidney	0.0002	ı	ı	0.0002
			Calcium	1		1	,	Calcium	ı	ı	t	1	1
			Copper	1	١	1	1	Copper	Gi traci	0.007	•	1	0.007
			£	ı	1	1	:	lon	blood/fiver/GI tract	0.002	1	:	200.0
			(Alegarence)	,	,	ı	,	- Chartest		,	1	'	:
			Manganese (food)	1	;	ı	ı	Manganese (food)	CNS	0.0003		t	0.0003
			Neckel.	t	,	ı	;	Nicke	hearthrer	0.0008	,	,	90000
			Potassium	1	1	ı	†	Potassium	1	ı	ı	1	ı
			Selenium	ا	,	1		Selecium	Liverheit/neite/skin/CNS	0.004	_	,	0.004

TABLE 9.2.0.7
CT SUMMARY OF SITE CANCER RISKS AND NON-CANCER HAZARDS FOR COPCE. ADULT FISHER
SS-ES, Langer Af Form Base

	Heceptor Age: Actuit										•		
Medun	Exposus	Esposure Point	Chemical		3	Carcinoganic Risk		Chemical	¥	Nen-Cerchtoperio Hazard Guoderi	Hazard Ouote	_	ļ
_				Ingestion Ertelation	Habition	Dermal	Exposure Routes Total		Primary Turgel Organ	hgestion	Inhelation	Dermal	Exposure Rouse Total
			Shar	-	1	-	1	Silver	578	100'0	-	-	0.004
			Sodem	1	'	ı	:	Sodium	ı	,	1	;	1
			į	t	,	1	1	25	Phood	900'0	,		9000
			CIRCANICS					ORGANICS					
			4.000	1E-09	1	;	16.00	000:,*'	,	ı	ı	,	t
			4.e-00E	7E-09	,	;	¥6.08	4,4'.DDE	,	1	1	ı	1
			Heptachior	1E-09		1	4E.00	Heptachtor	*	0.000003	1	1	0.000003
			Heptachtor epoxida	86-98	t	ı	96.08	Heptachior eposide	ř.	0.002	1	ı	0.002
			PCB-1254	7. 10.08	'	,	7E-08	PCB-1264	mmune eystem/eye/nsik	6,0,0	_	,	10:0
			Premol	ı	,	,	,	Phenos	fetus	0.000006	,	1	0.00000
			Die (2-Ethyfranyi) phitralete	4E-09	,	1	4E-00	bie (2-Ethylhaxyi) phthelete	PAN4	0.0001	-	ŧ	0.0001
			(Total)	(Total) 1E.07	;	_	1E-07	(Total)		0.0			0,0
				Top	al Risk Acros	Total Risk Across Surfect Water	16-00			Total He	azard Index Ac	Total Hezard Index Across Surface Water	D:000053
				٩	is Risk Acro	Total Risk Across Animal Trace 4E-06	4E-06			TOTAL	Axend Index A	Total Mazard Index Across Animal Tassus	2.0
						•							

Total Hazard Index Across All Media and All Exposure Rouse 0.2

Total Flak Across All Media and All Exposure Routes 45:05

TO LINE AND THE PARTY AND THE	Total blood HI = 0.006	Total CNS HI = 0.0108	Total Day, NS HI = 0.0189	Total eye HI = 0.2	Total fette His - 0.000006	Total Gi tract Hi • 0.006	Total half HI = 0.01	Total heart HI = 0.0008	Total formune system H1 = 0.2	Total kidney HI = 0.DOGZ	Total Iver HI 0 015	Total rails HI = 0.20	Total akin HI = 0.0	Total vescular H1 = 0.0	
AND														Estimated ritel from ingression of figh and crabs does not include the contribution of severitin instrum. Based on statistical arrelysis of septiment data, it was determined that aneatoric in fish and crab itsee to related to also activities (see Section 4).	
														Estimated risk from ingestion of fish and crabs does not include the conti	

TABLE 9.1.RME
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS; CHILD FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Curren/Future Receptor Population: Fisher Receptor Age: Child

					-	-	_		-	_	-	_	-		-	-	_	_		-	
	Exposure	Routes Total		0.05	1.24	60:0	0.0017	0.18	0.24	7 0.0	0.04	90.0	0.00	0.02	0.21	:	0.0026	;	:	:	ı
	Dermal			ı	1	1	1	1	1	ı	:	;	;	1	ı		1	ı	;	,	1
otient	Inhalation			1	:	ı	1	:	1	1	t	:	1	:	t		1	ı	;	1	1
ic Hazard Or	Ingestion			0.05	1.24	60.0	00.0	0.18	0.24	0.04	\$	9.	0.09	0.02	0.21		0.00	:	ı	ı	t
Non-Carcinogenic Hazard Quolient	Primary	Target Organ		Dev. NS	skirvascular	kidney	Gl tract/fetus/bone marrow/spleen/liver	Gitract	blood/liver/Gl tract	CNS	Dev. NS	Liverhair/nails/skin/CNS	skin	GI tract/CNS/kidney/bone marrow/liver	Nood		liver	N/A	NA	A/A	NVA
Chemical			INORGANICS	Aluminum	Arsenic	Cadmium	Chromium (Total)	Copper	Iron	Manganese	Mercury	Selenium	Silver	Vanadium	Zinc	ORGANICS	Aldrin	Aroclor 5432	Benzo(a)amhracene	Benzo(a)pyrene	Benzo(b)fluoranthene
	Exposure	Roules Total		1	5.6E-05	;	:	;	;	1	,	ı	:	ı	1	ı	1.3E-07	4.4E-06	6.2E-07	6.7E-06	7.15-07
Carcinogenic Risk	Demal			;	;	1	;	ı	1	ı	;	;	;	;	,		,	;	;	:	:
Carcino	Ingestion Inhalation			1	1	;	;	1	;	:	ı	:	ì	;	;		;	ŀ	:	ı	:
	Ingestion			;	5.6E-05	1	;	ı	:	ı	1	;	:	;	:		1.3E-07	4.4E-06	6.2E-07	6.7E-06	7.1E-07
Chemical			INORGANICS	Atuminum	Arsenic	Cadmium	Chromium (Total)	Copper	lron	Manganese	Mercury	Selenium	Silver	Vanadium	Zwc	ORGANICS	Aldrin	Araclor 5432	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)lluoranthene
Exposure Point			Bivalves from Back River																		
Exposure Medium			Animal Tissue																		
Medium			Animal Tissue																		

TABLE 9.1.FIME
RIME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: CHILD FISHER
SS-63, Langley Air Force Base

Scenario Timetrame: Current/Future Receptor Population: Fisher Receptor Age: Child

Medium	Exposure	Exposure	Chemical		Carcino	Carcinogenic Risk		Chemical	Non-Carchogenic Hazard Quotient	enic Hazard Q	uotient		
				Ingestion	Inhalation	Dermal	Inhalation Dermal Exposure		Primary	Ingestion	Ingestion Inhalation Dermal	Dermal	Exposure
							Routes Total		Target Organ				Routes Total
			Heptachlor epoxide	1.1E-07	:	1	1.1E-07	Heptachlor epoxide	liver	10.0	ı	:	10.0
			PCB 1254	1.7E-06	1	;	1.7E-06	PCB 1254	Immune system/eye/nails	0.42	1	;	0.42
			PCB 1260	2.5E-07	1	;	2.5E-07	PCB 1260	N/A	1	1	1	1
			alpha-BHC	7.1E-08	;	;	7.1E-08	alpha-BHC	N/A	ı	ı	ı	ı
			delta-BHC	1.5E-08	:	1	1.5E-08	delta-BHC	N/A	:	1	1	1
			(Total)	Total) 7.0E-05	1	;	7.0E-05	(Total)		2.7	1		2.7

Control of the last of the las	0.45	0.11	0.093	0.42	0.0017	0.44	0.045	0.42	0.11	0.32	0.47	4.	1.2	0.024	0.0017
	Total blood HI =	Total CNS HI =	Total Dev. NS HI	Total eye HI ≖	Total fetus HI =	Total Gi trect HI ⋅	Total hair HI =	Total Immune system HI =	Total kidney HI *	Total liver HI *	Total nails HI	Total skin Hi =	Total vascular HI	Total Bone Marrow =	Total Spleen HI =

TABLE 9.2.RME
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs: ADULT FISHER
SS-63, Langley Air Force Base

Scenario Timelrame: Current/Future Receptor Population: Fisher Receptor Age: Adult

Medium	Exposure	Exposure	Сћетка		Carcino	Carcinogenic Risk		Chemical	Non-Carchrog	Non-Carcinogenic Hazard Quotieni	wotient		
				ingestion	Inhalation	Dermal	Exposure		Primary	Ingestion	Inhalation	Dermal	Exposure
							Fourtes Total		Target Organ				Routes Total
Animal Tissue	Animal Tissue	Animal Tissue Bivalves from Back River	INORGANICS					INORGANICS					
			Aluminum	,	ŀ	;	ı	Aluminum	Dev. NS	0.05	1	ı	0.05
			Arsenic	2.2E-04	ı	1	2.2E-04	Arsenic	şkinVascular	1.12	:	ı	1.12
			Cadmium	,	;	ı	:	Cadmium	kidney	0.08	١	1	90:0
			Chromium (Total)	;	ı	;	ŧ	Chromium (Total)	Gi tract/letus/bone marrow/spleen/liver	00:0	ŀ	ι	0.0016
			Copper	;	:	ı	:	Copper	GI tract	0.16	ı	1	0.16
			Iron	,	1	1	:	Iron	blood/liver/Gl tract	0.21	ı	<u> </u>	0.21
			Manganese	,	;	:	;	Manganese	CNS	0.03	ı	ı	0.03
			Mercury	,	:	1	ļ.	Mercury	Dev. NS	90.0	ï	ı	20.0
			Selenium	,	1	ı	ı	Selenium	Liverhair/nails/skiv/CNS	8.0	l 	1	0.04 4
			Siver	,	:	;	l	Silver	skin	0.08	1	1	90:0
			Vanadium	;	1	ı	1	Vanadium	GI tract/CNS/liddney/bone marrow/liver	0.02	:	ı	0.02
			Zinc	;	1	;	:	Zinc	poola	0.19	ı	ı	0.10
			ORGANICS			_		ORGANICS				_	
			Aldrin	5.1E-07	:	;	5.1E-07	Aldrin	iver	0.00	ı	ı	0.0023
			Araclar 5432	1.7E-05	;	ı	1.7E-05	Aroctor 5432	N/A	1	1	ı	1
			Вепzо(а)аптивселе	2.4E-06	1	'	2.4E-06	Benzo(a)anthracene	¥/N	:	i	ı	1
			Benzo(a)pyrene	2.6E-05	:	;	2.6E-05	Вепго(а)ругеле	N/A	1	1	ı	1
			Benzo(b)fluoranthene	2.7E-06	:	-	2.7E-06	Benzo(b)fluoranthene	N/A		_	1	•

TABLE 9.2. FIME
SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: ADULT FISHER SS-63, Langley Air Force Base

Scenario Timetrame: Current/Future Receptor Population: Fisher Receptor Age: Adult

Medium	Exposure	Exposure	Chemical		Carcho	Carchogenic Risk		Chemical	Non-Carcinog	Non-Carcinogenic Hazard Quotient	uotient		
•				Ingestion	Ingestion Inhalation		Dermal Exposure		Primary	Ingestion Inhalation Dermal	Inhalation	Dermal	Exposure
							Routes Total		Farget Organ				Routes Total
			Heptachlor epoxide	4.2E-07	1	ı	4.2E-07	Heptachlor epoxide	¥ver	0.01		٠	10.0
			PCB 1254	6.5E-06	ı	:	6.5E-06	PCB 1254	mmune system/eye/rails	0.38	ı	1	0.38
			PCB 1260	9.6E-07	1	1	9.6E-07	PCB 1260	NA	:	1	ı	ı
			alpha-BHC	2.7E-07	ı	1	2.7E-07	alpha-BHC	N/A	ı	1	ı	,
			defta-BHC	5.9E-08	:	1	5.9E-08 delta-BHC	delta-BHC	N/A	1	;	1	ı
			(Total)	Total) 2.7E-04	:	١	2.7E-04	(Total)		2.4	,	1	2.4

0.41	0.10	0.084	0.38	0.0016	0.39	0.040	0.38	01.0	0.29	0.42	1.2	1:1	0.022	0.0018
Total blood HI =	Total CNS HI =	Total Dev. NS HI =	Total eye HI =	Total fetus HI =	Total GI tract HI =	Total hair HI =	Total Immune system HI =	Total kidney HI =	Total liver HI =	Total naka HI =	Total skin HI =	Total vaccular HI =	Total Bone Marrow =	Total Spieen HI =

TABLE 9.1.CT
CT SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs; CHILD FISHER SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Heceptor Population: Fisher Heceptor Age: Child

	95	Total		0.004	0.24	0.01	0.0001	=	8	0.005	- -	5	=	0.003	0.02	ı	0.0005	1	,	,	
	i Expoeure	Routes Total		- 0.	- -	ő	00	<u></u>	ő	~	ő —	ō —	<u> </u>	0	<u>-</u>		0.0		_		
	Dermal		_	ı	1	:	:	!	1	:	1	1	:	ı	!		1	:	1	:	
uotient	Inhelation			1	:	t	1	1	;	ı	;	;	;	ı	ı		;	1	!	;	;
nic Hazard Q	Ingestion			0.00	0.24	0.01	0.00	0.0	0.03	9.0	0.01	0.0	0.01	0.00	0.02		0.00	ı	t	ŀ	١
Non-Carcinogenic Hazard Cuoiteri	Ритагу	Target Organ		Dev. NS	skin/vascular	kidney	GI tract/letus/bone marrow/spleen/liver	Gliraci	blood/liver/GI tract	CNS	Dev. NS	Liverhair/nails/skin/CNS	skin	GI tract/CNS/kidney/bone marrow/liver	poold		liver	N/A	N/A	₹/N	4 2
Chemical			INOFIGANICS	Aluminum	Arsenic	Cadmium	Chromium (Total)	Copper	lron	Manganese	Mercury	Sefenium	Silver	Vanadium	Zinc	ORGANICS	Aldrin	Aroclar 5432	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)(luoranthene
	Exposure	Routes Total		;	3.3E-06	;	:	1	;	:	1	;	:	1	1	;	7.5E-09	2.5E-07	3.9E-08	4.0E-07	4.1E-08
Carcinogenic Risk	Dermal			1	1	:	í	:	:	í	1	ı	:	;	;		;	į	1	;	;
Carcino	Inhalation			ı	ı	;	;	ı	;	ı	:	:	۱	:	;	•	ı	1	;	ı	;
	Ingestion			,	3.3E-06	;	;	;		;	;	ı	:	1	:		7.5E-09	2.5E-07	3.9E-08	4.0E-07	4.1E-08
Chemical			INORGANICS	Aluminum	Arsenic	Cadmium	Chromium (Total)	Copper	lron	Manganese	Mercury	Selenium	Silver	Vanadium	Zinc	ORGANICS	Aldrin	Aroctor 5432	Benzo(a)anthracene	Berzo(a)pyrene	Benzo(b)fluoranthene
Exposure Point			Bivalves from Back River																		
Exposure		,	Animal Tissue																		
Medium			Animal Tissue																		

TABLE 9.1.CT CT SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs: CHILD FISHER

SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future	h: Fisher	0
Timeframe	Receptor Population: Fisher	Receptor Age: Child
٥	<u>ত</u>	ģ

	_			_				-
	Exposure	Routes Total	0.002	80.0	1	;	:	2
	Demail		:	3	ı	ı	1	
notient	Ingestion Inhalation Demail		,)	1	1	ı	,
enic Hazard O	Ingestion		0.0 0.0	90'0	ı	ı	1	70
Non-Carchogenic Hazard Quotient	Primary	Target Organ	fiver	Immune system/eye/nalls	N/A	N/A	NA	
Сћетіса			Heptachlor spoxide	PCB 1254	PCB 1260	alpha-BHC	delta-BHC	CTotal
	Exposure	Routes Total	5.8E-09	9.0E-08	1.4E-08	3.5E-09	5.2E-10	4.1E-06
Carcinogenic Risk	Dermal		1	ı	;	:	:	ı
Carcino	Ingestion Inhalation Dermal		ı	;	;	:		;
	Ingestion		5.8E-09	9.0E-08	1.4E-08	3.56-09	5.2E-10	(Total) 4.1E-06
Chemical			Haptachlor epoxide	PCB 1254	PCB 1260	alpha-BHC	delta-BHC	(Total)
Exposure Point								
Exposure Medium							•	
Medium		1				_		

0.05	0.02	0.011	0.08	0.0001	9.04	0.008	0.08	0.02	90.04	90'0	0.3	0.2	0.003	0.0001
Total blood HI	Total CNS HI	Total Dev. NS HI	Total eye HI ■	Total fetus HI =	Total GI tract HI =	Total hair HI	Total immune system Hi =	Total kidney Hi =	Total liver HI =	Total nails HI =	Total skin HI =	Totel vascular HI =	Total Bone Marrow =	Total Spleen Hi =

TABLE 9.2.CT CT SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs; ADULT FISHER SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Adult

										2			
Medium	Exposure	Exposure	Chemical		Carcino	Carcinogenic Risk		Chemical	Non-Cardinog	Non-Carcinogenic Hazard Quotient	Audient		
				ingestion inhalation	Inhalation	Dermal	Exposure		Primary	Ingestion	Inhalation	Demail	Exposure
							Routes Total		Target Organ				Routes Total
Animal Tissue	Animal Tissue	Animal Tissue Bivalves from Back River	INORGANICS					INORGANICS					
			Aluminum	:	ı	í	ı	Aluminum	Dev. NS	0.00	;	1	0.003
			Arsenic	1.1E-05	ı	;	1.1E-05	Arsenic	skinvascular	0.19	ì	ŧ	0.19
			Cadmium	1	;	,	:	Cadmium	kidney	0.01	1	ı	0.01
			Chromium (Total)	1	:	ı	:	Chromium (Total)	Gl tract/letus/bone marrow/spleen/liver	0.00	ı	t	0.0001
			Copper	;	ı	;	1	Copper	Gitnact	0.01	;	1	0.01
			fron	:	1	,	1	Iron	blood/liver/Gl tract	0.02	t	1	0.02
W1 40 40 10 10 10 10 10 10 10 10 10 10 10 10 10	an.		Малдапеѕе	ı	1	ı	;	Manganese	CNS	0.00	1	;	0.004
			Mercury	ì	1	,	:	Mercury	Dev. NS	0.00	•	t	0.006
			Selenium	1	1	;	1	Selenium	Liverhair/nails/skin/CNS	0.0	1	;	0.01
			Silver	1	,	:	;	Silver	Bkin	0.01	;	1	0.01
			Vanadíum	;	ı	:	;	Vanadium	GI tract/CNS/kidney/bone marrow/liver	0.00	1	:	0.002
			Zinc	1	:	;	1	Zinc	poold	0.02	1	. 1	0.02
			ORGANICS					ORGANICS					
			Aldrin	2.5E-08	í	;	2.5E-08	Aldrin	liver	0.00	;	:	0.0004
			Arodor 5432	8.1E-07	;	,	8.1E-07	Aroctor 5432	¥Z.	1	;	t	
			Benzo(a)anthracene	1.3E-07	1	ı	1.3E-07	Benzo(a)anthracene	N/A	1	;	:	ŧ
			Benzo(a)pyrene	1.3E-06	ı	;	1.35-06	Benzo(a)pyrene	N/A	í	ï	;	7
			Benzo(b)fluoranthene	1.4E-07	ŧ	-	1.4E-07	Benzo(b)fluoranthene	N/A	i	1	ŧ	,

TABLE 9.2.CT CT SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCs: ADULT FISHER SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Adult

Medium	Exposure	Exposure	Chemical		Carcino	Carcinogenic Risk		Chemical	Non-Carding	Non-Cardinogenic Hazard Guotieri	Metal		
				Ingestion	Ingestion Inhalation	Dermal	Exposure		Primary	Inhalation Dermal	Inhalation	Dermal	Exposure
							Routes Total		Target Organ				Routes Total
			Heptachior epoxide	1.9E-08	ı	:	1.9E-08	1.9E-08 Heptachlor epoxide	liver	00:0	,	,	100.0
			PCB 1254	3.0E-07	1	ı	3.0E-07	PCB 1254	immune system/eye/nails	90:0	:	ı	800
			PCB 1260	4.5E-08	;	1	4.5E-08	PCB 1260	N/A	;	1	1	ŀ
			alpha-BHC	1.1E-08	1	;	1.1E-08	alpha-BHC	N/A	t	ı	,	ı
			delta-BHC	1.7E-09	ı	t	1.7E-09	delta-BHC	N/A	;	ı	1	;
	T The second sec		(Total)	Total) 1.4E-05	1	١	1.4E-05	(Total)		0.3	ı	1	0.3

90:04	0.01	0.008	90'0	0.0001	0.03	0.007	90.0	0.01	0.03	90'0	0.2	0.2	0.003	0.0001
Total blood HI	Total CNS HI .	Total Dev. NS HI =	Total eye Hi =	Total fetus HI =	Total Gi tract HI =	Total hair HI =	Total Immune system HI =	Total kidney HI .	Total iver HI *	Total nails Fil =	Total skin HI =	Total vascular HI =	Total Bone Marrow =	Total Spleen HI =

Appendix A.10

RAGS Part D Table 10's Risk Assessment Summary Resonable Maximum Exposure

TABLE 10.1.RME
RIME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCICHILD FISHER
\$5-83, Langley Aif Force Baye

Scenario Timeframe: Current/Future Receptor Population: Fisher Beneator Ann: Child

			, i										
Medium	Exposure	Exposure	Chemical		Card	Carchogenic Risk		Chemical	ž	Non-Cartinogenic Hezerd Quotien	Hezard Quotin	Ę	
				Ingestion	Inhalation	Dermal	Exposure Poutes Total		Primary Tarret Ocean	Ingestion	Inhalation	Dermet	Exposure Double Total
Surface Water	Surface Water	Surface Water Surface Water from Back River	*	-	,	1			1		·		
			(Total)	1	1	1	ı	(Total)	1	1	1	t	ŀ
Animal Tissue	Animal Tissue	Fish from Back River	INDRGANICS					INORGANICS					
			Arsenic	5.4E-05	1	:	SE-05	Arpenic	skin/vascular	-	1	1	-
			ORGANICS		_			ORGANICS					
			4.4-000	1.3E-07	;		1E-07	4,4-000	ι	1	1	ı	ı
		-	4.4DDE	1 6E-07	,	1	2E-07	4.4'-DDE	ι	ı	1	ï	ı
			Arodor 5432	3.2E-05	1	ı	36-05	Aroclor 5432	1	ı	1	t	ı
			PCB-1248	1.7E.08	ı	:	2E-06	PCB-1248	ı	1	1	ţ	ı
			PCB-1254	8.3E-06	ı	1	BE-08	PCB-1254	Immune system/eye/nells	'n	ı	1	2
			PCB-1280	2 2E-06	1	:	2E-06	PCB-1260	:	1	ι	1	:
			(Tatal)	1E-04	1		16-04	(Total)		3.3	-		3.3
		Crabs from Back River	INORGANICS					INORGANICS					
	-		Arsenic	40-11	1	1	1E-04	Arsenic	skin/vascutar	2.1	1	1	2.1
			(Total)	1E-04	•	***	16-04	(Total)		2.1	-	1	2.4
				Tot	al Risk Acros	Total Risk Across Surface Water				Total Hay	zard Index Ac	Total Hazard Index Across Surface Water	

Total fumure system HI = Total resist HI = Total resist HI = Total resist HI = Total extr. HI = Total vescular HI = Total vesc

Total Hazard Index Across Animal Tissue

Total Hazard Index Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes 2E-04

Total Risk Across Animal Tissue 2E-04

TABLE 10.2 RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCADULT FISHER SS-03, Langiey Air Force Beve

Scanario Timeframe: Current/Future	Fisher		
frame:	Receptor Population: Fisher	Receptor Age: Adult	
Ē	ą	8	I
enario	Septor.	ceptor	
ß	ž	ě	IJ

Медішт	Exposure	Exposure	Chemical		Carc	Carcinogenic Risk		Chemical	z	Non-Carcinogenic Hazard Quobent	Hazard Quobe	Ę	
				ngestion	Inhalation	Оетпа	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Surface Water Surface Water from Back River		:	:	1	1	:	-	1	1	ţ	ı
			(Total)	ı	1	1	:	(Total)		ı	ı	t	ı
Animal Tissue	Animal Tissue	Animal Tissue Fish from Back River	INORGANICS					INORGANICS			_		
			Arsenic	2.1E-04	1	1	2E-04	Arsenic	skinvascular	-	,	1	-
			ORGANICS					ORGANICS					
			Arodor 5432	1.3E-04	;	1	<u>\$</u>	Arodor 5432	ı	ı	,	ı	1
			PCB-1254	3.2E-05	:	:	3E-05	PCB-1254	Immune system/eye/nails	CN .	,	1	۲۹
	_		(Total)		-	-	4E-04	(Total)		3.0	-	1	3.0
		Crabs from Back River	INORGANICS					INORGANICS					
	_		Arsemc	4E-04	ı	1	4E-04	Arsenic	skin/vascular	~	1 (ı	2
			(Total)	4E-04	:	-	€ E-04	(Total)		1.9	-	1	1.8
				Tot	al Risk Acro.	ital Risk Across Surface Water				Total Ha	zard Index Ac	Total Hazard Index Across Surface Water	
				Þ	al Risk Acro	Total Risk Across Animal Tissue	7E-04		-	Total Ha	szard Index Ac	Total Hazard Index Across Animal Tissue	5

7E-04	
Total Risk Across All Media and All Exposure Routes	

7	2	3	3
Total Immune system HI =	Total nails HI =	Total skin HI =	Total vascular HI =

TABLE 10.1 CT
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPC.CHILD FISHER
\$\$-63, Langley Air Force Base

Scenario Timethame, Current/Future Receptor Population: Fisher Receptor Age, Child

Medium	Exposure	Exposure	Chemical		Carc	Carcinogenic Risk		Chemical	Z	Non-Carcinogenic Hazard Quotient	Hazard Quotie	*	
	Medium	Point					Ī						
				Ingestion	Inhalation	Demai	Exposure		Primary	ingestion	Inhalation	Dermal	Exposure
	EI .						Routes Total		Target Organ				Routes Total
Surface Water	Surface Water	Surface Water from Back River	1	;		t	1	;	1:	ı	ı	,	:
			(Total)	-	,		;	(Total)		ı	ı	ı	i
Animal Tissue	Animal Tissue	Fish from Back River	INORGANICS					INORGANICS					
			Arsenic	3.2E-06	ı	ı	3E-06	Arsenic	skin/vascular	0.2	,	ı	0.5
			Calcium	1	ı	:	1	Calcium	ı	ı	ı	1	ı
			Wagnesium	,		ı	ı	Magnesium	ı	,	_	ı	ı
			Methylmacury	1	'	:	ì	Methylmercury	Dev. NS	0.024	,	:	0.024
			Potassium	1	:	ı	ł	Potassium	ı	ı	1	ı	1
			Selenium	ì	1	ı	1	Seterium	Liver/hair/nails/skin/CNS	0.008	1	1	9000
			Sodium	1	ı	,	:	Sodium	1	ı	ı	;	ı
			ORGANICS					ORGANICS					
			4.4'-000	3.7E-09	1	ı	4E-09	4,4'-000	:	t	ı	ı	ı
			4.4.DDE	8 5E-09	1	1	9E-09	4,4'.DDE	ı	t	ı	t	ı
	_		Aracter 5432	8 0E-07	1	t	6E-07	Aroclor 5432	1	· 	1	ı	1
	-	-	PCB-1248	8 1E-09	1	ı	9E-08	PCB-1248	ı	ı	ı	ı	ı
			PCB-1254	2.7E-07	,	ı	3E-07	PCB-1254	immune system/eya/naits	0.2	1	1	0.2
			PCB-1260	1.1E-07	ı	:	1E-07	PCB-1260	1	ı		1	ı
_			(Total)	4E:06	ı	_	4E-08	(Totel)		0.5	1	1	0.5
		Crabs from Back River	INORGANICS					INORGANICS					
			Arsenic	6E-06	:	1	9E-08	Arsenic	skinvascular	0.4	1	ŧ	0.4
			(Total)	6E-06	-	_	9E-06	(Total)		0.4	_	ı	0.4
				Tot	al Risk Acros	Total Risk Across Surface Water	;			Total Haz	sard Index Acr	Total Hazard Index Across Surface Wate	
				Tota		l Risk Across Animal Tissue	1E-05			Total Ha.	zard Index Acr	Total Hazard Index Across Animal Tissu	8.0

Total Risk Across All Media and All Exposure Routes 15-05

Total Hazard Index Across All Media and All Exposure Routes 0

0.2	0.008	0.2	20	0.7	0.7
Total ays HI =	Total hair HI =	Total immune system HI =	Total nails HI =	Total skin HI =	Total vascular HI =

TABLE 10.2 CT
RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCADULT FISHER
SS-63, Langley Air Force Base

Scenario Timeframe: Current/Future Receptor Population: Fisher Receptor Age: Adult

			7										
Medium	Exposure	Exposure	Chemical		Carc	Carcinogenic Risk		Chamical	3 W	Non-Carcinogenic Hazard Quobent	Hiszard Quobie	ž	
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Tardet Organ	Ingestion	Inhaletion	Dermail	Exposure Routes Total
Surface Water	Surface Water	Surface Water from Back River									٠	1	
			(Total)	. 1	,			(Total)		1		2	:
Animal Tissue	Animal Tissue	Fish from Back River	INORGANICS					INORGANICS					
			Arsenic	1.06-05	;	1	1E-05	Arsenic	skinvescular	0.2	;	1	0.2
			Catour	;	'	ı	:	Calcium		1	1	ī	ı
			Magnesium	ı	ı	1	1	Magnesium	ı	ŧ	:	ı	1
			Methylmercury	;	ı	1		Methylmercury	Dev. NS	0.019	:	ı	0.019
			Potassium	ı	1	ı	;	Potassium	1	ı	1	ı	ŀ
			Selenum	;	;	ı	:	Selenium	Liver/hair/nails/skin/CNS	0.008	t	1	900.0
			Sodium	ı	1	1	1	Sodium	1	t	ı	ì	1
			ORGANICS					ORGANICS					_
			4.4:000	1 ZE-08	1	ı	1E-08	4.4-000	ı	ı	ı	ı	ı
	_		4.4:DDE	2.8E-08	ı	1	36-08	4,4:-DDE	ı	1	1	1	1
			Aroclor 5432	2.0E-08	ı	ı	2E-08	Aroclor 5432	ı	:	:	1	1
			PCB-1248	2.0E-07	ı	ı	2E-07	PCB-1248	1	1	'	i	ì
			PCB-1254	B 9€-07	,	ı	9E-07	PCB-1254	immune system/eye/nails	0.2	:	1	0.2
			PCB-1260	3 5E-07	1	- 1	4E-07	PCB-1260	1	1	ı	1	:
			(Total)	1E-05	1		1E-05	(Total)		P.4	_	t	0.4
		Crabs from Back River	INORGANICS					INORGANICS					
			Arsenic	2E-05	,	ı	2E-05	Arsenic	skinVescular	0.3	1	1:	63
			(Total)	2E-05	;	ı	2E-05	(Total)			-	ı	0.3
				٢	tal Risk Acros	Total Risk Across Surface Water	t			Total Ha	szard Index Ac	Total Hazard Index Across Surface Wate	
				7	tal Risk Acro	Total Risk Across Animal Tissue	3E-05			Total Ha	azand Index Ac	Total Hazard Index Across Animal Tissu	0.7

Total Risk Across All Media and All Exposure Routes 36-05

Total Hazard Index Across All Media and All Exposure Routes

0.2	9000	0.2	0.2	0.5	0.5
Tolal eye HI ≖	Total hair HI ≖	Total Immune system HI =	Total nails Ht =	Total skin HI =	Total vascular HI =

TABLE 10.1 RME RME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: CHILD FISHER SS-63, Langley Aif Force Base

Scenario Limetrame: Curreni/Future	ē	
3	Fishe	
iame:	Receptor Population:	Receptor Age: Child
Ē	Pope	Age:
	P Plor	eptor
š	8	ğ

	_	_		_	_		•
	Exposure Routes Total		2		77	12	
	Dermal		ı		1	Total Hazard Index Armes All Exposure Boutes/Pathways	
azard Guotlen	Inhalation		1		,	as All Exposur	
Non-Carcinogenic Hazard Guotlent	Ingestion Inhalation		1.2		12	Hazard Index Acro	
	Primary Tarnet Organ		BldnVascular			Total	
Chemical			NORGANICS Arsenic	ORGANICS	(Total)		
	Exposure	HOWIES FOR			06+00		0E+00
mogenic Risk	Carcinogenic Risk						All Exposure Routes/Pathways 0E+00
Inhala					-		All Exposure
	Ingestion				Total	OCT-CO	Total filsk Across /
Chemical			INORGANICS	ORGANICS		101	Tota
Exposure	Point		Animal Tissue Bivalves from Back River				
Exposure	Medium		Animal Tissue				
Medium			Animal Tissue				

	_
1.2	1.2
ř	•
Ŧ	Ξ
rotal sidn H =	Total vescular Ht
ă	2
×	á
	ই
	•

TABLE 10.2 FIME
FIME SUMMARY OF CANCER RISKS AND NON-CANCER HAZARDS FOR COPCS: ADULT FISHER
SS-63, Langley AIF FORCE Base

ario Timelrame: Current/Future ptor Population: Fisher

	Evroping	Routes Total		-						1.1
	Jemes			1						s Routes/Pathws
tazard Quotleni									1	oss All Exposur
Non-Carcinogenic Hazard Quotient		uonseõvi		;	<u>:</u>				1.1	Total Hazard Index Across As Exposure Routes/Pathways
2		Primary Target Ordan			SKINVESCHAI					Total
Chemical				INORGANICS	Arsenic	ORGANICS			(Total)	
		Exposure	Houtes Otal	_	2.2E-04		1.7E-05	2.6E-05	2.6E-04	2.6E-04
Carcinogenic Risk		Dermal			1		;	1	:	Exposure Boutes/Pathways 2.6E-04
Carc		Inhalation			ı		1	1	;	
		Ingestion			2.2E-04		1.7E-05	2.6E-05	Total 2 6F-04	Total Bick Across All
Chemical				INORGANICS	Arsenic	ORGANICS	Aroctor 5432	Benzolalovrene		Total
Exposure	Point			Animal Tissue Bivalves from Back River						
Exposure	Madirm			Animal Tissue						
Medium				Animal Tiesue			-			

Total skin Hi = Total vescular Hi =

Appendix A.11

Ecological Risk Assessment Data

Table 7.1-1. Summary of SERA Results for Specific Receptors, Site SS-63

		Croshor		Kingfisher		Mink	
Benthic Invertebrates	ates	Cloanel			Ì		SERA
	SERA	o de la companya de l	SERA Results	Parameter	Results	Parameter	Results
Parameter	Kesnits	Talalita					
Inorganic Analytes	ļ		•	Aluminum	 -	Aluminum	*
Aluminum	•	Aluminum		Satimon's		Antimony	
Antimony	•	Antimony	-	America	-	Arsenic	•
Arsenic	*	Arsenic	•	Al Sering	-	Bartum	•
Barium	-	Barrum	•	Calcing	6	Beryllium	1
Beryllium	•	Beryllium	•	Chromina	-	Cadmium	1
Cadmium	•	Cadmium	,	Choose	-	Calcium	9
Calcium	9	Calcium	2	COPPE		Chromium	•
Chromium		Chromium	•	I DOU	-	Cobalt	1
Cobalt	*	Cobalt	. ,	Leau		Copper	 -
Copper	ļ	Copper		Magnesium	-	Cyanida	-
Cyanide	*	Cyanide	-	Manganese	- *	Iron	1
Iron	-	Iron	*	Mercury		100	•
paol	*	Lead	*	Nickel	_	Cean	•
1400001	-	Magnesium	•	Potassium	es .	Magnesium	
in confidence	-	Manganese	*	Selenium	1	Manganese	- •
Manganese	*	Morrino		Silver	1	Mercury	
mercury	•	Nickel	*	Sodium	ဗ	Nickel	
Nickel	,	Detrocium	6	Vanadium	1	Potassium	3
Potassium		Polassium Polassium		Zinc	•	Selenium	•
Selenium		Serement	*			Silver	1
Silver		Silver	-			Sodium	3
Sodium	2	Sodium				Thallium	*
Thallium	-	- naillum	*			Vanadium	•
Vanadium		Vanadium	1.			Zinc	•
Zinc		Zinc					
Volatile Organic Compounds	ls		,	Occion (-	Acetone	-
Acetone	2	Acetone	-	Account		2-Rutacone (MFK)	
2-Butanone (MEK)	2	2-Butanone (MEK)	-			Carbon disulfide	-
Carbon disulfide	2	Carbon disulfide	-			Methylene chloride	-
Methylene chloride	2	Methylene chloride				Tolliene	 -
Toluene	2	Toluene	-			200	
Semi-volatile Organic Compounds	- 1		•	Bis/2_ethylhexyl)nhthalate	-	2-Methylnaphthalene	-
2-Methylnaphthalene	2	Z-Metnyinaphthalene	٠	Dhenol	•	Acenaphthene	•
Acenaphthene		Acenaphmene	•			Acenaphthylene	
Acenaphthylene	.	Acenaphunyiene	*			Anthracene	*
Anthracene	•	Anthracene	-			Benz(a)anthracene	
Benz(a)anthracene	.	Benz(a)animacene	-			Benzo(a)pyrene	•
Benzo(a)pyrene	.	Benzo(a)pyrene	-			Benzo(b)fluoranthene	*
Benzo(b)fluoranthene	.	Benzolojituorantnene				Benzo(g,h,i)perylene	
Benzo(g,h,i)perylene	.	Benzo(g,n,ı)perylene				Benzo(k)fluoranthene	*
Benzo(k)fluoranthene		Benzo(k)muoranuiene	-			Butylbenzylphthalate	1
Butylbenzylphthalate	7	Butylbenzylprivialate				Bis(2-ethylhexyl)phthalate	-
Bis(2-ethylhexyl)phthalate		BIS(2-emyinexy),printalate	- •			Carbazole	ļ
Carbazole	2	Carbazole				Chrysene	•
Chrysene	-	Chrysene	. -		<u> </u> -	Dibenz(a,h)anthracene	-
Dibenz(a,h)anthracene	•	Dibenz(a,h)anthracene					

Table 7.1-1. Summary of SERA Results for Specific Receptors, Site SS-63

		Croaker		Kingfisher		WHILE	
Benthic Invertebrates	rates	Coare			VCEDV		SERA
	SERA	,	SERA	Darameter	Results	Parameter	Results
Parameter	Results	Parameter	Kasans			Dibenzofuran	*
Dibenzofuran	2	Dibenzofuran				Fluoranthene	-
Fluoranthene	•	Fluoranthene	*			Fluorene	_
Fluorene		Fluorene	•			Indeno(1,2,3-cd)pyrene	-
ndeno(1,2,3-cd)pyrene	•	Indeno(1,2,3-cd)pyrene	-			Naphthalene	-
Naphthalene	2	Naphthalene				Phenanthrene	•
Phenanthrene		Phenanthrene	*			Pyrene	1
Pyrene	*	Pyrene	,			Phenol	-
		2,6-Dinitrotoluene	7				
		Z-Metnyiphenoi					
Pesticides & PCBs	 - -	A1455	-	Aldrin	1	Aldrin	_
Aldrin	, , -	Aldım		Dieldrin	1	Arochlor 5432	-
Arochlor 5432		Arochiol 3432	•	aloha-BHC	1	Arochlor 6040	-
Arochlor 6040	.	Arochior 6040		beta-BHC	-	Arochlor 6062	_
Arochlor 6062		Arochior 6062		gamma-BHC(Lindane)	-	Arochlor 6070	-
Arochior 6070	•	Arochior bury	 -	alpha-Chlordane		Dieldrin	-
Dieldrin	-	Dicamba	<u> </u>	Chlordane	-	alpha-BHC	+
alpha-BHC	-	Dieldrin	 *	Endosulfan I	 - 	beta-BHC	-
beta-BHC	-	alpha-BHC		Endosulfan II	 - -	gamma-BHC(Lindane)	-
gamma-BHC(Lindane)	-	beta-BHC		Endosulfan Sulfate	-	alpha-Chlordane	1
alpha-Chlordane	-	gamma-BHC(Lindane)	*	Endrin		gamma-Chlordane	1
gamma-Chlordane		alpha-Chlordane	-	Endrin Ketone	-	delta - BHC	1
Endosulfan I	•	gamma-cnlordane	.	4 4'.000	-	Endosulfan I	1
Endosutfan II	•	delta - BHC	-	4 4'-DDE	-	Endosulfan II	-
Endosulfan Sulfate	.	Endosullan	-	Hentachlor	-	Endosulfan Sulfate	-
Endrin	•	Endosuman II	- -	Hentachlor epoxide	-	Endrin	-
Endrin Ketone	*	Endosultan Suitate	- •	DCB-1948	-	Endrin Ketone	1
Endrin Aldehyde	*	Endrin		DC0 1254		Endrin Aldehyde	-
4,4'-000	•	Endrin Ketone	_ ,	FCB-1254	-	4 4-DDD	-
4,4'-DDE	*	Endrin Aldehyde	- -	PCB-1200	-	4 4-DDE	-
4,4'-DDT	*	4,4'-DDD		1-0,4,2	*	4 4-DDT	-
Heptachlor	•	4,4'-DDE	-	MCTT.	-	Hentachlor	-
Hentachlor epoxide	*	4,4'-DDT		Dicamba	- -	Heptachlor epoxide	-
MCPA	2	Heptachlor	•	detta - BHC	- 6	MCPA	<u> </u>
Methoxychlor	*	Heptachlor epoxide	.	Z.4,5 - 1P	•	MCPP	•
PCB-1254		MCPA	.			Methoxychlor	-
PCB-1260	-	Methoxychlor	. .			PCB - 1248	-
2,4,5-T	_	PCB - 1248				PCB-1254	-
2.4-D	2	PCB-1254				PCB-1260	1
		PCB-1260	. .			2.4.5-T	-
		2,4,5-T	-\ -\			24.0	-
		2,4,5-TP				Dicamba	-
		2,4-D	-\ -\				
		2,4-DB	·				
							\ -
	-						-

Chemical will be evaluated in BERA (chemicals are in bold type)
 Hazard Quotient less than 1 - not evaluated in BERA
 Macanipula and evaluated in REPA

7-39

Table 7.1-2. Baseline Assessment and Measurement Endpoints for the Evaluation of Aquatic Ecosystems,

Measurement Endpoint	To determine whether concentrations of chemicals in sediment are toxic to benthic organisms, a 10-day toxicity evaluation was performed using the amphipod Leptocheirus plumulosus. The endpoint for this evaluation was survival. Test results were compared with those from a reference location. This test was use through a consist y testing at Langley AFB. Collocated sediment samples were analyzed for Target Analyte List (TAL) metals, Target Compound List (TCL) organics, PCTs, chlorinated herbicides, total organic carbon, particle size distribution, and percent moisture. Care was taken to collect sediment samples from depositional areas. To determine whether concentrations of chemicals in sediment which become resuspended and dissolved in the water column are toxic to organisms inhabiting the water column are toxic to organisms inhabiting the water column or upper portions of the benthic substrate and to determine whether contaminants are impacting the reproductive capability of these organisms, a 7-day toxicity evaluation was performed using mysid shrimp (Mysidopsis bahia). The endpoints for this evaluation were survival, growth and fecundity. Test results were compared with those from a reference location. To evaluate the effects of sediment resuspension on the water column and the subsequent impact on aquatic organisms, this test was performed using elutriate prepared by mixing sediment and water. This test provided insight into whether epibenthic organisms are being adversely affected by contaminants and addressed the potential effect of the frequent sediment resuspension, which occurs in the Back River. Collocated sediment campon, and particle size distribution.
Risk Onestions	Are levels of site contaminants in sediment sufficient to cause adverse alterations to the structure and/or function to the benthic community at either the population or community level?
7.1	Protection of benthic and epibenthic invertebrate communities from toxic effects of contaminants in sediment to maintain species diversity, biomass, and nutrient cycling (trophic structure); to provide a food source for higher level consumers; and to insure that contaminant levels in benthic invertebrate tissue are low enough to minimize the risk of bioaccumulation and/or other negative toxic effects in higher trophic levels.
	Assessment Goal Protection of aquatic ecosystem structure and function

Table 7.1-2. Baseline Assessment and Measurement Endpoints for the Evaluation of Aquatic Ecosystems, Site SS-63 (Continued)

Measurement Endpoint	To determine whether concentrations of chemicals in the sediment are causing adverse alterations to the structure of the benthic macroinvertebrate community, sediment samples were collected for identification and enumeration of benthic macroinvertebrates. Indices measuring the richness and diversity of species composition were used to assess community structure and for comparison with a reference location. Similar evaluation was performed at other near-shore locations at Langley during the PA/SI. Collocated sediment samples were analyzed for TAL metals, TCL compounds, PCTs, chlorinated herbicides, total organic carbon, particle size distribution, and percent moisture. To provide additional evidence concerning the potential for adverse effects to benthic organisms attributable to concentrations of chemicals in sediment collected from near-shore locations, these chemical data were used in the BERA in conjunction with TEVs to determine HQ values for COCs.	To provide information concerning the potential for adverse effects to the fish community attributable to concentrations of chemicals in the sediment and biota which are components of the fish diet, chemical data from sediment and biota samples collected from nearshore locations were used to estimate the dose of various chemicals to the fish. The diet of the selected indicator species, the Atlantic croaker, was assumed to consist of benthic invertebrates (assumed to have chemical concentrations equal to those detected in sediment), bivalves and killifish. The dose calculated for the croaker was then used in the BERA in conjunction with TEVs to determine HQ values for the COCs.
Risk Questions	Are levels of site contaminants in sediment sufficient to cause adverse alterations to the structure and/or function to the benthic community at either the population or community level?	Are levels of site contaminants in water and sediment sufficient to cause adverse alterations to the structure and reproductive capacity of the aquatic community?
Assessment Endnoint	Protection of benthic and epibenthic invertebrate communities from toxic effects of contaminants in sediment to maintain species diversity, biomass, and nutrient cycling (trophic structure); to provide a food source for higher level consumers; and to insure that contaminant levels in benthic invertebrate tissue are low enough to minimize the risk of bioaccumulation and/or other negative toxic effects in higher trophic levels.	Protecting fish communities from toxic effects of contaminants in surface water to maintain species diversity; also ensuring that ingestion of contaminants by fish not have a negative impact on growth or survival; additionally, ensuring that contaminant levels accumulated in fish tissue are low enough to minimize risk of accumulation and negative effects to higher trophic levels.
100	Protection of aquatic ecosystem structure and function.	Protection of aquatic ecosystem structure and function.

Table 7.1-2. Baseline Assessment and Measurement Endpoints for the Evaluation of Aquatic Ecosystems, Site SS-63 (Continued)

A secretary (Lool	A seessment Endooint	Risk Questions	Measurement Endpoint
Protection of aquatic ecosystem structure and function.	Protecting fish communities from toxic effects of contaminants in surface water to maintain species diversity; also ensuring that ingestion of contaminants by fish not have a negative impact on growth or survival; additionally, ensuring that contaminant levels accumulated in fish tissue are low enough to minimize risk of accumulation and negative effects to higher trophic levels.	Are levels of site contaminants in water and sediment sufficient to cause adverse alterations to the structure and reproductive capacity of the aquatic community?	To provide insight concerning whether chemicals contained in dietary components are accumulating in fish, samples of killifish were collected from nearshore locations adjacent to Langley AFB and analyzed for TAL metals, SVOCs, organochlorine pesticides, PCBs, PCTs, chlorinated herbicides, and cyanide. Samples of sport fish (predominantly croaker and spot) were also collected from near-shore locations adjacent to Langley and analyzed for the same list of chemicals. Because the sport fish were used for evaluation of potential adverse effects to human health, only the fillets were submitted for chemical analysis. Although analysis of the fillets excludes internal organs and other tissues in which chemicals in ternal organs and other tissues in which chemicals in conjunction with the killifish whole body data. The absence of specific chemicals or classes of chemicals in the fish tissue would provide an indication that these chemicals are being metabolized by the fish. To determine whether concentrations of chemicals in surface water and sediment are adversely affecting the aquatic community, samples of killifish were collected and analyzed for TAL metals, SVOCs, organochlorine pesticides, PCBs, PCTs, chlorinated herbicides, cyanide, percent lipids, percent solids, and percent water content. These data was compared to TEVs for survival or reproductive capacity from current scientific literature.
·			

Table 7.1-2. Baseline Assessment and Measurement Endpoints for the Evaluation of Aquatic Ecosystems, Site SS-63 (Continued)

	1 It 2	re ish
Measurement Endpoint	To provide insight into the overall health of aquatic organisms and the potential for adverse effects from specific contaminants, samples of killifish and larger sport fish (such as spot or croaker) were carefully examined for any indication of stress or disease. At locations where elevated concentrations of specific contaminants are present such as lead concentrations in the vicinity of ERP Site LF-17 and PAH and PCB concentrations in the vicinity of Outfall 4 in the Southwest Branch, internal organs of fish were examined for contaminant-specific abnormalities. For lead, these include damage to the liver, kidney or gill. For PCBs and PAHs, these include damage to the liver or kidney. A similar evaluation was performed for fish obtained at a reference location. It is acknowledged that the fish collected during this effort cannot be closely associated with a discreet portion of shoreline because of their much larger home range, however, this effort still provides useful information concerning the health of fish whose range includes the contaminated areas as well as the overall health of the aquatic community.	A food chain model was used to evaluate risk to aquatic feeding birds that utilize the site as a food source. The selected endpoint receptor species is the belted kingfisher (Ceryle alcyon). Fish were identified as the primary food source for the kingfisher with shellfish as a secondary source. A dietary dose was calculated based on ingestion of fish and shellfish. The concentration of COCs in the fish and in shellfish was obtained from direct measurement. The resulting total daily dose was compared to existing toxicity data through the calculation of a HQ.
Risk Ouestions	Are levels of site contaminants in water and sediment sufficient to cause adverse alterations to the structure and reproductive capacity of the aquatic community?	Are levels of site contaminants in surface water and fish sufficient to have adverse effects on the long-term health and reproductive capacity of aquatic feeding birds [belted kingfisher (Ceryle alcyon)] that utilize the site?
A seessment Enduoint	Protecting fish communities from toxic effects of contaminants in surface water to maintain species diversity; also ensuring that ingestion of contaminants by fish not have a negative impact on growth or survival; additionally, ensuring that contaminant levels accumulated in fish tissue are low enough to minimize risk of accumulation and negative effects to higher trophic levels.	Protecting piscivorous birds to ensure that ingestion of contaminants in water or food organisms does not have negative impact on growth, survival, or reproduction.
Accessment Goal	Protection of aquatic ecosystem structure and function.	Protection of aquatic ecosystem structure and function.

Table 7.1-2. Baseline Assessment and Measurement Endpoints for the Evaluation of Aquatic Ecosystems, Site SS-63 (Continued)

Assessment Goal	Assessment Endpoint	Risk Questions	Measurement Endpoint	╗
Protection of aquatic ecosystem structure and function.	Protecting semi-aquatic carnivorous mammals that feed on aquatic life to ensure that contaminants in water and in food organisms do not have a negative impact on growth, survival, or reproduction.	Are levels of site contaminants in surface water and fish sufficient to have adverse effects on the long-term health and reproductive capacity of carnivorous semiaquatic mammals [mink (Mustela vison)] that utilize the site?	A food chain model was used to evaluate risk to carnivorous semi-aquatic mammals that utilize the site as a food source. The selected endpoint receptor species is the mink (Mustela vison). Fish and invertebrates were identified as the primary food source for the mink. A dietary dose was calculated based on ingestion of fish and invertebrates. The concentration of COCs in the fish was obtained from direct measurement. Concentrations of chemicals in invertebrates were assumed the same as those detected in sediment. The resulting total daily dose was compared to existing toxicity data through the calculation of a HQ.	
=: -				

Measurement endpoint evaluated in the SERA.

Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Beited Kingfisher	Mink
Inorganic Analytes		i av		
Aluminum-max	1.38E+00	8.28E+02	6.75E-02	2.94E+00
Aluminum-mean	5.61E-01	3.38E+02	3.37E-02	1.20E+00
Antimony-max	1.95E+00	3.23E-02	1.65E-02	7.19E-03
Antimony-mean	2.85E-01	4.75E-03	7.51E-03	1.10E-03
Arsenic-max	1.42E+00	3.80E+01	ပ္က	9.24E-01
Arsenic-mean	6.69E-01	1.86E+01	ပ္သ	4.52E-01
Barium-max	2	1.16E+03	O .	1.52E-02
Barium-mean	S	5.26E+02	O'	6.96E-03
Beryllium-max	1.48E+00	3.04E-01	O'	S.
Beryllium-mean	5.05E-01	1.04E-01	O :	S S
Cadmium-max	1.72E+00	2.30E+00	ON THE	2
Cadmium-mean	2.34E-01	3.82E-01	ON N	S
Chromium-max	3.02E+00	3.69E+01	<u>ာ</u>	8.34E-03
Chromium-mean	1.32E+00	1.57E+01	O.	3.65E-03
Cobalt-max	1.56E+00	3.32E+01	O :	2
Cobalt-mean	5.89E-01	1.25E+01	2	S
Copper-max	S	8.56E+01	2	S.
Copper-mean	2	2.35E+01	2	20
Cyanide-max	1.04E+00	S	ာင	2
Cyanide-mean	2.51E-01	Sign) (C	20
Iron-max	S	4.22E+03	22) (Z Z
Iron-mean	2	1.86E+U3	24	2717
Lead-max	7.81E+00	5.35=+03	<u>ک</u>	5.3/E-02
Lead-mean	1.80E+00	1.24E+03	S	1.48E-02
Magnesium-max	S	1.04E+03	1.55E+00	6.82E-01
Magnesium-mean	S	5.59E+02	1.28E+00	4.47E-01
Manganese-max	S	9.80E+01	O :	<u>၁</u>
Manganese-mean	ပ္	4.32E+01	S	S
Mercury-max	1.17E+00	3.42E+03	2.07E+00	3.77E-01
Mercury-mean	3.99E-01	1.23E+03	1.18E+00	1.39E-01

Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration)	Benthic	Atlantic Croaker	Relted Kingfisher	Mink
(mean Concentration)	Invertebrate	August		
Nickel-max	2.57E+00	6.93E+02	NC	NC
Nickel-mean	1.11E+00	2.98E+02	S	S
Selenium-max	2.70E+00	7.83E+00	2	8.98E-02
Selenium-mean	1.14E+00	4.81E+00	S	5.89E-02
Silver-max	2.20E+00	9.27E+01	S	S
Silver-mean	7.05E-01	3.10E+01	S	S
Thallium-max	S	1.84E+00	O Z	2.38E-01
Thallium-mean	2	9.15E-01	S	1.19E-01
Vanadium-max	S	8.22E+00	O N	5.26E-02
Vanadium-mean	S	3.64E+00	S	2.34E-02
Zinc-max	S	4.4E+00	3.12E-01	2
Zinc-mean	SC	1.21E+00	2.43E-01	S
Somivolatile Organic Compounds	and.			
Scillivoianie Organie Compo		7 246+04	CIN	CN
2-Methylnaphthalene-max	<u>ا</u>	10444		2 2
2-Methylnaphthalene-mean	S	1.34E+01	S	2
Acenaphthene-max	S	2.24E+00	S	1.79E+00
Acenaphthene-mean	S	1.90E-01	SC	1.52E-01
Acenaphthylene-max	8.86E+00	4.93E+00	S	S
Acenaphthylene-mean	8.86E+00	4.93E+00	S	S
Anthracene-max	9.37E+03	8.80E+02	S	1.87E-01
Anthracene-mean	4.31E+02	4.05E+01	S	8.62E-03
Benz(a)anthracene:max	2.14E+01	9,44E+02	NC	1.10E-01
Renz(a)anthracene-mean	9.25E-01	4.13E+01	S	4.75E-03
Benzo(a)nvrene-max	2.28E+01	3,36E+03	S	1.69E-01
Renzo(a)nvrene-mean	1.03E+00	1.52E+02	NC	7.58E-03
Benzo(b)fluoranthene-max	9.95E+00	2.44E+03	SC	3.83E-01
Renzo(h)fluoranthene-mean	5.10E-01	1,27E+02	S	1.97E-02
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Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

ration) Benthic Atlantic Croaker Belted Kingfisher e-max 2.37E+01 1.95E+03 NC e-mean 1.11E+00 9.30E+01 NC e-mean 1.19E+01 2.91E+03 NC re-mean 1.19E+01 2.91E+03 NC re-mean 1.19E+01 NC NC thalate-mean 1.49E+00 NC NC thalate-mean 1.37E+00 NC NC thalate-mean 1.36E+02 NC NC ne-max 2.40E+02 NC NC ne-max 2.40E+02 NC NC nc-max 2.25E+01 1.16E+03 NC nc-max 2.52E+01 1.77E+02 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC ene-mean 1.09E+01 3.59E+01 NC 7.79E+01 7.79E+01 1.86E+01 5.60E+03 NC 1.86E+01 5.60E+03 NC	COPEC				
2.37E+01 1.95E+03 NC 1.11E+00 9.30E+01 NC 1.19E+01 2.91E+03 NC 5.60E-01 1.37E+02 NC can 1.49E+00 NC NC 1.94E+02 NC NC 2.32E+01 NC 1.30E+02 1.06E+01 NC 1.30E+02 1.26E+02 NC 2.27E+01 1.19E+01 NC NC 1.67E+01 NC NC 1.67E+01 NC 2.52E+01 1.77E+03 NC 1.02E+00 4.70E+01 NC NC 3.32E+01 NC 1.09E+00 8.55E+01 NC NC 7.79E+01 NC 1.09E+00 8.55E+01 NC 1.09E+01 5.60E+03 NC 1.09E+01 5.60E+03 NC 1.09E+01 1.77E+03 NC	(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
2.37E+01 1.95E+03 NC 1.11E+00 9.30E+01 NC 1.19E+01 2.91E+03 NC 5.60E-01 1.37E+02 NC can 1.49E+00 NC NC 1.94E+02 NC NC 2.32E+01 NC 1.30E+02 1.06E+01 NC 2.27E+01 1.19E+01 NC NC 0.167E+01 NC NC 1.67E+01 NC 2.52E+01 1.77E+02 NC 2.27E+01 1.77E+03 NC NC 3.32E+01 NC NC 1.77E+03 NC NC 1.77E+03 NC NC 1.79E+01 NC N		***			
1.11E+00 1.19E+01 2.91E+03 5.60E-01 1.37E+02 NC 5.60E-01 1.37E+02 NC NC NC NC 1.94E+02 NC 1.94E+02 NC 1.30E+02 NC 1.30E+02 NC 1.30E+02 1.06E+01 NC 2.27E+01 NC 2.27E+01 1.19E+01 NC 2.27E+01 1.19E+01 NC 2.27E+01 1.10E+02 NC 2.27E+01 1.77E+02 NC 2.27E+01 1.77E+03 NC 2.27E+01 1.77E+03 NC 2.27E+01 1.77E+03 NC 3.32E+01 NC 1.38E+01 NC	Benzo(g,h,i)perylene-max	2.37E+01	1.95E+03	NC	9.80E-02
1.19E+01 3.37E+02 8.17E+00 NC NC NC 1.30E+02 NC 1.30E+02 NC 1.30E+02 1.30E+02 1.30E+02 1.30E+02 1.30E+02 1.30E+01 1.30E+02 1.30E+02 1.30E+02 1.30E+01 1.30E+02 1.30E+01 1.30E+02 1.30E+01 1.30E+02 1.30E+01	Benzo(g,h,i)perylene-mean	1.11E+00	9.30E+01	S	4.57E-03
5.60E-01 1.37E+02 NC 8.17E+00 NC NC NC NC NC 1.94E+02 NC NC 1.30E+02 NC 1.94E+01 NC 1.30E+02 NC 1.30E+02 1.06E+01 NC 6.00E+00 4.92E-01 NC 2.27E+01 1.19E+01 NC 2.27E+01 1.16E+03 NC 2.52E+01 1.67E+01 NC 2.52E+01 1.77E+02 NC 2.27E+01 3.59E+01 NC 1.09E+00 8.55E+01 NC 1.09E+00 8.55E+01 NC 1.86E+01 5.60E+03 NC 1.86E+01 5.60E+03 NC 1.86E+01 5.41E+03 NC 1.86E+01 5.60E+03 NC	Benzo(k)fluoranthene-max	1.19E+01	2.91E+03	S	2.53E-01
ax 8.17E+00 NC NC \(\text{NC} \) \(\text{1.30E+02} \) \(\text{NC} \) \(\text{1.30E+02} \) \(\text{NC} \) \(\text{1.30E+02} \) \(\text{1.30E+02} \) \(\text{NC} \) \(\text{1.19E+01} \) \(\text{NC} \) \(\text{1.19E+01} \) \(\text{NC} \) \(\text{1.10E+02} \) \(\text{NC} \) \(\text{1.10E+03} \) \(\text{NC} \) \(\text{1.77E+03} \) \(\text{NC} \) \(\text{1.77E+03} \) \(\text{NC} \) \(\text{1.30E+01} \) \(\text{NC} \) \(\text{1.30E+01} \) \(\text{NC} \) \(\text{1.77E+03} \) \(\text{NC} \) \(\text{1.30E+01} \) \(1.30E+	Benzo(k)fluoranthene-mean	5.60E-01	1.37E+02	SC	1.19E-02
1.49E+00 NC	Bis(2-ethylhexyl)phthalate-max	8.17E+00	S	S	NC
NC 1.94E+02 NC NC 1.30E+01 NC 2.32E+01 NC 2.32E+01 NC 6.00E+00 4.92E-01 NC 2.27E+01 NC 2.27E+01 1.19E+01 NC NC NC NC NC NC NC NC NC 1.67E+01 NC 1.67E+01 NC 1.67E+01 NC 1.02E+00 4.70E+01 NC 2.27E+01 1.77E+02 NC 2.27E+01 1.77E+03 NC 1.09E+00 8.55E+01 NC 1.32E+01 NC 1.86E+01 5.60E+03 NC 2.41E+01 1.86E+01 5.60E+03 NC 2.41E+02 NC 2.4	Bis(2-ethylhexyl)phthalate-mean	1.49E+00	S	S	SC
1.30E+02	Carbazole-max	S	1.94E+02	SO.	S
1.30E+02 1.06E+01 NC 6.00E+00 4.92E-01 NC racene-max 2.27E+01 1.26E+02 NC ax NC 6.17E+01 NC ax NC 6.17E+01 NC ax NC 1.67E+01 NC ax 2.52E+01 1.16E+03 NC ax 2.52E+01 1.16E+03 NC ax 2.27E+01 1.77E+02 NC byrene-max 2.27E+01 1.77E+02 NC byrene-max 2.27E+01 1.77E+03 NC ax NC 7.79E+01 NC ax 1.86E+01 5.60E+03 NC ax 1.86E+01 2.41E+02 NC	Carbazole-mean	S	2.32E+01	S	NC
6.00E+00 4.92E-01 NC Iracene-max 2.27E+01 1.26E+02 NC Iracene-mean 2.27E+01 1.19E+01 NC Iean NC 6.17E+01 NC Iean NC 1.67E+01 NC Iean 1.02E+00 4.70E+01 NC Iean 1.02E+00 4.70E+01 NC Ipyrene-max 2.27E+01 1.77E+02 NC Ipyrene-max 2.27E+01 1.77E+03 NC Ipyrene-max 2.27E+01 1.77E+03 NC Imax NC 7.79E+01 NC Inax 1.86E+01 5.60E+03 NC Inax 7.97E-01 2.41E+02 NC	Chrysene-max	1.30E+02	1.06E+01	S	4.27E-01
tracene-max 2.40E+02 1.26E+02 NC tracene-mean 2.27E+01 1.19E+01 NC tean NC 6.17E+01 NC tean 2.52E+01 1.16E+03 NC tean 1.02E+00 4.70E+01 NC tean 1.02E+00 4.70E+01 NC tean 1.77E+02 NC typrene-max 2.27E+01 1.77E+02 NC tax NC 3.59E+01 NC ax NC 7.79E+01 NC ax NC 7.79E+01 NC ax NC 3.32E+01 NC nax 1.86E+01 5.60E+03 NC nax 7.97E-01 2.41E+02 NC	Chrysene-mean	6.00E+00	4.92E-01	SC	1.96E-02
2.27E+01 1.19E+01 NC NC 6.17E+01 NC NC 1.67E+01 NC 2.52E+01 1.16E+03 NC 1.02E+00 4.70E+01 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC 2.27E+01 1.77E+03 NC NC 7.79E+01 NC NC 7.79E+01 NC 1.86E+01 5.60E+03 NC 7.72E+01 NC NC 7.79E+01 NC	Dibenz(a,h)anthracene-max	2.40E+02	1.26E+02	S	SC
NC 6.17E+01 NC NC 1.67E+01 NC 2.52E+01 1.16E+03 NC 1.02E+00 4.70E+01 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC 2.27E+01 1.77E+03 NC NC 7.79E+01 NC NC 7.79E+01 NC 1.86E+01 5.60E+02 NC	Dibenz(a,h)anthracene-mean	2.27E+01	1.19E+01	S	SC
2.52E+01 1.16E+03 NC 2.52E+01 1.16E+03 NC 1.02E+00 4.70E+01 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC 2.27E+01 1.77E+03 NC NC NC NC NC NC 7.79E+01 NC NC 3.32E+01 NC 1.86E+01 5.60E+03 NC	Dibenzofuran-max	S	6.17E+01	SC	2.14E+03
2.52E+01 1.16E+03 NC 1.02E+00 4.70E+01 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC ene-mean 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 7.29E+01 NC 1.86E+01 5.60E+03 NC 7.02E-01 7.47E+03 NC	Dibenzofuran-mean	SC	1.67E+01	SC	5.80E+02
1.02E+00 4.70E+01 NC 4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC ene-max 2.27E+01 1.77E+03 NC ene-max 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 3.32E+01 NC 1.86E+01 5.60E+03 NC 7.02E-01 2.41E+02 NC	Fluoranthene-max	2.52E+01	1.16E+03	NC	SC
4.81E+01 1.77E+02 NC 9.77E+00 3.59E+01 NC ene-max 2.27E+01 1.77E+03 NC ene-mean 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 3.32E+01 NC 7.92E+01 NC NC 7.92E-01 NC NC	Fluoranthene-mean	1.02E+00	4.70E+01	SC	SC
9.77E+00 3.59E+01 NC ene-mean 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 3.32E+01 NC 1.86E+01 5.60E+03 NC 7.02E-01 NC	Fluorene-max	4.81E+01	1.77E+02	NC	SC
ene-max 2.27E+01 1.77E+03 NC ene-mean 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 3.32E+01 NC 1.86E+01 5.60E+03 NC 7.97E-01 2.41E+02 NC	Fluorene-mean	9.77E+00	3.59E+01	SC	SC
ene-mean 1.09E+00 8.55E+01 NC NC 7.79E+01 NC NC 3.32E+01 NC 1.86E+01 5.60E+03 NC 7.92E-01 2.41E+02 NC	Indeno(1,2,3-cd)pyrene-max	2.27E+01	1.77E+03	SC	S
NC 7.79E+01 NC NC NC NC NC 1.86E+01 5.60E+03 NC 7.92E-01 NC	Indeno(1,2,3-cd)pyrene-mean	1.09E+00	8.55E+01	SC	S
1.86E+01 5.60E+03 NC 7.92E-01 2.41E+02 NC	Naphthalene-max	SC	7.79E+01	S	S
1.86E+01 5.60E+03 NC 7.92E-01 2.41E+02 NC	Naphthalene-mean	S	3.32E+01	NC	S
7 92E-01 9 44E+02 NO	Phenanthrene-max	1.86E+01	5.60E+03	NC	4.48E-01
C11 25-1-10-1-25	Phenanthrene-mean	7.92E-01	2.41E+02	NC	1.90E-02

Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

Invertebrate Atlantic Croaker Belted Kingfisher Microprentration Invertebrate 1.20E+04 NC NC NC NC NC NC NC N	COPEC				
2.32E+01 1.20E+04 NC 9.67E-01 NC NC NC 1.40E+02 NC NC NC 3.19E+01 NC NC 1.40E+02 NC NC 1.40E+02 NC NC 1.37E+00 NC 1.37E+00 NC 1.37E+00 NC 1.37E+00 NC 1.98E+00 NC NC NC 1.98E+00 NC NC NC 1.98E+00 NC NC NC NC NC 1.95E+00 NC	(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
BS 1.44E+01 5.01E+02 NC NC 1.40E+02 NC NC NC 1.40E+02 NC NC 1.37E+00 NC NC 1.37E+00 NC NC 1.37E+00 NC 1.37E+00 NC 1.98E+00 NC 1.98E+00 NC	Pyrene-max	2.32E+01	1.20E+04	NC	NC
NC NC 1.40E+02 NC NC 3.19E+01 MC 4.27E+00 NC MC 4.27E+00 NC NC 1.37E+00 NC NC 1.37E+00 NC NC NC NC 1.98E+00 NC NC 1.98E+00 NC NC 1.09E+01 NC NC 1.09E+01 NC NC Instructure NC	Pyrene-mean	9.67E-01	5.01E+02	SC	S
max NC A:27E+00 NC mean NC 4.27E+00 NC MC 1.37E+00 NC NC 1.98E+00 NC NC NC 1.98E+01 NC NC NC 1.98E+01 NC NC NC 1.98E+02 NC NC NC 1.98E+03 NC NC NC 1.98E+04 NC NC NC 1.98E+04 NC NC NC 1.50E+04 2.25E+03 NC 1.50E+04 2.25E+03 NC 1.50E+04 1.42E+03 NC 1.50E+04 1.42E+03 NC <td>Phenol-max</td> <th>SC</th> <td>S</td> <td>1.40E+02</td> <td>SC</td>	Phenol-max	SC	S	1.40E+02	SC
max NC 4.27E+00 NC mean NC 1.37E+00 NC Bs 1.44E+01 NC NC 1.98E+00 NC NC NC 1.98E+00 NC NC NC 1.09E+01 NC NC NC 1.39E+02 NC NC NC 1.25E+03 NC NC NC 1.20E+01 2.25E+03 NC NC 1.50E+02 2.25E+03 NC NC 1.50E+01 2.25E+03 NC NC 1.50E+01 5.51E+03 NC NC 1.50E+02 1.42E+03 NC NC 1.50E+03 NC 3.54E+03 NC	Phenol-mean	SC	S	3.19E+01	S
BS 1.44E+01 NC 1.37E+00 NC 1.37E+00 NC 1.98E+00 NC NC NC NC NC 1.98E+00 NC NC NC NC NC 1.99E+01 NC NC NC NC NC 1.99E+01 NC	2-Methylphenol-max	S	4.27E+00	SC	S
BS 1.44E+01 NC NC 1.98E+00 NC NC NC 1.98E+00 NC NC NC NC NC 1.10E+00 NC NC NC NC 1.99E+01 NC NC NC 1.95E+00 NC NC NC NC NC 1.95E+00 NC	2-Methylphenol-mean	NC	1.37E+00	S	S
1.44E+01 NC NC 1.98E+00 NC 1.98E+00 NC 1.10E+00 NC 1.10E+00 NC 1.09E+01 NC 1.95E+00 NC 1.95E+00 NC 1.95E+00 NC 1.95E+01 1.39E+04 NC 1.50E+01 2.79E+04 NC 1.50E+01 2.79E+04 NC 1.50E+01 2.79E+04 NC 1.50E+01 1.42E+03 NC					
1.98E+00 NC NC 5.48E+00 NC NC 1.10E+00 NC NC 1.09E+01 NC NC 1.09E+01 NC NC 1.95E+00 NC 3.58E-01 NC NC 3.58E-01 NC NC 3.58E-01 NC NC 1.39E+04 NC 1.50E+01 2.25E+03 NC 1.50E+01 2.23E+03 NC 1.50E+01 3.54E+03 NC 1.50E+01 3.54E+03 NC 1.50E+01 3.54E+03 NC	4 4'-DDD-max	1.44E+01	S	SC	S
5.48E+00 NC NC 1.10E+00 NC NC 9.94E+01 NC NC 1.09E+01 NC NC 1.95E+00 NC NC 1.95E+00 NC NC 1.95E+00 NC NC 1.95E+00 NC NC 1.88E+01 1.39E+04 NC 1.88E+00 2.25E+03 NC 1.50E+01 2.25E+03 NC 1.50E+01 2.23E+03 NC 1.50E+01 5.51E+03 NC 1.50E+01 3.54E+03 NC 1.50E+02 1.42E+03 NC 1.50E+01 3.54E+03 NC	4,4'-DDD-mean	1.98E+00	SC	S	S
1.10E+00 NC NC 9.94E+01 NC NC 1.09E+01 NC NC 1.09E+01 NC NC 3.58E-01 NC NC 3.58E-01 NC NC 3.58E-01 NC NC 1.20E+02 2.65E+05 NC 1.20E+01 2.55E+04 NC 1.20E+01 2.25E+03 NC 1.20E+01 2.25E+03 NC 1.50E+01 2.23E+03 NC 1.50E+01 3.54E+03 NC	4.4'-DDE-max	5.48E+00	NC	S	SC
9.94E+01 NC 1.09E+01 NC 1.95E+00 NC 3.58E-01 NC 3.58E-01 NC NC 3.80E+01 1.39E+04 NC	4,4'-DDE-mean	1.10E+00	SC	S	SC
tax 1.09E+01 NC NC 1.95E+00 NC NC 3.58E-01 NC NC nean 6.81E+01 2.55E+04 NC nean 6.12E+00 2.25E+04 NC nean 6.12E+00 2.25E+03 NC nean 7.60E+01 2.25E+03 NC nean 6.08E+00 2.23E+03 NC nean 1.50E+01 5.51E+03 NC nean NC 3.54E+03 NC NC 3.54E+03 NC NC 3.54E+03 NC	4,4'-DDT-max	9.94E+01	SC	S	S
tax 1.95E+00 NC NC 3.58E-01 NC NC nean 6.81E+01 2.65E+05 NC nax 3.80E+01 1.39E+04 NC nean 6.12E+00 2.25E+03 NC nean 6.08E+00 2.25E+03 NC nean 6.08E+00 2.23E+03 NC nean 1.50E+01 5.51E+03 NC nean NC 3.54E+03 NC ncan NC 3.54E+03 NC ncan NC 3.54E+03 NC	4,4'-DDT-mean	1.09E+01	S	S	S
12-max 3.58E-01 NC NC 12-max 7.20E+02 2.65E+05 NC 10-max 6.81E+01 2.55E+04 NC 10-max 3.80E+01 1.39E+04 NC 10-max 7.60E+01 2.25E+03 NC 12-max 7.60E+01 2.79E+04 NC 12-max 6.08E+00 2.23E+03 NC 10-max 1.50E+01 5.51E+03 NC 10-mean 3.88E+00 1.42E+03 NC 10-max NC 3.54E+03 NC 10-max NC 8.17E+02 NC	Aldrin-max	1.95E+00	SC	S	S
12-max 7.20E+02 2.65E+05 NC 12-mean 6.81E+01 2.55E+04 NC 10-max 3.80E+01 1.39E+04 NC 12-max 6.12E+00 2.25E+03 NC 12-max 7.60E+01 2.79E+04 NC 12-max 6.08E+00 2.23E+03 NC 10-max 1.50E+01 5.51E+03 NC 10-mean 3.88E+00 1.42E+03 NC 10-mean NC 3.54E+03 NC 10-mean NC 8.17E+02 NC	Aldrin-mean	3.58E-01	SC	SC	SC
6.81E+01 2.55E+04 NC 3.80E+01 1.39E+04 NC 7.60E+01 2.25E+03 NC 7.60E+01 2.79E+04 NC 1.50E+01 2.23E+03 NC 1.50E+01 5.51E+03 NC N	Arochlor 5432-max	7.20E+02	2.65E+05	SC	SC
3.80E+01 1.39E+04 NC 6.12E+00 2.25E+03 NC 7.60E+01 2.79E+04 NC 6.08E+00 2.23E+03 NC 1.50E+01 5.51E+03 NC N	Arochlor 5432-mean	6.81E+01	2.55E+04	S	SC
n 6.12E+00 2.25E+03 NC 7.60E+01 2.79E+04 NC 1.50E+01 2.23E+03 NC 1.50E+01 5.51E+03 NC	Arochlor 6040-max	3.80E+01	1.39E+04	NC	S
62-max 7.60E+01 2.79E+04 NC 62-mean 6.08E+00 2.23E+03 NC 70-max 1.50E+01 5.51E+03 NC 70-mean 3.88E+00 1.42E+03 NC max NC 3.54E+03 NC mean NC 8.17E+02 NC	Arochlor 6040-mean	6.12E+00	2.25E+03	S	2
6.2-mean 6.08E+00 2.23E+03 NC 70-max 1.50E+01 5.51E+03 NC 70-mean 3.88E+00 1.42E+03 NC max NC 3.54E+03 NC mean NC 8.17E+02 NC	Arochlor 6062-max	7.60E+01	2.79E+04	NC	SC
70-max	Arochlor 6062-mean	6.08E+00	2.23E+03	SC	S
70-mean 3.88E+00 1.42E+03 NC max NC 3.54E+03 NC mean NC NC NC	Arochlor 6070-max	1.50E+01	5.51E+03	S	S
max NC 3.54E+03 NC mean NC 8.17E+02 N.	Arochlor 6070-mean	3.88E+00	1.42E+03	SC	S
NO 8.17E+02	alpha-BHC-max	S	3.54E+03	SC	S
	alpha-BHC-mean	SC	8.17E+02	2	NC

Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
beta-BHC-max	NC	5.92E+00	Ć	NC
beta-BHC-mean	S	5.82E-01	SC	S
delta-BHC-max	SC	3.93E-01	S	S
delta-BHC-mean	S	6.45E-02	SC	S
gamma-BHC(Lindane)-max	SC	7.33E+02	S	S
gamma-BHC(Lindane)-mean	S	6.13E+02	SC	S.
alpha-Chlordane-max	S	8.30E+02	SC	SC
alpha-Chlordane-mean	S	2.29E+02	SC	NC
Endosulfan I-max	6.00E+01	S	SC	SC
Endosulfan I-mean	1.66E+01	S	SC	SC
Endosulfan II-max	5.50E+02	S	SC	NC
Endosulfan II-mean	4.91E+01	S	SC	SC
Endosulfan Sulfate-max	6.50E+02	S	S	NC
Endosulfan Sulfate-mean	1.05E+02	S	SC	NC
Endrin-max	4.34E+03	6.04E-03	SC	S
Endrin-mean	1.43E+02	1.99E-04	SC	NC
Endrin Ketone-max	1.23E+03	NC	SC	NC
Endrin Ketone-mean	8.18E+01	S	SC	SC
Endrin Aldehyde-max	1.02E+05	S	SC	NC
Endrin Aldehyde-mean	5.95E+03	S	SC	SC
PCB-1248-max	S	2.56E+02	SC	NC
PCB-1248-mean	S	7.23E+01	SC	SC
PCB-1260-max	SC	9.04E+03	SC	NC
PCB-1260-mean	S	2.09E+03	NC	SC
PCB-1254-max	4.18E+02	1.57E+05	SC	5.67E-01
PCB-1254-mean	1.89E+01	8.75E+03	NC	3.18E-02

Table 7.4-1

Summary of Baseline Assessment NOAEL-Based Hazard Quotients Site SS-63

Benthic Atlantic Croaker Invertebrate	Atlantic Croaker Belted Kingfisher	Mink
4.99E+01	NC	5.58E-01
7.65E+00	SC	8.56E-02
NC	2.75E+03	1.38E+00
NC	1.31E+03	6.61E-01
2.84E+01 4.34E+04	SC	SC
1.32E+00 2.02E+03	SC	SC
6.00E+00 4.24E+02	SC	S
2.84E+00 2.01E+02	SC	S
9.72E+00 9.40E+02	S	S
2.28E+00 2.42E+02	S	S
5.23E+04 8.52E+03	S	S
2.00E+03 3.26E+02	S	SC
3.95E-01	S	SC
9.64E-02	NC	NC
	+ 0.0 + 0.0	

For each COPEC, the top value was calculated using maximum media concentrations. The bottom value was calculated using mean media concentrations.

Bold values indicate the NOAEL-based hazard quotient is greater than or equal to one.

NC = Not Calculated, Chemical was eliminated during SERA

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Site SS-63

(maximum concentration)				
	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
Increasis Anglytas				
Aluminum-max	1.00E+00	8.28E+01	6.75E-03	2.94E-01
Aluminum-mean	4.08E-01	3.38E+01	3.37E-03	1.20E-01
Antimony-max	5.63E-03	3.23E-03	1.65E-03	7.19E-04
Antimony-mean	8.26E-04	4.75E-04	7.51E-04	1.10E-04
Arsenic-max	9.31E-02	3.80E+00	S	9.24E-02
Arsenic-mean	4.38E-02	1.86E+00	S	4.52E-02
Barium-max	S	1.16E+02	S	1.52E-03
Barium-mean	S	5.26E+01	OZ	6.96E-04
Beryllium-max	1.42E-01	3.04E-02	S	ဎ
Beryllium-mean	4.85E-02	1.04E-02	SC	ပ္
Cadmium-max	1.62E-01	2.30E-01	S	S
Cadmium-mean	2.21E-02	3.82E-02	S	ပ္
Chromium-max	3.50E-01	3.69E+00	S	8.34E-04
Chromium-mean	1.53E-01	1.57E+00	S	3.65E-04
Cobalt-max	1.64E-01	3.32E+00	O Z	ပ္ဆ
Cobalt-mean .	6.18E-02	1.25E+00	S.	႘
Copper-max	2	8.56E+00	S.	ည
Copper-mean	ဍ	2.35E+00	O Z	2
Cyanide-max	5.87E-01	ပ္	S.	ည
Cyanide-mean	1.42E-01	ပ္	O:	ည
Iron-max	ပ္	4.22E+02	O Z	ည
Iron-mean	S	1.86E+02	O :	S
Lead-max	2.08E+00	5.35E+02	O I	6.37E-03
Lead-mean	4.78E-01	1.24E+02	S Z	1.48E-03
Magnesium-max	2	1.04E+02	1.55E-01	6.82E-02
Magnesium-mean	ဗ	5.59E+01	1.28E-01	4.47E-02
Manganese-max	ပ္	9.80E+00	O X	ပ္
Manganese-mean	ပ္	4.32E+00	S	2
Mercury-max	1.35E-01	3.42E+02	2.07E-01	3.77E-02
Mercury-mean	4.59E-02	1.23E+02	1.18E-01	1.39E-02
Nickel-max	1.39E-01	6.93E+01	2	ပ္
Nickel-mean	6.04E-02	2.98E+01	NC	NC

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
Bis(2-ethylhexyl)phthalate-max	8.17E-01	S	S	NC
Bis(2-ethylhexyl)phthalate-mean	1.49E-01	S	Š	S
Carbazole-max	N.	1.94E+01	S	S
Carbazole-mean	SC	2.32E+00	S	S
Chrysene-max	1.96E+01	1.06E+00	S	4.27E-02
Chrysene-mean	9.00E-01	4.92E-02	S	1.96E-03
Dibenz(a,h)anthracene-max	2.40E+01	1.26E+01	S	S
Dibenz(a,h)anthracene-mean	2.27E+00	1.19E+00	S	S
Dibenzofuran-max	S	6.17E+00	S	2.14E+02
Dibenzofuran-mean	S	1.67E+00	S	5.80E+01
Fluoranthene-max	2.10E+00	1.16E+02	S	SC
Fluoranthene-mean	8.50E-02	4.70E+00	S	SC
Fluorene-max	4.81E+00	1.77E+01	SC	S
Fluorene-mean	9.77E-01	3.59E+00	S	S
Indeno(1,2,3-cd)pyrene-max	2.42E+00	1.77E+02	S	SC
Indeno(1,2,3-cd)pyrene-mean	1.17E-01	8.55E+00	S	SC
Naphthalene-max	SC	7.79E+00	S	S
Naphthalene-mean	S	3.32E+00	SC	NC N
Phenanthrene-max	2.42E+00	5.60E+02	SC	4.48E-02
Phenanthrene-mean	1.03E-01	2.41E+01	S	1.90E-03
Pyrene-max	2.44E+00	1.20E+03	S	SC
Pyrene-mean	1.02E-01	5.01E+01	SC	S
Phenol-max	S	SC	1.40E+01	SC
Phenol-mean	S	SC	3.19E+00	SC
2-Methylphenol-max	S	4.27E-01	S	S
2-Methylphenol-mean	NC	1.37E-01	NC	NC

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Ste SS-63

oncentration) intration) CBs				
Pesticides & PCBs	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
4,4'-DDD-max	1.60E+00	S	N	S
4,4'-DDD-mean	2.20E-01	S	S	S
4,4'-DDE-max	3.09E-01	SC	S	SC
4,4'-DDE-mean	6.22E-02	SC	S	SC
4,4'-DDT-max	3.31E+00	S	S	SC
4,4'-DDT-mean	3.65E-01	S	NC	S
Aldrin-max	1.84E-01	S	S	S
Aldrin-mean	3.37E-02	SC	SC	S
Arochlor 5432-max	7.20E+01	2.65E+04	S	S
Arochlor 5432-mean	6.81E+00	2.55E+03	SC	S
Arochlor 6040-max	3.80E+00	1.39E+03	Q	S
Arochlor 6040-mean	6.12E-01	2.25E+02	S	S
Arochlor 6062-max	7.60E+00	2.79E+03	S	S
Arochlor 6062-mean	6.08E-01	2.23E+02	S	S
Arochlor 6070-max	1.50E+00	5.51E+02	S	S
Arochlor 6070-mean	3.88E-01	1.42E+02	SC	S
alpha-BHC-max	NC	3.54E+02	SC	SC
alpha-BHC-mean	SC	8.17E+01	SC	S
beta-BHC-max	S	5.92E-01	SC	S
beta-BHC-mean	NC	5.82E-02	SC	2
delta-BHC-max	SC	3.93E-02	S	2
delta-BHC-mean	SC	6.45E-03	S	S
gamma-BHC(Lindane)-max	SC	7.33E+01	S	S
gamma-BHC(Lindane)-mean	SC	6.13E+01	S	S
alpha-Chlordane-max	SC	8.30E+01	S	S
alpha-Chlordane-mean	S	2.29E+01	S	S
Endosulfan I-max	6.00E+00	NC	S	SC

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
Endosulfan I-mean	1.66E+00	NC	NC	NC
Endosulfan II-max	5.50E+01	S	SC	S
Endosulfan II-mean	4.91E+00	SC	SC	SC
Endosulfan Sulfate-max	6.50E+01	S	SC	S
Endosulfan Sulfate-mean	1.05E+01	Š	S	S
Endrin-max	4.34E+01	6.04E-04	S	SC
Endrin-mean	1.43E+00	1.99E-05	S	S
Endrin Ketone-max	1.23E+01	S	S	S
Endrin Ketone-mean	8.18E-01	SC	C.Z.	SC
Endrin Aldehyde-max	1.02E+04	SC	S	S
Endrin Aldehyde-mean	5.95E+02	S	SC	S
PCB-1248-max	S	2.56E+01	S	SC
PCB-1248-mean	S	7.23E+00	S	S
PCB-1260-max	S	9.04E+02	S	S
PCB-1260-mean	S	2.09E+02	S	S
PCB-1254-max	4.18E+01	1.57E+04	S	5.67E-02
PCB-1254-mean	1.89E+00	8.75E+02	S	3.18E-03
МСРА-тах	S	4.99E+00	S	5.58E-02
MCPA-mean	S	7.65E-01	S	8.56E-03
MCPP-max	S	S	2.75E+02	1.38E-01
MCPP-mean	NC	NC	1.31E+02	6.61E-02

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Site SS-63

COPEC				
(maximum concentration) (mean Concentration)	Benthic Invertebrate	Atlantic Croaker	Belted Kingfisher	Mink
gamma-Chlordane-max	2.84E+00	4.34E+03	NC	SC
oamma-Chlordane-mean	1.32E-01	2.02E+02	SC	S
Hentachlor-max	6.00E-01	4.24E+01	S	S
Hentachlor-mean	2.84E-01	2.01E+01	NC	S
Hentachlor epoxide-max	8.75E-01	9.40E+01	SC	S
Hentachlor enoxide-mean	2.05E-01	2.42E+01	NC	S
Methoxychlor-max	5.23E+03	8.52E+02	NC	S
Methoxychlor-mean	2.00E+02	3.26E+01	SC	S
7 4-DB-max	S	3.95E-02	NC	S
2,4-DB-mean	S	9.64E-03	NC	NC

For each COPEC, the top value was calculated using maximum media concentrations. The bottom value was calculated using mean media concentrations. Bold values indicate the LOAEL-based hazard quotient is greater than or equal to one.

NC =Not Calculated, Chemical was eliminated during SERA

Table 7.4-2

Summary of Baseline Assessment LOAEL-Based Hazard Quotients Site SS-63

(maximum concentration)				
centration)	Benthic Invertebrate	Atlantic Croaker	Beited Kingfisher	Mink
Selenium-max	2.43E-01	7.83E-01	NC	8.98E-03
Selenium-mean	1.03E-01	4.81E-01	2	5.89E-03
Silver-max	2.09E-01	9.27E+00	SC	S
Silver-mean	6.72E-02	3.10E+00	O _Z	S
Thallium-max	S	1.84E-01	S	2.38E-02
Thallium-mean	S	9.15E-02	S	1.19E-02
Vanadium-max	S	8.22E-01	S	5.26E-03
Vanadium-mean	S	3.64E-01	O Z	2.34E-03
Zinc-max	S	4.44E-01	3.12E-02	S
Zinc-mean	S	1.21E-01	2.43E-02	S
Semivolatile Organic Compounds				
	S	1.34E+00	S	S
	S	1.34E+00	S	S
Acenaphthene-max	S	2.24E-01	SC	1.79E-01
Acenaphthene-mean	S	1.90E-02	S	1.52E-02
Acenaphthylene-max	8.86E-01	4.93E-01	S	S
Acenaphthylene-mean	8.86E-01	4.93E-01	S	SC
Anthracene-max	9.37E+02	8.80E+01	S	1.87E-02
Anthracene-mean	4.31E+01	4.05E+00	S	8.62E-04
Benz(a)anthracene-max	2.57E+00	9.44E+01	S	1.10E-02
Benz(a)anthracene-mean	1.11E-01	4.13E+00	SC	4.75E-04
Benzo(a)pyrene-max	2.74E+00	3.36E+02	S	1.69E-02
Benzo(a)pyrene-mean	1.23E-01	1.52E+01	S	7.58E-04
Benzo(b)fluoranthene-max	9.95E-01	2.44E+02	SC	3.83E-02
Benzo(b)fluoranthene-mean	5.10E-02	1.27E+01	2	1.97E-03
Benzo(g,h,i)perylene-max	2.27E+00	1.95E+02	NC	9.80E-03
Benzo(g,h,i)perylene-mean	1.06E-01	9.30E+00	SC	4.57E-04
Benzo(k)fluoranthene-max	1.19E+00	2.91E+02	NC	2.53E-02
Benzo(k)fluoranthene-mean	5.60E-02	1.37E+01	NC	1.19E-03

APPENDIX B

ARARs

	FEDERAL	
Environmental Laws and Regulations	Requirement Synopsis	Status
National Environmental Policy Act of 1969		
Procedure for Implementing the National I	Environmental Policy Act and Assessing the Environmental Effects Abroad of EPA Actions	
Federal Executive Order 11988 40 CFR Part 6, Appendix A 40 CFR 6.302 (b), (d), (g) and (h)	Any activity located in a floodplain must comply with the provisions of this Executive Order. The Order requires that Federal activities in floodplains must reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and preserve the natural and beneficial values served by floodplains. Most of Langley AFB is located in the 100-year floodplain. The remedy must comply with the substantive provisions of the Exec. Order; however, CERCLA actions are exempt from the permit provision.	A
Federal Endangered Species Act of 1973:	16 U.S.C. § 1536 (a) (1) and (2)	
Interagency Cooperation Endangered Spec	ies Act of 1973, As Amended	
50 CFR Sections 402.10 (a) and (c)	Requires a determination as to whether any action is likely to jeopardize the continued existence of any endangered species or the critical habitat designated for such species. Endangered or threatened species have not been documented as roosting, nesting or living on Langley AFB, but the possibility of an incidental occurrence exists during the implementation of the remedial action at ERP Site SS-63 Southwest Branch.	R/A
Clean Water Act (Federal Water Pollution	Control Act): 33 U.S.C. § 1344 (Section 404)	
Section 404(B)(1) Guidelines for Specificati	on of Disposal Sites for Dredged or Fill Material	_
40 CFR 230	Regulates dredging and discharge of dredged materials (spoils) in navigable waters of the United States. The degradation Section requires that degradation or destruction of wetlands and other aquatic sites be avoided to the extent possible. Dredged or fill material must not be discharged to navigable waters if the activity contributes to the violation of Virginia water quality standards; violates any toxic effluent standard covered in CWA Sec. 307; jeopardizes endangered or threatened species; or violates requirements of Title III of the Marine Protection, Research, and Sanctuaries Act of 1972. In the case where a wetland has already been severely degraded due to prior discharges of waste, dredging activities conducted as part of the remedy would serve as an economic benefit and, therefore, the lead agency would not be obligated under Section 404 to mitigate the impacts which preceded the remedial fill operation. However, for those dredging actions that impact a wetland and cannot be avoided or minimized, enhancement, restoration, or creation of another wetland may be required. The remedy must comply with the substantive provisions of the Clean Water Act; however, CERCLA actions are exempt from the permit provision.	A

	FEDERAL	
Environmental Laws and Regulations	Requirement Synopsis	Status
Toxic Substances Control Act		
Polychlorinated Biphenols (PCBs) Manufactu	ring, Processing, Distribution in Commerce and Use Prohibitions	
40 CFR 761.61 Sections (a)(5)(ii) and (c)	Allows for off-site disposal of PCB-contaminated waste, if the waste is dewatered onsite or transported offsite in appropriate containers. Establishes locations where PCB remediation waste may be disposed.	R/A
Coastal Zone Management Act		
15 CFR 930.30 and 930.34	Ensures that all Federal agency activities are undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of approved management programs. Requires Federal agencies to perform a consistency determination on activities affecting any coastal use or resource. Because the contaminated sediment is within a water body in the Virginia coastal zone, planned remedial activities will affect a coastal resource.	A

	STATE	
Environmental Laws and Regulations	Requirement Synopsis	Status
Title 4 - Conservation and Natural Resou	urces	
Agency 15 - Department of Game and Inland	Fisheries	
Chapter 20 – Definitions and Miscellaneous in C	General	
4 VAC 15-20-130 and -140	These regulations adopt the federal list of endangered or threatened species and expand upon that list for purposes of actions in the Commonwealth of Virginia. Endangered or threatened species have not been documented as roosting, nesting or living on Langley AFB, but the possibility of an incidental occurrence exists during the implementation of the remedial action at ERP Site SS-63 Southwest Branch.	R/A
Agency 20 – Marine Resources Commission		
Chapter 390 – Wetlands Mitigation Compensation		•
4 VAC 20-390-10, -30, -40, and -50	Requires that any activity which would destroy tidal wetland be undertaken only if in the public interest and, then, the destroyed wetlands must be mitigated with creation of wetlands. This ARAR includes the substance of the requirement, not the requirement to procure a permit. Wetlands along the Southwest Branch shoreline may be impacted by the remedial action.	A

	STATE	
Environmental Laws and Regulations	Requirement Synopsis	Status
Agency 50 – Virginia Soil and Water Conserv	vation Board	
Chapter 30 - Erosion and Sediment Control Res	gulations	
4 VAC 50-30-10, -40, and -60	Establishes minimum standards for the control of erosion, sediment deposition, and runoff, and requires that an erosion and sediment control plan be implemented and maintained.	R/A
Title 9 – Environment		•
Agency 5 - State Air Pollution Control Board		
Chapter 30 – Ambient Air Quality Standards		
9 VAC 5-30-10, -60, -65, and -66	These regulations are designed to ensure that ambient concentrations of air pollutants are consistent with established criteria, and, unless specified otherwise, apply throughout the Commonwealth of Virginia. Any air emissions from the remedial activities at the Site must meet these standards.	A
Agency 10 – Chesapeake Bay Local Assistanc	e Board	
Chapter 20 - Chesapeake Bay Preservation Act	Designation and Management Regulations	
9 VAC 10-20-120 and -130	Locally- designated tidal and non-tidal wetlands are subject to limitations regarding land-disturbing activities, removal of vegetation, use of impervious cover, erosion and sediment control, storm water management, and other aspects of land use that may have effects on water quality. The Back River, where ERP Site SS-63 is located, is a tributary of the Chesapeake Bay.	A
Agency 20 -Virginia Waste Management Boa	rd	•
Chapter 80 – Solid Waste Management Regulati	ions	
9 VAC 20-80-140	Defines a solid waste as any discarded material. This definition would apply to wastes generated by the ERP Site SS-63 Southwest Branch remedial action, including IDW.	A
9 VAC 20-80-630 and -650	Section 630 establishes procedures for the disposal of special wastes. Special wastes are defined as wastes that require special handling and precautions. Nonhazardous wastes generated during the ERP Site SS-63 remedial action, including IDW and materials containing PCBs, will be considered handled as a special waste. Section 650 clarifies PCB disposal requirements at 40 CFR 761, and makes clear that PCB remediation waste containing PCB concentrations between 1.0 ppm and 50 ppm are restricted to disposal in sanitary landfills or industrial waste landfills with leachate collection, liners, and appropriate ground water monitoring systems.	A

STATE		
Environmental Laws and Regulations	Requirement Synopsis	Status
Title 9 – Environment		
Agency 25 - State Water Control Board		
Chapter 31 – Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation		
9 VAC 25-31-50, -100.G.7, -220.A.1,	Regulates the discharge of wastes and deleterious substances into State waters. Prohibits	A
-220.B.1, -220.D, and -220.E	discharges of wastes that would alter the physical, chemical, or biological properties of a State	
	water and result in detrimental effects on the beneficial use of the water. Under CERCLA, an	
	onsite discharge of waste water to a surface water must meet the substantive requirements of	
	VPDES, but it is not necessary to obtain a permit or comply with the administrative requirements	
	of the permitting process. For an offsite discharge, it would be necessary to comply with the	
	administrative requirements of the regulation.	
Chapter 32 – Virginia Pollution Abatement (VPA) Permit Regulation		
9 VAC 25-32-30, -80, and -100	Prohibits direct discharges into water except in accordance with Virginia Pollution Abatement	R/A
	permits issued pursuant to the State Water Quality Control Law. While CERCLA does not	
	require that permits be obtained for remedial activities, it is necessary for the remedial action to	
	comply with effluent limitations that would be established under a permit and notification	
	requirements in the event of exceedances of limits.	
Chapter 210 – Virginia Water Protection Permit Program Regulation		
9 VAC 25-210-10, -50, -110 and -115	Prohibition on discharging any pollutant into, or adjacent to surface waters that would alter the	Α
	physical, chemical or biological properties of surface waters and make them detrimental to the	
	public health, or to animal or aquatic life. Includes Section 115 for substantive requirements only	
	and does not include administrative permitting requirements.	
Chapter 260 – Water Quality Standards		
9 VAC 25-260-10, -20, -30, -50 (class II),	Establishes water quality standards to protect surface waters. If contaminants are discharged to a	R/A
-140, -160, -185 and -290.	surface water body, the cleanup level at the discharge point would be the more stringent of the	
	established cleanup levels for the Virginia or Federal surface water standard or criterion for	
	protection of aquatic life.	

STATE			
Environmental Laws and Regulations	Requirement Synopsis	Status	
Title 9 – Environment			
Chapter 380 – Wetlands Policy			
9 VAC 25-380-30	This policy establishes the preservation and protection of wetlands ecosystems by: requiring proper control of any construction activities and of non-point sources to prevent discharges which would impair the quality of the wetland area; ensuring that wastewaters will be kept below a level that would not alter the natural, physical, chemical, or biological integrity of the wetland; minimizing the alteration of the quality and quantity of the natural flow of water to the ecosystem; protection of the wetlands from adverse dredging or filling practices, solid waste management practices, siltation, or the addition of contamination from non-point source wastes and through construction activities; and preventing violations of applicable water quality standards.		

 $\label{eq:Key:A} Key: A = Applicable \qquad R/A = Relevant \ and \ Appropriate \\ Note: For offsite activities, \ all \ applicable \ regulations \ apply \ at the time \ of the \ remedial \ action.$